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# Case Narrative

**CASE NARRATIVE**  
**for**  
**MWH LABORATORIES**  
**MWH PROJECT: 99-22319/170393**  
**TRONOX HENDERSON SITE**  
**SDG: 159244**

**April 27, 2006**

**Laboratory Identification:**

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

**Summary**

**Sample receipt** The sample arrived at General Engineering Laboratories, LLC, Charleston, South Carolina on March 28, 2006 for analysis. Shipping container temperature was checked, documented, and within specifications. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

**Sample Identification** The laboratory received the following sample:

<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
159244001	2603250005 EB-3

**Case Narrative**

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

**Data Package**

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

This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.

Edith Kent



Project Manager

# **Chain of Custody and Supporting Documentation**

1592447

MWH Laboratories



A Division of MWH Americas, Inc.  
750 Royal Oaks Drive Suite 100  
Monrovia, CA 91016-3629  
Ph (626) 386-1100 Fax (626) 386-1095

Date 03/27/06

Submittal Form & Purchase Order 99-22319

\*REPORTING REQUIREMENTS: Do Not Combine Report with any other samples submitted under different MWH project numbers!  
Report & Invoice must have the MWH Project Number 170393 and Job # Find Out

Report all quality control data according to Method. Include dates analyzed, date extracted (if extracted) and Method reference on the report.  
Results must have Complete data & QC with Approval Signature. See reverse side for List of Terms and Conditions

Ship To Edie Kent

General Engineering Laboratories, LLC

2040 Savage Road  
Charleston, SC 29414

(843) 556-8171 X4433 Fax (843) 766-1178

MWH Project # Report Due: Sub PO#  
170393 04/11/06 99-22319

JDL

Use MWH  
Lab # for ID

Reports: Julie Lee Sub-contracting Administrator  
EMAIL TO: Julie.Lee@mwhglobal.com  
MWH Laboratories 750 Royal Oaks Dr. Ste. 100, Monrovia, CA 91016  
Phone (626) 386-1136 Fax (626) 386-1095  
Invoices to: MWH LABORATORIES  
Accounts Payable PO BOX 6610, Broomfield, CO 80021

Provide in each Report  
the Specified State  
Certification # & Exp Date for  
requested tests + matrix

CA ELAP OK

Container

Analysis Requested

Sample

Date & Time

Matrix

Client Sample ID for reference only	Analysis Requested	Sample Date & Time	Matrix
1	RADIUM 226	03/24/06 12:00	grnd 1L plastic bottles
2	RADIUM 228		
3	LEAD 210		
4	LEAD212		
5	THORIUM (ISOTOPIC)		
6	URANIUM (ISOTOPIC)		
7	URANIUM (TOTAL)		

Relinquished by: Nick Yasa

Sample Control

Date 03/27/06

Time 1:03

MUST HAVE NOTIFICATION IF TEMP IS GREATER THAN 6 OR LESS THAN 2 CELSIUS

Received by: David Pathos

Date 3/28/06

Time 1:00

Page 1

An Acknowledgement of Receipt is requested to attn: Julie Lee



# SAMPLE RECEIPT & REVIEW FORM

PM use only

Client: <u>MWH</u>	SDG/ARCO/Work Order:
Date Received: <u>8/28/06</u>	PM(A) Review (ensure non-conforming items are resolved prior to signing):
Received By: <u>[Signature]</u>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	/			Circle Applicable: seals broken damaged container leaking container other (describe)
2 Samples requiring cold preservation within (4 +/- 2 C)? Record preservation method.	/			Circle Coolant # ice bags <u>blue ice</u> dry ice none other describe <u>20c</u>
3 Chain of custody documents included with shipment?	/			
4 Sample containers intact and sealed?	/			Circle Applicable: seals broken damaged container leaking container other (describe)
5 Samples requiring chemical preservation at proper pH?	/			Sample ID's, containers affected and observed pH:
6 VOA vials free of headspace (defined as < 6mm bubble)?			/	Sample ID's and containers affected:
7 Are Encore containers present? (If yes, immediately deliver to VOA laboratory)			/	
8 Samples received within holding time?	/			Id's and tests affected:
9 Sample ID's on COC match ID's on bottles?	/			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	/			Sample ID's affected:
11 Number of containers received match number indicated on COC?			/	Sample ID's affected: <u>See Continuation Sheet</u>
12 COC form is properly signed in relinquished/received sections?	/			

14	Air Bill , Tracking #'s, & Additional Comments	<u>5548-32</u> <u>Fx 16912 3665 5684-2c</u>
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Suspected Hazard Information	Non-Regulated	Regulated	High Level	RSO RAD Receipt # _____ *If > x2 area background is observed on samples identified as "non-regulated/non-radioactive", contact the Radiation Safety group for further investigation.
A Radiological Classification?	/			Maximum Counts Observed*: <u>9 PM 60</u>
B PCB Regulated?	/			Comments:
C Shipped as DOT Hazardous Material? If yes, contact Waste Manager or ESH Manager.	/			Hazard Class Shipped: UN#:

PM (or PMA) review of Hazard classification: \_\_\_\_\_ Initials \_\_\_\_\_ Date: \_\_\_\_\_



# SAMPLE RECEIPT & REVIEW FORM CONTINUATION FORM

MWH Laboratories

3/23/06

Received 10 containers w/ID# 2603230069  
5 Containers w/ID# 2603250005  
5 Containers w/ID# 2603230197  
5 Containers w/ID# 2603240118  
5 Containers w/ID# 2603240122  
5 Containers w/ID# 2603240135

Labels 2603240119  
2603240111  
2603240120

ARE ALL on the same sample  
container  
RECEIVE 5 Containers

# RADIOLOGICAL ANALYSIS



**Radiochemistry Case Narrative  
MWH Laboratories (MWHL)  
Work Order 159244**

**Method/Analysis Information**

**Product:** Alphaspec Th, Liquid  
Analytical Method: DOE EML HASL-300, Th-01-RC Modified  
Analytical Batch Number: 520798

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201071140	Method Blank (MB)
1201071141	159242003(2603240135 M-121) Sample Duplicate (DUP)
1201071142	159242003(2603240135 M-121) Matrix Spike (MS)
1201071143	Laboratory Control Sample (LCS)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-038 REV# 9.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159242003 (2603240135 M-121).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Manual Integration**

No manual integrations were performed on data in this batch.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Alphaspec U, Liquid  
**Analytical Method:** DOE EML HASL-300, U-02-RC Modified  
**Analytical Batch Number:** 520799

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201071144	Method Blank (MB)
1201071145	159242003(2603240135 M-121) Sample Duplicate (DUP)
1201071146	159242003(2603240135 M-121) Matrix Spike (MS)
1201071147	Laboratory Control Sample (LCS)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 14.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159242003 (2603240135 M-121).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

Sample 1201071145 (2603240135 M-121) was recounted due to poor resolution.

**Miscellaneous Information:****NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Manual Integration**

No manual integrations were performed on data in this batch.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Gamma, (Pb-212)

Analytical Method: EPA 901.1

Analytical Batch Number: 519510

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201068236	Method Blank (MB)
1201068237	159247001(2603230069 M-120) Sample Duplicate (DUP)
1201068238	Laboratory Control Sample (LCS)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 10.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159247001 (2603230069 M-120).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Qualifier	Reason	Analyte	Sample
UI	Data rejected due to low abundance.	Lead-212	159244001
			1201068236

**Method/Analysis Information**

**Product:** GFPC, Pb210, Liquid

Analytical Method: DOE RP280 Modified

Analytical Batch Number: 520607

Sample ID	Client ID
159244001	2603250005 EB-3
1201070733	Method Blank (MB)
1201070734	159242003(2603240135 M-121) Sample Duplicate (DUP)
1201070735	159242003(2603240135 M-121) Matrix Spike (MS)
1201070736	Laboratory Control Sample (LCS)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-018 REV# 5.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:****Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159242003 (2603240135 M-121).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

**Miscellaneous Information:****NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** GFPC, Ra228, Liquid

Analytical Method: EPA 904.0 Modified

Analytical Batch Number: 515983

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201060416	Method Blank (MB)
1201060417	159242003(2603240135 M-121) Sample Duplicate (DUP)
1201060418	159242003(2603240135 M-121) Matrix Spike (MS)
1201060419	Laboratory Control Sample (LCS)

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 12.

#### **Calibration Information:**

##### **Calibration Information**

All initial and continuing calibration requirements have been met.

##### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

##### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

##### **Blank Information**

The blank volume is representative of the sample volume in this batch.

##### **Designated QC**

The following sample was used for QC: 159242003 (2603240135 M-121).

##### **QC Information**

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

##### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

##### **Preparation Information**

All preparation criteria have been met for these analyses.

##### **Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

##### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** Lucas Cell, Ra226, liquid

Analytical Method: EPA 903.1 Modified

Analytical Batch Number: 518058

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201064983	Method Blank (MB)
1201064984	159247001(2603230069 M-120) Sample Duplicate (DUP)
1201064985	159247001(2603230069 M-120) Matrix Spike (MS)
1201064986	Laboratory Control Sample (LCS)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 REV# 9.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:****Blank Information**

The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159247001 (2603230069 M-120).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:****Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Miscellaneous Information:****NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** KPA, Total U, Liquid

Analytical Method: ASTM D 5174

Analytical Batch Number: 523680

<b>Sample ID</b>	<b>Client ID</b>
159244001	2603250005 EB-3
1201077880	Method Blank (MB)
1201077881	159242003(2603240135 M-121) Sample Duplicate (DUP)
1201077882	159242003(2603240135 M-121) Matrix Spike (MS)
1201077883	Laboratory Control Sample (LCS)
1201077884	Laboratory Control Sample Duplicate (LCSD)

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-023 REV# 11.

**Calibration Information:****Calibration Information**

All initial and continuing calibration requirements have been met. The calibration for Total Uranium is performed prior to each analysis and is located in the raw data section.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:****Blank Information**



The blank volume is representative of the sample volume in this batch.

**Designated QC**

The following sample was used for QC: 159242003 (2603240135 M-121).

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

Initial results of samples 1201077881 (2603240135 M-121) were greater than RDL. Samples were reanalyzed and verified initial results. The initial results are reported. The initial results of samples 159244001 (2603250005 EB-3) failed R2 and/or lifetime. Samples were treated with a post-spike, reanalyzed, and passed. The initial result is reported.

**Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A nonconformance report (NCR) was not generated for this SDG.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier information**

Manual qualifiers were not required.


**Certification Statement**

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

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

Reviewer/Date:                                 

# SAMPLE DATA SUMMARY

# GENERAL ENGINEERING LABORATORIES, LLC

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

## Certificate of Analysis Report for

MWHL002 MWH Laboratories

Client SDG: 159244 GEL Work Order: 159244

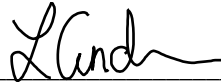
### The Qualifiers in this report are defined as follows:

- \* Indicates that a quality control analyte recovery is outside of specified acceptance criteria.
- < Result is less than amount reported.
- > Result is greater than amount reported.
- B Target analyte was detected in the sample as well as the associated blank.
- BD Results below the MDC or low tracer recovery.
- D Sample has been diluted and reanalyzed after initially exceeding inst. calibration range
- E Concentration of the target analyte exceeds the instrument calibration range.
- H Analytical holding time exceeded.
- J Indicates an estimated value.
- P The response between the confirmation and the primary columns is >40% Different.
- R Sample results are rejected.
- U Target analyte was analyzed for but not detected above the MDL, MDA, or LOD.
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.
- Y QC Samples were not spiked with this compound.
- Z Paint Filter qualifier: Particulates passed through the filter. No free liquids were observed.
- d The 2:1 depletion requirement was not met for this sample
- h Sample preparation or preservation holding time exceeded.
- ND The analyte concentration is not detected above the reporting limit.

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

\*\* Indicates the analyte is a surrogate compound.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.



Reviewed by \_\_\_\_\_

# GENERAL ENGINEERING LABORATORIES, LLC

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

## Certificate of Analysis

Company : MWH Laboratories  
 Address : 750 Royal Oaks Drive, Suite 100  
 Monrovia, California 91016

Report Date: April 26, 2006

Contact: Ms. Julie Lee  
 Project: **Tronox Henderson**

Client Sample ID:	2603250005 EB-3	Project:	MWHL00106
Sample ID:	159244001	Client ID:	MWHL002
Matrix:	Ground Water		
Collect Date:	24-MAR-06 12:00		
Receive Date:	28-MAR-06		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Rad Alpha Spec Analysis</b>												
<i>Alphaspec Th, Liquid</i>												
Thorium-228	U	0.102	+/-0.210	0.464	2.00	pCi/L		BJB1	04/20/06	0749	520798	1
Thorium-230	U	0.0179	+/-0.0729	0.215	2.00	pCi/L						
Thorium-232	U	0.00	+/-2.01	0.103	2.00	pCi/L						
<i>Alphaspec U, Liquid</i>												
Uranium-233/234	U	-0.0233	+/-0.0795	0.309	1.00	pCi/L		BJB1	04/21/06	0738	520799	2
Uranium-235/236	U	-0.0203	+/-0.0282	0.263	1.00	pCi/L						
Uranium-238	U	0.0521	+/-0.0977	0.213	1.00	pCi/L						
<b>Rad Gamma Spec Analysis</b>												
<i>Gamma, (Pb-212)</i>												
Lead-212	UUI	0.00	+/-2.58	4.65	10.0	pCi/L		MJH1	04/25/06	1842	519510	3
<b>Rad Gas Flow Proportional Counting</b>												
<i>GFPC, Pb210, Liquid</i>												
Lead-210	U	-0.832	+/-0.839	2.00	3.00	pCi/L		BXF1	04/25/06	1103	520607	4
<i>GFPC, Ra228, Liquid</i>												
Radium-228	U	0.693	+/-0.491	0.934	2.00	pCi/L		KSD1	04/26/06	1330	515983	5
<b>Rad Radium-226</b>												
<i>Lucas Cell, Ra226, liquid</i>												
Radium-226		0.591	+/-0.386	0.517	2.00	pCi/L		SG	04/10/06	0855	518058	6
<b>Rad Total Uranium</b>												
<i>KPA, Total U, Liquid</i>												
Total Uranium	U	0.158	+/-0.0308	0.430	1.00	ug/L		DRS1	04/26/06	1057	523680	7

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	DOE EML HASL-300, Th-01-RC Modified	
2	DOE EML HASL-300, U-02-RC Modified	
3	EPA 901.1	
4	DOE RP280 Modified	
5	EPA 904.0 Modified	
6	EPA 903.1 Modified	
7	ASTM D 5174	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
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# GENERAL ENGINEERING LABORATORIES, LLC

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

## Certificate of Analysis

Company : MWH Laboratories  
 Address : 750 Royal Oaks Drive, Suite 100  
 Monrovia, California 91016

Report Date: April 26, 2006

Contact: Ms. Julie Lee  
 Project: **Tronox Henderson**

Client Sample ID: 2603250005 EB-3  
 Sample ID: 159244001

Project: MWHL00106  
 Client ID: MWHL002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<b>Surrogate/Tracer recovery</b>	<b>Test</b>					<b>Result</b>	<b>Nominal</b>	<b>Recovery%</b>			<b>Acceptable Limits</b>
Actinium-227	Alphaspec Th, Liquid							80			
Actinium-227	Alphaspec Th, Liquid							80			
Actinium-227	Alphaspec Th, Liquid							80			
Uranium-232	Alphaspec U, Liquid							83			(25%–125%)
Uranium-232	Alphaspec U, Liquid							83			(25%–125%)
Uranium-232	Alphaspec U, Liquid							83			(25%–125%)
Lead-210	GFPC, Pb210, Liquid							64			(25%–125%)
Radium-228	GFPC, Ra228, Liquid							84			(15%–125%)

# QUALITY CONTROL DATA

# GENERAL ENGINEERING LABORATORIES, LLC

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

## QC Summary

Report Date: April 26, 2006

Page 1 of 4

**MWH Laboratories**  
**750 Royal Oaks Drive, Suite 100**  
**Monrovia, California**

**Contact: Ms. Julie Lee**

**Workorder: 159244**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	520798										
QC1201071141	159242003	DUP									
Thorium-228		0.311	U	0.175	pCi/L	56*		(0%-20%)	BJB1	04/20/06	07:49
		+/-0.217		+/-0.215							
Thorium-230	U	0.114	U	0.0239	pCi/L	131*		(0%-20%)			
		+/-0.122		+/-0.0973							
Thorium-232	U	0.0416	U	0.081	pCi/L	64*		(0%-20%)			
		+/-0.0977		+/-0.133							
QC1201071143	LCS										
Thorium-228			U	0.211	pCi/L			(75%-125%)			
				+/-0.193							
Thorium-230	53.9			46.9	pCi/L		87	(75%-125%)			
				+/-8.06							
Thorium-232				0.316	pCi/L			(75%-125%)			
				+/-0.212							
QC1201071140	MB										
Thorium-228			U	0.0376	pCi/L						
				+/-0.158							
Thorium-230			U	0.0737	pCi/L						
				+/-0.116							
Thorium-232			U	-0.0233	pCi/L						
				+/-0.0271							
QC1201071142	159242003	MS									
Thorium-228		0.311	U	0.483	pCi/L			(75%-125%)			
		+/-0.217		+/-0.665							
Thorium-230	108	U	0.114	118	pCi/L		109	(75%-125%)			
		+/-0.122		+/-31.2							
Thorium-232	U	0.0416	U	0.121	pCi/L			(75%-125%)			
		+/-0.0977		+/-0.328							
Batch	520799										
QC1201071145	159242003	DUP									
Uranium-233/234		9.54		10.4	pCi/L	9		(0%-20%)	BJB1	04/22/06	07:38
		+/-1.27		+/-1.10							
Uranium-235/236		0.311		0.362	pCi/L	15		(0%-20%)			
		+/-0.261		+/-0.230							
Uranium-238		4.98		5.85	pCi/L	16		(0%-20%)			
		+/-0.916		+/-0.821							
QC1201071147	LCS										
Uranium-233/234				15.5	pCi/L			(75%-125%)		04/21/06	07:38
				+/-1.40							
Uranium-235/236				0.801	pCi/L			(75%-125%)			
				+/-0.356							
Uranium-238	13.1			14.1	pCi/L		108	(75%-125%)			
				+/-1.33							
QC1201071144	MB										

# GENERAL ENGINEERING LABORATORIES, LLC

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

## QC Summary

Workorder: 159244

Page 2 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Alpha Spec</b>											
Batch	520799										
Uranium-233/234			U	0.0694 +/-0.130	pCi/L						
Uranium-235/236			U	0.0565 +/-0.111	pCi/L				BJB1	04/21/06	07:38
Uranium-238			U	0.0128 +/-0.0969	pCi/L						
QC1201071146	159242003	MS									
Uranium-233/234		9.54 +/-1.27		33.4 +/-3.23	pCi/L			(75%-125%)			
Uranium-235/236		0.311 +/-0.261		1.18 +/-0.684	pCi/L			(75%-125%)			
Uranium-238	26.3	4.98 +/-0.916		32.3 +/-3.18	pCi/L		104	(75%-125%)			
<b>Rad Gamma Spec</b>											
Batch	519510										
QC1201068237	159247001	DUP									
Lead-212	UUI	0.00 +/-5.11	U	1.88 +/-4.45	pCi/L	97			MJH1	04/26/06	05:28
QC1201068238	LCS										
Americium-241	1220			1330 +/-171	pCi/L		109	(75%-125%)		04/26/06	05:24
Cesium-137	463			471 +/-34.7	pCi/L		102	(75%-125%)			
Cobalt-60	659			646 +/-49.1	pCi/L		98	(75%-125%)			
Lead-212			U	15.7 +/-16.8	pCi/L						
QC1201068236	MB										
Lead-212			UUI	0.00 +/-2.25	pCi/L					04/25/06	18:43
<b>Rad Gas Flow</b>											
Batch	515983										
QC1201060417	159242003	DUP									
Radium-228		1.24 +/-0.666	U	0.577 +/-0.503	pCi/L	73*		(0%-20%)	KSD1	04/26/06	13:29
QC1201060419	LCS										
Radium-228	40.3			46.1 +/-2.84	pCi/L		115	(75%-125%)		04/26/06	14:35
QC1201060416	MB										
Radium-228			U	0.323 +/-0.444	pCi/L					04/26/06	13:29
QC1201060418	159242003	MS									
Radium-228	61.0	1.24 +/-0.666		71.6 +/-4.18	pCi/L		115	(75%-125%)		04/26/06	13:44
Batch	520607										
QC1201070734	159242003	DUP									
Lead-210	U	1.08 +/-1.08	U	0.877 +/-1.12	pCi/L	0		(0%-20%)	BXF1	04/25/06	14:15



# GENERAL ENGINEERING LABORATORIES, LLC

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

## QC Summary

Workorder: 159244

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Gas Flow</b>											
Batch	520607										
QC1201070736	LCS										
Lead-210	36.5			29.5 +/-4.70	pCi/L		81	(75%-125%)	BXF1	04/25/06	14:15
QC1201070733	MB										
Lead-210			U	0.253 +/-0.972	pCi/L						
QC1201070735	159242003	MS									
Lead-210	91.5	U		1.08 +/-1.08	pCi/L		77	(75%-125%)			
<b>Rad Ra-226</b>											
Batch	518058										
QC1201064984	159247001	DUP									
Radium-226		U		0.232 +/-0.356	pCi/L	36*		(0%-20%)	SG	04/10/06	09:30
QC1201064986	LCS										
Radium-226	25.1			30.1 +/-2.32	pCi/L		120	(75%-125%)			
QC1201064983	MB										
Radium-226		U		0.550 +/-0.431	pCi/L					04/10/06	08:55
QC1201064985	159247001	MS									
Radium-226	25.1	U		0.232 +/-0.356	pCi/L		92	(75%-125%)		04/10/06	09:30
<b>Rad Total U</b>											
Batch	523680										
QC1201077881	159242003	DUP									
Total Uranium				13.7 +/-0.299	ug/L	0		(0%-20%)	DRS1	04/26/06	10:18
QC1201077883	LCS										
Total Uranium	50.0			37.5 +/-2.27	ug/L		75	(75%-125%)		04/26/06	10:26
QC1201077884	LCSD										
Total Uranium	5.00			5.24 +/-0.116	ug/L	151	105			04/26/06	10:27
QC1201077880	MB										
Total Uranium		U		0.164 +/-0.035	ug/L					04/26/06	10:15
QC1201077882	159242003	MS									
Total Uranium	50.0			13.7 +/-0.299	ug/L		104	(75%-125%)		04/26/06	10:22

Notes:

The Qualifiers in this report are defined as follows:

- B Target analyte was detected in the sample as well as the associated blank.
- BD Results below the MDC or low tracer recovery.
- E Concentration of the target analyte exceeds the instrument calibration range.
- H Analytical holding time exceeded.

# GENERAL ENGINEERING LABORATORIES, LLC

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

## QC Summary

Workorder: 159244

Page 4 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
U											
UI											
X											
d											
h											

J Indicates an estimated value.

U Target analyte was analyzed for but not detected above the MDL, MDA, or LOD.

UI Uncertain identification for gamma spectroscopy.

X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.

d The 2:1 depletion requirement was not met for this sample

h Sample preparation or preservation holding time exceeded.

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

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

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

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

# RAW DATA

### Radiochemistry Batch Checklist, Rev 4

Batch# 520798 Product: Th-228 Date: 04/24/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.			N/A
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			N/A
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms. All lineouts initialed and dated. No transcription errors are apparent.	✓		
QC data entered into QC database. Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.			N/A

General Engineering Laboratories

2/22/2005  
Primary Review Performed By: Parrelaf Dalley 04/24/06

Secondary Review Performed By: no 4/25/06

# Thorium-228 Que Sheet

19-APR-06

Batch #: 520798    Analyst: BJB1    Minimum Due Date: 20-APR-06    Ac-227 Separation Date/Time: 4/19/06 0730; #45 0815  
 Tracer Isotope: Ac-227    Tracer Code: 0387-B-02    Expiration Date: 7/11/06    Vol: 0.1ml  
 LCS Isotope: Th-230    LCS Code: 0159-0    Expiration Date: 6/23/06    Vol: 0.1ml  
 Spike Isotope: Th-230    Spike Code: 0159-0    Expiration Date: 6/23/06    Vol: 0.1ml  
 Prep Date: 4/18/06    Initials: BJB    Pipet ID: 1167560257    Balance ID: 1167560257    Witness: JAB 4/18/06

of 788

Sample I	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collection Date	Label #	Aliquot (g/μl)	Th Det #	Ash Weight (g)
158272001	2603140436 TR-10A	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	13-MAR-06	31	0.200	26	
158275001	2603140472 PUMP BLANK	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	13-MAR-06	32	0.200	27	
158276001	2603090347 FB-1	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	08-MAR-06	33	0.200	29	
158277001	2603100260 EB-1	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	09-MAR-06	34	0.200	30	
158436001	2603150120 TR-9A	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	14-MAR-06	35	0.200	65	
158971001	2603220347 M-103	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	21-MAR-06	36	0.200	69	
158971002	2603220348 TR-7	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	21-MAR-06	37	0.200	70	
158971003	2603220357 TR-9	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	21-MAR-06	38	0.200	72	
158971004	2603220360 TR-10	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	21-MAR-06	39	0.200	73	
159242001	2603240118 H-11	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	23-MAR-06	40	0.200	75	
159242002	2603240122 M-117	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	23-MAR-06	41	0.200	77	
159242003	2603240135 M-121	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	23-MAR-06	42	0.200	79	
159243001	2603230197 M-118	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	22-MAR-06	43	0.200	79	
159244001	2603250005 EB-3	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	24-MAR-06	44	0.200	80	
159247001	2603230069 M-120	SAMPLE		2 pCi/L	GROUND WATER	MWHL002	22-MAR-06	45	0.200	81	
1201071140	MB for batch 520798	MB		2 pCi/L	GROUND WATER	QC ACCOUNT		46	0.200	83	
1201071141	2603240135 M-121(159242003DUP)	DUP		2 pCi/L	GROUND WATER	QC ACCOUNT		47	0.200	85	
1201071142	2603240135 M-121(159242003MS)	MS		2 pCi/L	GROUND WATER	QC ACCOUNT		48	0.200	86	
1201071143	LCS for batch 520798	LCS		2 pCi/L	GROUND WATER	QC ACCOUNT		49	0.200	88	

BJB 4/18/06

Solid Sample Dissolution by: LEACH or DIGESTION  
 Circle One

Data Reviewed By: Paralee Halley 04/24/06

MB 4/25/06

GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S0159242003\_TH  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :34425  
AVERAGE %EFFICIENCY :32.6623  
% YIELD : 107.855

COUNT DATE:20-APR-2006 07:49:44  
ELAPSED LIVE TIME(SEC): 14399.99  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B078.CNF;602  
BKG DATE: 16-APR-2006

MS PCI/L : 53.92892  
MSD PCI/L : 53.92892  
LCS PCI/L : 53.92892  
TRACER DPM : 4.3537  
EFF FILE : W078.CNF;154  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

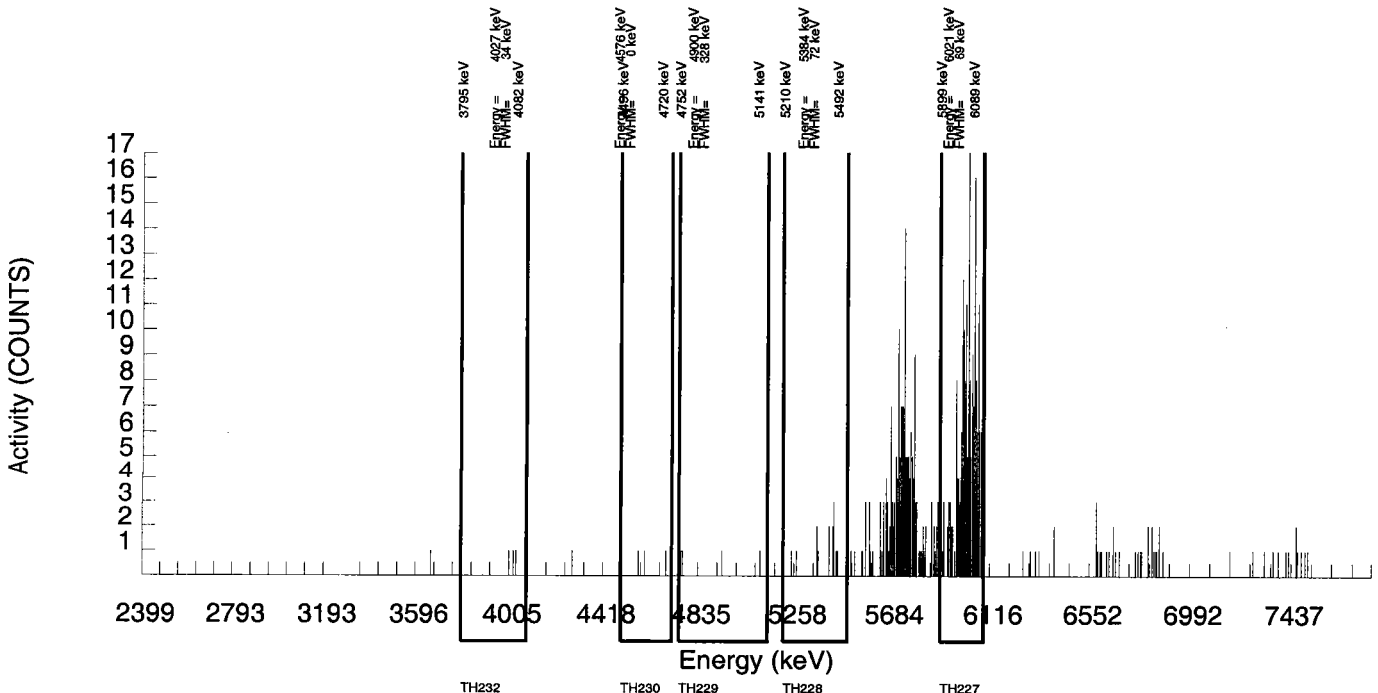
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	193.520	0.480	54.75400	9.81E+00	2.07E+00	3.15E-01
TH-228	5363.000	11.640	3.360	99.94000	3.11E-01	2.17E-01	3.07E-01
TH229	4900.000	1.360	2.640	99.52000	3.64E-02	1.15E-01	2.83E-01
TH-230	4625.000	4.280	0.720	100.0000	1.14E-01	1.22E-01	1.85E-01
TH-232	3972.000	1.560	1.440	100.0000	4.16E-02	9.77E-02	2.29E-01

REVIEWED BY:

DATE :

*Handwritten signature*



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S0159244001\_TH  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :29269  
AVERAGE %EFFICIENCY :34.1362  
% YIELD : 79.734

COUNT DATE:20-APR-2006 07:49:44  
ELAPSED LIVE TIME(SEC): 14399.99  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B080.CNF;603  
BKG DATE: 16-APR-2006

MS PCI/L : 53.92892  
MSD PCI/L : 53.92892  
LCS PCI/L : 53.92892  
TRACER DPM : 4.3537  
EFF FILE : W080.CNF;153  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

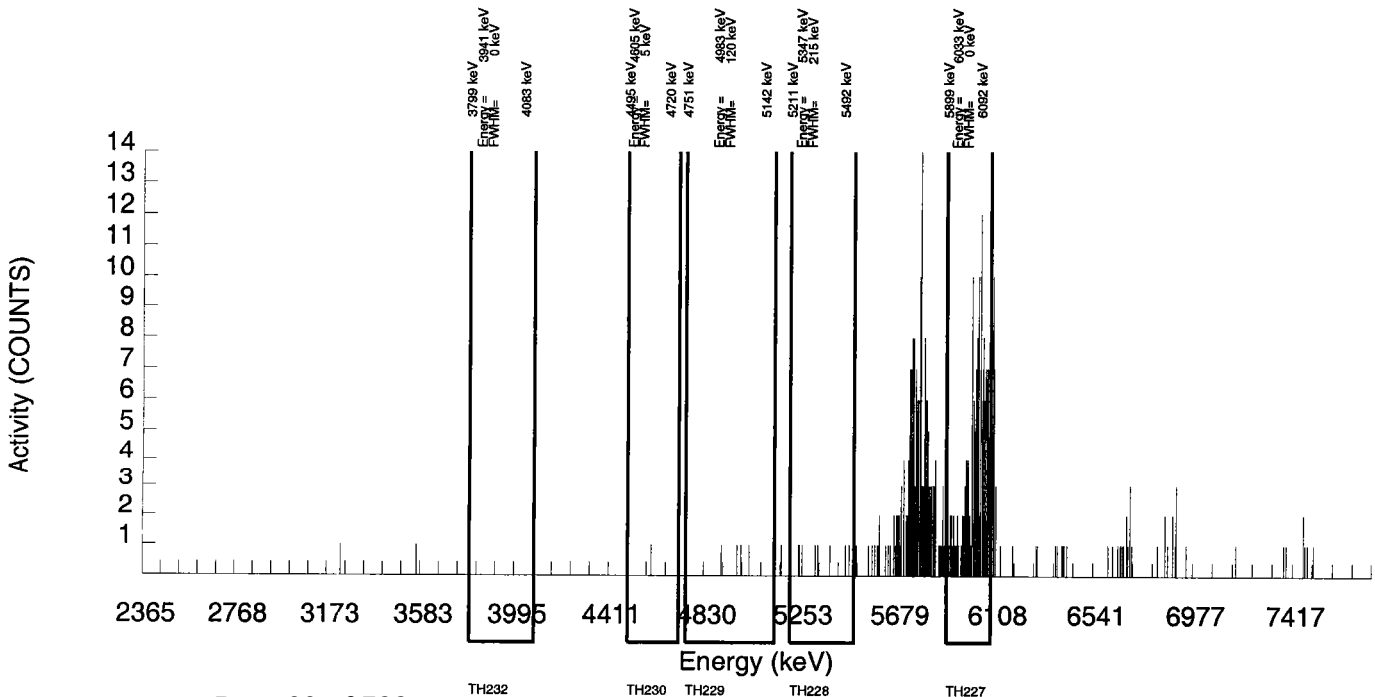
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	149.520	0.480	54.75400	9.81E+00	2.33E+00	4.08E-01
TH-228	5363.000	2.960	5.040	99.94000	1.02E-01	2.10E-01	4.64E-01
TH229	4900.000	2.320	1.680	99.52000	8.04E-02	1.46E-01	3.13E-01
TH-230	4625.000	0.520	0.480	100.0000	1.79E-02	7.29E-02	2.15E-01
TH-232	3972.000	0.000	0.000	100.0000	0.00E+00	2.01E+00	1.03E-01

REVIEWED BY:

DATE :

*JD 4/20/06*



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S1201071140\_TH  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :34436  
AVERAGE %EFFICIENCY :30.6338  
% YIELD : 94.792

COUNT DATE:20-APR-2006 07:49:45  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B083.CNF;602  
BKG DATE: 16-APR-2006

MS PCI/L : 53.92892  
MSD PCI/L : 53.92892  
LCS PCI/L : 53.92892  
TRACER DPM : 4.3537  
EFF FILE : W083.CNF;187  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

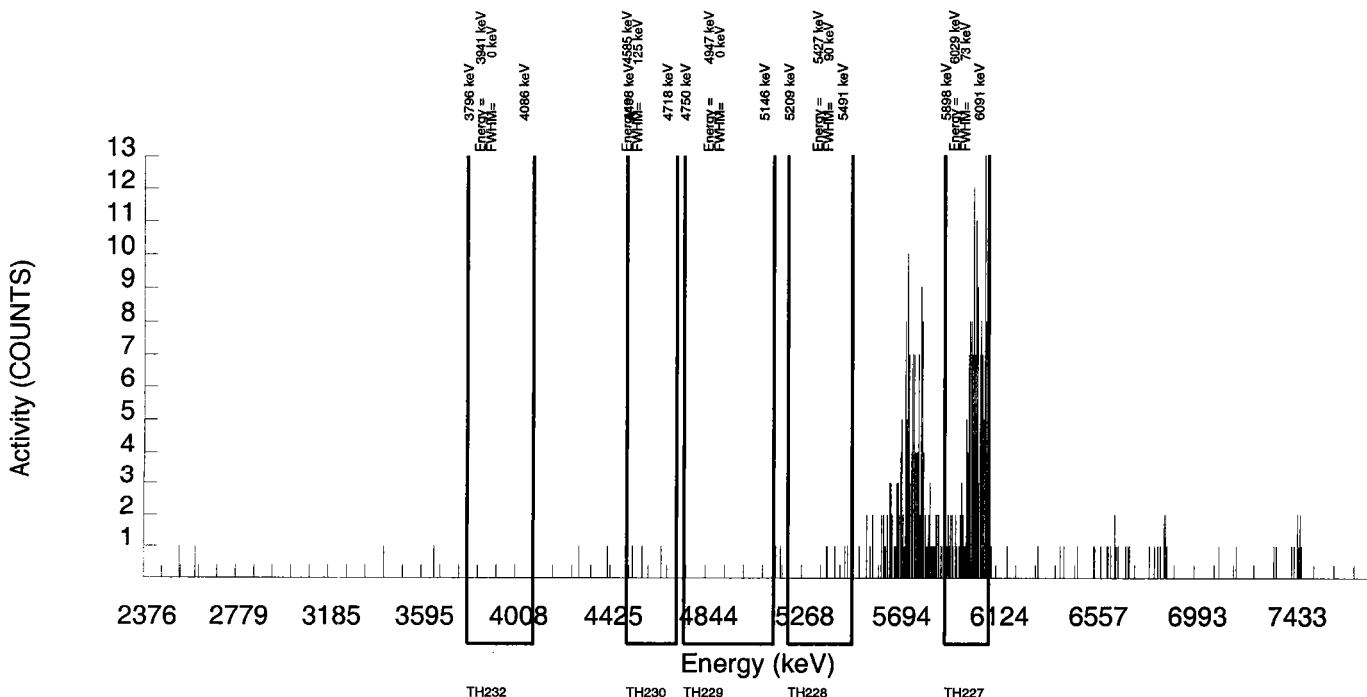
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	159.520	0.480	54.75400	9.81E+00	2.26E+00	3.82E-01
TH-228	5363.000	1.160	3.840	99.94000	3.76E-02	1.58E-01	3.92E-01
TH229	4900.000	-4.560	4.560	99.52000	-1.48E-01	7.23E-02	4.20E-01
TH-230	4625.000	2.280	0.720	100.0000	7.37E-02	1.16E-01	2.24E-01
TH-232	3972.000	-0.720	0.720	100.0000	-2.33E-02	2.71E-02	2.24E-01

REVIEWED BY:

DATE :

*BJB/01/04*





GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S1201071141\_TH  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :30451  
AVERAGE %EFFICIENCY :29.9703  
% YIELD : 68.028

COUNT DATE:20-APR-2006 07:49:45  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B085.CNF;607  
BKG DATE: 16-APR-2006

MS PCI/L : 53.92892  
MSD PCI/L : 53.92892  
LCS PCI/L : 53.92892  
TRACER DPM : 4.3537  
EFF FILE : W085.CNF;205  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

NUCLIDE ACTIVITY SUMMARY

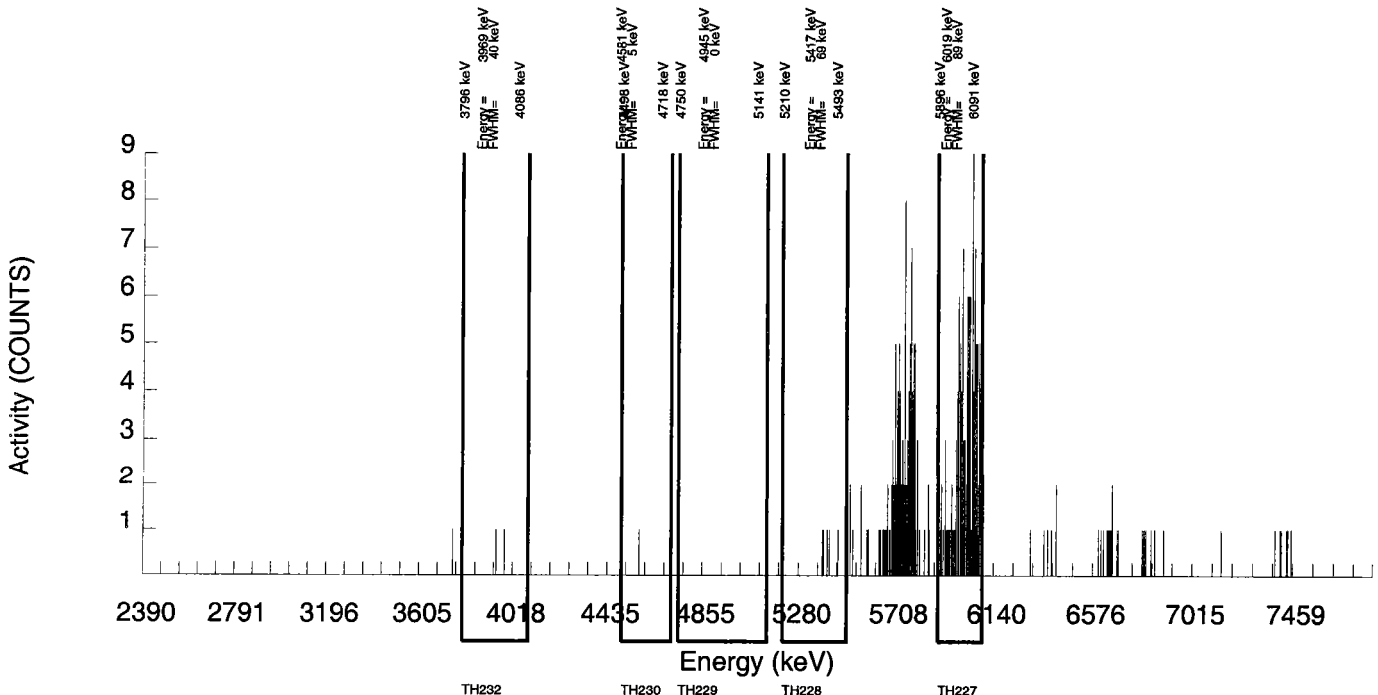
NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	112.000	0.000	54.75400	9.81E+00	2.67E+00	2.63E-01
TH-228	5363.000	3.800	1.200	99.94000	1.75E-01	2.15E-01	3.73E-01
TH229	4900.000	-1.200	1.200	99.52000	-5.55E-02	5.08E-02	3.74E-01
TH-230	4625.000	0.520	0.480	100.0000	2.39E-02	9.73E-02	2.86E-01
TH-232	3972.000	1.760	0.240	100.0000	8.10E-02	1.33E-01	2.43E-01

REVIEWED BY:

DATE :

*BJB 4/20/06*

*Th-228 = S.G.D ACT < MDA*  
*Th-230 } ACT < MDA*  
*Th-232*



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S1201071142\_TH  
SAMPLE QTY: 0.100 L

DETECTOR NUMBER :29278  
AVERAGE %EFFICIENCY :26.2964  
% YIELD : 44.996

COUNT DATE:20-APR-2006 07:49:45  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B086.CNF;608  
BKG DATE: 16-APR-2006

MS PCI/L : 107.8578  
MSD PCI/L : 107.8578  
LCS PCI/L : 107.8578  
TRACER DPM : 4.3537  
EFF FILE : W086.CNF;176  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

NUCLIDE ACTIVITY SUMMARY

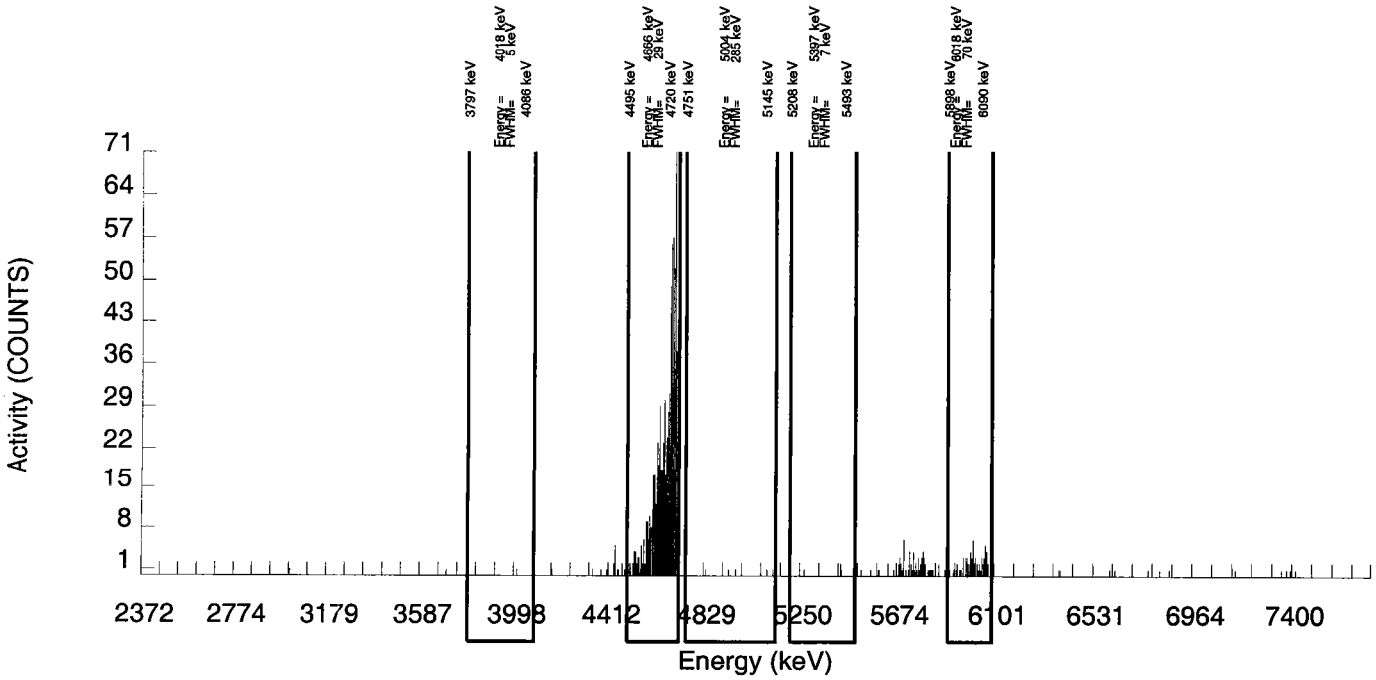
NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	65.000	0.000	54.75400	1.96E+01	6.96E+00	9.05E-01
TH-228	5363.000	3.040	0.960	99.94000	4.83E-01	6.65E-01	1.20E+00
TH229	4900.000	2.840	2.160	99.52000	4.53E-01	7.58E-01	1.57E+00
TH-230	4625.000	744.040	0.960	100.0000	1.18E+02	3.12E+01	1.20E+00
TH-232	3972.000	0.760	0.240	100.0000	1.21E-01	3.28E-01	8.37E-01

REVIEWED BY:

DATE :

*BJB 4/20/06*

$$MS = \frac{118 - 0}{108} = 109\%$$



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520798  
SAMPLE DATE : 19-APR-2006 07:30:00

SAMPLE ID : S1201071143\_TH  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :30434  
AVERAGE %EFFICIENCY :27.0872  
% YIELD : 112.742

COUNT DATE:20-APR-2006 07:49:45  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0159-O  
MSD : 0159-O  
LCS : 0159-O  
TRACER : 0387-B-102  
BKG FILE: B088.CNF;598  
BKG DATE: 16-APR-2006

MS PCI/L : 53.92892  
MSD PCI/L : 53.92892  
LCS PCI/L : 53.92892  
TRACER DPM : 4.3537  
EFF FILE : W088.CNF;171  
CAL DATE: 3-APR-2006

MS ISOTOPE : TH-230  
MSD ISOTOPE: TH-230  
LCS ISOTOPE: TH-230  
TRACER ISOTOPE: AC227  
LIB FILE : ENV\_ALPHA\_TH.N

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	ERROR 2-SIGMA	MDA pCi/L
AC-227	5978.000	167.760	0.240	54.75400	9.81E+00	2.21E+00	3.08E-01
TH-228	5363.000	6.840	2.160	99.94000	2.11E-01	1.93E-01	3.03E-01
TH229	4900.000	10.560	1.440	99.52000	3.26E-01	2.23E-01	2.65E-01
TH-230	4625.000	1527.040	0.960	100.0000	4.69E+01	8.06E+00	2.32E-01
TH-232	3972.000	10.280	0.720	100.0000	3.16E-01	2.12E-01	2.13E-01

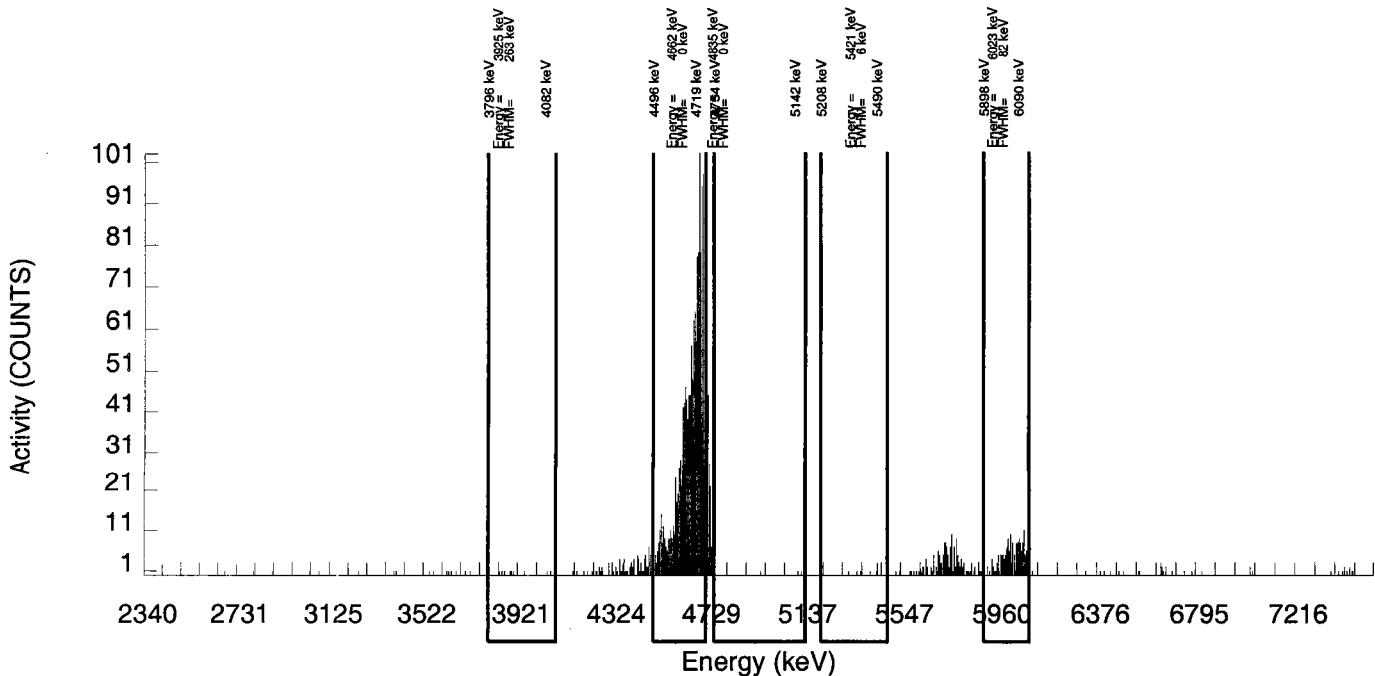
REVIEWED BY:

DATE:

*[Handwritten signature]*

*[Handwritten signature]*

$$LCS = \frac{46.9}{53.9} = 87.0\%$$



Radiochemistry Batch Checklist, Rev 4

Batch# 520799 Product: U Date: 04/25/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.			N/A
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits. Instument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			N/A
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms. All lineouts initialed and dated.	✓		
No transcription errors are apparent.	✓		
QC data entered into QC database.	✓		
Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.			N/A

General Engineering Laboratories

2/22/2005 Primary Review Performed By: James Halley 04/25/06

Secondary Review Performed By: NO 4/25/06

04/20-04/27

# Uranium Que Sheet

13-APR-06

Batch #: 520799 Analyst: BJB1 Minimum Due Date: 20-APR-06  
 Tracer Isotope: U-232/U-236 Tracer Code: 0688-4 Expiration Date: 11/21/07 Vol: 0.100  
 LCS Isotope: U-238 LCS Code: 0850-3 Expiration Date: 11/21/06 Vol: 0.100  
 Spike Isotope: U-238 Spike Code: 0852-2 Expiration Date: 11/21/06 Vol: 0.100  
 Prep Date: 4/18/06 Initials: BJB Pipet ID: 182854 Balance ID: 167560207

Witness: JKS 4/18/06

Sample ID	Client Description	Hazard Code	Type	Min CRDL	Matrix	Client	Collection Date	Label #	Aliquot (g)( $\mu$ l)	U Det #	Ash Weight (g)
158272001	2603140436 TR-10A		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	13-MAR-06	31	0.200	19	
158275001	2603140472 PUMP BLANK		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	13-MAR-06	32	0.200	20	
158276001	2603090347 FB-1		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	08-MAR-06	33	0.200	21	
158277001	2603100260 EB-1		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	09-MAR-06	34	0.200	23	
158436001	2603150120 TR-9A		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	14-MAR-06	35	0.200	1	
158971001	2603220347 M-103		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	21-MAR-06	36	0.200	7	
158971002	2603220348 TR-7		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	21-MAR-06	37	0.200	4	
158971003	2603220357 TR-9		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	21-MAR-06	38	0.200	5	
158971004	2603220360 TR-10		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	21-MAR-06	39	0.200	7	
159242001	2603240118 H-11		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	23-MAR-06	40	0.200	9	
159242002	2603240122 M-117		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	23-MAR-06	41	0.200	10	
159242003	2603240135 M-121		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	23-MAR-06	42	0.200	11	
159243001	2603230197 M-118		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	22-MAR-06	43	0.200	13	
159244001	2603250005 EB-3		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	24-MAR-06	44	0.200	16	
159247001	2603230069 M-120		SAMPLE	1 pCi/L	GROUND WATI	MWHL002	22-MAR-06	45	0.200	17	
1201071144	MB for batch 520799		MB		GROUND WATI	QC ACCOUNT		46	0.200	18	
1201071145	2603240135 M-121(159242003DUP)		DUP		GROUND WATI	QC ACCOUNT	23-MAR-06	47	0.200	19	
1201071146	2603240135 M-121(159242003MS)		MS		GROUND WATI	QC ACCOUNT	23-MAR-06	48	0.100	20	
1201071147	LCS for batch 520799		LCS		GROUND WATI	QC ACCOUNT		49	0.200	21	

388 4/17/06

Solid Sample Dissolution by: LEACH or DIGESTION  
 Circle One

Data Reviewed By: Barbara D. Valley 4/25/06  
 JKS 4/18/06

Choose SOP used: GL-RAD-A-011  
~~GL-RAD-A-038~~  
 GL-RAD-A-045  
 GL-RAD-A-043

General Engineering Laboratories, Radiochemistry Division

GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799  
SAMPLE DATE : 23-MAR-2006 00:00:00

SAMPLE ID : S0159242003\_UU  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :9537  
AVERAGE %EFFICIENCY :31.0572  
% YIELD : 69.076

COUNT DATE:21-APR-2006 07:38:20  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0858-B  
MSD : 0858-B  
LCS : 0858-B  
TRACER : 0688-H  
BKG FILE: B011.CNF;696  
BKG DATE: 17-APR-2006

MS PCI/L : 13.14673  
MSD PCI/L : 13.14673  
LCS PCI/L : 13.14673  
TRACER DPM : 5.4106  
EFF FILE : W011.CNF;198  
CAL DATE: 3-APR-2006

MS ISOTOPE : U-238  
MSD ISOTOPE: U-238  
LCS ISOTOPE: U-238  
TRACER ISOTOPE: U232  
LIB FILE : ENV\_ALPHA\_UU.N

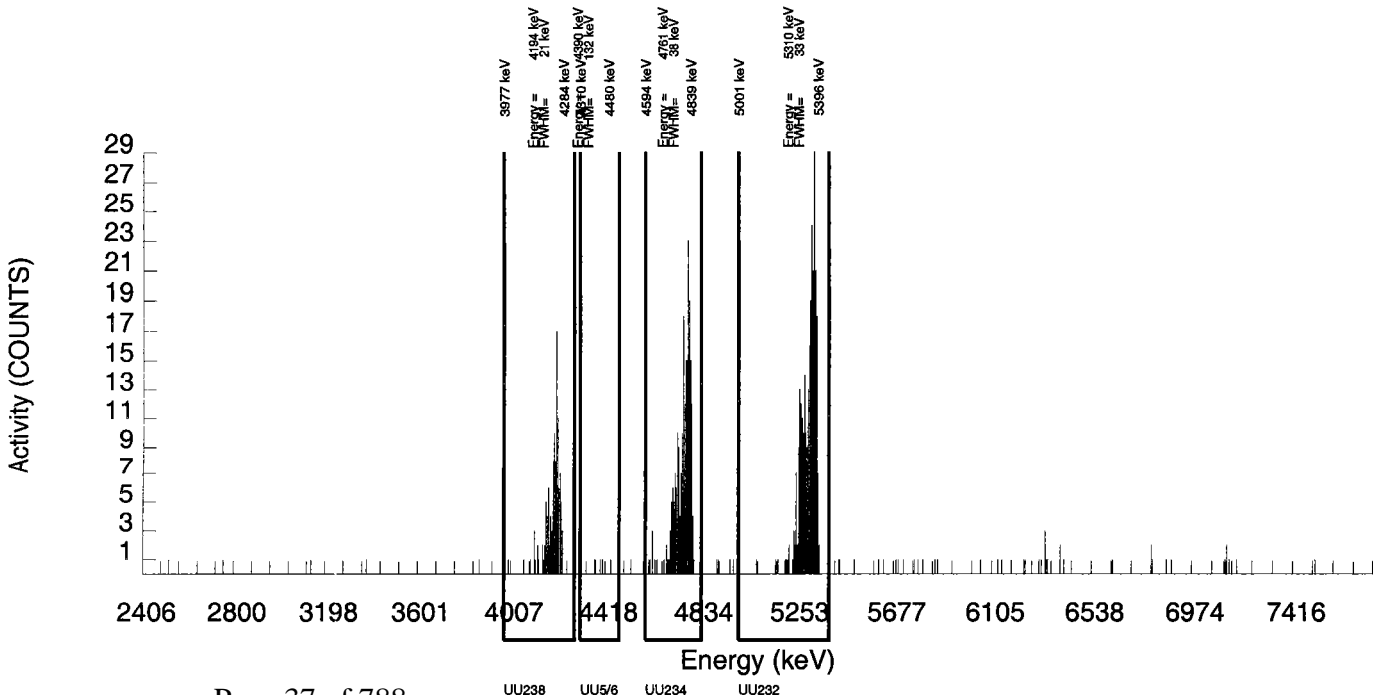
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	218.080	1.920	100.0000	9.54E+00	1.95E+00	4.13E-01	1.27E+00
U232	5302.100	278.360	2.640	100.0000	1.22E+01	2.37E+00	4.62E-01	1.44E+00
U-235	4391.000	5.760	0.240	80.90000	3.11E-01	2.65E-01	2.85E-01	2.61E-01
U-238	4184.730	113.760	0.240	100.0000	4.98E+00	1.20E+00	2.31E-01	9.16E-01

REVIEWED BY:

DATE :

*PSH 04/21/06*



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799  
SAMPLE DATE : 24-MAR-2006 00:00:00

SAMPLE ID : S0159244001\_UU  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :21086  
AVERAGE %EFFICIENCY :33.0341  
% YIELD : 82.925

COUNT DATE:21-APR-2006 07:38:29  
ELAPSED LIVE TIME(SEC): 14399.99  
ANALYST :BJB1

MS : 0858-B  
MSD : 0858-B  
LCS : 0858-B  
TRACER : 0688-H  
BKG FILE: B016.CNF;667  
BKG DATE: 17-APR-2006

MS PCI/L : 13.14673  
MSD PCI/L : 13.14673  
LCS PCI/L : 13.14673  
TRACER DPM : 5.4104  
EFF FILE : W016.CNF;192  
CAL DATE: 3-APR-2006

MS ISOTOPE : U-238  
MSD ISOTOPE: U-238  
LCS ISOTOPE: U-238  
TRACER ISOTOPE: U232  
LIB FILE : ENV\_ALPHA\_UU.N

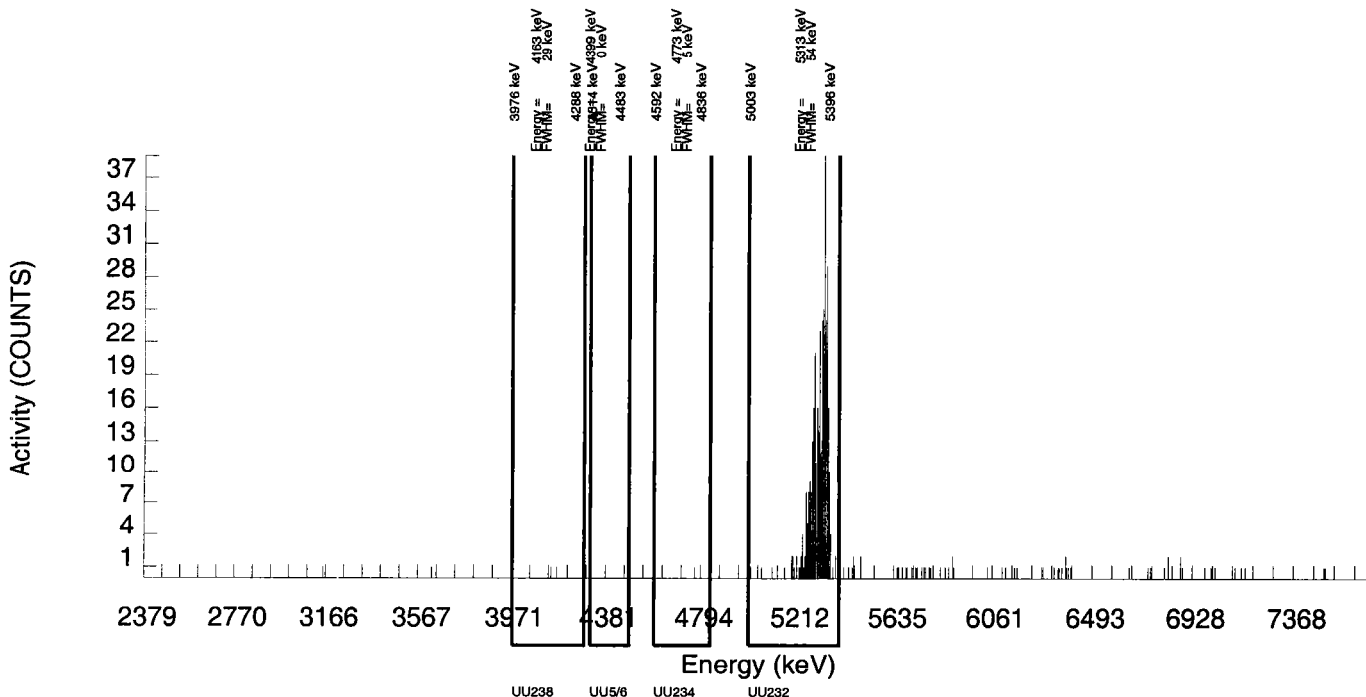
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	-0.680✓	1.680	100.0000	-2.33E-02	7.96E-02	3.09E-01	7.95E-02
U232	5302.100	355.440	4.560	100.0000	1.22E+01	2.18E+00	4.43E-01	1.28E+00
U-235	4391.000	-0.480✓	0.480	80.90000	-2.03E-02	2.83E-02	2.63E-01	2.82E-02
U-238	4184.730	1.520	0.480	100.0000	5.21E-02	9.79E-02	2.13E-01	9.77E-02

REVIEWED BY:

DATE :

*BJB 04/21/06*



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799  
SAMPLE DATE : 18-APR-2006 00:00:00

SAMPLE ID : S1201071144\_UU  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :21063  
AVERAGE %EFFICIENCY :25.5920  
% YIELD : 80.286

COUNT DATE:21-APR-2006 07:38:29  
ELAPSED LIVE TIME(SEC): 14399.99  
ANALYST :BJB1

MS : 0858-B  
MSD : 0858-B  
LCS : 0858-B  
TRACER : 0688-H  
BKG FILE: B018.CNF;670  
BKG DATE: 17-APR-2006

MS PCI/L : 13.14673  
MSD PCI/L : 13.14673  
LCS PCI/L : 13.14673  
TRACER DPM : 5.4069  
EFF FILE : W018.CNF;190  
CAL DATE: 3-APR-2006

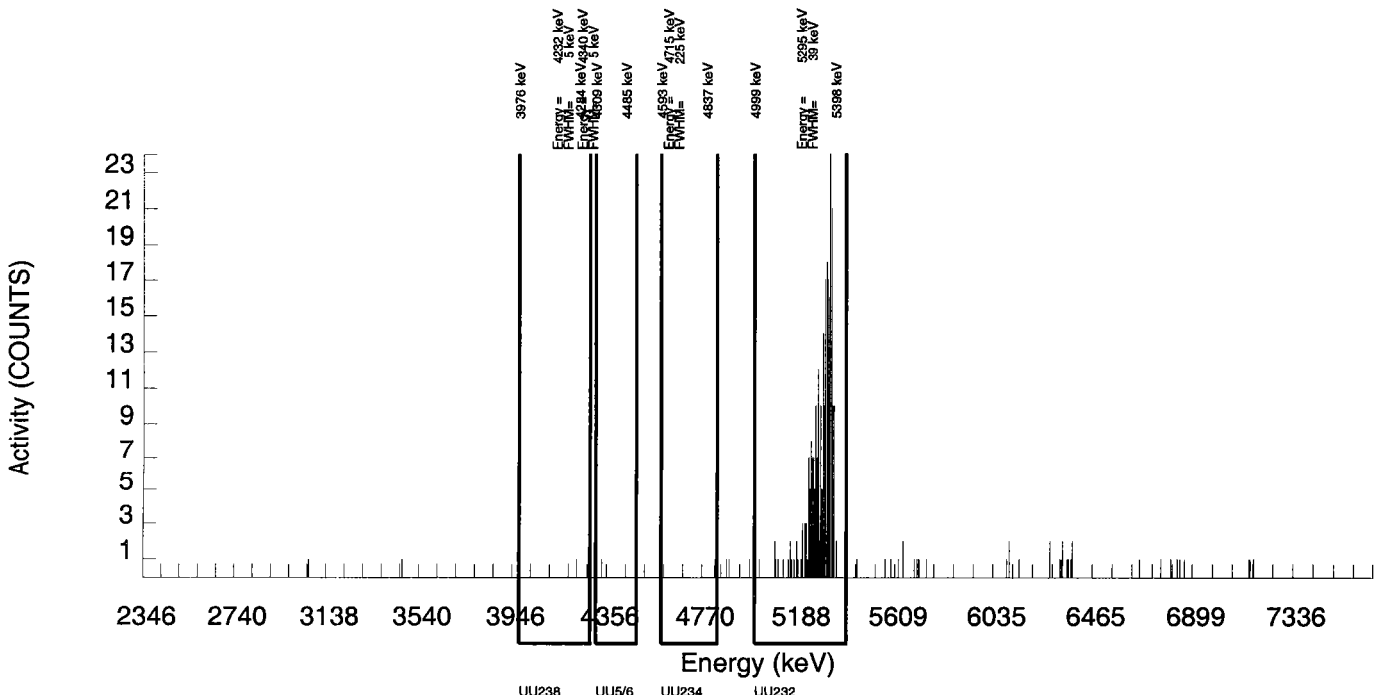
MS ISOTOPE : U-238  
MSD ISOTOPE: U-238  
LCS ISOTOPE: U-238  
TRACER ISOTOPE: U232  
LIB FILE : ENV\_ALPHA\_UU.N

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	1.520	0.480	100.0000	6.94E-02	1.31E-01	2.84E-01	1.30E-01
U232	5302.100	266.600	2.400	100.0000	1.22E+01	2.41E+00	4.66E-01	1.47E+00
U-235	4391.000	1.000	0.000	80.90000	5.65E-02	1.11E-01	1.69E-01	1.11E-01
U-238	4184.730	0.280	0.720	100.0000	1.28E-02	9.70E-02	3.17E-01	9.69E-02

REVIEWED BY:

DATE: *DH 04/21/06*





GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799 SAMPLE DATE : 23-MAR-2006 00:00:00		SAMPLE ID : S1201071145_UU SAMPLE QTY: 0.200 L	
DETECTOR NUMBER :45-132FF2 AVERAGE %EFFICIENCY :39.0663 % YIELD : 80.097		COUNT DATE:22-APR-2006 07:38:41 ELAPSED LIVE TIME(SEC): 14400.00 ANALYST :BJB1	
MS : 0858-B MSD : 0858-B LCS : 0858-B TRACER : 0688-H BKG FILE: B116.CNF;16 BKG DATE: 16-APR-2006	MS PCI/L : 13.14673 MSD PCI/L : 13.14673 LCS PCI/L : 13.14673 TRACER DPM : 5.4106 EFF FILE : W116.CNF;11 CAL DATE: 4-APR-2006	MS ISOTOPE : U-238 MSD ISOTOPE: U-238 LCS ISOTOPE: U-238 TRACER ISOTOPE: U232 LIB FILE : ENV_ALPHA_UU.N	

NUCLIDE ACTIVITY SUMMARY

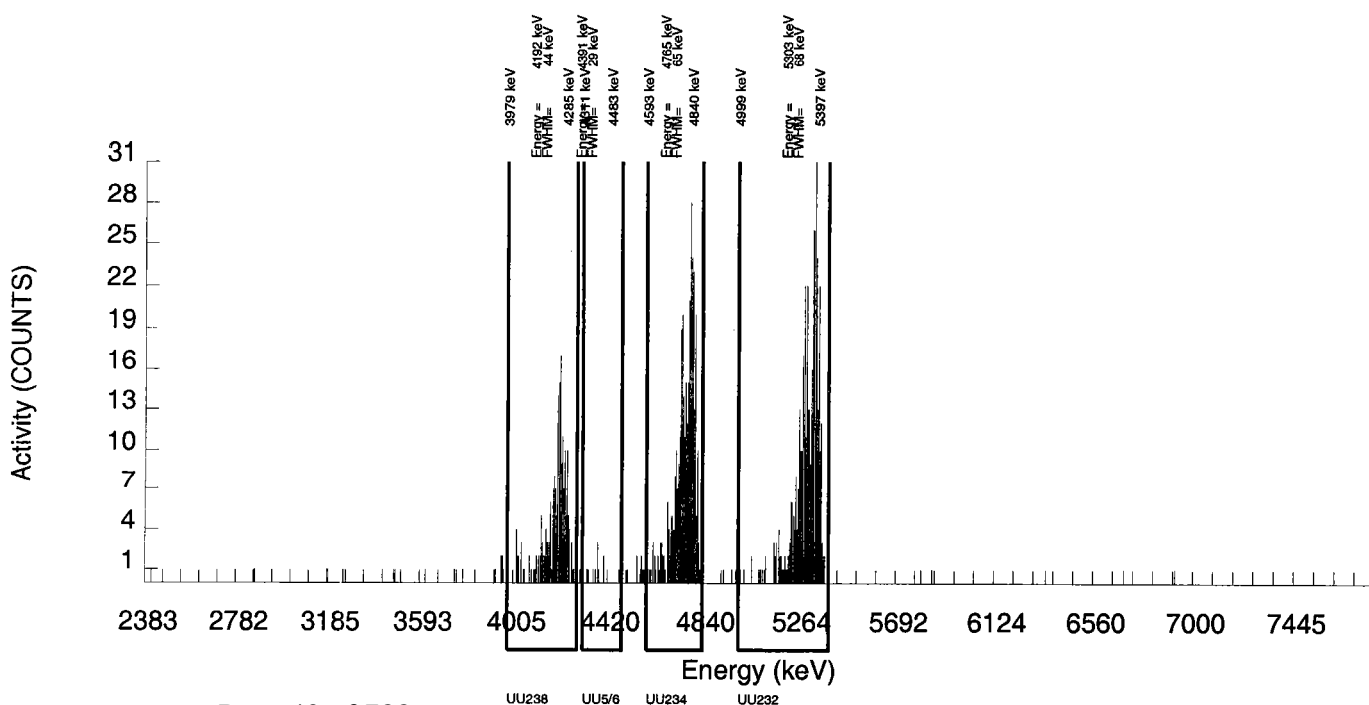
NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	348.280	0.720	100.0000	1.04E+01	1.82E+00	2.08E-01	1.10E+00
U232	5302.100	406.000	0.000	100.0000	1.22E+01	2.07E+00	9.00E-02	1.19E+00
U-235	4391.000	9.760	0.240	80.90000	3.62E-01	2.36E-01	1.96E-01	2.30E-01
U-238	4184.730	195.000	0.000	100.0000	5.85E+00	1.16E+00	9.00E-02	8.21E-01

REVIEWED BY:

DATE :

*REC =*  
~~U-3/4 = 0.114 0.632~~  
~~U-235 = 0.057 0.282~~  
~~U-238 = 0.184 1.02~~  
*DUPLICATE*

*RAD = JH 04/28/06*  
 U-3/4 = 8.63%  
 U-235 = 15.2%  
 U-238 = 16.1%



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799  
SAMPLE DATE : 23-MAR-2006 00:00:00

SAMPLE ID : S1201071146\_UU  
SAMPLE QTY: 0.100 L

DETECTOR NUMBER :33093  
AVERAGE %EFFICIENCY :33.7467  
% YIELD : 68.376

COUNT DATE:21-APR-2006 07:38:37  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0858-B  
MSD : 0858-B  
LCS : 0858-B  
TRACER : 0688-H  
BKG FILE: B020.CNF;677  
BKG DATE: 17-APR-2006

MS PCI/L : 26.29347  
MSD PCI/L : 26.29347  
LCS PCI/L : 26.29347  
TRACER DPM : 5.4106  
EFF FILE : W020.CNF;179  
CAL DATE: 3-APR-2006

MS ISOTOPE : U-238  
MSD ISOTOPE: U-238  
LCS ISOTOPE: U-238  
TRACER ISOTOPE: U232  
LIB FILE : ENV\_ALPHA\_UU.N

NUCLIDE ACTIVITY SUMMARY

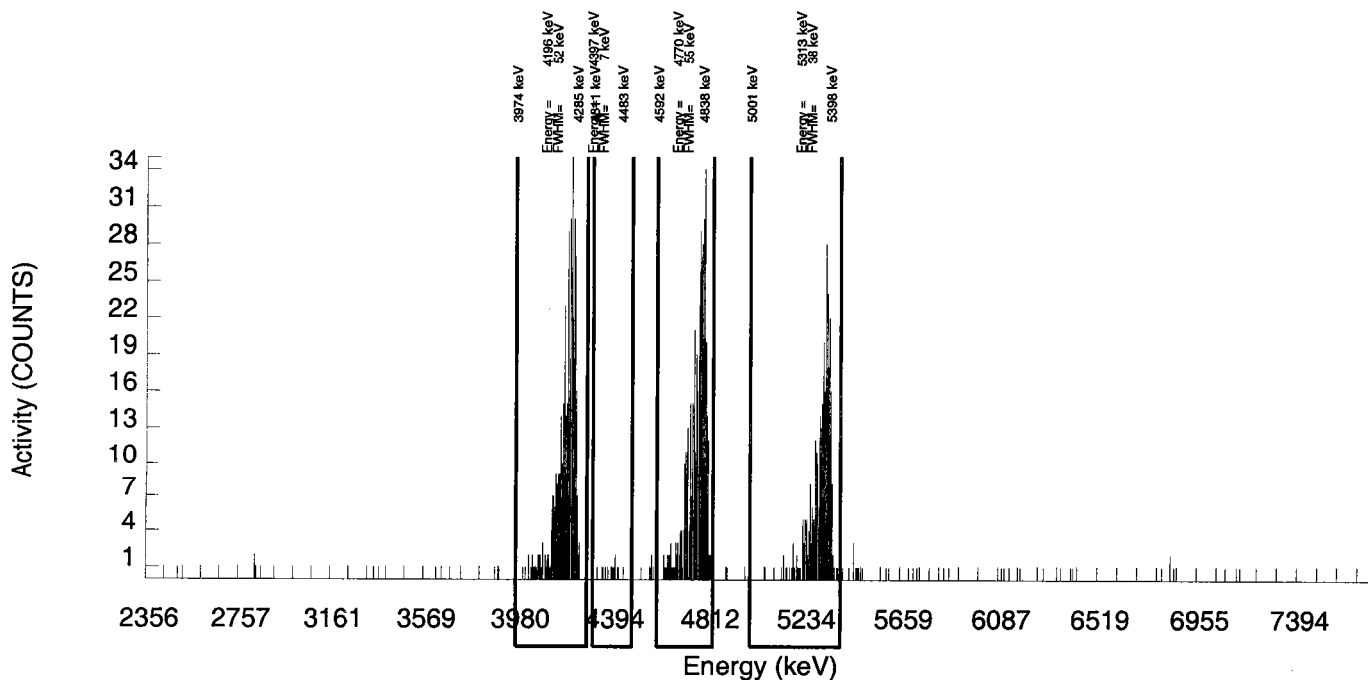
NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	410.760	0.240	100.0000	3.34E+01	6.01E+00	4.29E-01	3.23E+00
U232	5302.100	299.400	3.600	100.0000	2.44E+01	4.63E+00	9.62E-01	2.78E+00
U-235	4391.000	11.760	0.240	80.90000	1.18E+00	7.07E-01	5.31E-01	6.84E-01
U-238	4184.730	397.280	0.720	100.0000	3.23E+01	5.84E+00	5.65E-01	3.18E+00

REVIEWED BY:

DATE :

$$ms = \frac{32.3 - 4.98}{26.3} = 104\%$$

PJH 04/21/06



GENERAL ENGINEERING LABORATORIES, LLC.  
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 520799  
SAMPLE DATE : 18-APR-2006 00:00:00

SAMPLE ID : S1201071147\_UU  
SAMPLE QTY: 0.200 L

DETECTOR NUMBER :33893  
AVERAGE %EFFICIENCY :30.9792  
% YIELD : 92.317

COUNT DATE:21-APR-2006 07:38:37  
ELAPSED LIVE TIME(SEC): 14400.00  
ANALYST :BJB1

MS : 0858-B  
MSD : 0858-B  
LCS : 0858-B  
TRACER : 0688-H  
BKG FILE: B021.CNF;681  
BKG DATE: 17-APR-2006

MS PCI/L : 13.14673  
MSD PCI/L : 13.14673  
LCS PCI/L : 13.14673  
TRACER DPM : 5.4069  
EFF FILE : W021.CNF;201  
CAL DATE: 3-APR-2006

MS ISOTOPE : U-238  
MSD ISOTOPE: U-238  
LCS ISOTOPE: U-238  
TRACER ISOTOPE: U232  
LIB FILE : ENV\_ALPHA\_UU.N

NUCLIDE ACTIVITY SUMMARY

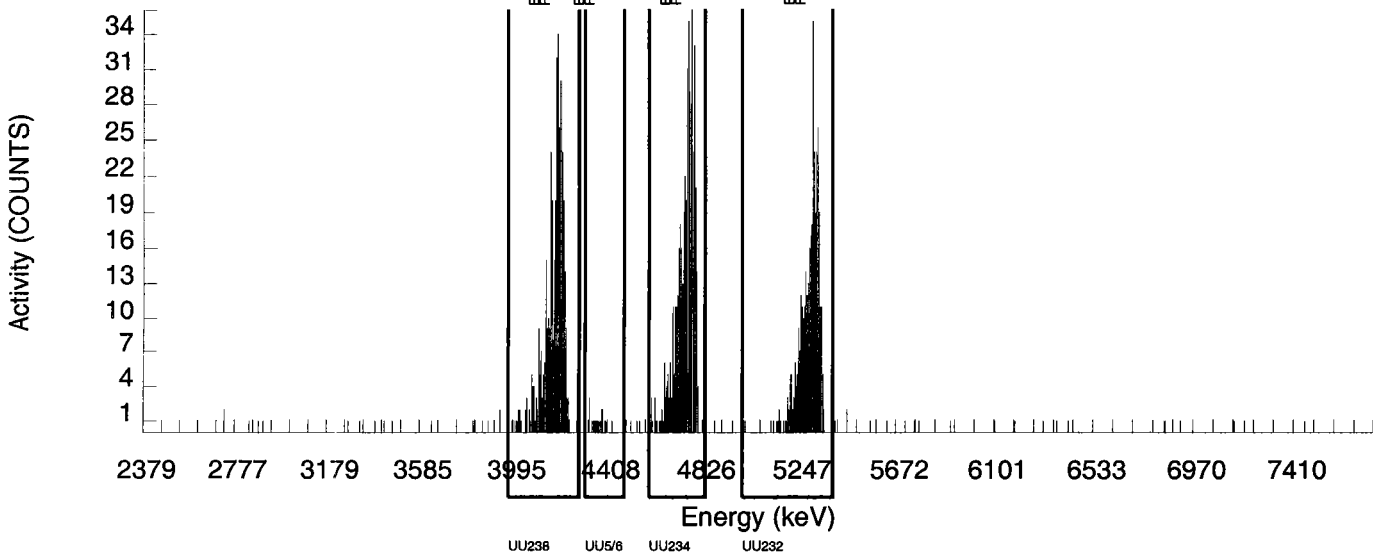
NUCLIDE	ENERGY	NET AREA	BKG AREA	%ABUN	ACTIVITY pCi/L	TPU 1.96-SIGMA	MDA pCi/L	UNC pCi/L
U-3/4	4763.020	473.280	0.720	100.0000	1.55E+01	2.62E+00	2.28E-01	1.40E+00
U232	5302.100	371.080	1.920	100.0000	1.22E+01	2.14E+00	3.10E-01	1.24E+00
U-235	4391.000	19.760	0.240	80.90000	8.01E-01	3.74E-01	2.14E-01	3.56E-01
U-238	4184.730	428.520	0.480	100.0000	1.41E+01	2.41E+00	2.04E-01	1.33E+00

REVIEWED BY:

DATE:

PJH 04/21/06

$$UCS = \frac{14.1}{13.1} = 108\%$$



### Radiochemistry Batch Checklist, Rev 4

Batch# 519510      Product: 8L/mwHL      Date: 4/26/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.			NA
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓	✓	NCR
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%.	✓		
Or meets the client's required RER acceptance criteria.			
Tracer yield is 15-125% . Carrier yield 25-125%.			
Or meets the client's contract acceptance criteria.			N/A
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			N/A
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms.	✓		
All lineouts initialed and dated.	✓		
No transcription errors are apparent.	✓		
QC data entered into QC database.	✓		
Batch entered into Case Narrative.	✓		
Batch non-conformances completed if applicable.	✓		

General Engineering Laboratories

2/22/2005

Primary Review Performed By: Jodi Cummings 4/26/06

Secondary Review Performed By: Michael P. [Signature] 4/26/06

# Gamma Spec Que Sheet

04/25/2006

Batch #: 519510      Analyst: BRST <sup>MSH 4/25/06</sup> ~~MTH~~      Minimum Due Date: 04/20/2006  
 Gamma Spike Isotope: Mixed Gamma      Spike Code: N/A      Expiration Date: N/A      Vol: N/A      Nominal Concentration: N/A  
 Gamma LCS Isotope: Mixed Gamma      LCS Code: 0781-A      Expiration Date: 4/27/06      Vol: 1.0 mL      Nominal Concentration: 657-403.2      660 = 658.9  
 Initials: DRS      Prep Date: 4-25-06      Witness: N/A      MSH 4/25/06

Sample ID	Client Description / Container ID	Type	Hazard Code	RDL	Client	Matrix	Collect Date	Aliquot (g / F)	Detector	Sealing Date/Time (if Applicable)
158272001	2603140436 TR-10A	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	13-MAR-06 14:35:00	2.0	1	
158275001	2603140472 PUMP BLANK	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	13-MAR-06 10:45:00	2.0	3	
158276001	2603090347 FB-1	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	08-MAR-06 15:30:00	2.0	4	
158277001	2603100260 EB-1	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	09-MAR-06 14:00:00	2.0	6	
158436001	2603150120 TR-9A	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	14-MAR-06 14:45:00	2.0	7	
158971001	2603220347 M-103	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	21-MAR-06 14:00:00	1.926	8	
158971002	2603220348 TR-7	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	21-MAR-06 12:00:00	2.0	9	
158971003	2603220357 TR-9	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	21-MAR-06 09:00:00	2.0	10	
158971004	2603220360 TR-10	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	21-MAR-06 10:20:00	2.0	11	
159242001	2603240118 H-11	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	23-MAR-06 15:20:00	2.0	12	
159242002	2603240122 M-117	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	23-MAR-06 14:50:00	2.0	13	
159242003	2603240135 M-121	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	23-MAR-06 08:30:00	2.0	14	
159243001	2603230197 M-118	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	22-MAR-06 14:30:00	2.0	15	
159244001	2603250005 EB-3	SAMPLE	10 pCi/L		MWHL002	GROUND WATER	24-MAR-06 12:00:00	2.0	16	
159247001	2603230069 M-120	SAMPLE	2 pCi/L		MWHL002	GROUND WATER	22-MAR-06 10:20:00	2.0	17	
1201068236	MB for batch 519510	MB	2 pCi/L		QC ACCOUNT	GROUND WATER	4/25/06	2.0	19	
1201068237	2603230069 M-120 (159247001DUP)	DUP	2 pCi/L		QC ACCOUNT	GROUND WATER	22-MAR-06 10:20:00	2.0	19	
1201068238	LCS for batch 519510	LCS	2 pCi/L		QC ACCOUNT	GROUND WATER	4/25/06	2.0	19	

MSH 4/25/06

General Engineering Laboratories, Radiochemistry Division

Data Reviewed By:

*Jodi Cummings 4/26/06*

## Failed RDL Report

Batch Id	Samp Id	Sample Type	Run Date	Parmname	Result	MDA	RDL
519510	158272001	SAMPLE	25-APR-06				
519510	158275001	SAMPLE	25-APR-06				
519510	158276001	SAMPLE	25-APR-06				
519510	158277001	SAMPLE	25-APR-06				
519510	158436001	SAMPLE	25-APR-06				
519510	158971001	SAMPLE	25-APR-06				
519510	158971002	SAMPLE	25-APR-06				
519510	158971003	SAMPLE	25-APR-06				
519510	158971004	SAMPLE	25-APR-06				
519510	159242001	SAMPLE	25-APR-06				
519510	159242002	SAMPLE	25-APR-06				
519510	159242003	SAMPLE	25-APR-06				
519510	159243001	SAMPLE	26-APR-06				
519510	159244001	SAMPLE	25-APR-06				
519510	159247001	SAMPLE	25-APR-06	Actinium-228	-6.361	3.935	2.00
519510	1201068236	MB	25-APR-06	Actinium-228	5.78	10.21	2.00
				Bismuth-212	6.397	18.43	10.0
519510	1201068237	DUP	26-APR-06	Actinium-228	0.8134	4.83	2.00
519510	1201068238	LCS	26-APR-06	Actinium-228	50.08	75.87	2.00
				Bismuth-212	68.21	146.5	10.0
				Lead-212	15.72	30.23	10.0
				Protactinium-231	-412.2	684.7	280

## Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL
519510	158272001	SAMPLE	25-APR-06	Annihilation Rad.	12.73	1.786	pCi/L	3.74	N
				Cadmium-115	2.320E+05	2.226E+06	pCi/L	0	N
				Iodine-135	1.000E+41	1.390E+41	pCi/L	0	N
				Lead-212 LA	<del>4.946</del> 0	2.429	pCi/L	4.371	10.0 U
				Manganese-56	1.000E+41	2.000E+41	pCi/L	0	N
				Molybdenum-99	1.172E+05	89520	pCi/L	0	N
				Potassium-40 HE	43.16	16.33	pCi/L	34.39	N
				Technetium-99m	1.000E+41	7.636E+40	pCi/L	0	N
Thulium-171 HE	4043	2188	pCi/L	2075	N				
519510	158275001	SAMPLE	25-APR-06	Annihilation Rad.	15.58	2.031	pCi/L	3.721	N
				Antimony-127	4866	7583	pCi/L	0	N
				Cadmium-115	5.908E+05	2.532E+06	pCi/L	0	N
				Cerium-143	5.140E+08	8.507E+09	pCi/L	0	N
				Lead-212 LA	<del>7.164</del> 0	2.547	pCi/L	4.625	10.0 U
				Molybdenum-99	1.425E+05	1.297E+05	pCi/L	0	N
				Potassium-40	32.23	15.22	pCi/L	30.47	N
				Praseodymium-144	1.000E+41	1.852E+41	pCi/L	0	N
				Promethium-149	1.750E+06	2.588E+07	pCi/L	0	N
				Sodium-24	2.035E+20	1.161E+21	pCi/L	0	N
				Technetium-99m	1.000E+41	1.213E+41	pCi/L	0	N
				Thorium-234 HE	287.2	154.4	pCi/L	117.4	N
				Thulium-171 HE	2399	1367	pCi/L	2171	N
				Uranium-238 HE	287.2	154.4	pCi/L	89.81	N
519510	158276001	SAMPLE	25-APR-06	Actinium-227 HE	32.23	23.18	pCi/L	25.11	N
				Annihilation Rad.	16.28	1.843	pCi/L	3.962	N
				Antimony-127	11930	16570	pCi/L	0	N
				Cadmium-115	1.783E+06	1.059E+07	pCi/L	0	N
				Cerium-143	1.154E+11	1.435E+11	pCi/L	0	N
				Lead-212 LA	<del>5.69</del> 0	2.591	pCi/L	4.671	10.0 U
				Molybdenum-99	4.877E+05	3.927E+05	pCi/L	0	N
				Praseodymium-144	1.000E+41	2.000E+41	pCi/L	0	N
				Sodium-24	3.619E+23	2.323E+23	pCi/L	0	N
				Technetium-99m	1.000E+41	8.052E+40	pCi/L	0	N
				Thorium-227 HE	31.63	22.75	pCi/L	24.64	N
Thulium-171 HE	2712	2464	pCi/L	2441	N				
519510	158277001	SAMPLE	25-APR-06	Annihilation Rad.	16.49	1.962	pCi/L	4.163	N
				Antimony-127	6976	16060	pCi/L	0	N

## Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL
519510	158277001	SAMPLE	25-APR-06	Cadmium-115	3.677E+06	9.401E+06	pCi/L	0	N
				Lanthanum-140	2.439E+08	5.002E+08	pCi/L	0	N
				Molybdenum-99	4.079E+05	2.336E+05	pCi/L	0	N
				Niobium-95m	5761	44030	pCi/L	0	N
				Potassium-40 <i>HE</i>	62.33	19.26	pCi/L	40.57	N
				Promethium-149	2.327E+07	1.026E+08	pCi/L	0	N
				Sodium-24	1.585E+22	8.289E+22	pCi/L	0	N
				Technetium-99m	1.000E+41	5.728E+40	pCi/L	0	N
				Thulium-171 <i>HE</i>	5661	3203	pCi/L	2659	N
519510	158436001	SAMPLE	25-APR-06	Annihilation Rad.	13.23	1.808	pCi/L	3.787	N
				Antimony-127	667.6	6518	pCi/L	0	N
				Cadmium-115	2.338E+06	1.802E+06	pCi/L	0	N
				Iodine-132	1.000E+41	2.000E+41	pCi/L	0	N
				Lead-212 <i>LA</i>	<del>4.907</del> 0	2.483	pCi/L	4.547	10.0 <i>CU</i>
				Molybdenum-99	50670	86830	pCi/L	0	N
				Praseodymium-144	1.000E+41	1.378E+41	pCi/L	0	N
				Technetium-99m	1.000E+41	1.714E+41	pCi/L	0	N
				Thulium-171 <i>HE</i>	2982	2061	pCi/L	2551	N
519510	158971001	SAMPLE	25-APR-06	Actinium-228 <i>HE</i>	10.61	4.909	pCi/L	9.879	N
				Annihilation Rad.	14.6	1.821	pCi/L	3.846	N
				Antimony-127	2131	1809	pCi/L	0	N
				Bismuth-211 <i>HE</i>	14.77	16.48	pCi/L	11.92	N
				Cadmium-115	52020	1.900E+05	pCi/L	0	N
				Cerium-143	6.537E+07	1.284E+08	pCi/L	0	N
				Iodine-132	1.000E+41	2.000E+41	pCi/L	0	N
				Iodine-135	2.156E+39	1.972E+39	pCi/L	0	N
				Molybdenum-99	17960	14140	pCi/L	0	N
				Potassium-40 <i>HE</i>	24.96	26.93	pCi/L	18.68	N
				Radium-228 <i>HE</i>	10.61	4.909	pCi/L	9.879	N
				Sodium-24	2.011E+17	1.617E+17	pCi/L	0	N
				Technetium-99m	1.000E+41	7.873E+40	pCi/L	0	N
				Thorium-234 <i>HE</i>	112.6	68.12	pCi/L	108.5	N
				Thulium-171 <i>HE</i>	2826	1738	pCi/L	1932	N
				Uranium-238 <i>HE</i>	112.6	68.12	pCi/L	108.5	N
519510	158971002	SAMPLE	25-APR-06	Annihilation Rad.	16.2	1.889	pCi/L	3.974	N
				Iodine-135	2.678E+38	2.518E+39	pCi/L	0	N



# Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL
519510	158971002	SAMPLE	25-APR-06	Manganese-56	1.000E+41	2.000E+41	pCi/L	0	N
				Molybdenum-99	18850	16570	pCi/L	0	N
				Praseodymium-144	1.000E+41	2.000E+41	pCi/L	0	N
				Promethium-149	9.997E+05	2.196E+06	pCi/L	0	N
				Technetium-99m	1.000E+41	8.788E+40	pCi/L	0	N
				Thulium-171 <i>HE</i>	3368	2485	pCi/L	2281	N
519510	158971003	SAMPLE	25-APR-06	Annihilation Rad.	15.53	2.091	pCi/L	3.875	N
				Iodine-133	1.048E+12	2.619E+12	pCi/L	0	N
				Molybdenum-99	23630	13690	pCi/L	0	N
				Potassium-40 <i>HE</i>	18.58	29.58	pCi/L	18.54	N
				Protactinium-234m <i>HE</i>	304.7	250.4	pCi/L	234.8	N
				Technetium-99m	1.000E+41	8.747E+40	pCi/L	0	N
519510	158971004	SAMPLE	25-APR-06	Annihilation Rad.	15.66	2.196	pCi/L	3.943	N
				Cerium-143	8.039E+07	1.510E+08	pCi/L	0	N
				Iodine-133	3.963E+11	2.726E+12	pCi/L	0	N
				Lead-212 <i>LA</i>	<del>5.599</del> 0	2.897	pCi/L	5	10.0 <i>CU</i>
				Manganese-56	1.000E+41	2.506E+41	pCi/L	0	N
				Molybdenum-99	20220	14670	pCi/L	0	N
				Praseodymium-144	1.000E+41	3.076E+41	pCi/L	0	N
				Promethium-149	1.033E+06	2.345E+06	pCi/L	0	N
				Sodium-24	3.551E+17	3.676E+17	pCi/L	0	N
				Technetium-99m	1.000E+41	9.772E+40	pCi/L	0	N
Tellurium-132	211.8	2368	pCi/L	0	N				
519510	159242001	SAMPLE	25-APR-06	Annihilation Rad.	17.95	1.793	pCi/L	3.848	N
				Cadmium-115	67830	1.070E+05	pCi/L	0	N
				Iodine-135	3.094E+37	2.350E+37	pCi/L	0	N
				Manganese-56	1.000E+41	2.000E+41	pCi/L	0	N
				Molybdenum-99	10770	9356	pCi/L	0	N
				Praseodymium-144	1.000E+41	2.000E+41	pCi/L	0	N
				Promethium-149	2.939E+05	1.135E+06	pCi/L	0	N
				Technetium-99m	2.596E+40	2.256E+40	pCi/L	0	N
				Tellurium-132	292.3	1344	pCi/L	0	N
				Thorium-234 <i>LA</i>	262.3	62.63	pCi/L	118.4	N
Uranium-238 <i>LA</i>	262.3	62.63	pCi/L	118.4	N				
519510	159242002	SAMPLE	25-APR-06	Antimony-127	634.4	1211	pCi/L	0	N
				Bismuth-210 <i>HE</i>	126.9	280.6	pCi/L	116	N
				Bismuth-211 <i>HE</i>	12.88	12.43	pCi/L	6.006	N

## Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL				
519510	159242002	SAMPLE	25-APR-06	Gross Gamma	7.527E+08	4.784E+08	pCi/L	5.223E+07	N				
				Iodine-132	1.000E+41	7.243E+41	pCi/L	0	N				
				Iodine-133	1.327E+10	4.512E+11	pCi/L	0	N				
				Iodine-135	3.320E+36	1.362E+37	pCi/L	0	N				
				Lead-210	126.9	280.6	pCi/L	116	N				
				Lead-212 <i>UA</i>	<u>6.241</u> <i>0</i>	4.662	pCi/L	3.129	10.0 <i>u1</i>				
				Manganese-56	1.000E+41	1.295E+41	pCi/L	0	N				
				Molybdenum-99	10380	7018	pCi/L	0	N				
				Niobium-95m	3257	2617	pCi/L	0	N				
				Praseodymium-144	1.000E+41	1.322E+41	pCi/L	0	N				
				Promethium-149	97580	1.162E+06	pCi/L	0	N				
				Protactinium-231 <i>HE</i>	70.73	69.61	pCi/L	61.12	N				
				Radium-224 <i>HE</i>	46.55	35.72	pCi/L	24.83	N				
				Sodium-24	1.151E+16	1.483E+16	pCi/L	0	N				
				Technetium-99m	2.651E+40	2.421E+40	pCi/L	0	N				
				Tellurium-125m	474.3	511.9	pCi/L	471.2	N				
				Tellurium-132	214.8	1250	pCi/L	0	N				
				Thorium-234 <i>HE</i>	55.7	77.63	pCi/L	46.22	N				
				Thulium-171 <i>HE</i>	3903	2103	pCi/L	1226	N				
				Uranium-238 <i>HE</i>	55.7	77.63	pCi/L	46.22	N				
				519510	159242003	SAMPLE	25-APR-06	Annihilation Rad.	14.15	1.748	pCi/L	3.678	N
								Antimony-127	127.3	1412	pCi/L	0	N
								Bismuth-210 <i>HE</i>	45.91	48.07	pCi/L	33.22	N
								Cadmium-115	1.166E+05	1.158E+05	pCi/L	0	N
Cerium-143	7.707E+06	4.887E+07	pCi/L					0	N				
Iodine-135	5.803E+36	2.532E+37	pCi/L					0	N				
Lead-210 <i>HE</i>	45.91	48.07	pCi/L					33.22	N				
Manganese-56	1.000E+41	1.523E+41	pCi/L					0	N				
Molybdenum-99	14010	8105	pCi/L					0	N				
Potassium-40 <i>HE</i>	55.32	19.28	pCi/L					38.78	N				
Sodium-24	1.081E+16	2.102E+16	pCi/L					0	N				
Technetium-99m	6.943E+40	4.017E+40	pCi/L					0	N				
Thorium-234 <i>UA</i>	153.9	25.81	pCi/L					49.19	N				
Uranium-238 <i>UA</i>	153.9	25.81	pCi/L					49.19	N				
519510	159243001	SAMPLE	26-APR-06					Antimony-127	978.4	1558	pCi/L	0	N
								Cadmium-115	2.405E+05	1.452E+05	pCi/L	0	N
				Cerium-144 <i>HE</i>	12.34	10.23	pCi/L	9.106	N				

# Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL				
519510	159243001	SAMPLE	26-APR-06	Gross Gamma	1.700E+09	1.537E+09	pCi/L	4.398E+08	N				
				Iodine-133	1.988E+12	1.313E+12	pCi/L	0	N				
				Iodine-135	2.996E+38	6.061E+38	pCi/L	0	N				
				Manganese-56	1.000E+41	1.032E+42	pCi/L	0	N				
				Molybdenum-99	19090	9959	pCi/L	0	N				
				Neodymium-147 <i>KE</i>	94.56	58.27	pCi/L	65.94	N				
				Niobium-95m	2646	3503	pCi/L	0	N				
				Praseodymium-144	1.000E+41	1.359E+41	pCi/L	0	N				
				Sodium-24	4.661E+16	7.977E+16	pCi/L	0	N				
				Technetium-99m	1.000E+41	8.264E+40	pCi/L	0	N				
				Tellurium-132	1717	1763	pCi/L	0	N				
				Thorium-234 <i>KE</i>	99.27	90.06	pCi/L	55.46	N				
				Thulium-171 <i>KE</i>	3245	1222	pCi/L	1167	N				
				Tin-115 <i>KE</i>	192.7	155.5	pCi/L	162.1	N				
				Uranium-238 <i>KE</i>	99.27	90.06	pCi/L	46.35	N				
519510	159244001	SAMPLE	25-APR-06	Annihilation Rad.	13.3	1.94	pCi/L	4.025	N				
				Cadmium-115	31370	1.007E+05	pCi/L	0	N				
				Iodine-132	1.000E+41	1.239E+41	pCi/L	0	N				
				Lead-212 <i>UA</i>	<del>6.651</del> 0	2.583	pCi/L	4.647	10.0 <i>UL</i>				
				Manganese-56	1.000E+41	2.000E+41	pCi/L	0	N				
				Molybdenum-99	9982	5982	pCi/L	0	N				
				Praseodymium-144	1.000E+41	1.473E+41	pCi/L	0	N				
				Promethium-149	87820	8.511E+05	pCi/L	0	N				
				Protactinium-234m <i>KE</i>	324.3	205.2	pCi/L	309.9	N				
				Technetium-99m	2.771E+39	1.660E+39	pCi/L	0	N				
				Thulium-171 <i>KE</i>	1565	946.1	pCi/L	1119	N				
				Uranium-235 <i>KE</i>	14.95	8.194	pCi/L	14.62	N				
				519510	159247001	SAMPLE	25-APR-06	Antimony-127	718.1	1494	pCi/L	0	N
								Bismuth-211 <i>KE</i>	12.27	15.52	pCi/L	6.833	N
								Bismuth-212 <i>UA</i>	<del>12.08</del> 0	10.09	pCi/L	10.25	10.0 <i>UL</i>
Californium-251	16.95	8.944	pCi/L					4.78	N				
Cerium-143	3.583E+07	8.342E+07	pCi/L					0	N				
Iodine-132	1.000E+41	6.603E+41	pCi/L					0	N				
Iodine-133	1.324E+11	1.047E+12	pCi/L					0	N				
Lead-212 <i>UA</i>	<del>5.428</del> 0	5.108	pCi/L					2.676	10.0 <i>UL</i>				
Manganese-56	1.000E+41	1.619E+41	pCi/L					0	N				
Molybdenum-99	15550	10390	pCi/L					0	N				

## Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL
519510	159247001	SAMPLE	25-APR-06	Niobium-95m	823.7	3112	pCi/L	0	N
				Praseodymium-144	1.000E+41	1.490E+41	pCi/L	0	N
				Promethium-149	1.785E+06	1.737E+06	pCi/L	0	N
				Radium-224 <i>HE</i>	61.27	57.61	pCi/L	22.48	N
				Technetium-99m	1.000E+41	9.224E+40	pCi/L	0	N
				Tellurium-132	205.2	1650	pCi/L	0	N
				Thorium-234 <i>HE</i>	112.1	96.33	pCi/L	59.99	N
				Thulium-171 <i>HE</i>	3807	1521	pCi/L	1261	N
				Uranium-238 <i>HE</i>	112.1	96.33	pCi/L	46.16	N
519510	1201068236	MB	25-APR-06	Barium-137m	17.07	2.005	pCi/L	4.244	N
				Bismuth-210 <i>HE</i>	231.5	98.63	pCi/L	157.3	N
				Cesium-137 <i>LA</i>	18.04	2.119	pCi/L	4.486	N
				Krypton-85 <i>LA</i>	1690	341.2	pCi/L	614.6	N
				Lead-210 <i>LA</i>	231.5	98.63	pCi/L	157.3	N
				Lead-212 <i>LA</i> <del>0.650</del>	2.246	2.246	pCi/L	4.183	10.0 <i>u</i>
				Potassium-40 <i>HE</i>	35.98	14.79	pCi/L	29.86	N
				Praseodymium-144	1.000E+41	1.197E+41	pCi/L	0	N
				Promethium-147 <i>LA</i>	3.886E+06	1.932E+06	pCi/L	3.303E+06	N
519510	1201068237	DUP	26-APR-06	Antimony-127	199.1	1561	pCi/L	0	N
				Cadmium-115	1733	1.800E+05	pCi/L	0	N
				Californium-251 <i>LA</i>	19.33	9.376	pCi/L	5.512	N
				Iodine-133	3.961E+11	1.602E+12	pCi/L	0	N
				Iodine-135	1.134E+37	8.162E+38	pCi/L	0	N
				Molybdenum-99	23310	11740	pCi/L	0	N
				Niobium-95m	460.7	3550	pCi/L	0	N
				Praseodymium-144	1.000E+41	3.613E+42	pCi/L	0	N
				Sodium-24	2.522E+16	8.848E+16	pCi/L	0	N
				Technetium-99m	1.000E+41	8.176E+40	pCi/L	0	N
				Thorium-234 <i>LA</i>	89.8	91.91	pCi/L	60.98	N
				Thulium-171 <i>LA</i>	2844	1503	pCi/L	1251	N
				Uranium-238 <i>LA</i>	89.8	91.91	pCi/L	51.75	N
519510	1201068238	LCS	26-APR-06	Americium-241	1332	170.5	pCi/L	116.9	N
				Barium-137m	445.6	32.86	pCi/L	13.77	N
				Cadmium-109	8784	657.9	pCi/L	426.1	N
				Cerium-139	78.49	15.07	pCi/L	13.35	N
				Cesium-137	471	34.74	pCi/L	14.56	N
				Cobalt-57	138.8	16.11	pCi/L	13	N

## Result Greater Than MDA

Batch Id	Sample Id	Sample Type	Run Date	Parmname	Result	Uncertainty	Units	MDA	RDL
519510	1201068238	LCS	26-APR-06	Cobalt-60	645.8	49.12	pCi/L	15.69	N
				Gross Gamma	3193	746.2	pCi/L	1536	N
				Neptunium-237	2637	197.5	pCi/L	130.8	N
				Promethium-147	2.960E+08	3.437E+07	pCi/L	5.405E+07	N
				Tin-113	100.3	26.19	pCi/L	17.38	N
				Tin-126	898.1	67.27	pCi/L	43.85	N
				Yttrium-88	127.9	30.16	pCi/L	13.35	N

# GEL QUALS

Batch ID: 519510

Report run on: April 26, 2006 4:02 PM

**Samp Id      Parmname      Cofa   Edd      Qual Comments      Auto   Result   MDA   Uncert   SQL**

158272001-1 25-APR-2006 18:37	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
158275001-1 25-APR-2006 18:37	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
158276001-1 25-APR-2006 18:37	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
158496001-1 25-APR-2006 18:38	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
158971004-1 25-APR-2006 18:39	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
159244001-1 25-APR-2006 18:42	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
159242002-1 25-APR-2006 18:43	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
1201068236-1 MB 25-APR-2006 18:43	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			
159247001-1 25-APR-2006 18:46	Bismuth-212	UI	UI	UI	Data rejected due to low abundance.	0			
	Lead-212	UI	UI	UI	Data rejected due to low abundance.	0			

*mgt 4/26/06*  
*✗ mgt 4/26/06*

VAX/VMS Nuclide Identification Report Generated 26-APR-2006 04:45:35.52

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration   : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159244001.CNF;1
Sample date     : 24-MAR-2006 12:00:00 Acquisition date : 25-APR-2006 18:42:47
Sample ID      : G159244001 Sample quantity   : 2.00000E+00 LITER
Detector name  : GAMMA17 Detector geometry: 2L_MB
Elapsed live time: 0 10:00:00.00 Elapsed real time: 0 10:00:02.82 0.0%
Energy tolerance: 2.00000 KEV Analyst Initials : MJH1
Abundance limit : 75.00000 Sensitivity      : 3.00000
Batch ID       : 519510 Detector SN#      : 30-TN10348
Matrix Spike DPM : LCS DPM                  :
*****

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.59*	8	822	0.96	81.04	77	9	2.34E-04	797.9	
2	0	53.66*	31	681	1.18	95.24	91	7	8.49E-04	167.6	
3	4	63.54*	94	506	0.90	115.07	111	14	2.62E-03	72.0	9.18E-01
4	4	66.14	171	850	1.59	120.31	111	14	4.76E-03	30.2	
5	0	84.49*	34	738	1.31	157.14	154	8	9.37E-04	169.6	
6	0	133.84	48	441	1.01	256.26	254	7	1.34E-03	73.8	
7	0	140.00	160	609	1.09	268.62	263	10	4.45E-03	30.0	
8	0	186.06*	18	654	1.05	361.13	355	12	5.03E-03	44.8	
9	0	198.74*	94	403	0.94	386.59	383	8	2.62E-03	45.7	
10	0	252.89	20	241	0.99	495.35	494	6	5.68E-04	121.4	
11	0	326.22	40	244	1.79	642.63	639	8	1.10E-03	70.3	
12	0	500.23	31	119	1.24	992.15	989	7	8.75E-04	59.8	
13	0	583.67*	26	199	0.84	1159.75	1153	13	7.27E-04	142.6	
14	0	596.83	64	217	0.96	1186.18	1180	12	1.79E-03	47.4	
15	0	642.89	16	120	0.59	1278.70	1277	8	4.45E-04	120.4	
16	0	669.45*	44	121	3.10	1332.06	1328	12	1.23E-03	61.9	
17	0	694.74*	32	113	0.88	1382.87	1378	11	8.92E-04	73.7	
18	0	898.35	28	86	1.32	1791.94	1788	10	7.90E-04	63.5	
19	0	945.09	5	55	1.29	1885.84	1884	7	1.52E-04	227.7	
20	0	1001.65	42	43	1.73	1999.49	1996	8	1.15E-03	31.6	
21	0	1027.76	20	73	3.24	2051.94	2049	11	5.49E-04	88.4	
22	0	1120.53*	9	54	0.85	2238.35	2235	9	2.46E-04	213.3	
23	0	1274.12*	1	65	0.98	2546.99	2546	11	2.38E-05	*****	
24	3	1323.16	39	24	2.48	2645.53	2641	17	1.09E-03	25.3	2.84E+00
25	3	1327.69	30	6	2.18	2654.64	2641	17	8.38E-04	25.4	
26	0	1342.81	15	12	1.35	2685.02	2683	5	4.19E-04	43.3	
27	0	1349.89	24	20	2.58	2699.25	2696	8	6.67E-04	38.2	
28	0	1358.68	30	57	6.25	2716.91	2706	18	8.24E-04	63.1	
29	0	1463.33*	18	69	4.68	2927.23	2916	22	4.97E-04	144.5	
30	0	1473.38	35	53	7.21	2947.44	2938	21	9.79E-04	54.1	
31	0	1494.49	27	24	3.27	2989.85	2985	12	7.50E-04	41.1	
32	0	1535.16	5	28	0.55	3071.60	3067	8	1.39E-04	188.7	
33	0	1670.69	19	12	1.39	3344.01	3340	8	5.39E-04	38.3	
34	0	1746.42	12	6	1.40	3496.21	3494	7	3.41E-04	44.8	
35	0	1773.27*	5	2	1.72	3550.20	3548	6	1.34E-04	169.6	
36	0	1905.73	30	20	2.24	3816.46	3809	19	8.41E-04	39.1	
37	0	1916.65	22	37	10.10	3838.41	3827	29	6.20E-04	80.4	
38	0	1988.26*	16	6	2.20	3982.37	3976	12	4.41E-04	46.0	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
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Flag: "\*" = Peak area was modified by background subtraction



VAX/VMS Nuclide Identification Report Generated

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*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
*                               DETECTOR DATA                                       *
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159244001             *
* Acquisition date   : 25-APR-2006 18:42:47 Detector SN#      : 30-TN10348         *
* Detector ID       : GAMMA17 Sensitivity                    : 3.000                 *
* Geometry          : 2L_MB Energy tolerance:                : 2.000                 *
* Elapsed live time : 0 10:00:00.00 Abundance limit          : 75.000                *
* Elapsed real time : 0 10:00:02.82 Half life ratio         : 8.000                 *
*****
*                               SAMPLE DATA                                         *
* Sample date       : 24-MAR-2006 12:00:00 Nuclide Library   : FERMC                 *
* Sample ID        : G159244001 Analyst initials:           : MJH1                 *
* Batch Number     : 519510 Sample Quantity:                : 2.0000E+00 LITER     *
* Recovery         : 1.00000 Carrier Weight :                : 0.00000              *
*****
*                               QC DATA                                             *
* Standard Weight  : 0.00000 MS Isotope                      :                               *
* CALIB. DATE/TIME : 6-JAN-2006 16:48:24 MSD Isotope        :                               *
* MSD DPM          : ***** LCS Isotope                    :                               *
* LCS DPM         : 0.000 LCS Isotope                        :                               *
* LCSD DPM        : 0.000 LCSD Isotope                       :                               *
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
NA-22	7.036E-02	2.706E+00	2.965E+00	0.000E+00
CE-144	6.849E+00	1.011E+01	1.414E+01	0.000E+00
TM-171	1.565E+03	9.461E+02	1.119E+03	0.000E+00
BI-210	3.543E+00	5.655E+01	4.489E+01	0.000E+00
PB-210	3.543E+00	5.655E+01	4.489E+01	0.000E+00
PA-234M	3.243E+02	2.052E+02	3.099E+02	0.000E+00
NP-237	3.558E+00	1.207E+01	1.134E+01	0.000E+00
U-238	3.519E+01	5.063E+01	4.365E+01	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )	
BE-7	-9.945E+00	1.788E+01	3.014E+01	0.000E+00 NOT IDENT.
NA-24	0.000E+00	7.113E+15	0.000E+00	0.000E+00 SHORT HLIF
AL-26	1.586E+00	1.505E+00	3.113E+00	0.000E+00 NOT IDENT.
K-40	1.743E+01	1.818E+01	3.444E+01	0.000E+00 NOT IDENT.
SC-46	1.006E-01	2.263E+00	3.834E+00	0.000E+00 FAIL ABUN
V-48	-3.729E+00	6.259E+00	1.071E+01	0.000E+00 FAIL ABUN
CR-51	-3.811E-01	2.276E+01	4.006E+01	0.000E+00 NOT IDENT.
MN-54	8.295E-01	1.809E+00	3.161E+00	0.000E+00 NOT IDENT.
CO-56	8.808E-01	2.214E+00	3.856E+00	0.000E+00 NOT IDENT.
MN-56	0.000E+00	2.000E+41	0.000E+00	0.000E+00 SHORT HLIF
CO-57	4.379E-01	1.053E+00	1.809E+00	0.000E+00 NOT IDENT.
CO-58	1.290E+00	2.035E+00	3.638E+00	0.000E+00 NOT IDENT.
FE-59	-1.050E+00	5.104E+00	8.919E+00	0.000E+00 NOT IDENT.
CO-60	4.401E-01	1.712E+00	3.106E+00	0.000E+00 NOT IDENT.
ZN-65	2.166E+00	3.448E+00	6.454E+00	0.000E+00 NOT IDENT.
SE-75	7.171E-01	1.976E+00	3.317E+00	0.000E+00 FAIL ABUN
KR-85	-9.891E+02	4.377E+02	6.823E+02	0.000E+00 NOT IDENT.
SR-85	-6.084E+00	2.693E+00	4.197E+00	0.000E+00 NOT IDENT.
Y-88	5.216E-01	2.189E+00	4.104E+00	0.000E+00 FAIL ABUN

Y-91	1.391E+00	1.915E+00	3.456E+00	0.000E+00	NOT IDENT.
NB-94	-1.204E-01	1.556E+00	2.640E+00	0.000E+00	NOT IDENT.
NB-95	2.701E+00	2.886E+00	5.235E+00	0.000E+00	NOT IDENT.
NB-95M	0.000E+00	2.168E+03	0.000E+00	0.000E+00	SHORT HLIF
ZR-95	-9.762E-01	3.816E+00	6.397E+00	0.000E+00	NOT IDENT.
MO-99	0.000E+00	5.982E+03	0.000E+00	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.660E+39	0.000E+00	0.000E+00	SHORT HLIF
RU-103	-8.220E-01	2.773E+00	4.132E+00	0.000E+00	NOT IDENT.
RH-106	8.037E+00	1.520E+01	2.693E+01	0.000E+00	NOT IDENT.
RU-106	8.270E+00	1.510E+01	2.680E+01	0.000E+00	NOT IDENT.
AG-108M	-6.374E-01	1.383E+00	2.357E+00	0.000E+00	NOT IDENT.
CD-109	-1.152E+01	2.664E+01	4.022E+01	0.000E+00	NOT IDENT.
AG-110M	-1.111E+00	1.740E+00	2.860E+00	0.000E+00	NOT IDENT.
SN-113	1.463E+00	2.088E+00	3.763E+00	0.000E+00	NOT IDENT.
CD-115	0.000E+00	1.007E+05	0.000E+00	0.000E+00	SHORT HLIF
SN-115	1.721E+02	1.995E+02	3.764E+02	0.000E+00	NOT IDENT.
SN-117M	3.109E+00	5.155E+00	8.849E+00	0.000E+00	NOT IDENT.
TE-123M	9.325E-01	1.210E+00	2.090E+00	0.000E+00	NOT IDENT.
SB-124	1.933E-01	4.865E+00	8.660E+00	0.000E+00	NOT IDENT.
SB-125	-2.817E+00	3.943E+00	6.635E+00	0.000E+00	NOT IDENT.
TE-125M	1.394E+02	4.297E+02	7.382E+02	0.000E+00	NOT IDENT.
I-126	9.011E+00	2.253E+01	3.506E+01	0.000E+00	NOT IDENT.
SB-126	3.775E+00	1.767E+01	3.054E+01	0.000E+00	FAIL ABUN
SN-126	-1.523E+00	2.615E+00	3.925E+00	0.000E+00	FAIL ABUN
SB-127	0.000E+00	1.399E+03	0.000E+00	0.000E+00	SHORT HLIF
I-131	-2.238E+00	2.029E+01	3.548E+01	0.000E+00	NOT IDENT.
I-132	0.000E+00	1.239E+41	0.000E+00	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.052E+03	0.000E+00	0.000E+00	SHORT HLIF
BA-133	-9.747E-01	1.831E+00	3.137E+00	0.000E+00	NOT IDENT.
I-133	0.000E+00	2.757E+11	0.000E+00	0.000E+00	SHORT HLIF
CS-134	5.530E-01	1.744E+00	3.053E+00	0.000E+00	NOT IDENT.
CS-135	-6.889E+00	6.504E+00	1.020E+01	0.000E+00	NOT IDENT.
I-135	0.000E+00	1.897E+36	0.000E+00	0.000E+00	SHORT HLIF
CS-136	-3.281E+00	1.130E+01	1.972E+01	0.000E+00	FAIL ABUN
BA-137M	4.671E-01	1.556E+00	2.721E+00	0.000E+00	NOT IDENT.
CS-137	4.937E-01	1.644E+00	2.877E+00	0.000E+00	NOT IDENT.
CE-139	-8.620E-01	1.254E+00	2.052E+00	0.000E+00	NOT IDENT.
BA-140	-7.730E+00	2.886E+01	4.921E+01	0.000E+00	NOT IDENT.
LA-140	-4.411E+00	1.011E+01	1.703E+01	0.000E+00	NOT IDENT.
CE-141	2.024E+00	3.527E+00	6.056E+00	0.000E+00	NOT IDENT.
CE-143	0.000E+00	3.244E+07	0.000E+00	0.000E+00	SHORT HLIF
PM-144	1.640E+00	2.416E+00	2.581E+00	0.000E+00	FAIL ABUN
PR-144	0.000E+00	1.473E+41	0.000E+00	0.000E+00	SHORT HLIF
PM-146	-7.046E-01	1.927E+00	3.290E+00	0.000E+00	NOT IDENT.
ND-147	8.388E+00	7.227E+01	1.261E+02	0.000E+00	NOT IDENT.
PM-147	3.546E+06	2.096E+06	3.742E+06	0.000E+00	NOT IDENT.
PM-149	0.000E+00	8.511E+05	0.000E+00	0.000E+00	SHORT HLIF
EU-152	6.912E-01	3.902E+00	6.908E+00	0.000E+00	NOT IDENT.
GD-153	3.760E-01	2.965E+00	5.077E+00	0.000E+00	FAIL ABUN
EU-154	1.948E-01	7.491E+00	9.359E+00	0.000E+00	FAIL ABUN
EU-155	-2.293E+00	3.906E+00	6.534E+00	0.000E+00	NOT IDENT.
TB-160	-2.485E+00	7.941E+00	1.312E+01	0.000E+00	NOT IDENT.
HF-181	4.114E-01	2.520E+00	4.409E+00	0.000E+00	FAIL ABUN
TA-182	1.878E-01	7.722E+00	1.372E+01	0.000E+00	FAIL ABUN
IR-192	2.375E-01	1.637E+00	2.901E+00	0.000E+00	NOT IDENT.
HG-203	2.433E+00	2.012E+00	3.512E+00	0.000E+00	FAIL ABUN
BI-207	5.907E-01	2.153E+00	3.921E+00	0.000E+00	FAIL ABUN
TL-208	1.308E+00	3.729E+00	3.543E+00	0.000E+00	FAIL ABUN
BI-211	7.224E+00	8.553E+00	1.549E+01	0.000E+00	NOT IDENT.
PB-211	9.262E+00	3.803E+01	6.723E+01	0.000E+00	NOT IDENT.
BI-212	-1.950E+00	1.336E+01	2.257E+01	0.000E+00	NOT IDENT.
PB-212	0.000E+00	2.583E+00	4.647E+00	0.000E+00	NOT IDENT.
BI-214	3.397E+00	3.349E+00	6.030E+00	0.000E+00	FAIL ABUN
PB-214	3.244E+00	3.011E+00	5.494E+00	0.000E+00	NOT IDENT.
RN-219	-1.353E+01	1.712E+01	2.880E+01	0.000E+00	NOT IDENT.
RA-223	-4.340E+00	2.904E+01	4.478E+01	0.000E+00	NOT IDENT.
RA-224	-2.441E+01	2.821E+01	4.497E+01	0.000E+00	NOT IDENT.
RA-226	3.397E+00	3.349E+00	6.030E+00	0.000E+00	NOT IDENT.
AC-227	-6.369E+00	1.836E+01	2.641E+01	0.000E+00	NOT IDENT.
TH-227	-6.260E+00	1.805E+01	2.596E+01	0.000E+00	NOT IDENT.
AC-228	5.817E+00	6.113E+00	1.152E+01	0.000E+00	NOT IDENT.
RA-228	5.817E+00	6.113E+00	1.152E+01	0.000E+00	NOT IDENT.
TH-228	0.000E+00	2.583E+00	4.648E+00	0.000E+00	FAIL ABUN
TH-229	1.340E-01	1.906E+01	3.185E+01	0.000E+00	FAIL ABUN
TH-230	3.396E+00	3.349E+00	6.030E+00	0.000E+00	NOT IDENT.
PA-231	2.535E+00	6.138E+01	1.014E+02	0.000E+00	NOT IDENT.
TH-231	2.604E+00	7.591E+00	1.270E+01	0.000E+00	FAIL ABUN
TH-232	0.000E+00	2.501E+00	4.500E+00	0.000E+00	NOT IDENT.

PA-233	8.474E-02	2.748E+00	4.514E+00	0.000E+00	NOT IDENT.
PA-234	2.858E+00	1.301E+01	2.367E+01	0.000E+00	FAIL ABUN
TH-234	3.519E+01	5.063E+01	6.549E+01	0.000E+00	FAIL ABUN
U-234	3.869E+00	5.505E+00	9.337E+00	0.000E+00	FAIL ABUN
U-235	0.000E+00	8.194E+00	1.462E+01	0.000E+00	FAIL ABUN
NP-239	-4.767E+00	7.349E+00	1.222E+01	0.000E+00	NOT IDENT.
AM-241	-1.521E+00	2.560E+00	4.361E+00	0.000E+00	NOT IDENT.
AM-242	-2.346E+01	7.790E+01	1.316E+02	0.000E+00	NOT IDENT.
CM-247	-1.146E+00	1.510E+00	2.543E+00	0.000E+00	NOT IDENT.
CF-249	-2.918E-01	1.658E+00	2.878E+00	0.000E+00	FAIL ABUN
CF-251	7.866E-01	4.974E+00	8.378E+00	0.000E+00	NOT IDENT.
ANH-511	0.000E+00	1.940E+00	4.025E+00	0.000E+00	NOT IDENT.

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159244001.CNF;1
Sample date        : 24-MAR-2006 12:00:00 Acquisition date : 25-APR-2006 18:42:47
Sample ID          : G159244001 Sample quantity : 2.00000E+00 LITER
Detector name     : GAMMA17 Detector geometry: 2L_MB
Elapsed live time : 0 10:00:00.00 Elapsed real time: 0 10:00:02.82 0.0%
Energy tolerance  : 2.00000 KEV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# : 30-TN10348
Matrix Spike DPM : LCS DPM :
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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.59	385	822	0.96	81.04	77	9	1.07E-02	14.3	
2	0	53.66	70	681	1.18	95.24	91	7	1.96E-03	62.7	
3	4	63.54	821	506	0.90	115.07	111	14	2.28E-02	5.4	9.18E-01
4	4	66.14	171	850	1.59	120.31	111	14	4.76E-03	30.2	
5	0	84.49	146	738	1.31	157.14	154	8	4.06E-03	33.2	
6	0	92.99	1070	912	1.07	174.22	170	10	2.97E-02	6.1	
7	0	133.84	48	441	1.01	256.26	254	7	1.34E-03	73.8	
8	0	140.00	160	609	1.09	268.62	263	10	4.45E-03	30.0	
9	0	143.98	146	452	1.37	276.62	273	8	4.06E-03	26.5	
10	0	163.36	62	380	1.89	315.54	313	7	1.71E-03	53.9	
11	0	186.06	484	654	1.05	361.13	355	12	1.34E-02	11.5	
12	0	198.74	147	403	0.94	386.59	383	8	4.08E-03	25.1	
13	0	238.98	127	514	0.99	467.41	462	10	3.53E-03	34.6	
14	0	252.89	20	241	0.99	495.35	494	6	5.68E-04	121.4	
15	0	326.22	40	244	1.79	642.63	639	8	1.10E-03	70.3	
16	0	352.27	51	275	1.15	694.96	691	9	1.42E-03	60.2	
17	0	500.23	31	119	1.24	992.15	989	7	8.75E-04	59.8	
18	0	511.45	480	302	2.68	1014.67	1008	18	1.33E-02	9.6	
19	0	583.67	102	199	0.84	1159.75	1153	13	2.85E-03	30.0	
20	0	596.83	64	217	0.96	1186.18	1180	12	1.79E-03	47.4	
21	0	609.74	61	137	1.47	1212.13	1208	9	1.69E-03	36.9	
22	0	638.27	6	122	0.89	1269.42	1264	9	1.70E-04	327.1	
23	0	642.89	16	120	0.59	1278.70	1277	8	4.45E-04	120.4	
24	0	669.45	60	121	3.10	1332.06	1328	12	1.66E-03	39.3	
25	0	694.74	45	113	0.88	1382.87	1378	11	1.24E-03	48.8	
26	0	802.26	31	102	2.26	1598.88	1596	10	8.50E-04	64.0	
27	0	898.35	28	86	1.32	1791.94	1788	10	7.90E-04	63.5	
28	0	911.91	28	52	1.40	1819.17	1816	6	7.88E-04	44.7	
29	0	945.09	5	55	1.29	1885.84	1884	7	1.52E-04	227.7	
30	0	969.41	9	116	0.77	1934.71	1931	11	2.36E-04	247.2	
31	0	1001.65	42	43	1.73	1999.49	1996	8	1.15E-03	31.6	
32	0	1027.76	20	73	3.24	2051.94	2049	11	5.49E-04	88.4	
33	0	1120.53	17	54	0.85	2238.35	2235	9	4.72E-04	81.6	
34	0	1274.12	10	65	0.98	2546.99	2546	11	2.91E-04	150.6	
35	3	1323.16	39	24	2.48	2645.53	2641	17	1.09E-03	25.3	2.84E+00
36	3	1327.69	30	6	2.18	2654.64	2641	17	8.38E-04	25.4	
37	0	1342.81	15	12	1.35	2685.02	2683	5	4.19E-04	43.3	
38	0	1349.89	24	20	2.58	2699.25	2696	8	6.67E-04	38.2	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1358.68	30	57	6.25	2716.91	2706	18	8.24E-04	63.1	
40	0	1463.33	59	69	4.68	2927.23	2916	22	1.64E-03	38.7	
41	0	1473.38	35	53	7.21	2947.44	2938	21	9.79E-04	54.1	
42	0	1494.49	27	24	3.27	2989.85	2985	12	7.50E-04	41.1	
43	0	1535.16	5	28	0.55	3071.60	3067	8	1.39E-04	188.7	
44	0	1664.97	12	16	1.59	3332.50	3330	8	3.33E-04	64.5	
45	0	1670.69	19	12	1.39	3344.01	3340	8	5.39E-04	38.3	
46	0	1746.42	12	6	1.40	3496.21	3494	7	3.41E-04	44.8	
47	0	1773.27	17	2	1.72	3550.20	3548	6	4.71E-04	28.6	
48	0	1905.73	30	20	2.24	3816.46	3809	19	8.41E-04	39.1	
49	0	1916.65	22	37	10.10	3838.41	3827	29	6.20E-04	80.4	
50	0	1988.26	21	6	2.20	3982.37	3976	12	5.94E-04	31.4	

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                 *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159244001.CNF;1
Sample date        : 24-MAR-2006 12:00:00 Acquisition date : 25-APR-2006 18:42:47
Sample ID          : G159244001           Sample quantity  : 2.00000E+00 LITER
Detector name     : GAMMA17              Detector geometry: 2L_MB
Elapsed live time : 0 10:00:00.00        Elapsed real time: 0 10:00:02.82  0.0%
Energy tolerance  : 2.00000 KEV          Analyst Initials  : MJH1
Abundance limit   : 75.00000             Sensitivity       : 3.00000
Batch ID          : 519510                Detector SN#      : 30-TN10348
Matrix Spike DPM  :                       LCS DPM         :
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Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
NA-22	1274.53	1	99.94*	4.692E-01	6.871E-02	7.036E-02	3845.53
CE-144	133.51	48	10.80*	2.654E+00	6.328E+00	6.849E+00	147.67
TM-171	51.87	31	0.81	2.434E+00	5.825E+01	6.015E+01	335.22
	59.40	-----	0.21	2.569E+00	-----	Line Not Found	-----
	66.72	171	0.16*	2.684E+00	1.516E+03	1.565E+03	60.45
BI-210	46.50	8	4.05*	2.209E+00	3.534E+00	3.543E+00	1595.78
PB-210	46.50	8	4.05*	2.209E+00	3.534E+00	3.543E+00	1595.78
PA-234M	766.40	-----	0.21	7.196E-01	-----	Line Not Found	-----
	1001.03	42	0.85*	5.696E-01	3.243E+02	3.243E+02	63.27
NP-237	86.48	34	12.60*	2.826E+00	3.558E+00	3.558E+00	339.17
	95.87	-----	2.60	2.832E+00	-----	Line Not Found	-----
U-238	63.29	94	3.80*	2.645E+00	3.519E+01	3.519E+01	143.91

Flag: "\*" = Keyline

Total number of lines in spectrum 38  
 Number of unidentified lines 20  
 Number of lines tentatively identified by NID 18 47.37%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
NA-22	2.60Y	1.02	6.871E-02	7.036E-02	270.6E-02	3845.53	
CE-144	284.30D	1.08	6.328E+00	6.849E+00	10.11E+00	147.67	
TM-171	1.92Y	1.03	1.516E+03	1.565E+03	0.946E+03	60.45	
BI-210	22.26Y	1.00	3.534E+00	3.543E+00	56.55E+00	1595.78	
PB-210	22.26Y	1.00	3.534E+00	3.543E+00	56.55E+00	1595.78	
PA-234M	4.47E+09Y	1.00	3.243E+02	3.243E+02	2.052E+02	63.27	
NP-237	2.14E+06Y	1.00	3.558E+00	3.558E+00	12.07E+00	339.17	
U-238	4.47E+09Y	1.00	3.519E+01	3.519E+01	5.063E+01	143.91	
Total Activity :			1.892E+03	1.942E+03			

Grand Total Activity : 1.892E+03 1.942E+03

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	140.00	160	609	1.09	268.62	263	10	4.45E-03	59.9	2.61E+00	T
0	186.06	18	654	1.05	361.13	355	12	5.03E-04	****	2.29E+00	T
0	198.74	94	403	0.94	386.59	383	8	2.62E-03	91.5	2.20E+00	T
0	252.89	20	241	0.99	495.35	494	6	5.68E-04	****	1.88E+00	T
0	326.22	40	244	1.79	642.63	639	8	1.10E-03	****	1.54E+00	
0	500.23	31	119	1.24	992.15	989	7	8.75E-04	****	1.06E+00	
0	583.67	26	199	0.84	1159.75	1153	13	7.27E-04	****	9.22E-01	T
0	596.83	64	217	0.96	1186.18	1180	12	1.79E-03	94.7	9.03E-01	
0	642.89	16	120	0.59	1278.70	1277	8	4.45E-04	****	8.44E-01	
0	669.45	44	121	3.10	1332.06	1328	12	1.23E-03	****	8.13E-01	T
0	694.74	32	113	0.88	1382.87	1378	11	8.92E-04	****	7.86E-01	T
0	898.35	28	86	1.32	1791.94	1788	10	7.90E-04	****	6.25E-01	T
0	945.09	5	55	1.29	1885.84	1884	7	1.52E-04	****	5.98E-01	T
0	1027.76	20	73	3.24	2051.94	2049	11	5.49E-04	****	5.57E-01	
0	1120.53	9	54	0.85	2238.35	2235	9	2.46E-04	****	5.19E-01	T
3	1323.16	39	24	2.48	2645.53	2641	17	1.09E-03	50.5	4.56E-01	
3	1327.69	30	6	2.18	2654.64	2641	17	8.38E-04	50.7	4.55E-01	
0	1342.81	15	12	1.35	2685.02	2683	5	4.19E-04	86.6	4.51E-01	
0	1349.89	24	20	2.58	2699.25	2696	8	6.67E-04	76.4	4.49E-01	
0	1358.68	30	57	6.25	2716.91	2706	18	8.24E-04	****	4.47E-01	
0	1463.33	18	69	4.68	2927.23	2916	22	4.97E-04	****	4.24E-01	
0	1473.38	35	53	7.21	2947.44	2938	21	9.79E-04	****	4.22E-01	
0	1494.49	27	24	3.27	2989.85	2985	12	7.50E-04	82.2	4.18E-01	
0	1535.16	5	28	0.55	3071.60	3067	8	1.39E-04	****	4.10E-01	
0	1670.69	19	12	1.39	3344.01	3340	8	5.39E-04	76.5	3.88E-01	
0	1746.42	12	6	1.40	3496.21	3494	7	3.41E-04	89.6	3.77E-01	
0	1773.27	5	2	1.72	3550.20	3548	6	1.34E-04	****	3.74E-01	
0	1905.73	30	20	2.24	3816.46	3809	19	8.41E-04	78.2	3.58E-01	
0	1916.65	22	37	10.10	3838.41	3827	29	6.20E-04	****	3.57E-01	
0	1988.26	16	6	2.20	3982.37	3976	12	4.41E-04	91.9	3.50E-01	

Flags: "T" = Tentatively associated



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*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
*                                     DETECTOR DATA                                   *
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159244001.CNF;1          *
* Acquisition date   : 25-APR-2006 18:42:47  Detector SN#      : 30-TN10348          *
* Detector ID       : GAMMA17                      Sensitivity   : 3.00000          *
* Geometry          : 2L_MB                        Energy tolerance: 2.00000          *
* Elapsed live time : 0 10:00:00.00                Abundance limit : 75.00000          *
* Elapsed real time : 0 10:00:02.82                Half life ratio  : 8.00000          *
*****
*                                     SAMPLE DATA                                   *
* Sample date       : 24-MAR-2006 12:00:00  Nuclide Library  : EPI                    *
* Sample ID        : G159244001              Analyst initials : MJH1                    *
* Batch Number     : 519510                  Sample Quantity  : 2.00000E+00 LITER *
*****
*                                     QC DATA                                   *
* CALIB. DATE/TIME : 6-JAN-2006 16:48:24.61MS Isotope      :                    *
* MSD DPM          :                          MSD Isotope   :                    *
* LCS DPM          :                          LCS Isotope    :                    *
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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NA-22	7.036E-02	2.706E+00	2.965E+00	0.000E+00	0.024
CE-144	6.849E+00	1.011E+01	1.414E+01	0.000E+00	0.485
TM-171	1.565E+03	9.461E+02	1.119E+03	0.000E+00	1.399
BI-210	3.543E+00	5.655E+01	4.489E+01	0.000E+00	0.079
PB-210	3.543E+00	5.655E+01	4.489E+01	0.000E+00	0.079
PA-234M	3.243E+02	2.052E+02	3.099E+02	0.000E+00	1.047
NP-237	3.558E+00	1.207E+01	1.134E+01	0.000E+00	0.314
U-238	3.519E+01	5.063E+01	4.365E+01	0.000E+00	0.806

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

Nuclide	Key-Line Activity K.L. (pCi/LITER) Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BE-7	-9.945E+00	1.788E+01	3.014E+01	0.000E+00	-0.330
AL-26	1.586E+00	1.505E+00	3.113E+00	0.000E+00	0.509
K-40	1.743E+01	1.818E+01	3.444E+01	0.000E+00	0.506
SC-46	1.006E-01	2.263E+00	3.834E+00	0.000E+00	0.026

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
V-48	-3.729E+00		6.259E+00	1.071E+01	0.000E+00	-0.348
CR-51	-3.811E-01		2.276E+01	4.006E+01	0.000E+00	-0.010
MN-54	8.295E-01		1.809E+00	3.161E+00	0.000E+00	0.262
CO-56	8.808E-01		2.214E+00	3.856E+00	0.000E+00	0.228
CO-57	4.379E-01		1.053E+00	1.809E+00	0.000E+00	0.242
CO-58	1.290E+00		2.035E+00	3.638E+00	0.000E+00	0.355
FE-59	-1.050E+00		5.104E+00	8.919E+00	0.000E+00	-0.118
CO-60	4.401E-01		1.712E+00	3.106E+00	0.000E+00	0.142
ZN-65	2.166E+00		3.448E+00	6.454E+00	0.000E+00	0.336
SE-75	7.171E-01		1.976E+00	3.317E+00	0.000E+00	0.216
KR-85	-9.891E+02		4.377E+02	6.823E+02	0.000E+00	-1.450
SR-85	-6.084E+00		2.693E+00	4.197E+00	0.000E+00	-1.450
Y-88	5.216E-01		2.189E+00	4.104E+00	0.000E+00	0.127
Y-91	1.391E+00		1.915E+00	3.456E+00	0.000E+00	0.403
NB-94	-1.204E-01		1.556E+00	2.640E+00	0.000E+00	-0.046
NB-95	2.701E+00		2.886E+00	5.235E+00	0.000E+00	0.516
ZR-95	-9.762E-01		3.816E+00	6.397E+00	0.000E+00	-0.153
RU-103	-8.220E-01		2.773E+00	4.132E+00	0.000E+00	-0.199
RH-106	8.037E+00		1.520E+01	2.693E+01	0.000E+00	0.298
RU-106	8.270E+00		1.510E+01	2.680E+01	0.000E+00	0.309
AG-108M	-6.374E-01		1.383E+00	2.357E+00	0.000E+00	-0.270
CD-109	-1.152E+01		2.664E+01	4.022E+01	0.000E+00	-0.286
AG-110M	-1.111E+00		1.740E+00	2.860E+00	0.000E+00	-0.389
SN-113	1.463E+00		2.088E+00	3.763E+00	0.000E+00	0.389
SN-115	1.721E+02		1.995E+02	3.764E+02	0.000E+00	0.457
SN-117M	3.109E+00		5.155E+00	8.849E+00	0.000E+00	0.351
TE-123M	9.325E-01		1.210E+00	2.090E+00	0.000E+00	0.446
SB-124	1.933E-01		4.865E+00	8.660E+00	0.000E+00	0.022
SB-125	-2.817E+00		3.943E+00	6.635E+00	0.000E+00	-0.425
TE-125M	1.394E+02		4.297E+02	7.382E+02	0.000E+00	0.189
I-126	9.011E+00		2.253E+01	3.506E+01	0.000E+00	0.257
SB-126	3.775E+00		1.767E+01	3.054E+01	0.000E+00	0.124
SN-126	-1.523E+00		2.615E+00	3.925E+00	0.000E+00	-0.388
I-131	-2.238E+00		2.029E+01	3.548E+01	0.000E+00	-0.063
BA-133	-9.747E-01		1.831E+00	3.137E+00	0.000E+00	-0.311
CS-134	5.530E-01		1.744E+00	3.053E+00	0.000E+00	0.181
CS-135	-6.889E+00		6.504E+00	1.020E+01	0.000E+00	-0.675
CS-136	-3.281E+00		1.130E+01	1.972E+01	0.000E+00	-0.166
BA-137M	4.671E-01		1.556E+00	2.721E+00	0.000E+00	0.172
CS-137	4.937E-01		1.644E+00	2.877E+00	0.000E+00	0.172
CE-139	-8.620E-01		1.254E+00	2.052E+00	0.000E+00	-0.420
BA-140	-7.730E+00		2.886E+01	4.921E+01	0.000E+00	-0.157
LA-140	-4.411E+00		1.011E+01	1.703E+01	0.000E+00	-0.259
CE-141	2.024E+00		3.527E+00	6.056E+00	0.000E+00	0.334
PM-144	1.640E+00	+	2.416E+00	2.581E+00	0.000E+00	0.635
PM-146	-7.046E-01		1.927E+00	3.290E+00	0.000E+00	-0.214
ND-147	8.388E+00		7.227E+01	1.261E+02	0.000E+00	0.067
PM-147	3.546E+06		2.096E+06	3.742E+06	0.000E+00	0.947

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
EU-152	6.912E-01		3.902E+00	6.908E+00	0.000E+00	0.100
GD-153	3.760E-01		2.965E+00	5.077E+00	0.000E+00	0.074
EU-154	1.948E-01	+	7.491E+00	9.359E+00	0.000E+00	0.021
EU-155	-2.293E+00		3.906E+00	6.534E+00	0.000E+00	-0.351
TB-160	-2.485E+00		7.941E+00	1.312E+01	0.000E+00	-0.189
HF-181	4.114E-01		2.520E+00	4.409E+00	0.000E+00	0.093
TA-182	1.878E-01		7.722E+00	1.372E+01	0.000E+00	0.014
IR-192	2.375E-01		1.637E+00	2.901E+00	0.000E+00	0.082
HG-203	2.433E+00		2.012E+00	3.512E+00	0.000E+00	0.693
BI-207	5.907E-01		2.153E+00	3.921E+00	0.000E+00	0.151
TL-208	1.308E+00	+	3.729E+00	3.543E+00	0.000E+00	0.369
BI-211	7.224E+00		8.553E+00	1.549E+01	0.000E+00	0.466
PB-211	9.262E+00		3.803E+01	6.723E+01	0.000E+00	0.138
BI-212	-1.950E+00		1.336E+01	2.257E+01	0.000E+00	-0.086
PB-212	6.651E+00		2.583E+00	4.647E+00	0.000E+00	1.431
BI-214	3.397E+00		3.349E+00	6.030E+00	0.000E+00	0.563
PB-214	3.244E+00		3.011E+00	5.494E+00	0.000E+00	0.590
RN-219	-1.353E+01		1.712E+01	2.880E+01	0.000E+00	-0.470
RA-223	-4.340E+00		2.904E+01	4.478E+01	0.000E+00	-0.097
RA-224	-2.441E+01		2.821E+01	4.497E+01	0.000E+00	-0.543
RA-226	3.397E+00		3.349E+00	6.030E+00	0.000E+00	0.563
AC-227	-6.369E+00		1.836E+01	2.641E+01	0.000E+00	-0.241
TH-227	-6.260E+00		1.805E+01	2.596E+01	0.000E+00	-0.241
AC-228	5.817E+00		6.113E+00	1.152E+01	0.000E+00	0.505
RA-228	5.817E+00		6.113E+00	1.152E+01	0.000E+00	0.505
TH-228	6.659E+00		2.583E+00	4.648E+00	0.000E+00	1.433
TH-229	1.340E-01		1.906E+01	3.185E+01	0.000E+00	0.004
TH-230	3.396E+00		3.349E+00	6.030E+00	0.000E+00	0.563
PA-231	2.535E+00		6.138E+01	1.014E+02	0.000E+00	0.025
TH-231	2.604E+00		7.591E+00	1.270E+01	0.000E+00	0.205
TH-232	6.450E+00		2.501E+00	4.500E+00	0.000E+00	1.433
PA-233	8.474E-02		2.748E+00	4.514E+00	0.000E+00	0.019
PA-234	2.858E+00	+	1.301E+01	2.367E+01	0.000E+00	0.121
TH-234	3.519E+01	+	5.063E+01	6.549E+01	0.000E+00	0.537
U-234	3.869E+00		5.505E+00	9.337E+00	0.000E+00	0.414
U-235	1.495E+01		8.194E+00	1.462E+01	0.000E+00	1.023
NP-239	-4.767E+00		7.349E+00	1.222E+01	0.000E+00	-0.390
AM-241	-1.521E+00		2.560E+00	4.361E+00	0.000E+00	-0.349
AM-242	-2.346E+01		7.790E+01	1.316E+02	0.000E+00	-0.178
CM-247	-1.146E+00		1.510E+00	2.543E+00	0.000E+00	-0.450
CF-249	-2.918E-01		1.658E+00	2.878E+00	0.000E+00	-0.101
CF-251	7.866E-01		4.974E+00	8.378E+00	0.000E+00	0.094
ANH-511	1.330E+01		1.940E+00	4.025E+00	0.000E+00	3.305

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*****
*
*                               General Engineering Labs, LLC
*                               2040 SAVAGE ROAD
*                               CHARLESTON ,SC 29417
*                               GROSS GAMMA REPORT
*
*****
*
*   BATCH ID      : 519510          SAMPLE ID   : G159244001
*   ANALYST       : MJH1            DETECTOR    : GAMMA17
*   SAMPLE DATE   : 24-MAR-2006 12:00:00.00  COUNT TIME  : 0 10:00:00.00
*   ANALYSIS DATE: 25-APR-2006 18:42:47.89  SAMPLE ALQT: 2.000 LITER
*
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GROSS GAMMA ACTIVITY (pCi/LITER ) : 5.689E+01
GROSS GAMMA ERROR   (pCi/LITER ) : 6.523E+01
GROSS GAMMA MDA     (pCi/LITER ) : 2.580E+02
GROSS GAMMA DLC     (pCi/LITER ) : 1.261E+02

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VAX/VMS Nuclide Identification Report Generated 26-APR-2006 04:46:35.81

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159247001.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 25-APR-2006 18:46:09
Sample ID          : G159247001 Sample quantity : 2.00000E+00 LITER
Detector name     : GAM19 Detector geometry: 2LMB
Elapsed live time : 0 10:00:00.00 Elapsed real time: 0 10:00:03.46 0.0%
Energy tolerance  : 2.00000 keV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# :
Matrix Spike DPM : LCS DPM :
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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	18.63	89	731	1.65	37.00	35	6	2.47E-03	49.5	0.00E+00
2	0	46.83*	41	492	1.45	93.34	89	9	1.14E-03	120.4	
3	2	63.46*	144	631	1.59	126.55	119	19	3.99E-03	41.9	1.21E+00
4	2	66.45	222	534	1.37	132.52	119	19	6.17E-03	19.4	
5	0	139.97*	157	547	1.35	279.40	275	10	4.37E-03	33.2	
6	0	176.58	207	632	2.92	352.55	346	13	5.75E-03	26.1	
7	0	198.34*	127	437	1.56	396.01	391	10	3.52E-03	46.0	
8	0	205.30	31	390	1.09	409.92	406	9	8.48E-04	118.4	
9	0	239.25*	138	614	1.34	477.75	470	16	3.84E-03	46.9	
10	0	262.42	22	397	3.93	524.03	519	12	6.16E-04	181.2	
11	0	283.63	24	256	0.64	566.41	563	8	6.70E-04	116.4	
12	0	326.90	67	266	2.58	652.88	648	10	1.86E-03	47.6	
13	0	351.80*	75	297	4.73	702.61	697	14	2.07E-03	63.1	
14	0	583.66*	32	138	1.44	1165.93	1160	12	8.75E-04	106.7	
15	0	609.82	90	160	2.33	1218.22	1212	13	2.51E-03	30.7	
16	0	622.49	12	114	0.47	1243.53	1240	10	3.24E-04	174.4	
17	0	630.27	28	75	1.33	1259.08	1254	8	7.92E-04	56.5	
18	0	707.74	60	137	1.65	1413.92	1407	13	1.68E-03	41.9	
19	0	774.15	21	65	1.57	1546.63	1541	9	5.72E-04	75.7	
20	0	787.43	14	91	1.35	1573.19	1569	11	3.84E-04	136.2	
21	0	795.85	39	106	0.82	1590.00	1583	13	1.07E-03	57.5	
22	0	868.26	33	102	5.17	1734.74	1727	14	9.12E-04	67.4	
23	0	1079.72	26	54	1.84	2157.45	2150	12	7.13E-04	60.6	
24	0	1462.26*	17	80	1.33	2922.31	2915	13	4.79E-04	140.0	
25	0	1518.18	12	29	1.74	3034.14	3027	9	3.30E-04	89.0	
26	0	1521.09	13	22	0.73	3039.97	3036	10	3.75E-04	68.4	
27	0	1667.29*	9	49	6.76	3332.35	3320	20	2.60E-04	207.9	
28	1	1700.12	20	37	2.37	3398.02	3393	22	5.51E-04	56.4	2.96E+00
29	1	1705.33	25	36	2.37	3408.43	3393	22	7.06E-04	55.5	
30	0	1709.99	14	12	0.67	3417.76	3414	7	3.86E-04	49.5	
31	6	1750.10	12	4	1.30	3497.98	3496	12	3.40E-04	38.3	8.96E-01
32	6	1752.99	18	12	1.85	3503.77	3496	12	5.00E-04	40.9	
33	0	1787.71	25	97	6.72	3573.20	3551	30	6.94E-04	116.9	
34	0	1848.41	13	29	4.37	3694.64	3685	13	3.49E-04	93.2	
35	0	1967.34	24	35	2.85	3932.53	3921	16	6.62E-04	59.7	

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

VAX/VMS Nuclide Identification Report Generated

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*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
*                               DETECTOR DATA                                       *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159247001
* Acquisition date   : 25-APR-2006 18:46:09 Detector SN#      :
* Detector ID        : GAM19                               Sensitivity      : 3.000
* Geometry           : 2LMB                               Energy tolerance: 2.000
* Elapsed live time  : 0 10:00:00.00                    Abundance limit : 75.000
* Elapsed real time  : 0 10:00:03.46                    Half life ratio  : 8.000
*****
*                               SAMPLE DATA                                         *
*
* Sample date        : 22-MAR-2006 10:20:00 Nuclide Library :
* Sample ID          : G159247001                    Analyst initials: MJH1
* Batch Number       : 519510                        Sample Quantity : 2.0000E+00 LITER
* Recovery           : 1.00000                      Carrier Weight  : 0.00000
*****
*                               QC DATA                                             *
*
* Standard Weight    : 0.00000
* CALIB. DATE/TIME  : 17-FEB-2006 16:09:06 MS Isotope      :
* MSD DPM            : 0.000                          MSD Isotope      :
* LCS DPM            : 0.000                          LCS Isotope      :
* LCSD DPM           : 0.000                          LCSD Isotope     :
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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
K-40	9.849E+00	2.759E+01	1.167E+01	0.000E+00
RU-106	3.959E+00	1.382E+01	1.038E+01	0.000E+00
BI-210	1.065E+02	2.568E+02	1.532E+02	0.000E+00
PB-210	1.065E+02	2.568E+02	1.532E+02	0.000E+00
BI-211	1.227E+01	1.552E+01	6.833E+00	0.000E+00
RA-224	6.127E+01	5.761E+01	2.248E+01	0.000E+00
RA-226	5.990E+00	3.709E+00	2.217E+00	0.000E+00
TH-228	5.426E+00	5.108E+00	1.955E+00	0.000E+00
TH-230	5.990E+00	3.709E+00	2.217E+00	0.000E+00
U-238	1.121E+02	9.633E+01	4.616E+01	0.000E+00
CF-251	1.695E+01	8.944E+00	4.780E+00	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )	
BE-7	2.601E+00	1.464E+01	1.416E+01	0.000E+00 NOT IDENT.
NA-22	-1.934E-01	1.244E+00	1.173E+00	0.000E+00 NOT IDENT.
NA-24	0.000E+00	5.503E+16	0.000E+00	0.000E+00 SHORT HLIF
AL-26	-2.827E-01	1.362E+00	1.299E+00	0.000E+00 NOT IDENT.
SC-46	-6.438E-01	1.387E+00	1.304E+00	0.000E+00 NOT IDENT.
V-48	1.534E+00	4.647E+00	4.624E+00	0.000E+00 NOT IDENT.
CR-51	-1.805E-01	2.463E+01	2.262E+01	0.000E+00 NOT IDENT.
MN-54	-3.475E-01	1.124E+00	1.074E+00	0.000E+00 NOT IDENT.
CO-56	9.327E-01	1.509E+00	1.531E+00	0.000E+00 NOT IDENT.
MN-56	0.000E+00	1.619E+41	0.000E+00	0.000E+00 SHORT HLIF
CO-57	-1.860E-01	1.126E+00	1.061E+00	0.000E+00 NOT IDENT.
CO-58	1.499E+00	1.553E+00	1.552E+00	0.000E+00 NOT IDENT.
FE-59	1.851E+00	3.897E+00	3.885E+00	0.000E+00 NOT IDENT.
CO-60	3.256E-01	1.407E+00	1.367E+00	0.000E+00 NOT IDENT.
ZN-65	-5.230E-01	2.741E+00	2.601E+00	0.000E+00 NOT IDENT.
SE-75	-2.765E-01	2.037E+00	1.724E+00	0.000E+00 FAIL ABUN

KR-85	7.654E+01	3.964E+02	3.810E+02	0.000E+00	NOT IDENT.
SR-85	4.812E-01	2.492E+00	2.396E+00	0.000E+00	NOT IDENT.
Y-88	-8.333E-01	1.713E+00	1.586E+00	0.000E+00	NOT IDENT.
Y-91	-8.687E-01	1.645E+00	1.517E+00	0.000E+00	NOT IDENT.
NB-94	-1.139E+00	1.405E+00	1.056E+00	0.000E+00	NOT IDENT.
NB-95	-1.195E+00	2.165E+00	1.945E+00	0.000E+00	NOT IDENT.
NB-95M	0.000E+00	3.112E+03	0.000E+00	0.000E+00	SHORT HLIF
ZR-95	-1.823E+00	2.864E+00	2.558E+00	0.000E+00	NOT IDENT.
MO-99	0.000E+00	1.039E+04	0.000E+00	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	9.224E+40	0.000E+00	0.000E+00	SHORT HLIF
RU-103	-1.785E+00	2.004E+00	1.807E+00	0.000E+00	FAIL ABUN
RH-106	3.959E+00	1.381E+01	1.065E+01	0.000E+00	FAIL ABUN
AG-108	-8.011E-01	1.177E+00	1.092E+00	0.000E+00	NOT IDENT.
CD-109	-8.087E+01	3.303E+01	2.845E+01	0.000E+00	NOT IDENT.
AG-110M	-4.207E-01	1.175E+00	1.083E+00	0.000E+00	FAIL ABUN
SN-113	-7.211E-01	1.825E+00	1.730E+00	0.000E+00	NOT IDENT.
CD-115	0.000E+00	1.461E+05	0.000E+00	0.000E+00	SHORT HLIF
SN-115	1.834E+01	1.421E+02	1.395E+02	0.000E+00	NOT IDENT.
SN-117M	2.992E+00	5.814E+00	5.562E+00	0.000E+00	NOT IDENT.
TE-123M	3.219E-01	1.267E+00	1.202E+00	0.000E+00	NOT IDENT.
SB-124	-1.446E+00	4.161E+00	3.767E+00	0.000E+00	NOT IDENT.
SB-125	1.559E+00	3.413E+00	3.356E+00	0.000E+00	FAIL ABUN
TE-125M	8.217E+01	4.915E+02	4.693E+02	0.000E+00	NOT IDENT.
I-126	-7.012E+00	1.709E+01	1.570E+01	0.000E+00	NOT IDENT.
SB-126	8.222E+00	1.479E+01	1.440E+01	0.000E+00	NOT IDENT.
SN-126	-3.605E+00	3.032E+00	2.776E+00	0.000E+00	FAIL ABUN
SB-127	0.000E+00	1.494E+03	0.000E+00	0.000E+00	SHORT HLIF
I-131	-3.522E-01	2.196E+01	2.125E+01	0.000E+00	FAIL ABUN
I-132	0.000E+00	6.603E+41	0.000E+00	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.650E+03	0.000E+00	0.000E+00	SHORT HLIF
BA-133	1.360E+00	1.828E+00	1.604E+00	0.000E+00	NOT IDENT.
I-133	0.000E+00	1.047E+12	0.000E+00	0.000E+00	SHORT HLIF
CS-134	0.000E+00	2.020E+00	1.373E+00	0.000E+00	FAIL ABUN
CS-135	1.794E+00	6.232E+00	5.393E+00	0.000E+00	NOT IDENT.
I-135	0.000E+00	2.622E+38	0.000E+00	0.000E+00	SHORT HLIF
CS-136	-3.387E-01	9.470E+00	9.129E+00	0.000E+00	FAIL ABUN
BA-137M	3.314E-01	1.135E+00	1.093E+00	0.000E+00	NOT IDENT.
CS-137	3.520E-01	1.200E+00	1.156E+00	0.000E+00	NOT IDENT.
CE-139	3.987E-01	1.272E+00	1.208E+00	0.000E+00	NOT IDENT.
BA-140	-3.890E+00	2.518E+01	2.375E+01	0.000E+00	NOT IDENT.
LA-140	1.136E+00	8.949E+00	8.558E+00	0.000E+00	FAIL ABUN
CE-141	-3.104E+00	4.933E+00	3.601E+00	0.000E+00	NOT IDENT.
CE-143	0.000E+00	8.342E+07	0.000E+00	0.000E+00	SHORT HLIF
CE-144	5.871E+00	8.954E+00	8.325E+00	0.000E+00	NOT IDENT.
PM-144	8.612E-01	1.284E+00	1.257E+00	0.000E+00	NOT IDENT.
PR-144	0.000E+00	1.490E+41	0.000E+00	0.000E+00	SHORT HLIF
PM-146	9.193E-01	1.645E+00	1.620E+00	0.000E+00	NOT IDENT.
ND-147	-2.982E-01	6.112E+01	5.829E+01	0.000E+00	NOT IDENT.
PM-147	8.642E+05	2.216E+06	2.126E+06	0.000E+00	NOT IDENT.
PM-149	0.000E+00	1.737E+06	0.000E+00	0.000E+00	SHORT HLIF
EU-152	-3.506E+00	4.861E+00	3.360E+00	0.000E+00	NOT IDENT.
GD-153	-9.017E+00	4.528E+00	3.200E+00	0.000E+00	NOT IDENT.
EU-154	-5.600E-01	3.438E+00	3.239E+00	0.000E+00	NOT IDENT.
EU-155	-6.049E+00	4.391E+00	3.961E+00	0.000E+00	NOT IDENT.
TB-160	-2.731E-01	5.140E+00	4.993E+00	0.000E+00	NOT IDENT.
TM-171	0.000E+00	1.521E+03	1.261E+03	0.000E+00	FAIL ABUN
HF-181	6.491E-01	2.017E+00	1.966E+00	0.000E+00	FAIL ABUN
TA-182	-2.293E+00	5.871E+00	5.444E+00	0.000E+00	FAIL ABUN
IR-192	-5.901E-01	1.577E+00	1.512E+00	0.000E+00	NOT IDENT.
HG-203	8.353E-01	2.275E+00	1.973E+00	0.000E+00	NOT IDENT.
BI-207	9.205E-01	1.494E+00	1.513E+00	0.000E+00	NOT IDENT.
TL-208	1.153E+00	2.462E+00	1.395E+00	0.000E+00	FAIL ABUN
PB-211	1.092E+01	3.335E+01	3.200E+01	0.000E+00	NOT IDENT.
BI-212	0.000E+00	1.009E+01	1.025E+01	0.000E+00	NOT IDENT.
PB-212	0.000E+00	5.108E+00	2.676E+00	0.000E+00	FAIL ABUN
BI-214	0.000E+00	3.709E+00	2.656E+00	0.000E+00	FAIL ABUN
PB-214	0.000E+00	5.404E+00	2.792E+00	0.000E+00	FAIL ABUN
RN-219	-2.190E+00	1.471E+01	1.409E+01	0.000E+00	NOT IDENT.
RA-223	1.178E+01	2.876E+01	2.482E+01	0.000E+00	NOT IDENT.
AC-227	-2.265E+00	1.628E+01	1.445E+01	0.000E+00	NOT IDENT.
TH-227	-2.226E+00	1.601E+01	1.420E+01	0.000E+00	NOT IDENT.
AC-228	-6.361E+00	6.340E+00	3.935E+00	0.000E+00	FAIL ABUN
RA-228	-6.361E+00	6.340E+00	3.935E+00	0.000E+00	FAIL ABUN
TH-229	2.734E+00	2.319E+01	1.903E+01	0.000E+00	NOT IDENT.
PA-231	2.815E+01	6.566E+01	5.660E+01	0.000E+00	FAIL ABUN
TH-231	-1.226E+00	6.819E+00	6.255E+00	0.000E+00	FAIL ABUN
TH-232	0.000E+00	4.936E+00	2.584E+00	0.000E+00	FAIL ABUN
PA-233	-6.460E-01	2.423E+00	2.334E+00	0.000E+00	NOT IDENT.

PA-234	-1.765E-01	9.014E+00	8.745E+00	0.000E+00	FAIL ABUN
PA-234M	-1.769E+02	2.173E+02	1.466E+02	0.000E+00	NOT IDENT.
TH-234	0.000E+00	9.633E+01	5.999E+01	0.000E+00	FAIL ABUN
U-234	-1.491E+00	6.345E+00	4.861E+00	0.000E+00	FAIL ABUN
U-235	-2.234E+00	1.075E+01	8.010E+00	0.000E+00	FAIL ABUN
NP-237	-3.305E+00	8.871E+00	8.350E+00	0.000E+00	NOT IDENT.
NP-239	-7.024E+00	7.820E+00	7.182E+00	0.000E+00	NOT IDENT.
AM-241	-1.004E+00	7.986E+00	5.820E+00	0.000E+00	NOT IDENT.
AM-242	-1.887E+01	8.711E+01	8.227E+01	0.000E+00	NOT IDENT.
CM-247	3.372E-01	1.309E+00	1.278E+00	0.000E+00	NOT IDENT.
CF-249	5.133E-01	1.424E+00	1.399E+00	0.000E+00	NOT IDENT.
ANH-511	-6.930E+00	2.681E+00	2.090E+00	0.000E+00	NOT IDENT.



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*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159247001.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 25-APR-2006 18:46:09
Sample ID         : G159247001 Sample quantity : 2.00000E+00 LITER
Detector name     : GAM19 Detector geometry: 2LMB
Elapsed live time: 0 10:00:00.00 Elapsed real time: 0 10:00:03.46 0.0%
Energy tolerance  : 2.00000 keV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# :
Matrix Spike DPM : LCS DPM :
*****

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	7	4.72	1176	298	1.05	9.21	6	14	3.27E-02	4.8	4.21E+00
2	7	6.48	1293	2094	2.30	12.73	6	14	3.59E-02	8.4	
3	0	10.85	355	1728	1.43	21.46	19	8	9.87E-03	21.2	
4	0	18.63	89	731	1.65	37.00	35	6	2.47E-03	49.5	
5	0	46.83	128	492	1.45	93.34	89	9	3.56E-03	32.4	
6	2	63.46	271	631	1.59	126.55	119	19	7.52E-03	18.8	1.21E+00
7	2	66.45	222	534	1.37	132.52	119	19	6.17E-03	19.4	
8	0	77.69	27	561	0.81	154.99	151	8	7.63E-04	152.2	
9	0	92.52	457	901	1.55	184.62	177	14	1.27E-02	14.7	
10	0	139.97	176	547	1.35	279.40	275	10	4.88E-03	26.0	
11	0	143.88	60	542	3.21	287.22	284	10	1.68E-03	73.3	
12	0	176.58	207	632	2.92	352.55	346	13	5.75E-03	26.1	
13	0	185.82	240	619	1.38	371.00	366	12	6.68E-03	21.7	
14	0	198.34	224	437	1.56	396.01	391	10	6.23E-03	18.8	
15	0	205.30	31	390	1.09	409.92	406	9	8.48E-04	118.4	
16	0	239.25	325	614	1.34	477.75	470	16	9.03E-03	17.9	
17	0	262.42	22	397	3.93	524.03	519	12	6.16E-04	181.2	
18	0	283.63	24	256	0.64	566.41	563	8	6.70E-04	116.4	
19	0	326.90	67	266	2.58	652.88	648	10	1.86E-03	47.6	
20	0	351.80	138	297	4.73	702.61	697	14	3.83E-03	27.8	
21	0	511.55	792	214	2.79	1021.83	1014	20	2.20E-02	5.8	
22	0	583.66	77	138	1.44	1165.93	1160	12	2.14E-03	32.8	
23	0	609.82	90	160	2.33	1218.22	1212	13	2.51E-03	30.7	
24	0	622.49	12	114	0.47	1243.53	1240	10	3.24E-04	174.4	
25	0	630.27	28	75	1.33	1259.08	1254	8	7.92E-04	56.5	
26	0	707.74	60	137	1.65	1413.92	1407	13	1.68E-03	41.9	
27	0	774.15	21	65	1.57	1546.63	1541	9	5.72E-04	75.7	
28	0	787.43	14	91	1.35	1573.19	1569	11	3.84E-04	136.2	
29	0	795.85	39	106	0.82	1590.00	1583	13	1.07E-03	57.5	
30	0	868.26	33	102	5.17	1734.74	1727	14	9.12E-04	67.4	
31	0	1079.72	26	54	1.84	2157.45	2150	12	7.13E-04	60.6	
32	0	1462.26	80	80	1.33	2922.31	2915	13	2.21E-03	25.8	
33	0	1518.18	12	29	1.74	3034.14	3027	9	3.30E-04	89.0	
34	0	1521.09	13	22	0.73	3039.97	3036	10	3.75E-04	68.4	
35	0	1667.29	20	49	6.76	3332.35	3320	20	5.60E-04	88.6	
36	1	1700.12	20	37	2.37	3398.02	3393	22	5.51E-04	56.4	2.96E+00
37	1	1705.33	25	36	2.37	3408.43	3393	22	7.06E-04	55.5	
38	0	1709.99	14	12	0.67	3417.76	3414	7	3.86E-04	49.5	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	6	1750.10	12	4	1.30	3497.98	3496	12	3.40E-04	38.3	8.96E-01
40	6	1752.99	18	12	1.85	3503.77	3496	12	5.00E-04	40.9	
41	0	1787.71	25	97	6.72	3573.20	3551	30	6.94E-04	116.9	
42	0	1848.41	13	29	4.37	3694.64	3685	13	3.49E-04	93.2	
43	0	1967.34	24	35	2.85	3932.53	3921	16	6.62E-04	59.7	

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159247001.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 25-APR-2006 18:46:09
Sample ID          : G159247001 Sample quantity : 2.00000E+00 LITER
Detector name     : GAM19 Detector geometry: 2LMB
Elapsed live time : 0 10:00:00.00 Elapsed real time: 0 10:00:03.46 0.0%
Energy tolerance  : 2.00000 keV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# :
Matrix Spike DPM : LCS DPM :
*****
    
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Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
K-40	1460.81	17	10.67*	6.163E-01	9.849E+00	9.849E+00	280.09
RU-106	622.20	12	9.80*	1.204E+00	3.710E+00	3.959E+00	349.04
BI-210	46.50	41	4.05*	3.583E-01	1.062E+02	1.065E+02	241.03
PB-210	46.50	41	4.05*	3.583E-01	1.062E+02	1.065E+02	241.03
BI-211	351.07	75	12.94*	1.761E+00	1.227E+01	1.227E+01	126.47
RA-226	295.21	-----	19.20	1.962E+00	-----	Line Not Found	-----
	351.92	75	37.20	1.761E+00	4.270E+00	4.270E+00	126.44
	609.31	90	46.30*	1.222E+00	5.990E+00	5.990E+00	61.91
TH-228	84.40	-----	1.21	2.243E+00	-----	Line Not Found	-----
	238.60	138	44.60*	2.221E+00	5.243E+00	5.426E+00	94.14
	300.10	-----	3.41	1.943E+00	-----	Line Not Found	-----
TH-230	295.21	-----	19.20	1.962E+00	-----	Line Not Found	-----
	351.92	75	37.20	1.761E+00	4.270E+00	4.270E+00	126.44
	609.31	90	46.30*	1.222E+00	5.990E+00	5.990E+00	61.91
U-238	63.29	144	3.80*	1.265E+00	1.121E+02	1.121E+02	85.94
CF-251	176.00	207	17.70*	2.590E+00	1.695E+01	1.695E+01	52.77
	227.00	-----	6.30	2.287E+00	-----	Line Not Found	-----
	285.00	24	1.40	2.010E+00	3.218E+01	3.218E+01	232.88

Nuclide Type: NATURAL

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
RA-224	240.98	138	3.95*	2.221E+00	5.920E+01	6.127E+01	94.04

Flag: "\*" = Keyline

Total number of lines in spectrum 35  
 Number of unidentified lines 13  
 Number of lines tentatively identified by NID 22 62.86%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	9.849E+00	9.849E+00	27.59E+00	280.09	
RU-106	368.20D	1.07	3.710E+00	3.959E+00	13.82E+00	349.04	
BI-210	22.26Y	1.00	1.062E+02	1.065E+02	2.568E+02	241.03	
PB-210	22.26Y	1.00	1.062E+02	1.065E+02	2.568E+02	241.03	
BI-211	7.04E+08Y	1.00	1.227E+01	1.227E+01	1.552E+01	126.47	
RA-226	1600.00Y	1.00	5.990E+00	5.990E+00	3.709E+00	61.91	
TH-228	1.91Y	1.03	5.243E+00	5.426E+00	5.108E+00	94.14	
TH-230	7.70E+04Y	1.00	5.990E+00	5.990E+00	3.709E+00	61.91	
U-238	4.47E+09Y	1.00	1.121E+02	1.121E+02	0.963E+02	85.94	
CF-251	900.00Y	1.00	1.695E+01	1.695E+01	0.894E+01	52.77	
Total Activity :			3.846E+02	3.856E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-224	1.91Y	1.03	5.920E+01	6.127E+01	5.761E+01	94.04	
Total Activity :			5.920E+01	6.127E+01			

Grand Total Activity : 4.438E+02 4.469E+02

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	18.63	89	731	1.65	37.00	35	6	2.47E-03	99.0	1.87E-06	
2	66.45	222	534	1.37	132.52	119	19	6.17E-03	38.7	1.43E+00	T
0	139.97	157	547	1.35	279.40	275	10	4.37E-03	66.4	2.78E+00	T
0	198.34	127	437	1.56	396.01	391	10	3.52E-03	92.1	2.46E+00	T
0	205.30	31	390	1.09	409.92	406	9	8.48E-04	****	2.41E+00	T
0	262.42	22	397	3.93	524.03	519	12	6.16E-04	****	2.11E+00	T
0	326.90	67	266	2.58	652.88	648	10	1.86E-03	95.2	1.84E+00	T
0	583.66	32	138	1.44	1165.93	1160	12	8.75E-04	****	1.26E+00	T
0	630.27	28	75	1.33	1259.08	1254	8	7.92E-04	****	1.19E+00	T
0	707.74	60	137	1.65	1413.92	1407	13	1.68E-03	83.9	1.09E+00	T
0	774.15	21	65	1.57	1546.63	1541	9	5.72E-04	****	1.02E+00	T
0	787.43	14	91	1.35	1573.19	1569	11	3.84E-04	****	1.01E+00	
0	795.85	39	106	0.82	1590.00	1583	13	1.07E-03	****	1.00E+00	T
0	868.26	33	102	5.17	1734.74	1727	14	9.12E-04	****	9.34E-01	T
0	1079.72	26	54	1.84	2157.45	2150	12	7.13E-04	****	7.82E-01	
0	1518.18	12	29	1.74	3034.14	3027	9	3.30E-04	****	6.00E-01	
0	1521.09	13	22	0.73	3039.97	3036	10	3.75E-04	****	5.99E-01	
0	1667.29	9	49	6.76	3332.35	3320	20	2.60E-04	****	5.65E-01	
1	1700.12	20	37	2.37	3398.02	3393	22	5.51E-04	****	5.59E-01	
1	1705.33	25	36	2.37	3408.43	3393	22	7.06E-04	****	5.58E-01	T
0	1709.99	14	12	0.67	3417.76	3414	7	3.86E-04	99.1	5.57E-01	
6	1750.10	12	4	1.30	3497.98	3496	12	3.40E-04	76.6	5.50E-01	
6	1752.99	18	12	1.85	3503.77	3496	12	5.00E-04	81.8	5.49E-01	
0	1787.71	25	97	6.72	3573.20	3551	30	6.94E-04	****	5.44E-01	
0	1848.41	13	29	4.37	3694.64	3685	13	3.49E-04	****	5.35E-01	
0	1967.34	24	35	2.85	3932.53	3921	16	6.62E-04	****	5.22E-01	

Flags: "T" = Tentatively associated

```

*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
*                                     DETECTOR DATA                                   *
*
* Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G159247001.CNF;1          *
* Acquisition date   : 25-APR-2006 18:46:09   Detector SN#      :                 *
* Detector ID       : GAM19                   Sensitivity        : 3.00000         *
* Geometry          : 2LMB                    Energy tolerance    : 2.00000         *
* Elapsed live time: 0 10:00:00.00           Abundance limit     : 75.00000         *
* Elapsed real time: 0 10:00:03.46           Half life ratio     : 8.00000         *
*****
*                                     SAMPLE DATA                                   *
*
* Sample date       : 22-MAR-2006 10:20:00   Nuclide Library    : EPI             *
* Sample ID        : G159247001             Analyst initials    : MJH1           *
* Batch Number     : 519510                 Sample Quantity    : 2.00000E+00 LITER      *
*****
*                                     QC DATA                                       *
*
* CALIB. DATE/TIME : 17-FEB-2006 16:09:06.3MS Isotope      :                 *
* MSD DPM          :                        MSD Isotope      :                 *
* LCS DPM          :                        LCS Isotope      :                 *
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
K-40	9.849E+00	2.759E+01	1.167E+01	7.401E-01	0.844
RU-106	3.959E+00	1.382E+01	1.038E+01	1.236E+00	0.381
BI-210	1.065E+02	2.568E+02	1.532E+02	1.368E+01	0.696
PB-210	1.065E+02	2.568E+02	1.532E+02	1.368E+01	0.696
BI-211	1.227E+01	1.552E+01	6.833E+00	4.890E-01	1.796
RA-224	6.127E+01	5.761E+01	2.248E+01	1.698E+00	2.726
RA-226	5.990E+00	3.709E+00	2.217E+00	1.785E-01	2.702
TH-228	5.426E+00	5.108E+00	1.955E+00	1.719E-01	2.775
TH-230	5.990E+00	3.709E+00	2.217E+00	1.785E-01	2.702
U-238	1.121E+02	9.633E+01	4.616E+01	8.728E+00	2.428
CF-251	1.695E+01	8.944E+00	4.780E+00	3.632E-01	3.545

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

Nuclide	Key-Line Activity K.L. (pCi/LITER) Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BE-7	2.601E+00	1.464E+01	1.416E+01	9.975E-01	0.184

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NA-22	-1.934E-01		1.244E+00	1.173E+00	7.194E-02	-0.165
NA-24	-1.935E+09		2.751E+10	Half-Life	too short	
AL-26	-2.827E-01		1.362E+00	1.299E+00	7.405E-02	-0.218
SC-46	-6.438E-01		1.387E+00	1.304E+00	1.040E-01	-0.494
V-48	1.534E+00		4.647E+00	4.624E+00	3.555E-01	0.332
CR-51	-1.805E-01		2.463E+01	2.262E+01	1.708E+00	-0.008
MN-54	-3.475E-01		1.124E+00	1.074E+00	8.069E-02	-0.323
CO-56	9.327E-01		1.509E+00	1.531E+00	1.165E-01	0.609
MN-56	1.000E+35		8.094E+34	Half-Life	too short	
CO-57	-1.860E-01		1.126E+00	1.061E+00	7.715E-02	-0.175
CO-58	1.499E+00		1.553E+00	1.552E+00	1.138E-01	0.966
FE-59	1.851E+00		3.897E+00	3.885E+00	3.034E-01	0.476
CO-60	3.256E-01		1.407E+00	1.367E+00	8.128E-02	0.238
ZN-65	-5.230E-01		2.741E+00	2.601E+00	1.781E-01	-0.201
SE-75	-2.765E-01		2.037E+00	1.724E+00	1.293E-01	-0.160
KR-85	7.654E+01		3.964E+02	3.810E+02	2.354E+01	0.201
SR-85	4.812E-01		2.492E+00	2.396E+00	1.480E-01	0.201
Y-88	-8.333E-01		1.713E+00	1.586E+00	8.983E-02	-0.526
Y-91	-8.687E-01		1.645E+00	1.517E+00	9.398E-02	-0.573
NB-94	-1.139E+00		1.405E+00	1.056E+00	6.769E-02	-1.079
NB-95	-1.195E+00		2.165E+00	1.945E+00	1.350E-01	-0.614
NB-95M	8.237E-04		1.556E-03	Half-Life	too short	
ZR-95	-1.823E+00		2.864E+00	2.558E+00	2.027E-01	-0.713
MO-99	1.555E-02	+	5.196E-03	Half-Life	too short	
TC-99M	1.000E+35	+	4.612E+34	Half-Life	too short	
RU-103	-1.785E+00		2.004E+00	1.807E+00	2.316E-01	-0.988
RH-106	3.959E+00	+	1.381E+01	1.065E+01	6.549E-01	0.372
AG-108M	-8.011E-01		1.177E+00	1.092E+00	7.132E-02	-0.733
CD-109	-8.087E+01		3.303E+01	2.845E+01	2.674E+00	-2.842
AG-110M	-4.207E-01		1.175E+00	1.083E+00	6.981E-02	-0.388
SN-113	-7.211E-01		1.825E+00	1.730E+00	1.091E-01	-0.417
CD-115	-9.720E-02		7.305E-02	Half-Life	too short	
SN-115	1.834E+01		1.421E+02	1.395E+02	1.105E+01	0.132
SN-117M	2.992E+00		5.814E+00	5.562E+00	4.167E-01	0.538
TE-123M	3.219E-01		1.267E+00	1.202E+00	9.084E-02	0.268
SB-124	-1.446E+00		4.161E+00	3.767E+00	2.396E-01	-0.384
SB-125	1.559E+00		3.413E+00	3.356E+00	2.105E-01	0.465
TE-125M	8.217E+01		4.915E+02	4.693E+02	4.526E+01	0.175
I-126	-7.012E+00		1.709E+01	1.570E+01	9.607E-01	-0.447
SB-126	8.222E+00		1.479E+01	1.440E+01	9.440E-01	0.571
SN-126	-3.605E+00		3.032E+00	2.776E+00	2.603E-01	-1.299
SB-127	7.181E-04		7.469E-04	Half-Life	too short	
I-131	-3.522E-01		2.196E+01	2.125E+01	1.549E+00	-0.017
I-132	1.000E+35		3.301E+35	Half-Life	too short	
TE-132	2.052E-04		8.252E-04	Half-Life	too short	
BA-133	1.360E+00		1.828E+00	1.604E+00	1.914E-01	0.848
I-133	1.324E+05		5.235E+05	Half-Life	too short	
CS-134	1.753E+00	+	2.020E+00	1.373E+00	9.939E-02	1.277

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
CS-135	1.794E+00		6.232E+00	5.393E+00	4.832E-01	0.333
I-135	-1.976E+31		1.311E+32	Half-Life	too short	
CS-136	-3.387E-01		9.470E+00	9.129E+00	7.100E-01	-0.037
BA-137M	3.314E-01		1.135E+00	1.093E+00	6.647E-02	0.303
CS-137	3.520E-01		1.200E+00	1.156E+00	7.055E-02	0.305
CE-139	3.987E-01		1.272E+00	1.208E+00	9.184E-02	0.330
BA-140	-3.890E+00		2.518E+01	2.375E+01	7.742E+00	-0.164
LA-140	1.136E+00		8.949E+00	8.558E+00	5.100E-01	0.133
CE-141	-3.104E+00		4.933E+00	3.601E+00	2.708E-01	-0.862
CE-143	3.583E+01		4.171E+01	Half-Life	too short	
CE-144	5.871E+00		8.954E+00	8.325E+00	1.236E+00	0.705
PM-144	8.612E-01		1.284E+00	1.257E+00	8.017E-02	0.685
PR-144	1.000E+35		7.452E+34	Half-Life	too short	
PM-146	9.193E-01		1.645E+00	1.620E+00	1.430E-01	0.567
ND-147	-2.982E-01		6.112E+01	5.829E+01	7.984E+00	-0.005
PM-147	8.642E+05		2.216E+06	2.126E+06	1.547E+05	0.407
PM-149	1.785E+00		8.685E-01	Half-Life	too short	
EU-152	-3.506E+00		4.861E+00	3.360E+00	2.466E-01	-1.043
GD-153	-9.017E+00		4.528E+00	3.200E+00	2.687E-01	-2.818
EU-154	-5.600E-01		3.438E+00	3.239E+00	3.091E-01	-0.173
EU-155	-6.049E+00		4.391E+00	3.961E+00	3.165E-01	-1.527
TB-160	-2.731E-01		5.140E+00	4.993E+00	3.941E-01	-0.055
TM-171	3.807E+03	+	1.521E+03	1.261E+03	1.245E+02	3.019
HF-181	6.491E-01		2.017E+00	1.966E+00	1.208E-01	0.330
TA-182	-2.293E+00		5.871E+00	5.444E+00	3.405E-01	-0.421
IR-192	-5.901E-01		1.577E+00	1.512E+00	1.067E-01	-0.390
HG-203	8.353E-01		2.275E+00	1.973E+00	1.510E-01	0.423
BI-207	9.205E-01		1.494E+00	1.513E+00	1.091E-01	0.608
TL-208	1.153E+00	+	2.462E+00	1.395E+00	9.798E-02	0.826
PB-211	1.092E+01		3.335E+01	3.200E+01	1.995E+01	0.341
BI-212	1.393E+01		1.009E+01	1.025E+01	8.551E-01	1.358
PB-212	5.426E+00	+	5.108E+00	2.676E+00	2.352E-01	2.028
BI-214	5.990E+00	+	3.709E+00	2.656E+00	2.139E-01	2.255
PB-214	4.270E+00	+	5.404E+00	2.792E+00	2.470E-01	1.529
RN-219	-2.190E+00		1.471E+01	1.409E+01	1.927E+00	-0.155
RA-223	1.178E+01		2.876E+01	2.482E+01	4.208E+00	0.475
AC-227	-2.265E+00		1.628E+01	1.445E+01	2.154E+00	-0.157
TH-227	-2.226E+00		1.601E+01	1.420E+01	2.493E+00	-0.157
AC-228	-6.361E+00		6.340E+00	3.935E+00	4.243E-01	-1.617
RA-228	-6.361E+00		6.340E+00	3.935E+00	4.243E-01	-1.617
TH-229	2.734E+00		2.319E+01	1.903E+01	1.447E+00	0.144
PA-231	2.815E+01	+	6.566E+01	5.660E+01	8.202E+00	0.497
TH-231	-1.226E+00		6.819E+00	6.255E+00	5.403E-01	-0.196
TH-232	5.243E+00	+	4.936E+00	2.584E+00	2.271E-01	2.029
PA-233	-6.460E-01		2.423E+00	2.334E+00	1.722E-01	-0.277
PA-234	-1.765E-01		9.014E+00	8.745E+00	1.612E+00	-0.020
PA-234M	-1.769E+02		2.173E+02	1.466E+02	1.331E+01	-1.207
TH-234	1.121E+02	+	9.633E+01	5.999E+01	1.134E+01	1.869



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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
U-234	-1.491E+00		6.345E+00	4.861E+00	4.649E-01	-0.307
U-235	-2.234E+00		1.075E+01	8.010E+00	1.354E+00	-0.279
NP-237	-3.305E+00		8.871E+00	8.350E+00	1.891E+00	-0.396
NP-239	-7.024E+00		7.820E+00	7.182E+00	5.313E-01	-0.978
AM-241	-1.004E+00		7.986E+00	5.820E+00	6.840E-01	-0.173
AM-242	-1.887E+01		8.711E+01	8.227E+01	6.554E+00	-0.229
CM-247	3.372E-01		1.309E+00	1.278E+00	7.622E-02	0.264
CF-249	5.133E-01		1.424E+00	1.399E+00	8.385E-02	0.367
ANH-511	-6.930E+00		2.681E+00	2.090E+00	1.291E-01	-3.316

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*****
*
*                               General Engineering Labs, LLC
*                               2040 SAVAGE ROAD
*                               CHARLESTON ,SC 29417
*                               GROSS GAMMA REPORT
*
*****
*
* BATCH ID      : 519510          SAMPLE ID   : G159247001
* ANALYST      : MJH1            DETECTOR    : GAM19
* SAMPLE DATE   : 22-MAR-2006 10:20:00.00  COUNT TIME  : 0 10:00:00.00
* ANALYSIS DATE: 25-APR-2006 18:46:09.53  SAMPLE ALQT: 2.000 LITER
*
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GROSS GAMMA ACTIVITY (pCi/LITER ) : 1.785E+06
GROSS GAMMA ERROR   (pCi/LITER ) : 1.112E+06
GROSS GAMMA MDA     (pCi/LITER ) : 2.005E+06
GROSS GAMMA DLC     (pCi/LITER ) : 9.758E+05

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VAX/VMS Nuclide Identification Report Generated 26-APR-2006 11:24:04.02

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                 *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068236.CNF;1
Sample date        : 25-APR-2006 00:00:00 Acquisition date : 25-APR-2006 18:43:09
Sample ID          : G1201068236 Sample quantity      : 2.00000E+00 LITER
Detector name     : WELL Detector geometry          : 2L_MB
Elapsed live time : 0 16:40:00.00 Elapsed real time: 0 16:40:12.98 0.0%
Energy tolerance  : 2.00000 KEV Analyst Initials    : MJH1
Abundance limit   : 75.00000 Sensitivity           : 3.00000
Batch ID          : 519510 Detector SN#          : 3941466
Matrix Spike DPM  : LCS DPM                        :
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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.44*	104	992	1.38	125.44	121	9	1.74E-03	81.4	
2	0	84.25*	39	809	1.65	166.79	164	7	6.52E-04	187.9	
3	0	127.14	152	956	2.40	252.00	247	10	2.54E-03	38.9	
4	0	144.32*	106	902	1.26	286.13	282	9	1.76E-03	77.4	
5	0	185.86*	189	1096	1.32	368.66	363	13	3.15E-03	53.9	
6	0	198.00*	31	868	2.49	392.79	388	10	5.15E-04	240.7	
7	0	205.59*	26	541	0.98	407.86	405	7	4.33E-04	222.7	
8	0	269.75	49	442	1.16	535.37	533	7	8.15E-04	72.6	
9	0	284.94	42	391	1.32	565.55	563	7	7.00E-04	79.4	
10	0	295.73*	35	455	0.79	586.97	583	9	5.89E-04	155.8	
11	0	300.19	77	365	1.61	595.85	593	7	1.28E-03	42.7	
12	0	338.45*	7	526	2.03	671.87	666	11	1.14E-04	923.0	
13	0	409.22	29	262	0.99	812.52	810	7	4.84E-04	94.3	
14	0	437.53	30	235	1.04	868.79	865	7	5.02E-04	86.3	
15	0	511.12*	31	487	2.64	1015.05	1008	16	5.14E-04	273.2	
16	0	569.39*	73	365	3.52	1130.86	1122	17	1.22E-03	79.1	
17	0	582.82*	77	250	2.07	1157.56	1150	13	1.28E-03	71.7	
18	0	609.33*	38	156	1.75	1210.25	1207	7	6.39E-04	112.8	
19	0	680.39	51	122	2.73	1351.50	1348	9	8.52E-04	41.6	
20	0	766.58	61	107	2.16	1522.85	1519	8	1.02E-03	32.2	
21	0	794.47	33	82	2.36	1578.30	1575	8	5.58E-04	49.5	
22	0	802.47*	23	168	3.23	1594.20	1590	12	3.81E-04	150.8	
23	0	859.60	28	98	1.48	1707.79	1704	8	4.63E-04	64.6	
24	0	910.99*	41	131	2.78	1809.96	1805	12	6.83E-04	84.7	
25	0	921.32	27	123	0.61	1830.51	1823	12	4.46E-04	86.0	
26	0	939.39	38	61	0.71	1866.43	1864	8	6.36E-04	38.8	
27	0	963.77*	19	87	2.94	1914.92	1911	10	3.09E-04	154.3	
28	0	1076.24	68	98	7.89	2138.57	2130	19	1.13E-03	37.4	
29	0	1307.25	20	22	1.84	2598.01	2594	8	3.36E-04	46.0	
30	0	1364.42	49	45	2.44	2711.73	2706	14	8.17E-04	32.5	
31	0	1462.83	78	153	7.41	2907.51	2896	25	1.30E-03	45.4	
32	0	1500.73	15	45	1.37	2982.90	2977	11	2.51E-04	91.0	
33	0	1522.40	13	44	3.57	3026.02	3021	12	2.24E-04	103.2	
34	0	1559.27	16	23	0.76	3099.37	3095	9	2.72E-04	59.6	
35	0	1570.09*	6	50	0.54	3120.91	3118	14	9.80E-05	368.7	
36	0	1591.26	23	21	1.52	3163.02	3160	6	3.76E-04	39.1	
37	0	1668.54	13	15	1.47	3316.79	3315	7	2.10E-04	57.6	
38	0	1895.13	5	20	0.91	3767.70	3767	6	7.67E-05	160.1	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1923.95*	6	7	0.63	3825.07	3822	5	1.05E-04	129.1	
40	0	1975.83*	2	25	4.62	3928.33	3921	17	2.94E-05	865.0	

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

VAX/VMS Nuclide Identification Report Generated

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*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
*                               DETECTOR DATA                                       *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068236
* Acquisition date   : 25-APR-2006 18:43:09 Detector SN#      : 3941466
* Detector ID       : WELL                               Sensitivity      : 3.000
* Geometry          : 2L_MB                             Energy tolerance: 2.000
* Elapsed live time: 0 16:40:00.00                    Abundance limit : 75.000
* Elapsed real time: 0 16:40:12.98                    Half life ratio  : 8.000
*****
*                               SAMPLE DATA                                         *
*
* Sample date       : 25-APR-2006 00:00:00 Nuclide Library  : FERMC
* Sample ID        : G1201068236                      Analyst initials: MJH1
* Batch Number     : 519510                            Sample Quantity : 2.0000E+00 LITER
* Recovery         : 1.00000                            Carrier Weight  : 0.00000
*****
*                               QC DATA                                             *
*
* Standard Weight   : 0.00000
* CALIB. DATE/TIME : 13-DEC-2005 09:34:01 MS Isotope      :
* MSD DPM           : *****                          MSD Isotope      :
* LCS DPM           : 0.000                            LCS Isotope      :
* LCSD DPM          : 0.000                            LCSD Isotope     :
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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
NB-95	2.134E+00	1.376E+00	1.970E+00	0.000E+00
CS-135	4.258E+00	6.180E+00	9.037E+00	0.000E+00
CE-141	1.356E+00	3.533E+00	2.610E+00	0.000E+00
PM-149	2.805E+01	4.453E+01	7.028E+01	0.000E+00
TL-208	2.484E+00	3.560E+00	2.331E+00	0.000E+00
PA-231	3.825E+01	6.072E+01	9.780E+01	0.000E+00
U-235	9.939E+00	1.538E+01	1.347E+01	0.000E+00
U-238	5.169E+01	8.414E+01	6.622E+01	0.000E+00
ANH-511	7.473E-01	4.083E+00	1.881E+00	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )	
BE-7	3.532E+00	1.071E+01	1.812E+01	0.000E+00 NOT IDENT.
NA-22	-2.950E-01	1.261E+00	2.128E+00	0.000E+00 NOT IDENT.
NA-24	-2.677E+00	4.683E+00	6.790E+00	0.000E+00 NOT IDENT.
AL-26	1.775E-01	1.176E+00	2.152E+00	0.000E+00 FAIL ABUN
K-40	0.000E+00	1.479E+01	2.986E+01	0.000E+00 NOT IDENT.
SC-46	2.679E-01	1.263E+00	2.213E+00	0.000E+00 NOT IDENT.
V-48	-6.140E-01	1.236E+00	2.070E+00	0.000E+00 NOT IDENT.
CR-51	2.679E-01	9.895E+00	1.673E+01	0.000E+00 NOT IDENT.
MN-54	-7.428E-01	1.262E+00	2.117E+00	0.000E+00 NOT IDENT.
CO-56	-1.752E-01	1.254E+00	2.157E+00	0.000E+00 NOT IDENT.
MN-56	-1.228E+02	8.715E+02	1.499E+03	0.000E+00 NOT IDENT.
CO-57	1.219E+00	9.119E-01	1.531E+00	0.000E+00 NOT IDENT.
CO-58	3.440E-01	1.295E+00	2.276E+00	0.000E+00 NOT IDENT.
FE-59	1.213E+00	2.282E+00	4.078E+00	0.000E+00 NOT IDENT.
CO-60	2.143E+00	1.385E+00	2.635E+00	0.000E+00 NOT IDENT.
ZN-65	-3.648E-01	2.725E+00	4.634E+00	0.000E+00 NOT IDENT.
SE-75	9.296E-02	1.446E+00	2.464E+00	0.000E+00 FAIL ABUN
KR-85	0.000E+00	3.412E+02	6.146E+02	0.000E+00 NOT IDENT.

SR-85	0.000E+00	1.509E+00	2.719E+00	0.000E+00	NOT IDENT.
Y-88	9.787E-01	1.338E+00	2.547E+00	0.000E+00	NOT IDENT.
Y-91	-5.862E-01	1.215E+00	1.971E+00	0.000E+00	NOT IDENT.
NB-94	2.442E-01	1.252E+00	2.197E+00	0.000E+00	NOT IDENT.
NB-95M	-2.316E+01	4.814E+00	7.168E+00	0.000E+00	NOT IDENT.
ZR-95	1.694E+00	2.074E+00	3.775E+00	0.000E+00	NOT IDENT.
MO-99	1.763E-01	1.387E+00	2.128E+00	0.000E+00	NOT IDENT.
TC-99M	2.406E+00	1.894E+01	2.905E+01	0.000E+00	NOT IDENT.
RU-103	3.641E-01	1.250E+00	2.113E+00	0.000E+00	FAIL ABUN
RH-106	3.284E+00	1.184E+01	2.095E+01	0.000E+00	FAIL ABUN
RU-106	3.287E+00	1.184E+01	2.096E+01	0.000E+00	NOT IDENT.
AG-108M	5.621E-01	1.390E+00	2.088E+00	0.000E+00	NOT IDENT.
CD-109	2.205E+01	2.701E+01	4.492E+01	0.000E+00	NOT IDENT.
AG-110M	-1.258E+01	1.780E+00	2.263E+00	0.000E+00	FAIL ABUN
SN-113	1.488E-01	1.596E+00	2.689E+00	0.000E+00	NOT IDENT.
CD-115	-1.361E-01	5.258E+00	8.753E+00	0.000E+00	NOT IDENT.
SN-115	6.681E-01	9.192E+01	1.594E+02	0.000E+00	NOT IDENT.
SN-117M	3.280E-01	9.394E-01	1.633E+00	0.000E+00	NOT IDENT.
TE-123M	2.012E-01	9.163E-01	1.588E+00	0.000E+00	NOT IDENT.
SB-124	1.609E+00	2.610E+00	4.926E+00	0.000E+00	NOT IDENT.
SB-125	-3.360E-01	3.511E+00	5.862E+00	0.000E+00	NOT IDENT.
TE-125M	-5.709E+00	3.034E+02	4.917E+02	0.000E+00	NOT IDENT.
I-126	-2.521E+01	4.073E+00	5.272E+00	0.000E+00	NOT IDENT.
SB-126	2.823E+00	2.348E+00	4.327E+00	0.000E+00	NOT IDENT.
SN-126	2.888E+00	3.071E+00	4.596E+00	0.000E+00	FAIL ABUN
SB-127	1.086E+00	3.869E+00	6.855E+00	0.000E+00	NOT IDENT.
I-131	-4.598E-01	1.347E+00	2.238E+00	0.000E+00	FAIL ABUN
I-132	0.000E+00	1.748E+03	0.000E+00	0.000E+00	SHORT HLIF
TE-132	2.434E-01	1.194E+00	2.049E+00	0.000E+00	NOT IDENT.
BA-133	-6.041E-02	1.637E+00	2.754E+00	0.000E+00	NOT IDENT.
I-133	-2.322E-02	3.124E+00	5.199E+00	0.000E+00	NOT IDENT.
CS-134	1.376E+00	1.363E+00	2.416E+00	0.000E+00	FAIL ABUN
I-135	7.796E+00	6.750E+01	1.171E+02	0.000E+00	NOT IDENT.
CS-136	-6.304E-01	1.689E+00	2.840E+00	0.000E+00	NOT IDENT.
BA-137M	0.000E+00	2.005E+00	4.244E+00	0.000E+00	NOT IDENT.
CS-137	0.000E+00	2.119E+00	4.486E+00	0.000E+00	NOT IDENT.
CE-139	-5.681E-01	9.654E-01	1.639E+00	0.000E+00	NOT IDENT.
BA-140	-3.400E+00	4.764E+00	7.650E+00	0.000E+00	NOT IDENT.
LA-140	-7.499E-01	1.497E+00	2.561E+00	0.000E+00	FAIL ABUN
CE-143	2.575E+00	4.393E+00	6.696E+00	0.000E+00	NOT IDENT.
CE-144	-1.913E+00	6.887E+00	1.186E+01	0.000E+00	NOT IDENT.
PM-144	1.087E+00	1.301E+00	2.342E+00	0.000E+00	NOT IDENT.
PR-144	0.000E+00	1.197E+41	0.000E+00	0.000E+00	SHORT HLIF
PM-146	3.352E-01	1.722E+00	2.902E+00	0.000E+00	NOT IDENT.
ND-147	4.124E+00	8.905E+00	1.517E+01	0.000E+00	NOT IDENT.
PM-147	0.000E+00	1.932E+06	3.303E+06	0.000E+00	NOT IDENT.
EU-152	4.850E+00	3.685E+00	6.488E+00	0.000E+00	FAIL ABUN
GD-153	-1.123E+00	2.729E+00	4.395E+00	0.000E+00	FAIL ABUN
EU-154	-2.541E+00	3.690E+00	5.982E+00	0.000E+00	NOT IDENT.
EU-155	-1.960E+00	4.009E+00	6.426E+00	0.000E+00	NOT IDENT.
TB-160	-7.863E-01	4.181E+00	7.181E+00	0.000E+00	FAIL ABUN
TM-171	3.386E+02	9.621E+02	1.429E+03	0.000E+00	NOT IDENT.
HF-181	5.794E-01	1.320E+00	2.247E+00	0.000E+00	FAIL ABUN
TA-182	-2.994E+00	5.075E+00	8.316E+00	0.000E+00	NOT IDENT.
IR-192	-8.961E-02	1.121E+00	1.890E+00	0.000E+00	FAIL ABUN
HG-203	1.278E+00	1.199E+00	2.098E+00	0.000E+00	FAIL ABUN
BI-207	7.765E-01	1.769E+00	3.130E+00	0.000E+00	FAIL ABUN
BI-210	0.000E+00	9.863E+01	1.573E+02	0.000E+00	NOT IDENT.
PB-210	0.000E+00	9.863E+01	1.573E+02	0.000E+00	NOT IDENT.
BI-211	5.345E+00	7.711E+00	1.329E+01	0.000E+00	NOT IDENT.
PB-211	4.375E+00	3.592E+01	6.053E+01	0.000E+00	NOT IDENT.
BI-212	6.397E+00	1.028E+01	1.843E+01	0.000E+00	NOT IDENT.
PB-212	0.000E+00	2.246E+00	4.183E+00	0.000E+00	FAIL ABUN
BI-214	2.337E+00	5.274E+00	4.983E+00	0.000E+00	FAIL ABUN
PB-214	3.230E+00	2.649E+00	4.649E+00	0.000E+00	FAIL ABUN
RN-219	-5.727E+00	1.548E+01	2.562E+01	0.000E+00	FAIL ABUN
RA-223	-4.666E+00	2.524E+01	4.234E+01	0.000E+00	FAIL ABUN
RA-224	-1.132E+01	2.446E+01	4.107E+01	0.000E+00	NOT IDENT.
RA-226	2.337E+00	5.274E+00	4.983E+00	0.000E+00	FAIL ABUN
AC-227	-2.683E+00	1.399E+01	2.367E+01	0.000E+00	FAIL ABUN
TH-227	-2.644E+00	1.379E+01	2.333E+01	0.000E+00	FAIL ABUN
AC-228	5.780E+00	9.788E+00	1.021E+01	0.000E+00	FAIL ABUN
RA-228	5.780E+00	9.788E+00	1.021E+01	0.000E+00	FAIL ABUN
TH-228	0.000E+00	2.245E+00	4.183E+00	0.000E+00	FAIL ABUN
TH-229	4.427E+00	1.992E+01	3.031E+01	0.000E+00	FAIL ABUN
TH-230	2.337E+00	5.273E+00	4.983E+00	0.000E+00	FAIL ABUN
TH-231	5.009E+00	7.270E+00	1.141E+01	0.000E+00	FAIL ABUN
TH-232	0.000E+00	2.243E+00	4.178E+00	0.000E+00	FAIL ABUN

PA-233	-8.750E-01	2.342E+00	3.914E+00	0.000E+00	FAIL	ABUN
PA-234	-2.240E-01	1.012E+01	1.751E+01	0.000E+00	FAIL	ABUN
PA-234M	1.865E+02	1.661E+02	3.034E+02	0.000E+00	FAIL	ABUN
TH-234	5.169E+01	8.414E+01	8.462E+01	0.000E+00	FAIL	ABUN
U-234	2.765E+00	8.616E+00	8.496E+00	0.000E+00	FAIL	ABUN
NP-237	3.935E+00	9.269E+00	1.364E+01	0.000E+00	NOT	IDENT.
NP-239	-5.333E+00	7.140E+00	1.132E+01	0.000E+00	NOT	IDENT.
AM-241	4.433E+00	6.817E+00	8.173E+00	0.000E+00	NOT	IDENT.
AM-242	2.488E+01	8.066E+01	1.323E+02	0.000E+00	NOT	IDENT.
CM-247	-3.006E-01	1.402E+00	2.334E+00	0.000E+00	NOT	IDENT.
CF-249	-1.107E-03	1.531E+00	2.573E+00	0.000E+00	NOT	IDENT.
CF-251	1.957E+00	4.525E+00	7.852E+00	0.000E+00	FAIL	ABUN

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068236.CNF;1
Sample date        : 25-APR-2006 00:00:00 Acquisition date : 25-APR-2006 18:43:09
Sample ID          : G1201068236 Sample quantity : 2.00000E+00 LITER
Detector name     : WELL Detector geometry: 2L_MB
Elapsed live time : 0 16:40:00.00 Elapsed real time: 0 16:40:12.98 0.0%
Energy tolerance  : 2.00000 KEV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# : 3941466
Matrix Spike DPM : LCS DPM :
*****

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.99	187	1051	1.76	92.75	88	9	3.12E-03	32.1	
2	0	63.44	588	992	1.38	125.44	121	9	9.80E-03	10.5	
3	0	77.52	65	658	0.88	153.41	151	5	1.08E-03	60.6	
4	0	84.25	182	809	1.65	166.79	164	7	3.04E-03	26.8	
5	0	87.95	55	1061	1.03	174.13	170	8	9.19E-04	103.1	
6	0	92.85	1280	1186	1.50	183.86	180	10	2.13E-02	5.8	
7	0	112.52	42	1085	1.21	222.96	220	9	7.04E-04	141.8	
8	0	127.14	152	956	2.40	252.00	247	10	2.54E-03	38.9	
9	0	144.32	215	902	1.26	286.13	282	9	3.59E-03	26.1	
10	0	162.52	52	791	0.95	322.29	320	8	8.61E-04	95.1	
11	0	185.86	869	1096	1.32	368.66	363	13	1.45E-02	8.6	
12	0	198.00	153	868	2.49	392.79	388	10	2.56E-03	37.0	
13	0	205.59	97	541	0.98	407.86	405	7	1.62E-03	41.2	
14	0	238.62	272	887	1.32	473.50	469	10	4.54E-03	21.3	
15	0	269.75	49	442	1.16	535.37	533	7	8.15E-04	72.6	
16	0	284.94	42	391	1.32	565.55	563	7	7.00E-04	79.4	
17	0	295.73	121	455	0.79	586.97	583	9	2.01E-03	33.3	
18	0	300.19	77	365	1.61	595.85	593	7	1.28E-03	42.7	
19	0	338.45	98	526	2.03	671.87	666	11	1.63E-03	46.6	
20	0	351.42	71	350	1.19	697.65	695	8	1.19E-03	46.7	
21	0	409.22	29	262	0.99	812.52	810	7	4.84E-04	94.3	
22	0	437.53	30	235	1.04	868.79	865	7	5.02E-04	86.3	
23	0	511.12	1085	487	2.64	1015.05	1008	16	1.81E-02	5.5	
24	0	569.39	105	365	3.52	1130.86	1122	17	1.76E-03	42.7	
25	0	582.82	200	250	2.07	1157.56	1150	13	3.33E-03	17.8	
26	0	609.33	87	156	1.75	1210.25	1207	7	1.44E-03	26.2	
27	0	650.12	38	375	8.18	1291.34	1285	20	6.27E-04	127.1	
28	0	661.54	530	251	2.20	1314.04	1308	13	8.83E-03	7.6	
29	0	680.39	51	122	2.73	1351.50	1348	9	8.52E-04	41.6	
30	0	725.65	25	419	9.16	1441.48	1426	23	4.25E-04	209.7	
31	0	766.58	61	107	2.16	1522.85	1519	8	1.02E-03	32.2	
32	0	794.47	33	82	2.36	1578.30	1575	8	5.58E-04	49.5	
33	0	802.47	65	168	3.23	1594.20	1590	12	1.08E-03	41.8	
34	0	859.60	28	98	1.48	1707.79	1704	8	4.63E-04	64.6	
35	0	910.99	111	131	2.78	1809.96	1805	12	1.85E-03	22.6	
36	0	921.32	27	123	0.61	1830.51	1823	12	4.46E-04	86.0	
37	0	939.39	38	61	0.71	1866.43	1864	8	6.36E-04	38.8	
38	0	963.77	50	87	2.94	1914.92	1911	10	8.31E-04	37.8	



Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1000.49	55	84	1.32	1987.92	1984	9	9.10E-04	33.1	
40	0	1076.24	68	98	7.89	2138.57	2130	19	1.13E-03	37.4	
41	0	1239.65	12	39	1.34	2463.55	2462	7	2.03E-04	90.3	
42	0	1307.25	20	22	1.84	2598.01	2594	8	3.36E-04	46.0	
43	0	1332.48	59	58	2.35	2648.19	2642	14	9.81E-04	30.6	
44	0	1364.42	49	45	2.44	2711.73	2706	14	8.17E-04	32.5	
45	0	1462.83	78	153	7.41	2907.51	2896	25	1.30E-03	45.4	
46	0	1495.26	7	38	1.38	2972.02	2966	9	1.15E-04	166.2	
47	0	1500.73	15	45	1.37	2982.90	2977	11	2.51E-04	91.0	
48	0	1509.24	27	48	4.30	2999.83	2994	14	4.49E-04	58.2	
49	0	1522.40	13	44	3.57	3026.02	3021	12	2.24E-04	103.2	
50	0	1559.27	16	23	0.76	3099.37	3095	9	2.72E-04	59.6	
51	0	1570.09	14	50	0.54	3120.91	3118	14	2.27E-04	112.9	
52	0	1591.26	23	21	1.52	3163.02	3160	6	3.76E-04	39.1	
53	0	1668.54	13	15	1.47	3316.79	3315	7	2.10E-04	57.6	
54	0	1763.84	51	44	2.17	3506.43	3501	11	8.57E-04	28.6	
55	0	1772.46	9	15	0.59	3523.57	3519	7	1.44E-04	83.3	
56	0	1895.13	5	20	0.91	3767.70	3767	6	7.67E-05	160.1	
57	0	1923.95	12	7	0.63	3825.07	3822	5	2.04E-04	43.6	
58	0	1975.83	29	25	4.62	3928.33	3921	17	4.87E-04	46.0	

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068236.CNF;1
Sample date        : 25-APR-2006 00:00:00 Acquisition date : 25-APR-2006 18:43:09
Sample ID         : G1201068236 Sample quantity : 2.00000E+00 LITER
Detector name     : WELL Detector geometry: 2L_MB
Elapsed live time : 0 16:40:00.00 Elapsed real time: 0 16:40:12.98 0.0%
Energy tolerance  : 2.00000 KEV Analyst Initials : MJH1
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 519510 Detector SN# : 3941466
Matrix Spike DPM : LCS DPM :
*****
    
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Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
NB-95	765.79	61	99.81*	6.608E-01	2.087E+00	2.134E+00	64.47
CS-135	268.24	49	16.00*	1.617E+00	4.258E+00	4.258E+00	145.13
CE-141	145.44	106	48.40*	2.280E+00	2.156E+00	2.209E+00	154.73
PM-149	285.95	42	3.10*	1.547E+00	1.974E+01	2.805E+01	158.77
TL-208	75.00	-----	3.43	1.606E+00	-----	Line Not Found	-----
	277.35	-----	6.80	1.581E+00	-----	Line Not Found	-----
	510.84	31	21.60	9.288E-01	3.460E+00	3.464E+00	546.34
	583.14	77	84.20*	8.292E-01	2.481E+00	2.484E+00	143.31
	763.30	-----	1.64	6.631E-01	-----	Line Not Found	-----
	860.37	28	12.46	6.035E-01	8.325E+00	8.334E+00	129.13
PA-231	1093.90	-----	0.37	5.016E-01	-----	Line Not Found	-----
	283.67	42	1.60*	1.547E+00	3.825E+01	3.825E+01	158.77
	301.29	77	4.60	1.481E+00	2.537E+01	2.537E+01	85.49
	330.00	-----	1.30	1.366E+00	-----	Line Not Found	-----
U-235	89.95	-----	2.70	1.980E+00	-----	Line Not Found	-----
	93.35	-----	4.50	2.042E+00	-----	Line Not Found	-----
	105.00	-----	2.10	2.194E+00	-----	Line Not Found	-----
	143.76	106	10.50*	2.280E+00	9.939E+00	9.939E+00	154.73
	163.33	-----	4.70	2.204E+00	-----	Line Not Found	-----
	185.71	189	54.00	2.082E+00	3.787E+00	3.787E+00	107.78
	205.31	26	5.00	1.965E+00	5.955E+00	5.955E+00	445.37
U-238	63.29	104	3.80*	1.197E+00	5.169E+01	5.169E+01	162.78
ANH-511	511.00	31	100.00*	9.288E-01	7.473E-01	7.473E-01	546.34

Flag: "\*" = Keyline

Total number of lines in spectrum 40  
 Number of unidentified lines 16  
 Number of lines tentatively identified by NID 24 60.00%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected	Decay Corr	Decay Corr	2-Sigma	Flags
			pCi/LITER	pCi/LITER	2-Sigma Error	%Error	
NB-95	35.06D	1.02	2.087E+00	2.134E+00	1.376E+00	64.47	
CS-135	2.30E+06Y	1.00	4.258E+00	4.258E+00	6.180E+00	145.13	
CE-141	32.50D	1.02	2.156E+00	2.209E+00	3.418E+00	154.73	
PM-149	53.08H	1.42	1.974E+01	2.805E+01	4.453E+01	158.77	
TL-208	1.91Y	1.00	2.481E+00	2.484E+00	3.560E+00	143.31	
PA-231	3.28E+04Y	1.00	3.825E+01	3.825E+01	6.072E+01	158.77	
U-235	7.04E+08Y	1.00	9.939E+00	9.939E+00	15.38E+00	154.73	
U-238	4.47E+09Y	1.00	5.169E+01	5.169E+01	8.414E+01	162.78	
ANH-511	1.00E+09Y	1.00	7.473E-01	7.473E-01	40.83E-01	546.34	
Total Activity :			1.313E+02	1.398E+02			

Grand Total Activity : 1.313E+02 1.398E+02

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	84.25	39	809	1.65	166.79	164	7	6.52E-04	****	1.86E+00	T
0	127.14	152	956	2.40	252.00	247	10	2.54E-03	77.7	2.30E+00	
0	198.00	31	868	2.49	392.79	388	10	5.15E-04	****	2.01E+00	T
0	295.73	35	455	0.79	586.97	583	9	5.89E-04	****	1.50E+00	T
0	338.45	7	526	2.03	671.87	666	11	1.14E-04	****	1.34E+00	T
0	409.22	29	262	0.99	812.52	810	7	4.84E-04	****	1.13E+00	
0	437.53	30	235	1.04	868.79	865	7	5.02E-04	****	1.07E+00	
0	569.39	73	365	3.52	1130.86	1122	17	1.22E-03	****	8.46E-01	T
0	609.33	38	156	1.75	1210.25	1207	7	6.39E-04	****	7.98E-01	T
0	680.39	51	122	2.73	1351.50	1348	9	8.52E-04	83.1	7.28E-01	
0	794.47	33	82	2.36	1578.30	1575	8	5.58E-04	99.1	6.42E-01	T
0	802.47	23	168	3.23	1594.20	1590	12	3.81E-04	****	6.37E-01	T
0	910.99	41	131	2.78	1809.96	1805	12	6.83E-04	****	5.77E-01	T
0	921.32	27	123	0.61	1830.51	1823	12	4.46E-04	****	5.72E-01	T
0	939.39	38	61	0.71	1866.43	1864	8	6.36E-04	77.6	5.63E-01	T
0	963.77	19	87	2.94	1914.92	1911	10	3.09E-04	****	5.52E-01	T
0	1076.24	68	98	7.89	2138.57	2130	19	1.13E-03	74.7	5.08E-01	
0	1307.25	20	22	1.84	2598.01	2594	8	3.36E-04	92.0	4.38E-01	
0	1364.42	49	45	2.44	2711.73	2706	14	8.17E-04	65.0	4.24E-01	T
0	1462.83	78	153	7.41	2907.51	2896	25	1.30E-03	90.8	4.02E-01	
0	1500.73	15	45	1.37	2982.90	2977	11	2.51E-04	****	3.94E-01	
0	1522.40	13	44	3.57	3026.02	3021	12	2.24E-04	****	3.89E-01	
0	1559.27	16	23	0.76	3099.37	3095	9	2.72E-04	****	3.82E-01	
0	1570.09	6	50	0.54	3120.91	3118	14	9.80E-05	****	3.80E-01	
0	1591.26	23	21	1.52	3163.02	3160	6	3.76E-04	78.1	3.76E-01	
0	1668.54	13	15	1.47	3316.79	3315	7	2.10E-04	****	3.62E-01	
0	1895.13	5	20	0.91	3767.70	3767	6	7.67E-05	****	3.24E-01	
0	1923.95	6	7	0.63	3825.07	3822	5	1.05E-04	****	3.20E-01	
0	1975.83	2	25	4.62	3928.33	3921	17	2.94E-05	****	3.13E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
*                                     DETECTOR DATA                                   *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068236.CNF;1
* Acquisition date   : 25-APR-2006 18:43:09   Detector SN#      : 3941466
* Detector ID        : WELL                    Sensitivity          : 3.00000
* Geometry           : 2L_MB                   Energy tolerance     : 2.00000
* Elapsed live time  : 0 16:40:00.00          Abundance limit     : 75.00000
* Elapsed real time  : 0 16:40:12.98          Half life ratio     : 8.00000
*****
*                                     SAMPLE DATA                                   *
*
* Sample date        : 25-APR-2006 00:00:00   Nuclide Library     : EPI
* Sample ID          : G1201068236           Analyst initials    : MJH1
* Batch Number       : 519510                Sample Quantity     : 2.00000E+00 LITER
*****
*                                     QC DATA                                   *
*
* CALIB. DATE/TIME  : 13-DEC-2005 09:34:01.1MS Isotope       :
* MSD DPM           :                        MSD Isotope       :
* LCS DPM           :                        LCS Isotope       :
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NB-95	2.134E+00	1.376E+00	1.970E+00	0.000E+00	1.083
CS-135	4.258E+00	6.180E+00	9.037E+00	0.000E+00	0.471
CE-141	1.356E+00	3.533E+00	2.610E+00	0.000E+00	0.520
PM-149	2.805E+01	4.453E+01	7.028E+01	0.000E+00	0.399
TL-208	2.484E+00	3.560E+00	2.331E+00	0.000E+00	1.066
PA-231	3.825E+01	6.072E+01	9.780E+01	0.000E+00	0.391
U-235	9.939E+00	1.538E+01	1.347E+01	0.000E+00	0.738
U-238	5.169E+01	8.414E+01	6.622E+01	0.000E+00	0.781
ANH-511	7.473E-01	4.083E+00	1.881E+00	0.000E+00	0.397

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

Nuclide	Key-Line Activity K.L. (pCi/LITER) Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BE-7	3.532E+00	1.071E+01	1.812E+01	0.000E+00	0.195
NA-22	-2.950E-01	1.261E+00	2.128E+00	0.000E+00	-0.139
NA-24	-2.677E+00	4.683E+00	6.790E+00	0.000E+00	-0.394

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
AL-26	1.775E-01		1.176E+00	2.152E+00	0.000E+00	0.082
K-40	3.598E+01		1.479E+01	2.986E+01	0.000E+00	1.205
SC-46	2.679E-01		1.263E+00	2.213E+00	0.000E+00	0.121
V-48	-6.140E-01		1.236E+00	2.070E+00	0.000E+00	-0.297
CR-51	2.679E-01		9.895E+00	1.673E+01	0.000E+00	0.016
MN-54	-7.428E-01		1.262E+00	2.117E+00	0.000E+00	-0.351
CO-56	-1.752E-01		1.254E+00	2.157E+00	0.000E+00	-0.081
MN-56	-1.228E+02		8.715E+02	1.499E+03	0.000E+00	-0.082
CO-57	1.219E+00		9.119E-01	1.531E+00	0.000E+00	0.796
CO-58	3.440E-01		1.295E+00	2.276E+00	0.000E+00	0.151
FE-59	1.213E+00		2.282E+00	4.078E+00	0.000E+00	0.298
CO-60	2.143E+00		1.385E+00	2.635E+00	0.000E+00	0.813
ZN-65	-3.648E-01		2.725E+00	4.634E+00	0.000E+00	-0.079
SE-75	9.296E-02		1.446E+00	2.464E+00	0.000E+00	0.038
KR-85	1.690E+03		3.412E+02	6.146E+02	0.000E+00	2.749
SR-85	7.475E+00		1.509E+00	2.719E+00	0.000E+00	2.749
Y-88	9.787E-01		1.338E+00	2.547E+00	0.000E+00	0.384
Y-91	-5.862E-01		1.215E+00	1.971E+00	0.000E+00	-0.297
NB-94	2.442E-01		1.252E+00	2.197E+00	0.000E+00	0.111
NB-95M	-2.316E+01		4.814E+00	7.168E+00	0.000E+00	-3.231
ZR-95	1.694E+00		2.074E+00	3.775E+00	0.000E+00	0.449
MO-99	1.763E-01		1.387E+00	2.128E+00	0.000E+00	0.083
TC-99M	2.406E+00		1.894E+01	2.905E+01	0.000E+00	0.083
RU-103	3.641E-01		1.250E+00	2.113E+00	0.000E+00	0.172
RH-106	3.284E+00		1.184E+01	2.095E+01	0.000E+00	0.157
RU-106	3.287E+00		1.184E+01	2.096E+01	0.000E+00	0.157
AG-108M	5.621E-01		1.390E+00	2.088E+00	0.000E+00	0.269
CD-109	2.205E+01		2.701E+01	4.492E+01	0.000E+00	0.491
AG-110M	-1.258E+01		1.780E+00	2.263E+00	0.000E+00	-5.558
SN-113	1.488E-01		1.596E+00	2.689E+00	0.000E+00	0.055
CD-115	-1.361E-01		5.258E+00	8.753E+00	0.000E+00	-0.016
SN-115	6.681E-01		9.192E+01	1.594E+02	0.000E+00	0.004
SN-117M	3.280E-01		9.394E-01	1.633E+00	0.000E+00	0.201
TE-123M	2.012E-01		9.163E-01	1.588E+00	0.000E+00	0.127
SB-124	1.609E+00		2.610E+00	4.926E+00	0.000E+00	0.327
SB-125	-3.360E-01		3.511E+00	5.862E+00	0.000E+00	-0.057
TE-125M	-5.709E+00		3.034E+02	4.917E+02	0.000E+00	-0.012
I-126	-2.521E+01		4.073E+00	5.272E+00	0.000E+00	-4.781
SB-126	2.823E+00		2.348E+00	4.327E+00	0.000E+00	0.653
SN-126	2.888E+00		3.071E+00	4.596E+00	0.000E+00	0.628
SB-127	1.086E+00		3.869E+00	6.855E+00	0.000E+00	0.158
I-131	-4.598E-01		1.347E+00	2.238E+00	0.000E+00	-0.205
TE-132	2.434E-01		1.194E+00	2.049E+00	0.000E+00	0.119
BA-133	-6.041E-02		1.637E+00	2.754E+00	0.000E+00	-0.022
I-133	-2.322E-02		3.124E+00	5.199E+00	0.000E+00	-0.004
CS-134	1.376E+00	+	1.363E+00	2.416E+00	0.000E+00	0.570
I-135	7.796E+00		6.750E+01	1.171E+02	0.000E+00	0.067
CS-136	-6.304E-01		1.689E+00	2.840E+00	0.000E+00	-0.222

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BA-137M	1.707E+01		2.005E+00	4.244E+00	0.000E+00	4.022
CS-137	1.804E+01		2.119E+00	4.486E+00	0.000E+00	4.021
CE-139	-5.681E-01		9.654E-01	1.639E+00	0.000E+00	-0.347
BA-140	-3.400E+00		4.764E+00	7.650E+00	0.000E+00	-0.444
LA-140	-7.499E-01		1.497E+00	2.561E+00	0.000E+00	-0.293
CE-143	2.575E+00		4.393E+00	6.696E+00	0.000E+00	0.385
CE-144	-1.913E+00		6.887E+00	1.186E+01	0.000E+00	-0.161
PM-144	1.087E+00		1.301E+00	2.342E+00	0.000E+00	0.464
PM-146	3.352E-01		1.722E+00	2.902E+00	0.000E+00	0.115
ND-147	4.124E+00		8.905E+00	1.517E+01	0.000E+00	0.272
PM-147	3.886E+06		1.932E+06	3.303E+06	0.000E+00	1.177
EU-152	4.850E+00		3.685E+00	6.488E+00	0.000E+00	0.748
GD-153	-1.123E+00		2.729E+00	4.395E+00	0.000E+00	-0.255
EU-154	-2.541E+00		3.690E+00	5.982E+00	0.000E+00	-0.425
EU-155	-1.960E+00		4.009E+00	6.426E+00	0.000E+00	-0.305
TB-160	-7.863E-01		4.181E+00	7.181E+00	0.000E+00	-0.109
TM-171	3.386E+02		9.621E+02	1.429E+03	0.000E+00	0.237
HF-181	5.794E-01		1.320E+00	2.247E+00	0.000E+00	0.258
TA-182	-2.994E+00		5.075E+00	8.316E+00	0.000E+00	-0.360
IR-192	-8.961E-02		1.121E+00	1.890E+00	0.000E+00	-0.047
HG-203	1.278E+00		1.199E+00	2.098E+00	0.000E+00	0.609
BI-207	7.765E-01		1.769E+00	3.130E+00	0.000E+00	0.248
BI-210	2.315E+02		9.863E+01	1.573E+02	0.000E+00	1.471
PB-210	2.315E+02		9.863E+01	1.573E+02	0.000E+00	1.471
BI-211	5.345E+00		7.711E+00	1.329E+01	0.000E+00	0.402
PB-211	4.375E+00		3.592E+01	6.053E+01	0.000E+00	0.072
BI-212	6.397E+00		1.028E+01	1.843E+01	0.000E+00	0.347
PB-212	9.659E+00		2.246E+00	4.183E+00	0.000E+00	2.309
BI-214	2.337E+00	+	5.274E+00	4.983E+00	0.000E+00	0.469
PB-214	3.230E+00		2.649E+00	4.649E+00	0.000E+00	0.695
RN-219	-5.727E+00		1.548E+01	2.562E+01	0.000E+00	-0.224
RA-223	-4.666E+00		2.524E+01	4.234E+01	0.000E+00	-0.110
RA-224	-1.132E+01		2.446E+01	4.107E+01	0.000E+00	-0.276
RA-226	2.337E+00	+	5.274E+00	4.983E+00	0.000E+00	0.469
AC-227	-2.683E+00		1.399E+01	2.367E+01	0.000E+00	-0.113
TH-227	-2.644E+00		1.379E+01	2.333E+01	0.000E+00	-0.113
AC-228	5.780E+00	+	9.788E+00	1.021E+01	0.000E+00	0.566
RA-228	5.780E+00	+	9.788E+00	1.021E+01	0.000E+00	0.566
TH-228	9.658E+00		2.245E+00	4.183E+00	0.000E+00	2.309
TH-229	4.427E+00		1.992E+01	3.031E+01	0.000E+00	0.146
TH-230	2.337E+00	+	5.273E+00	4.983E+00	0.000E+00	0.469
TH-231	5.009E+00	+	7.270E+00	1.141E+01	0.000E+00	0.439
TH-232	9.647E+00		2.243E+00	4.178E+00	0.000E+00	2.309
PA-233	-8.750E-01		2.342E+00	3.914E+00	0.000E+00	-0.224
PA-234	-2.240E-01		1.012E+01	1.751E+01	0.000E+00	-0.013
PA-234M	1.865E+02		1.661E+02	3.034E+02	0.000E+00	0.615
TH-234	5.169E+01	+	8.414E+01	8.462E+01	0.000E+00	0.611
U-234	2.765E+00	+	8.616E+00	8.496E+00	0.000E+00	0.325

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NP-237	3.935E+00		9.269E+00	1.364E+01	0.000E+00	0.288
NP-239	-5.333E+00		7.140E+00	1.132E+01	0.000E+00	-0.471
AM-241	4.433E+00		6.817E+00	8.173E+00	0.000E+00	0.542
AM-242	2.488E+01		8.066E+01	1.323E+02	0.000E+00	0.188
CM-247	-3.006E-01		1.402E+00	2.334E+00	0.000E+00	-0.129
CF-249	-1.107E-03		1.531E+00	2.573E+00	0.000E+00	0.000
CF-251	1.957E+00		4.525E+00	7.852E+00	0.000E+00	0.249



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*****
*
*                               General Engineering Labs, LLC
*                               2040 SAVAGE ROAD
*                               CHARLESTON ,SC 29417
*                               GROSS GAMMA REPORT
*
*****
*
*   BATCH ID      : 519510                SAMPLE ID   : G1201068236
*   ANALYST       : MJH1                  DETECTOR    : WELL
*   SAMPLE DATE   : 25-APR-2006 00:00:00.00  COUNT TIME  : 0 16:40:00.00
*   ANALYSIS DATE: 25-APR-2006 18:43:09.10  SAMPLE ALQT: 2.000 LITER
*
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GROSS GAMMA ACTIVITY (pCi/LITER ) : 4.604E+01
GROSS GAMMA ERROR (pCi/LITER ) : 5.361E+01
GROSS GAMMA MDA (pCi/LITER ) : 1.983E+02
GROSS GAMMA DLC (pCi/LITER ) : 9.730E+01

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VAX/VMS Nuclide Identification Report Generated 26-APR-2006 15:32:33.23

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068237.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 26-APR-2006 05:28:03
Sample ID          : G1201068237 Sample quantity      : 2.00000E+00 LITER
Detector name     : GAM19 Detector geometry: 2LMB
Elapsed live time : 0 10:00:00.00 Elapsed real time: 0 10:00:06.59 0.0%
Energy tolerance  : 2.00000 keV Analyst Initials    : MJH1
Abundance limit   : 75.00000 Sensitivity         : 3.00000
Batch ID          : 519510 Detector SN#       :
Matrix Spike DPM  : LCS DPM                       :
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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	9	5.01*	3201	1638	1.35	9.81	6	12	8.89E-02	3.9	3.49E+01
2	0	10.51*	66	4003	1.01	20.79	18	7	1.82E-03	191.0	
3	0	14.40	185	3325	1.55	28.56	26	7	5.13E-03	52.4	
4	0	46.86*	16	660	1.22	93.40	89	8	4.36E-04	338.8	
5	2	63.40*	115	606	1.56	126.45	121	16	3.19E-03	50.3	1.86E+00
6	2	66.41	166	578	1.60	132.45	121	16	4.60E-03	25.9	
7	0	84.72	39	587	0.66	169.02	164	9	1.10E-03	111.9	
8	0	140.04*	211	540	1.04	279.54	275	10	5.86E-03	24.9	
9	0	176.54	236	658	2.73	352.47	346	14	6.56E-03	24.0	
10	0	185.99*	34	461	1.26	371.34	367	10	9.35E-04	160.0	
11	0	198.61*	109	528	1.42	396.55	391	12	3.02E-03	57.9	
12	0	204.90	44	391	0.66	409.12	407	9	1.22E-03	82.2	
13	0	239.37*	48	510	1.24	477.98	472	13	1.33E-03	118.5	
14	0	265.86	25	264	0.72	530.92	528	8	6.94E-04	114.3	
15	0	326.20	46	259	1.32	651.46	646	10	1.29E-03	66.7	
16	0	352.31*	16	176	2.33	703.63	700	8	4.37E-04	233.9	
17	0	472.06	36	245	6.09	942.92	936	16	1.00E-03	98.1	
18	0	484.78	38	224	4.85	968.34	959	15	1.06E-03	87.2	
19	0	489.33	36	132	1.51	977.42	974	9	1.01E-03	59.0	
20	0	569.31*	16	208	3.26	1137.26	1128	15	4.54E-04	215.2	
21	0	584.22*	17	158	1.15	1167.05	1160	11	4.85E-04	194.2	
22	0	596.03	49	134	1.66	1190.65	1188	8	1.37E-03	42.6	
23	0	609.96	76	146	1.41	1218.49	1214	12	2.12E-03	34.0	
24	0	645.94	15	117	1.22	1290.39	1283	11	4.26E-04	141.7	
25	0	651.43	94	157	7.08	1301.38	1293	20	2.62E-03	34.0	
26	0	819.74	40	55	2.32	1637.76	1633	10	1.11E-03	38.7	
27	0	869.24	83	125	4.36	1736.70	1726	20	2.31E-03	34.7	
28	0	912.61*	5	148	4.28	1823.39	1812	19	1.48E-04	636.6	
29	0	922.01	15	52	0.49	1842.18	1836	9	4.13E-04	91.2	
30	0	1227.06	22	93	5.83	2452.03	2436	19	6.12E-04	110.2	
31	0	1287.80	41	81	7.73	2573.47	2562	23	1.14E-03	58.9	
32	0	1498.87	18	38	1.51	2995.54	2990	11	5.09E-04	69.4	
33	1	1696.61	28	35	2.16	3391.00	3373	38	7.83E-04	46.8	1.57E+00
34	1	1699.11	18	37	2.16	3396.00	3373	38	5.12E-04	73.9	
35	0	1745.33	23	57	7.21	3488.45	3477	18	6.33E-04	81.3	
36	0	1800.14	13	25	1.55	3598.08	3589	14	3.67E-04	84.3	
37	0	1873.57	17	44	6.51	3744.96	3732	17	4.86E-04	92.1	
38	0	1960.59	38	16	4.63	3919.04	3912	14	1.05E-03	28.5	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
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Flag: "\*" = Peak area was modified by background subtraction

VAX/VMS Nuclide Identification Report Generated

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*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
*                               DETECTOR DATA                                       *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068237
* Acquisition date   : 26-APR-2006 05:28:03 Detector SN#      :
* Detector ID       : GAM19                               Sensitivity      : 3.000
* Geometry          : 2LMB                               Energy tolerance: 2.000
* Elapsed live time : 0 10:00:00.00                    Abundance limit : 75.000
* Elapsed real time : 0 10:00:06.59                    Half life ratio  : 8.000
*****
*                               SAMPLE DATA                                         *
*
* Sample date       : 22-MAR-2006 10:20:00 Nuclide Library :
* Sample ID        : G1201068237                    Analyst initials: MJH1
* Batch Number     : 519510                          Sample Quantity : 2.0000E+00 LITER
* Recovery         : 1.00000                          Carrier Weight  : 0.00000
*****
*                               QC DATA                                             *
*
* Standard Weight  : 0.00000
* CALIB. DATE/TIME : 17-FEB-2006 16:09:06 MS Isotope      :
* MSD DPM          : 0.000                          MSD Isotope     :
* LCS DPM          : 0.000                          LCS Isotope     :
* LCSD DPM        : 0.000                          LCSD Isotope    :
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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
BI-210	4.053E+01	2.746E+02	1.833E+02	0.000E+00
PB-210	4.053E+01	2.746E+02	1.833E+02	0.000E+00
BI-211	2.595E+00	1.214E+01	6.879E+00	0.000E+00
RA-224	2.120E+01	5.028E+01	2.244E+01	0.000E+00
RA-226	5.065E+00	3.465E+00	2.297E+00	0.000E+00
TH-228	1.877E+00	4.454E+00	2.067E+00	0.000E+00
TH-230	5.065E+00	3.465E+00	2.297E+00	0.000E+00
TH-232	1.813E+00	4.302E+00	1.997E+00	0.000E+00
NP-237	5.213E+00	1.173E+01	8.155E+00	0.000E+00
U-238	8.980E+01	9.191E+01	5.175E+01	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )	
BE-7	-4.062E+00	2.635E+01	1.424E+01	0.000E+00 NOT IDENT.
NA-22	3.565E-01	1.283E+00	1.257E+00	0.000E+00 NOT IDENT.
NA-24	0.000E+00	8.848E+16	0.000E+00	0.000E+00 SHORT HLIF
AL-26	3.295E-01	1.392E+00	1.362E+00	0.000E+00 NOT IDENT.
K-40	5.311E+00	2.121E+01	1.748E+01	0.000E+00 NOT IDENT.
SC-46	-2.367E-01	1.408E+00	1.355E+00	0.000E+00 NOT IDENT.
V-48	-7.506E+00	5.317E+00	4.562E+00	0.000E+00 NOT IDENT.
CR-51	1.087E+01	2.587E+01	2.241E+01	0.000E+00 NOT IDENT.
MN-54	7.352E-01	1.178E+00	1.197E+00	0.000E+00 NOT IDENT.
CO-56	-6.100E-01	1.519E+00	1.444E+00	0.000E+00 NOT IDENT.
MN-56	0.000E+00	2.491E+41	0.000E+00	0.000E+00 SHORT HLIF
CO-57	3.795E-01	1.098E+00	1.052E+00	0.000E+00 NOT IDENT.
CO-58	-2.751E-01	1.678E+00	1.551E+00	0.000E+00 NOT IDENT.
FE-59	3.084E-01	3.734E+00	3.624E+00	0.000E+00 NOT IDENT.
CO-60	2.445E-01	1.320E+00	1.280E+00	0.000E+00 NOT IDENT.
ZN-65	-5.357E-02	2.529E+00	2.432E+00	0.000E+00 NOT IDENT.
SE-75	9.199E-01	2.105E+00	1.800E+00	0.000E+00 FAIL ABUN

KR-85	-5.741E+02	3.887E+02	3.512E+02	0.000E+00	NOT IDENT.
SR-85	-3.626E+00	2.455E+00	2.218E+00	0.000E+00	NOT IDENT.
Y-88	6.325E-01	1.635E+00	1.651E+00	0.000E+00	NOT IDENT.
Y-91	-2.381E-01	1.581E+00	1.491E+00	0.000E+00	NOT IDENT.
NB-94	2.155E-01	1.234E+00	1.174E+00	0.000E+00	FAIL ABUN
NB-95	3.961E-01	2.134E+00	2.029E+00	0.000E+00	NOT IDENT.
NB-95M	0.000E+00	3.550E+03	0.000E+00	0.000E+00	SHORT HLIF
ZR-95	-1.915E+00	2.901E+00	2.587E+00	0.000E+00	NOT IDENT.
MO-99	0.000E+00	1.174E+04	0.000E+00	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	8.176E+40	0.000E+00	0.000E+00	SHORT HLIF
RU-103	-2.050E-01	2.099E+00	1.997E+00	0.000E+00	FAIL ABUN
RH-106	4.494E+00	1.181E+01	1.144E+01	0.000E+00	NOT IDENT.
RU-106	8.205E+00	1.173E+01	1.154E+01	0.000E+00	NOT IDENT.
AG-108M	5.042E-02	1.184E+00	1.141E+00	0.000E+00	NOT IDENT.
CD-109	-1.062E+02	3.843E+01	2.740E+01	0.000E+00	NOT IDENT.
AG-110M	-1.258E-01	1.361E+00	1.100E+00	0.000E+00	NOT IDENT.
SN-113	8.867E-01	1.761E+00	1.740E+00	0.000E+00	NOT IDENT.
CD-115	0.000E+00	1.800E+05	0.000E+00	0.000E+00	SHORT HLIF
SN-115	4.332E+01	1.554E+02	1.539E+02	0.000E+00	FAIL ABUN
SN-117M	3.664E+00	5.962E+00	5.721E+00	0.000E+00	NOT IDENT.
TE-123M	2.223E-01	1.265E+00	1.198E+00	0.000E+00	NOT IDENT.
SB-124	1.737E-01	3.786E+00	3.580E+00	0.000E+00	FAIL ABUN
SB-125	1.094E+00	3.333E+00	3.259E+00	0.000E+00	FAIL ABUN
TE-125M	-3.751E+02	4.910E+02	4.540E+02	0.000E+00	NOT IDENT.
I-126	1.496E+00	1.681E+01	1.597E+01	0.000E+00	NOT IDENT.
SB-126	9.136E+00	1.452E+01	1.422E+01	0.000E+00	NOT IDENT.
SN-126	-3.627E+00	3.383E+00	2.688E+00	0.000E+00	FAIL ABUN
SB-127	0.000E+00	1.561E+03	0.000E+00	0.000E+00	SHORT HLIF
I-131	-1.353E+01	2.344E+01	2.208E+01	0.000E+00	NOT IDENT.
I-132	0.000E+00	7.018E+41	0.000E+00	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.818E+03	0.000E+00	0.000E+00	SHORT HLIF
BA-133	5.742E-01	1.749E+00	1.503E+00	0.000E+00	NOT IDENT.
I-133	0.000E+00	1.602E+12	0.000E+00	0.000E+00	SHORT HLIF
CS-134	6.035E-01	1.325E+00	1.282E+00	0.000E+00	FAIL ABUN
CS-135	6.010E-01	6.359E+00	5.447E+00	0.000E+00	NOT IDENT.
I-135	0.000E+00	8.162E+38	0.000E+00	0.000E+00	SHORT HLIF
CS-136	-7.805E-01	8.986E+00	8.625E+00	0.000E+00	FAIL ABUN
BA-137M	-1.269E-01	1.199E+00	1.093E+00	0.000E+00	NOT IDENT.
CS-137	-1.383E-01	1.268E+00	1.155E+00	0.000E+00	NOT IDENT.
CE-139	-2.849E-01	1.299E+00	1.211E+00	0.000E+00	NOT IDENT.
BA-140	-1.850E+00	2.535E+01	2.406E+01	0.000E+00	NOT IDENT.
LA-140	-1.681E+00	9.371E+00	8.681E+00	0.000E+00	FAIL ABUN
CE-141	1.271E+00	4.976E+00	3.799E+00	0.000E+00	NOT IDENT.
CE-143	0.000E+00	1.111E+08	0.000E+00	0.000E+00	SHORT HLIF
CE-144	1.431E+00	8.854E+00	8.125E+00	0.000E+00	NOT IDENT.
PM-144	3.574E-02	1.291E+00	1.219E+00	0.000E+00	NOT IDENT.
PR-144	0.000E+00	3.613E+42	0.000E+00	0.000E+00	SHORT HLIF
PM-146	4.571E-01	1.597E+00	1.555E+00	0.000E+00	NOT IDENT.
ND-147	3.783E+01	6.585E+01	6.476E+01	0.000E+00	NOT IDENT.
PM-147	-9.980E+05	2.223E+06	2.075E+06	0.000E+00	NOT IDENT.
PM-149	0.000E+00	1.699E+06	0.000E+00	0.000E+00	SHORT HLIF
EU-152	-4.415E+00	4.885E+00	3.440E+00	0.000E+00	NOT IDENT.
GD-153	-1.165E+01	4.553E+00	3.094E+00	0.000E+00	FAIL ABUN
EU-154	1.011E+00	3.551E+00	3.480E+00	0.000E+00	NOT IDENT.
EU-155	4.074E+00	4.443E+00	4.335E+00	0.000E+00	FAIL ABUN
TB-160	4.123E+00	5.717E+00	5.720E+00	0.000E+00	NOT IDENT.
TM-171	0.000E+00	1.503E+03	1.251E+03	0.000E+00	FAIL ABUN
HF-181	4.640E-01	2.369E+00	1.995E+00	0.000E+00	FAIL ABUN
TA-182	2.574E+00	6.697E+00	5.766E+00	0.000E+00	FAIL ABUN
IR-192	-1.115E+00	1.553E+00	1.465E+00	0.000E+00	NOT IDENT.
HG-203	1.490E+00	1.974E+00	1.980E+00	0.000E+00	NOT IDENT.
BI-207	1.038E+00	1.584E+00	1.604E+00	0.000E+00	FAIL ABUN
TL-208	6.402E-01	2.488E+00	1.450E+00	0.000E+00	FAIL ABUN
PB-211	8.929E+00	3.257E+01	3.138E+01	0.000E+00	NOT IDENT.
BI-212	2.307E-01	9.514E+00	8.961E+00	0.000E+00	NOT IDENT.
PB-212	1.877E+00	4.454E+00	2.518E+00	0.000E+00	FAIL ABUN
BI-214	0.000E+00	3.465E+00	2.571E+00	0.000E+00	FAIL ABUN
PB-214	9.028E-01	4.225E+00	2.651E+00	0.000E+00	FAIL ABUN
RN-219	6.767E+00	1.464E+01	1.441E+01	0.000E+00	NOT IDENT.
RA-223	-5.475E-02	2.826E+01	2.389E+01	0.000E+00	NOT IDENT.
AC-227	-1.179E+01	1.431E+01	1.349E+01	0.000E+00	NOT IDENT.
TH-227	-1.158E+01	1.410E+01	1.326E+01	0.000E+00	NOT IDENT.
AC-228	8.134E-01	1.036E+01	4.830E+00	0.000E+00	FAIL ABUN
RA-228	8.134E-01	1.036E+01	4.830E+00	0.000E+00	FAIL ABUN
TH-229	6.179E+00	2.320E+01	1.918E+01	0.000E+00	FAIL ABUN
PA-231	-5.266E+01	5.658E+01	5.276E+01	0.000E+00	NOT IDENT.
TH-231	9.197E-01	7.290E+00	6.256E+00	0.000E+00	FAIL ABUN
PA-233	2.136E+00	2.360E+00	2.376E+00	0.000E+00	FAIL ABUN

PA-234	9.417E-01	9.561E+00	9.353E+00	0.000E+00	FAIL ABUN
PA-234M	-2.302E+02	2.175E+02	1.429E+02	0.000E+00	NOT IDENT.
TH-234	0.000E+00	9.191E+01	6.098E+01	0.000E+00	FAIL ABUN
U-234	3.646E-01	6.490E+00	5.106E+00	0.000E+00	FAIL ABUN
U-235	-4.325E+00	1.107E+01	8.209E+00	0.000E+00	FAIL ABUN
NP-239	-7.653E+00	7.948E+00	7.284E+00	0.000E+00	NOT IDENT.
AM-241	-2.304E+00	8.448E+00	6.218E+00	0.000E+00	NOT IDENT.
AM-242	2.172E+01	8.958E+01	8.587E+01	0.000E+00	NOT IDENT.
CM-247	1.107E+00	1.297E+00	1.300E+00	0.000E+00	NOT IDENT.
CF-249	-8.488E-01	1.374E+00	1.286E+00	0.000E+00	NOT IDENT.
CF-251	0.000E+00	9.376E+00	5.512E+00	0.000E+00	FAIL ABUN
ANH-511	-6.215E+00	2.644E+00	2.071E+00	0.000E+00	NOT IDENT.

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                             *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068237.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 26-APR-2006 05:28:03
Sample ID         : G1201068237          Sample quantity  : 2.00000E+00 LITER
Detector name     : GAM19                Detector geometry: 2LMB
Elapsed live time: 0 10:00:00.00         Elapsed real time: 0 10:00:06.59  0.0%
Energy tolerance  : 2.00000 keV         Analyst Initials  : MJH1
Abundance limit   : 75.00000           Sensitivity       : 3.00000
Batch ID          : 519510              Detector SN#      :
Matrix Spike DPM  :                     LCS DPM          :
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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	9	5.01	4433	1638	1.35	9.81	6	12	1.23E-01	2.5	3.49E+01
2	9	6.51	1724	4033	1.89	12.80	6	12	4.79E-02	8.3	
3	0	10.51	483	4003	1.01	20.79	18	7	1.34E-02	22.4	
4	0	14.40	185	3325	1.55	28.56	26	7	5.13E-03	52.4	
5	0	46.86	103	660	1.22	93.40	89	8	2.86E-03	44.5	
6	2	63.40	242	606	1.56	126.45	121	16	6.72E-03	19.8	1.86E+00
7	2	66.41	166	578	1.60	132.45	121	16	4.60E-03	25.9	
8	0	84.72	39	587	0.66	169.02	164	9	1.10E-03	111.9	
9	0	92.61	430	698	1.36	184.80	178	11	1.19E-02	12.9	
10	0	140.04	229	540	1.04	279.54	275	10	6.37E-03	20.1	
11	0	176.54	236	658	2.73	352.47	346	14	6.56E-03	24.0	
12	0	185.99	294	461	1.26	371.34	367	10	8.18E-03	14.8	
13	0	198.61	206	528	1.42	396.55	391	12	5.73E-03	23.4	
14	0	204.90	44	391	0.66	409.12	407	9	1.22E-03	82.2	
15	0	239.37	235	510	1.24	477.98	472	13	6.52E-03	20.9	
16	0	265.86	25	264	0.72	530.92	528	8	6.94E-04	114.3	
17	0	326.20	46	259	1.32	651.46	646	10	1.29E-03	66.7	
18	0	352.31	79	176	2.33	703.63	700	8	2.19E-03	31.2	
19	0	472.06	36	245	6.09	942.92	936	16	1.00E-03	98.1	
20	0	484.78	38	224	4.85	968.34	959	15	1.06E-03	87.2	
21	0	489.33	36	132	1.51	977.42	974	9	1.01E-03	59.0	
22	0	511.23	735	230	2.91	1021.18	1012	19	2.04E-02	6.2	
23	0	569.31	55	208	3.26	1137.26	1128	15	1.52E-03	59.1	
24	0	584.22	63	158	1.15	1167.05	1160	11	1.75E-03	40.8	
25	0	596.03	49	134	1.66	1190.65	1188	8	1.37E-03	42.6	
26	0	609.96	76	146	1.41	1218.49	1214	12	2.12E-03	34.0	
27	0	645.94	15	117	1.22	1290.39	1283	11	4.26E-04	141.7	
28	0	651.43	94	157	7.08	1301.38	1293	20	2.62E-03	34.0	
29	0	819.74	40	55	2.32	1637.76	1633	10	1.11E-03	38.7	
30	0	869.24	83	125	4.36	1736.70	1726	20	2.31E-03	34.7	
31	0	912.61	48	148	4.28	1823.39	1812	19	1.34E-03	61.8	
32	0	922.01	15	52	0.49	1842.18	1836	9	4.13E-04	91.2	
33	0	1227.06	22	93	5.83	2452.03	2436	19	6.12E-04	110.2	
34	0	1287.80	41	81	7.73	2573.47	2562	23	1.14E-03	58.9	
35	0	1463.26	46	91	1.35	2924.32	2915	14	1.28E-03	46.4	
36	0	1498.87	18	38	1.51	2995.54	2990	11	5.09E-04	69.4	
37	1	1696.61	28	35	2.16	3391.00	3373	38	7.83E-04	46.8	1.57E+00
38	1	1699.11	18	37	2.16	3396.00	3373	38	5.12E-04	73.9	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1745.33	23	57	7.21	3488.45	3477	18	6.33E-04	81.3	
40	0	1800.14	13	25	1.55	3598.08	3589	14	3.67E-04	84.3	
41	0	1873.57	17	44	6.51	3744.96	3732	17	4.86E-04	92.1	
42	0	1960.59	38	16	4.63	3919.04	3912	14	1.05E-03	28.5	



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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068237.CNF;1
Sample date        : 22-MAR-2006 10:20:00 Acquisition date : 26-APR-2006 05:28:03
Sample ID          : G1201068237           Sample quantity  : 2.00000E+00 LITER
Detector name     : GAM19                 Detector geometry: 2LMB
Elapsed live time : 0 10:00:00.00         Elapsed real time: 0 10:00:06.59  0.0%
Energy tolerance  : 2.00000 keV          Analyst Initials  : MJH1
Abundance limit   : 75.00000             Sensitivity       : 3.00000
Batch ID          : 519510                Detector SN#      :
Matrix Spike DPM  :                       LCS DPM         :
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Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
BI-210	46.50	16	4.05*	3.596E-01	4.041E+01	4.053E+01	677.59
PB-210	46.50	16	4.05*	3.596E-01	4.041E+01	4.053E+01	677.59
BI-211	351.07	16	12.94*	1.759E+00	2.595E+00	2.595E+00	467.92
RA-226	295.21	-----	19.20	1.962E+00	-----	Line Not Found	-----
	351.92	16	37.20	1.759E+00	9.028E-01	9.028E-01	467.91
	609.31	76	46.30*	1.221E+00	5.065E+00	5.065E+00	68.42
TH-228	84.40	39	1.21	2.253E+00	5.429E+01	5.621E+01	224.25
	238.60	48	44.60*	2.220E+00	1.813E+00	1.877E+00	237.24
	300.10	-----	3.41	1.943E+00	-----	Line Not Found	-----
TH-230	295.21	-----	19.20	1.962E+00	-----	Line Not Found	-----
	351.92	16	37.20	1.759E+00	9.028E-01	9.028E-01	467.91
	609.31	76	46.30*	1.221E+00	5.065E+00	5.065E+00	68.42
TH-232	238.59	48	44.60*	2.220E+00	1.813E+00	1.813E+00	237.24
	911.20	5	27.70	8.970E-01	8.041E-01	8.041E-01	1273.17
	964.40	-----	5.20	8.576E-01	-----	Line Not Found	-----
	969.11	-----	16.60	8.542E-01	-----	Line Not Found	-----
NP-237	86.48	39	12.60*	2.253E+00	5.213E+00	5.213E+00	224.98
	95.87	-----	2.60	2.545E+00	-----	Line Not Found	-----
U-238	63.29	115	3.80*	1.262E+00	8.980E+01	8.980E+01	102.35

Nuclide Type: NATURAL

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
RA-224	240.98	48	3.95*	2.220E+00	2.047E+01	2.120E+01	237.20

Flag: "\*" = Keyline

Total number of lines in spectrum 38  
 Number of unidentified lines 15  
 Number of lines tentatively identified by NID 23 60.53%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BI-210	22.26Y	1.00	4.041E+01	4.053E+01	27.46E+01	677.59	
PB-210	22.26Y	1.00	4.041E+01	4.053E+01	27.46E+01	677.59	
BI-211	7.04E+08Y	1.00	2.595E+00	2.595E+00	12.14E+00	467.92	
RA-226	1600.00Y	1.00	5.065E+00	5.065E+00	3.465E+00	68.42	
TH-228	1.91Y	1.04	1.813E+00	1.877E+00	4.454E+00	237.24	
TH-230	7.70E+04Y	1.00	5.065E+00	5.065E+00	3.465E+00	68.42	
TH-232	1.41E+10Y	1.00	1.813E+00	1.813E+00	4.302E+00	237.24	
NP-237	2.14E+06Y	1.00	5.213E+00	5.213E+00	11.73E+00	224.98	
U-238	4.47E+09Y	1.00	8.980E+01	8.980E+01	9.191E+01	102.35	
Total Activity :			1.922E+02	1.925E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-224	1.91Y	1.04	2.047E+01	2.120E+01	5.028E+01	237.20	
Total Activity :			2.047E+01	2.120E+01			

Grand Total Activity : 2.127E+02 2.137E+02

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
9	5.01	3201	1638	1.35	9.81	6	12	8.89E-02	7.8	0.00E+00	
0	10.51	66	4003	1.01	20.79	18	7	1.82E-03	****	5.98E-15	
0	14.40	185	3325	1.55	28.56	26	7	5.13E-03	****	1.39E-09	
2	66.41	166	578	1.60	132.45	121	16	4.60E-03	51.9	1.43E+00	T
0	140.04	211	540	1.04	279.54	275	10	5.86E-03	49.8	2.78E+00	T
0	176.54	236	658	2.73	352.47	346	14	6.56E-03	47.9	2.59E+00	T
0	185.99	34	461	1.26	371.34	367	10	9.35E-04	****	2.53E+00	T
0	198.61	109	528	1.42	396.55	391	12	3.02E-03	****	2.45E+00	T
0	204.90	44	391	0.66	409.12	407	9	1.22E-03	****	2.42E+00	T
0	265.86	25	264	0.72	530.92	528	8	6.94E-04	****	2.09E+00	T
0	326.20	46	259	1.32	651.46	646	10	1.29E-03	****	1.85E+00	
0	472.06	36	245	6.09	942.92	936	16	1.00E-03	****	1.46E+00	T
0	484.78	38	224	4.85	968.34	959	15	1.06E-03	****	1.43E+00	T
0	489.33	36	132	1.51	977.42	974	9	1.01E-03	****	1.42E+00	T
0	569.31	16	208	3.26	1137.26	1128	15	4.54E-04	****	1.28E+00	T
0	584.22	17	158	1.15	1167.05	1160	11	4.85E-04	****	1.26E+00	T
0	596.03	49	134	1.66	1190.65	1188	8	1.37E-03	85.3	1.24E+00	
0	645.94	15	117	1.22	1290.39	1283	11	4.26E-04	****	1.17E+00	T
0	651.43	94	157	7.08	1301.38	1293	20	2.62E-03	67.9	1.16E+00	T
0	819.74	40	55	2.32	1637.76	1633	10	1.11E-03	77.4	9.77E-01	T
0	869.24	83	125	4.36	1736.70	1726	20	2.31E-03	69.5	9.33E-01	T
0	922.01	15	52	0.49	1842.18	1836	9	4.13E-04	****	8.90E-01	
0	1227.06	22	93	5.83	2452.03	2436	19	6.12E-04	****	7.05E-01	
0	1287.80	41	81	7.73	2573.47	2562	23	1.14E-03	****	6.78E-01	
0	1498.87	18	38	1.51	2995.54	2990	11	5.09E-04	****	6.06E-01	
1	1696.61	28	35	2.16	3391.00	3373	38	7.83E-04	93.7	5.59E-01	
1	1699.11	18	37	2.16	3396.00	3373	38	5.12E-04	****	5.59E-01	
0	1745.33	23	57	7.21	3488.45	3477	18	6.33E-04	****	5.51E-01	
0	1800.14	13	25	1.55	3598.08	3589	14	3.67E-04	****	5.42E-01	
0	1873.57	17	44	6.51	3744.96	3732	17	4.86E-04	****	5.32E-01	
0	1960.59	38	16	4.63	3919.04	3912	14	1.05E-03	57.0	5.23E-01	

Flags: "T" = Tentatively associated

```

*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
*                                     DETECTOR DATA                                   *
*
* Configuration      : DKA0:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068237.CNF;1          *
* Acquisition date   : 26-APR-2006 05:28:03   Detector SN#      :                   *
* Detector ID       : GAM19                    Sensitivity       : 3.00000          *
* Geometry         : 2LMB                      Energy tolerance  : 2.00000          *
* Elapsed live time: 0 10:00:00.00            Abundance limit   : 75.00000          *
* Elapsed real time: 0 10:00:06.59            Half life ratio   : 8.00000          *
*****
*                                     SAMPLE DATA                                   *
*
* Sample date       : 22-MAR-2006 10:20:00   Nuclide Library  : EPI                *
* Sample ID        : G1201068237            Analyst initials  : MJH1                *
* Batch Number     : 519510                 Sample Quantity  : 2.00000E+00 LITER          *
*****
*                                     QC DATA                                   *
*
* CALIB. DATE/TIME : 17-FEB-2006 16:09:06.3MS Isotope      :                   *
* MSD DPM          :                        MSD Isotope     :                   *
* LCS DPM         :                        LCS Isotope      :                   *
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BI-210	4.053E+01	2.746E+02	1.833E+02	1.637E+01	0.221
PB-210	4.053E+01	2.746E+02	1.833E+02	1.637E+01	0.221
BI-211	2.595E+00	1.214E+01	6.879E+00	4.923E-01	0.377
RA-224	2.120E+01	5.028E+01	2.244E+01	1.695E+00	0.945
RA-226	5.065E+00	3.465E+00	2.297E+00	1.850E-01	2.205
TH-228	1.877E+00	4.454E+00	2.067E+00	1.817E-01	0.908
TH-230	5.065E+00	3.465E+00	2.297E+00	1.849E-01	2.205
TH-232	1.813E+00	4.302E+00	1.997E+00	1.755E-01	0.908
NP-237	5.213E+00	1.173E+01	8.155E+00	1.847E+00	0.639
U-238	8.980E+01	9.191E+01	5.175E+01	9.784E+00	1.735

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BE-7	-4.062E+00		2.635E+01	1.424E+01	1.003E+00	-0.285
NA-22	3.565E-01		1.283E+00	1.257E+00	7.711E-02	0.284

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NA-24	2.522E+10		4.424E+10	Half-Life too short		
AL-26	3.295E-01		1.392E+00	1.362E+00	7.763E-02	0.242
K-40	5.311E+00		2.121E+01	1.748E+01	1.109E+00	0.304
SC-46	-2.367E-01		1.408E+00	1.355E+00	1.081E-01	-0.175
V-48	-7.506E+00		5.317E+00	4.562E+00	3.507E-01	-1.645
CR-51	1.087E+01		2.587E+01	2.241E+01	1.692E+00	0.485
MN-54	7.352E-01		1.178E+00	1.197E+00	8.987E-02	0.614
CO-56	-6.100E-01		1.519E+00	1.444E+00	1.099E-01	-0.423
MN-56	-1.000E+35		1.245E+35	Half-Life too short		
CO-57	3.795E-01		1.098E+00	1.052E+00	7.650E-02	0.361
CO-58	-2.751E-01		1.678E+00	1.551E+00	1.137E-01	-0.177
FE-59	3.084E-01		3.734E+00	3.624E+00	2.830E-01	0.085
CO-60	2.445E-01		1.320E+00	1.280E+00	7.608E-02	0.191
ZN-65	-5.357E-02		2.529E+00	2.432E+00	1.665E-01	-0.022
SE-75	9.199E-01	+	2.105E+00	1.800E+00	1.350E-01	0.511
KR-85	-5.741E+02		3.887E+02	3.512E+02	2.170E+01	-1.635
SR-85	-3.626E+00		2.455E+00	2.218E+00	1.371E-01	-1.635
Y-88	6.325E-01		1.635E+00	1.651E+00	9.355E-02	0.383
Y-91	-2.381E-01		1.581E+00	1.491E+00	9.235E-02	-0.160
NB-94	2.155E-01		1.234E+00	1.174E+00	7.526E-02	0.184
NB-95	3.961E-01		2.134E+00	2.029E+00	1.407E-01	0.195
NB-95M	4.607E-04		1.775E-03	Half-Life too short		
ZR-95	-1.915E+00		2.901E+00	2.587E+00	2.050E-01	-0.740
MO-99	2.331E-02	+	5.870E-03	Half-Life too short		
TC-99M	1.000E+35	+	4.088E+34	Half-Life too short		
RU-103	-2.050E-01		2.099E+00	1.997E+00	2.560E-01	-0.103
RH-106	4.494E+00		1.181E+01	1.144E+01	7.032E-01	0.393
RU-106	8.205E+00		1.173E+01	1.154E+01	1.374E+00	0.711
AG-108M	5.042E-02		1.184E+00	1.141E+00	7.452E-02	0.044
CD-109	-1.062E+02		3.843E+01	2.740E+01	2.575E+00	-3.875
AG-110M	-1.258E-01		1.361E+00	1.100E+00	7.090E-02	-0.114
SN-113	8.867E-01		1.761E+00	1.740E+00	1.098E-01	0.510
CD-115	1.733E-03		8.999E-02	Half-Life too short		
SN-115	4.332E+01		1.554E+02	1.539E+02	1.219E+01	0.282
SN-117M	3.664E+00		5.962E+00	5.721E+00	4.285E-01	0.640
TE-123M	2.223E-01		1.265E+00	1.198E+00	9.050E-02	0.186
SB-124	1.737E-01		3.786E+00	3.580E+00	2.277E-01	0.049
SB-125	1.094E+00		3.333E+00	3.259E+00	2.044E-01	0.336
TE-125M	-3.751E+02		4.910E+02	4.540E+02	4.380E+01	-0.826
I-126	1.496E+00		1.681E+01	1.597E+01	9.771E-01	0.094
SB-126	9.136E+00		1.452E+01	1.422E+01	9.321E-01	0.643
SN-126	-3.627E+00		3.383E+00	2.688E+00	2.520E-01	-1.349
SB-127	1.991E-04		7.807E-04	Half-Life too short		
I-131	-1.353E+01		2.344E+01	2.208E+01	1.612E+00	-0.613
I-132	-1.000E+35		3.509E+35	Half-Life too short		
TE-132	-9.308E-04		9.091E-04	Half-Life too short		
BA-133	5.742E-01		1.749E+00	1.503E+00	1.794E-01	0.382
I-133	3.961E+05		8.009E+05	Half-Life too short		

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
CS-134	6.035E-01		1.325E+00	1.282E+00	9.280E-02	0.471
CS-135	6.010E-01		6.359E+00	5.447E+00	4.880E-01	0.110
I-135	1.134E+31		4.081E+32	Half-Life	too short	
CS-136	-7.805E-01		8.986E+00	8.625E+00	6.709E-01	-0.090
BA-137M	-1.269E-01		1.199E+00	1.093E+00	6.649E-02	-0.116
CS-137	-1.383E-01		1.268E+00	1.155E+00	7.053E-02	-0.120
CE-139	-2.849E-01		1.299E+00	1.211E+00	9.202E-02	-0.235
BA-140	-1.850E+00		2.535E+01	2.406E+01	7.841E+00	-0.077
LA-140	-1.681E+00		9.371E+00	8.681E+00	5.173E-01	-0.194
CE-141	1.271E+00		4.976E+00	3.799E+00	2.856E-01	0.334
CE-143	-8.497E+01		5.554E+01	Half-Life	too short	
CE-144	1.431E+00		8.854E+00	8.125E+00	1.207E+00	0.176
PM-144	3.574E-02		1.291E+00	1.219E+00	7.777E-02	0.029
PR-144	1.000E+35		1.807E+36	Half-Life	too short	
PM-146	4.571E-01		1.597E+00	1.555E+00	1.372E-01	0.294
ND-147	3.783E+01		6.585E+01	6.476E+01	8.871E+00	0.584
PM-147	-9.980E+05		2.223E+06	2.075E+06	1.510E+05	-0.481
PM-149	-1.390E+00		8.497E-01	Half-Life	too short	
EU-152	-4.415E+00		4.885E+00	3.440E+00	2.524E-01	-1.284
GD-153	-1.165E+01		4.553E+00	3.094E+00	2.598E-01	-3.764
EU-154	1.011E+00		3.551E+00	3.480E+00	3.322E-01	0.290
EU-155	4.074E+00		4.443E+00	4.335E+00	3.464E-01	0.940
TB-160	4.123E+00		5.717E+00	5.720E+00	4.515E-01	0.721
TM-171	2.844E+03	+	1.503E+03	1.251E+03	1.235E+02	2.274
HF-181	4.640E-01		2.369E+00	1.995E+00	1.226E-01	0.233
TA-182	2.574E+00		6.697E+00	5.766E+00	3.606E-01	0.446
IR-192	-1.115E+00		1.553E+00	1.465E+00	1.034E-01	-0.762
HG-203	1.490E+00		1.974E+00	1.980E+00	1.515E-01	0.753
BI-207	1.038E+00		1.584E+00	1.604E+00	1.157E-01	0.647
TL-208	6.402E-01	+	2.488E+00	1.450E+00	1.018E-01	0.442
PB-211	8.929E+00		3.257E+01	3.138E+01	1.956E+01	0.285
BI-212	2.307E-01		9.514E+00	8.961E+00	7.473E-01	0.026
PB-212	1.877E+00	+	4.454E+00	2.518E+00	2.213E-01	0.746
BI-214	5.065E+00	+	3.465E+00	2.571E+00	2.071E-01	1.970
PB-214	9.028E-01	+	4.225E+00	2.651E+00	2.346E-01	0.341
RN-219	6.767E+00		1.464E+01	1.441E+01	1.970E+00	0.470
RA-223	-5.475E-02		2.826E+01	2.389E+01	4.050E+00	-0.002
AC-227	-1.179E+01		1.431E+01	1.349E+01	2.011E+00	-0.874
TH-227	-1.158E+01		1.410E+01	1.326E+01	2.328E+00	-0.874
AC-228	8.134E-01	+	1.036E+01	4.830E+00	5.208E-01	0.168
RA-228	8.134E-01	+	1.036E+01	4.830E+00	5.208E-01	0.168
TH-229	6.179E+00		2.320E+01	1.918E+01	1.458E+00	0.322
PA-231	-5.266E+01		5.658E+01	5.276E+01	7.646E+00	-0.998
TH-231	9.197E-01		7.290E+00	6.256E+00	5.404E-01	0.147
PA-233	2.136E+00		2.360E+00	2.376E+00	1.753E-01	0.899
PA-234	9.417E-01		9.561E+00	9.353E+00	1.724E+00	0.101
PA-234M	-2.302E+02		2.175E+02	1.429E+02	1.297E+01	-1.611
TH-234	8.980E+01	+	9.191E+01	6.098E+01	1.153E+01	1.473

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
U-234	3.646E-01		6.490E+00	5.106E+00	4.883E-01	0.071
U-235	-4.325E+00		1.107E+01	8.209E+00	1.388E+00	-0.527
NP-239	-7.653E+00		7.948E+00	7.284E+00	5.389E-01	-1.051
AM-241	-2.304E+00		8.448E+00	6.218E+00	7.307E-01	-0.370
AM-242	2.172E+01		8.958E+01	8.587E+01	6.841E+00	0.253
CM-247	1.107E+00		1.297E+00	1.300E+00	7.753E-02	0.851
CF-249	-8.488E-01		1.374E+00	1.286E+00	7.711E-02	-0.660
CF-251	1.933E+01	+	9.376E+00	5.512E+00	4.188E-01	3.506
ANH-511	-6.215E+00		2.644E+00	2.071E+00	1.279E-01	-3.000

VAX/VMS Nuclide Identification Report Generated 26-APR-2006 06:24:34.65

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*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration   : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068238.CNF;1
Sample date     : 25-APR-2006 00:00:00 Acquisition date : 26-APR-2006 05:24:01
Sample ID      : G1201068238 Sample quantity   : 2.00000E+00 LITER
Detector name  : GAMMA6 Detector geometry    : 2L_MB
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:01.09 0.0%
Energy tolerance: 2.00000 KEV Analyst Initials  : MJH1
Abundance limit : 75.00000 Sensitivity     : 3.00000
Batch ID       : 519510 Detector SN#     : 1922827
Matrix Spike DPM : LCS DPM                    :
*****

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	59.54	924	675	1.09	120.28	115	11	2.57E-01	6.4	
2	0	66.80*	55	433	1.79	134.77	132	8	1.54E-02	66.5	
3	0	88.15*	1706	637	1.06	177.38	171	11	4.74E-01	3.7	
4	0	102.91	42	199	0.85	206.83	205	6	1.18E-02	54.6	
5	0	122.26	744	339	1.08	245.45	241	9	2.07E-01	5.8	
6	2	137.05	125	208	1.11	274.98	269	13	3.46E-02	21.2	3.92E+00
7	2	138.57	39	168	1.08	278.00	269	13	1.08E-02	59.2	
8	0	166.11	372	277	1.02	332.97	329	9	1.03E-01	9.6	
9	0	185.58*	27	215	1.37	371.82	367	9	7.39E-03	103.3	
10	0	198.42*	18	167	0.73	397.46	394	7	5.06E-03	124.6	
11	0	203.10*	36	136	1.60	406.80	405	7	9.93E-03	57.0	
12	0	294.96*	9	86	1.30	590.14	588	6	2.45E-03	175.6	
13	0	331.52	20	51	0.50	663.12	660	5	5.51E-03	58.5	
14	0	371.57	56	78	1.60	743.05	739	9	1.54E-02	31.8	
15	0	375.25	20	81	1.52	750.40	747	8	5.61E-03	80.0	
16	0	391.78*	231	159	1.19	783.40	777	13	6.43E-02	13.1	
17	1	469.59	27	76	1.55	938.72	931	21	7.54E-03	63.1	1.86E+00
18	1	473.38*	27	93	1.55	946.28	931	21	7.48E-03	62.8	
19	0	485.15*	10	65	0.59	969.78	964	8	2.84E-03	143.7	
20	0	511.14*	15	84	3.31	1021.66	1017	11	4.27E-03	133.0	
21	0	527.89	22	26	1.35	1055.09	1052	6	6.04E-03	43.3	
22	0	661.87	997	73	1.41	1322.59	1316	15	2.77E-01	3.7	
23	3	675.33	30	14	1.49	1349.46	1347	11	8.35E-03	26.2	1.83E+00
24	3	677.98	18	16	1.42	1354.74	1347	11	5.01E-03	41.7	
25	0	884.81	23	78	6.82	1767.73	1763	16	6.51E-03	85.9	
26	0	898.17	248	111	1.47	1794.41	1786	16	6.88E-02	11.5	
27	0	922.24	20	32	0.92	1842.48	1839	7	5.66E-03	50.8	
28	0	1053.34	25	33	2.13	2104.30	2100	11	6.96E-03	49.9	
29	0	1115.81	21	20	1.22	2229.06	2226	7	5.72E-03	45.3	
30	0	1159.36*	56	65	16.43	2316.05	2294	37	1.55E-02	48.2	
31	0	1173.41	1031	43	1.95	2344.11	2338	17	2.86E-01	3.5	
32	0	1239.28*	20	7	0.73	2475.67	2470	13	5.42E-03	36.4	
33	0	1299.97	18	7	4.82	2596.92	2590	14	5.00E-03	39.1	
34	0	1332.60*	903	48	1.71	2662.10	2653	19	2.51E-01	3.8	
35	0	1404.40*	11	27	14.79	2805.53	2782	36	3.00E-03	155.7	
36	0	1414.87	7	7	0.90	2826.44	2823	13	1.92E-03	85.5	
37	0	1426.57	9	18	1.04	2849.82	2846	23	2.43E-03	128.5	
38	0	1461.47*	3	0	3.33	2919.53	2916	9	8.80E-04	136.4	



Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1538.95	9	6	3.46	3074.33	3071	10	2.61E-03	55.8	
40	0	1559.91	4	13	3.31	3116.21	3113	17	1.07E-03	219.0	
41	0	1836.62*	144	21	2.23	3669.14	3659	22	4.01E-02	11.8	

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

VAX/VMS Nuclide Identification Report Generated

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*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
*                               DETECTOR DATA                                       *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068238
* Acquisition date   : 26-APR-2006 05:24:01 Detector SN#      : 1922827
* Detector ID        : GAMMA6                               Sensitivity      : 3.000
* Geometry           : 2L_MB                               Energy tolerance : 2.000
* Elapsed live time  : 0 01:00:00.00                      Abundance limit  : 75.000
* Elapsed real time  : 0 01:00:01.09                      Half life ratio  : 8.000
*****
*                               SAMPLE DATA                                           *
*
* Sample date        : 25-APR-2006 00:00:00 Nuclide Library  : FERMC
* Sample ID          : G1201068238                      Analyst initials : MJH1
* Batch Number       : 519510                          Sample Quantity  : 2.0000E+00 LITER
* Recovery           : 1.00000                          Carrier Weight   : 0.00000
*****
*                               QC DATA                                               *
*
* Standard Weight    : 0.00000
* CALIB. DATE/TIME  : 29-DEC-2005 05:08:19 MS Isotope      : TOPLOADER
* MSD DPM            : 5.440                            MSD Isotope      : TOPLOADER
* LCS DPM            : 0.000                            LCS Isotope      : TOPLOADER
* LCSD DPM           : 0.000                            LCSD Isotope     : TOPLOADER
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
K-40	2.276E+01	6.209E+01	1.148E+02	0.000E+00
CO-57	1.388E+02	1.611E+01	1.300E+01	0.000E+00
CO-60	6.458E+02	4.912E+01	1.569E+01	0.000E+00
ZN-65	2.514E+01	2.277E+01	4.058E+01	0.000E+00
Y-88	1.279E+02	3.016E+01	1.335E+01	0.000E+00
MO-99	1.025E+01	1.214E+01	1.707E+01	0.000E+00
TC-99M	2.186E+02	2.589E+02	3.640E+02	0.000E+00
CD-109	8.784E+03	6.579E+02	4.261E+02	0.000E+00
SN-113	1.003E+02	2.619E+01	1.738E+01	0.000E+00
SN-126	8.981E+02	6.727E+01	4.385E+01	0.000E+00
I-133	2.328E+01	2.014E+01	4.042E+01	0.000E+00
BA-137M	4.456E+02	3.286E+01	1.377E+01	0.000E+00
CS-137	4.710E+02	3.474E+01	1.456E+01	0.000E+00
CE-139	7.849E+01	1.507E+01	1.335E+01	0.000E+00
NP-237	2.637E+03	1.975E+02	1.308E+02	0.000E+00
AM-241	1.332E+03	1.705E+02	1.169E+02	0.000E+00
ANH-511	5.126E+00	1.364E+01	1.370E+01	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )	
BE-7	-3.471E+01	8.309E+01	1.272E+02	0.000E+00 NOT IDENT.
NA-22	5.170E+00	6.742E+00	1.469E+01	0.000E+00 NOT IDENT.
NA-24	-1.840E+01	2.193E+01	3.549E+01	0.000E+00 NOT IDENT.
AL-26	-2.933E+00	5.963E+00	1.045E+01	0.000E+00 FAIL ABUN
SC-46	2.328E+00	1.272E+01	1.991E+01	0.000E+00 NOT IDENT.
V-48	-5.362E+00	1.081E+01	1.796E+01	0.000E+00 NOT IDENT.
CR-51	1.802E+01	7.275E+01	1.269E+02	0.000E+00 NOT IDENT.
MN-54	-4.854E+00	1.004E+01	1.689E+01	0.000E+00 NOT IDENT.
CO-56	-6.226E+00	1.034E+01	1.716E+01	0.000E+00 FAIL ABUN
MN-56	0.000E+00	3.189E+04	0.000E+00	0.000E+00 SHORT HLIF

CO-58	-5.073E+00	9.538E+00	1.603E+01	0.000E+00	NOT IDENT.
FE-59	6.860E+00	2.158E+01	3.869E+01	0.000E+00	NOT IDENT.
SE-75	1.168E+01	1.203E+01	2.183E+01	0.000E+00	FAIL ABUN
KR-85	1.677E+03	1.963E+03	3.402E+03	0.000E+00	NOT IDENT.
SR-85	7.429E+00	8.695E+00	1.507E+01	0.000E+00	NOT IDENT.
Y-91	3.841E+00	8.266E+00	1.543E+01	0.000E+00	NOT IDENT.
NB-94	-1.325E+00	8.479E+00	1.494E+01	0.000E+00	NOT IDENT.
NB-95	-3.221E+00	9.685E+00	1.665E+01	0.000E+00	NOT IDENT.
NB-95M	-3.522E+01	3.632E+01	5.924E+01	0.000E+00	NOT IDENT.
ZR-95	7.775E+00	1.711E+01	3.156E+01	0.000E+00	NOT IDENT.
RU-103	2.444E+00	8.378E+00	1.551E+01	0.000E+00	NOT IDENT.
RH-106	1.159E+01	7.269E+01	1.338E+02	0.000E+00	FAIL ABUN
RU-106	-1.247E+01	7.325E+01	1.306E+02	0.000E+00	NOT IDENT.
AG-108M	-6.696E-01	9.555E+00	1.606E+01	0.000E+00	NOT IDENT.
AG-110M	1.287E+00	8.854E+00	1.435E+01	0.000E+00	FAIL ABUN
CD-115	3.756E+01	3.249E+01	6.351E+01	0.000E+00	FAIL ABUN
SN-115	-2.380E+01	8.743E+02	1.522E+03	0.000E+00	FAIL ABUN
SN-117M	3.700E+00	7.121E+00	1.283E+01	0.000E+00	NOT IDENT.
TE-123M	3.152E+00	7.018E+00	1.259E+01	0.000E+00	NOT IDENT.
SB-124	-1.553E+00	1.186E+01	2.331E+01	0.000E+00	NOT IDENT.
SB-125	-1.295E+00	2.554E+01	4.312E+01	0.000E+00	NOT IDENT.
TE-125M	1.776E+02	2.379E+03	4.231E+03	0.000E+00	NOT IDENT.
I-126	-1.476E+01	2.427E+01	3.523E+01	0.000E+00	NOT IDENT.
SB-126	9.719E+00	1.584E+01	3.011E+01	0.000E+00	NOT IDENT.
SB-127	8.285E+00	2.806E+01	5.175E+01	0.000E+00	FAIL ABUN
I-131	2.661E+00	1.004E+01	1.745E+01	0.000E+00	NOT IDENT.
I-132	0.000E+00	7.708E+04	0.000E+00	0.000E+00	SHORT HLIF
TE-132	-5.670E+00	1.067E+01	1.789E+01	0.000E+00	NOT IDENT.
BA-133	-4.950E+00	1.204E+01	1.989E+01	0.000E+00	NOT IDENT.
CS-134	-2.886E+00	1.084E+01	1.874E+01	0.000E+00	NOT IDENT.
CS-135	-3.550E+01	4.372E+01	7.137E+01	0.000E+00	NOT IDENT.
I-135	6.145E+01	5.032E+02	1.011E+03	0.000E+00	NOT IDENT.
CS-136	5.657E-01	1.517E+01	2.656E+01	0.000E+00	FAIL ABUN
BA-140	-7.234E+00	3.119E+01	5.543E+01	0.000E+00	NOT IDENT.
LA-140	2.789E+00	9.529E+00	1.896E+01	0.000E+00	FAIL ABUN
CE-141	-4.868E+00	1.257E+01	2.171E+01	0.000E+00	NOT IDENT.
CE-143	9.136E+00	3.209E+01	5.256E+01	0.000E+00	FAIL ABUN
CE-144	-1.747E+01	6.141E+01	9.579E+01	0.000E+00	NOT IDENT.
PM-144	-6.150E+00	8.554E+00	1.428E+01	0.000E+00	NOT IDENT.
PR-144	0.000E+00	1.391E+41	0.000E+00	0.000E+00	SHORT HLIF
PM-146	-6.358E+00	1.211E+01	1.952E+01	0.000E+00	NOT IDENT.
ND-147	-4.335E+00	6.180E+01	1.111E+02	0.000E+00	NOT IDENT.
PM-147	0.000E+00	3.437E+07	5.405E+07	0.000E+00	FAIL ABUN
PM-149	1.515E+02	3.088E+02	5.501E+02	0.000E+00	NOT IDENT.
EU-152	-2.409E+01	2.681E+01	4.267E+01	0.000E+00	FAIL ABUN
GD-153	1.422E+01	2.216E+01	4.053E+01	0.000E+00	FAIL ABUN
EU-154	1.439E+01	1.894E+01	4.123E+01	0.000E+00	FAIL ABUN
EU-155	-1.218E+01	3.611E+01	5.674E+01	0.000E+00	FAIL ABUN
TB-160	1.399E+01	3.538E+01	6.475E+01	0.000E+00	FAIL ABUN
TM-171	1.213E+04	1.612E+04	1.856E+04	0.000E+00	FAIL ABUN
HF-181	-5.942E+00	1.037E+01	1.560E+01	0.000E+00	FAIL ABUN
TA-182	6.087E+00	2.754E+01	5.454E+01	0.000E+00	FAIL ABUN
IR-192	-1.083E+00	8.754E+00	1.485E+01	0.000E+00	FAIL ABUN
HG-203	3.915E+00	9.118E+00	1.610E+01	0.000E+00	NOT IDENT.
BI-207	-1.236E+01	1.476E+01	2.331E+01	0.000E+00	FAIL ABUN
TL-208	8.574E+00	9.469E+00	1.821E+01	0.000E+00	FAIL ABUN
BI-210	-9.189E+02	2.365E+03	3.516E+03	0.000E+00	NOT IDENT.
PB-210	-9.189E+02	2.365E+03	3.516E+03	0.000E+00	NOT IDENT.
BI-211	-3.950E+01	5.784E+01	9.358E+01	0.000E+00	NOT IDENT.
PB-211	1.329E+02	2.557E+02	4.524E+02	0.000E+00	NOT IDENT.
BI-212	6.821E+01	7.660E+01	1.465E+02	0.000E+00	NOT IDENT.
PB-212	1.572E+01	1.678E+01	3.023E+01	0.000E+00	FAIL ABUN
BI-214	2.661E+00	1.803E+01	3.268E+01	0.000E+00	FAIL ABUN
PB-214	1.793E+01	1.878E+01	3.437E+01	0.000E+00	FAIL ABUN
RN-219	1.933E-01	1.153E+02	1.957E+02	0.000E+00	NOT IDENT.
RA-223	1.595E+01	1.813E+02	3.123E+02	0.000E+00	FAIL ABUN
RA-224	-6.663E+01	1.894E+02	3.195E+02	0.000E+00	NOT IDENT.
RA-226	2.661E+00	1.803E+01	3.268E+01	0.000E+00	FAIL ABUN
AC-227	4.873E+01	1.080E+02	1.914E+02	0.000E+00	FAIL ABUN
TH-227	4.803E+01	1.064E+02	1.886E+02	0.000E+00	FAIL ABUN
AC-228	5.008E+01	3.883E+01	7.587E+01	0.000E+00	NOT IDENT.
RA-228	5.008E+01	3.883E+01	7.587E+01	0.000E+00	NOT IDENT.
TH-228	1.553E+01	1.677E+01	3.019E+01	0.000E+00	NOT IDENT.
TH-229	4.272E+01	1.385E+02	2.449E+02	0.000E+00	FAIL ABUN
TH-230	2.661E+00	1.803E+01	3.268E+01	0.000E+00	FAIL ABUN
PA-231	-4.122E+02	4.260E+02	6.847E+02	0.000E+00	FAIL ABUN
TH-231	-2.792E+01	5.018E+01	8.333E+01	0.000E+00	FAIL ABUN
TH-232	1.544E+01	1.675E+01	3.014E+01	0.000E+00	NOT IDENT.

PA-233	5.779E+00	1.730E+01	3.044E+01	0.000E+00	FAIL	ABUN
PA-234	6.687E+01	9.922E+01	1.826E+02	0.000E+00	FAIL	ABUN
PA-234M	-4.836E+02	1.386E+03	2.330E+03	0.000E+00	NOT	IDENT.
TH-234	8.569E+01	5.275E+02	8.016E+02	0.000E+00	NOT	IDENT.
U-234	1.066E+01	3.746E+01	6.189E+01	0.000E+00	FAIL	ABUN
U-235	4.096E+01	5.517E+01	1.006E+02	0.000E+00	FAIL	ABUN
U-238	8.569E+01	5.275E+02	8.016E+02	0.000E+00	NOT	IDENT.
NP-239	-4.913E+01	5.912E+01	1.009E+02	0.000E+00	NOT	IDENT.
AM-242	7.073E+02	7.722E+02	1.176E+03	0.000E+00	FAIL	ABUN
CM-247	-6.406E+00	1.042E+01	1.679E+01	0.000E+00	NOT	IDENT.
CF-249	3.763E+00	1.268E+01	1.976E+01	0.000E+00	FAIL	ABUN
CF-251	-1.287E+01	3.468E+01	5.946E+01	0.000E+00	NOT	IDENT.

```

*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068238.CNF;1
Sample date        : 25-APR-2006 00:00:00 Acquisition date : 26-APR-2006 05:24:01
Sample ID          : G1201068238           Sample quantity  : 2.00000E+00 LITER
Detector name     : GAMMA6                 Detector geometry: 2L_MB
Elapsed live time : 0 01:00:00.00         Elapsed real time: 0 01:00:01.09  0.0%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : MJH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          : 519510                 Detector SN#      : 1922827
Matrix Spike DPM  :                       LCS DPM         :
*****

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	59.54	924	675	1.09	120.28	115	11	2.57E-01	6.4	
2	0	66.80	59	433	1.79	134.77	132	8	1.63E-02	62.4	
3	0	88.15	1710	637	1.06	177.38	171	11	4.75E-01	3.7	
4	0	102.91	42	199	0.85	206.83	205	6	1.18E-02	54.6	
5	0	122.26	744	339	1.08	245.45	241	9	2.07E-01	5.8	
6	2	137.05	125	208	1.11	274.98	269	13	3.46E-02	21.2	3.92E+00
7	2	138.57	39	168	1.08	278.00	269	13	1.08E-02	59.2	
8	0	166.11	372	277	1.02	332.97	329	9	1.03E-01	9.6	
9	0	185.58	46	215	1.37	371.82	367	9	1.28E-02	59.0	
10	0	198.42	34	167	0.73	397.46	394	7	9.33E-03	66.4	
11	0	203.10	38	136	1.60	406.80	405	7	1.06E-02	53.1	
12	0	294.96	18	86	1.30	590.14	588	6	5.06E-03	83.6	
13	0	331.52	20	51	0.50	663.12	660	5	5.51E-03	58.5	
14	0	371.57	56	78	1.60	743.05	739	9	1.54E-02	31.8	
15	0	375.25	20	81	1.52	750.40	747	8	5.61E-03	80.0	
16	0	391.78	234	159	1.19	783.40	777	13	6.49E-02	12.9	
17	1	469.59	27	76	1.55	938.72	931	21	7.54E-03	63.1	1.86E+00
18	1	473.38	28	93	1.55	946.28	931	21	7.86E-03	59.6	
19	0	485.15	13	65	0.59	969.78	964	8	3.55E-03	113.5	
20	0	511.14	90	84	3.31	1021.66	1017	11	2.51E-02	22.1	
21	0	527.89	22	26	1.35	1055.09	1052	6	6.04E-03	43.3	
22	0	661.87	997	73	1.41	1322.59	1316	15	2.77E-01	3.7	
23	3	675.33	30	14	1.49	1349.46	1347	11	8.35E-03	26.2	1.83E+00
24	3	677.98	18	16	1.42	1354.74	1347	11	5.01E-03	41.7	
25	0	884.81	23	78	6.82	1767.73	1763	16	6.51E-03	85.9	
26	0	898.17	248	111	1.47	1794.41	1786	16	6.88E-02	11.5	
27	0	922.24	20	32	0.92	1842.48	1839	7	5.66E-03	50.8	
28	0	1053.34	25	33	2.13	2104.30	2100	11	6.96E-03	49.9	
29	0	1115.81	21	20	1.22	2229.06	2226	7	5.72E-03	45.3	
30	0	1159.36	57	65	16.43	2316.05	2294	37	1.59E-02	46.9	
31	0	1173.41	1031	43	1.95	2344.11	2338	17	2.86E-01	3.5	
32	0	1239.28	22	7	0.73	2475.67	2470	13	5.97E-03	32.6	
33	0	1299.97	18	7	4.82	2596.92	2590	14	5.00E-03	39.1	
34	0	1332.60	904	48	1.71	2662.10	2653	19	2.51E-01	3.8	
35	0	1404.40	12	27	14.79	2805.53	2782	36	3.32E-03	140.5	
36	0	1414.87	7	7	0.90	2826.44	2823	13	1.92E-03	85.5	
37	0	1426.57	9	18	1.04	2849.82	2846	23	2.43E-03	128.5	
38	0	1461.47	17	0	3.33	2919.53	2916	9	4.72E-03	24.3	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1538.95	9	6	3.46	3074.33	3071	10	2.61E-03	55.8	
40	0	1559.91	4	13	3.31	3116.21	3113	17	1.07E-03	219.0	
41	0	1836.62	146	21	2.23	3669.14	3659	22	4.06E-02	11.6	

```

*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068238.CNF;1
Sample date        : 25-APR-2006 00:00:00 Acquisition date : 26-APR-2006 05:24:01
Sample ID          : G1201068238          Sample quantity  : 2.00000E+00 LITER
Detector name     : GAMMA6                Detector geometry: 2L_MB
Elapsed live time : 0 01:00:00.00         Elapsed real time : 0 01:00:01.09  0.0%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : MJH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          : 519510                 Detector SN#      : 1922827
Matrix Spike DPM  :                       LCS DPM         :
*****
    
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Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
K-40	1460.81	3	10.67*	4.897E-01	2.276E+01	2.276E+01	272.82
CO-57	122.06	744	85.51*	2.359E+00	1.384E+02	1.388E+02	11.61
	136.47	125	10.47	2.353E+00	1.899E+02	1.905E+02	42.44
CO-60	1173.24	1031	99.90	5.825E-01	6.649E+02	6.652E+02	6.92
	1332.50	903	99.98*	5.250E-01	6.455E+02	6.458E+02	7.61
ZN-65	1115.55	21	50.75*	6.078E-01	2.505E+01	2.514E+01	90.59
Y-88	898.02	248	93.40	7.308E-01	1.362E+02	1.373E+02	22.95
	1836.01	144	99.38*	4.292E-01	1.269E+02	1.279E+02	23.58
MO-99	140.51	39	82.70*	2.350E+00	7.489E+00	1.025E+01	118.46
	181.06	-----	6.20	2.147E+00	-----	Line Not Found	-----
	739.58	-----	12.80	8.564E-01	-----	Line Not Found	-----
TC-99M	140.51	39	89.07*	2.350E+00	6.953E+00	2.186E+02	118.46
CD-109	88.03	1706	3.79*	1.927E+00	8.768E+03	8.784E+03	7.49
SN-113	391.69	231	64.90*	1.345E+00	9.951E+01	1.003E+02	26.12
SN-126	64.28	-----	9.60	9.606E-01	-----	Line Not Found	-----
	86.94	1706	8.90	1.927E+00	3.734E+03	3.734E+03	7.49
	87.57	1706	37.00*	1.927E+00	8.981E+02	8.981E+02	7.49
I-133	529.87	22	86.30*	1.101E+00	8.596E+00	2.328E+01	86.51
	875.33	-----	4.47	7.467E-01	-----	Line Not Found	-----
	1298.22	18	2.33	5.355E-01	5.415E+02	1.467E+03	78.17
BA-137M	661.65	997	89.98*	9.334E-01	4.455E+02	4.456E+02	7.38
CS-137	661.66	997	85.12*	9.334E-01	4.710E+02	4.710E+02	7.38
CE-139	165.85	372	80.35*	2.230E+00	7.800E+01	7.849E+01	19.20
PM-147	121.30	744	0.00*	2.359E+00	2.958E+08	2.960E+08	11.61
NP-237	86.48	1706	12.60*	1.927E+00	2.637E+03	2.637E+03	7.49
	95.87	-----	2.60	2.109E+00	-----	Line Not Found	-----
AM-241	59.54	924	35.90*	7.253E-01	1.332E+03	1.332E+03	12.80
ANH-511	511.00	15	100.00*	1.126E+00	5.126E+00	5.126E+00	266.05

Flag: "\*" = Keyline

Total number of lines in spectrum 41  
 Number of unidentified lines 11  
 Number of lines tentatively identified by NID 30 73.17%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	2.276E+01	2.276E+01	6.209E+01	272.82	
CO-57	270.90D	1.00	1.384E+02	1.388E+02	0.161E+02	11.61	
CO-60	5.27Y	1.00	6.455E+02	6.458E+02	0.491E+02	7.61	
ZN-65	244.40D	1.00	2.505E+01	2.514E+01	2.277E+01	90.59	
Y-88	106.60D	1.01	1.269E+02	1.279E+02	0.302E+02	23.58	
MO-99	66.02H	1.37	7.489E+00	1.025E+01	1.214E+01	118.46	
TC-99M	6.01H	31.4	6.953E+00	2.186E+02	2.589E+02	118.46	
CD-109	464.00D	1.00	8.768E+03	8.784E+03	0.658E+03	7.49	
SN-113	115.10D	1.01	9.951E+01	1.003E+02	0.262E+02	26.12	
SN-126	1.00E+05Y	1.00	8.981E+02	8.981E+02	0.673E+02	7.49	
I-133	20.80H	2.71	8.596E+00	2.328E+01	2.014E+01	86.51	
BA-137M	30.17Y	1.00	4.455E+02	4.456E+02	0.329E+02	7.38	
CS-137	30.17Y	1.00	4.710E+02	4.710E+02	0.347E+02	7.38	
CE-139	137.66D	1.01	7.800E+01	7.849E+01	1.507E+01	19.20	
PM-147	2.62Y	1.00	2.958E+08	2.960E+08	0.344E+08	11.61	
NP-237	2.14E+06Y	1.00	2.637E+03	2.637E+03	0.198E+03	7.49	
AM-241	432.20Y	1.00	1.332E+03	1.332E+03	0.171E+03	12.80	
ANH-511	1.00E+09Y	1.00	5.126E+00	5.126E+00	13.64E+00	266.05	
Total Activity :			2.958E+08	2.961E+08			

Grand Total Activity : 2.958E+08 2.961E+08

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



It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	66.80	55	433	1.79	134.77	132	8	1.54E-02	****	1.09E+00	T
0	102.91	42	199	0.85	206.83	205	6	1.18E-02	****	2.22E+00	T
0	185.58	27	215	1.37	371.82	367	9	7.39E-03	****	2.12E+00	T
0	198.42	18	167	0.73	397.46	394	7	5.06E-03	****	2.05E+00	T
0	203.10	36	136	1.60	406.80	405	7	9.93E-03	****	2.02E+00	
0	294.96	9	86	1.30	590.14	588	6	2.45E-03	****	1.62E+00	T
0	331.52	20	51	0.50	663.12	660	5	5.51E-03	****	1.50E+00	T
0	371.57	56	78	1.60	743.05	739	9	1.54E-02	63.6	1.39E+00	T
0	375.25	20	81	1.52	750.40	747	8	5.61E-03	****	1.38E+00	
1	469.59	27	76	1.55	938.72	931	21	7.54E-03	****	1.19E+00	T
1	473.38	27	93	1.55	946.28	931	21	7.48E-03	****	1.19E+00	T
0	485.15	10	65	0.59	969.78	964	8	2.84E-03	****	1.17E+00	T
3	675.33	30	14	1.49	1349.46	1347	11	8.35E-03	52.5	9.19E-01	
3	677.98	18	16	1.42	1354.74	1347	11	5.01E-03	83.5	9.16E-01	T
0	884.81	23	78	6.82	1767.73	1763	16	6.51E-03	****	7.40E-01	T
0	922.24	20	32	0.92	1842.48	1839	7	5.66E-03	****	7.15E-01	
0	1053.34	25	33	2.13	2104.30	2100	11	6.96E-03	99.8	6.38E-01	
0	1159.36	56	65	16.43	2316.05	2294	37	1.55E-02	96.4	5.88E-01	
0	1239.28	20	7	0.73	2475.67	2470	13	5.42E-03	72.8	5.57E-01	T
0	1404.40	11	27	14.79	2805.53	2782	36	3.00E-03	****	5.04E-01	
0	1414.87	7	7	0.90	2826.44	2823	13	1.92E-03	****	5.01E-01	
0	1426.57	9	18	1.04	2849.82	2846	23	2.43E-03	****	4.98E-01	
0	1538.95	9	6	3.46	3074.33	3071	10	2.61E-03	****	4.72E-01	
0	1559.91	4	13	3.31	3116.21	3113	17	1.07E-03	****	4.68E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GENERAL ENG. LABS, LLC.                                     *
*                                     2040 Savage Road                                       *
*                                     Charleston, SC 29414                                   *
*****
*                                     DETECTOR DATA                                       *
*
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1201068238.CNF;1
* Acquisition date   : 26-APR-2006 05:24:01  Detector SN#      : 1922827
* Detector ID        : GAMMA6                  Sensitivity       : 3.00000
* Geometry           : 2L_MB                   Energy tolerance: 2.00000
* Elapsed live time  : 0 01:00:00.00           Abundance limit  : 75.00000
* Elapsed real time  : 0 01:00:01.09           Half life ratio  : 8.00000
*****
*                                     SAMPLE DATA                                       *
*
* Sample date        : 25-APR-2006 00:00:00  Nuclide Library   : EPI
* Sample ID          : G1201068238           Analyst initials   : MJH1
* Batch Number       : 519510                Sample Quantity   : 2.00000E+00 LITER
*****
*                                     QC DATA                                           *
*
* CALIB. DATE/TIME  : 29-DEC-2005 05:08:19.2MS Isotope       : TOPLOADER
* MSD DPM           :                          MSD Isotope    :
* LCS DPM           :                          LCS Isotope    :
*****

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Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
K-40	2.276E+01	6.209E+01	1.148E+02	0.000E+00	0.198
CO-57	1.388E+02	1.611E+01	1.300E+01	0.000E+00	10.678
CO-60	6.458E+02	4.912E+01	1.569E+01	0.000E+00	41.149
ZN-65	2.514E+01	2.277E+01	4.058E+01	0.000E+00	0.619
Y-88	1.279E+02	3.016E+01	1.335E+01	0.000E+00	9.583
MO-99	1.025E+01	1.214E+01	1.707E+01	0.000E+00	0.600
TC-99M	2.186E+02	2.589E+02	3.640E+02	0.000E+00	0.600
CD-109	8.784E+03	6.579E+02	4.261E+02	0.000E+00	20.614
SN-113	1.003E+02	2.619E+01	1.738E+01	0.000E+00	5.767
SN-126	8.981E+02	6.727E+01	4.385E+01	0.000E+00	20.484
I-133	2.328E+01	2.014E+01	4.042E+01	0.000E+00	0.576
BA-137M	4.456E+02	3.286E+01	1.377E+01	0.000E+00	32.348
CS-137	4.710E+02	3.474E+01	1.456E+01	0.000E+00	32.348
CE-139	7.849E+01	1.507E+01	1.335E+01	0.000E+00	5.879
NP-237	2.637E+03	1.975E+02	1.308E+02	0.000E+00	20.165
AM-241	1.332E+03	1.705E+02	1.169E+02	0.000E+00	11.395
ANH-511	5.126E+00	1.364E+01	1.370E+01	0.000E+00	0.374

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

Nuclide	Key-Line Activity K.L. (pCi/LITER) Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
BE-7	-3.471E+01	8.309E+01	1.272E+02	0.000E+00	-0.273

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
NA-22	5.170E+00		6.742E+00	1.469E+01	0.000E+00	0.352
NA-24	-1.840E+01		2.193E+01	3.549E+01	0.000E+00	-0.518
AL-26	-2.933E+00		5.963E+00	1.045E+01	0.000E+00	-0.281
SC-46	2.328E+00		1.272E+01	1.991E+01	0.000E+00	0.117
V-48	-5.362E+00		1.081E+01	1.796E+01	0.000E+00	-0.298
CR-51	1.802E+01		7.275E+01	1.269E+02	0.000E+00	0.142
MN-54	-4.854E+00		1.004E+01	1.689E+01	0.000E+00	-0.287
CO-56	-6.226E+00		1.034E+01	1.716E+01	0.000E+00	-0.363
CO-58	-5.073E+00		9.538E+00	1.603E+01	0.000E+00	-0.316
FE-59	6.860E+00		2.158E+01	3.869E+01	0.000E+00	0.177
SE-75	1.168E+01		1.203E+01	2.183E+01	0.000E+00	0.535
KR-85	1.677E+03		1.963E+03	3.402E+03	0.000E+00	0.493
SR-85	7.429E+00		8.695E+00	1.507E+01	0.000E+00	0.493
Y-91	3.841E+00		8.266E+00	1.543E+01	0.000E+00	0.249
NB-94	-1.325E+00		8.479E+00	1.494E+01	0.000E+00	-0.089
NB-95	-3.221E+00		9.685E+00	1.665E+01	0.000E+00	-0.193
NB-95M	-3.522E+01		3.632E+01	5.924E+01	0.000E+00	-0.594
ZR-95	7.775E+00		1.711E+01	3.156E+01	0.000E+00	0.246
RU-103	2.444E+00		8.378E+00	1.551E+01	0.000E+00	0.158
RH-106	1.159E+01		7.269E+01	1.338E+02	0.000E+00	0.087
RU-106	-1.247E+01		7.325E+01	1.306E+02	0.000E+00	-0.095
AG-108M	-6.696E-01		9.555E+00	1.606E+01	0.000E+00	-0.042
AG-110M	1.287E+00		8.854E+00	1.435E+01	0.000E+00	0.090
CD-115	3.756E+01	+	3.249E+01	6.351E+01	0.000E+00	0.591
SN-115	-2.380E+01		8.743E+02	1.522E+03	0.000E+00	-0.016
SN-117M	3.700E+00		7.121E+00	1.283E+01	0.000E+00	0.288
TE-123M	3.152E+00		7.018E+00	1.259E+01	0.000E+00	0.250
SB-124	-1.553E+00		1.186E+01	2.331E+01	0.000E+00	-0.067
SB-125	-1.295E+00		2.554E+01	4.312E+01	0.000E+00	-0.030
TE-125M	1.776E+02		2.379E+03	4.231E+03	0.000E+00	0.042
I-126	-1.476E+01		2.427E+01	3.523E+01	0.000E+00	-0.419
SB-126	9.719E+00		1.584E+01	3.011E+01	0.000E+00	0.323
SB-127	8.285E+00		2.806E+01	5.175E+01	0.000E+00	0.160
I-131	2.661E+00		1.004E+01	1.745E+01	0.000E+00	0.153
TE-132	-5.670E+00		1.067E+01	1.789E+01	0.000E+00	-0.317
BA-133	-4.950E+00		1.204E+01	1.989E+01	0.000E+00	-0.249
CS-134	-2.886E+00		1.084E+01	1.874E+01	0.000E+00	-0.154
CS-135	-3.550E+01		4.372E+01	7.137E+01	0.000E+00	-0.497
I-135	6.145E+01		5.032E+02	1.011E+03	0.000E+00	0.061
CS-136	5.657E-01		1.517E+01	2.656E+01	0.000E+00	0.021
BA-140	-7.234E+00		3.119E+01	5.543E+01	0.000E+00	-0.131
LA-140	2.789E+00		9.529E+00	1.896E+01	0.000E+00	0.147
CE-141	-4.868E+00		1.257E+01	2.171E+01	0.000E+00	-0.224
CE-143	9.136E+00	+	3.209E+01	5.256E+01	0.000E+00	0.174
CE-144	-1.747E+01		6.141E+01	9.579E+01	0.000E+00	-0.182
PM-144	-6.150E+00		8.554E+00	1.428E+01	0.000E+00	-0.431
PM-146	-6.358E+00		1.211E+01	1.952E+01	0.000E+00	-0.326
ND-147	-4.335E+00		6.180E+01	1.111E+02	0.000E+00	-0.039

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Ided	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
PM-147	2.960E+08		3.437E+07	5.405E+07	0.000E+00	5.477
PM-149	1.515E+02		3.088E+02	5.501E+02	0.000E+00	0.275
EU-152	-2.409E+01		2.681E+01	4.267E+01	0.000E+00	-0.565
GD-153	1.422E+01		2.216E+01	4.053E+01	0.000E+00	0.351
EU-154	1.439E+01		1.894E+01	4.123E+01	0.000E+00	0.349
EU-155	-1.218E+01		3.611E+01	5.674E+01	0.000E+00	-0.215
TB-160	1.399E+01		3.538E+01	6.475E+01	0.000E+00	0.216
TM-171	1.213E+04	+	1.612E+04	1.856E+04	0.000E+00	0.654
HF-181	-5.942E+00		1.037E+01	1.560E+01	0.000E+00	-0.381
TA-182	6.087E+00		2.754E+01	5.454E+01	0.000E+00	0.112
IR-192	-1.083E+00		8.754E+00	1.485E+01	0.000E+00	-0.073
HG-203	3.915E+00		9.118E+00	1.610E+01	0.000E+00	0.243
BI-207	-1.236E+01		1.476E+01	2.331E+01	0.000E+00	-0.530
TL-208	8.574E+00		9.469E+00	1.821E+01	0.000E+00	0.471
BI-210	-9.189E+02		2.365E+03	3.516E+03	0.000E+00	-0.261
PB-210	-9.189E+02		2.365E+03	3.516E+03	0.000E+00	-0.261
BI-211	-3.950E+01		5.784E+01	9.358E+01	0.000E+00	-0.422
PB-211	1.329E+02		2.557E+02	4.524E+02	0.000E+00	0.294
BI-212	6.821E+01		7.660E+01	1.465E+02	0.000E+00	0.466
PB-212	1.572E+01		1.678E+01	3.023E+01	0.000E+00	0.520
BI-214	2.661E+00		1.803E+01	3.268E+01	0.000E+00	0.081
PB-214	1.793E+01		1.878E+01	3.437E+01	0.000E+00	0.522
RN-219	1.933E-01		1.153E+02	1.957E+02	0.000E+00	0.001
RA-223	1.595E+01		1.813E+02	3.123E+02	0.000E+00	0.051
RA-224	-6.663E+01		1.894E+02	3.195E+02	0.000E+00	-0.209
RA-226	2.661E+00		1.803E+01	3.268E+01	0.000E+00	0.081
AC-227	4.873E+01		1.080E+02	1.914E+02	0.000E+00	0.255
TH-227	4.803E+01		1.064E+02	1.886E+02	0.000E+00	0.255
AC-228	5.008E+01		3.883E+01	7.587E+01	0.000E+00	0.660
RA-228	5.008E+01		3.883E+01	7.587E+01	0.000E+00	0.660
TH-228	1.553E+01		1.677E+01	3.019E+01	0.000E+00	0.514
TH-229	4.272E+01		1.385E+02	2.449E+02	0.000E+00	0.174
TH-230	2.661E+00		1.803E+01	3.268E+01	0.000E+00	0.081
PA-231	-4.122E+02		4.260E+02	6.847E+02	0.000E+00	-0.602
TH-231	-2.792E+01		5.018E+01	8.333E+01	0.000E+00	-0.335
TH-232	1.544E+01		1.675E+01	3.014E+01	0.000E+00	0.512
PA-233	5.779E+00		1.730E+01	3.044E+01	0.000E+00	0.190
PA-234	6.687E+01		9.922E+01	1.826E+02	0.000E+00	0.366
PA-234M	-4.836E+02		1.386E+03	2.330E+03	0.000E+00	-0.208
TH-234	8.569E+01		5.275E+02	8.016E+02	0.000E+00	0.107
U-234	1.066E+01	+	3.746E+01	6.189E+01	0.000E+00	0.172
U-235	4.096E+01		5.517E+01	1.006E+02	0.000E+00	0.407
U-238	8.569E+01		5.275E+02	8.016E+02	0.000E+00	0.107
NP-239	-4.913E+01		5.912E+01	1.009E+02	0.000E+00	-0.487
AM-242	7.073E+02	+	7.722E+02	1.176E+03	0.000E+00	0.601
CM-247	-6.406E+00		1.042E+01	1.679E+01	0.000E+00	-0.382
CF-249	3.763E+00		1.268E+01	1.976E+01	0.000E+00	0.190
CF-251	-1.287E+01		3.468E+01	5.946E+01	0.000E+00	-0.216

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*****
*
*                               General Engineering Labs, LLC
*                               2040 SAVAGE ROAD
*                               CHARLESTON ,SC 29417
*                               GROSS GAMMA REPORT
*
*****
*
*   BATCH ID      : 519510                SAMPLE ID   : G1201068238
*   ANALYST       : MJH1                  DETECTOR    : GAMMA6
*   SAMPLE DATE   : 25-APR-2006 00:00:00.00  COUNT TIME  : 0 01:00:00.00
*   ANALYSIS DATE: 26-APR-2006 05:24:01.34  SAMPLE ALQT: 2.000 LITER
*
*****

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GROSS GAMMA ACTIVITY (pCi/LITER ) : 3.193E+03
GROSS GAMMA ERROR   (pCi/LITER ) : 7.462E+02
GROSS GAMMA MDA     (pCi/LITER ) : 1.536E+03
GROSS GAMMA DLC     (pCi/LITER ) : 7.439E+02

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Radiochemistry Batch Checklist, Rev 4

Batch# 515983 Product: Ra-228 Date: 4/26/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.	NA		
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits. Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time. Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.	NA		
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms. All lineouts initialed and dated. No transcription errors are apparent.	✓		
QC data entered into QC database. Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.	NA		

General Engineering Laboratories

2/22/2005  
Primary Review Performed By: J. Paron 4/26/06

Secondary Review Performed By: NO 4/26/06

4/20-4/27

# Radium-228 Water

Filename : RA228.XLS  
 File type : Excel  
 Version # : 1

Spike S/N : 0503-B  
 Spike Exp Date : 9/9/2006  
 Spike Activity (dpm/ml): 268.22  
 Spike Volume Added: 0.2

Pipet, 0.1 ml Stdev : +/- 0.000701 ml  
 Pipet, 0.5 ml Stdev : +/- 0.002564 ml  
 Pipet, 1 ml Stdev : +/- 0.005480 ml

LCS S/N : 0503-B  
 LCS Exp Date : 9/9/2006  
 LCS Activity (dpm/ml): 268.22  
 LCS Volume Added: 0.2

Procedure Code : GFC28FIAL  
 Parname : Radium-228  
 Required MDA: 2 pCi/L  
 Half-life of Ra-228: 5.75 years  
 Half-life of Ac-228: 6.13 hours  
 Batch counted on : PIC  
 BKG Count time : 500 min

Tracer S/N : 0112-H  
 Tracer Exp Date : 1/18/2007  
 Tracer Volume Added: 0.2

Batch : 515983  
 Analyst : KSD1  
 Prep Date : 4/20/2006  
 Ra-228 Abundance : 1

Calibration Date : 4/22/2005  
 Calibration Due Date : 4/30/2006

Sample Characteristics				Tracer Calculations				
Sample ID	Sample Aliquot L	Sample Aliquot StDev.	Sample Date/Time	Tracer Concentration (Ba-133 Ref.)	Tracer Ref. Count Uncertainty	Tracer Concentration (Ba-133 Samp.)	Tracer Aliquot (mL)	Tracer Aliquot StDev.
158783003	0.600	2.0573E-05	3/20/2006 15:00	391.9	2.40%	710.7	0.2	0.000701
158783004	0.600	2.0573E-05	3/20/2006 14:00	391.9	2.40%	719.8	0.2	0.000701
158783005	0.600	2.0573E-05	3/20/2006 12:00	391.9	2.40%	710.9	0.2	0.000701
158971001	0.600	2.0573E-05	3/21/2006 14:00	391.9	2.40%	734.9	0.2	0.000701
158971002	0.600	2.0573E-05	3/21/2006 12:00	391.9	2.40%	798.4	0.2	0.000701
158971003	0.600	2.0573E-05	3/21/2006 9:00	391.9	2.40%	606.2	0.2	0.000701
158971004	0.600	2.0573E-05	3/21/2006 10:20	391.9	2.40%	677.1	0.2	0.000701
159242001	0.600	2.0573E-05	3/23/2006 15:20	391.9	2.40%	639.0	0.2	0.000701
159242002	0.600	2.0573E-05	3/23/2006 14:50	391.9	2.40%	653.3	0.2	0.000701
159242003	0.600	2.0573E-05	3/23/2006 8:30	391.9	2.40%	576.8	0.2	0.000701
159243001	0.600	2.0573E-05	3/22/2006 14:30	391.9	2.40%	689.0	0.2	0.000701
159244001	0.600	2.0573E-05	3/24/2006 12:00	391.9	2.40%	659.7	0.2	0.000701
159247001	0.600	2.0573E-05	3/22/2006 10:20	391.9	2.40%	657.6	0.2	0.000701
1201060416	0.600	2.0573E-05	4/20/2006 0:00	391.9	2.40%	700.1	0.2	0.000701
1201060417	0.600	2.0573E-05	3/23/2006 8:30	391.9	2.40%	696.5	0.2	0.000701
1201060418	0.400	1.9669E-05	3/23/2006 8:30	391.9	2.40%	669.6	0.2	0.000701
1201060419	0.600	2.0573E-05	4/20/2006 0:00	391.9	2.40%	695.9	0.2	0.000701

*no 4/26/06*

*SK 4/26/06*

# Radium-228 Que Sheet

Batch #: 515983      Analyst: KSDI      Minimum Due Date: 04/20/2006 <sup>Jan</sup> <sub>1st</sub>   
 Spike Isotope: Radium-228      Spike Code: ~~D503-B~~      Expiration Date: 4/1/06      Vol: 0.7      0.12   
 LCS Isotope: Radium-228      LCS Code: ~~D503-B~~      Expiration Date: 4/1/06      Vol: 0.1      0.12   
 Tracer Isotope: Barium-133      Tracer Code: 0112-H      Expiration Date: 1/18/07      Vol: 0.1      0.12   
 Prep Date: 4/20/06      Initials: KSD      Pipet ID: 276653      Balance ID: S1204863      Ac-228 Ingrow: 2200      4/24/06   
 Ac-228 Separation Date/Time: 112Y 4/26/06      Witness: MSP 4/26/06

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collect Date & Time	Bkr #	Vol (mL)	Det #	Ba Yield (%)	Gamma Det. #
158783003	2603210153	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	20-MAR-06 03:00 PM	1	600	1A	90.67	98-1
158783004	2603210155	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	20-MAR-06 02:00 PM	2	600	1B	91.83	98-2
158783005	2603210156	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	20-MAR-06 12:00 PM	3	600	1C	90.70	98-3
158971001	2603220347 M-103	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	21-MAR-06 02:00 PM	4	600	1D	90.76	98-4
158971002	2603220348 TR-7	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	21-MAR-06 12:00 PM	5	600	2A	101.86	98-5
158971003	2603220357 TR-9	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	21-MAR-06 09:00 AM	6	600	2B	77.34	91-6
158971004	2603230360 TR-10	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	21-MAR-06 10:20 AM	7	600	2C	86.39	91-7
159242001	2603240118 H-11	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	23-MAR-06 03:20 PM	8	600	2D	81.53	91-8
159242002	2603240122 M-117	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	23-MAR-06 02:50 PM	9	600	3A	83.35	91-9
159242003	2603240135 M-121	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	23-MAR-06 08:30 AM	10	600	3B	73.57	91-10
159243001	2603230197 M-118	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	22-MAR-06 02:30 PM	11	600	3C	87.91	94-11
159244001	2603250005 EB-3	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	24-MAR-06 12:00 PM	12	600	4A	84.17	94-12
159247001	2603230069 M-120	SAMPLE		2 pCi/L	GROUND WATI	MWHL002	22-MAR-06 10:20 AM	13	600	4B	83.70	94-13
1201060416	MB for batch 515983	MB		2 pCi/L	GROUND WATI	QC ACCOUNT		14	600	4C	89.32	94-14
1201060417	2603240135 M-121(159242003)DUIDUP			2 pCi/L	GROUND WATI	QC ACCOUNT		15	600	4D	88.86	94-15
1201060418	2603240135 M-121(159242003)MSMS			2 pCi/L	GROUND WATI	QC ACCOUNT	23-MAR-06 08:30 AM	16	400	3D	85.43	93-16
1201060419	LCS for batch 515983	LCS		2 pCi/L	GROUND WATI	QC ACCOUNT	23-MAR-06 08:30 AM	17	600	3E	88.79	93-17

Comments: Review 4/26/06

Data Reviewed By: \_\_\_\_\_

PIC S/N: 10751-4

Instrument Used: (Circle One) LB4100 S/N: 8219

NO 4/26/06



Count raw Data															
Detector ID	Counting Time	Gross Counts		Beta cpm	Detector Efficiency	Detector Efficiency Error	Weekly Bkg		Separation Date/Time	Count Start Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Count Correction	Sample Recovery %	Sample Recovery Error %
		Alpha	Beta				cpm	Count Time							
1A	60	14	70	1.167	0.5132	0.00600	0.414	500	4/26/2006 11:24	4/26/2006 13:29	0.988	0.789	1.058	90.67%	1.56%
1B	60	6	37	0.617	0.5082	0.00409	0.308	500	4/26/2006 11:24	4/26/2006 13:29	0.988	0.789	1.058	91.83%	1.56%
1C	60	8	39	0.650	0.5231	0.00344	0.368	500	4/26/2006 11:24	4/26/2006 13:29	0.988	0.789	1.058	90.70%	1.56%
1D	60	6	32	0.593	0.5121	0.00511	0.450	500	4/26/2006 11:24	4/26/2006 13:30	0.988	0.789	1.058	93.76%	1.55%
2A	60	6	31	0.517	0.5097	0.00349	0.376	500	4/26/2006 11:24	4/26/2006 13:30	0.988	0.789	1.058	101.86%	1.53%
2B	60	6	28	0.467	0.5242	0.00383	0.312	500	4/26/2006 11:24	4/26/2006 13:30	0.988	0.788	1.058	77.34%	1.61%
2C	60	4	44	0.733	0.5009	0.00575	0.294	500	4/26/2006 11:24	4/26/2006 13:30	0.988	0.788	1.058	86.39%	1.57%
2D	60	15	46	0.767	0.5067	0.00479	0.388	500	4/26/2006 11:24	4/26/2006 13:30	0.989	0.788	1.058	81.53%	1.59%
3A	60	15	49	0.817	0.4603	0.00943	0.308	500	4/26/2006 11:24	4/26/2006 13:30	0.989	0.788	1.058	83.35%	1.59%
3B	60	12	48	0.800	0.4832	0.00655	0.368	500	4/26/2006 11:24	4/26/2006 13:30	0.989	0.788	1.058	73.59%	1.62%
3C	60	6	47	0.783	0.4861	0.00535	0.436	500	4/26/2006 11:24	4/26/2006 13:30	0.989	0.788	1.058	87.91%	1.57%
4A	60	12	38	0.633	0.5121	0.00744	0.340	500	4/26/2006 11:24	4/26/2006 13:30	0.989	0.788	1.058	84.17%	1.58%
4B	60	9	40	0.667	0.5268	0.00196	0.502	500	4/26/2006 11:24	4/26/2006 13:32	0.988	0.786	1.058	83.90%	1.58%
4C	60	11	34	0.567	0.5052	0.00426	0.422	500	4/26/2006 11:24	4/26/2006 13:29	0.998	0.789	1.058	89.32%	1.57%
4D	60	15	42	0.700	0.5004	0.00816	0.448	500	4/26/2006 11:24	4/26/2006 13:29	0.989	0.789	1.058	88.86%	1.57%
3D	60	43	1181	19.683	0.4940	0.00464	0.420	500	4/26/2006 11:24	4/26/2006 13:44	0.989	0.768	1.058	85.43%	1.58%
3B	60	72	1063	17.717	0.4832	0.00655	0.368	500	4/26/2006 11:24	4/26/2006 14:35	0.998	0.698	1.058	88.79%	1.57%

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Results Decision Level pCi/L	Critical Level pCi/L	MDA pCi/L	Sample Act. Conc.	Sample Act. Error	Net Count Rate	Net Count Rate Error	2 SIGMA Counting Uncertainty	2 SIGMA Total Prop. Uncertainty	Sample QC	Sample Type	RPD	FIER	Nominal	Recovery
0.5994	0.4232	0.9451	1.6482	0.1889	0.7527	0.1424	0.6111	0.6135		SAMPLE				
0.5155	0.3640	0.8264	0.6740	0.3385	0.3087	0.1044	0.4467	0.4472		SAMPLE				
0.5543	0.3914	0.8796	0.6058	0.3818	0.2820	0.1076	0.4529	0.4533		SAMPLE				
0.6056	0.4275	0.9508	0.1768	1.1874	0.0833	0.0989	0.4115	0.4115		SAMPLE				
0.5120	0.3614	0.8114	0.2761	0.6881	0.1407	0.0968	0.3722	0.3723		SAMPLE				
0.5973	0.4217	0.9568	0.3888	0.5929	0.1547	0.0917	0.4516	0.4518		SAMPLE				
0.5433	0.3836	0.8734	1.0348	0.2582	0.4393	0.1132	0.5225	0.5236		SAMPLE				
0.6533	0.4613	1.0337	0.9337	0.3079	0.3787	0.1164	0.5626	0.5634		SAMPLE				
0.6269	0.4426	1.0049	1.3507	0.2352	0.5087	0.1193	0.6208	0.6227		SAMPLE				
0.7395	0.5221	1.1733	1.2379	0.2751	0.4320	0.1186	0.6662	0.6675		SAMPLE				
0.6700	0.4730	1.0537	0.8285	0.3402	0.3473	0.1180	0.5517	0.5524		SAMPLE				
0.5862	0.4139	0.9344	0.6933	0.3618	0.2933	0.1060	0.4910	0.4916		SAMPLE				
0.6973	0.4923	1.0890	0.3810	0.6886	0.1647	0.1101	0.4991	0.4993		SAMPLE				
0.6177	0.4361	0.9729	0.3233	0.7013	0.1447	0.1014	0.4443	0.4445		MB				
0.6518	0.4602	1.0236	0.5769	0.4451	0.2520	0.1121	0.5029	0.5033	159242003	DUP	72.8%		60.96	115.5%
1.0251	0.7237	1.6151	71.6257	0.0340	19.2633	0.5735	4.1795	4.7742	159242003	MS			40.27	114.5%
0.6861	0.4844	1.0888	46.1275	0.0357	17.3487	0.5441	2.8953	3.2251		LCS				

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4/26/01

SampleID	Instr	Time	Alpha	Beta	Count Start Time	Count End Time
158783003	1A	60	14	70	4/26/2006 13:29	4/26/2006 14:29
158783004	1B	60	6	37	4/26/2006 13:29	4/26/2006 14:29
158783005	1C	60	8	39	4/26/2006 13:29	4/26/2006 14:29
158971001	1D	60	6	32	4/26/2006 13:30	4/26/2006 14:30
158971002	2A	60	6	31	4/26/2006 13:30	4/26/2006 14:30
158971003	2B	60	6	28	4/26/2006 13:30	4/26/2006 14:30
158971004	2C	60	4	44	4/26/2006 13:30	4/26/2006 14:30
159242001	2D	60	15	46	4/26/2006 13:30	4/26/2006 14:30
159242002	3A	60	15	49	4/26/2006 13:30	4/26/2006 14:30
159242003	3B	60	12	48	4/26/2006 13:30	4/26/2006 14:30
159243001	3C	60	6	47	4/26/2006 13:30	4/26/2006 14:30
159244001	4A	60	12	38	4/26/2006 13:30	4/26/2006 14:30
159247001	4B	60	9	40	4/26/2006 13:32	4/26/2006 14:32
1201060416	4C	60	11	34	4/26/2006 13:29	4/26/2006 14:29
1201060417	4D	60	15	42	4/26/2006 13:29	4/26/2006 14:29
1201060418	3D	60	43	1181	4/26/2006 13:44	4/26/2006 14:44
1201060419	3B	60	72	1063	4/26/2006 14:35	4/26/2006 15:35

1/2/2006

1480, RiaCalc WIZ, program 3.6, serial #4800440

ASSAY 25-Apr-06 17:54:18

Protocol id 8 228\_REC  
Time limit 300  
Count limit 50000  
Isotope Ba-133  
Protocol date 27-Apr-05 14:46:49  
Run id. 94

	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVI
	1	98	98	1	300	2127	391.9	2.4
*	1	98	98	1	300	3720	710.7	1.74 90.67
*	2	98	98	2	300	3766	719.8	1.72 91.83
*	3	98	98	3	300	3721	710.9	1.74 90.70
*	4	98	98	4	300	3841	734.9	1.71 93.76
*	5	98	98	5	300	4158	798.4	1.63 101.86
*	6	91	91	6	300	3198	606.2	1.89 77.34
*	7	91	91	7	300	3552	677.1	1.78 86.39
*	8	91	91	8	300	3362	639	1.84 81.53
*	9	91	91	9	300	3433	653.3	1.82 83.35
*	10	91	91	10	300	3051	576.8	1.94 73.59
*	11	94	94	11	300	3612	689	1.76 87.91
*	12	94	94	12	300	3465	659.7	1.81 84.17
*	13	94	94	13	300	3455	657.6	1.81 83.90
*	14	94	94	14	300	3667	700.1	1.75 89.32
*	15	94	94	15	300	3649	696.5	1.75 88.86
*	16	93	93	16	300	3515	669.6	1.79 85.43
*	17	93	93	17	300	3646	695.9	1.76 88.79

\* Samples were double spiked *traced. & 4/26/06*

END OF ASSAY

END OF COUNTING

*2/6 4/25/07*

Radiochemistry Batch Checklist, Rev 4

Batch# 520607 Product: Pb-210 Date: 4/26/04

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.	NA		
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.	NA		
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms. All lineouts initialed and dated. No transcription errors are apparent.	✓		
QC data entered into QC database.	✓		
Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.	NA		

General Engineering Laboratories

2/22/2005

Primary Review Performed By: \_\_\_\_\_

*J. Rosen* 4/26/06

Secondary Review Performed By: \_\_\_\_\_

*NO* 4/26/04

4/20-4/27

MWAHL Page 132 of 788

# Pb-210 Que Sheet

04/13/06

Batch #: 520607 Analyst: BXF1 Minimum Due Date 04/20/2006  
 Spike Isotope: Pb210 Spike Code: ET 491E Expiration Date: 11-11-06 Vol: 0.1 ml Bi Separation Date/Time: 1830 4/20/06  
 LCS Isotope: Pb210 LCS Code: ET 491E Expiration Date: 11-11-06 Vol: 0.1 ml Std Wt: 13.88  
 Carrier: Pb Carrier Code: 100L4864 Expiration Date: 1-19-08 Analytical Scale #: 38110047  
 Prep Date: 4-19-06 Initials: Bxif Pipet #: 4497063 Balance #: 36040216 Witness: Bx 4/19/06

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Sample ID	Client Description	Type	Hazard Code	RDL	Client	Matrix	Collection Date & Time	Bkr#	Aliquot (ml or g)	Det	Initial Pb Weight (g)	Final Pb Weight (g)	Net Pb Weight (mg)
158272001	2603140436 TR-10A	SAMPLE		3 pCi/L	MWHL002	GROUND WAT113-MAR-06			500	1B	.0744	.0841	9.7
158275001	2603140472 PUMP BLANK	SAMPLE		3 pCi/L	MWHL002	GROUND WAT113-MAR-06			500	1C	.0739	.0832	9.3
158276001	2603090347 FB-1	SAMPLE		3 pCi/L	MWHL002	GROUND WAT108-MAR-06			500	1D	.0741	.0837	9.6
158277001	2603100260 EB-1	SAMPLE		3 pCi/L	MWHL002	GROUND WAT109-MAR-06			500	2A	.0748	.0841	9.3
158436001	2603150120 TR-9A	SAMPLE		3 pCi/L	MWHL002	GROUND WAT114-MAR-06			500	2B	.0734	.0816	8.2
158971001	2603220347 M-103	SAMPLE		3 pCi/L	MWHL002	GROUND WAT121-MAR-06			500	2C	.0734	.0823	8.9
158971002	2603220348 TR-7	SAMPLE		3 pCi/L	MWHL002	GROUND WAT121-MAR-06			500	2D	.0745	.0782	3.7
158971003	2603220357 TR-9	SAMPLE		3 pCi/L	MWHL002	GROUND WAT121-MAR-06			500	3A	.0736	.0819	8.3
158971004	2603220360 TR-10	SAMPLE		3 pCi/L	MWHL002	GROUND WAT121-MAR-06			500	3B	.0737	.0815	7.8
159242001	2603240118 H-11	SAMPLE		3 pCi/L	MWHL002	GROUND WAT123-MAR-06			500	3C	.0749	.0813	6.4
159242002	2603240122 M-117	SAMPLE		3 pCi/L	MWHL002	GROUND WAT123-MAR-06			500	7D	.0745	.0817	7.2
159242003	2603240135 M-121	SAMPLE		3 pCi/L	MWHL002	GROUND WAT123-MAR-06			400	4A	.0812	.0909	9.7
159243001	2603230197 M-118	SAMPLE		3 pCi/L	MWHL002	GROUND WAT123-MAR-06			500	4B	.0742	.0810	6.8
159244001	2603250005 EB-3	SAMPLE		3 pCi/L	MWHL002	GROUND WAT124-MAR-06			500	4C	.0793	.0882	8.9
159247001	2603230069 M-120	SAMPLE		3 pCi/L	MWHL002	GROUND WAT122-MAR-06			500	4D	.0769	.0920	15.1
1201070733	MB for batch 520607	MB		3 pCi/L	QC ACCOUNT	GROUND WAT1			500	3A	.0795	.0867	7.2
1201070734	2603240135 M-121(159242003DUP)DUP	DUP		3 pCi/L	QC ACCOUNT	GROUND WAT123-MAR-06			400	3B	.0729	.0823	9.4
1201070735	2603240135 M-121(159242003MS) MS	MS		3 pCi/L	QC ACCOUNT	GROUND WAT123-MAR-06			200	3C	.0777	.0860	9.3
1201070736	LCS for batch 520607	LCS		3 pCi/L	QC ACCOUNT	GROUND WAT1			500	3D	.0772	.0849	7.7
											.0842	.0842	7.0

WTR

*Handwritten signature*

Data Reviewed By:

Page 1 of 1

Instrument Used (circle one): LB4100 S/N 8219

PIC SN: 10751-4

NO 4 100 100

# Lead-210 Water

Filename : PB210.XLS  
 File type : Excel  
 Version # : 1

Spike S/N : ET491-E  
 Spike Exp Date : 11/11/2006  
 Spike Activity (dpm/ml) : 405.42  
 Spike Volume Added : 0.1

Pipet, 0.1 ml Stdev : +/- 0.000701 ml  
 Pipet, 0.5 ml Stdev : +/- 0.002564 ml  
 Pipet, 1 ml Stdev : +/- 0.005480 ml

LCS S/N : ET491-E  
 LCS Exp Date : 11/11/2006  
 LCS Activity (dpm/ml) : 405.42  
 LCS Volume Added : 0.1

Batch : 520607  
 Analyst : BXF1  
 Prep Date : 4/19/2006

Pb-210 Abundance : 1

Carrier S/N : 1006864  
 Carrier Exp Date : 1/19/2008  
 Carrier Volume Added : 1.0  
 Carrier Weight (mg/ml) : 13.88  
 Carrier Weight StDev.: 0.05

Calibration Date : 7/29/2005  
 Calibration Due Date : 7/29/2006

Procedure Code : GFC\_PBL  
 Parname : Lead-210  
 Required MDA : 3 pCi/L  
 Half-life of Pb-210 : 22.26 years  
 Half-life of Bi-210 : 5.013 days  
 Batch counted on : PIC  
 BKG Count time : 500 min

Sample Characteristics			Carrier Calculations				
Sample ID	Sample Aliquot L	Sample Aliquot StDev.	Carrier Weight (Standard)	Net Weight (Sample)	Net Weight StDev.	Carrier Aliquot (mL)	Carrier Aliquot StDev.
158272001	0.500	2.0256E-05	13.88	9.7	0.049021	1.0	0.005480
158275001	0.500	2.0256E-05	13.88	9.3	0.047301	1.0	0.005480
158276001	0.500	2.0256E-05	13.88	9.6	0.048591	1.0	0.005480
158277001	0.500	2.0256E-05	13.88	9.3	0.047301	1.0	0.005480
158436001	0.500	2.0256E-05	13.88	8.2	0.042574	1.0	0.005480
158971001	0.500	2.0256E-05	13.88	8.9	0.045582	1.0	0.005480
158971002	0.500	2.0256E-05	13.88	3.7	0.023233	1.0	0.005480
158971003	0.500	2.0256E-05	13.88	8.3	0.043003	1.0	0.005480
158971004	0.500	2.0256E-05	13.88	7.8	0.040854	1.0	0.005480
159242001	0.500	2.0256E-05	13.88	6.4	0.034837	1.0	0.005480
159242002	0.500	2.0256E-05	13.88	7.2	0.038276	1.0	0.005480
159242003	0.400	1.9669E-05	13.88	9.7	0.049021	1.0	0.005480
159243001	0.500	2.0256E-05	13.88	6.8	0.036556	1.0	0.005480
159244001	0.500	2.0256E-05	13.88	8.9	0.045582	1.0	0.005480
159247001	0.500	2.0256E-05	13.88	15.1	0.072230	1.0	0.005480
1201070733	0.500	2.0256E-05	13.88	7.2	0.038276	1.0	0.005480
1201070734	0.400	1.9669E-05	13.88	9.4	0.047731	1.0	0.005480
1201070735	0.200	1.6007E-05	13.88	8.3	0.043003	1.0	0.005480
1201070736	0.500	2.0256E-05	13.88	7.0	0.037416	1.0	0.005480

*Handwritten notes:*  
 12/1/06  
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Count Raw Data														
Detector ID	Counting Time	Gross Alpha	Gross Beta	Gross Beta CPM	Weekly Bkg		Detector Efficiency	Detector Error	Count Start Date/Time	Bi-210 Separation Date/Time	Bi-210 Ingrowth	Pb-210 Decay	Sample Recovery %	Sample Recovery Error %
					CPM	Count Time								
1B	180	15	314	1.744	0.308	500	0.3392	0.00409	4/25/2006 11:02	4/20/2006 18:30	0.482	0.996	69.88%	0.97%
1C	180	15	75	0.417	0.368	500	0.3465	0.00344	4/25/2006 11:02	4/20/2006 18:30	0.482	0.996	67.00%	0.97%
1D	180	17	88	0.489	0.450	500	0.3439	0.00511	4/25/2006 11:02	4/20/2006 18:30	0.482	0.996	69.16%	0.97%
2A	180	13	88	0.489	0.376	500	0.3482	0.00349	4/25/2006 11:02	4/20/2006 18:30	0.482	0.996	67.00%	0.97%
2B	180	18	63	0.350	0.312	500	0.3583	0.00383	4/25/2006 11:02	4/20/2006 18:30	0.482	0.996	59.08%	0.98%
2C	180	9	75	0.417	0.294	500	0.3487	0.00575	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	64.12%	0.98%
2D	400	25	182	0.455	0.388	500	0.4007	0.00479	4/25/2006 12:32	4/20/2006 18:30	0.491	0.997	26.66%	1.10%
3A	180	15	86	0.478	0.308	500	0.3447	0.00943	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	59.80%	0.98%
3B	180	17	86	0.478	0.368	500	0.3527	0.00655	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	56.20%	0.99%
3C	180	18	75	0.417	0.436	500	0.3665	0.00535	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	46.11%	1.01%
3D	180	11	83	0.461	0.420	500	0.3619	0.00464	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	51.87%	1.00%
4A	180	11	81	0.450	0.340	500	0.3421	0.00744	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	69.88%	0.97%
4B	180	29	78	0.433	0.502	500	0.3720	0.00196	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	48.99%	1.00%
4C	180	17	58	0.322	0.422	500	0.3507	0.00426	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	64.12%	0.98%
4D	180	27	70	0.389	0.448	500	0.2944	0.00816	4/25/2006 11:03	4/20/2006 18:30	0.482	0.997	108.79%	0.94%
3A	180	15	60	0.333	0.308	500	0.3543	0.00943	4/25/2006 14:15	4/20/2006 18:30	0.491	0.999	51.87%	1.00%
3B	180	13	82	0.456	0.368	500	0.3391	0.00655	4/25/2006 14:15	4/20/2006 18:30	0.491	0.997	67.72%	0.97%
3C	60	5	217	3.617	0.436	500	0.3501	0.00535	4/25/2006 14:15	4/20/2006 18:30	0.488	0.997	59.80%	0.98%
3D	60	7	201	3.350	0.420	500	0.3637	0.00464	4/25/2006 14:15	4/20/2006 18:30	0.488	0.999	50.43%	1.00%

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4/26/06



Results		Critical Level	MDA	Sample Act. Conc.	Sample Act. Error	Net Count Rate	Net Count Rate Error	2 SIGMA Counting Uncertainty	2 SIGMA Total Prop. Uncertainty	Sample QC	Sample Type	RPD	RER	Nominal	Recovery
Decision Level	pCi/L	pCi/L	pCi/L												
1.0796	0.7622	1.6436	11.3779	0.0715	1.4364	0.1015	1.5762	1.5936			SAMPLE				
1.2048	0.8506	1.8227	0.3935	1.1350	0.0487	0.0552	0.8754	0.8754			SAMPLE				
1.3010	0.9185	1.9558	0.3071	1.5463	0.0369	0.0601	0.9307	0.9307			SAMPLE				
1.2125	0.8560	1.8331	0.9089	0.5218	0.1129	0.0589	0.9293	0.9295			SAMPLE				
1.2166	0.8589	1.8512	0.3370	1.3337	0.0360	0.0507	0.8809	0.8809			SAMPLE				
1.1174	0.7889	1.7040	1.0293	0.4394	0.1227	0.0539	0.8861	0.8864			SAMPLE				
1.7667	1.2473	2.6110	1.1534	0.6530	0.0670	0.0437	1.4759	1.4762			SAMPLE				
1.2405	0.8758	1.8885	1.5452	0.3371	0.1698	0.0572	1.0201	1.0210			SAMPLE				
1.4101	0.9955	2.1333	1.0389	0.5305	0.1098	0.0582	1.0801	1.0803			SAMPLE				
1.8001	1.2709	2.7087	-0.2146	2.9199	-0.0193	0.0565	1.2282	1.2282			SAMPLE				
1.5902	1.1227	2.3955	0.4107	1.4187	0.0411	0.0583	1.1421	1.1421			SAMPLE				
1.4043	0.9915	2.1304	1.0787	0.5128	0.1100	0.0564	1.0838	1.0841			SAMPLE				
1.7911	1.2645	2.6638	-0.7068	0.8507	-0.0687	0.0584	1.1783	1.1784			SAMPLE				
1.3306	0.9394	2.0042	-0.8321	0.5145	-0.0998	0.0513	0.8390	0.8391			SAMPLE				
0.9627	0.6797	1.4474	-0.3462	0.9354	-0.0591	0.0553	0.6346	0.6346			SAMPLE				
1.3612	0.9610	2.0722	0.2530	1.9610	0.0253	0.0497	0.9724	0.9724			MB				
1.4917	1.0532	2.2568	0.8766	0.6529	0.0876	0.0572	1.1216	1.1218	159242003		DUP	0.0%		91.52	76.8%
6.2076	4.3826	9.7619	70.2912	0.0785	3.1807	0.2473	10.7112	10.8217	159242003		MS			36.52	80.7%
2.7750	1.9592	4.3723	29.4923	0.0820	2.9300	0.2381	4.6966	4.7397			LCS				

*Day 12/10/15*

SampleID	Instr	Time	Alpha	Beta	Count	Start Time	Count	End Time
158272001	1B	180	15	314	4/25/2006	11:02	4/25/2006	14:02
158275001	1C	180	15	75	4/25/2006	11:02	4/25/2006	14:02
158276001	1D	180	17	88	4/25/2006	11:02	4/25/2006	14:02
158277001	2A	180	13	88	4/25/2006	11:02	4/25/2006	14:02
158436001	2B	180	18	63	4/25/2006	11:02	4/25/2006	14:02
158971001	2C	180	9	75	4/25/2006	11:03	4/25/2006	14:03
158971002	2D	400	25	182	4/25/2006	12:32	4/25/2006	19:12
158971003	3A	180	15	86	4/25/2006	11:03	4/25/2006	14:03
158971004	3B	180	17	86	4/25/2006	11:03	4/25/2006	14:03
159242001	3C	180	18	75	4/25/2006	11:03	4/25/2006	14:03
159242002	3D	180	11	83	4/25/2006	11:03	4/25/2006	14:03
159242003	4A	180	11	81	4/25/2006	11:03	4/25/2006	14:03
159243001	4B	180	29	78	4/25/2006	11:03	4/25/2006	14:03
159244001	4C	180	17	58	4/25/2006	11:03	4/25/2006	14:03
159247001	4D	180	27	70	4/25/2006	11:03	4/25/2006	14:03
1201070733	3A	180	15	60	4/25/2006	14:15	4/25/2006	17:15
1201070734	3B	180	13	82	4/25/2006	14:15	4/25/2006	17:15
1201070735	3C	60	5	217	4/25/2006	14:15	4/25/2006	15:15
1201070736	3D	60	7	201	4/25/2006	14:15	4/25/2006	15:15

*John*  
*4/26/06*

Radiochemistry Batch Checklist, Rev 4

Batch# 523680 Product: Toluene Date: 8/26/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.	✓		
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	N/A		
Smears Taken for Radioactive batches.	MA		
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms.	✓		
All lineouts initialed and dated.	✓		
No transcription errors are apparent.	✓		
QC data entered into QC database.	✓		
Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.	MP		

General Engineering Laboratories

2/22/2005

Primary Review Performed By: SC 4/26/06

Secondary Review Performed By: SC 4/26/06

# Total Uranium Que Sheet

04/24/2006

Batch #: 523680 Analyst: DRS1 Minimum Due Date: 04/20/2006 Comments

Spike Isotope: Natural U Spike Code: 0903 Expiration Date: 3-1-07 Vol: 1.0 Nom Conc: 25.0

LCS Isotope: Natural U LCS Code: 0903 Expiration Date: 3-1-07 Vol: 1.0 Nom Conc: 25.0

Prep Date: 4-24-06 Initials: DRJ Pipet ID: 160845/1829224 (Co.) Witness: CHS 4/24/06

Sample I	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Bktr#	Sample Aliquot (g or mL)	Aliquot for Analysis (mL)
15827001	2603140436 TR-10A	SAMPLE		1 ug/L	GROUND WATER	MWHL002	1	5:10	1.0
158275001	2603140472 PUMP BLANK	SAMPLE		1 ug/L	GROUND WATER	MWHL002	2	5:10	1.0
158276001	2603090347 FB-1	SAMPLE		1 ug/L	GROUND WATER	MWHL002	3	5:10	1.0
158277001	2603100260 EB-1	SAMPLE		1 ug/L	GROUND WATER	MWHL002	4	5:10	1.0
158436001	2603150120 TR-9A	SAMPLE		1 ug/L	GROUND WATER	MWHL002	5	5:10	1.0
158971001	2603220347 M-103	SAMPLE		1 ug/L	GROUND WATER	MWHL002	6	5:10	1.0
158971002	2603220348 TR-7	SAMPLE		1 ug/L	GROUND WATER	MWHL002	7	5:10	1.0
158971003	2603220357 TR-9	SAMPLE		1 ug/L	GROUND WATER	MWHL002	8	5:10	1.0
158971004	2603220360 TR-10	SAMPLE		1 ug/L	GROUND WATER	MWHL002	9	5:10	1.0
159242001	2603240118 H-11	SAMPLE		1 ug/L	GROUND WATER	MWHL002	10	5:10	1.0
159242002	2603240122 M-117	SAMPLE		1 ug/L	GROUND WATER	MWHL002	11	5:10	1.0
159242003	2603240135 M-121	SAMPLE		1 ug/L	GROUND WATER	MWHL002	12	5:10	1.0
159243001	2603230197 M-118	SAMPLE		1 ug/L	GROUND WATER	MWHL002	13	5:10	1.0
159244001	2603250005 EB-3	SAMPLE		1 ug/L	GROUND WATER	MWHL002	14	5:10	1.0
159247001	2603230069 M-120	SAMPLE		1 ug/L	GROUND WATER	MWHL002	15	5:10	1.0
1201077880	MB for batch 523680	MB		UCF ug/L to uGROUND WATER	GROUND WATER	QC ACCOUNT	16	5:10	1.0
1201077881	2603240135 M-121(159242003)DUP	DUP		1 ug/L	GROUND WATER	QC ACCOUNT	17	5:10	1.0
1201077882	2603240135 M-121(159242003)MS	MS		1 ug/L	GROUND WATER	QC ACCOUNT	18	5:10	1.0
1201077883	LCS for batch 523680	LCS		UCF ug/L to uGROUND WATER	GROUND WATER	QC ACCOUNT	19	5:10	1.0
1201077884	LCSD for batch 523680	LCSD		UCF ug/L to uGROUND WATER	GROUND WATER	QC ACCOUNT	20	5:10	1.0

Instrument Used (circle one): KPA-10 S/N 89-05050-0035, KPA-10A S/N 89-05040-025, KPA-11 S/N 94-45050-064 TRITON 2 SIN 05-005 0 No 2

Data Reviewed By: SEL 4/20/06

General Engineering Laboratories, Radiochemistry Division

Page 1 of 1

# Uranium Water

Filename : TOTU.XLS  
 File type : Excel  
 Version # : 1

Spike S/N : 0903  
 Spike Exp Date : 3/1/2007  
 Spike Activity (ug/L): 250.00  
 Spike Volume Added(mL): 1.0

LCS S/N : 0903  
 LCS Exp Date : 3/1/2007  
 LCS Activity (ug/L): 250.00  
 LCS Volume Added(mL): 1.0

Batch : 523680  
 Analyst : DRS1  
 Prep Date : 4/24/2006  
 Nat-U Abundance : 1

Procedure Code : KPATOTUL  
 Parmname : Total Uranium

Calibration Date : 4/26/2006 9:32:10  
 Calibration Due Date : 4/27/2006 9:32:10  
 Batch counted on : KPA11AUTO2

**Sample Characteristics**

**KPA Raw Data**

Sample ID	Initial Aliquot L	Initial Sample StDev.	Final Aliquot L	Final Aliquot StDev.	Sample Counted mL	Sample Counted StDev.	Sample Date/Time	Analysis Range	Intensity	Lifetime (us)	R^2
158272001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/13/2006 14:35	Low	14837.950	205.4560	0.9999
158275001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/13/2006 10:45	Low	128.716	405.5095	0.9078
158276001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/8/2006 15:30	Low	18179.560	314.5181	0.9997
158277001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/9/2006 14:00	Low	109.785	389.9206	0.8704
158436001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/14/2006 14:45	Low	8384.440	304.4823	0.9995
158971001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/21/2006 14:00	Low	11429.830	304.0079	0.9997
158971002	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/21/2006 12:00	Low	8779.347	299.2141	0.9998
158971003	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/21/2006 9:00	Low	7751.080	315.1842	0.9996
158971004	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/21/2006 10:20	Low	14388.240	297.1293	0.9999
159242001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/23/2006 15:20	Low	338.874	217.5325	0.9061
159242002	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/23/2006 14:50	Low	10709.190	301.4254	0.9996
159243001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/23/2006 8:30	Low	47166.910	294.7017	0.9999
159244001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/22/2006 14:30	Low	8510.882	301.0075	0.9993
159247001	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/24/2006 12:00	Low	99.989	340.0651	0.7262
1201077880	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/22/2006 10:20	High	2774.895	297.2591	0.9995
1201077881	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	4/24/2006 0:00	Low	120.520	401.1802	0.6136
1201077882	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/23/2006 8:30	Low	47183.600	296.7125	0.9999
1201077883	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	3/23/2006 8:30	High	3843.490	294.0193	0.9995
1201077884	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	4/24/2006 0:00	High	2185.972	323.5353	0.9990
1201077884	0.005	3.7355E-06	0.010	4.2391E-06	1.000	5.4802E-03	4/24/2006 0:00	Low	17815.530	317.4648	0.9998

*Handwritten signatures and initials:*  
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 [Signature]

Ref Ratio	Results (ug/L)	Error (ug/L)	Count Date/Time	Dilution Corrected Results			Results (pCi)					
				KPA Result ug/L	KPA Error ug/L	Decision Level pCi/L	Critical Level pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error pCi/L	1 SIGMA Counting Uncertainty	1 SIGMA Total Prop. Uncertainty
1.0242	2.1947	0.0252	4/26/2006 10:30	4.3894	0.0504	0.2040	0.1440	0.2880	2.9409	0.0077	0.0662	0.0736
1.0268	0.0831	0.0037	4/26/2006 10:32	0.1663	0.0074	0.2040	0.1440	0.2880	0.1114	0.0298	0.0097	0.0098
1.0246	2.6744	0.0305	4/26/2006 10:34	5.3488	0.0610	0.2040	0.1440	0.2880	3.5837	0.0076	0.0801	0.0891
1.0267	0.0804	0.0044	4/26/2006 10:36	0.1608	0.0089	0.2040	0.1440	0.2880	0.1078	0.0371	0.0117	0.0117
1.0188	1.2683	0.0149	4/26/2006 10:38	2.5365	0.0298	0.2040	0.1440	0.2880	1.6995	0.0079	0.0392	0.0433
1.0186	1.7055	0.0196	4/26/2006 10:40	3.4109	0.0391	0.2040	0.1440	0.2880	2.2853	0.0077	0.0514	0.0571
1.0182	1.3250	0.0150	4/26/2006 10:43	2.6499	0.0299	0.2040	0.1440	0.2880	1.7755	0.0076	0.0393	0.0438
1.0126	1.1774	0.0137	4/26/2006 10:45	2.3547	0.0273	0.2040	0.1440	0.2880	1.5777	0.0078	0.0359	0.0398
1.0195	2.1301	0.0239	4/26/2006 10:47	4.2603	0.0478	0.2040	0.1440	0.2880	2.8544	0.0075	0.0628	0.0701
1.0180	0.1133	0.0093	4/26/2006 10:49	0.2266	0.0185	0.2040	0.1440	0.2880	0.1518	0.0548	0.0244	0.0244
1.0307	1.6020	0.0186	4/26/2006 10:51	3.2040	0.0373	0.2040	0.1440	0.2880	2.1467	0.0078	0.0490	0.0543
1.0177	6.8357	0.0763	4/26/2006 10:53	13.6713	0.1527	0.2040	0.1440	0.2880	9.1598	0.0075	0.2005	0.2240
1.0208	1.2864	0.0155	4/26/2006 10:55	2.5728	0.0310	0.2040	0.1440	0.2880	1.7238	0.0081	0.0407	0.0448
1.0279	0.0790	0.0079	4/26/2006 10:57	0.1580	0.0157	0.2040	0.1440	0.2880	0.1059	0.0667	0.0207	0.0207
1.0368	23.7634	0.7311	4/26/2006 11:01	47.5268	1.4621	0.2040	0.1440	0.2880	31.8429	0.0206	1.9201	1.9512
1.0199	0.0820	0.0089	4/26/2006 10:15	0.1639	0.0179	0.2040	0.1440	0.2880	0.1098	0.0730	0.0234	0.0235
1.0191	6.8380	0.0762	4/26/2006 10:18	13.6761	0.1524	0.2040	0.1440	0.2880	9.1630	0.0075	0.2001	0.2236
1.0301	32.8797	1.0119	4/26/2006 10:22	65.7593	2.0237	0.2040	0.1440	0.2880	44.0588	0.0206	2.6576	2.7007
1.0376	18.7377	0.5803	4/26/2006 10:26	37.4754	1.1606	0.2040	0.1440	0.2880	25.1085	0.0207	1.5241	1.5485
1.0327	2.6221	0.0295	4/26/2006 10:27	5.2443	0.0591	0.2040	0.1440	0.2880	3.5137	0.0075	0.0776	0.0865

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MDA Study Information

Effective Date: 4/1/2006  
 Expiration Date: 7/1/2006  
 Average: 1.090000000  
 StDev.: 0.046200000

Results (ug) Decision Level ug/L	Critical Level ug/L	MDA ug/L	Sample Act. Conc. ug/L	Sample Act. Error ug/L	2 SIGMA Counting Uncertainty	2 SIGMA Total Prop. Uncertainty	Sample QC	Sample Type	RPD	RER	Nominal	Recovery
0.3045	0.2150	0.4299	4.3894	0.0115	0.0988	0.1098		SAMPLE				
0.3045	0.2150	0.4299	0.1663	0.0445	0.0145	0.0146		SAMPLE				
0.3045	0.2150	0.4299	5.3488	0.0114	0.1196	0.1330		SAMPLE				
0.3045	0.2150	0.4299	0.1608	0.0553	0.0174	0.0175		SAMPLE				
0.3045	0.2150	0.4299	2.5365	0.0118	0.0585	0.0647		SAMPLE				
0.3045	0.2150	0.4299	3.4109	0.0115	0.0767	0.0852		SAMPLE				
0.3045	0.2150	0.4299	2.6499	0.0113	0.0586	0.0654		SAMPLE				
0.3045	0.2150	0.4299	2.3547	0.0116	0.0536	0.0594		SAMPLE				
0.3045	0.2150	0.4299	4.2603	0.0112	0.0938	0.1047		SAMPLE				
0.3045	0.2150	0.4299	0.2266	0.0818	0.0363	0.0364		SAMPLE				
0.3045	0.2150	0.4299	3.2040	0.0116	0.0731	0.0810		SAMPLE				
0.3045	0.2150	0.4299	13.6713	0.0112	0.2992	0.3343		SAMPLE				
0.3045	0.2150	0.4299	2.5728	0.0120	0.0607	0.0669		SAMPLE				
0.3045	0.2150	0.4299	0.1580	0.0995	0.0308	0.0309		SAMPLE				
0.3045	0.2150	0.4299	47.5268	0.0308	2.8658	2.9122		SAMPLE				
0.3045	0.2150	0.4299	0.1639	0.1089	0.0350	0.0350		MB				
0.3045	0.2150	0.4299	13.6761	0.0111	0.2986	0.3338	159242003	DUP	0.0%		50.00	104.2%
0.3045	0.2150	0.4299	65.7593	0.0308	3.9665	4.0308	159242003	MS			50.00	75.0%
0.3045	0.2150	0.4299	37.4754	0.0310	2.2748	2.3112		LCS			5.00	104.9%
0.3045	0.2150	0.4299	5.2443	0.0113	0.1158	0.1291		LCS	150.9%			

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KPAwin© (Version 1.2.8) Multiple Sample Report

Laboratory: ANALYTE: Uranium ANALYST: sa101078

Sample Identification

Sample ID	Proc ID	Sample Type	Description	Date / Time	SpA	SpG	Atomic Mass	Basis Sample	Customer ID
2.0	None	CChkStd	CChkStd	04/26/2006 09:45 AM	2.5E+04	1	238.0289	None	None
3.0	None	CChkStd	CChkStd	04/26/2006 09:48 AM	2.5E+04	1	238.0289	None	None
50.0	None	CChkStd	CChkStd	04/26/2006 09:50 AM	2.5E+04	1	238.0289	None	None
250.0	None	CChkStd	CChkStd	04/26/2006 09:52 AM	2.5E+04	1	238.0289	None	None
1201077880	None	MtdBlk	523680	04/26/2006 10:15 AM	2.5E+04	1	238.0289	None	None
1201077881	None	Sample	523680	04/26/2006 10:18 AM	2.5E+04	1	238.0289	None	None
1201077882	None	Sample	523680	04/26/2006 10:22 AM	2.5E+04	1	238.0289	None	None
1201077883	None	MtdStd	523680	04/26/2006 10:26 AM	2.5E+04	1	238.0289	None	None
1201077884	None	MtdStd	523680	04/26/2006 10:27 AM	2.5E+04	1	238.0289	None	None
158272001	None	Sample	523680	04/26/2006 10:30 AM	2.5E+04	1	238.0289	None	None
158275001	None	Sample	523680	04/26/2006 10:32 AM	2.5E+04	1	238.0289	None	None
158276001	None	Sample	523680	04/26/2006 10:34 AM	2.5E+04	1	238.0289	None	None
158277001	None	Sample	523680	04/26/2006 10:36 AM	2.5E+04	1	238.0289	None	None
158436001	None	Sample	523680	04/26/2006 10:38 AM	2.5E+04	1	238.0289	None	None
158271001	None	Sample	523680	04/26/2006 10:40 AM	2.5E+04	1	238.0289	None	None
158271002	None	Sample	523680	04/26/2006 10:43 AM	2.5E+04	1	238.0289	None	None
158271003	None	Sample	523680	04/26/2006 10:45 AM	2.5E+04	1	238.0289	None	None

88129  
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KPAWIN® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST:

sal01078

Sample Identification

Sample ID	Proc ID	Sample Type	Description	Date / Time	SpA	SPG	Atomic Mass	Basis Sample	Customer ID
158271004 <i>97</i>	None	Sample	523680	04/26/2006 10:47 AM	2.5E+04	1	238.0289	None	None
159242001 <i>98</i>	None	Sample	523680	04/26/2006 10:49 AM	2.5E+04	1	238.0289	None	None
159242002	None	Sample	523680	04/26/2006 10:51 AM	2.5E+04	1	238.0289	None	None
159242003	None	Sample	523680	04/26/2006 10:53 AM	2.5E+04	1	238.0289	None	None
159243001	None	Sample	523680	04/26/2006 10:55 AM	2.5E+04	1	238.0289	None	None
159244001	None	Sample	523680	04/26/2006 10:57 AM	2.5E+04	1	238.0289	None	None
159247001	None	Sample	523680	04/26/2006 11:01 AM	2.5E+04	1	238.0289	None	None
2.0	None	CChkStd	CChkStd	04/26/2006 11:03 AM	2.5E+04	1	238.0289	None	None
5.0	None	CChkStd	CChkStd	04/26/2006 11:05 AM	2.5E+04	1	238.0289	None	None
50.0	None	CChkStd	CChkStd	04/26/2006 11:07 AM	2.5E+04	1	238.0289	None	None
250.0	None	CChkStd	CChkStd	04/26/2006 11:10 AM	2.5E+04	1	238.0289	None	None
1201077881 <i>92</i>	None	Sample	523680	04/26/2006 11:27 AM	2.5E+04	1	238.0289	None	None
158272001 <i>93</i>	None	Sample	523680	04/26/2006 11:30 AM	2.5E+04	1	238.0289	None	None
1201077881 <i>94</i>	None	Sample	523680	04/26/2006 11:34 AM	2.5E+04	1	238.0289	None	None
158272001 <i>95</i>	None	Sample	523680	04/26/2006 11:36 AM	2.5E+04	1	238.0289	None	None
158276001	None	Sample	523680	04/26/2006 11:47 AM	2.5E+04	1	238.0289	None	None
158246001	None	Sample	523680	04/26/2006 11:49 AM	2.5E+04	1	238.0289	None	None

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KPAWin® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST:

sal01078

Sample Identification

Sample ID	Proc ID	Sample Type	Description	Date / Time	SpA	SpG	Atomic Mass	Basis Sample	Customer ID
158271001	None	Sample	523680	04/26/2006 11:51 AM	2.5E+04	1	238.0289	None	None
158271002	None	Sample	523680	04/26/2006 11:53 AM	2.5E+04	1	238.0289	None	None
158271003	None	Sample	523680	04/26/2006 11:55 AM	2.5E+04	1	238.0289	None	None
158271004	None	Sample	523680	04/26/2006 11:57 AM	2.5E+04	1	238.0289	None	None
159242002	None	Sample	523680	04/26/2006 11:59 AM	2.5E+04	1	238.0289	None	None
159242003	None	Sample	523680	04/26/2006 12:01 PM	2.5E+04	1	238.0289	None	None
159243001	None	Sample	523680	04/26/2006 12:04 PM	2.5E+04	1	238.0289	None	None
159247001	None	Sample	523680	04/26/2006 12:08 PM	2.5E+04	1	238.0289	None	None
2.0	None	CChkStd	CChkStd	04/26/2006 12:09 PM	2.5E+04	1	238.0289	None	None
5.0	None	CChkStd	CChkStd	04/26/2006 12:12 PM	2.5E+04	1	238.0289	None	None
50.0	None	CChkStd	CChkStd	04/26/2006 12:14 PM	2.5E+04	1	238.0289	None	None
250.0	None	CChkStd	CChkStd	04/26/2006 12:16 PM	2.5E+04	1	238.0289	None	None
158275001	None	Sample	523680	04/26/2006 12:29 PM	2.5E+04	1	238.0289	None	None
158277001	None	Sample	523680	04/26/2006 12:31 PM	2.5E+04	1	238.0289	None	None
159242001	None	Sample	523680	04/26/2006 12:33 PM	2.5E+04	1	238.0289	None	None
159244001	None	Sample	523680	04/26/2006 12:36 PM	2.5E+04	1	238.0289	None	None
2.0	None	CChkStd	CChkStd	04/26/2006 12:41 PM	2.5E+04	1	238.0289	None	None

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KPAWin© (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST: sal01078

Sample Identification

Sample ID	Proc ID	Sample Type	Description	Date / Time	SpA	SPG	Atomic Mass	Basis Sample	Customer ID
147.5.0	None	CChkStd	CChkStd	04/26/2006 12:44 PM	2.5E+04	1	238.0289	None	None
147.50.0	None	CChkStd	CChkStd	04/26/2006 12:46 PM	2.5E+04	1	238.0289	None	None
147.520.0	None	CChkStd	CChkStd	04/26/2006 12:48 PM	2.5E+04	1	238.0289	None	None

*sal01078*

KPAWin© (Version 1.2.8) Multiple Sample Report

Laboratory: ANALYTE: Uranium ANALYST: sal01078

Analytical Results

Sample ID	Range	Time Gates	Sample Units	Analytical Result	Total Dilution	Sample Type	Final Result	Pulses	Calibration ID	Uncertainty
482.0	Low	5 -39	µg/l	1.98E+00		CChkStd		1000	4/26/06	2.34E-02
483.0	Low	5 -39	µg/l	4.87E+00		CChkStd		1000	4/26/06	5.42E-02
50.0	High	5 -39	µg/l	4.99E+01		CChkStd		1000	4/26/06	1.54E+00
250.0	High	5 -39	µg/l	2.46E+02		CChkStd		1000	4/26/06	7.51E+00
1201077880	Low	5 -39	µg/l	8.20E-02	1	MtdBlk	8.20E-02	1000	4/26/06	8.93E-03
1201077881	Low	5 -39	µg/l	6.84E+00	1	Sample	6.84E+00	1000	4/26/06	7.62E-02
1201077882	High	5 -39	µg/l	3.29E+01	1	Sample	3.29E+01	1000	4/26/06	1.01E+00
1201077883	High	5 -39	µg/l	1.87E+01	1	MtdStd	1.87E+01	1000	4/26/06	5.80E-01
1201077884	Low	5 -39	µg/l	2.62E+00	1	MtdStd	2.62E+00	1000	4/26/06	2.95E-02
158272001	Low	5 -39	µg/l	2.19E+00	1	Sample	2.19E+00	1000	4/26/06	2.52E-02
158275001	Low	5 -39	µg/l	8.31E-02	1	Sample	8.31E-02	1000	4/26/06	3.70E-03
158276001	Low	5 -39	µg/l	2.67E+00	1	Sample	2.67E+00	1000	4/26/06	3.05E-02
158277001	Low	5 -39	µg/l	8.04E-02	1	Sample	8.04E-02	1000	4/26/06	4.45E-03
158436001	Low	5 -39	µg/l	1.27E+00	1	Sample	1.27E+00	1000	4/26/06	1.49E-02
158271001	Low	5 -39	µg/l	1.71E+00	1	Sample	1.71E+00	1000	4/26/06	1.96E-02
158271002	Low	5 -39	µg/l	1.32E+00	1	Sample	1.32E+00	1000	4/26/06	1.50E-02
158271003	Low	5 -39	µg/l	1.18E+00	1	Sample	1.18E+00	1000	4/26/06	1.37E-02

*Sal*  
*4/26/06*  
*12:52:14 PM*

KPAWIN® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST:

sal01078

Analytical Results

Sample ID	Range	Time Gates	Sample Units	Analytical Result	Total Dilution	Sample Type	Final Result	Pulses	Calibration ID	Uncertainty
15871004	Low	5 -39	µg/l	2.13E+00	1	Sample	2.13E+00	1000	4/26/06	2.39E-02
159242001	Low	5 -39	µg/l	1.13E-01	1	Sample	1.13E-01	1000	4/26/06	9.27E-03
159242002	Low	5 -39	µg/l	1.60E+00	1	Sample	1.60E+00	1000	4/26/06	1.86E-02
159242003	Low	5 -39	µg/l	6.84E+00	1	Sample	6.84E+00	1000	4/26/06	7.63E-02
159243001	Low	5 -39	µg/l	1.29E+00	1	Sample	1.29E+00	1000	4/26/06	1.55E-02
159244001	Low	5 -39	µg/l	7.90E-02	1	Sample	7.90E-02	1000	4/26/06	7.86E-03
159247001	High	5 -39	µg/l	2.38E+01	1	Sample	2.38E+01	1000	4/26/06	7.31E-01
2.0	Low	5 -39	µg/l	2.05E+00		CChkStd		1000	4/26/06	2.33E-02
5.0	Low	5 -39	µg/l	4.92E+00		CChkStd		1000	4/26/06	5.51E-02
50.0	High	5 -39	µg/l	5.01E+01		CChkStd		1000	4/26/06	1.56E+00
250.0	High	5 -39	µg/l	2.44E+02		CChkStd		1000	4/26/06	7.46E+00
1201077881	Low	5 -39	µg/l	6.96E+00	1	Sample	6.96E+00	1000	4/26/06	7.77E-02
158272001	Low	5 -39	µg/l	2.28E+00	1	Sample	2.28E+00	1000	4/26/06	2.58E-02
1201077881	Low	5 -39	µg/l	7.01E+00	1	Sample	7.01E+00	1000	4/26/06	7.77E-02
158272001	Low	5 -39	µg/l	2.30E+00	1	Sample	2.30E+00	1000	4/26/06	2.60E-02
158276001	Low	5 -39	µg/l	2.69E+00	1	Sample	2.69E+00	1000	4/26/06	3.06E-02
158246001	Low	5 -39	µg/l	1.30E+00	1	Sample	1.30E+00	1000	4/26/06	1.49E-02

KPAWIN® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST:

sal01078

Analytical Results

Sample ID	Range	Time Gates	Sample Units	Analytical Result	Total Dilution	Sample Type	Final Result	Pulses	Calibration ID	Uncertainty
158271001	Low	5 -39	µg/l	1.73E+00	1	Sample	1.73E+00	1000	4/26/06	1.93E-02
158271002	Low	5 -39	µg/l	1.36E+00	1	Sample	1.36E+00	1000	4/26/06	1.55E-02
158271003	Low	5 -39	µg/l	1.19E+00	1	Sample	1.19E+00	1000	4/26/06	1.36E-02
158271004	Low	5 -39	µg/l	2.16E+00	1	Sample	2.16E+00	1000	4/26/06	2.47E-02
159242002	Low	5 -39	µg/l	1.62E+00	1	Sample	1.62E+00	1000	4/26/06	1.83E-02
159242003	Low	5 -39	µg/l	7.02E+00	1	Sample	7.02E+00	1000	4/26/06	7.80E-02
159243001	Low	5 -39	µg/l	1.29E+00	1	Sample	1.29E+00	1000	4/26/06	1.44E-02
159247001	High	5 -39	µg/l	2.33E+01	1	Sample	2.33E+01	1000	4/26/06	7.26E-01
2.0	Low	5 -39	µg/l	2.01E+00		CChkStd		1000	4/26/06	2.28E-02
5.0	Low	5 -39	µg/l	4.89E+00		CChkStd		1000	4/26/06	5.46E-02
50.0	High	5 -39	µg/l	5.06E+01		CChkStd		1000	4/26/06	1.56E+00
250.0	High	5 -39	µg/l	2.53E+02		CChkStd		1000	4/26/06	7.72E+00
158275001	Low	5 -39	µg/l	4.67E+00	1	Sample	4.67E+00	1000	4/26/06	5.28E-02
158277001	Low	5 -39	µg/l	4.57E+00	1	Sample	4.57E+00	1000	4/26/06	5.09E-02
159242001	Low	5 -39	µg/l	3.74E+00	1	Sample	3.74E+00	1000	4/26/06	6.74E-02
159244001	Low	5 -39	µg/l	4.71E+00	1	Sample	4.71E+00	1000	4/26/06	5.24E-02
2.0	Low	5 -39	µg/l	2.01E+00		CChkStd		1000	4/26/06	2.30E-02

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KPAWin© (Version 1.2.8) Multiple Sample Report

Laboratory: ANALYTE: Uranium ANALYST: sal01078

Analytical Results

Sample ID	Range	Time Gates	Sample Units	Analytical Result	Total Dilution	Sample Type	Final Result	Pulses	Calibration ID	Uncertainty
5.0	Low	5 -39	µg/l	4.92E+00		CchkStd		1000	4/26/06	5.47E-02
50.0	High	5 -39	µg/l	5.07E+01		CchkStd		1000	4/26/06	1.55E+00
250.0	High	5 -39	µg/l	2.34E+02		CchkStd		1000	4/26/06	7.15E+00

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KPAWin® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE: Uranium

ANALYST:

sal01078

Quality Control

Sample ID	Basis Sample	Reference Lifetime	R <sup>2</sup> Intensity	Reference Ratio	Sample Lifetime	Sample Intercept	IDL / MDL	Recovery (%)	RPD (%)	AW Flags
2.0	None	297	.9994	1.00084	320	13368	0E+00/ 0E+00	99.18		
5.0	None	297	.9999	.99957	343	33479	0E+00/ 0E+00	97.41		
50.0	None	297	.9994	1.01295	330	5836	0E+00/ 0E+00	99.75		
250.0	None	295	.9999	1.01972	333	28866	0E+00/ 0E+00	98.26		
1201077880	None	294	.6136	1.01989	401	121	0E+00/ 0E+00			A8, A10
1201077881	None	294	.9999	1.01911	297	47184	0E+00/ 0E+00			
1201077882	None	295	.9995	1.03011	294	3843	0E+00/ 0E+00			
1201077883	None	294	.9990	1.03765	324	2186	0E+00/ 0E+00	1873.77		
1201077884	None	293	.9998	1.03268	317	17816	0E+00/ 0E+00	262.21		
158272001	None	295	.9999	1.02420	205	14838	0E+00/ 0E+00			
158275001	None	295	.9078	1.02681	406	129	0E+00/ 0E+00			A8, A10, A73
158276001	None	295	.9997	1.02460	315	18180	0E+00/ 0E+00			
158277001	None	292	.8704	1.02666	390	110	0E+00/ 0E+00			A8, A10, A73
158436001	None	294	.9995	1.01883	304	8384	0E+00/ 0E+00			
158471001	None	291	.9997	1.01856	304	11430	0E+00/ 0E+00			
158471002	None	291	.9998	1.01825	299	8779	0E+00/ 0E+00			
158471003	None	293	.9996	1.01265	315	7751	0E+00/ 0E+00			

*Handwritten signature and date: 4/26/06*

KPAWin® (Version 1.2.8) Multiple Sample Report

Laboratory: ANALYTE: Uranium ANALYST: sal01078

Quality Control

Sample ID	Basis Sample	Reference Lifetime	R Intensity	Reference Ratio	Sample Lifetime	Sample Intercept	IDL / MDL	Recovery (%)	RPD (%)	AW Flags
158771004	None	291	.9999	1.01947	297	14388	0E+00/ 0E+00			
159242001	None	292	.9061	1.01796	218	339	0E+00/ 0E+00			A8, A73
159242002	None	288	.9996	1.03073	301	10709	0E+00/ 0E+00			
159242003	None	292	.9999	1.01767	295	47167	0E+00/ 0E+00			
159243001	None	290	.9993	1.02075	301	8511	0E+00/ 0E+00			
159244001	None	289	.7262	1.02794	340	100	0E+00/ 0E+00			A8, A73
159247001	None	289	.9995	1.03681	297	2775	0E+00/ 0E+00			
2.0	None	288	.9998	1.02671	316	13813	0E+00/ 0E+00	102.38		
5.0	None	288	.9999	1.02902	336	33847	0E+00/ 0E+00	98.47		
50.0	None	288	.9988	1.03507	311	5863	0E+00/ 0E+00	100.22		
250.0	None	288	.9998	1.03679	301	28639	0E+00/ 0E+00	97.49		
1201077881	None	285	.9999	1.03327	283	48064	0E+00/ 0E+00			
158272001	None	286	.9999	1.03390	203	15430	0E+00/ 0E+00			
1201077881	None	286	1.0000	1.03072	290	48394	0E+00/ 0E+00			
158272001	None	286	.9999	1.03448	203	15555	0E+00/ 0E+00			
158276001	None	287	.9998	1.02704	309	18314	0E+00/ 0E+00			
158246001	None	286	.9997	1.03553	301	8600	0E+00/ 0E+00			

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KPAWIN® (Version 1.2.8) Multiple Sample Report

Laboratory:

ANALYTE:

Uranium

ANALYST:

sal01078

Quality Control

Sample ID	Basis Sample	Reference Lifetime	R <sup>2</sup> Intensity	Reference Ratio	Sample Lifetime	Sample Intercept	IDL / MDL	Recovery (%)	RPD (%)	AW Flags
158271001	None	287	.9999	1.03482	300	11600	0E+00/ 0E+00			
158271002	None	288	.9998	1.03185	293	9034	0E+00/ 0E+00			
158271003	None	286	.9997	1.03887	309	7863	0E+00/ 0E+00			
158271004	None	289	.9997	1.03416	293	14617	0E+00/ 0E+00			
159242002	None	287	.9999	1.03592	298	10857	0E+00/ 0E+00			
159242003	None	287	1.0000	1.03040	289	48445	0E+00/ 0E+00			
159243001	None	286	.9999	1.03012	300	8532	0E+00/ 0E+00			
159247001	None	285	.9989	1.03672	294	2721	0E+00/ 0E+00			
2.0	None	285	.9998	1.02977	318	13542	0E+00/ 0E+00	100.43		
5.0	None	285	.9999	1.02740	335	33596	0E+00/ 0E+00	97.75		
50.0	None	285	.9993	1.02635	321	5919	0E+00/ 0E+00	101.17		
250.0	None	286	1.0000	1.02645	327	29738	0E+00/ 0E+00	101.22		
158275001	None	283	.9998	1.01796	295	32062	0E+00/ 0E+00			
158277001	None	284	.9999	1.02530	310	31405	0E+00/ 0E+00			
159242001	None	283	.9992	1.03169	111	25589	0E+00/ 0E+00			A9
159244001	None	284	1.0000	1.02870	296	32375	0E+00/ 0E+00			
2.0	None	284	.9997	1.02735	319	13573	0E+00/ 0E+00	100.66		

*Handwritten signature/initials*

KPAWin© (Version 1.2.8) Multiple Sample Report

Laboratory: ANALYTE: Uranium ANALYST: sa101078

Quality Control

Sample ID	Basis Sample	Reference Lifetime	R <sup>2</sup> Intensity	Reference Ratio	Sample Lifetime	Sample Intercept	IDL / MDL	Recovery (%)	RPD (%)	AW Flags
55.0	None	284	1.0000	1.02988	336	33820	0E+00 / 0E+00	98.39		
50.0	None	283	.9997	1.03957	326	5932	0E+00 / 0E+00	101.39		
250.0	None	282	.9999	1.04602	324	27518	0E+00 / 0E+00	93.69		

Page 4 of 78

**KPAWIN® (Version 1.2.8) Multiple Sample Report**

Laboratory:

ANALYTE:

Uranium

ANALYST: sal01078

Calibration Report Results

Low Calibration ID - 4/26/06

High Calibration ID - 4/26/06

Batch ID - 1973

Date - 4/26/2006 9:32:10 AM

Calibration Report Results

Range	Used	Sample ID	Std Conc	Std ID	Intercept	Uncert	Percent Time Reference			R <sup>2</sup>	AW Flags
							Discrep	Gates	Ratio		
Low	+	BckGnd	0.000		488	22	.000	5-39	1.0000	303	.9613
Low	+	1.0 ug/L	1.000	0836	7000	84	6.950	5-39	1.0010	314	.9996
Low	+	3.0 ug/L	3.000	0838	20203	142	-1.172	5-39	1.0067	324	.9998
Low	+	5.0 ug/L	5.000	0839	33851	184	-1.517	5-39	1.0118	345	.9998
Low	+	10.0 ug/L	10.000	0840	69499	264	.415	5-39	1.0100	318	1.0000

---

High	+	BckGnd	0.000		5	3	.000	5-20	1.0000	154	.5912
High	+	10.0 ug/L	10.000	0840	1162	34	-.001	5-39	1.0129	320	.9991
High	+	250 ug/L	250.000	0856	29378	171	.000	5-39	1.0110	326	.9999
High	+	500 ug/L	500.000	0842	58986	243	.000	5-39	1.0105	320	.9999

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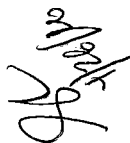
# KPAWIN Detailed Calibration Report

**Laboratory:**

Calibration Details

Laboratory ID	KPA11AUTO2	Customer ID	None
Analyst	sal01078	Procedure ID	None
Calibration Config ID	1001 Config	Calibration Date	4/26/2006 9:32:10 AM
Calibration Batch ID	1973		

	<u>Low Range Details</u>	<u>High Range Details</u>
User Calibration	True	True
Calibration Id	4/26/06	4/26/06
Minimum Number of Standards	3	3
Calibration Alarms	0.9996973	1
Calibration R <sup>2</sup>	7.35E+03	2.13E-09
Variance	Y= +6966.018X -450.366	Y= +0.002X^2 +117.107X -8.91
Calibration Equation		



Radiochemistry Batch Checklist, Rev 4

Batch# 518058 Product: Ra-226 Date: 4/10/06

Criteria:	Yes	No	Comments
Sample Solids are less than 100 mg for GAB.	NA		
If activity less 10* MDA, error is 150% or less of sample activity. If greater 10* MDA, error is 40% or less. If below the MDA, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL has been met.	✓		
If duplicate activities are less 5* MDA, then rpd is 100% or less. If greater 5* MDA, then rpd 20% or less. If below the MDA, the rpd is 0%. Or meets the client's required RER acceptance criteria.	✓		Case narrative
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	NA		
Method blank is less than the RDL. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Special requirements page checked	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.	NA		
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms.	✓		
All lineouts initialed and dated.	✓		
No transcription errors are apparent.	✓		
QC data entered into QC database.	✓		
Batch entered into Case Narrative.	✓		
Batch non-conformances completed If applicable.	NA		

General Engineering Laboratories

2/22/2005

Primary Review Performed By: J. P. Green 4/10/06

Secondary Review Performed By: SKO 4/12/06

# Radium-226 Que Sheet

04/05/2006 General Engineering Laboratories, Radiochemistry Division

Batch #: 518058 Analyst: SG Minimum Due Date: 04/20/2006  
 Spike Isotope: Radium-226 Spike Code: 0638-B Expiration Date: 1-17-07 Vol: 0.1 Nom Conc: 2.5.11  
 LCS Isotope: Radium-226 LCS Code: 0638-B Expiration Date: 1-17-07 Vol: 0.1 Nom Conc: 2.5.11  
 Prep Date: 4-7-06 Pipet ID: 1429323 Initials: SNB Witness: SLS 4/2/06 Sample Count Time: 30 (Min)  
 Bkg Count Time: 30 (Min)

Sample I	Client Description	Type	Hazard Code Matrix	Min CRDL	Client	Vol (mL)	End Init Degas Date/Tin	End LN De-em Date/Time	Start Count Date/Time	Cell #	Det #	Bkg cpm	Total Counts
158272001	2603140436 TR-10A	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	1	500	4-7-06 0835	4-10-06 0520	4-10-06 0855	604	6	8	20
159242001	2603240118 H-11	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	2	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	104	1	2	12
159242002	2603240122 M-117	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	3	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	207	2	8	27
159243001	2603250197 M-118	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	4	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	303	3	8	26
159244001	2603250005 EB-3	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	5	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	406	4	5	20
159247001	2603230069 M-120	SAMPLE	GROUND WAJ 2 pCi/L	MWHL002	6	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	572	5	8	14
1201064983	MB for batch 518058	MB	GROUND WAJ 2 pCi/L	QC ACCOUNT 7	7	500	4-7-06 0835	4-10-06 0555	4-10-06 0855	605	6	7	20
1201064984	2603230069 M-120(159247001)DxDUP	MB	GROUND WAJ 2 pCi/L	QC ACCOUNT 8	8	500	4-7-06 0835	4-10-06 0625	4-10-06 0930	112	1	8	26
1201064985	2603230069 M-120(159247001)MMS	MB	GROUND WAJ 2 pCi/L	QC ACCOUNT 9	9	500	4-7-06 0835	4-10-06 0625	4-10-06 0830	212	2	3	558
1201064986	LCS for batch 518058	LCS	GROUND WAJ 2 pCi/L	QC ACCOUNT 10	10	500	4-7-06 0835	4-10-06 0625	4-10-06 0930	307	3	7	665

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Data Reviewed By: SNB 4/10/06

Comments: \_\_\_\_\_

Instrument ID's: LUCAS1:90988, LUCAS2:136917, LUCAS3:90989, LUCAS4:102753, LUC5:132286, LUC6:170055

MWHL002  
4/12/06



# Radium-226 Water

Filename : RA226.XLS  
 File type : Excel  
 Version # : 1  
 Batch : 518058  
 Analyst : SG  
 Prep Date : 4/7/2006  
 Ra-226 Abundance : 1  
 Calibration Date : 5/9/2005  
 Calibration Due Date : 5/9/2006

Spike S/N : 0638-B  
 Spike Exp Date : 1/17/2007  
 Spike Activity (dpm/ml): 278.75  
 Spike Volume Added: 0.1

LCS S/N : 0638-B  
 LCS Exp Date : 1/17/2007  
 LCS Activity (dpm/ml): 278.75  
 LCS Volume Added: 0.1

Pipet, 0.1 ml Stdev : +/- 0.000701 ml  
 Pipet, 0.5 ml Stdev : +/- 0.002564 ml  
 Pipet, 1 ml Stdev : +/- 0.005480 ml

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 Required MDA: 2 pCi/L  
 Half-life of Ra-226 : 1600 years  
 Half-life of Rn-222: 3.823 days  
 Batch counted on : LUCAS CELL DETECTOR  
 BKG Count time : 30 min

Sample Characteristics			Count Raw Data				Weekly Background				Detector	
Sample ID	Sample Aliquot L	Sample Aliquot StDev.	Sample Date/Time	Cell Number	Counting Time	Gross Counts	Gross CPM	Counts	CPM	Count Time	Count Time	Efficiency
158272001	0.500	2.0256E-05	3/13/2006 14:35	604	30	20	0.667	8	0.267	30	30	1.8640
159242001	0.500	2.0256E-05	3/23/2006 15:20	104	30	12	0.400	2	0.067	30	30	1.7840
159242002	0.500	2.0256E-05	3/23/2006 14:50	207	30	27	0.900	8	0.267	30	30	1.7250
159243001	0.500	2.0256E-05	3/22/2006 14:30	303	30	26	0.867	8	0.267	30	30	1.8360
159244001	0.500	2.0256E-05	3/24/2006 12:00	406	30	20	0.667	5	0.167	30	30	1.9080
159247001	0.500	2.0256E-05	3/22/2006 10:20	512	30	14	0.467	8	0.267	30	30	1.9410
1201064983	0.500	2.0256E-05	4/7/2006 0:00	605	30	20	0.667	7	0.233	30	30	1.7780
1201064984	0.500	2.0256E-05	3/22/2006 10:20	112	30	26	0.867	8	0.267	30	30	1.5310
1201064985	0.500	2.0256E-05	3/22/2006 10:20	212	30	558	18.600	3	0.100	30	30	1.8080
1201064986	0.500	2.0256E-05	4/7/2006 0:00	307	30	665	22.167	7	0.233	30	30	1.6380

*Handwritten note:* 12/12/06

*Handwritten note:* 12/12/06

Detector Efficiency Error	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections		Ra-226 Decay
				De-Gas to Ingrowth	Ingrowth to Count	
0.02655	4/7/2006 8:35	4/10/2006 5:20	4/10/2006 8:20	0.405	0.978	1.000
0.02415	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.02691	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.00980	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.01759	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.02843	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.02655	4/7/2006 8:35	4/10/2006 5:55	4/10/2006 8:55	0.408	0.978	1.000
0.02415	4/7/2006 8:35	4/10/2006 6:25	4/10/2006 9:30	0.410	0.977	1.000
0.02691	4/7/2006 8:35	4/10/2006 6:25	4/10/2006 9:30	0.410	0.977	1.000
0.00980	4/7/2006 8:35	4/10/2006 6:25	4/10/2006 9:30	0.410	0.977	1.000

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Results Decision Level pCi/L	Critical Level pCi/L	MDA pCi/L	Sample Act. Conc.	Sample Act. Error	Net Count Rate	Net Count Rate Error	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal	Recovery
							Counting Uncertainty	Total Prop. Uncertainty						
0.3784	0.2672	0.6442	0.4873	0.4418	0.4000	0.1764	0.4211	0.4219		SAMPLE				
0.1964	0.1387	0.3914	0.4215	0.3749	0.3333	0.1247	0.3091	0.3098		SAMPLE				
0.4063	0.2869	0.6917	0.8283	0.3125	0.6333	0.1972	0.5055	0.5074		SAMPLE				
0.3817	0.2695	0.6499	0.7373	0.3241	0.6000	0.1944	0.4681	0.4683		SAMPLE				
0.2904	0.2050	0.5167	0.5912	0.3338	0.5000	0.1667	0.3862	0.3868		SAMPLE				
0.3611	0.2549	0.6147	0.2325	0.7823	0.2000	0.1563	0.3562	0.3564		SAMPLE				
0.3687	0.2603	0.6351	0.5498	0.4006	0.4333	0.1732	0.4307	0.4317		MB				
0.4556	0.3216	0.7756	0.8799	0.3248	0.6000	0.1944	0.5587	0.5602	159247001	DUP	35.5%		25.11	91.5%
0.2362	0.1668	0.4456	22.9729	0.0505	18.5000	0.7895	1.9216	2.2718	159247001	MS			25.11	119.7%
0.3983	0.2812	0.6860	30.0625	0.0406	21.9333	0.8641	2.3213	2.3921		LCS				
SAMPLE MDA USED TO CALCULATE RPD														

*Handwritten signature/initials*

# METHOD CALIBRATION DATA

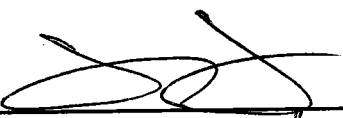
# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Gas Flow Proportional Counter Calibration Package

Method: Pb-210

	YES	NO	Comments
1) Is all calibration standard information enclosed for: primary standard certificate? secondard standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
2) Are the detector graphs included? beta absorption curves? beta plateau?	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
3) Is the raw count data included for: the plateau generation? the absorption curve generation? the calibration verification? the crosstalk calculations?	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
4) Are the calibration verification calculations included? are verification recoveries 100% +/- 25%	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		

Prepared By: 

Date: 7/29/05

Reviewed By: 

Date: 7/30/05

Effective Date: 7/29/05

0356

# DEUTSCHER KALIBRIERDIENST **DKD**

Kalibrierlaboratorium für Meßgrößen der Radioaktivität  
*Calibration laboratory for measurements of radioactivity*

AKKREDITIERT DURCH DIE  
**PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)**



**AEA Technology QSA GmbH**  
Postfach 58 42                      Gieselweg 1  
D-38049 Braunschweig            D-38110 Braunschweig  
Tel. +49 (0) 5307 932-0  
Fax +49 (0) 5307 932-194  
Source no. FX 248

08640
DKD-K-06501
01-01

**Kalibrierschein**  
*Calibration Certificate*

**Kalibrierzeichen**  
*Calibration mark*

**Gegenstand**  
*Object*

**Reference Solution**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

**Hersteller**  
*Manufacturer*

**AEA Technology QSA GmbH**

Der Deutsche Kalibrierdienst ist Unterzeichner des multilateralen Übereinkommens der European co-operation for Accreditation (EA) zur gegenseitigen Anerkennung der Kalibrierscheine.

**Typ**  
*Type*

**RBZB44**

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

**Strahler-Nr.**  
*Source number*

**FX 248**

**Auftraggeber**  
*Customer*

**AEA TECHNOLOGY QSA, INC.  
USA-BURLINGTON MA 01803**

*This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).*

**Auftragsnummer**  
*Order No.*

**CO 34622**

*The Deutscher Kalibrierdienst is signatory to the multilateral agreement of the European co-operation for (EA) for the mutual recognition of calibration certificates.*

**Anzahl der Seiten des Kalibrierscheines**  
*Number of pages of the certificate*

**2**

*The user is obliged to have the object recalibrated at appropriate intervals.*

**Referenzdatum**  
*Reference date*

**1 January 2001**

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Physikalisch-Technischen Bundesanstalt als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.

*This calibration certificate may not be reproduced other than in full except with the permission of both the Physikalisch-Technische Bundesanstalt and the issuing laboratory. Calibration certificates without signature and seal are not valid.*

<b>Stempel</b> <i>Seal</i>	<b>Datum</b> <i>Date</i>	<b>Leiter des Kalibrierlaboratoriums</b> <i>Head of the calibration laboratory</i>	<b>Stellvertreter</b> <i>Deputy</i>	<b>Bearbeiter</b> <i>Person in charge</i>
	31 January 2001		Schott	
		Dr. Thieme	Schott	Linke / Schott / Schüler

*mm 7/29/05*

**Reference Solution**

Solution no.	FX 248
Drawing	VZ-2058/1
Nuclide	Lead-210
Radioactive concentration	34.2 kBq/g
Reference date	1 January 20001 at 12.00 GMT
Mass of solution	(5.182 ± 0.001) g
Volume of solution	approx. 5 ml
Contamination test	Wipe test according to ISO 9978.
Date of wipe test	30 January 2001
Chemical composition	Solution in 1.2 M HNO <sub>3</sub> ; Carrier: Pb(NO <sub>3</sub> ) <sub>2</sub> , Bi(NO <sub>3</sub> ) <sub>3</sub> ; each 20 mg/l of the corresponding element.
Measuring method	The activity was determined by comparison with a reference solution by measurement with a Ge-detector with MCA.
Traceability	Additional to the direct traceability to the PTB through the DKD this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 AEA Technology QSA GmbH participates in the NEI/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 3 %. The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Pb-210 (equal 100 %) the following radioactive impurities were detected: Ra-226: 0.003 %
Quality assurance system	The quality assurance system of AEA Technology QSA GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 1994. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Remark	

*1297/29/02*

# Explanations for Certificates (Page 2 of Certificates)

## Overall uncertainty

The reported uncertainty is based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %. (ISO Guide, 1995)

## Traceability

This certificate documents the traceability of measurement results to national standards, standard measuring equipment and methods for the realisation of physical units of measurement according to the International System of Units (SI). Traceability is defined as 'the property of a result of a measurement whereby it can be related to appropriate standards, generally International or national standards, through an unbroken chain of comparisons'.

AEA Technology QSA GmbH has been accredited as DKD (Deutscher Kalibrierdienst) calibration laboratory by the Physikalisch-Technische Bundesanstalt (PTB) and is authorized to issue reference sources which are traceable to national standards held at the PTB in Germany. Because of the European co-operation for Accreditation (EA) mutual recognition agreement the certificates are also accepted by all EA-members (e. g. NAMAS, UK).

This product complies with the requirements for traceability to NIST specified in the American National Standard 'Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)'. As a requirement for the ANSI N42.22-1995 AEA Technology QSA participates in the NEVNIST Measurements Assurance Program of the Nuclear Power Industry.

## Leakage and contamination tests

Stringent tests for leakage are an essential feature of radioactive sources production. They are based on ISO 9978. Some standard methods used for testing radiation sources are listed below.

### Wipe test I

The source is wiped with a swab or tissue, moistened with ethanol or water, the activity removed is measured. Limit: 185 Bq

### Immersion test II

The source is immersed in a suitable liquid at 50 °C for at least 4 hours and the activity removed is measured. Limit: 185 Bq

### Bubble test III

The source is immersed in water or a suitable liquid and the pressure in the vessel reduced to 13 kPa (100 mm Hg). No bubbles must be observed. (This test conforms to ISO 9978 except that for some sources, the 100 mm<sup>3</sup> free volume requirement is not met.)

### Emanation test IV

The source is placed in a gas tight enclosure with activated carbon as absorber and is left there for at least 3 h. The source is considered leak tight when not more than 185 Bq Radon related to a collection time of 12 h can be measured afterwards.

## ISO classification

The International Organization for Standardization (ISO) has proposed a system of classification of sealed radioactive sources based on safety requirements for typical uses (see ISO 2919). This system provides a manufacturer of sealed radioactive sources with a set of tests to evaluate the safety of his products. It also assists a user of such sealed sources to select types which suit the application he has in mind. The tests to which specimen sources are subjected are listed in the following table.

Classification of sealed source performance standard according to ISO 2919

	Class 1	2	3	4	5	6
Temperature	No test	- 40 °C (20 min) + 80 °C (1 h)	- 40 °C (20 min) + 180 °C (1 h)	- 40 °C (20 min) + 400 °C (1 h) and thermal shock 400 °C to 20 °C	- 40 °C (20 min) + 600 °C (1 h) and thermal shock 600 °C to 20 °C	- 40 °C (20 min) + 800 °C (1 h) and thermal shock 800 °C to 20 °C
External Pressure	No test	25 kPa absolute	25 kPa absolute to 2 MPa absolute	25 kPa absolute to 7 MPa absolute	25 kPa absolute to 70 MPa absolute	25 kPa absolute to 170 MPa absolute
Impact	No test	50 g from 1 m	200 g from 1 m	2 kg from 1 m	5 kg from 1 m	20 kg from 1 m
Vibration	No test	3 x 10 min 25 - 500 Hz at 5 g peak amplitude	3 x 10 min 25 - 50 Hz at 5 g peak amplitude and 50 - 90 Hz at 0.635 mm amplitude peak to peak and 90 - 500 Hz at 10 g peak amplitude	3 x 30 min 25 - 80 Hz at 1.5 mm amplitude peak to peak and 80 - 2000 Hz at 20 g peak amplitude		
Puncture	No test	1 g from 1 m	10 g from 1 m	50 g from 1 m	300 g from 1 m	1 kg from 1 m

## Special applications

No test programme can cover all possible combinations of environments to which a source may be exposed. Users should therefore consult our experts before using sources in potentially adverse environments.

## IAEA Special Form

'Special Form' is a test specification for sealed sources given in the IAEA transport regulations (IAEA Safety Series No. 6, 1985, revised edition). It is used in determining the maximum acceptable activities for various types of transport containers.

## Quality assurance system

The quality assurance system of AEA Technology QSA GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 1994. Isotrak products meet the requirements of 10CFR50 Appendix B.



*ms/ector*







## Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0356	Isotope:	Lead-210
Prepared By:	Angela Albee	Prepared By:	Angela Albee
Carrier Conc:	1.2M HNO3	Prep Date:	04/03/2001
Reference Date:	01/01/2001	Verification Date:	07/12/2005
Ampoule Mass (g):	5.182 g	Expiration Date:	07/12/2006
Uncertainty:	+/- 3 %	Primary Code:	0356-A
LogBook No:	RC S 034 16b	Dilution(mL):	100 mL
		Mass of Parent(g):	4.275 g
		Density(g/mL):	1.0290

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.275 \text{ g}) * (34.2 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 87723.0000 \text{ dpm/mL}$
$(4.275 \text{ g}) * (34.2 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0290 \text{ g/mL}) / (100 \text{ mL}) = 85250.5630 \text{ dpm/g}$

## Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

*Angela Albee*

# Verification for Pb-210 Standard 0356-A

A. Fehr 7/12/2005		Standard	
Isotope	Detector CPM	BKG CPM	NET CPM
0356-A N1	20294.0000	21.7000	20294.0000
0356-A N2	20276.6000	21.7000	20276.6000
0356-A N3	20079.7000	21.7000	20079.7000
			Average =

Detector Eff Mass. Used (mL)	Source DPM/mL
0.1000	76051.19747
0.1000	75985.99146
0.1000	75248.11421
	75761.76771

Mean Value (Counting) =	75761.76771	dpm/g	99.4402909	Pass
Stdev =	446.03015	dpm/g	0.00588727	Rule 3 (Pass/Fail)
Certificate Value =	76188.2	dpm/g		
Lower Limit =	74869.70741	dpm/g		
Upper Limit =	76653.82801	dpm/g		
Rule 1 Pass/Fail	Pass			
Two sigma =	892.0603001			
10 % of Mean =	7576.176771			
Rule 2 (Pass/Fail)	Pass			

## Verification Rules

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

The analyst prepared three calibration sources for source 0356-A by transferring portions of the standard to tared glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The calibration vials and background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 31 for Pb-210 standard verification. The efficiency calibration which was used for verification calculations was performed on 7/12/05 using source ET491-A (Pb-210). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

*mm/2/2005*

*Angela D. Johnson 7/29/05*

**PROTOCOL** : 31 Pb-210 Verification  
**DATE** : 2005/07/12  
**TIME** : 05:29  
**ID** : P31AS005

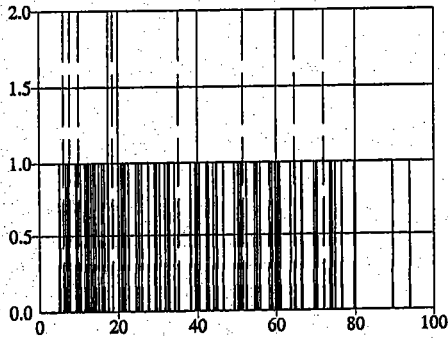
**Wallac 1414 WinSpectral v1.40 S/N 4140127**  
**Counting mode** : CPM  
**Isotope(s)** : Pb210  
**Pb210** = 5- 520,21.00 y  
**Protocol name** : Pb-210 Verification  
**Counting time** : 300  
**Repeats** : 1  
**Cycles** : 1  
**Replicates** : 1  
**2 sigma %** : 0.01  
**Minimum cpm** : 0.00 Checking time: 10  
**Advanced modes** : Chemilum,PSA  
**PSA level** : 35  
**Output to Display** :  
 POS,CTIME,DATE,TIME,RACKPOS,CPMw1,CPM,SQPI,CPM1  
**Additions to Display** : Spectrum,Header,Listing  
**Spectrum** : Alpha,Beta  
**Window 1** : 685- 745 /Alpha  
**Window 2** : 1-1024 /Beta  
**Window 3** : 1-1024 /Beta  
**Window 4** : 1-1024 /Beta  
**Window 5** : 1-1024 /Beta  
**Window 6** : 1-1024 /Beta  
**FNCT1 = FNCT1** :  
**FNCT2 = FNCT2** :  
**FNCT3 = FNCT3** :  
**FNCT4 = FNCT4** :

**Total count rate:**  
 Pb210 72372.3 CPM

*per 1/2/05*  
 Oct 7/12/05

*AAQ*  
 7/29/05

POS	CTIME	DATE	TIME	RACKPOS	CPM
1	300	7/12/2005	5:29 AM	1	20.20

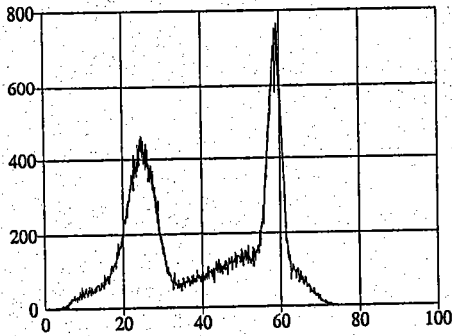


Counts Alpha

Counts Beta

Bkg

2	300	7/12/2005	5:35 AM	2	22785.60
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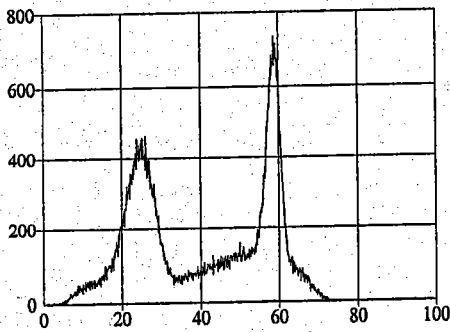


Counts Alpha

Counts Beta

ET491-A

3	300	7/12/2005	5:41 AM	3	22178.60
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Counts Alpha

Counts Beta

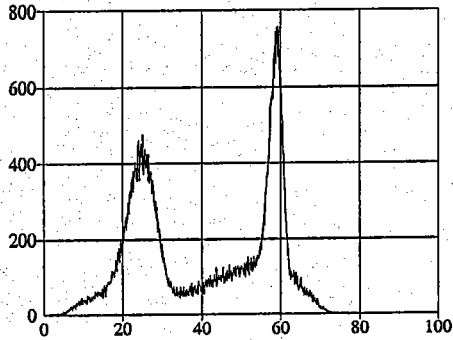
ET491-A

*ms 7/29/05*

ALF 7/12/05

*AdQ*  
*7/29/05*

POS	CTIME	DATE	TIME	RACKPOS	CPM
4	300	7/12/2005	5:46 AM	4	22065.70

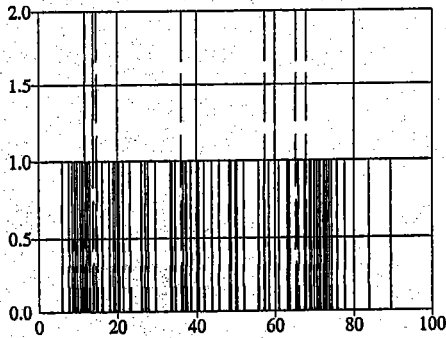


Counts Alpha

Counts Beta

ET491-A

5	300	7/12/2005	5:52 AM	5	21.70
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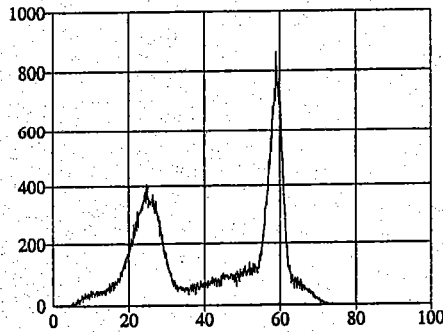


Counts Alpha

Counts Beta

Bkg

6	300	7/12/2005	5:58 AM	6	20294.00
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Counts Alpha

Counts Beta

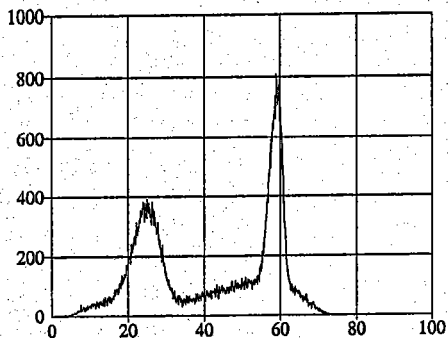
0356-A

*ms/rales*

ALF7/12/05

*200*  
7/29/05

POS	CTIME	DATE	TIME	RACKPOS	CPM
7	300	7/12/2005	6:04 AM	7	20276.60

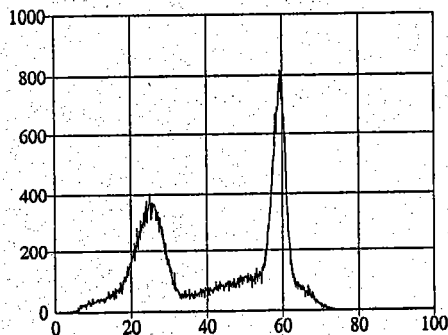


Counts Alpha

Counts Beta

0356-A

8	300	7/12/2005	6:09 AM	8	20079.70
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Counts Alpha

Counts Beta

0356-A

*pm 7/29/05*  
*ALF 7/12/05*

*ALF*  
*7/29/05*

**General Engineering Laboratories  
Calibration Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-018 Isotope Pb-210  
 Date Standards Prepared 7/14/05 Cocktail Type Used NA  
 Standard ID 0356-A Matrix of Vial/Planchett Lead chromate  
 Amount Used (g or ml) 0.5 precipitate on  
 Standard Activity (DPM/g or ml) 87723 Tuffryn filter  
 Reference Date 11/1/05 Type of Scintillation Vial N/A  
 Expiration Date 7/12/06 Pipette ID Used 2440913  
 Residue/Carrier Agent Lead Carrier 14.65  $\mu$ g/ml Balance ID Used R1212  
 Quenching Agent NIA

Separation Date / Time: 7/14/05 0800

Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
C1	0.1	0.0844	<del>0.0850</del>	<del>0.6</del>
C2	0.2	0.0851	<del>0.0865</del>	<del>1.4</del>
C3	0.3	0.0845	0.0880	3.5
C4	0.4	0.0849	0.0913	6.4
C5	0.5	0.0847	0.0926	7.9
C6	0.6	0.0874	0.0975	10.1
C7	0.7	0.0860	0.0950	9.0
C8	0.8	0.0879	0.1000	12.1
C9	0.9	0.0846	0.0966	12.0
C10	1.0	0.0852	0.1000	14.8
C11	1.1	0.0841	0.1010	16.9
C12	1.3	0.0865	0.1033	18.8
		0.0850	0.1053	
		7/13/05		

0.0854 1.0  
0.0875 2.4

Prepared By: [Signature] Date 7/14/05  
 Reviewed By: [Signature] Date 7/14/05

Rev 1 RLM 9/10/97







INSTR_ID	SAMPLE_ID	CNT_TIME	A	B	TIME	USER2	BATCH_ID
Instrument 1 - A	1	2	84	22018	7/28/2005 7:55	1575	PbCal705
Instrument 1 - A	2	2	84	22854	7/28/2005 8:20	1575	PbCal705
Instrument 1 - A	3	2	102	20935	7/28/2005 8:05	1575	PbCal705
Instrument 1 - A	4	2	99	22720	7/28/2005 8:01	1575	PbCal705
Instrument 1 - A	5	2	95	22892	7/28/2005 10:09	1575	PbCal705
Instrument 1 - A	6	2	83	23217	7/28/2005 10:25	1575	PbCal705
Instrument 1 - A	7	2	63	19193	7/28/2005 10:20	1575	PbCal705
Instrument 1 - A	8	2	78	20620	7/28/2005 10:16	1575	PbCal705
Instrument 1 - A	9	2	65	18730	7/28/2005 9:35	1575	PbCal705
Instrument 1 - A	10	2	73	20335	7/28/2005 10:06	1575	PbCal705
Instrument 1 - A	11	2	81	19694	7/28/2005 10:02	1575	PbCal705
Instrument 1 - A	12	2	89	20801	7/28/2005 9:43	1575	PbCal705
Instrument 1 - B	1	2	56	21763	7/28/2005 8:01	1575	PbCal705
Instrument 1 - B	2	2	78	22474	7/28/2005 7:55	1575	PbCal705
Instrument 1 - B	3	2	73	20359	7/28/2005 8:20	1575	PbCal705
Instrument 1 - B	4	2	58	22111	7/28/2005 8:05	1575	PbCal705
Instrument 1 - B	5	2	71	23056	7/28/2005 10:16	1575	PbCal705
Instrument 1 - B	6	2	72	22905	7/28/2005 10:09	1575	PbCal705
Instrument 1 - B	7	2	62	18664	7/28/2005 10:25	1575	PbCal705
Instrument 1 - B	8	2	56	20619	7/28/2005 10:21	1575	PbCal705
Instrument 1 - B	9	2	62	18705	7/28/2005 9:43	1575	PbCal705
Instrument 1 - B	10	2	45	19770	7/28/2005 9:35	1575	PbCal705
Instrument 1 - B	11	2	42	19125	7/28/2005 10:06	1575	PbCal705
Instrument 1 - B	12	2	56	20230	7/28/2005 10:02	1575	PbCal705
Instrument 1 - C	1	2	132	22038	7/28/2005 8:06	1575	PbCal705
Instrument 1 - C	2	2	151	22700	7/28/2005 8:01	1575	PbCal705
Instrument 1 - C	3	2	161	20552	7/28/2005 7:55	1575	PbCal705
Instrument 1 - C	4	2	179	22690	7/28/2005 8:20	1575	PbCal705
Instrument 1 - C	5	2	149	23030	7/28/2005 10:21	1575	PbCal705
Instrument 1 - C	6	2	163	22975	7/28/2005 10:16	1575	PbCal705
Instrument 1 - C	7	2	137	19131	7/28/2005 10:09	1575	PbCal705
Instrument 1 - C	8	2	136	20712	7/28/2005 10:25	1575	PbCal705
Instrument 1 - C	9	2	132	19007	7/28/2005 10:02	1575	PbCal705
Instrument 1 - C	10	2	129	20055	7/28/2005 9:43	1575	PbCal705
Instrument 1 - C	11	2	110	19004	7/28/2005 9:35	1575	PbCal705
Instrument 1 - C	12	2	125	20586	7/28/2005 10:06	1575	PbCal705
Instrument 1 - D	1	2	314	21985	7/28/2005 8:20	1575	PbCal705
Instrument 1 - D	2	2	339	22577	7/28/2005 8:06	1575	PbCal705
Instrument 1 - D	3	2	302	20759	7/28/2005 8:01	1575	PbCal705
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Instrument 1 - D	6	2	273	22954	7/28/2005 10:21	1575	PbCal705
Instrument 1 - D	7	2	234	19018	7/28/2005 10:16	1575	PbCal705
Instrument 1 - D	8	2	275	20545	7/28/2005 10:09	1575	PbCal705
Instrument 1 - D	9	2	253	18798	7/28/2005 10:06	1575	PbCal705
Instrument 1 - D	10	2	272	20117	7/28/2005 10:02	1575	PbCal705
Instrument 1 - D	11	2	259	19117	7/28/2005 9:43	1575	PbCal705
Instrument 1 - D	12	2	229	20856	7/28/2005 9:35	1575	PbCal705
Instrument 2 - A	1	2	225	21853	7/28/2005 8:42	1575	PbCal705
Instrument 2 - A	2	2	264	22781	7/28/2005 9:21	1575	PbCal705
Instrument 2 - A	3	2	246	20682	7/28/2005 8:52	1575	PbCal705

Instrument 2 - A	4	2	230	22878	7/28/2005 8:49	1575	PbCal705
Instrument 2 - A	5	2	266	23137	7/28/2005 7:55	1575	PbCal705
Instrument 2 - A	6	2	231	23217	7/28/2005 8:20	1575	PbCal705
Instrument 2 - A	7	2	172	19166	7/28/2005 8:06	1575	PbCal705
Instrument 2 - A	8	2	193	20672	7/28/2005 8:01	1575	PbCal705
Instrument 2 - A	9	2	201	19025	7/28/2005 10:09	1575	PbCal705
Instrument 2 - A	10	2	188	20237	7/28/2005 10:25	1575	PbCal705
Instrument 2 - A	11	2	194	19477	7/28/2005 10:21	1575	PbCal705
Instrument 2 - A	12	2	193	20724	7/28/2005 10:17	1575	PbCal705
Instrument 2 - B	1	2	9	22048	7/28/2005 8:49	1575	PbCal705
Instrument 2 - B	2	2	15	23045	7/28/2005 8:42	1575	PbCal705
Instrument 2 - B	3	2	16	20750	7/28/2005 9:21	1575	PbCal705
Instrument 2 - B	4	2	9	22958	7/28/2005 8:52	1575	PbCal705
Instrument 2 - B	5	2	12	23347	7/28/2005 8:01	1575	PbCal705
Instrument 2 - B	6	2	12	22888	7/28/2005 7:55	1575	PbCal705
Instrument 2 - B	7	2	12	19018	7/28/2005 8:20	1575	PbCal705
Instrument 2 - B	8	2	9	20774	7/28/2005 8:06	1575	PbCal705
Instrument 2 - B	9	2	12	18915	7/28/2005 10:17	1575	PbCal705
Instrument 2 - B	10	2	10	20157	7/28/2005 10:10	1575	PbCal705
Instrument 2 - B	11	2	14	19263	7/28/2005 10:25	1575	PbCal705
Instrument 2 - B	12	2	8	20483	7/28/2005 10:21	1575	PbCal705
Instrument 2 - C	1	2	280	21996	7/28/2005 8:52	1575	PbCal705
Instrument 2 - C	2	2	292	22508	7/28/2005 8:49	1575	PbCal705
Instrument 2 - C	3	2	244	20689	7/28/2005 8:42	1575	PbCal705
Instrument 2 - C	4	2	283	22518	7/28/2005 9:21	1575	PbCal705
Instrument 2 - C	5	2	264	23133	7/28/2005 8:06	1575	PbCal705
Instrument 2 - C	6	2	268	22568	7/28/2005 8:01	1575	PbCal705
Instrument 2 - C	7	2	240	18943	7/28/2005 7:55	1575	PbCal705
Instrument 2 - C	8	2	239	20584	7/28/2005 8:20	1575	PbCal705
Instrument 2 - C	9	2	222	18740	7/28/2005 10:21	1575	PbCal705
Instrument 2 - C	10	2	222	19943	7/28/2005 10:17	1575	PbCal705
Instrument 2 - C	11	2	221	19199	7/28/2005 10:10	1575	PbCal705
Instrument 2 - C	12	2	234	20523	7/28/2005 10:25	1575	PbCal705
Instrument 2 - D	1	2	280	22194	7/28/2005 9:21	1575	PbCal705
Instrument 2 - D	2	2	338	23021	7/28/2005 8:53	1575	PbCal705
Instrument 2 - D	3	2	288	20861	7/28/2005 8:49	1575	PbCal705
Instrument 2 - D	4	2	282	22714	7/28/2005 8:42	1575	PbCal705
Instrument 2 - D	5	2	254	23276	7/28/2005 8:20	1575	PbCal705
Instrument 2 - D	6	2	282	23097	7/28/2005 8:06	1575	PbCal705
Instrument 2 - D	7	2	232	19264	7/28/2005 8:02	1575	PbCal705
Instrument 2 - D	8	2	274	21105	7/28/2005 7:55	1575	PbCal705
Instrument 2 - D	9	2	221	19341	7/28/2005 10:25	1575	PbCal705
Instrument 2 - D	10	2	250	20334	7/28/2005 10:21	1575	PbCal705
Instrument 2 - D	11	2	210	19513	7/28/2005 10:17	1575	PbCal705
Instrument 2 - D	12	2	241	20672	7/28/2005 10:10	1575	PbCal705
Instrument 3 - A	1	2	151	21669	7/28/2005 9:34	1575	PbCal705
Instrument 3 - A	2	2	140	21967	7/28/2005 10:05	1575	PbCal705
Instrument 3 - A	3	2	151	20088	7/28/2005 10:01	1575	PbCal705
Instrument 3 - A	4	2	162	21796	7/28/2005 9:42	1575	PbCal705
Instrument 3 - A	5	2	165	22294	7/28/2005 8:42	1575	PbCal705
Instrument 3 - A	6	2	180	22353	7/28/2005 9:21	1575	PbCal705
Instrument 3 - A	7	2	95	18346	7/28/2005 8:53	1575	PbCal705

*M 7/29/05*

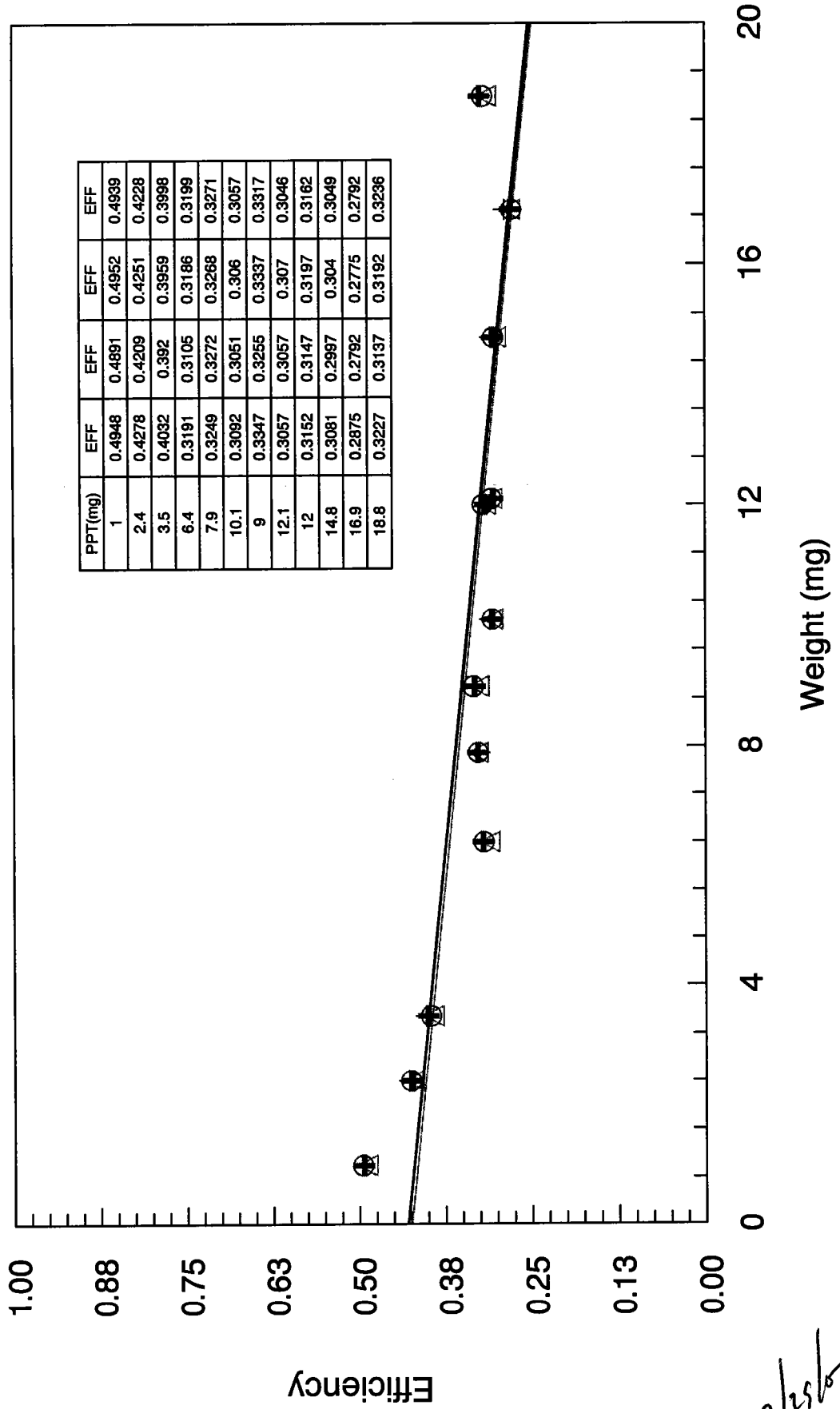
Instrument 3 - A	8	2	136	19841	7/28/2005 8:49	1575	PbCal705
Instrument 3 - A	9	2	104	18127	7/28/2005 7:56	1575	PbCal705
Instrument 3 - A	10	2	176	19341	7/28/2005 8:20	1575	PbCal705
Instrument 3 - A	11	2	120	18537	7/28/2005 8:06	1575	PbCal705
Instrument 3 - A	12	2	142	20233	7/28/2005 8:02	1575	PbCal705
Instrument 3 - B	1	2	236	21613	7/28/2005 9:42	1575	PbCal705
Instrument 3 - B	2	2	219	22011	7/28/2005 9:34	1575	PbCal705
Instrument 3 - B	3	2	220	20493	7/28/2005 10:05	1575	PbCal705
Instrument 3 - B	4	2	235	22109	7/28/2005 10:01	1575	PbCal705
Instrument 3 - B	5	2	244	22536	7/28/2005 8:49	1575	PbCal705
Instrument 3 - B	6	2	221	22658	7/28/2005 8:42	1575	PbCal705
Instrument 3 - B	7	2	207	18626	7/28/2005 9:21	1575	PbCal705
Instrument 3 - B	8	2	216	20102	7/28/2005 8:53	1575	PbCal705
Instrument 3 - B	9	2	188	18433	7/28/2005 8:02	1575	PbCal705
Instrument 3 - B	10	2	228	19517	7/28/2005 7:56	1575	PbCal705
Instrument 3 - B	11	2	189	19126	7/28/2005 8:20	1575	PbCal705
Instrument 3 - B	12	2	205	20505	7/28/2005 8:06	1575	PbCal705
Instrument 3 - C	1	2	322	21556	7/28/2005 10:01	1575	PbCal705
Instrument 3 - C	2	2	360	22173	7/28/2005 9:43	1575	PbCal705
Instrument 3 - C	3	2	329	20388	7/28/2005 9:34	1575	PbCal705
Instrument 3 - C	4	2	326	22168	7/28/2005 10:05	1575	PbCal705
Instrument 3 - C	5	2	338	23046	7/28/2005 8:53	1575	PbCal705
Instrument 3 - C	6	2	378	22957	7/28/2005 8:49	1575	PbCal705
Instrument 3 - C	7	2	283	18866	7/28/2005 8:42	1575	PbCal705
Instrument 3 - C	8	2	308	20233	7/28/2005 9:21	1575	PbCal705
Instrument 3 - C	9	2	291	18650	7/28/2005 8:06	1575	PbCal705
Instrument 3 - C	10	2	305	19515	7/28/2005 8:02	1575	PbCal705
Instrument 3 - C	11	2	290	19302	7/28/2005 7:56	1575	PbCal705
Instrument 3 - C	12	2	318	20119	7/28/2005 8:20	1575	PbCal705
Instrument 3 - D	1	2	244	21693	7/28/2005 10:05	1575	PbCal705
Instrument 3 - D	2	2	239	22623	7/28/2005 10:01	1575	PbCal705
Instrument 3 - D	3	2	241	20563	7/28/2005 9:43	1575	PbCal705
Instrument 3 - D	4	2	244	22484	7/28/2005 9:34	1575	PbCal705
Instrument 3 - D	5	2	258	23049	7/28/2005 9:21	1575	PbCal705
Instrument 3 - D	6	2	262	22650	7/28/2005 8:53	1575	PbCal705
Instrument 3 - D	7	2	196	19014	7/28/2005 8:50	1575	PbCal705
Instrument 3 - D	8	2	234	20041	7/28/2005 8:42	1575	PbCal705
Instrument 3 - D	9	2	213	18822	7/28/2005 8:20	1575	PbCal705
Instrument 3 - D	10	2	239	19800	7/28/2005 8:06	1575	PbCal705
Instrument 3 - D	11	2	221	18990	7/28/2005 8:02	1575	PbCal705
Instrument 3 - D	12	2	234	20049	7/28/2005 7:56	1575	PbCal705
Instrument 4 - A	1	2	179	22048	7/28/2005 10:09	1575	PbCal705
Instrument 4 - A	2	2	167	22217	7/28/2005 10:24	1575	PbCal705
Instrument 4 - A	3	2	149	20830	7/28/2005 10:20	1575	PbCal705
Instrument 4 - A	4	2	133	22551	7/28/2005 10:16	1575	PbCal705
Instrument 4 - A	5	2	137	23240	7/28/2005 9:34	1575	PbCal705
Instrument 4 - A	6	2	164	22718	7/28/2005 10:05	1575	PbCal705
Instrument 4 - A	7	2	130	19096	7/28/2005 10:01	1575	PbCal705
Instrument 4 - A	8	2	139	20375	7/28/2005 9:43	1575	PbCal705
Instrument 4 - A	9	2	126	18833	7/28/2005 8:42	1575	PbCal705
Instrument 4 - A	10	2	128	20217	7/28/2005 9:21	1575	PbCal705
Instrument 4 - A	11	2	149	19209	7/28/2005 8:53	1575	PbCal705

Instrument 4 - A	12	2	141	20634	7/28/2005 8:50	1575	PbCal705
Instrument 4 - B	1	2	19	22035	7/28/2005 10:16	1575	PbCal705
Instrument 4 - B	2	2	17	22750	7/28/2005 10:09	1575	PbCal705
Instrument 4 - B	3	2	21	21081	7/28/2005 10:24	1575	PbCal705
Instrument 4 - B	4	2	19	22859	7/28/2005 10:20	1575	PbCal705
Instrument 4 - B	5	2	19	23403	7/28/2005 9:43	1575	PbCal705
Instrument 4 - B	6	2	24	23177	7/28/2005 9:34	1575	PbCal705
Instrument 4 - B	7	2	13	19259	7/28/2005 10:05	1575	PbCal705
Instrument 4 - B	8	2	16	20883	7/28/2005 10:01	1575	PbCal705
Instrument 4 - B	9	2	12	19153	7/28/2005 8:50	1575	PbCal705
Instrument 4 - B	10	2	15	20262	7/28/2005 8:42	1575	PbCal705
Instrument 4 - B	11	2	23	19727	7/28/2005 9:21	1575	PbCal705
Instrument 4 - B	12	2	23	20878	7/28/2005 8:53	1575	PbCal705
Instrument 4 - C	1	2	249	22116	7/28/2005 10:20	1575	PbCal705
Instrument 4 - C	2	2	278	22252	7/28/2005 10:16	1575	PbCal705
Instrument 4 - C	3	2	254	20864	7/28/2005 10:09	1575	PbCal705
Instrument 4 - C	4	2	272	22535	7/28/2005 10:24	1575	PbCal705
Instrument 4 - C	5	2	272	23428	7/28/2005 10:02	1575	PbCal705
Instrument 4 - C	6	2	262	23097	7/28/2005 9:43	1575	PbCal705
Instrument 4 - C	7	2	208	19113	7/28/2005 9:35	1575	PbCal705
Instrument 4 - C	8	2	217	20633	7/28/2005 10:05	1575	PbCal705
Instrument 4 - C	9	2	233	18843	7/28/2005 8:53	1575	PbCal705
Instrument 4 - C	10	2	209	20281	7/28/2005 8:50	1575	PbCal705
Instrument 4 - C	11	2	244	19412	7/28/2005 8:43	1575	PbCal705
Instrument 4 - C	12	2	239	20691	7/28/2005 9:21	1575	PbCal705
Instrument 4 - D	1	2	522	21545	7/28/2005 10:25	1575	PbCal705
Instrument 4 - D	2	2	521	22295	7/28/2005 10:20	1575	PbCal705
Instrument 4 - D	3	2	520	20598	7/28/2005 10:16	1575	PbCal705
Instrument 4 - D	4	2	528	22522	7/28/2005 10:09	1575	PbCal705
Instrument 4 - D	5	2	519	23125	7/28/2005 10:05	1575	PbCal705
Instrument 4 - D	6	2	539	23225	7/28/2005 10:02	1575	PbCal705
Instrument 4 - D	7	2	422	18621	7/28/2005 9:43	1575	PbCal705
Instrument 4 - D	8	2	490	20410	7/28/2005 9:35	1575	PbCal705
Instrument 4 - D	9	2	450	18857	7/28/2005 9:21	1575	PbCal705
Instrument 4 - D	10	2	477	20057	7/28/2005 8:53	1575	PbCal705
Instrument 4 - D	11	2	424	19123	7/28/2005 8:50	1575	PbCal705
Instrument 4 - D	12	2	484	20501	7/28/2005 8:43	1575	PbCal705

# Pb-210 Efficiency Curve 7/05

## Instrument 1

+ 1-A    Δ 1-B    ○ 1-C    + 1-D

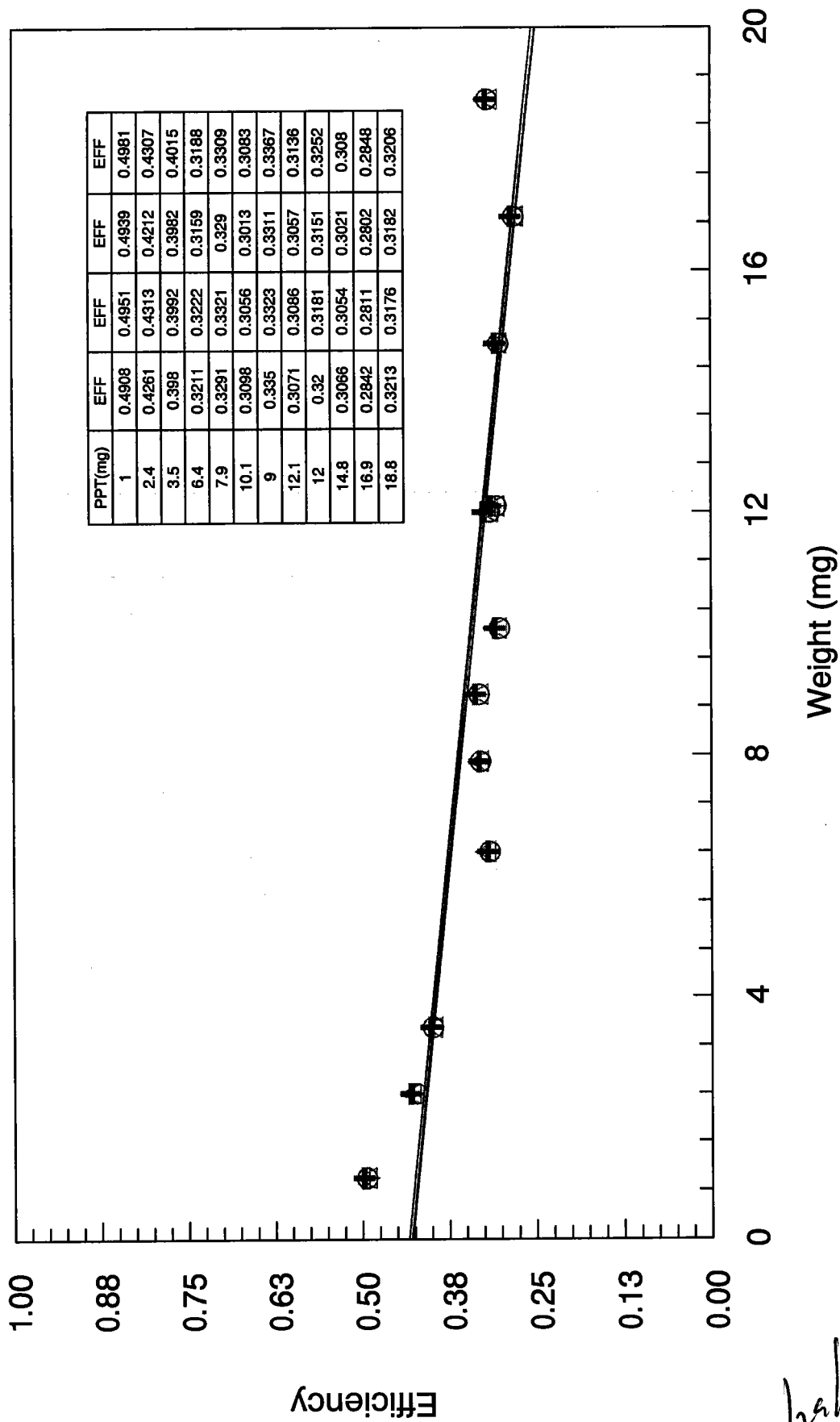


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# Pb-210 Efficiency Curve 7/05

## Instrument 2

+ 2-A    Δ 2-B    ○ 2-C    + 2-D

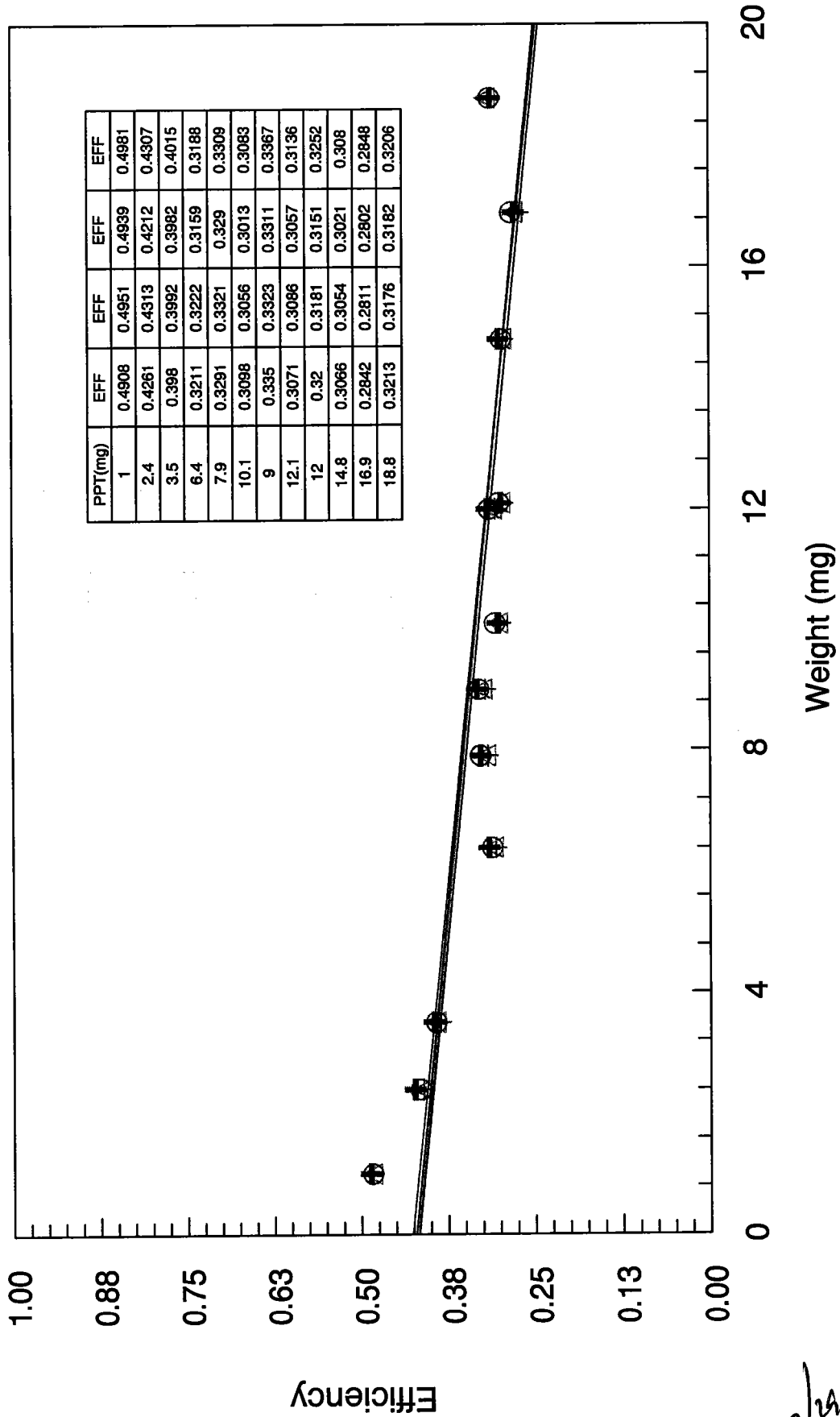


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# Pb-210 Efficiency Curve 7/05

## Instrument 3

+ 3-A    Δ 3-B    ○ 3-C    + 3-D



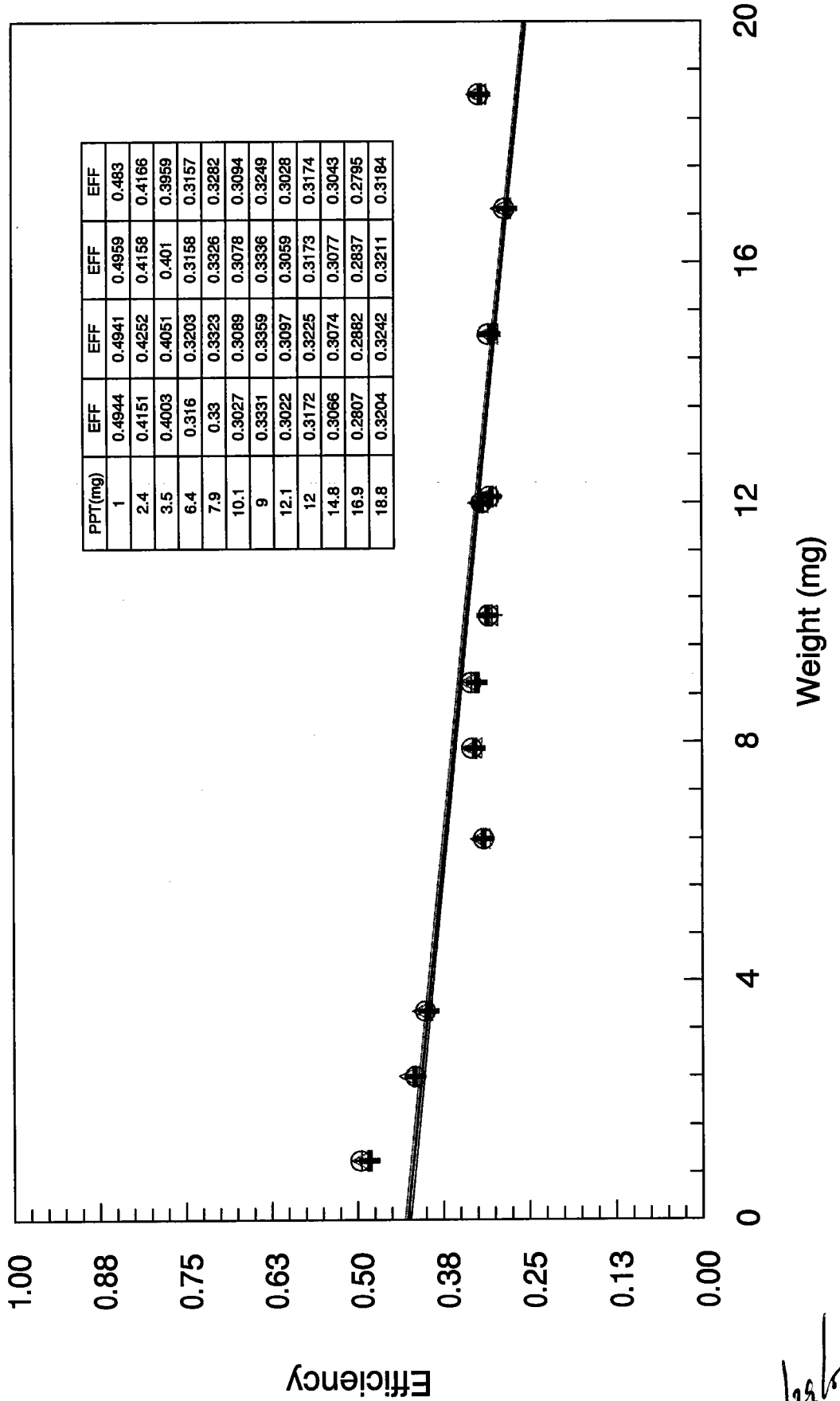
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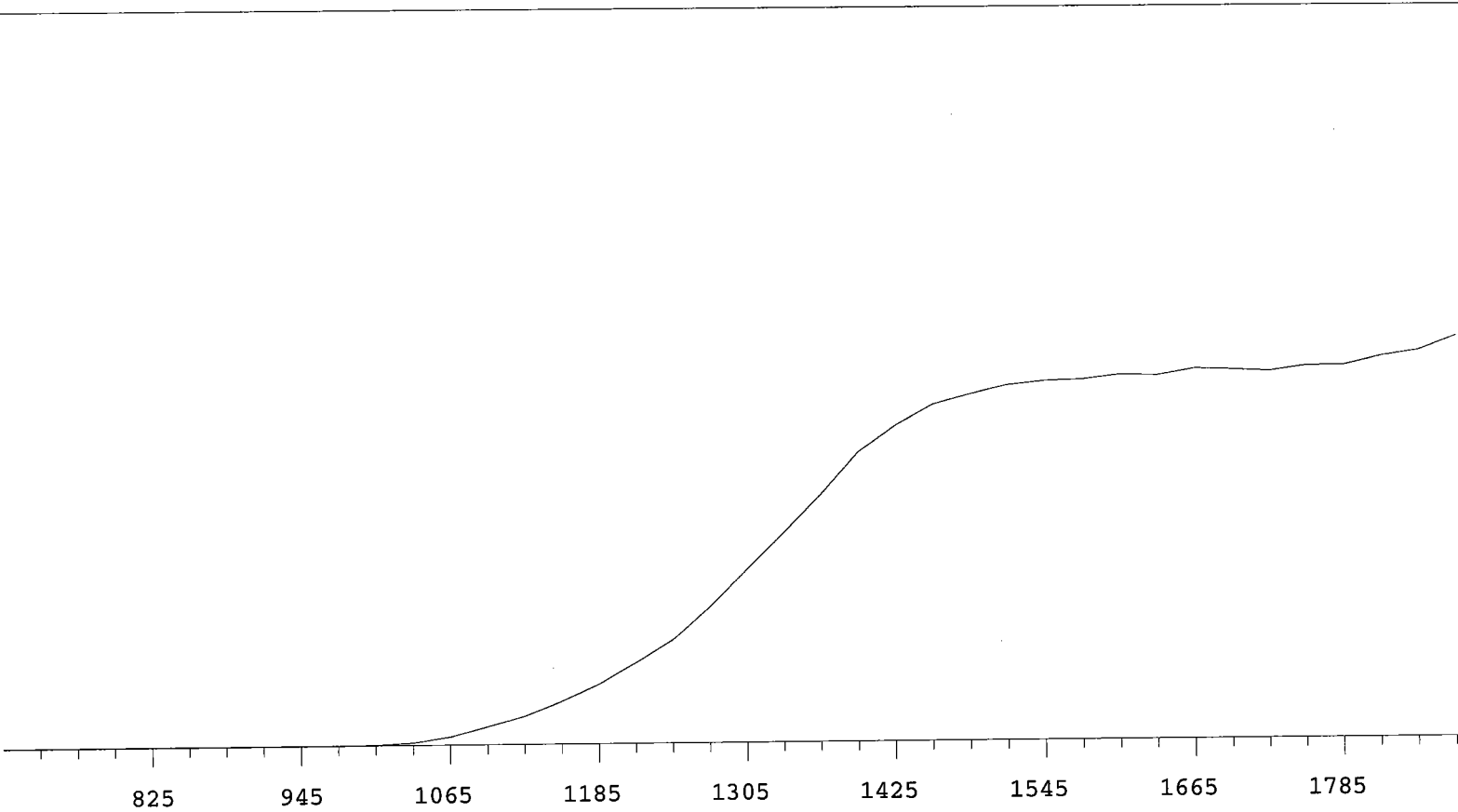
# Pb-210 Efficiency Curve 7/05

## Instrument 4

+ 4-A    Δ 4-B    ○ 4-C    + 4-D

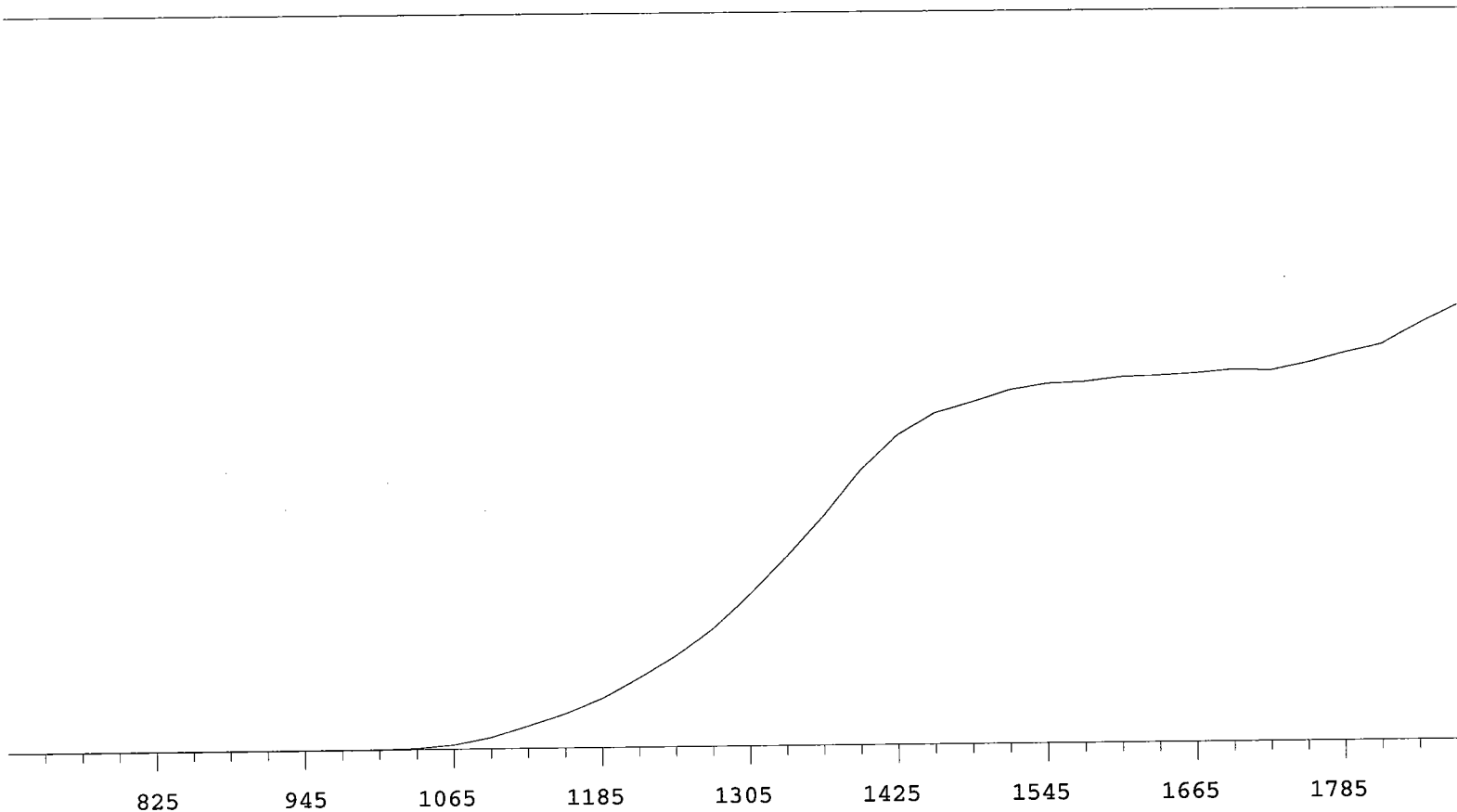


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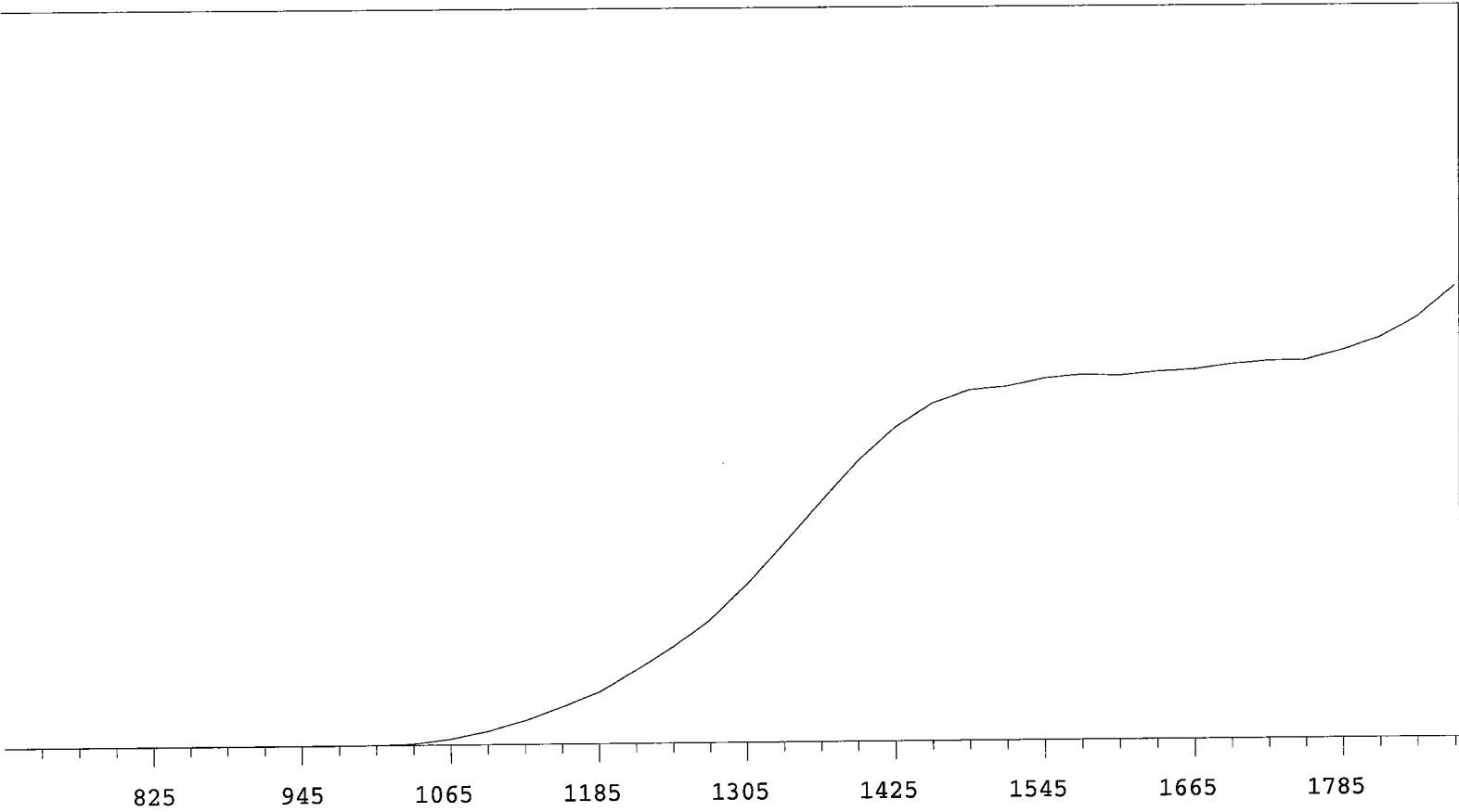
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	3		1305	16206	+70.03
735	1		1335	19739	+60.77
765	1	-18.52	1365	23317	+49.57
795	2	>100	1395	27238	+38.47
825	2	+76.92	1425	29745	+26.87
855	6	+0.00	1455	31733	+16.81
885	2	+0.00	1485	32738	+10.51
915	2	+0.00	1515	33561	+5.83
945	4	>100	1545	33929	+3.90
975	5	>100	1575	34042	+2.13
1005	45	>100	1605	34473	+2.40
1035	260	>100	1635	34376	+2.14
1065	800	>100	1665	34998	+0.99
1095	1706	>100	1695	34891	+1.35
1125	2681	>100	1725	34732	+0.78
1155	4043	>100	1755	35214	+2.68
1185	5606	+98.69	1785	35247	+4.20
1215	7546	+90.11	1815	36051	+6.12
1245	9680	+84.91	1845	36556	
1275	12706	+78.21	1875	37879	

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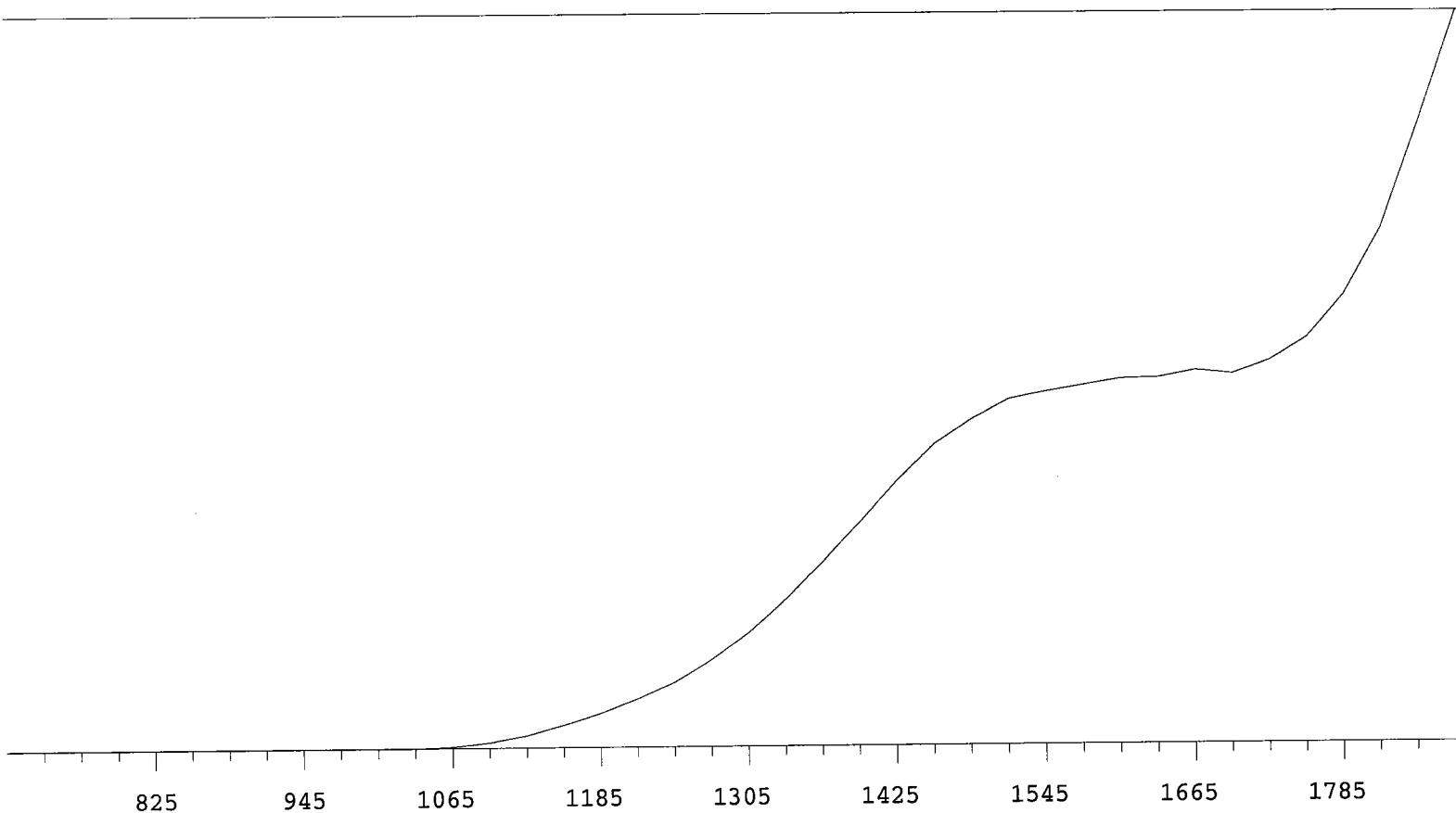
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	16022	+74.49
735	2		1335	19934	+67.06
765	3	+33.33	1365	24065	+57.27
795	2	-15.15	1395	28750	+45.17
825	2	-30.30	1425	32437	+31.43
855	2	+0.00	1455	34703	+19.63
885	2	+55.56	1485	35773	+11.94
915	2	+71.43	1515	37013	+7.34
945	4	>100	1545	37643	+5.08
975	4	>100	1575	37795	+2.85
1005	7	>100	1605	38223	+2.11
1035	115	>100	1635	38341	+2.22
1065	458	>100	1665	38578	+1.47
1095	1190	>100	1695	38896	+2.28
1125	2315	>100	1725	38794	+3.94
1155	3550	>100	1755	39562	+5.68
1185	5136	>100	1785	40569	+9.25
1215	7197	+97.45	1815	41402	+11.70
1245	9511	+89.47	1845	43531	
1275	12416	+81.91	1875	45470	

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VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16230	+74.23
735	0		1335	20402	+66.21
765	0		1365	24668	+55.06
795	1	>100	1395	28808	+42.90
825	0	>100	1425	32235	+30.71
855	2	+95.24	1455	34745	+19.08
885	2	>100	1485	36123	+11.26
915	2	+64.10	1515	36502	+6.50
945	3	>100	1545	37333	+3.68
975	4	>100	1575	37699	+2.82
1005	17	>100	1605	37570	+1.69
1035	154	>100	1635	37966	+2.25
1065	602	>100	1665	38158	+3.13
1095	1390	>100	1695	38687	+2.67
1125	2520	>100	1725	39009	+3.61
1155	3909	>100	1755	39083	+5.36
1185	5395	>100	1785	40069	+9.12
1215	7579	+92.75	1815	41344	+14.50
1245	9892	+86.09	1845	43429	
1275	12623	+79.89	1875	46557	

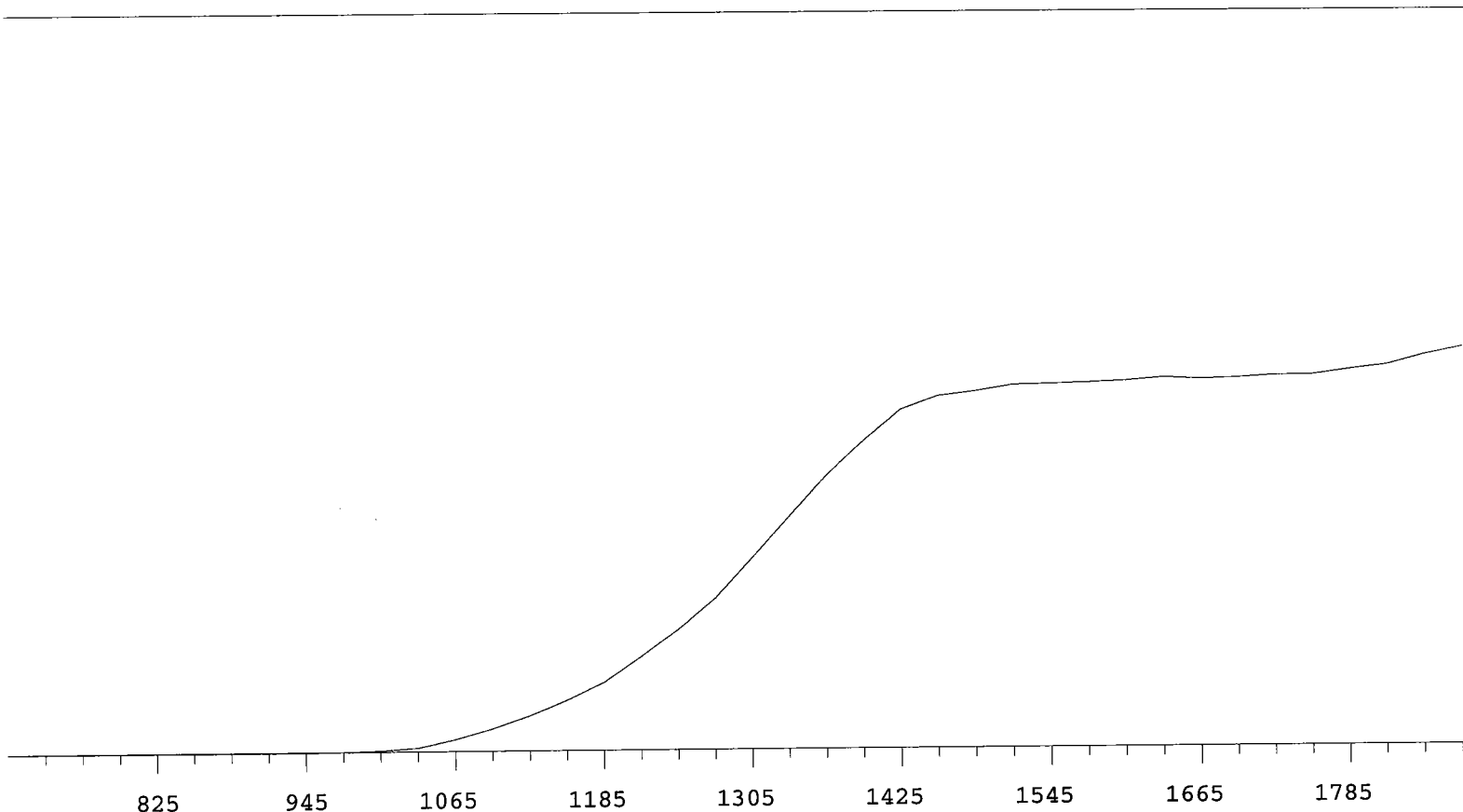
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VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	2	+0.00
795	1	-66.67
825	0	>100
855	1	+0.00
885	0	+0.00
915	1	+83.33
945	0	>100
975	2	>100
1005	1	>100
1035	13	>100
1065	134	>100
1095	511	>100
1125	1129	>100
1155	2134	>100
1185	3197	>100
1215	4542	>100
1245	6086	+97.20
1275	8291	+90.92

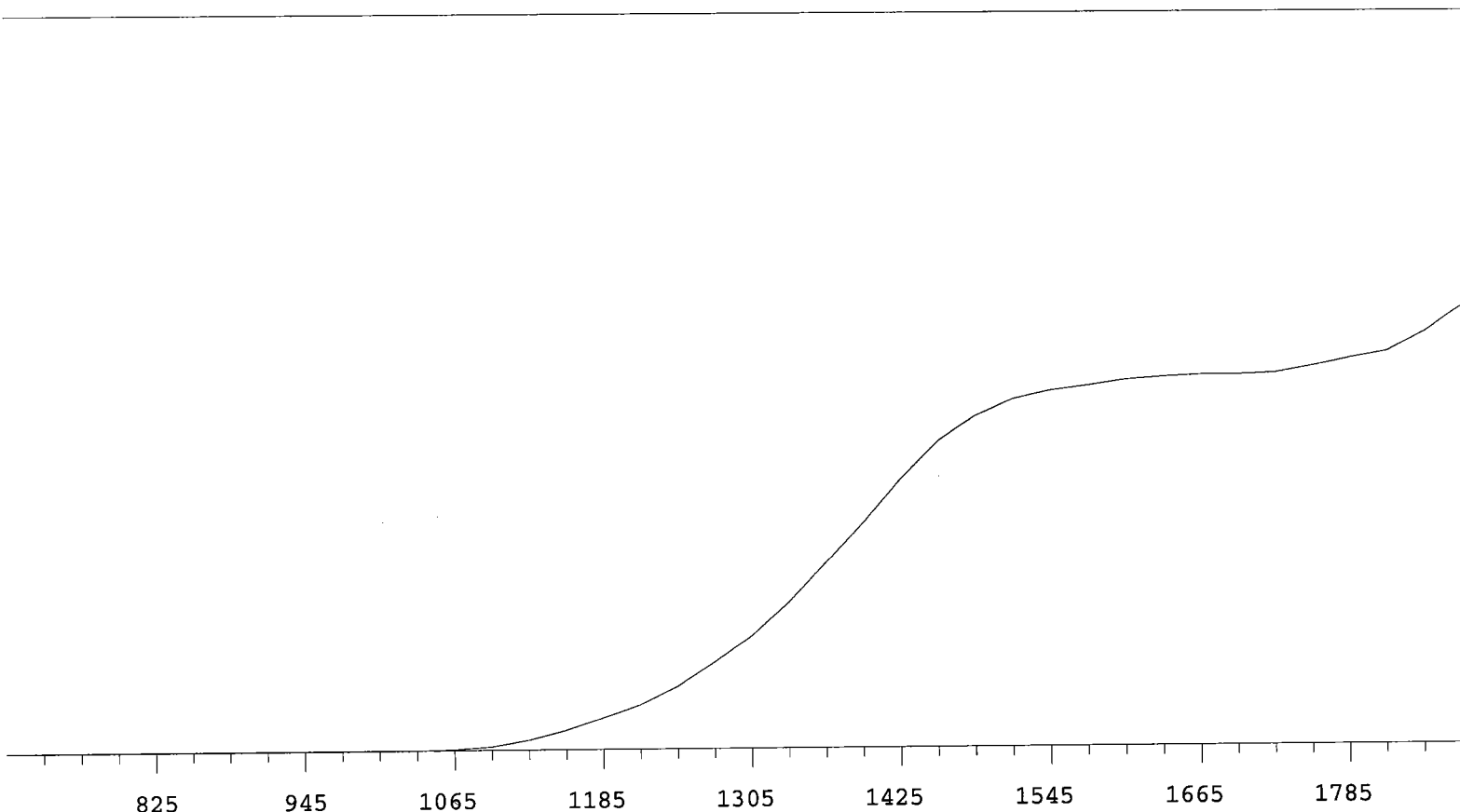
VOLTS	COUNTS	%/100 Volts
1305	10971	+84.34
1335	14097	+75.14
1365	17622	+66.59
1395	21247	+57.12
1425	25202	+45.74
1455	28604	+34.50
1485	30899	+22.78
1515	32756	+13.99
1545	33437	+8.81
1575	34038	+5.07
1605	34638	+4.42
1635	34735	+2.60
1665	35372	+3.37
1695	35026	+7.70
1725	36274	+15.84
1755	38436	+28.19
1785	42586	+41.27
1815	48885	+52.29
1845	58919	
1875	71030	

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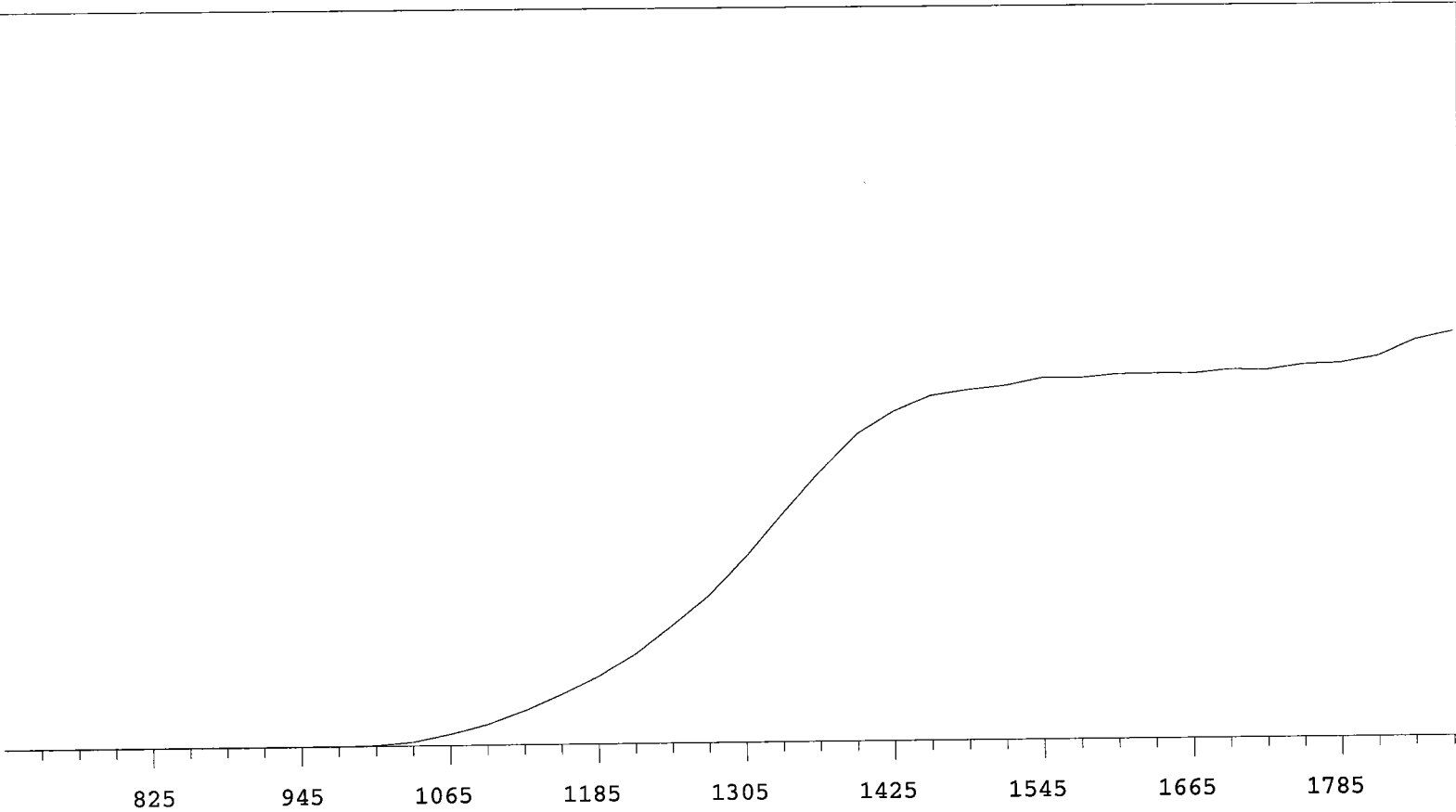
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	22314	+66.02
735	0		1335	27016	+56.65
765	0		1365	31730	+46.09
795	0	>100	1395	35861	+34.20
825	0	>100	1425	39521	+21.96
855	0	>100	1455	41096	+12.55
885	4	+33.33	1485	41618	+5.70
915	1	>100	1515	42360	+2.97
945	0	>100	1545	42428	+1.93
975	25	>100	1575	42562	+1.42
1005	123	>100	1605	42743	+1.15
1035	462	>100	1635	43108	+0.84
1065	1382	>100	1665	42891	+0.79
1095	2620	>100	1695	43031	+0.67
1125	4094	>100	1725	43288	+1.82
1155	5833	>100	1755	43345	+2.62
1185	7915	+97.20	1785	43916	+4.27
1215	10844	+88.32	1815	44430	+5.91
1245	14050	+81.59	1845	45569	
1275	17692	+73.63	1875	46488	

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VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	11504	+85.43
735	1		1335	14849	+76.81
765	2	+66.67	1365	18861	+68.80
795	1	-27.78	1395	22846	+58.63
825	1	+0.00	1425	27157	+46.27
855	1	>100	1455	30851	+34.04
885	2	+74.07	1485	33326	+22.12
915	3	+0.00	1515	34995	+13.15
945	2	+51.28	1545	35846	+7.97
975	1	>100	1575	36351	+4.94
1005	5	>100	1605	36888	+3.44
1035	11	>100	1635	37159	+2.18
1065	76	>100	1665	37334	+1.21
1095	354	>100	1695	37337	+1.96
1125	989	>100	1725	37477	+3.64
1155	1937	>100	1755	38192	+5.29
1185	3197	>100	1785	38972	+8.13
1215	4514	>100	1815	39629	+11.94
1245	6395	>100	1845	41535	
1275	8812	+93.25	1875	44161	

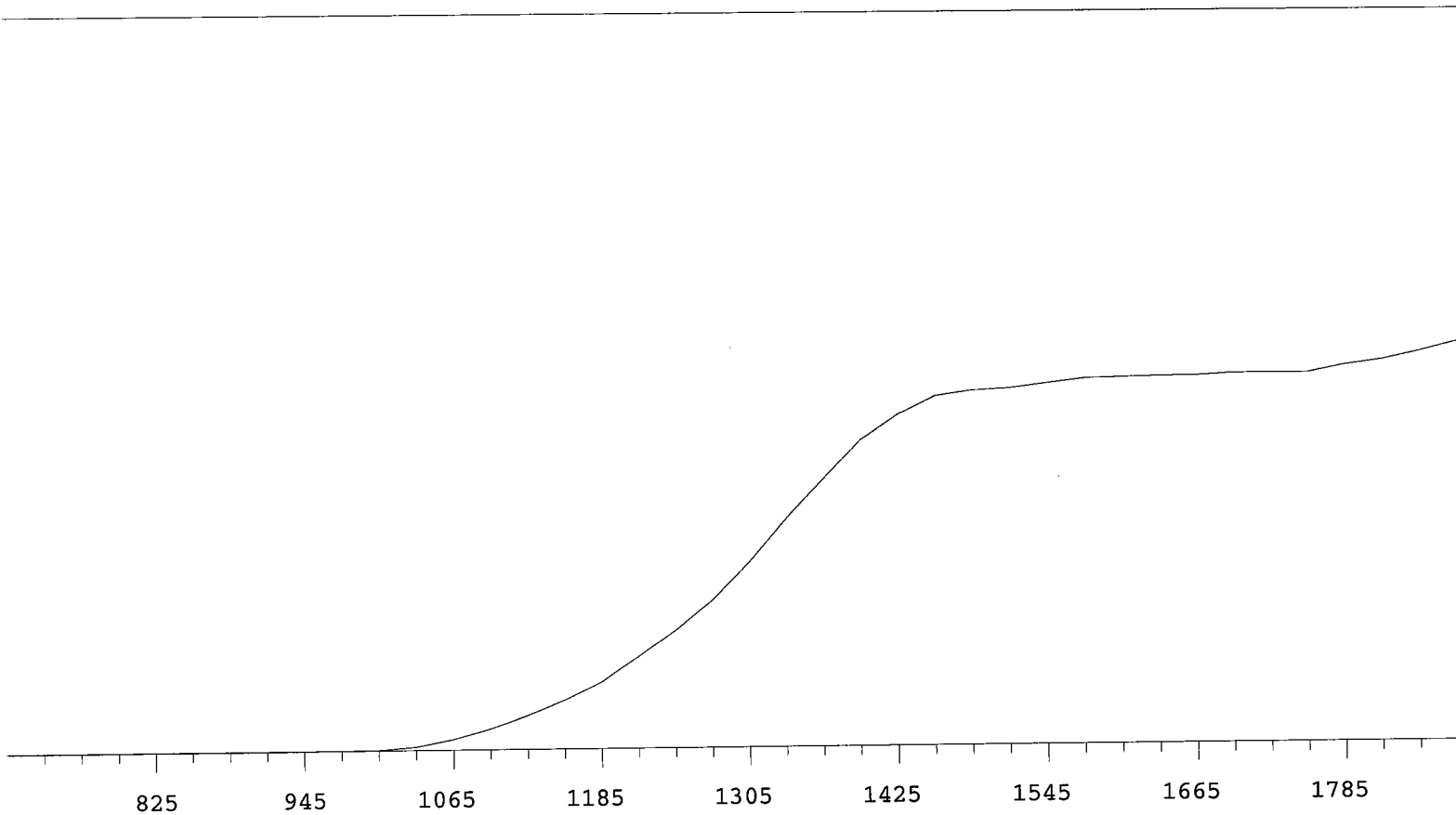
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VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	2		1305	16352	+67.34
735	6		1335	20077	+59.09
765	3	-20.83	1365	23789	+46.51
795	2	-58.82	1395	27076	+33.20
825	3	-41.67	1425	29091	+20.71
855	3	-66.67	1455	30421	+11.33
885	1	-30.30	1485	30894	+6.95
915	1	>100	1515	31231	+4.14
945	3	>100	1545	31889	+3.39
975	9	>100	1575	31864	+2.37
1005	87	>100	1605	32186	+0.96
1035	349	>100	1635	32217	+1.30
1065	1009	>100	1665	32174	+0.81
1095	1793	>100	1695	32499	+1.72
1125	2982	>100	1725	32437	+2.17
1155	4367	>100	1755	32922	+2.82
1185	5942	+97.04	1785	33023	+5.92
1215	7886	+87.16	1815	33599	+7.59
1245	10422	+80.66	1845	35066	
1275	13013	+74.57	1875	35778	

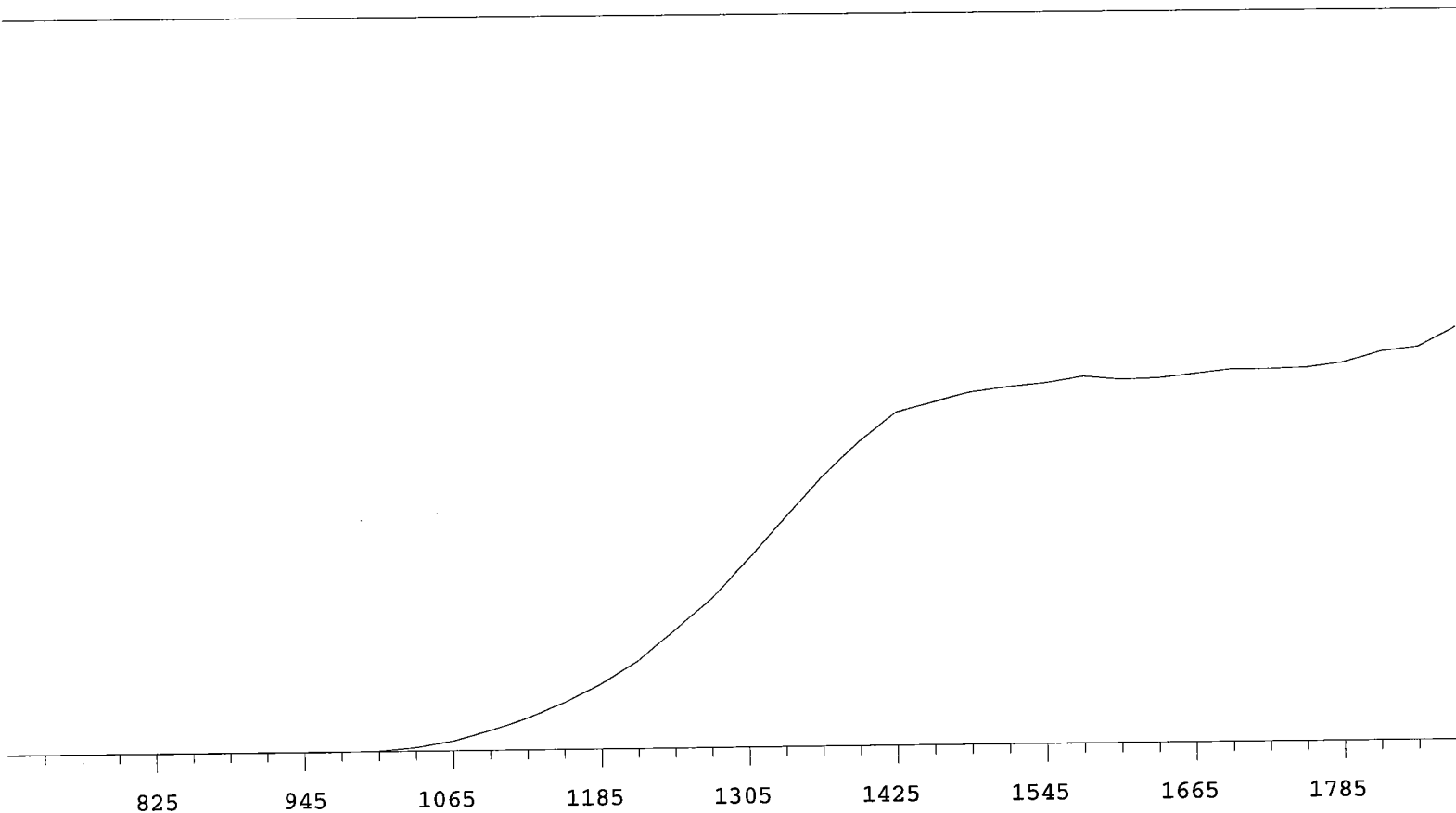
*pm 7/29/05*





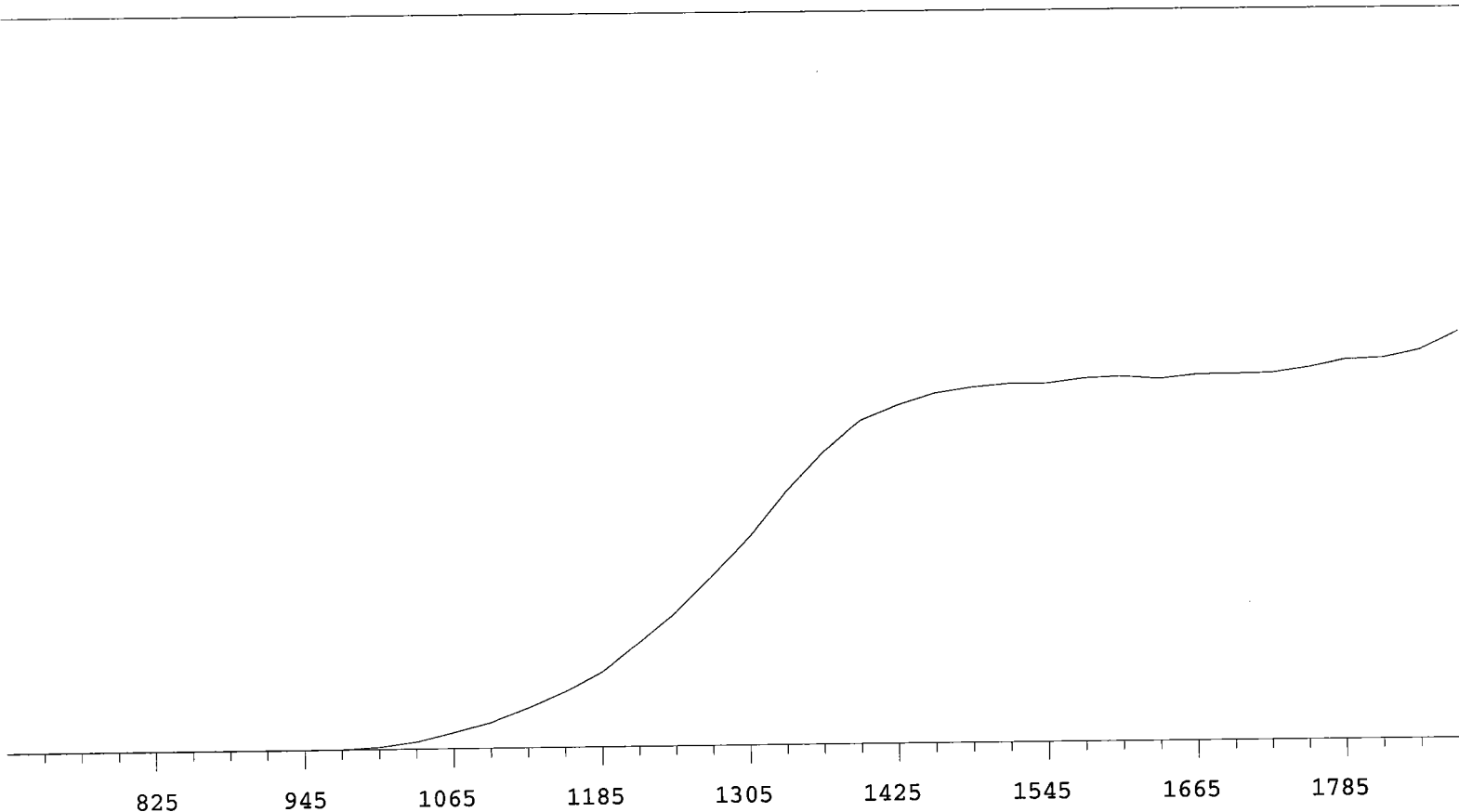
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	3		1305	22754	+66.54
735	1		1335	27979	+58.16
765	3	-55.56	1365	32713	+46.35
795	0	-23.81	1395	37461	+34.14
825	2	>100	1425	40450	+22.38
855	1	>100	1455	42675	+12.11
885	0	+66.67	1485	43308	+6.46
915	5	>100	1515	43568	+3.76
945	2	>100	1545	44157	+3.14
975	19	>100	1575	44714	+2.51
1005	86	>100	1605	44814	+1.32
1035	451	>100	1635	44910	+0.82
1065	1295	>100	1665	44945	+0.82
1095	2525	>100	1695	45204	+0.66
1125	4114	>100	1725	45222	+1.70
1155	5953	>100	1755	45215	+2.80
1185	8113	+98.45	1785	46095	+4.67
1215	11136	+88.70	1815	46688	+6.29
1245	14448	+81.12	1845	47723	
1275	18173	+74.07	1875	48829	

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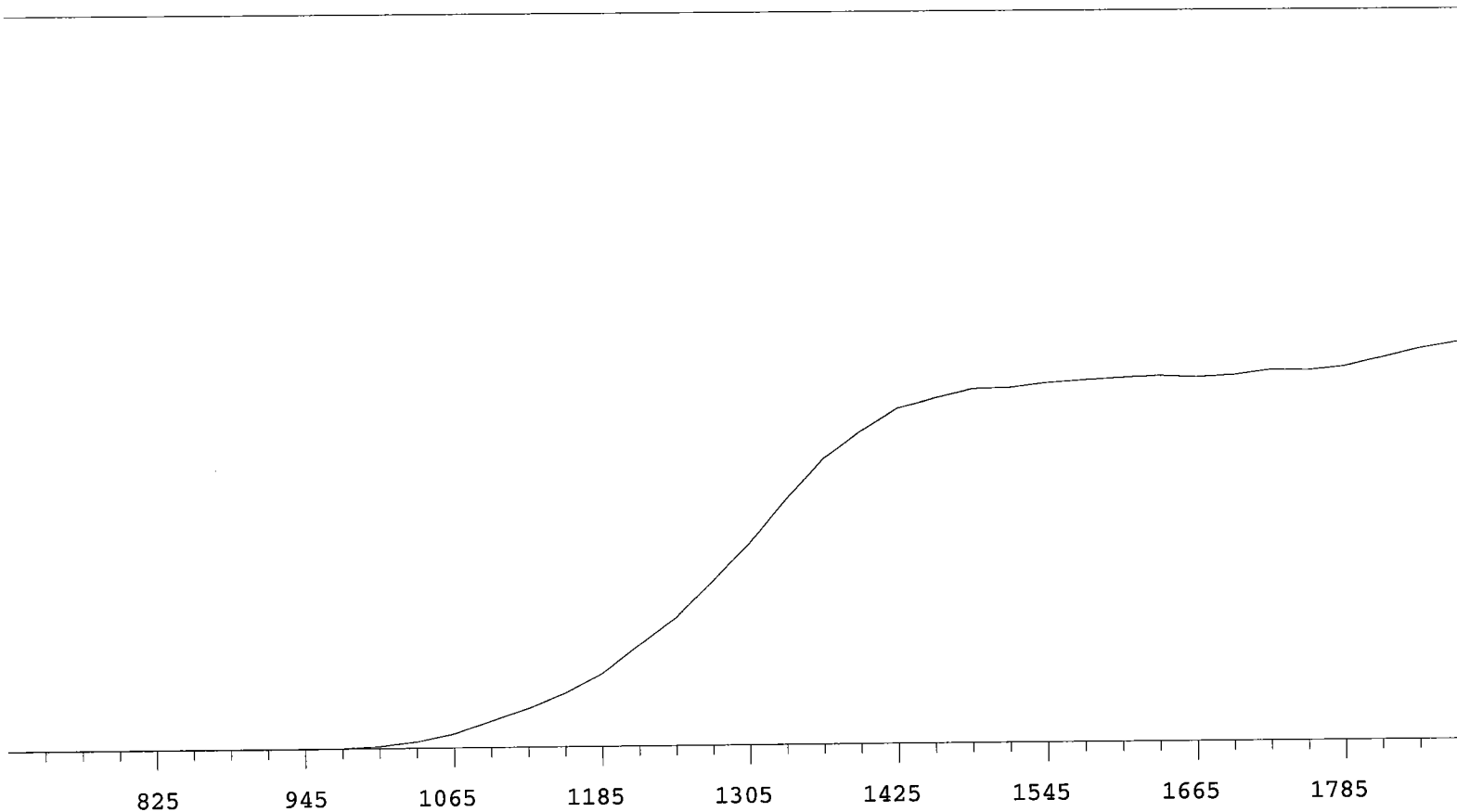
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	4		1305	19958	+67.03
735	4		1335	24246	+57.28
765	0		1365	28539	+46.21
795	0	+18.52	1395	32266	+33.26
825	1	>100	1425	35414	+21.60
855	4	+100.00	1455	36466	+12.52
885	3	-30.30	1485	37462	+6.66
915	2	+20.83	1515	37985	+5.29
945	1	>100	1545	38363	+3.02
975	6	>100	1575	39020	+1.64
1005	71	>100	1605	38677	+1.19
1035	402	>100	1635	38778	+1.48
1065	1048	>100	1665	39179	+2.33
1095	2130	>100	1695	39636	+2.03
1125	3384	>100	1725	39616	+1.90
1155	4976	>100	1755	39758	+3.40
1185	6855	>100	1785	40252	+4.91
1215	9208	+92.12	1815	41367	+7.87
1245	12454	+85.04	1845	41801	
1275	15798	+76.70	1875	43872	

*msk*



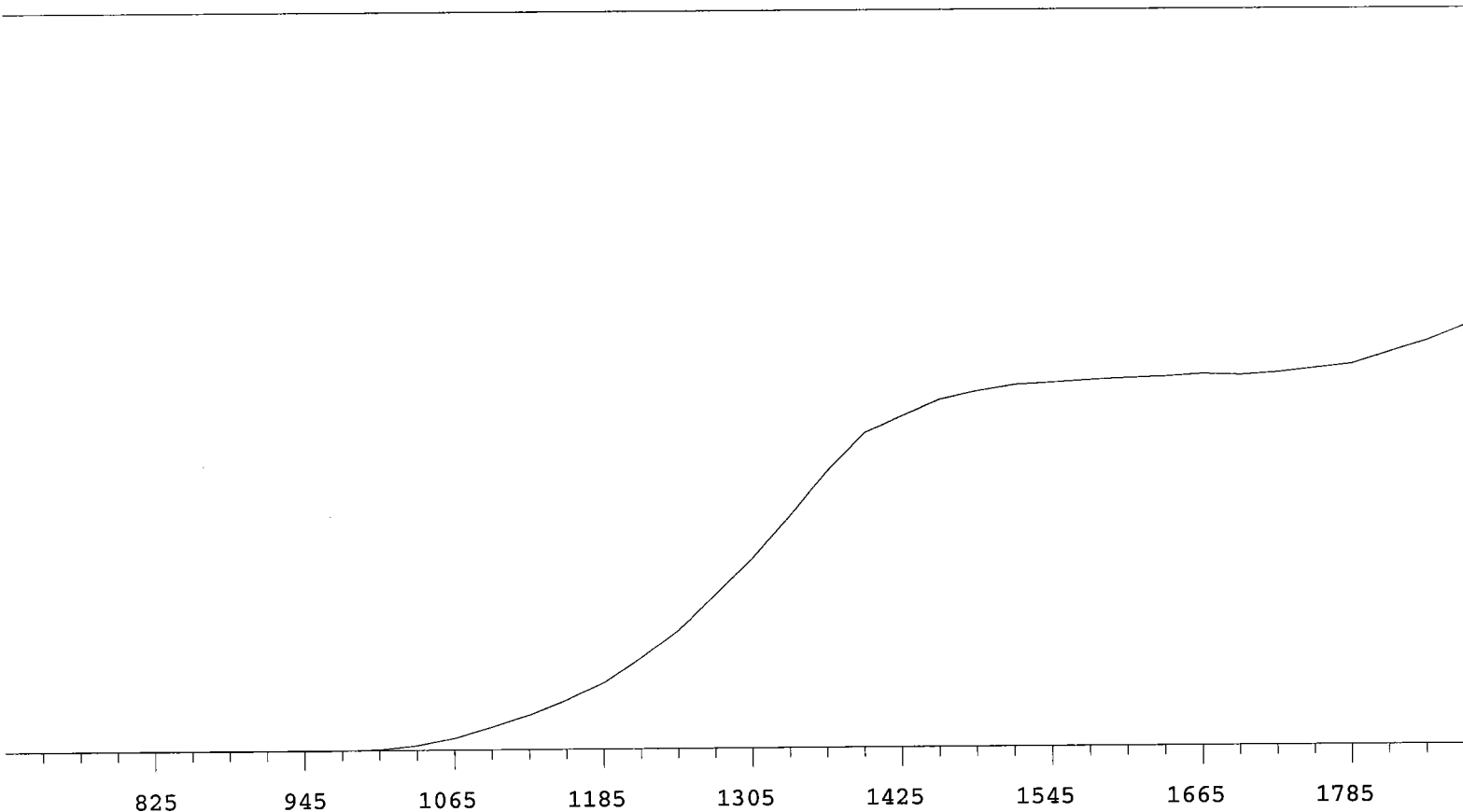
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	17371	+61.82
735	0		1335	21059	+51.03
765	1		1365	24146	+38.17
795	2	>100	1395	26716	+25.34
825	3	+0.00	1425	27972	+15.55
855	2	-33.33	1455	28941	+8.73
885	1	-33.33	1485	29433	+4.91
915	2	>100	1515	29724	+2.97
945	2	>100	1545	29727	+2.22
975	23	>100	1575	30112	+1.21
1005	188	>100	1605	30235	+1.21
1035	628	>100	1635	30012	+0.64
1065	1402	>100	1665	30324	+0.75
1095	2202	>100	1695	30358	+1.95
1125	3405	>100	1725	30404	+3.02
1155	4734	>100	1755	30862	+3.77
1185	6329	+95.04	1785	31464	+4.62
1215	8730	+88.10	1815	31575	+6.76
1245	11220	+79.46	1845	32217	
1275	14252	+70.70	1875	33728	

*mshab*



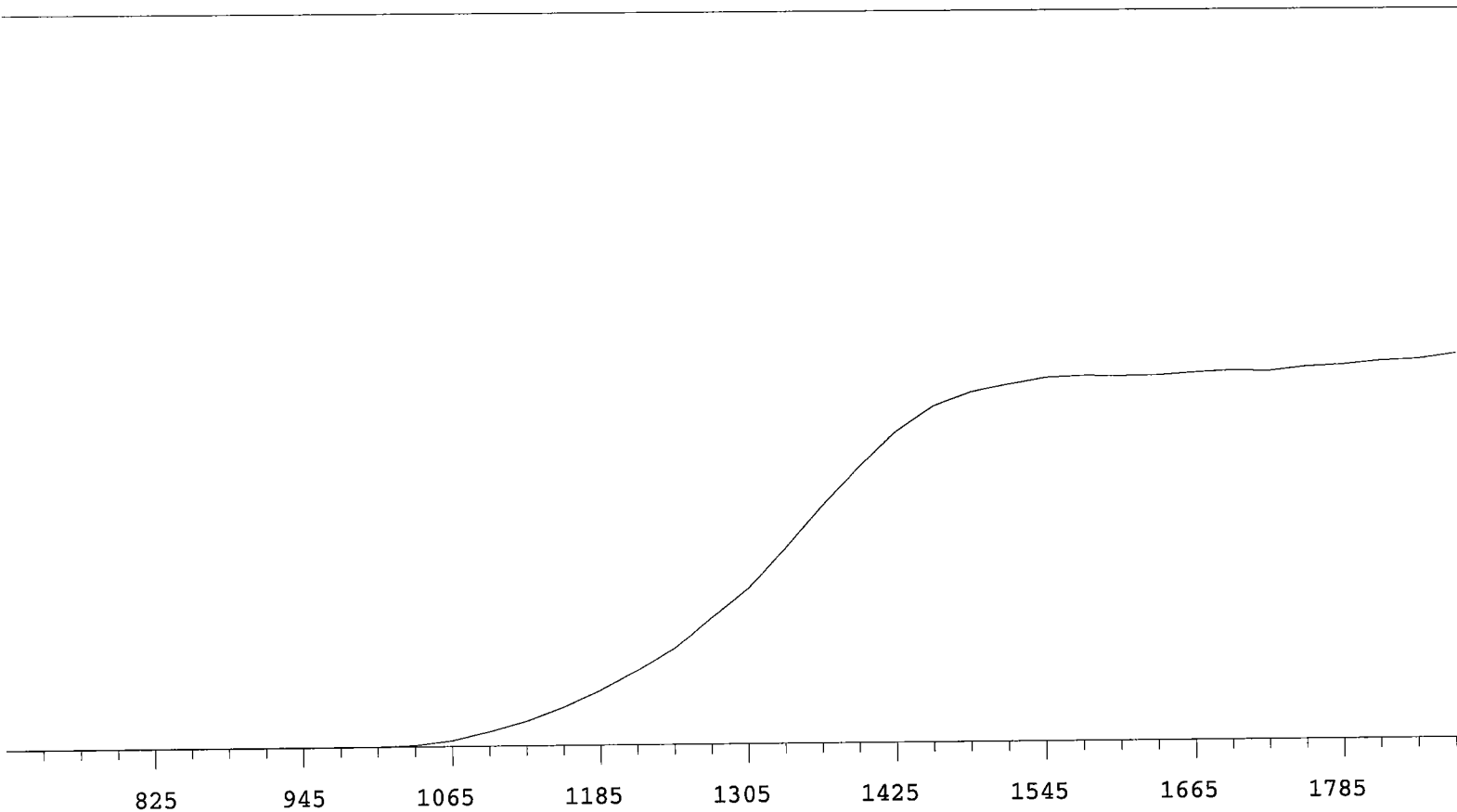
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19992	+64.10
735	1		1335	24434	+52.32
765	2	-55.56	1365	28341	+40.24
795	0	-83.33	1395	31016	+27.00
825	0	>100	1425	33244	+17.26
855	1	>100	1455	34234	+10.11
885	0	>100	1485	35116	+5.57
915	1	>100	1515	35198	+3.72
945	7	>100	1545	35658	+2.57
975	26	>100	1575	35928	+2.43
1005	201	>100	1605	36121	+1.20
1035	622	>100	1635	36271	+0.67
1065	1395	>100	1665	36135	+1.26
1095	2589	>100	1695	36285	+1.47
1125	3807	>100	1725	36799	+2.20
1155	5311	>100	1755	36745	+3.29
1185	7258	+96.60	1785	37112	+4.71
1215	10100	+88.77	1815	37953	+6.34
1245	12793	+79.49	1845	38842	
1275	16338	+71.46	1875	39499	

*Jan 12 2006*



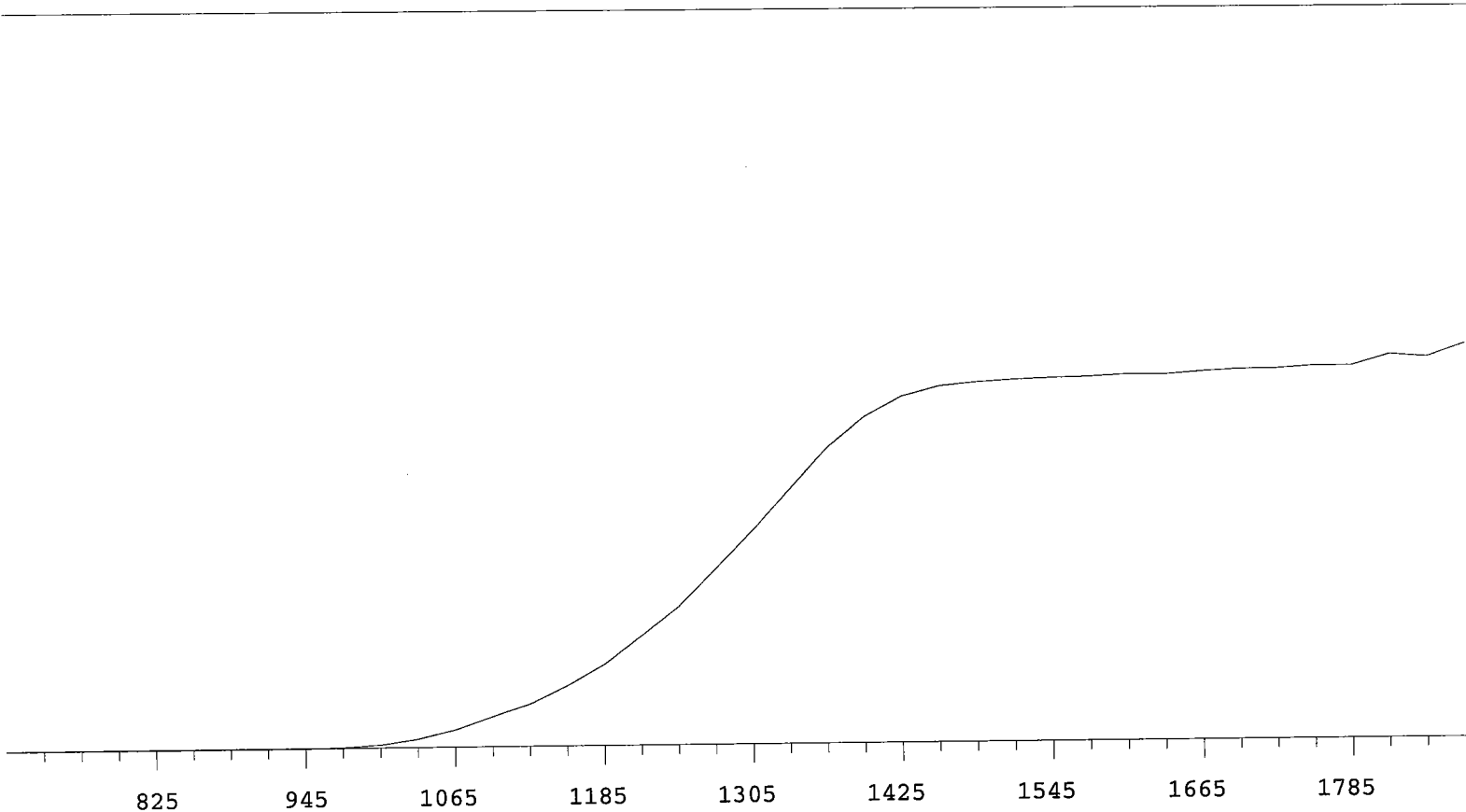
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	3		1305	20823	+66.52
735	0		1335	25209	+57.37
765	0	-27.78	1365	30058	+44.75
795	1	>100	1395	34207	+31.58
825	2	+41.67	1425	35961	+19.48
855	0	+27.78	1455	37712	+11.46
885	1	+0.00	1485	38621	+7.54
915	2	>100	1515	39266	+4.27
945	1	>100	1545	39505	+2.69
975	12	>100	1575	39765	+1.77
1005	101	>100	1605	39960	+1.71
1035	505	>100	1635	40095	+1.10
1065	1271	>100	1665	40363	+0.99
1095	2435	>100	1695	40227	+1.48
1125	3717	>100	1725	40494	+2.25
1155	5349	>100	1755	40925	+4.61
1185	7264	+98.50	1785	41387	+6.78
1215	9948	+91.79	1815	42624	+9.20
1245	13035	+83.57	1845	43902	
1275	16927	+74.29	1875	45583	

*m7/25/05*



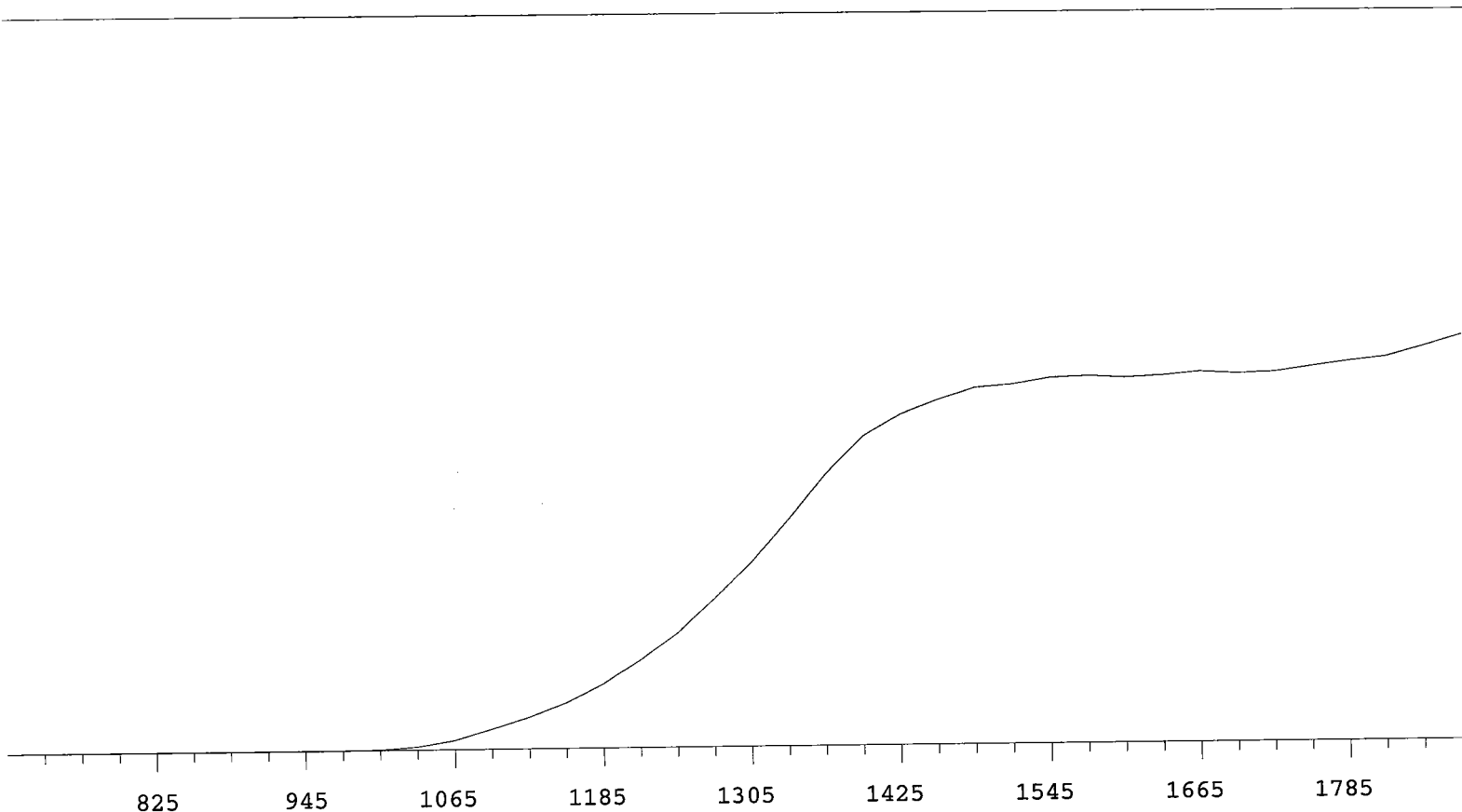
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	2		1305	18669	+72.76
735	0		1335	23370	+64.55
765	0	+66.67	1365	28550	+55.91
795	0	>100	1395	33260	+43.78
825	3	+83.33	1425	37418	+31.11
855	0	-83.33	1455	40334	+20.16
885	1	>100	1485	41951	+12.02
915	0	>100	1515	42838	+6.74
945	1	>100	1545	43602	+3.50
975	3	>100	1575	43809	+1.61
1005	34	>100	1605	43735	+0.82
1035	190	>100	1635	43823	+1.13
1065	725	>100	1665	44134	+1.17
1095	1724	>100	1695	44358	+1.41
1125	2937	>100	1725	44239	+1.42
1155	4543	>100	1755	44705	+1.95
1185	6429	>100	1785	44909	+2.35
1215	8789	+94.33	1815	45328	+2.52
1245	11443	+85.00	1845	45509	
1275	15155	+78.33	1875	46116	

*msh*



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	3		1305	17564	+61.34
735	2		1335	20983	+50.92
765	1	-66.67	1365	24340	+39.30
795	4	+45.45	1395	26885	+26.88
825	0	+30.30	1425	28563	+15.81
855	4	+0.00	1455	29365	+8.25
885	2	>100	1485	29683	+3.89
915	3	>100	1515	29898	+2.00
945	6	>100	1545	30019	+1.51
975	42	>100	1575	30093	+1.01
1005	244	>100	1605	30263	+1.18
1035	697	>100	1635	30232	+1.46
1065	1429	>100	1665	30485	+1.36
1095	2487	>100	1695	30648	+1.63
1125	3483	>100	1725	30678	+1.10
1155	4980	>100	1755	30883	+2.70
1185	6683	+92.69	1785	30876	+2.89
1215	8988	+84.24	1815	31805	+4.51
1245	11345	+76.74	1845	31569	
1275	14366	+68.74	1875	32673	

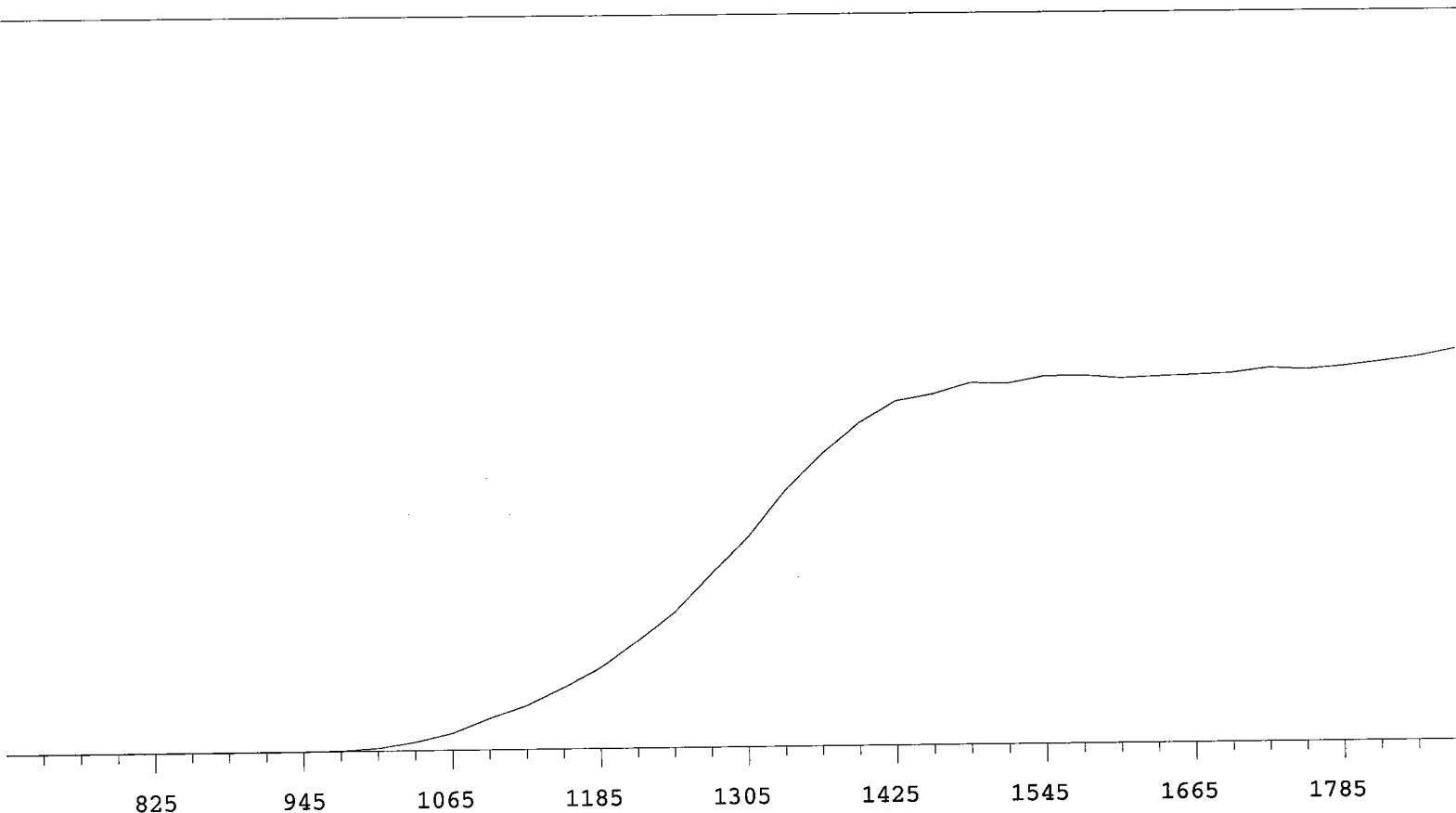
*Handwritten signature*



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	17606	+68.88
735	0		1335	21599	+59.41
765	0		1365	25809	+47.05
795	0	>100	1395	29372	+33.37
825	2	>100	1425	31486	+21.76
855	0	+100.00	1455	32894	+12.91
885	1	>100	1485	34077	+8.33
915	2	>100	1515	34357	+5.14
945	4	>100	1545	34948	+2.35
975	10	>100	1575	35100	+1.39
1005	53	>100	1605	34930	+0.94
1035	327	>100	1635	35093	+0.78
1065	902	>100	1665	35444	+1.03
1095	1970	>100	1695	35257	+1.49
1125	3079	>100	1725	35393	+2.34
1155	4435	>100	1755	35908	+3.77
1185	6202	+99.16	1785	36373	+5.15
1215	8385	+91.20	1815	36800	+6.47
1245	10930	+83.12	1845	37764	
1275	14132	+75.94	1875	38815	

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VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	4		1305	21893	+61.23
735	3		1335	26615	+50.22
765	1		1365	30345	+39.18
795	1	>100	1395	33570	+25.90
825	0	>100	1425	35845	+16.79
855	1	>100	1455	36520	+8.95
885	5	>100	1485	37628	+5.26
915	3	>100	1515	37539	+3.72
945	14	>100	1545	38268	+1.30
975	77	>100	1575	38301	+0.80
1005	298	>100	1605	37985	-0.13
1035	932	>100	1635	38135	+0.48
1065	1829	>100	1665	38276	+1.84
1095	3311	>100	1695	38429	+1.51
1125	4603	>100	1725	38899	+1.48
1155	6424	+96.24	1755	38695	+1.85
1185	8451	+88.86	1785	39003	+2.37
1215	11201	+83.16	1815	39457	+4.14
1245	14170	+76.31	1845	39914	
1275	18128	+69.83	1875	40696	

*mu 9/29/05*

# Pb-210 WATER

Batch : CALVER  
 Analyst : JMJ  
 Date : 7/28/2005

Procedure Code : GFC\_PBL  
 Parmname : Lead-210  
 Batch Counted On : PIC  
 Lead Carrier Weight : 14.65 mg/mL

Required MDA : 5.00 pCi/L  
 Bkg Count Time : 500 min

Sample ID	Sample Aliquot L	Sample Date/Time	Prep Date	Carrier Weight mg	Bi-210 Start Time	Bi-210 Ingrowth Factor	Detector Number#	Count Time min
V1	1.000	7/14/2005 0:00	7/14/2005	1.30	7/14/2005 8:00	0.858	1A	10
V2	1.000	7/14/2005 0:00	7/14/2005	2.10	7/14/2005 8:00	0.858	1B	10
V3	1.000	7/14/2005 0:00	7/14/2005	3.60	7/14/2005 8:00	0.858	1C	10
V4	1.000	7/14/2005 0:00	7/14/2005	5.00	7/14/2005 8:00	0.858	1D	10
V5	1.000	7/14/2005 0:00	7/14/2005	7.00	7/14/2005 8:00	0.858	2A	10
V6	1.000	7/14/2005 0:00	7/14/2005	8.80	7/14/2005 8:00	0.858	2B	10
V7	1.000	7/14/2005 0:00	7/14/2005	11.70	7/14/2005 8:00	0.858	2C	10
V8	1.000	7/14/2005 0:00	7/14/2005	13.40	7/14/2005 8:00	0.858	2D	10
V9	1.000	7/14/2005 0:00	7/14/2005	12.90	7/14/2005 8:00	0.858	3A	10
V10	1.000	7/14/2005 0:00	7/14/2005	15.30	7/14/2005 8:00	0.858	3B	10
V11	1.000	7/14/2005 0:00	7/14/2005	15.70	7/14/2005 8:00	0.858	3C	10
V12	1.000	7/14/2005 0:00	7/14/2005	19.80	7/14/2005 8:00	0.858	3D	10
V1	1.000	7/14/2005 0:00	7/14/2005	1.30	7/14/2005 8:00	0.858	4A	10
V2	1.000	7/14/2005 0:00	7/14/2005	2.10	7/14/2005 8:00	0.858	4B	10
V3	1.000	7/14/2005 0:00	7/14/2005	3.60	7/14/2005 8:00	0.858	4C	10
V4	1.000	7/14/2005 0:00	7/14/2005	5.00	7/14/2005 8:00	0.858	4D	10

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Pb-210 0.1 ML  
 ET491-A 80900.6 DPM  
 3644.17 pCi/L

Total Beta Counts	Raw cpm	Detector Efficiency dec	BKG cpm	Counted Time	Sample Decay Factor	Test Rec. dec	Pb-210 MDA pCi/L	Pb-210 RESULT pCi/L	Pb-210 Recovery (%)
22806	2280.60	0.4191	0.362	7/28/2005 10:51	0.999	0.8874	1.636	3223.022	88.44%
23555	2355.50	0.4061	0.296	7/28/2005 10:51	0.999	0.7167	1.937	4252.948	116.71%
25567	2556.70	0.3977	0.36	7/28/2005 10:51	0.999	0.8191	1.864	4124.728	113.19%
23587	2358.70	0.3846	0.338	7/28/2005 10:51	0.999	0.8532	1.806	3777.228	103.65%
26230	2623.00	0.3682	0.348	7/28/2005 10:52	0.999	0.9556	1.703	3917.583	107.50%
25997	2599.70	0.3528	0.386	7/28/2005 10:52	0.999	1.0011	1.766	3868.023	106.14%
26435	2643.50	0.3237	0.42	7/28/2005 10:52	0.999	1.1409	1.745	3762.025	103.23%
26101	2610.10	0.3139	0.414	7/28/2005 10:52	0.999	1.1433	1.786	3822.424	104.89%
22288	2228.80	0.3046	0.32	7/28/2005 10:52	0.999	0.9784	1.948	3930.475	107.86%
24112	2411.20	0.2889	0.366	7/28/2005 10:52	0.999	1.0444	2.025	4199.302	115.23%
22831	2283.10	0.2864	0.402	7/28/2005 10:52	0.999	0.9742	2.271	4300.541	118.01%
21369	2136.90	0.2483	0.384	7/28/2005 10:53	0.999	1.0396	2.411	4349.436	119.35%
22530	2253.00	0.4156	0.334	7/28/2005 11:09	0.999	0.8874	1.600	3210.006	88.09%
24318	2431.80	0.4129	0.32	7/28/2005 11:09	0.999	0.7167	1.961	4317.153	118.47%
25689	2568.90	0.3967	0.35	7/28/2005 11:09	0.999	0.8191	1.848	4153.294	113.97%
23412	2341.20	0.3802	0.394	7/28/2005 11:09	0.999	0.8532	1.937	3791.786	104.05%

VERRAW.XLS

INSTR_ID	SAMPLE_ID	CNT_TIME	A	B	TIME	USER2
Instrument 1 - A	1	10	112	22806	7/28/2005 10:51	1575
Instrument 1 - B	2	10	88	23555	7/28/2005 10:51	1575
Instrument 1 - C	3	10	212	25567	7/28/2005 10:51	1575
Instrument 1 - D	4	10	331	23587	7/28/2005 10:51	1575
Instrument 2 - A	5	10	310	26230	7/28/2005 10:52	1575
Instrument 2 - B	6	10	14	25997	7/28/2005 10:52	1575
Instrument 2 - C	7	10	357	26435	7/28/2005 10:52	1575
Instrument 2 - D	8	10	314	26101	7/28/2005 10:52	1575
Instrument 3 - A	9	10	192	22288	7/28/2005 10:52	1575
Instrument 3 - B	10	10	240	24112	7/28/2005 10:52	1575
Instrument 3 - C	11	10	308	22831	7/28/2005 10:52	1575
Instrument 3 - D	12	10	276	21369	7/28/2005 10:53	1575
Instrument 4 - A	1	10	183	22530	7/28/2005 11:09	1575
Instrument 4 - B	2	10	30	24318	7/28/2005 11:09	1575
Instrument 4 - C	3	10	273	25689	7/28/2005 11:09	1575
Instrument 4 - D	4	10	602	23412	7/28/2005 11:09	1575

*for 2005*

**General Engineering Laboratories  
Verification Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-018 Isotope Pb-210  
 Date Standards Prepared 7/14/05 Cocktail Type Used N/A  
 Standard ID ET491-A Matrix of Vial/Planchett Lead chromate precipitate on Tuffryn filter  
 Amount Used (g or ml) 0.1 Type of Scintillation Vial N/A  
 Standard Activity (DPM/g or ml) 112301.8 Pipette ID Used 1429303  
 Reference Date 1/1/95 Balance ID Used N/A  
 Expiration Date 11/1/05 Quenching Agent N/A  
 Residue/Carrier Agent Lead Carrier 14.65 <sup>ug</sup>/ml

Separation Date/Time: 7/14/05 0800

	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	V1	0.1	0.0839	<del>0.0843</del>	<del>0.49</del> 0.0852
	V2	0.2	0.0841	<del>0.0856</del>	<del>1.5</del> 0.0862
	V3	0.3	0.0840	0.0876	3.6
	V4	0.4	0.0856	0.0906	5.0
	V5	0.5	0.0846	0.0916	7.0
	V6	0.6	0.0844	0.0932	8.8
	V7	0.7	0.0839	0.0956	11.7
	V8	0.8	0.0859	0.0993	13.4
	V9	0.9	0.0879	0.1008	12.9
	V10	1.0	0.0844	0.0997	15.3
	V11	1.1	0.0867	0.1024	13.7
	V12	1.3	0.0840	0.1038	19.8

1.3  
2.1

Prepared By: [Signature]

Date

7/29/05

Reviewed By: [Signature]

Date

2/20/08

Rev 1 RLM 9/10/97

# DEUTSCHER KALIBRIERDIENST (DKD)

Kalibrierlaboratorium für Meßgrößen der Radioaktivität  
 Calibration laboratory for measurements of radioactivity

AKKREDITIERT DURCH DIE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)



**Amersham Buchler GmbH & Co KG**  
 Postfach 11 49 Gieselweg 1  
 D-38001 Braunschweig D-38110 Braunschweig

Telefon (05307) 930-0  
 Telefax (05307) 930-293  
 Telefax-Zentrale 930-237

## Kalibrierschein Calibration Certificate

Kalibrierzeichen  
 Calibration mark

02628
DKD-K- 06501
95-10

Gegenstand <i>Object</i>	Radioactive Reference Solution
Hersteller <i>Manufacturer</i>	Amersham Buchler GmbH & Co KG Postfach 11 49 Gieselweg 1 D-38001 Braunschweig D-38110 Braunschweig
Typ <i>Type</i>	RBZB44
Strahler-Nr. <i>Source number</i>	ET 491
Auftraggeber <i>Customer</i>	Amersham Corporation 2636 S. Clearbrook Drive Arlington Heights, IL 60005 USA-Arlington Heights, IL
Auftragsnummer <i>Work order number</i>	112116
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	2
Referenzdatum <i>Reference date</i>	1 January 1995

Der Deutsche Kalibrierdienst ist Unterzeichner des multilateralen Übereinkommens der Western European Calibration Cooperation (WECC) zur gegenseitigen Anerkennung der Kalibrierscheine. Die Kalibrierung erfolgt auf der Grundlage des zwischen der Physikalisch-Technischen Bundesanstalt und dem Träger abgeschlossenen Vertrages. Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich. *The Deutscher Kalibrierdienst is signatory to the multilateral agreement of the Western European Calibration Cooperation (WECC) for the mutual recognition of calibration certificates. The calibration is performed according to the stipulations of the contract between the Physikalisch-Technische Bundesanstalt and the holder of the calibration laboratory. This calibration certificate documents the traceability to national standards, which realize the physical units of measurement according to the International System of Units (SI). The user is obliged to have the object recalibrated at appropriate intervals.*

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Physikalisch-Technischen Bundesanstalt als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit. *This calibration certificate may not be reproduced other than in full except with the permission of both the Physikalisch-Technische Bundesanstalt and the issuing laboratory. Calibration certificates without signature and seal are not valid.*

Stempel <i>Seal</i>	Datum <i>Date</i>	Leiter des Kalibrierlaboratoriums <i>Head of the calibration laboratory</i>	Stellvertreter <i>Deputy</i>	Bearbeiter <i>Person responsible</i>
	18 October 1995	Dr. Dornhöfer	Dr. Thieme	E. Schuber PC-5-013-4



# DEUTSCHER KALIBRIERDIENST (DKD)

PAGE 2 OF CALIBRATION CERTIFICATE FROM 18 October 1995

02628

DKD-K-  
06501

95-10

## Radioactive Reference Solution

Solution No.: ET 491

Drawing No.: VZ-2058

Nuclide: Lead-210

Radioactive concentration: 38.1 kBq/g

Reference date: 1 January 1995 at 12.00 GMT

Mass of solution: (5.182 ± 0.001) g

Volume of solution: approx. 5 ml

Chemical composition: Solution in 1.2 M HNO<sub>3</sub>  
Carrier: Pb (NO<sub>3</sub>)<sub>2</sub>, Bi (NO<sub>3</sub>)<sub>3</sub>; each 20 mg/l of the corresponding element.

Measuring method: The activity was determined by comparison with a reference solution by measurement with a Ge-detector with MCA.

Traceability: Additional to the direct traceability to the PTB through the DKD this product satisfies the quality assurance requirements of USNRC Regulatory Guide 4.15 Revision 1, February 1979, for achieving NIST traceability through Amersham's participation in the NEI-NIST Measurements Assurance Program of the Nuclear Power Industry.

Uncertainty: The relative uncertainty of the activity is ± 3 %.

The declared uncertainty U is an expanded uncertainty  $U = k \cdot u_c$  with a coverage factor of  $k = 3$ . The combined uncertainty  $u_c$  is the sum of all uncertainties which can be evaluated by statistical means (uncertainty type A,  $u_A$ ) and all other uncertainties (uncertainty type B,  $u_B$ ) whereby  $u_c^2 = u_A^2 + u_B^2$ .  
(Ref.: NIST Technical Note 1297 / WECC-Doc. 19-1990)

Radioactive impurities: Related to Pb-210 (equal 100 %) the following radioactive impurities were detected:  
Ra-226: 0.003 %



Handwritten signature and reference number: 20-5-013-47

## TRACEABILITY TO NIST

Amersham Corporation  
2636 S. Clearbrook Drive  
Arlington Heights, IL 60005  
tel (708) 593-6300  
fax (708) 593-8091



Traceability is the ability to relate the accuracy of measurement of radionuclides to the National Institute of Standards and Technology (NIST). Traceability is achieved by participation in a Measurements Assurance Program linked to NIST and production of certified materials in accordance with a quality assurance program.

Amersham participates in measurement assurance programs conducted by NIST in cooperation with the Nuclear Energy Institute (NEI, formerly USCEA). Additionally, our production facilities and measurement laboratories operate under routinely audited quality assurance programs.

Therefore, Amersham certified standardized products meet or exceed, the NRC requirements for measurements traceable to NIST.

278004C

*mu 7/25/06*

RC-S-013-4B





## Standard Traceability Log Rad

Source Material Info	
Parent Code:	ET491
Prepared By:	Garret Ray
Carrier Conc:	1.2M HNO3
Reference Date:	01/01/1995
Ampoule Mass (g):	5.182 g
Uncertainty:	+/- 3 %
LogBook No:	RC S 014 004

A Solution Material Info	
Isotope:	Lead-210
Prepared By:	Garret Ray
Prep Date:	03/01/1996
Verification Date:	07/12/2005
Expiration Date:	07/12/2006
Primary Code:	ET491-A
Dilution(mL):	100 mL
Mass of Parent(g):	5.0547 g
Density(g/mL):	1.0000

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(5.0547 \text{ g}) * (38.1 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 115550.4420 \text{ dpm/mL}$
$(5.0547 \text{ g}) * (38.1 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0000 \text{ g/mL}) / (100 \text{ mL}) = 115550.4420 \text{ dpm/g}$

## Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
10/20/1997	Richard Kinney	.467	100	ET491-B	524.45 dpm/ml	03/01/1997	03/01/1998
10/29/1997	Richard Kinney	3.0992	500	ET491-C	696.09 dpm/mL	10/29/1998	10/29/1999
04/03/2001	Angela Albee	.5184	100	ET491-D	582.17 dpm/mL	04/16/2003	04/16/2004
09/15/2003	Angela Albee	.5132	100	ET491-E	576.33 dpm/mL	11/11/2004	11/11/2005

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

*m 7/29/05*

# Verification for Pb-210 Standard ET491-A

A. Fehr  
7/12/2005

*AG*  
*7/29/05*

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Mass. Used (g)	Source DPM/ $\mu$ rc <sup>-2</sup> g
ET491-E N1	22785.6000	20.2000	22785.6000	2.63365	0.1038	83349.97114
ET491-E N2	22178.6000	20.2000	22178.6000	2.63365	0.1033	81522.24763
ET491-E N3	22065.7000	20.2000	22065.7000	2.63365	0.1031	81264.5963

Mean Value (Counting) = 82045.60502      **101.400909**      **Pass**  
 Stdev = 1136.936355      **0.01385737**      **Rule 3 (Pass/Fail)**

Certificate Value = 80912.1  
 Lower Limit = 79771.73231  
 Upper Limit = 84319.47773  
**Rule 1 Pass/Fail**      **Pass**  
 Two sigma = 2273.872711  
 10 % of Mean = 8204.560502  
**Rule 2 (Pass/Fail)**      **Pass**

### Verification Rules

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

The analyst prepared three calibration sources for source ET491-A by transferring 0.1 mL portions of the standard to glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The calibration vials and background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 31 for Pb-210 standard verification. The efficiency calibration which was used for verification calculations was performed on 7/12/05 using source 0356-A (Pb-210). Each verification source calculation was performed as follows:

Source dpm/g = (A - B)/(C/D)

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*7/29/05*

*Angela D. Johnson*  
*7/29/05*

PROTOCOL : 31 Pb-210 Verification  
DATE : 2005/07/12  
TIME : 05:29  
ID : P31AS005

Wallac 1414 WinSpectral v1.40 S/N 4140127

Counting mode : CPM  
Isotope(s) : Pb210  
Pb210 = 5- 520,21.00 y  
Protocol name : Pb-210 Verification  
Counting time : 300  
Repeats : 1  
Cycles : 1  
Replicates : 1  
2 sigma % : 0.01  
Minimum cpm : 0.00 Checking time: 10  
Advanced modes : Chemilum,PSA  
PSA level : 35  
Output to Display :  
POS,CTIME,DATE,TIME,RACKPOS,CPMw1,CPM,SQPI,CPM1  
Additions to Display : Spectrum,Header,Listing  
Spectrum : Alpha,Beta  
Window 1 : 685- 745 /Alpha  
Window 2 : 1-1024 /Beta  
Window 3 : 1-1024 /Beta  
Window 4 : 1-1024 /Beta  
Window 5 : 1-1024 /Beta  
Window 6 : 1-1024 /Beta  
FNCT1 = FNCT1 :  
FNCT2 = FNCT2 :  
FNCT3 = FNCT3 :  
FNCT4 = FNCT4 :

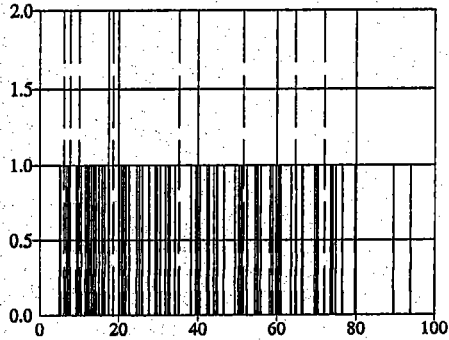
Total count rate:  
Pb210 72372.3 CPM

ast 7/12/05

*Handwritten signatures and dates:*  
7/29/05  
7/29/05

POS CTIME DATE TIME RACKPOS CPM

1 300 7/12/2005 5:29 AM 1 20.20

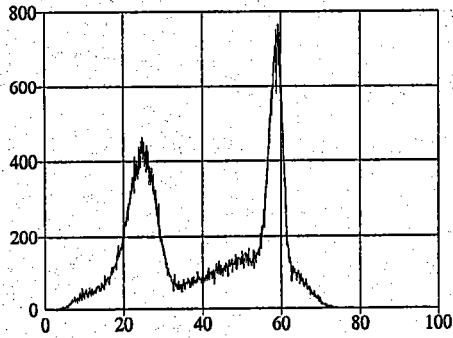


Counts Alpha

Counts Beta

Bkg

2 300 7/12/2005 5:35 AM 2 22785.60

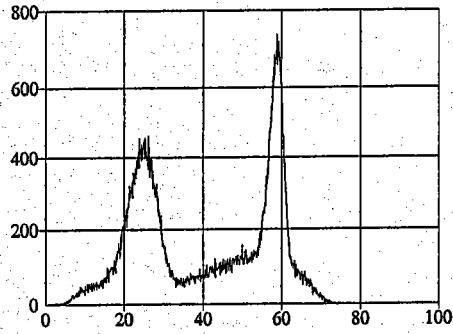


Counts Alpha

Counts Beta

ET491-A

3 300 7/12/2005 5:41 AM 3 22178.60



Counts Alpha

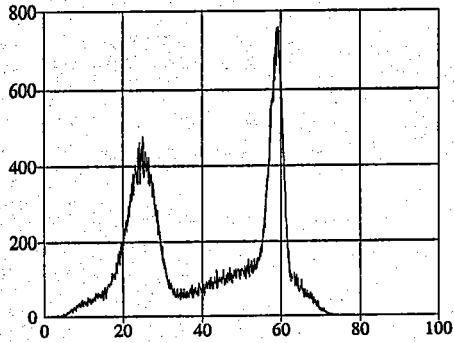
Counts Beta

ET491-A

acf 7/12/05

*m* 7/24/05  
7/29/05

POS	CTIME	DATE	TIME	RACKPOS	CPM
4	300	7/12/2005	5:46 AM	4	22065.70

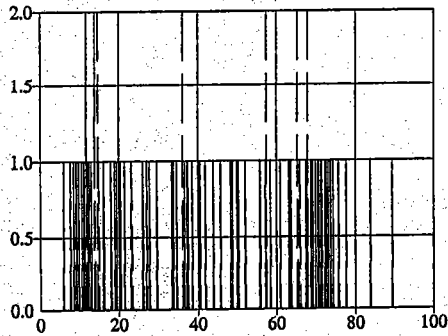


Counts Alpha

Counts Beta

ET491-A

5	300	7/12/2005	5:52 AM	5	21.70
---	-----	-----------	---------	---	-------

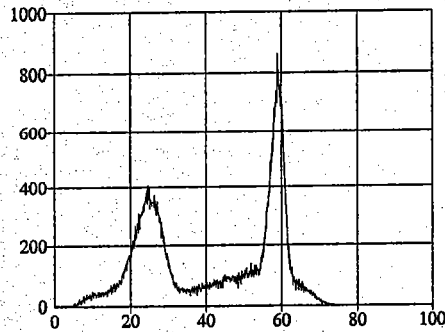


Counts Alpha

Counts Beta

Bkg

6	300	7/12/2005	5:58 AM	6	20294.00
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Counts Alpha

Counts Beta

0356-A

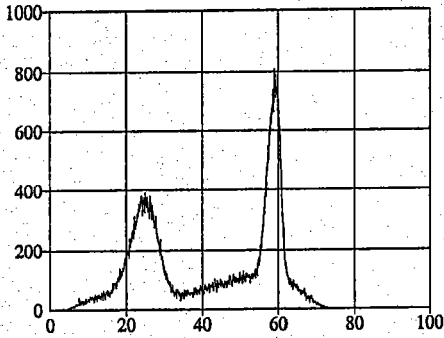
awf7/12/05

*Handwritten signature*

*Handwritten initials and date*  
JLQ  
7/29/05

POS CTIME DATE TIME RACKPOS CPM

7 300 7/12/2005 6:04 AM 7 20276.60

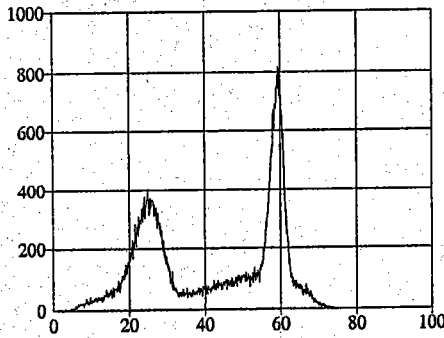


Counts Alpha

Counts Beta

0356-A

8 300 7/12/2005 6:09 AM 8 20079.70



Counts Alpha

Counts Beta

0356-A

AWF 7/12/05

*AWF 7/12/05*  
*AWF*  
*7/29/05*

# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Gas Flow Proportional Counter Calibration Package

Method: RA-228

	YES	NO	Comments
1) Is all calibration standard information enclosed for: primary standard certificate? second standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
2) Are the detector graphs included? beta absorption curves? beta plateau?			N/A
	<input checked="" type="checkbox"/>		
3) Is the raw count data included for: the plateau generation? the absorption curve generation? the calibration verification? the crosstalk calculations?	<input checked="" type="checkbox"/>		
			N/A
	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
4) Are the calibration verification calculations included? are verification recoveries 100% +/- 25%	<input checked="" type="checkbox"/>		
	<input checked="" type="checkbox"/>		
5) Is the method Carrier Standardization included?			N/A

Prepared By: 

Date: 4/22/05

Reviewed By: 

Date: 4/23/05

Effective Date: 4/22/05

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

68229-278

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

ISOTOPE:	Ra-228
ACTIVITY (dps):	2.524 E4
HALF-LIFE:	5.75 years
CALIBRATION DATE:	April 26, 2004 12:00 EST
RELATIVE EXPANDED UNCERTAINTY (k=2):	3.3%

Impurities:  $\gamma$ -impurities (other than decay products) <0.1%

5.00087 grams 0.1M HCl solution with 25  $\mu$ g/g Ba carrier.

P O NUMBER 3240 RD, Item 1

SOURCE PREPARED BY:

M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED:

ACM 4/28/04

RECEIVED  
4/29/04  
TCW

my 4/28/04





# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0683	Isotope:	Radium-228
Prepared By:	Amanda Fehr	Prepared By:	Amanda Fehr
Carrier Conc:	0.1M HCl	Prep Date:	02/03/2005
Reference Date:	04/26/2004	Verification Date:	02/04/2005
Ampoule Mass (g):	5.00087 g	Expiration Date:	02/04/2006
Uncertainty:	+/- 3.3 %	Primary Code:	0683-A
LogBook No:	RC-S-037-082	Dilution(mL):	100 mL
		Mass of Parent(g):	4.7315 g
		Density(g/mL):	0.9985

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

$(\text{Mass of parent(g)} * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)} * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.7315 \text{ g}) * (25240 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.00087 \text{ g} * 100 \text{ mL}) = 14304.3936 \text{ dpm/mL}$
$(4.7315 \text{ g}) * (25240 \text{ dps}) * (59.9 \text{ dpm/dps}) / (0.9985 \text{ g/mL}) / (5.00087 \text{ g} * 100 \text{ mL}) = 14325.2288 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

*m4k205*

# Verification for Ra-228 Standard 0683-A

A. Fehr 2/4/2005	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source dPPM/mL
	0683-A N1	46898.2000	33.7000	46864.5000	3.5679424	1.0000 13134.88131
	0683-A N2	46663.7000	33.7000	46630.0000	3.5679424	1.0000 13069.15716
	0683-A N3	46478.8000	33.7000	46445.1000	3.5679424	1.0000 13017.33457
						Average = 13073.79102

Mean Value (Counting) = 13073.79102 dpm/mL 100.210719 % of known  
 Stdev = 58.91021579 dpm/mL 0.00450598

Certificate Value = 13046.3 dpm/mL  
 Lower Limit = 12955.97058 dpm/mL  
 Upper Limit = 13191.61145 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 117.8204316  
 10 % of Mean = 1307.379102  
 Rule 2 (Pass/Fail) Pass

### Verification Rules

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

The analyst prepared three standard verification sources for Ra-228 source 0683-A by transferring portions of the standard into glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 4/26/04 using Analytic's source 0503-A (Ra-228). Calibration data is recorded in this logbook under Ra-228 0503. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*perdubor*

*Amanda D. Fehr 2/14/05*  
*[Signature]* 2/11/05

PROTOCOL : 23 Radium Std Ver.  
DATE : 2005/02/04  
TIME : 14:12  
ID : P23AS003

Wallac 1414 WinSpectral v1.40 S/N 4140127

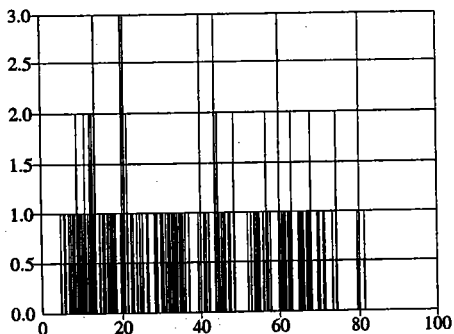
Counting mode : CPM  
Isotope(s) : H3  
H3 = 5- 350,12.43 y  
Protocol name : Radium Std Ver.  
Counting time : 300  
Repeats : 1  
Cycles : 1  
Replicates : 1  
2 sigma % : 0.01  
Minimum cpm : 0.00 Checking time: 10  
Output to Display :  
POS,CTIME,DATE,TIME,RACKPOS,CPMw1,CPM,SQPI,CPM1  
Additions to Display : Spectrum,Header,Listing  
Spectrum : Beta  
Window 1 : 1-1024 /Beta  
Window 2 : 1-1024 /Beta  
Window 3 : 1-1024 /Beta  
Window 4 : 1-1024 /Beta  
Window 5 : 1-1024 /Beta  
Window 6 : 1-1024 /Beta  
FNCT1 = FNCT1 :  
FNCT2 = FNCT2 :  
FNCT3 = FNCT3 :  
FNCT4 = FNCT4 :

Total count rate:  
H3 30936.7 CPM

*atf 214105*

*proyector*

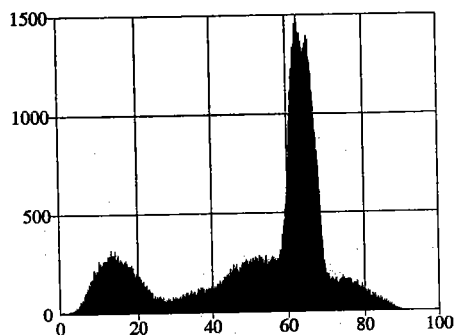
POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
1	300	2/4/2005	2:12 PM	1	33.70	33.70
					17.30	



Counts Beta

*Bkg*

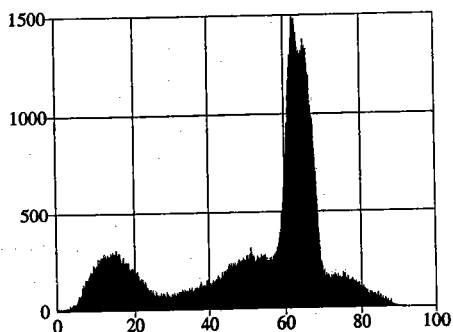
2	300	2/4/2005	2:18 PM	2	46899.00	46898.20
					9470.20	



Counts Beta

*0683-A*

3	300	2/4/2005	2:23 PM	3	46664.80	46663.70
					9499.90	



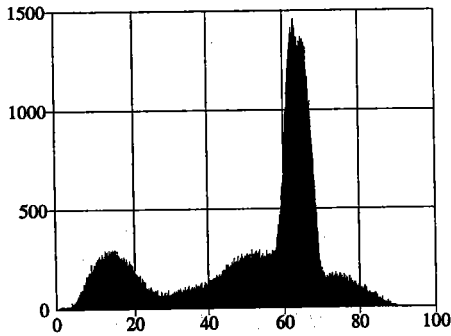
Counts Beta

*0683-A*

*ALF 2/4/05*

*[Handwritten signature]*

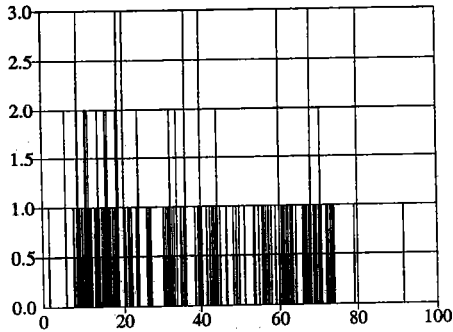
POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
4	300	2/4/2005	2:29 PM	4	46479.40	46478.80
					9454.60	



Counts Beta

0683-A

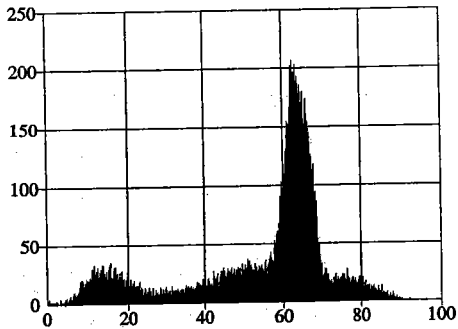
5	300	2/4/2005	2:34 PM	5	34.60	34.60
					19.00	



Counts Beta

BLG

6	300	2/4/2005	2:40 PM	6	5372.10	5371.90
					832.00	



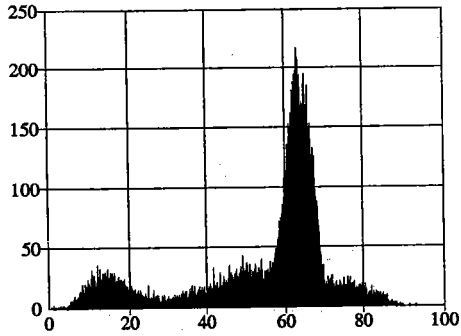
Counts Beta

0553-A

af 2/4/05

*Handwritten signature*

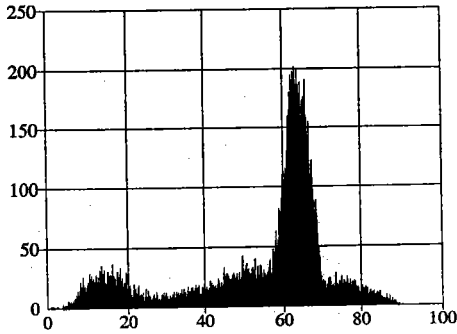
POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
7	300	2/4/2005	2:45 PM	7	5421.80	5421.80
					816.10	



Counts Beta

0553-A

8	300	2/4/2005	2:51 PM	8	5340.60	5340.60
					827.60	



Counts Beta

0553-A  
2/4/05  
0553-A

all 2/4/05

*Handwritten signature*

## General Engineering Laboratories Calibration Source Preparation Sheet

Applicable SOP Number GL-RAD-A-009 Isotope Ra-228  
 Date Standards Prepared 4/22/05 Cocktail Type Used NA  
 Standard ID 0683-A Matrix of Vial/Planchett 0.1m POLYPROPYLENE  
 Amount Used (g or  $\text{ml}$ ) 5.0 FILTER ATTACHED TO  
 Standard Activity (DPM/g or  $\text{ml}$ ) 14328.27 SS PLANCHETTE  
 Reference Date 2/3/05 Type of Scintillation Vial NA  
 Expiration Date 2/4/06 Pipette ID Used \_\_\_\_\_  
 Residue/Carrier Agent \_\_\_\_\_ Balance ID Used \_\_\_\_\_  
 Quenching Agent \_\_\_\_\_

Separation Date / Time: 4/22/05 / 0615

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				

*pre 4/22/05*

*pre 4/22/05*

Prepared By: Angela A. Johnson Date 4/22/05  
 Reviewed By: \_\_\_\_\_ Date 4/22/05





3-B	1	4	1240	17817	17817.00	0.0482	0.28	0.52	1.00	33897.33	1470		4/22/2005 11:58
3-B	1	5	1178	16876	16876.00	0.0482	0.28	0.52	1.00	32222.98	1470		4/22/2005 12:06
3-B	1	6	1317	18221	18221.00	0.0482	0.28	0.52	1.00	35018.34	1470		4/22/2005 12:03
3-B	1	7	1089	15238	15238.00	0.0482	0.28	0.51	1.00	29723.59	1470	Ra-228	4/22/2005 12:11
3-B	1	8	1428	19248	19248.00	0.0482	0.28	0.51	1.00	37350.47	1470	Efficiency	4/22/2005 12:09
									Average	33739.92		0.4832	
3-C	1	1	739	18087	18087.00	0.0407	0.46	0.52	1.00	34445.09	1470		4/22/2005 11:58
3-C	1	2	681	17872	17872.00	0.0407	0.46	0.53	1.00	33548.15	1470		4/22/2005 11:56
3-C	1	3	702	17887	17887.00	0.0407	0.46	0.53	1.00	33824.18	1470		4/22/2005 11:53
3-C	1	4	747	17811	17811.00	0.0407	0.46	0.52	1.00	34118.75	1470		4/22/2005 12:01
3-C	1	5	731	17040	17040.00	0.0407	0.46	0.51	1.00	33137.20	1470		4/22/2005 12:09
3-C	1	6	855	18315	18315.00	0.0407	0.46	0.52	1.00	35455.36	1470		4/22/2005 12:06
3-C	1	7	687	15413	15413.00	0.0407	0.46	0.52	1.00	29678.59	1470	Ra-228	4/22/2005 12:04
3-C	1	8	838	19109	19109.00	0.0407	0.46	0.51	1.00	37349.86	1470	Efficiency	4/22/2005 12:11
									Average	33944.37		0.4961	
3-D	1	1	589	18431	18431.00	0.0429	0.73	0.52	1.00	35321.89	1470		4/22/2005 12:01
3-D	1	2	533	17875	17875.00	0.0429	0.73	0.52	1.00	34089.55	1470		4/22/2005 11:58
3-D	1	3	530	18135	18135.00	0.0429	0.73	0.53	1.00	34438.15	1470		4/22/2005 11:58
3-D	1	4	484	18298	18298.00	0.0429	0.73	0.53	1.00	34594.85	1470		4/22/2005 11:53
3-D	1	5	549	17038	17038.00	0.0429	0.73	0.51	1.00	33319.81	1470		4/22/2005 12:12
3-D	1	6	640	18362	18362.00	0.0429	0.73	0.51	1.00	35722.19	1470		4/22/2005 12:09
3-D	1	7	502	15895	15895.00	0.0429	0.73	0.52	1.00	30790.80	1470	Ra-228	4/22/2005 12:06
3-D	1	8	806	19562	19562.00	0.0429	0.73	0.52	1.00	37699.31	1470	Efficiency	4/22/2005 12:04
									Average	34495.77		0.4940	
4-A	1	1	436	18783	18783.00	0.0578	0.34	0.52	1.00	36202.39	1470		4/22/2005 12:04
4-A	1	2	442	17978	17978.00	0.0578	0.34	0.51	1.00	35180.82	1470		4/22/2005 12:12
4-A	1	3	410	18198	18198.00	0.0578	0.34	0.51	1.00	35418.59	1470		4/22/2005 12:09
4-A	1	4	379	18683	18683.00	0.0578	0.34	0.52	1.00	36204.68	1470		4/22/2005 12:07
4-A	1	5	398	18198	18198.00	0.0578	0.34	0.53	1.00	34416.71	1470		4/22/2005 11:54
4-A	1	6	437	19420	19420.00	0.0578	0.34	0.52	1.00	37227.02	1470		4/22/2005 12:01
4-A	1	7	377	16781	16781.00	0.0578	0.34	0.52	1.00	32007.32	1470	Ra-228	4/22/2005 11:58
4-A	1	8	451	20737	20737.00	0.0578	0.34	0.53	1.00	39388.88	1470	Efficiency	4/22/2005 11:56
									Average	35755.80		0.5121	
4-B	1	1	73	19059	19059.00	0.0800	0.37	0.52	1.00	36869.81	1470		4/22/2005 12:07
4-B	1	2	62	18836	18836.00	0.0800	0.37	0.52	1.00	35862.06	1470		4/22/2005 12:04
4-B	1	3	63	18870	18870.00	0.0800	0.37	0.51	1.00	36880.44	1470		4/22/2005 12:12
4-B	1	4	53	19050	19050.00	0.0800	0.37	0.51	1.00	37122.57	1470		4/22/2005 12:08
4-B	1	5	53	18583	18583.00	0.0800	0.37	0.53	1.00	35299.98	1470		4/22/2005 11:56
4-B	1	6	50	20222	20222.00	0.0800	0.37	0.53	1.00	38288.88	1470		4/22/2005 11:54
4-B	1	7	66	16906	16906.00	0.0800	0.37	0.52	1.00	32446.75	1470	Ra-228	4/22/2005 12:01
4-B	1	8	55	21570	21570.00	0.0800	0.37	0.52	1.00	41194.45	1470	Efficiency	4/22/2005 11:58
									Average	36783.12		0.5268	
4-C	1	1	749	18454	18454.00	0.0364	0.36	0.51	1.00	35819.42	1470		4/22/2005 12:09
4-C	1	2	710	18119	18119.00	0.0364	0.36	0.52	1.00	35111.47	1470		4/22/2005 12:07
4-C	1	3	706	18128	18128.00	0.0364	0.36	0.52	1.00	34943.12	1470		4/22/2005 12:04
4-C	1	4	731	18045	18045.00	0.0364	0.36	0.51	1.00	35325.39	1470		4/22/2005 12:12
4-C	1	5	688	17757	17757.00	0.0364	0.36	0.52	1.00	33883.05	1470		4/22/2005 11:58
4-C	1	6	755	19232	19232.00	0.0364	0.36	0.53	1.00	36532.89	1470		4/22/2005 11:56
4-C	1	7	583	16571	16571.00	0.0364	0.36	0.53	1.00	31348.77	1470	Ra-228	4/22/2005 11:54
4-C	1	8	819	20415	20415.00	0.0364	0.36	0.52	1.00	39142.72	1470	Efficiency	4/22/2005 12:01
									Average	35275.86		0.5052	
4-D	1	1	1271	18178	18178.00	0.0431	0.58	0.51	1.00	35563.92	1470		4/22/2005 12:12
4-D	1	2	1275	17622	17622.00	0.0431	0.58	0.51	1.00	34248.58	1470		4/22/2005 12:09
4-D	1	3	1334	18020	18020.00	0.0431	0.58	0.52	1.00	34863.03	1470		4/22/2005 12:07
4-D	1	4	1337	18346	18346.00	0.0431	0.58	0.52	1.00	35311.38	1470		4/22/2005 12:04
4-D	1	5	1245	17305	17305.00	0.0431	0.58	0.52	1.00	33129.96	1470		4/22/2005 12:01
4-D	1	6	1357	19186	19186.00	0.0431	0.58	0.52	1.00	36557.46	1470		4/22/2005 11:58
4-D	1	7	1108	16383	16383.00	0.0431	0.58	0.53	1.00	31041.97	1470	Ra-228	4/22/2005 11:56
4-D	1	8	1366	20538	20538.00	0.0431	0.58	0.53	1.00	36795.26	1470	Efficiency	4/22/2005 11:54
									Average	34937.70		0.5004	

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## EFFRAW

INSTR_ID	SAMPLE_ID	CNT_TIME	A	B	TIME	USER2	BATCH_ID
Instrument 1 - A	1	1	223	19812	4/22/2005 11:33	1575	Ra2280422
Instrument 1 - A	2	1	221	19161	4/22/2005 11:40	1575	Ra2280422
Instrument 1 - A	3	1	217	19209	4/22/2005 11:38	1575	Ra2280422
Instrument 1 - A	4	1	190	19664	4/22/2005 11:35	1575	Ra2280422
Instrument 1 - A	5	1	252	18527	4/22/2005 11:43	1575	Ra2280422
Instrument 1 - A	6	1	270	20152	4/22/2005 11:50	1575	Ra2280422
Instrument 1 - A	7	1	209	17009	4/22/2005 11:48	1575	Ra2280422
Instrument 1 - A	8	1	226	21455	4/22/2005 11:45	1575	Ra2280422
Instrument 1 - B	1	1	193	19678	4/22/2005 11:36	1575	Ra2280422
Instrument 1 - B	2	1	160	19041	4/22/2005 11:33	1575	Ra2280422
Instrument 1 - B	3	1	169	19027	4/22/2005 11:41	1575	Ra2280422
Instrument 1 - B	4	1	156	19202	4/22/2005 11:38	1575	Ra2280422
Instrument 1 - B	5	1	168	18254	4/22/2005 11:45	1575	Ra2280422
Instrument 1 - B	6	1	178	20148	4/22/2005 11:43	1575	Ra2280422
Instrument 1 - B	7	1	159	16811	4/22/2005 11:50	1575	Ra2280422
Instrument 1 - B	8	1	177	21320	4/22/2005 11:48	1575	Ra2280422
Instrument 1 - C	1	1	190	19929	4/22/2005 11:38	1575	Ra2280422
Instrument 1 - C	2	1	222	19736	4/22/2005 11:36	1575	Ra2280422
Instrument 1 - C	3	1	215	20230	4/22/2005 11:33	1575	Ra2280422
Instrument 1 - C	4	1	198	19844	4/22/2005 11:41	1575	Ra2280422
Instrument 1 - C	5	1	216	18760	4/22/2005 11:48	1575	Ra2280422
Instrument 1 - C	6	1	247	20456	4/22/2005 11:46	1575	Ra2280422
Instrument 1 - C	7	1	191	17262	4/22/2005 11:43	1575	Ra2280422
Instrument 1 - C	8	1	228	21665	4/22/2005 11:50	1575	Ra2280422
Instrument 1 - D	1	1	38	19654	4/22/2005 11:41	1575	Ra2280422
Instrument 1 - D	2	1	53	19466	4/22/2005 11:38	1575	Ra2280422
Instrument 1 - D	3	1	56	19457	4/22/2005 11:36	1575	Ra2280422
Instrument 1 - D	4	1	44	19353	4/22/2005 11:33	1575	Ra2280422
Instrument 1 - D	5	1	53	18235	4/22/2005 11:51	1575	Ra2280422
Instrument 1 - D	6	1	59	20122	4/22/2005 11:48	1575	Ra2280422
Instrument 1 - D	7	1	49	17027	4/22/2005 11:46	1575	Ra2280422
Instrument 1 - D	8	1	56	21170	4/22/2005 11:43	1575	Ra2280422
Instrument 2 - A	1	1	737	19237	4/22/2005 11:44	1575	Ra2280422
Instrument 2 - A	2	1	698	18742	4/22/2005 11:51	1575	Ra2280422
Instrument 2 - A	3	1	766	18800	4/22/2005 11:48	1575	Ra2280422
Instrument 2 - A	4	1	671	19000	4/22/2005 11:46	1575	Ra2280422
Instrument 2 - A	5	1	620	18971	4/22/2005 11:33	1575	Ra2280422
Instrument 2 - A	6	1	767	20367	4/22/2005 11:41	1575	Ra2280422
Instrument 2 - A	7	1	612	17288	4/22/2005 11:38	1575	Ra2280422
Instrument 2 - A	8	1	717	21526	4/22/2005 11:36	1575	Ra2280422
Instrument 2 - B	1	1	158	19990	4/22/2005 11:46	1575	Ra2280422
Instrument 2 - B	2	1	125	19577	4/22/2005 11:44	1575	Ra2280422
Instrument 2 - B	3	1	114	19354	4/22/2005 11:51	1575	Ra2280422
Instrument 2 - B	4	1	136	19264	4/22/2005 11:48	1575	Ra2280422
Instrument 2 - B	5	1	144	19226	4/22/2005 11:36	1575	Ra2280422

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Instrument 2 - B	6	1	137	20876	4/22/2005 11:34	1575	Ra2280422
Instrument 2 - B	7	1	114	17642	4/22/2005 11:41	1575	Ra2280422
Instrument 2 - B	8	1	157	22249	4/22/2005 11:38	1575	Ra2280422
Instrument 2 - C	1	1	811	19238	4/22/2005 11:48	1575	Ra2280422
Instrument 2 - C	2	1	821	18388	4/22/2005 11:46	1575	Ra2280422
Instrument 2 - C	3	1	787	18847	4/22/2005 11:44	1575	Ra2280422
Instrument 2 - C	4	1	783	18544	4/22/2005 11:51	1575	Ra2280422
Instrument 2 - C	5	1	721	18272	4/22/2005 11:38	1575	Ra2280422
Instrument 2 - C	6	1	861	20306	4/22/2005 11:36	1575	Ra2280422
Instrument 2 - C	7	1	716	17078	4/22/2005 11:34	1575	Ra2280422
Instrument 2 - C	8	1	850	20865	4/22/2005 11:41	1575	Ra2280422
Instrument 2 - D	1	1	764	18765	4/22/2005 11:51	1575	Ra2280422
Instrument 2 - D	2	1	845	18699	4/22/2005 11:48	1575	Ra2280422
Instrument 2 - D	3	1	879	18907	4/22/2005 11:46	1575	Ra2280422
Instrument 2 - D	4	1	860	19192	4/22/2005 11:44	1575	Ra2280422
Instrument 2 - D	5	1	832	18606	4/22/2005 11:41	1575	Ra2280422
Instrument 2 - D	6	1	942	20333	4/22/2005 11:39	1575	Ra2280422
Instrument 2 - D	7	1	739	17047	4/22/2005 11:36	1575	Ra2280422
Instrument 2 - D	8	1	886	21415	4/22/2005 11:34	1575	Ra2280422
Instrument 3 - A	1	1	2133	17349	4/22/2005 11:53	1575	Ra2280422
Instrument 3 - A	2	1	2284	16837	4/22/2005 12:01	1575	Ra2280422
Instrument 3 - A	3	1	2165	16897	4/22/2005 11:58	1575	Ra2280422
Instrument 3 - A	4	1	2100	17023	4/22/2005 11:56	1575	Ra2280422
Instrument 3 - A	5	1	2111	16224	4/22/2005 12:03	1575	Ra2280422
Instrument 3 - A	6	1	2324	17122	4/22/2005 12:11	1575	Ra2280422
Instrument 3 - A	7	1	1975	14677	4/22/2005 12:09	1575	Ra2280422
Instrument 3 - A	8	1	2513	18247	4/22/2005 12:06	1575	Ra2280422
Instrument 3 - B	1	1	1229	18301	4/22/2005 11:56	1575	Ra2280422
Instrument 3 - B	2	1	1119	17820	4/22/2005 11:53	1575	Ra2280422
Instrument 3 - B	3	1	1193	17468	4/22/2005 12:01	1575	Ra2280422
Instrument 3 - B	4	1	1240	17817	4/22/2005 11:58	1575	Ra2280422
Instrument 3 - B	5	1	1176	16676	4/22/2005 12:06	1575	Ra2280422
Instrument 3 - B	6	1	1317	18221	4/22/2005 12:03	1575	Ra2280422
Instrument 3 - B	7	1	1089	15236	4/22/2005 12:11	1575	Ra2280422
Instrument 3 - B	8	1	1428	19246	4/22/2005 12:09	1575	Ra2280422
Instrument 3 - C	1	1	739	18067	4/22/2005 11:58	1575	Ra2280422
Instrument 3 - C	2	1	661	17672	4/22/2005 11:56	1575	Ra2280422
Instrument 3 - C	3	1	702	17897	4/22/2005 11:53	1575	Ra2280422
Instrument 3 - C	4	1	747	17811	4/22/2005 12:01	1575	Ra2280422
Instrument 3 - C	5	1	731	17040	4/22/2005 12:09	1575	Ra2280422
Instrument 3 - C	6	1	855	18315	4/22/2005 12:06	1575	Ra2280422
Instrument 3 - C	7	1	687	15413	4/22/2005 12:04	1575	Ra2280422
Instrument 3 - C	8	1	838	19109	4/22/2005 12:11	1575	Ra2280422
Instrument 3 - D	1	1	569	18431	4/22/2005 12:01	1575	Ra2280422
Instrument 3 - D	2	1	533	17875	4/22/2005 11:58	1575	Ra2280422
Instrument 3 - D	3	1	530	18135	4/22/2005 11:56	1575	Ra2280422

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Instrument 3 - D	4	1	484	18296	4/22/2005 11:53	1575	Ra2280422
Instrument 3 - D	5	1	549	17038	4/22/2005 12:12	1575	Ra2280422
Instrument 3 - D	6	1	640	18362	4/22/2005 12:09	1575	Ra2280422
Instrument 3 - D	7	1	502	15895	4/22/2005 12:06	1575	Ra2280422
Instrument 3 - D	8	1	606	19562	4/22/2005 12:04	1575	Ra2280422
Instrument 4 - A	1	1	436	18783	4/22/2005 12:04	1575	Ra2280422
Instrument 4 - A	2	1	442	17978	4/22/2005 12:12	1575	Ra2280422
Instrument 4 - A	3	1	410	18198	4/22/2005 12:09	1575	Ra2280422
Instrument 4 - A	4	1	379	18683	4/22/2005 12:07	1575	Ra2280422
Instrument 4 - A	5	1	398	18198	4/22/2005 11:54	1575	Ra2280422
Instrument 4 - A	6	1	437	19420	4/22/2005 12:01	1575	Ra2280422
Instrument 4 - A	7	1	377	16781	4/22/2005 11:58	1575	Ra2280422
Instrument 4 - A	8	1	451	20737	4/22/2005 11:56	1575	Ra2280422
Instrument 4 - B	1	1	73	19059	4/22/2005 12:07	1575	Ra2280422
Instrument 4 - B	2	1	62	18636	4/22/2005 12:04	1575	Ra2280422
Instrument 4 - B	3	1	63	18870	4/22/2005 12:12	1575	Ra2280422
Instrument 4 - B	4	1	53	19050	4/22/2005 12:09	1575	Ra2280422
Instrument 4 - B	5	1	53	18563	4/22/2005 11:56	1575	Ra2280422
Instrument 4 - B	6	1	50	20222	4/22/2005 11:54	1575	Ra2280422
Instrument 4 - B	7	1	66	16906	4/22/2005 12:01	1575	Ra2280422
Instrument 4 - B	8	1	55	21570	4/22/2005 11:58	1575	Ra2280422
Instrument 4 - C	1	1	749	18454	4/22/2005 12:09	1575	Ra2280422
Instrument 4 - C	2	1	710	18119	4/22/2005 12:07	1575	Ra2280422
Instrument 4 - C	3	1	706	18126	4/22/2005 12:04	1575	Ra2280422
Instrument 4 - C	4	1	731	18045	4/22/2005 12:12	1575	Ra2280422
Instrument 4 - C	5	1	688	17757	4/22/2005 11:58	1575	Ra2280422
Instrument 4 - C	6	1	755	19232	4/22/2005 11:56	1575	Ra2280422
Instrument 4 - C	7	1	583	16571	4/22/2005 11:54	1575	Ra2280422
Instrument 4 - C	8	1	819	20415	4/22/2005 12:01	1575	Ra2280422
Instrument 4 - D	1	1	1271	18178	4/22/2005 12:12	1575	Ra2280422
Instrument 4 - D	2	1	1275	17622	4/22/2005 12:09	1575	Ra2280422
Instrument 4 - D	3	1	1334	18020	4/22/2005 12:07	1575	Ra2280422
Instrument 4 - D	4	1	1337	18346	4/22/2005 12:04	1575	Ra2280422
Instrument 4 - D	5	1	1245	17305	4/22/2005 12:01	1575	Ra2280422
Instrument 4 - D	6	1	1357	19186	4/22/2005 11:59	1575	Ra2280422
Instrument 4 - D	7	1	1108	16363	4/22/2005 11:56	1575	Ra2280422
Instrument 4 - D	8	1	1366	20538	4/22/2005 11:54	1575	Ra2280422

Detector	Weight (mg)	Sample I.D.	Act. Time	Alpha	Beta	Voltage	Date/Time	Alpha Xtlk
1-A	0	1	4	123180	7004	1575	7/19/2004 12:45	0.05685988
1-A	2.6	2	4	132201	10981	1575	7/19/2004 13:05	0.083062912
1-A	6.6	3	4	138183	11002	1575	7/19/2004 12:59	0.079619056
1-A	9.7	4	4	118680	9570	1575	7/19/2004 12:51	0.080637007
1-A	13.8	5	4	143739	11066	1575	7/19/2004 14:06	0.076986761
1-A	16.5	6	4	153621	11776	1575	7/19/2004 14:23	0.076656186
1-A	24.4	7	4	128978	9363	1575	7/19/2004 14:17	0.072593776
1-A	34.5	8	4	123306	9830	1575	7/19/2004 14:11	0.07972037
1-A	54.1	9	4	120306	9399	1575	7/19/2004 13:40	0.078125779
1-A	75	10	4	96614	8151	1575	7/19/2004 13:58	0.084366655
1-A	108.1	11	4	101216	8301	1575	7/19/2004 13:51	0.082012725
1-A	128.6	12	4	99107	7975	1575	7/19/2004 13:45	0.080468584
1-B	0	1	4	120045	9546	1575	7/19/2004 12:51	0.07952018
1-B	2.6	2	4	126842	15082	1575	7/19/2004 12:45	0.118903833
1-B	6.6	3	4	131004	15988	1575	7/19/2004 13:05	0.122042075
1-B	9.7	4	4	114350	12711	1575	7/19/2004 12:59	0.111158723
1-B	13.8	5	4	138417	14961	1575	7/19/2004 14:11	0.108086434
1-B	16.5	6	4	150042	15386	1575	7/19/2004 14:06	0.102544621
1-B	24.4	7	4	125522	12682	1575	7/19/2004 14:23	0.101034082
1-B	34.5	8	4	119605	13034	1575	7/19/2004 14:17	0.108975377
1-B	54.1	9	4	116711	12671	1575	7/19/2004 13:45	0.108567316
1-B	75	10	4	92948	10714	1575	7/19/2004 13:40	0.115268752
1-B	108.1	11	4	97976	10862	1575	7/19/2004 13:58	0.110863885
1-B	128.6	12	4	96418	10100	1575	7/19/2004 13:51	0.104752225
1-C	0	1	4	124296	6464	1575	7/19/2004 12:59	0.052004892
1-C	2.6	2	4	133035	10258	1575	7/19/2004 12:51	0.077107528
1-C	6.6	3	4	138090	10531	1575	7/19/2004 12:45	0.076261858
1-C	9.7	4	4	120943	8343	1575	7/19/2004 13:05	0.068982909
1-C	13.8	5	4	144733	10074	1575	7/19/2004 14:18	0.069604029
1-C	16.5	6	4	155042	10804	1575	7/19/2004 14:11	0.069684344
1-C	24.4	7	4	130663	8868	1575	7/19/2004 14:06	0.067869251
1-C	34.5	8	4	125003	8910	1575	7/19/2004 14:23	0.071278289
1-C	54.1	9	4	121804	8748	1575	7/19/2004 13:51	0.071820301
1-C	75	10	4	98322	7255	1575	7/19/2004 13:45	0.073788165
1-C	108.1	11	4	102220	7796	1575	7/19/2004 13:40	0.076266875
1-C	128.6	12	4	101129	7164	1575	7/19/2004 13:58	0.070840214
1-D	0	1	4	123443	8458	1575	7/19/2004 13:05	0.068517453
1-D	2.6	2	4	132199	13898	1575	7/19/2004 12:59	0.105129388
1-D	6.6	3	4	135550	13902	1575	7/19/2004 12:51	0.102559941
1-D	9.7	4	4	120103	11392	1575	7/19/2004 12:45	0.094851919
1-D	13.8	5	4	143729	13676	1575	7/19/2004 14:23	0.095151292
1-D	16.5	6	4	154502	14607	1575	7/19/2004 14:18	0.094542465
								AVERAGE:
								0.077592474
								AVERAGE:
								0.107643125
								AVERAGE:
								0.070459055

AXTLK

1-D	24.4	7	4	129531	12207	1575	7/19/2004 14:11	0.094239989
1-D	34.5	8	4	123012	12757	1575	7/19/2004 14:06	0.10370533
1-D	54.1	9	4	120150	11613	1575	7/19/2004 13:58	0.096654182
1-D	75	10	4	98215	9779	1575	7/19/2004 13:51	0.099567276
1-D	108.1	11	4	101194	10974	1575	7/19/2004 13:45	0.108445165
1-D	128.6	12	4	99535	9759	1575	7/19/2004 13:40	0.098045913
2-A	0	1	4	124331	4254	1575	7/19/2004 13:12	0.034215119
2-A	2.6	2	4	134232	6233	1575	7/19/2004 13:32	0.046434531
2-A	6.6	2	4	140069	6405	1575	7/19/2004 13:26	0.045727463
2-A	9.7	3	4	122889	5590	1575	7/19/2004 13:20	0.045488205
2-A	13.8	5	4	146863	6837	1575	7/19/2004 12:45	0.046553591
2-A	16.5	6	4	156568	7018	1575	7/19/2004 13:05	0.044823974
2-A	24.4	7	4	131381	6012	1575	7/19/2004 12:59	0.045760041
2-A	34.5	8	4	127176	5984	1575	7/19/2004 12:51	0.047052903
2-A	54.1	9	4	123077	5740	1575	7/19/2004 14:06	0.046637471
2-A	75	10	4	98942	5507	1575	7/19/2004 14:23	0.055658871
2-A	108.1	11	4	104001	4825	1575	7/19/2004 14:18	0.046393785
2-A	128.6	12	4	101917	4956	1575	7/19/2004 14:11	0.048627805
2-B	0	2	4	120721	11567	1575	7/19/2004 13:20	0.095815972
2-B	2.6	3	4	126556	19106	1575	7/19/2004 13:12	0.150968741
2-B	6.6	3	4	132197	19354	1575	7/19/2004 13:32	0.146402717
2-B	9.7	4	4	115049	16847	1575	7/19/2004 13:26	0.146433259
2-B	13.8	5	4	138737	20181	1575	7/19/2004 12:52	0.145462278
2-B	16.5	6	4	148544	21207	1575	7/19/2004 12:46	0.14276578
2-B	24.4	7	4	124653	17331	1575	7/19/2004 13:05	0.139033958
2-B	34.5	8	4	120407	18554	1575	7/19/2004 12:59	0.154094031
2-B	54.1	9	4	116092	17170	1575	7/19/2004 14:11	0.147899941
2-B	75	10	4	93838	14131	1575	7/19/2004 14:06	0.150589313
2-B	108.1	11	4	96549	14386	1575	7/19/2004 14:23	0.149002061
2-B	128.6	12	4	95608	14028	1575	7/19/2004 14:18	0.146724124
2-C	0	1	4	123437	7996	1575	7/19/2004 13:26	0.064777984
2-C	6.6	3	4	130582	12877	1575	7/19/2004 13:21	0.098612366
2-C	2.6	4	4	135962	13321	1575	7/19/2004 13:12	0.097975905
2-C	9.7	4	4	117914	10926	1575	7/19/2004 13:32	0.092660753
2-C	13.8	5	4	142788	13288	1575	7/19/2004 12:59	0.093061042
2-C	16.5	6	4	152660	14110	1575	7/19/2004 12:52	0.092427617
2-C	24.4	7	4	128133	11613	1575	7/19/2004 12:46	0.09063239
2-C	34.5	8	4	123135	12371	1575	7/19/2004 13:05	0.100466967
2-C	54.1	9	4	119749	11112	1575	7/19/2004 14:18	0.092794094
2-C	75	10	4	96802	9106	1575	7/19/2004 14:11	0.094068304
2-C	108.1	11	4	99510	9531	1575	7/19/2004 14:06	0.095779319
2-C	128.6	12	4	99332	9346	1575	7/19/2004 14:23	0.094088511
2-D	0	1	4	124985	3697	1575	7/19/2004 13:32	0.02957955
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2-D	9.7	4	4	120900	4856	1575	7/19/2004 13:12	0.040165426
2-D	13.8	5	4	146331	5790	1575	7/19/2004 13:05	0.039567829
2-D	16.5	6	4	156656	6547	1575	7/19/2004 12:59	0.041792207
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2-D	54.1	9	4	122996	5076	1575	7/19/2004 14:24	0.041269635
2-D	75	10	4	98974	5113	1575	7/19/2004 14:18	0.051660032
2-D	108.1	11	4	103311	4367	1575	7/19/2004 14:11	0.042270426
2-D	128.6	12	4	101622	4274	1575	7/19/2004 14:06	0.042057822
3-A	0	1	4	122186	4445	1575	7/19/2004 13:40	0.036378963
3-A	2.6	2	4	130339	5572	1575	7/19/2004 13:58	0.042750059
3-A	6.6	3	4	140222	5810	1575	7/19/2004 13:51	0.041434297
3-A	9.7	4	4	119964	4894	1575	7/19/2004 13:45	0.040795572
3-A	13.8	5	4	143053	6082	1575	7/19/2004 13:12	0.042515711
3-A	16.5	6	4	153829	6793	1575	7/19/2004 13:33	0.044159424
3-A	24.4	7	4	126901	5289	1575	7/19/2004 13:27	0.041678159
3-A	34.5	8	4	123020	5105	1575	7/19/2004 13:21	0.041497318
3-A	54.1	9	4	120698	4933	1575	7/19/2004 12:46	0.040870603
3-A	75	10	4	97187	4395	1575	7/19/2004 13:05	0.045222098
3-A	108.1	11	4	101168	4293	1575	7/19/2004 13:00	0.042434367
3-A	128.6	12	4	99836	4174	1575	7/19/2004 12:52	0.041808566
3-B	0	1	4	121402	5014	1575	7/19/2004 13:45	0.041300802
3-B	2.6	2	4	129690	6779	1575	7/19/2004 13:40	0.0522708
3-B	6.6	3	4	138571	6967	1575	7/19/2004 13:58	0.050277475
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3-B	13.8	5	4	143658	7295	1575	7/19/2004 13:21	0.050780325
3-B	16.5	6	4	153281	7805	1575	7/19/2004 13:12	0.050919553
3-B	24.4	7	4	127795	6233	1575	7/19/2004 13:33	0.048773426
3-B	34.5	8	4	123289	6301	1575	7/19/2004 13:27	0.05110756
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3-B	75	10	4	96420	5434	1575	7/19/2004 12:46	0.056357602
3-B	108.1	11	4	101324	5330	1575	7/19/2004 13:05	0.052603529
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3-C	9.7	4	4	117244	5109	1575	7/19/2004 13:59	0.043575791
3-C	13.8	5	4	140315	6224	1575	7/19/2004 13:27	0.044357339
3-C	16.5	6	4	149844	6728	1575	7/19/2004 13:21	0.044900029
3-C	24.4	7	4	124407	5022	1575	7/19/2004 13:12	0.040367503
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3-C	108.1	11	4	98791	4743	1575	7/19/2004 12:46	0.048010446
3-C	128.6	12	4	98385	4632	1575	7/19/2004 13:05	0.047080348
3-D	0	1	4	116626	3829	1575	7/19/2004 13:59	0.032831444
3-D	2.6	2	4	120065	5035	1575	7/19/2004 13:51	0.041935618
3-D	6.6	3	4	133070	6019	1575	7/19/2004 13:45	0.045231833
3-D	9.7	4	4	112803	5203	1575	7/19/2004 13:40	0.04612466
3-D	13.8	5	4	135629	6272	1575	7/19/2004 13:33	0.046243797
3-D	16.5	6	4	145863	6984	1575	7/19/2004 13:27	0.047880545
3-D	24.4	7	4	121303	5235	1575	7/19/2004 13:21	0.043156393
3-D	34.5	8	4	118060	5449	1575	7/19/2004 13:12	0.046154498
3-D	54.1	9	4	114887	5495	1575	7/19/2004 13:05	0.047829606
3-D	75	10	4	91763	5562	1575	7/19/2004 13:00	0.060612665
3-D	108.1	11	4	96450	4792	1575	7/19/2004 12:52	0.049683774
3-D	128.6	12	4	93522	4729	1575	7/19/2004 12:46	0.050565642
4-A	0	1	4	120076	5726	1575	7/19/2004 14:05	0.047686465
4-A	2.6	2	4	129124	8209	1575	7/19/2004 14:24	0.063574548
4-A	6.6	3	4	135773	8094	1575	7/19/2004 14:18	0.059614209
4-A	9.7	4	4	117817	6776	1575	7/19/2004 14:12	0.057512923
4-A	13.8	5	4	140420	8331	1575	7/19/2004 13:40	0.059329155
4-A	16.5	6	4	150631	8981	1575	7/19/2004 13:59	0.059622521
4-A	24.4	7	4	126148	7123	1575	7/19/2004 13:51	0.056465422
4-A	34.5	8	4	121316	7207	1575	7/19/2004 13:46	0.059406838
4-A	54.1	9	4	118329	7059	1575	7/19/2004 13:13	0.059655706
4-A	75	10	4	94634	6413	1575	7/19/2004 13:33	0.067766342
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4-A	128.6	12	4	98809	5913	1575	7/19/2004 13:21	0.059842727
4-B	0	1	4	114878	6464	1575	7/19/2004 14:12	0.056268389
4-B	2.6	2	4	120144	9787	1575	7/19/2004 14:05	0.081460581
4-B	6.6	3	4	130808	11221	1575	7/19/2004 14:24	0.085782215
4-B	9.7	4	4	112163	9518	1575	7/19/2004 14:18	0.084858643
4-B	13.8	5	4	134597	11874	1575	7/19/2004 13:46	0.088218905
4-B	16.5	6	4	140671	12325	1575	7/19/2004 13:40	0.087615784
4-B	24.4	7	4	119419	9576	1575	7/19/2004 13:59	0.080189245
4-B	34.5	8	4	115264	10105	1575	7/19/2004 13:52	0.087668309
4-B	54.1	9	4	114888	10477	1575	7/19/2004 13:21	0.091193162
4-B	75	10	4	88706	9932	1575	7/19/2004 13:13	0.111965369
4-B	108.1	11	4	94176	8845	1575	7/19/2004 13:33	0.093919895
4-B	128.6	12	4	93601	8766	1575	7/19/2004 13:27	0.093652846
4-C	0	1	4	118134	3354	1575	7/19/2004 14:18	0.028391488
4-C	2.6	2	4	125302	4459	1575	7/19/2004 14:12	0.035586024
4-C	6.6	3	4	135611	5208	1575	7/19/2004 14:05	0.038403964
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AXTLK

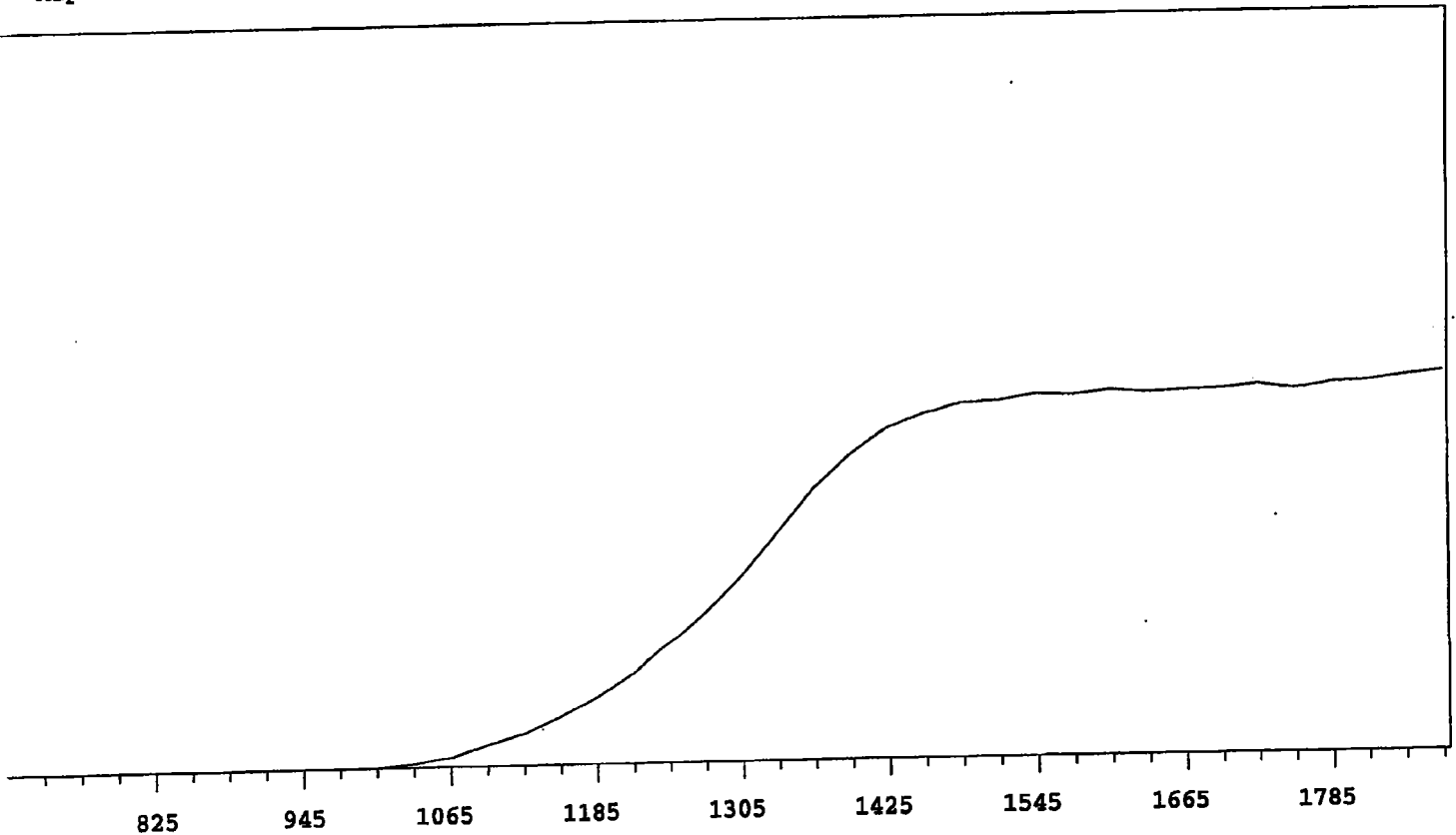
4-C	9.7	4	4	116746	4631	1575	7/19/2004 14:24	0.0396667312
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4-C	75	10	4	93892	4984	1575	7/19/2004 13:21	0.053082265
4-C	108.1	11	4	98070	4263	1575	7/19/2004 13:13	0.043468951
4-C	128.6	12	4	97189	4294	1575	7/19/2004 13:33	0.044181955
4-D	0	1	4	124733	4617	1575	7/19/2004 14:24	0.037015064
4-D	2.6	2	4	132301	5960	1575	7/19/2004 14:18	0.04504879
4-D	6.6	3	4	142954	6245	1575	7/19/2004 14:12	0.043685381
4-D	9.7	4	4	121909	5303	1575	7/19/2004 14:05	0.04349966
4-D	13.8	5	4	145491	6551	1575	7/19/2004 13:59	0.04502684
4-D	16.5	6	4	157710	7062	1575	7/19/2004 13:52	0.044778391
4-D	24.4	7	4	130628	5760	1575	7/19/2004 13:46	0.044094681
4-D	34.5	8	4	125691	5573	1575	7/19/2004 13:40	0.044338895
4-D	54.1	9	4	124488	5406	1575	7/19/2004 13:33	0.043425872
4-D	75	10	4	98537	4867	1575	7/19/2004 13:27	0.049392614
4-D	108.1	11	4	103586	4711	1575	7/19/2004 13:21	0.045479119
4-D	128.6	12	4	101025	4587	1575	7/19/2004 13:13	0.045404603
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Plateau 07/04

Instrument 1 MPC 9604 Detector A

7/19/2004

Alpha Volts: 1575 Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19647	+66.40
735	1		1335	24085	+56.97
765	0		1365	28472	+45.24
795	0	>100	1395	31886	+32.36
825	0	>100	1425	34566	+21.39
855	0	>100	1455	36094	+12.77
885	0	>100	1485	37160	+7.52
915	0	>100	1515	37374	+4.09
945	2	>100	1545	38060	+2.67
975	9	>100	1575	37933	+1.53
1005	93	>100	1605	38395	+0.47
1035	472	>100	1635	38079	+0.70
1065	1107	>100	1665	38254	+0.98
1095	2321	>100	1695	38405	+0.88
1125	3514	>100	1725	38794	+0.97
1155	5227	>100	1755	38316	+1.20
1185	7099	+98.30	1785	38858	+2.01
1215	9425	+88.55	1815	39067	+3.46
1245	12574	+81.27	1845	39590	
1275	15807	+74.39	1875	39984	

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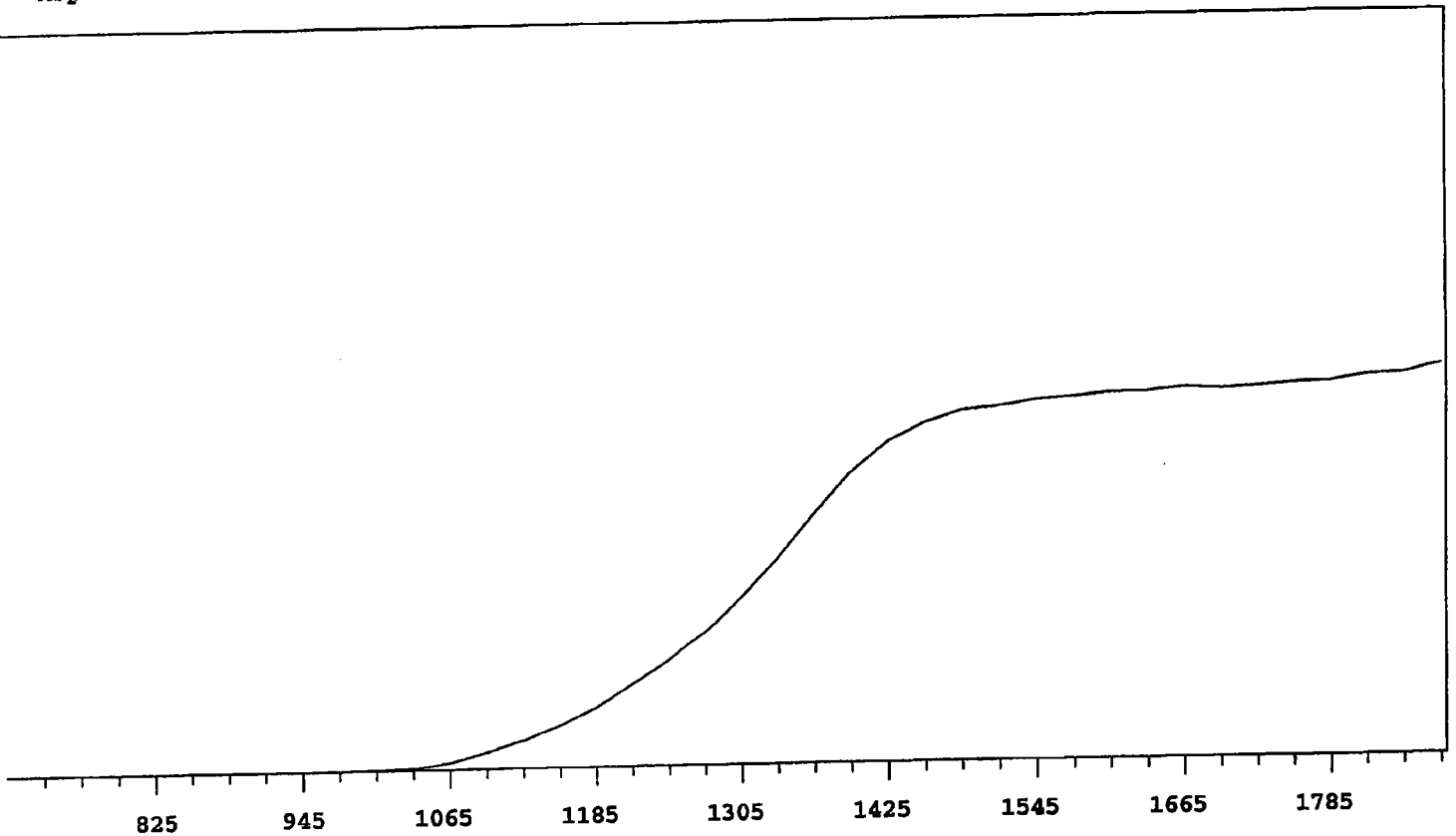
Plateau 07/04

Instrument 1 MPC 9604 Detector B

7/19/2004

Alpha Volts: 1575

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	18233	+71.56
735	0		1335	22329	+63.09
765	0		1365	26957	+52.29
795	0	>100	1395	31333	+40.07
825	0	>100	1425	34676	+27.41
855	0	>100	1455	36745	+16.34
885	0	>100	1485	38047	+9.30
915	0	>100	1515	38436	+5.37
945	1	>100	1545	39049	+3.58
975	1	>100	1575	39332	+2.73
1005	28	>100	1605	39689	+2.17
1035	189	>100	1635	39721	+1.41
1065	694	>100	1665	40142	+0.97
1095	1704	>100	1695	39944	+1.22
1125	2895	>100	1725	40159	+1.15
1155	4335	>100	1755	40445	+2.43
1185	6174	>100	1785	40586	+2.67
1215	8490	+93.12	1815	41204	+3.66
1245	11048	+85.61	1845	41412	
1275	14282	+78.12	1875	42292	

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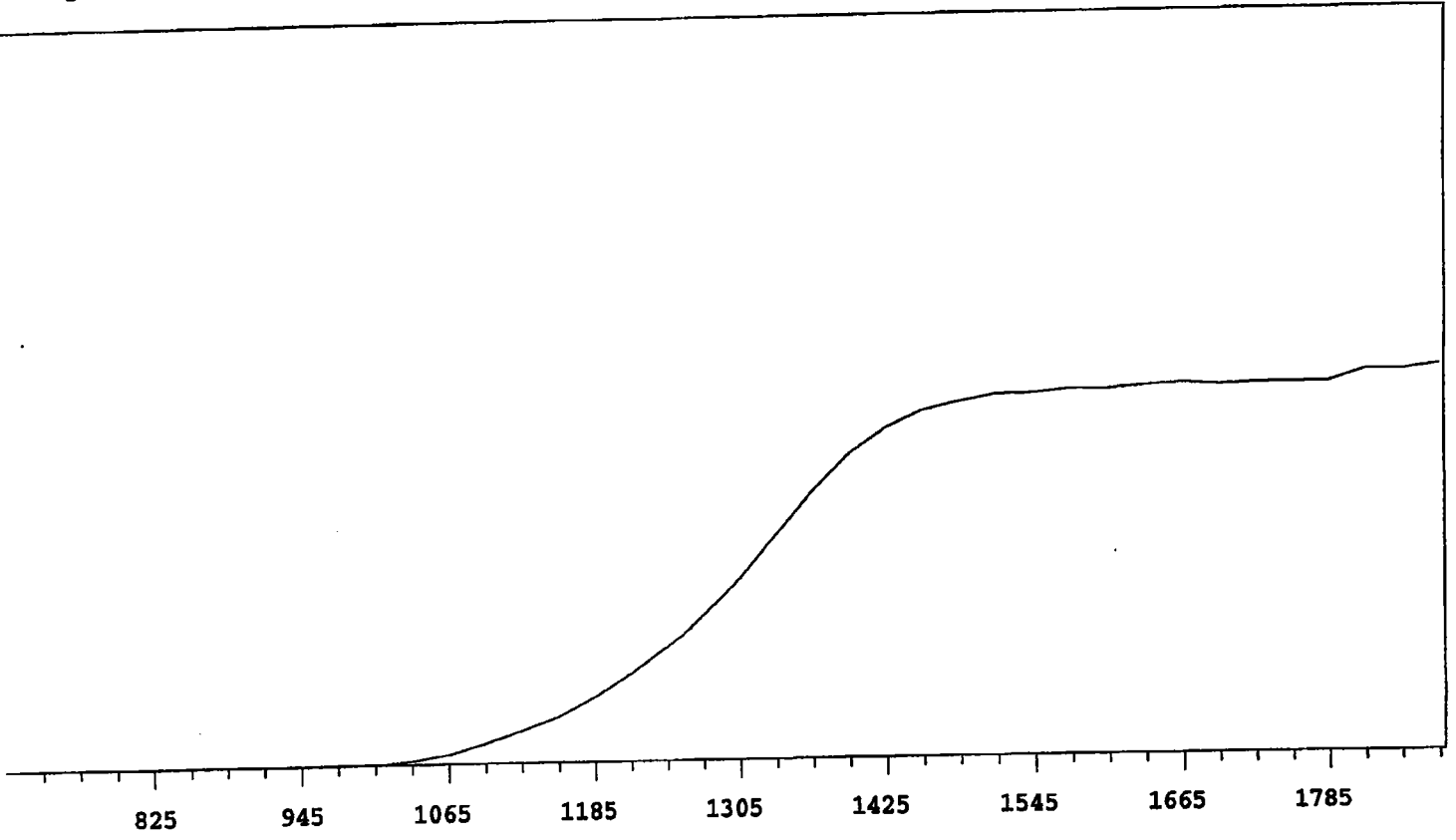
Plateau 07/04

Instrument 1 MPC 9604 Detector C

7/19/2004

Alpha Volts: 1575

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19843	+68.09
735	0		1335	24383	+58.12
765	0		1365	28965	+46.47
795	0	>100	1395	32739	+33.67
825	0	>100	1425	35363	+22.02
855	0	>100	1455	37211	+13.59
885	0	>100	1485	38118	+7.60
915	0	>100	1515	38793	+4.20
945	0	>100	1545	38869	+2.24
975	6	>100	1575	39257	+1.56
1005	67	>100	1605	39192	+1.77
1035	384	>100	1635	39548	+0.99
1065	1049	>100	1665	39770	+0.83
1095	2181	>100	1695	39557	+0.19
1125	3529	>100	1725	39678	+0.06
1155	4985	>100	1755	39708	+2.33
1185	7117	+98.92	1785	39728	+3.00
1215	9603	+91.00	1815	40929	+3.79
1245	12383	+81.78	1845	40873	
1275	16035	+75.02	1875	41442	

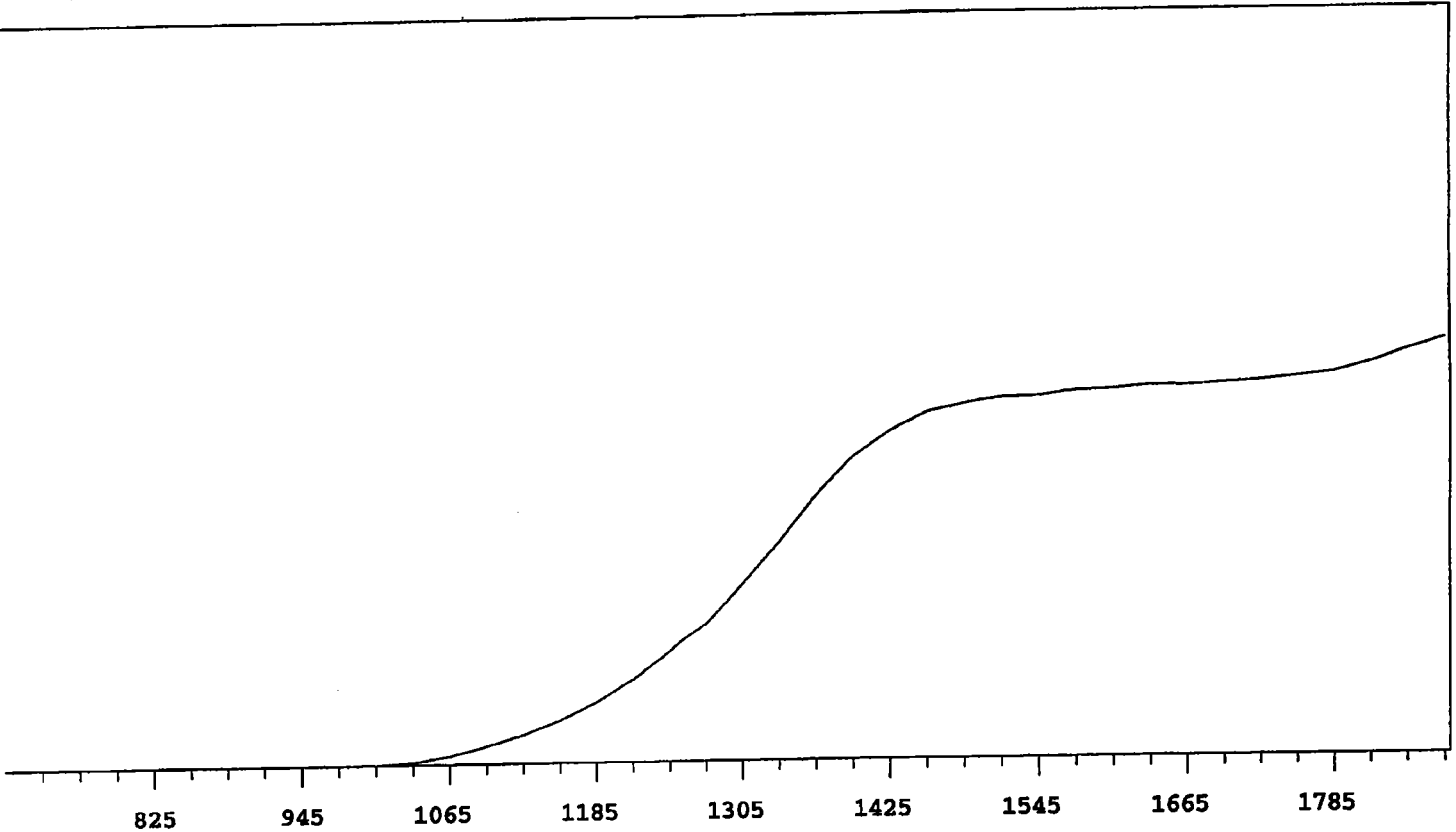
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Plateau 07/04

Instrument 1 MPC 9604 Detector D

7/19/2004

Alpha Volts: 1575 Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	18119	+70.98
735	0		1335	22262	+62.06
765	0		1365	26838	+49.29
795	0	>100	1395	30731	+36.23
825	0	>100	1425	33292	+23.33
855	0	>100	1455	35153	+13.90
885	1	>100	1485	35963	+7.60
915	0	>100	1515	36553	+4.34
945	1	>100	1545	36642	+2.93
975	3	>100	1575	37178	+2.39
1005	38	>100	1605	37266	+1.96
1035	235	>100	1635	37570	+1.40
1065	812	>100	1665	37540	+1.51
1095	1784	>100	1695	37829	+1.86
1125	2940	>100	1725	37991	+2.68
1155	4370	>100	1755	38402	+4.04
1185	6148	>100	1785	38788	+6.23
1215	8306	+93.10	1815	39767	+7.92
1245	11151	+85.86	1845	40972	
1275	14209	+78.51	1875	42061	

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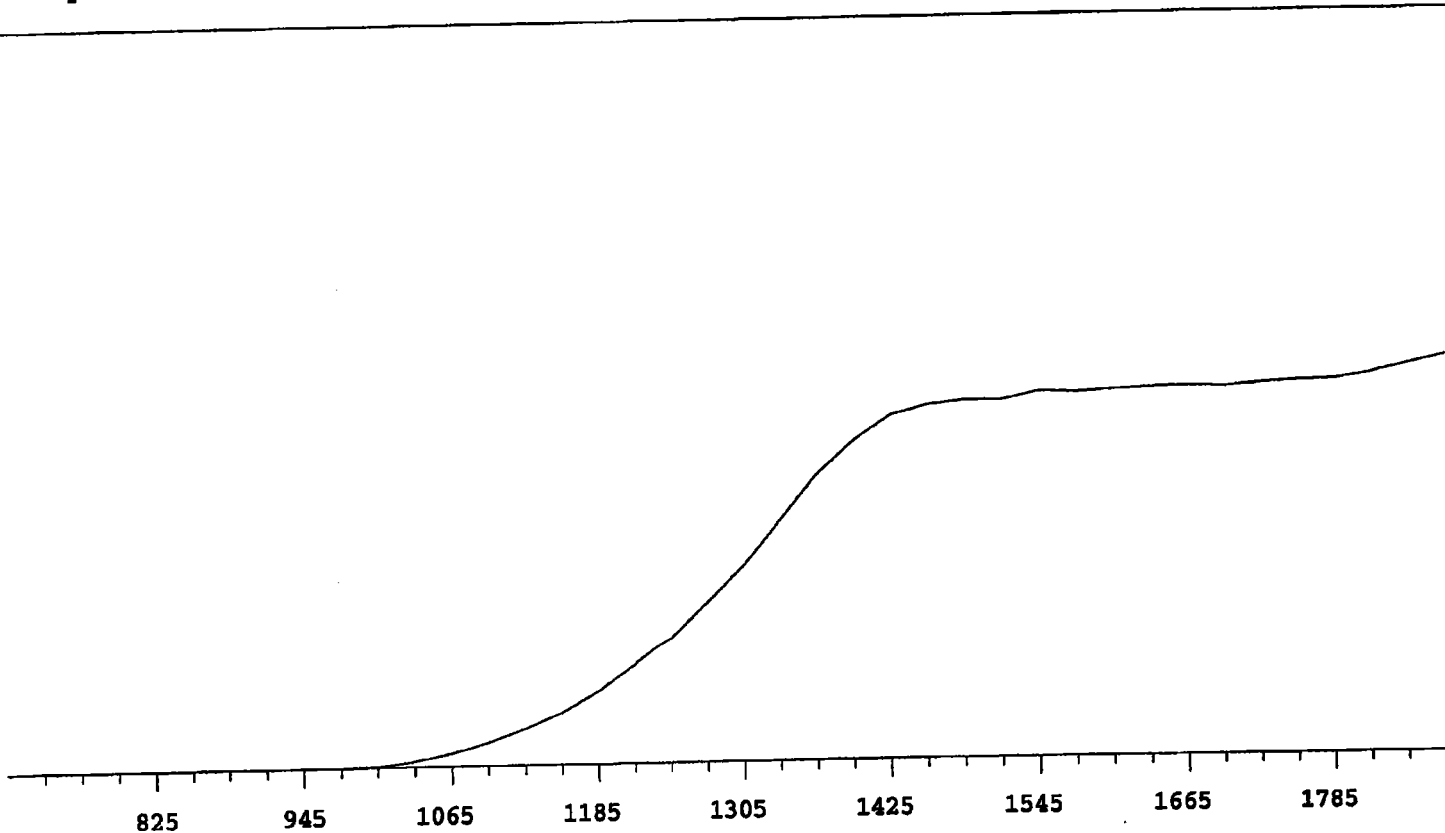
Plateau 07/04

Instrument 2 MPC 9604 Detector A

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	23851	+64.66
735	0		1335	29020	+54.28
765	0		1365	34107	+43.53
795	0	>100	1395	37915	+30.25
825	0	>100	1425	41080	+18.36
855	0	>100	1455	42265	+9.28
885	0	>100	1485	42852	+4.65
915	0	>100	1515	42788	+2.83
945	1	>100	1545	43789	+2.26
975	31	>100	1575	43625	+2.13
1005	186	>100	1605	43907	+1.05
1035	709	>100	1635	44123	+0.93
1065	1655	>100	1665	44235	+0.77
1095	2913	>100	1695	44074	+1.03
1125	4590	>100	1725	44441	+1.31
1155	6428	>100	1755	44707	+2.55
1185	8824	+94.92	1785	44790	+3.80
1215	11872	+87.83	1815	45612	+5.33
1245	15239	+79.24	1845	46564	
1275	19527	+71.87	1875	47485	

*mmh*

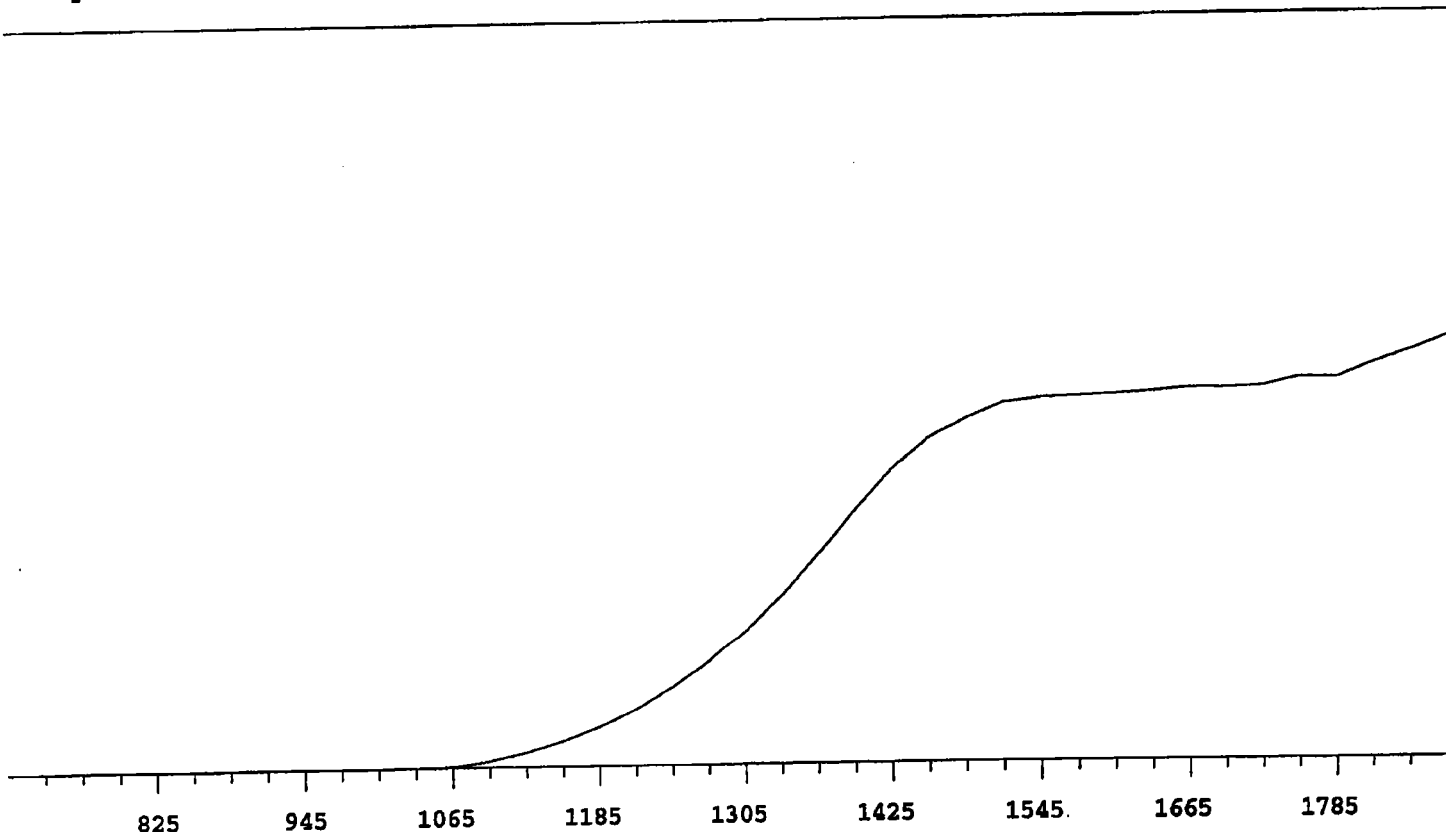
Plateau 07/04

Instrument 2 MPC 9604 Detector B

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	1	>100
1035	25	>100
1065	181	>100
1095	642	>100
1125	1508	>100
1155	2634	>100
1185	4092	>100
1215	5839	>100
1245	8055	+95.00
1275	10574	+86.26
1305	13796	+79.13
1335	17365	+72.79
1365	21609	+64.02
1395	26226	+52.97
1425	30369	+39.49
1455	33493	+27.22
1485	35403	+16.91
1515	36977	+9.40
1545	37438	+4.79
1575	37579	+2.09
1605	37762	+1.97
1635	37995	+1.78
1665	38346	+1.51
1695	38303	+2.41
1725	38472	+2.43
1755	39326	+4.86
1785	39246	+7.18
1815	40775	+8.99
1845	42052	
1875	43445	

VOLTS	COUNTS	%/100 Volts
1305	13796	+79.13
1335	17365	+72.79
1365	21609	+64.02
1395	26226	+52.97
1425	30369	+39.49
1455	33493	+27.22
1485	35403	+16.91
1515	36977	+9.40
1545	37438	+4.79
1575	37579	+2.09
1605	37762	+1.97
1635	37995	+1.78
1665	38346	+1.51
1695	38303	+2.41
1725	38472	+2.43
1755	39326	+4.86
1785	39246	+7.18
1815	40775	+8.99
1845	42052	
1875	43445	

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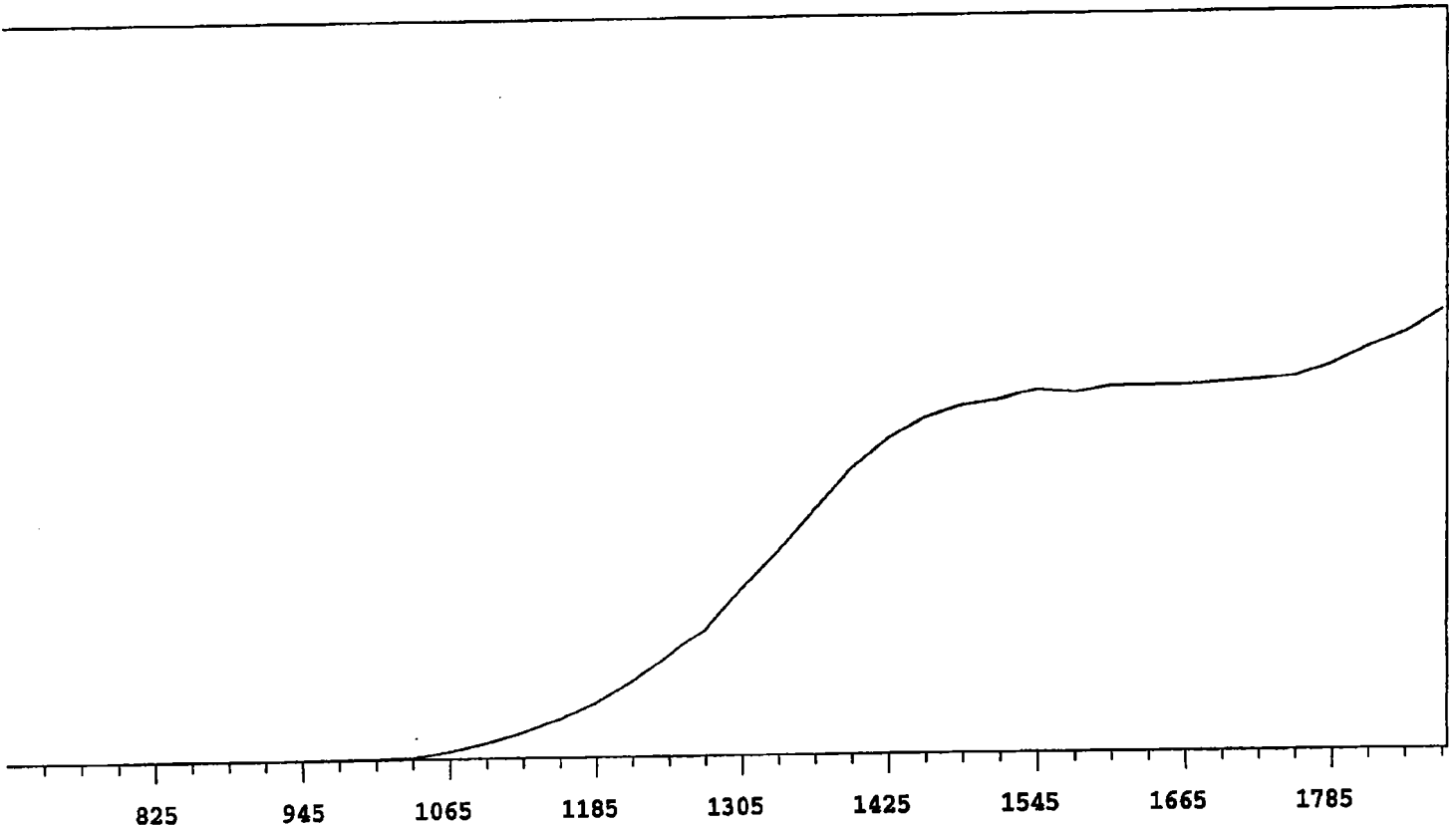
Plateau 07/04

Instrument 2 MPC 9604 Detector C

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	15462	+71.07
735	0		1335	18841	+62.11
765	0		1365	22516	+50.11
795	0	>100	1395	26055	+38.36
825	0	>100	1425	28616	+26.36
855	0	>100	1455	30333	+16.13
885	0	>100	1485	31358	+10.48
915	0	>100	1515	31858	+5.90
945	0	>100	1545	32724	+4.01
975	2	>100	1575	32459	+2.65
1005	34	>100	1605	33001	+1.27
1035	198	>100	1635	33015	+1.78
1065	678	>100	1665	33071	+1.30
1095	1441	>100	1695	33306	+2.08
1125	2391	>100	1725	33504	+4.14
1155	3604	>100	1755	33840	+7.46
1185	5105	>100	1785	34896	+10.40
1215	7080	+93.85	1815	36461	+13.37
1245	9331	+87.10	1845	37695	
1275	11919	+78.91	1875	39769	

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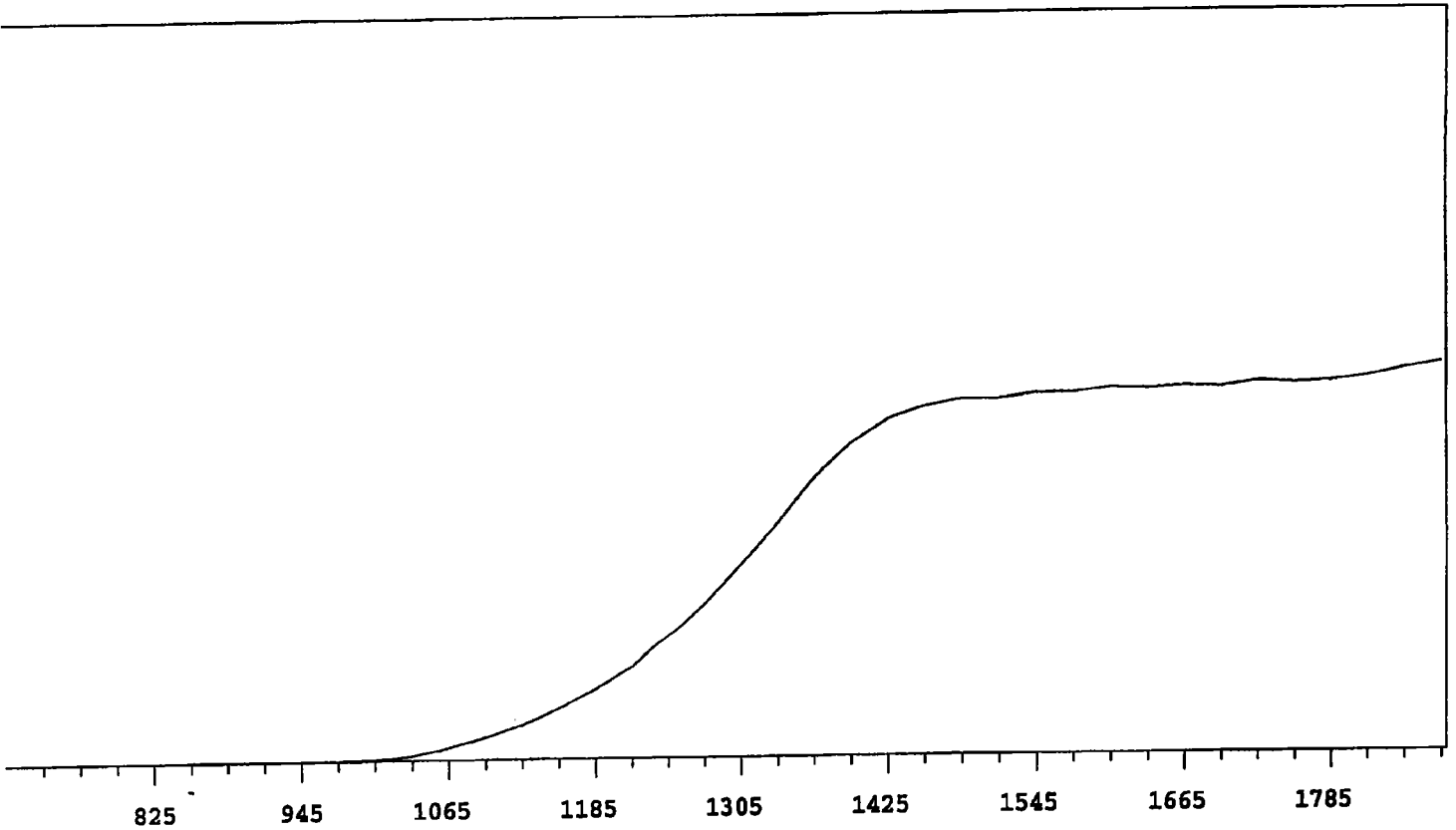
Plateau 07/04

Instrument 2 MPC 9604 Detector D

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	24635	+66.12
735	0		1335	29835	+56.19
765	0		1365	35285	+43.75
795	0	>100	1395	39469	+30.76
825	0	>100	1425	42337	+19.13
855	0	>100	1455	43919	+10.31
885	0	>100	1485	44875	+5.61
915	0	>100	1515	44862	+3.06
945	2	>100	1545	45596	+2.54
975	19	>100	1575	45621	+2.21
1005	153	>100	1605	46227	+1.45
1035	638	>100	1635	46064	+0.97
1065	1652	>100	1665	46372	+1.14
1095	2965	>100	1695	46217	+1.30
1125	4560	>100	1725	46942	+1.05
1155	6605	>100	1755	46688	+1.70
1185	9052	+95.03	1785	46874	+2.68
1215	11639	+87.08	1815	47445	+4.76
1245	15562	+81.12	1845	48467	
1275	19691	+74.76	1875	49304	

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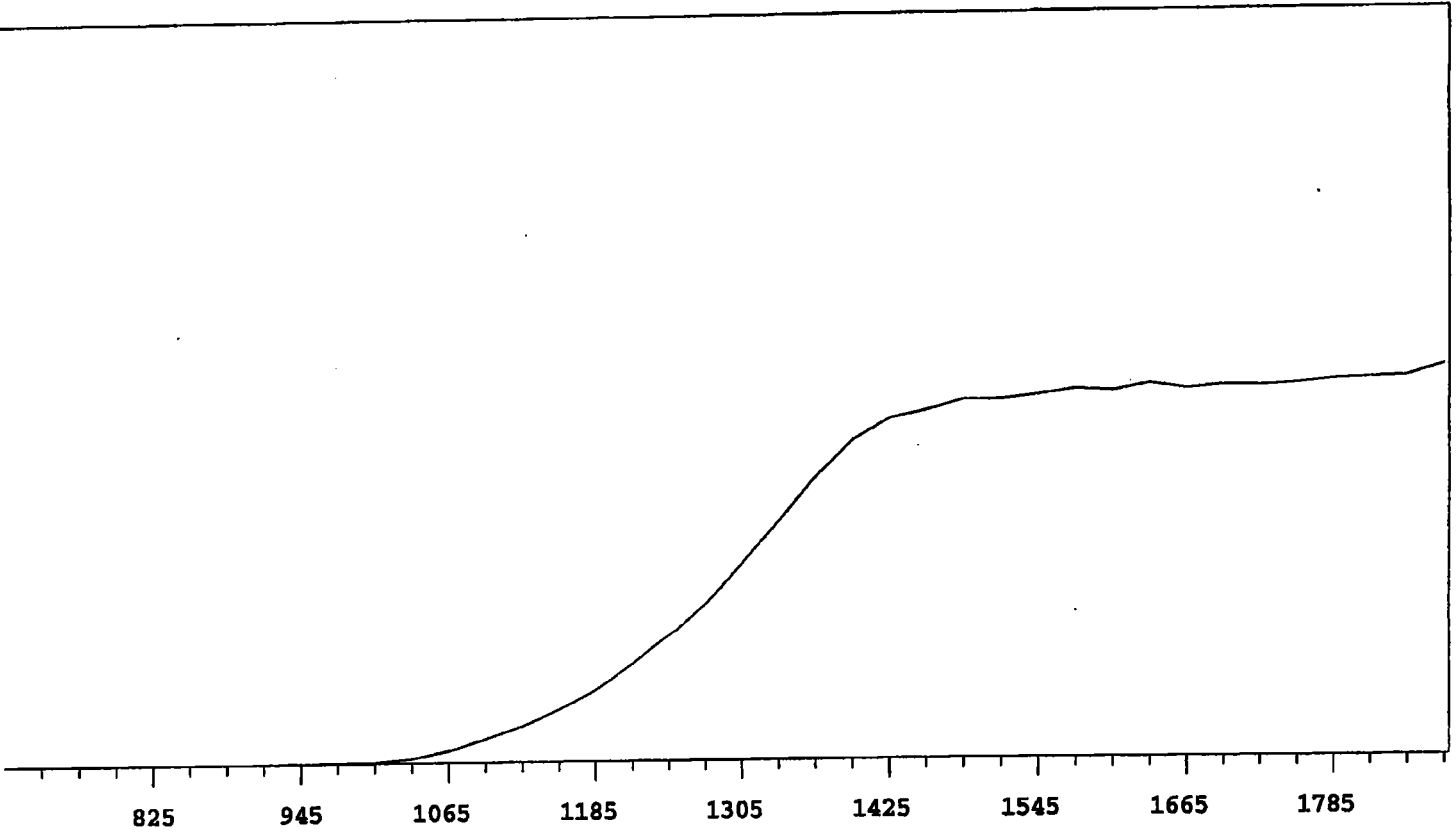
Plateau 07/04

Instrument 3 MPC 9604 Detector A

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	21575	+65.87
735	0		1335	26174	+56.59
765	0		1365	30896	+44.00
795	0	>100	1395	34809	+29.89
825	1	+0.00	1425	37134	+18.34
855	0	>100	1455	38035	+9.55
885	0	>100	1485	39191	+5.33
915	0	>100	1515	39178	+4.07
945	0	>100	1545	39651	+2.17
975	18	>100	1575	40203	+2.85
1005	109	>100	1605	39970	+1.23
1035	454	>100	1635	40729	+0.64
1065	1261	>100	1665	40127	+0.51
1095	2472	>100	1695	40509	+0.10
1125	3802	>100	1725	40387	+1.66
1155	5583	>100	1755	40662	+1.77
1185	7639	+99.85	1785	41060	+2.16
1215	10514	+89.69	1815	41255	+3.34
1245	13685	+81.66	1845	41417	
1275	17277	+73.24	1875	42557	

*g 7/22/04*

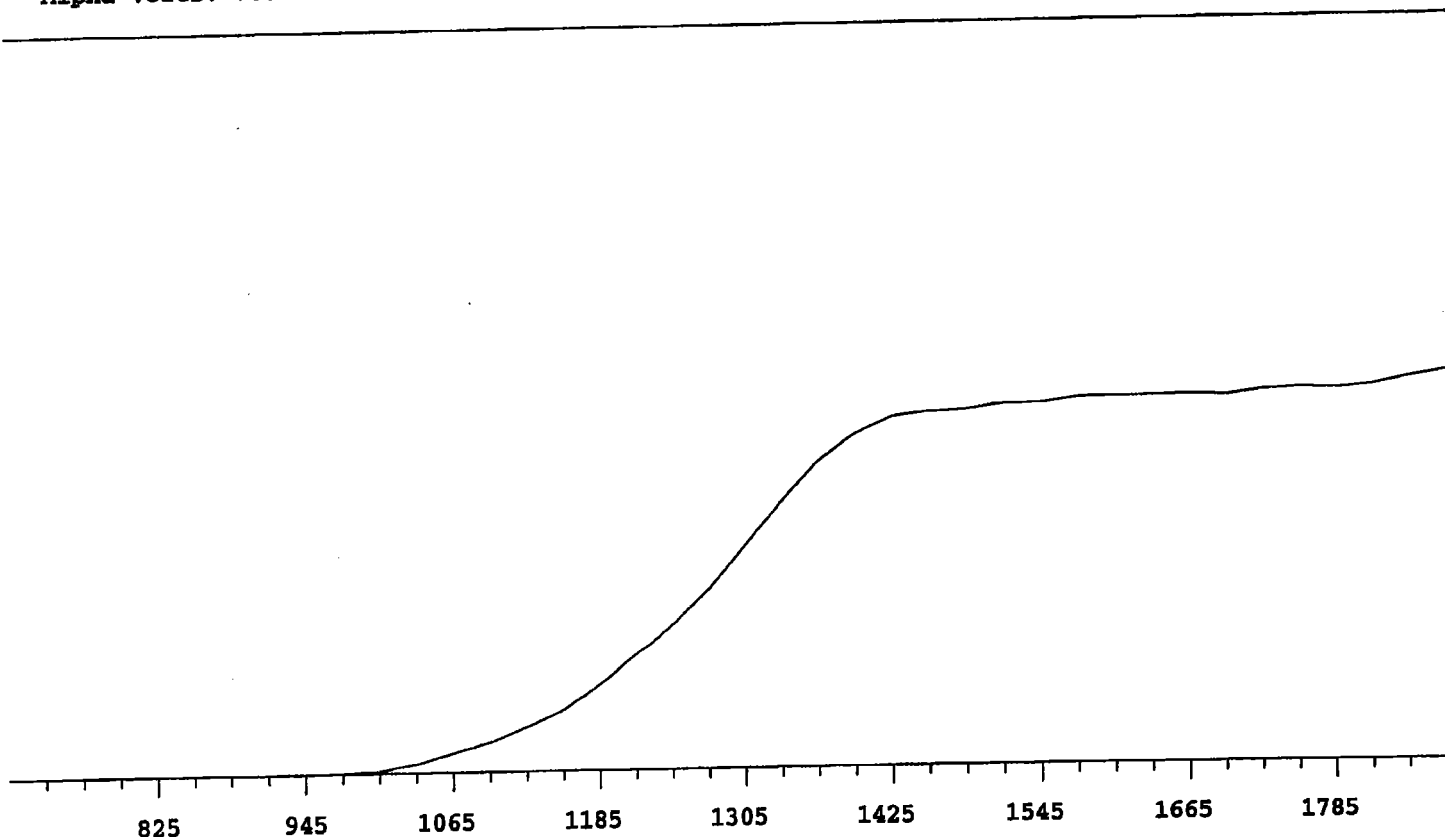
Plateau 07/04

Instrument 3 MPC 9604 Detector B

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19165	+59.15
735	0		1335	22642	+47.93
765	0		1365	25877	+34.84
795	0	>100	1395	28084	+22.41
825	0	>100	1425	29543	+12.08
855	0	>100	1455	29959	+6.28
885	0	>100	1485	30142	+3.11
915	0	>100	1515	30579	+2.97
945	4	>100	1545	30642	+2.65
975	46	>100	1575	31069	+1.73
1005	241	>100	1605	31120	+1.39
1035	763	>100	1635	31142	+0.31
1065	1642	>100	1665	31255	+0.92
1095	2578	>100	1695	31148	+1.60
1125	3908	>100	1725	31549	+1.43
1155	5339	>100	1755	31750	+1.73
1185	7437	+92.71	1785	31631	+2.34
1215	9881	+83.26	1815	31928	+3.75
1245	12503	+75.07	1845	32580	
1275	15447	+67.35	1875	33087	

*Jan 7/2004*

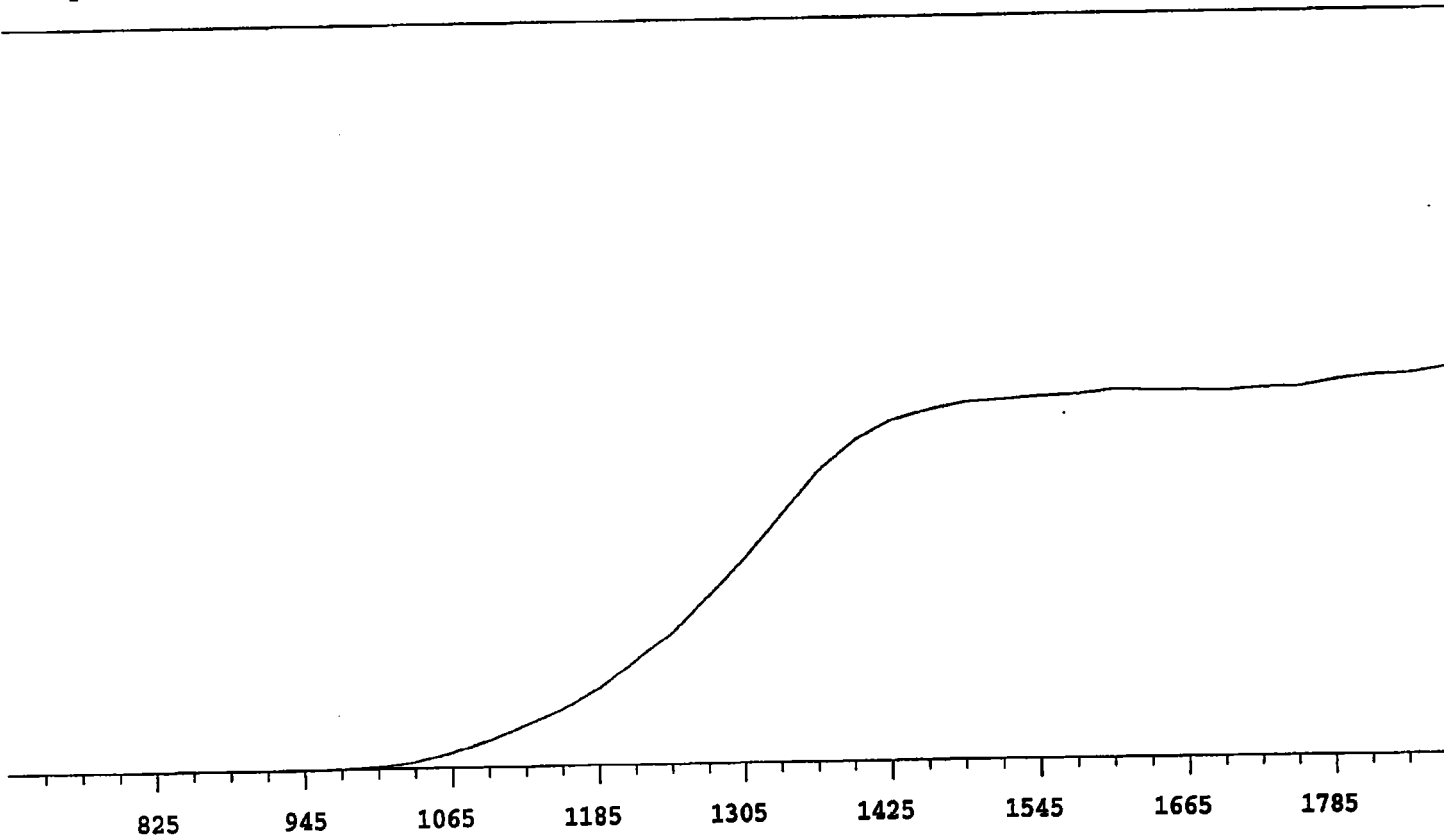
Plateau 07/04

Instrument 3 MPC 9604 Detector C

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	21337	+62.41
735	0		1335	25676	+51.87
765	0		1365	30007	+39.96
795	0	>100	1395	33079	+26.87
825	0	>100	1425	35034	+16.03
855	0	>100	1455	36048	+8.88
885	0	>100	1485	36739	+4.80
915	1	>100	1515	36965	+2.78
945	2	>100	1545	37198	+2.19
975	33	>100	1575	37358	+1.72
1005	226	>100	1605	37766	+1.06
1035	678	>100	1635	37648	+0.24
1065	1589	>100	1665	37650	+0.01
1095	2696	>100	1695	37553	+0.60
1125	4193	>100	1725	37820	+1.80
1155	5866	>100	1755	37904	+3.02
1185	7961	+94.24	1785	38499	+3.09
1215	10746	+87.02	1815	38941	+3.56
1245	13783	+78.35	1845	39086	
1275	17549	+69.99	1875	39684	

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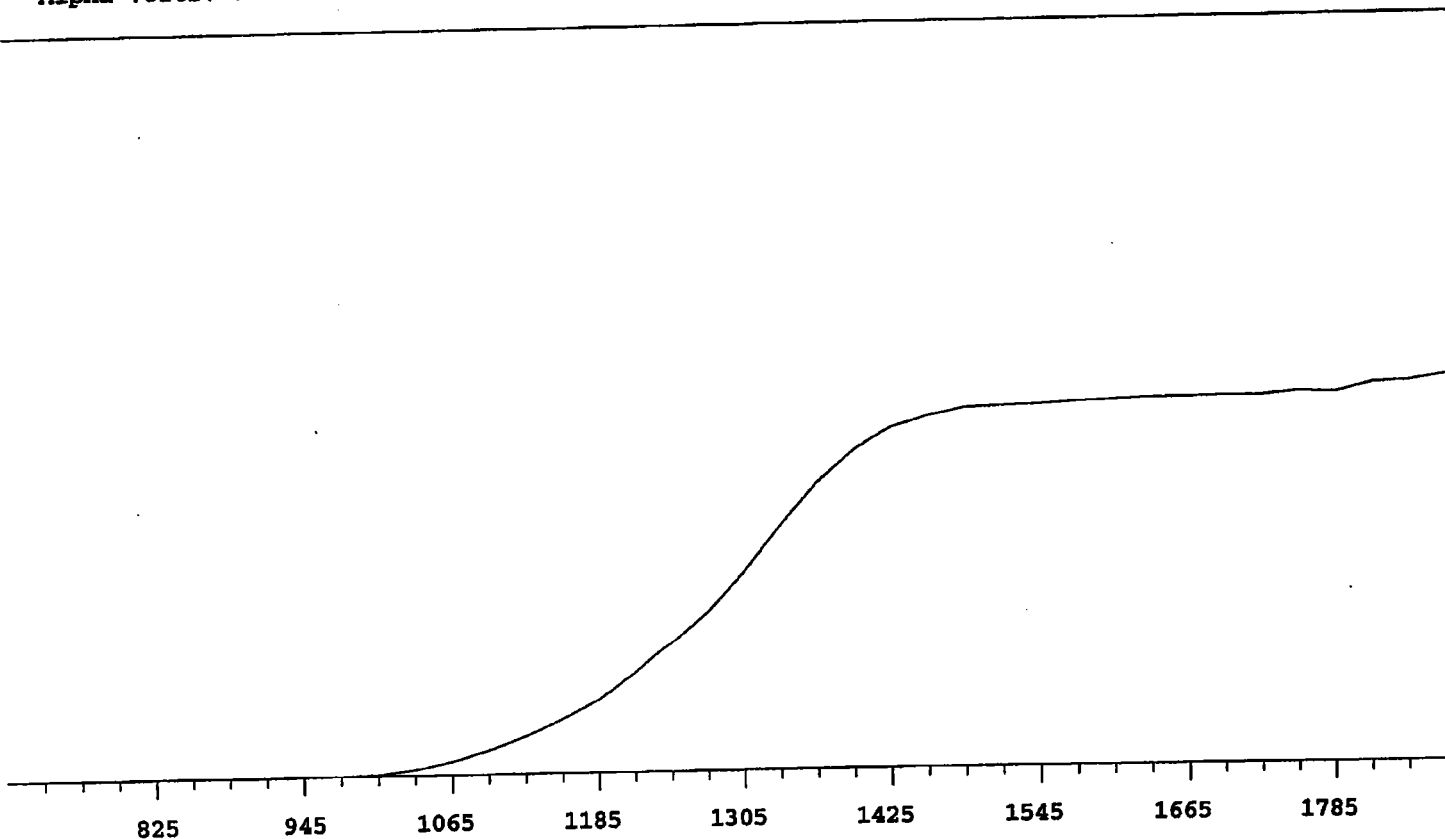
Plateau 07/04

Instrument 3 MPC 9604 Detector D

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	22384	+64.91
735	0		1335	27338	+55.29
765	0		1365	31944	+42.57
795	0	>100	1395	35658	+29.20
825	1	>100	1425	38071	+18.44
855	0	+0.00	1455	39378	+10.29
885	1	+0.00	1485	40341	+5.25
915	0	>100	1515	40508	+2.75
945	1	>100	1545	40640	+1.56
975	24	>100	1575	40893	+1.60
1005	140	>100	1605	41098	+1.34
1035	643	>100	1635	41263	+0.92
1065	1519	>100	1665	41279	+0.44
1095	2739	>100	1695	41369	+0.81
1125	4191	>100	1725	41320	+0.79
1155	6042	>100	1755	41747	+2.17
1185	8080	+96.76	1785	41579	+2.94
1215	10986	+87.61	1815	42600	+3.47
1245	14405	+80.38	1845	42748	
1275	17994	+72.82	1875	43368	

*Jan 7/2004*

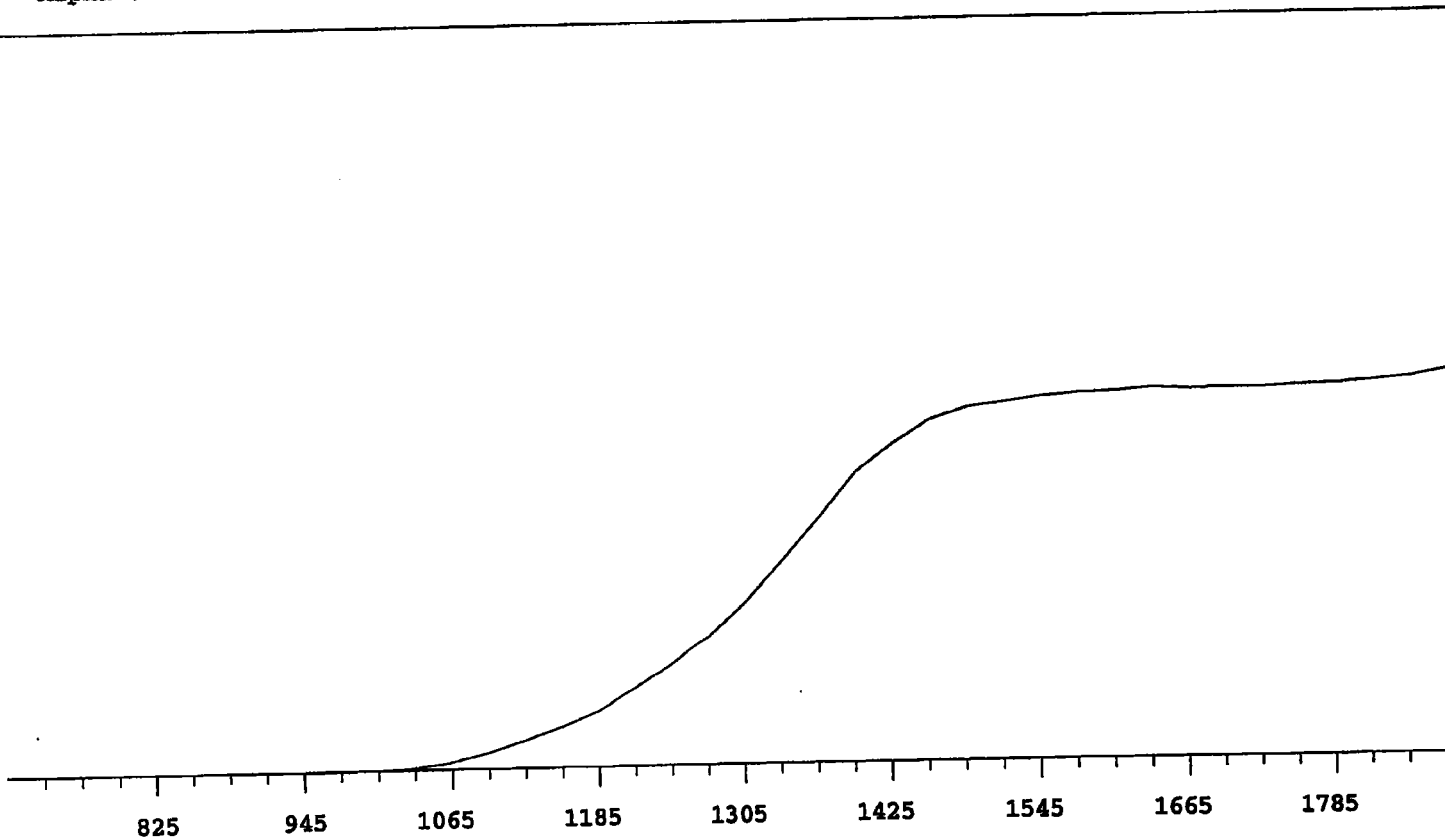
Plateau 07/04

Instrument 4 MPC 9604 Detector A

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	20196	+70.92
735	0		1335	25093	+64.47
765	0		1365	30252	+53.89
795	0	>100	1395	35803	+41.42
825	0	>100	1425	39177	+28.43
855	0	>100	1455	42048	+16.73
885	0	>100	1485	43395	+9.95
915	0	>100	1515	43954	+5.33
945	1	>100	1545	44588	+3.24
975	3	>100	1575	44953	+2.66
1005	38	>100	1605	45053	+1.37
1035	245	>100	1635	45510	+0.69
1065	830	>100	1665	45235	+0.28
1095	1955	>100	1695	45331	+0.23
1125	3389	>100	1725	45336	+0.89
1155	4997	>100	1755	45617	+1.20
1185	6863	>100	1785	45696	+1.76
1215	9674	+92.94	1815	45975	+2.73
1245	12535	+84.46	1845	46363	
1275	16168	+76.69	1875	47175	

*7/19/04*

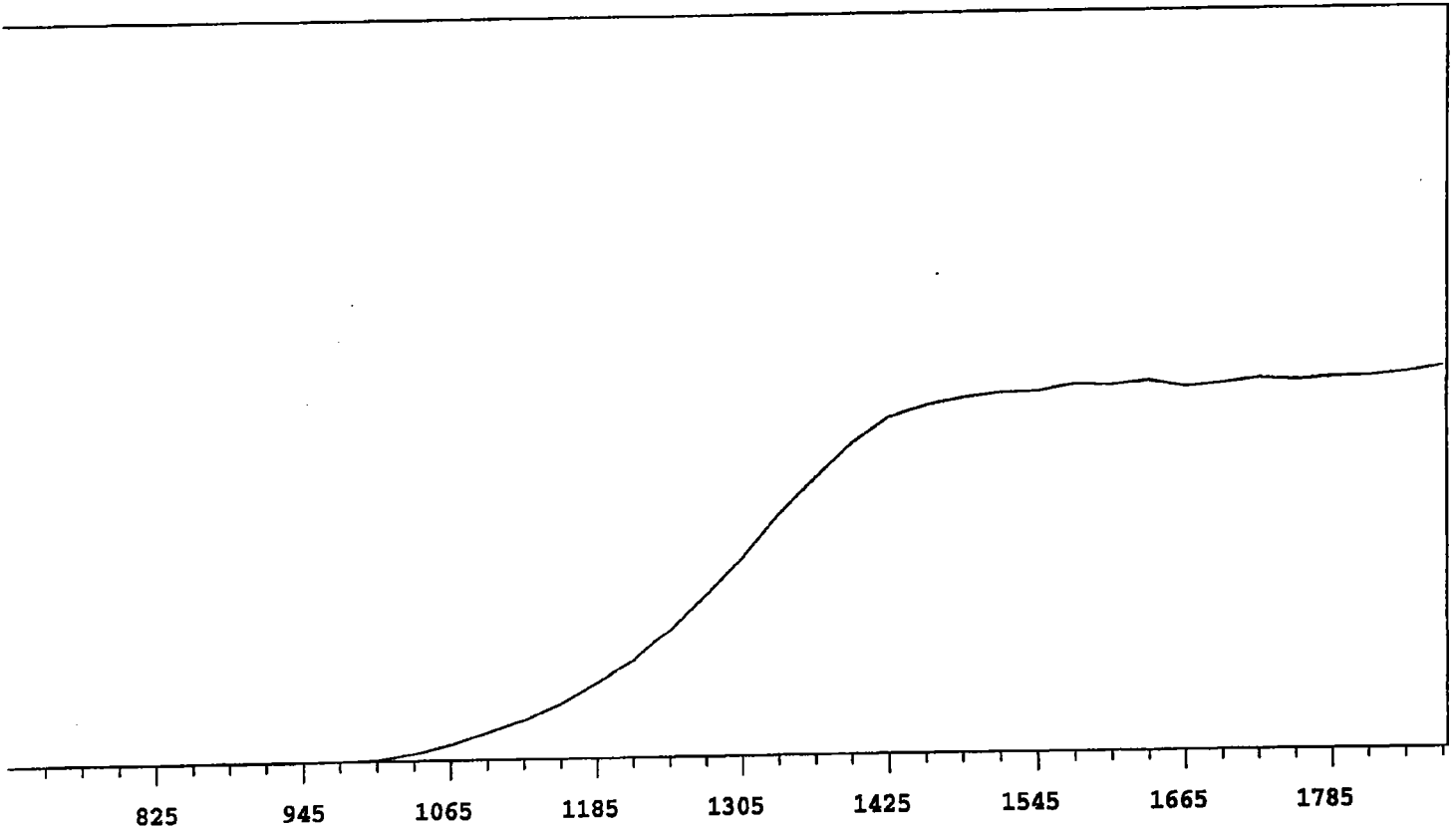
Plateau 07/04

Instrument 4 MPC 9604 Detector B

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16703	+61.95
735	0		1335	20386	+52.74
765	0		1365	23431	+42.22
795	0	>100	1395	26285	+29.61
825	0	>100	1425	28336	+19.32
855	0	>100	1455	29277	+11.04
885	0	>100	1485	29890	+5.68
915	0	>100	1515	30279	+4.18
945	2	>100	1545	30360	+2.81
975	36	>100	1575	30933	+2.50
1005	158	>100	1605	30845	+0.95
1035	577	>100	1635	31188	-0.15
1065	1316	>100	1665	30673	+0.82
1095	2298	>100	1695	30948	+0.70
1125	3318	>100	1725	31344	+1.72
1155	4684	>100	1755	31181	+1.01
1185	6422	+93.30	1785	31359	+1.04
1215	8326	+85.47	1815	31414	+2.60
1245	10922	+77.15	1845	31716	
1275	13740	+71.11	1875	32233	

*7/19/04*

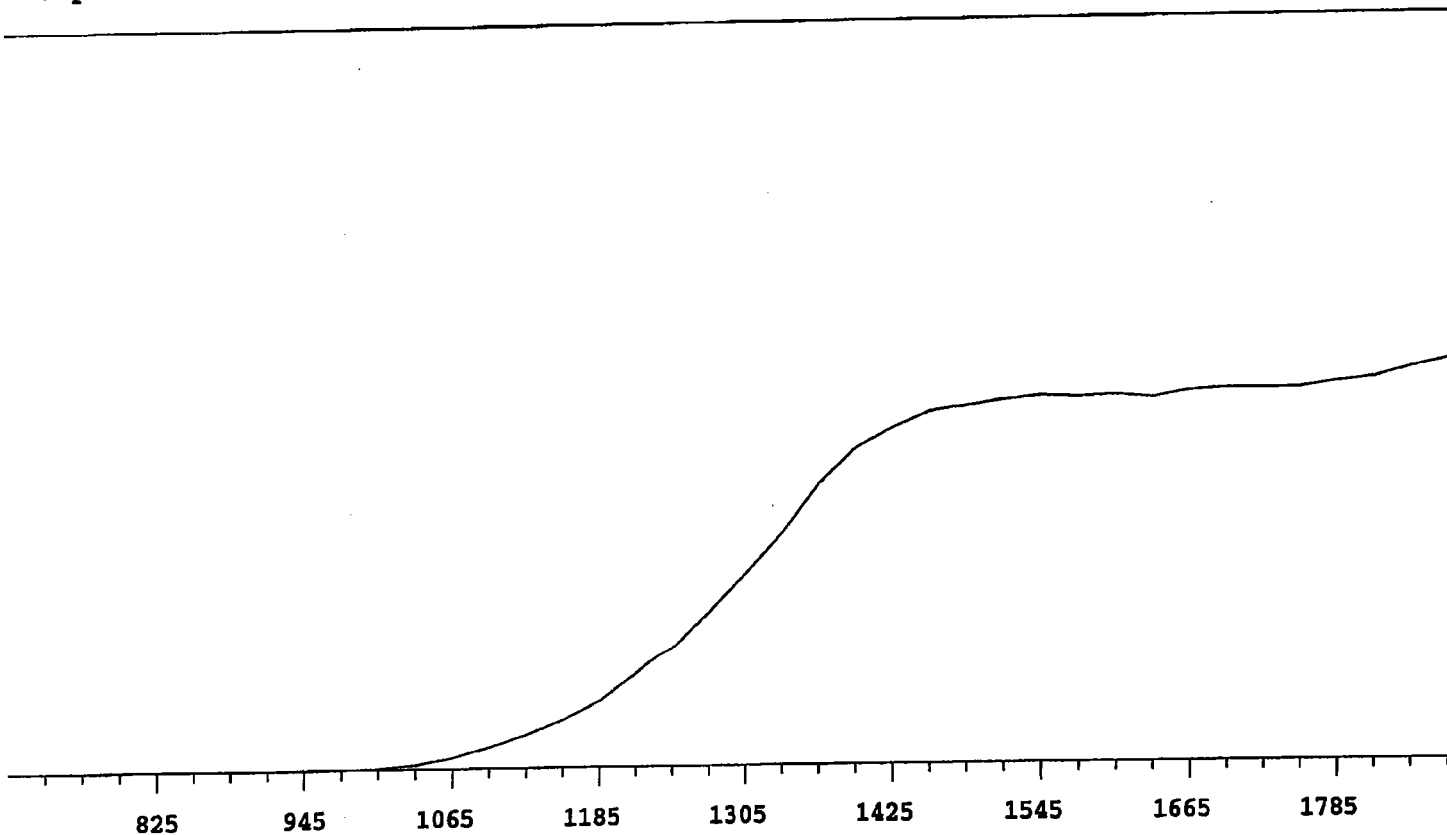
Plateau 07/04

Instrument 4 MPC 9604 Detector C

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	18839	+67.96
735	0		1335	22872	+57.68
765	0		1365	27407	+44.46
795	1	+0.00	1395	30682	+31.38
825	0	>100	1425	32591	+18.94
855	0	>100	1455	34190	+11.24
885	0	>100	1485	34722	+6.93
915	0	>100	1515	35262	+3.37
945	1	>100	1545	35641	+2.03
975	11	>100	1575	35504	+0.26
1005	103	>100	1605	35679	+0.69
1035	441	>100	1635	35382	+1.78
1065	1179	>100	1665	36072	+1.78
1095	2167	>100	1695	36265	+1.74
1125	3422	>100	1725	36194	+1.34
1155	4853	>100	1755	36262	+2.25
1185	6672	+97.47	1785	36803	+4.27
1215	9215	+89.47	1815	37192	+5.77
1245	11739	+81.79	1845	38095	
1275	15086	+73.77	1875	38856	

*per 7/19/04*



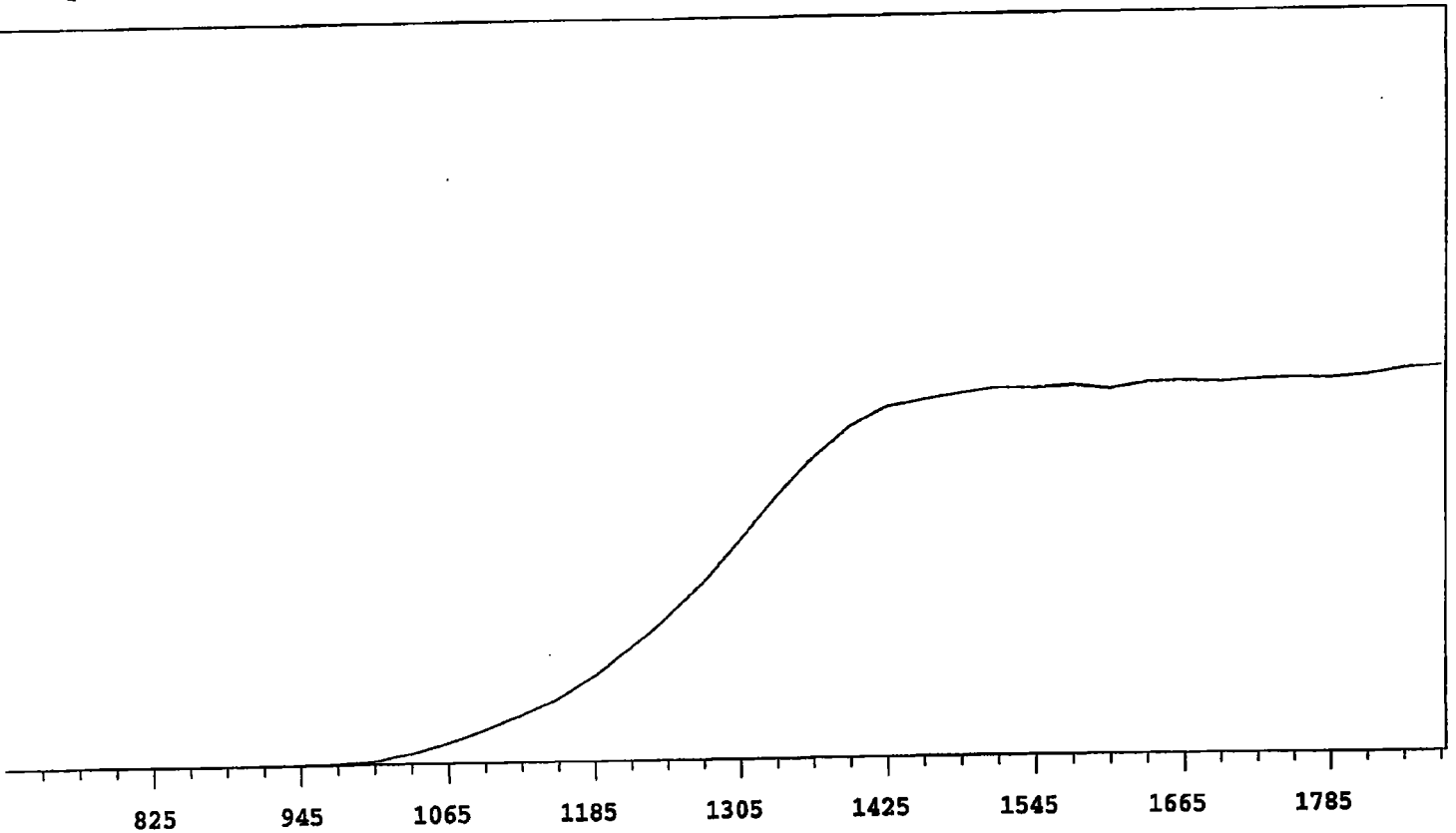
Plateau 07/04

Instrument 4 MPC 9604 Detector D

7/19/2004

Alpha Volts: 705

Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	23556	+58.78
735	0		1335	28144	+48.66
765	0		1365	32003	+36.52
795	0	>100	1395	35174	+24.06
825	0	>100	1425	37136	+14.44
855	0	>100	1455	37870	+8.04
885	0	>100	1485	38481	+4.14
915	0	>100	1515	39029	+2.66
945	9	>100	1545	38936	+0.63
975	84	>100	1575	39184	+0.49
1005	395	>100	1605	38768	+1.21
1035	1117	>100	1635	39399	+0.95
1065	2179	>100	1665	39540	+1.39
1095	3536	>100	1695	39360	+0.69
1125	5088	>100	1725	39609	+0.58
1155	6883	+96.73	1755	39771	+1.08
1185	9282	+89.24	1785	39681	+1.80
1215	12161	+81.81	1815	39966	+2.60
1245	15561	+74.40	1845	40592	
1275	19236	+67.51	1875	40881	

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VER4\_05  
RADIUM-228 WATER

Analyst : JMJ  
Batch : verification  
Date : 4/22/2005

Procedure Code : GFC28RAL

Parname : Radium-228

MDA : 1 pCi/L

Batch Counted on : PIC

Bkg Count Time: 1000 min

Sample I.D.	Sample Vol. L	Beta cpm	Ac 228 eff	Ba yield %	Ac-228		Ra-228		BKG cpm	Alpha cts	Beta cts
					Decay	Con	Decay	Con			
1A	1.000	7289.93	0.5132	100	0.58	1.00	1.000	0.49	505	36457	
1B	1.000	7542.79	0.5082	100	0.58	1.00	1.000	0.35	430	37720	
1C	1.000	7409.93	0.5231	100	0.58	1.00	1.000	0.35	500	37055	
1D	1.000	5865.16	0.5121	100	0.58	1.00	1.000	0.40	84	29327	
2A	1.000	5744.69	0.5097	100	0.58	1.00	1.000	0.48	1171	28748	
2B	1.000	7309.60	0.5242	100	0.58	1.00	1.000	0.32	302	36554	
2C	1.000	7315.97	0.5009	100	0.58	1.00	1.000	0.33	1759	36608	
2D	1.000	6912.80	0.5067	100	0.58	1.00	1.000	0.49	1600	34594	
3A	1.000	6638.33	0.4603	100	0.58	1.00	1.000	0.58	4839	33327	
3B	1.000	6177.63	0.4832	100	0.58	1.00	1.000	0.28	2355	30949	
3C	1.000	6140.98	0.4861	100	0.58	1.00	1.000	0.46	1449	30744	
3D	1.000	6727.78	0.4940	100	0.58	1.00	1.000	0.73	1195	33670	
4A	1.000	6135.16	0.5121	100	0.58	1.00	1.000	0.34	849	30684	
4B	1.000	7244.80	0.5268	100	0.58	1.00	1.000	0.37	154	36226	
4C	1.000	7153.96	0.5052	100	0.58	1.00	1.000	0.36	1434	35786	
4D	1.000	7365.57	0.5004	100	0.58	1.00	1.000	0.58	2976	36867	

*Mulatos*

Ac-228 0696-A 1mL NC 9369.54955

Count time min	Sampling Time Date/Time	Ac-228 Elution Date/time	Starting count Date/Time	Ra-228 MDA pCi/L	Ra-228 result pCi/L	Ra-228 error pCi/L	Ra-228 % RECOVERY
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	3.050	11112.583	114.092	118.60%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	2.734	11617.226	117.254	123.99%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	2.657	11089.935	112.931	118.36%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	2.844	8968.322	102.653	95.72%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	3.052	8827.546	102.097	94.22%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:26	2.572	10924.735	112.009	116.60%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	2.721	11445.723	117.300	122.16%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	3.095	10693.248	112.742	114.13%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	3.627	11306.800	121.652	120.68%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	2.670	10027.006	111.828	107.02%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	3.156	9909.619	110.852	105.76%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	3.689	10685.237	114.200	114.04%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	2.693	9401.891	105.220	100.35%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	2.697	10794.986	111.174	115.21%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:27	2.786	11117.128	115.216	118.65%
5	4/22/2005 0:00	4/22/2005 7:35	4/22/2005 12:28	3.341	11558.337	118.059	123.36%

*yan u/2005*

VERRAW

INSTR_ID	SAMPLE_ID	CNT_TIME	A	B	TIME	USER2	BATCH_ID
Instrument 1 - A	1	5	505	36457	4/22/2005 12:26	1575	Ra2280422v
Instrument 1 - B	2	5	430	37720	4/22/2005 12:26	1575	Ra2280422v
Instrument 1 - C	3	5	500	37055	4/22/2005 12:26	1575	Ra2280422v
Instrument 1 - D	4	5	84	29327	4/22/2005 12:26	1575	Ra2280422v
Instrument 2 - A	5	5	1171	28748	4/22/2005 12:26	1575	Ra2280422v
Instrument 2 - B	6	5	302	36554	4/22/2005 12:26	1575	Ra2280422v
Instrument 2 - C	7	5	1759	36608	4/22/2005 12:27	1575	Ra2280422v
Instrument 2 - D	8	5	1600	34594	4/22/2005 12:27	1575	Ra2280422v
Instrument 3 - A	9	5	4839	33327	4/22/2005 12:27	1575	Ra2280422v
Instrument 3 - B	10	5	2355	30949	4/22/2005 12:27	1575	Ra2280422v
Instrument 3 - C	11	5	1449	30744	4/22/2005 12:27	1575	Ra2280422v
Instrument 3 - D	12	5	1195	33670	4/22/2005 12:27	1575	Ra2280422v
Instrument 4 - A	13	5	849	30684	4/22/2005 12:27	1575	Ra2280422v
Instrument 4 - B	14	5	154	36226	4/22/2005 12:27	1575	Ra2280422v
Instrument 4 - C	15	5	1434	35786	4/22/2005 12:27	1575	Ra2280422v
Instrument 4 - D	16	5	2976	36867	4/22/2005 12:28	1575	Ra2280422v

*4/22/05*

**General Engineering Laboratories  
Verification Source Preparation Sheet**


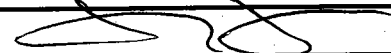
Applicable SOP Number GL-RAD-A-009 Isotope Ra-228  
 Date Standards Prepared 4/22/05 Cocktail Type Used NA  
 Standard ID 0696-A Matrix of Vial/Planchett 0.1M POLYPROPYLENE  
FILTED ATTACHED TO  
SS PLANCHETTE  
 Amount Used (g or ml) 1.0 Type of Scintillation Vial NA  
 Standard Activity (DPM/g or ml) 22558.26 Pipette ID Used 3001383  
 Reference Date 8/19/04 Balance ID Used NA  
 Expiration Date 4/21/06 Quenching Agent —  
 Residue/Carrier Agent —

Separation Date / Time: 4/22/05 / 0735

	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13				
	14				
	15				
	16				

*my 4/22/05*

*my 4/22/05*

Prepared By:  Date 4/22/05  
 Reviewed By:  Date 4/22/05

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

69008-278

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

ISOTOPE:	Ra-228
ACTIVITY (dps):	3.882 E4
HALF-LIFE:	5.75 years
CALIBRATION DATE:	August 19, 2004 12:00 EST
RELATIVE EXPANDED UNCERTAINTY (k=2):	3.3%

Impurities:  $\gamma$ -impurities <0.1%

5.02035 grams 0.1M HCl solution with 50  $\mu$ g/g Ba carrier.

P O NUMBER 3244 RD, Item 1

SOURCE PREPARED BY:

M. Taskaeva  
M. Taskaeva, Radiochemist

Q A APPROVED:

DM MJ 8-24-04

RECEIVED  
8/24/04

*my/zelos*

# Verification for Ra-228 Standard 0696-A

Standard	Detector Eff Mass. Used (mL)	Source DPM/mL
	0.1078	20839.30285
	0.1072	20927.70422
	0.1068	21021.83084
	Average =	20929.61264

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Source DPM/mL
0696-A N1	8043.6000	28.3000	8015.3000	0.1078	20839.30285
0696-A N2	8032.8000	28.3000	8004.5000	0.1072	20927.70422
0696-A N3	8038.8000	28.3000	8010.5000	0.1068	21021.83084
Mean Value (Counting) =	8038.1333	100.783034	8011.8333	Average =	20929.61264
Stdev =	91.27896032	0.00436124	Rule 3 (Pass/Fail)		

Certificate Value = 20767.0 dpm/mL  
 Lower Limit = 20747.05472 dpm/mL  
 Upper Limit = 21112.17056 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 182.5579206  
 10 % of Mean = 2092.961264  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-228 source 0696-A by transferring portions of the standard into glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 4/27/04 using Analytic's source 0503-A (Ra-228). Calibration data is recorded in this logbook under Ra-228 0503. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

Amanda L. Fehr 4/27/05

**PROTOCOL** : 23 Radium Std Ver.  
**DATE** : 2005/04/27  
**TIME** : 04:53  
**ID** : P23AS011

Wallac 1414 WinSpectral v1.40 S/N 4140127

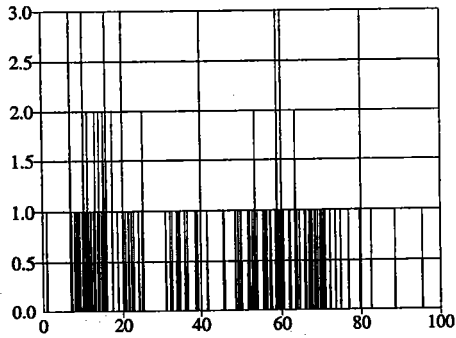
**Counting mode** : CPM  
**Isotope(s)** : H3  
**H3** = 5- 350,12.43 y  
**Protocol name** : Radium Std Ver.  
**Counting time** : 300  
**Repeats** : 1  
**Cycles** : 1  
**Replicates** : 1  
**2 sigma %** : 0.01  
**Minimum cpm** : 0.00 Checking time: 10  
**Output to Display** :  
 POS,CTIME,DATE,TIME,RACKPOS,CPMw1,CPM,SQPI,CPM1  
**Additions to Display** : Spectrum,Header,Listing  
**Spectrum** : Beta  
**Window 1** : 20- 80 /Beta  
**Window 2** : 1-1024 /Beta  
**Window 3** : 1-1024 /Beta  
**Window 4** : 1-1024 /Beta  
**Window 5** : 1-1024 /Beta  
**Window 6** : 1-1024 /Beta  
**FNCT1 = FNCT1** :  
**FNCT2 = FNCT2** :  
**FNCT3 = FNCT3** :  
**FNCT4 = FNCT4** :

**Total count rate:**  
 H3 5643.4 CPM

QMF4/27/05



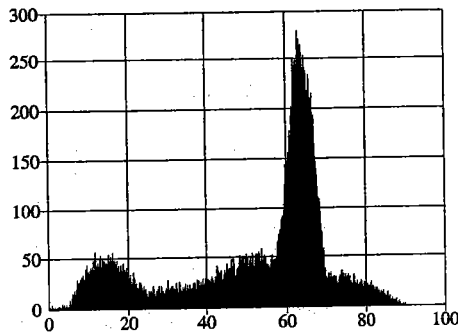
POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
1	300	4/27/2005	4:53 AM	1	1.20	28.30
					13.50	



Counts  
Beta

Bkg

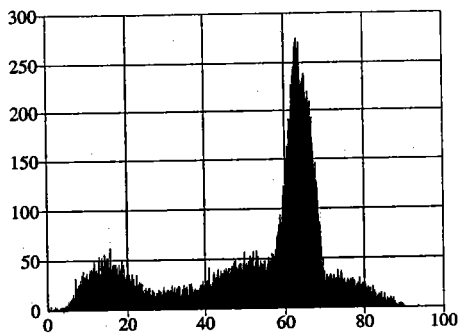
2	300	4/27/2005	4:59 AM	2	95.70	8043.60
					1590.80	



Counts  
Beta

0696-A

3	300	4/27/2005	5:04 AM	3	88.40	8032.80
					1601.40	



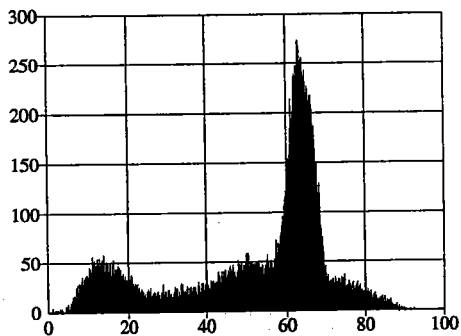
Counts  
Beta

0696-A

auF4127105

POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
-----	-------	------	------	---------	-------	-----

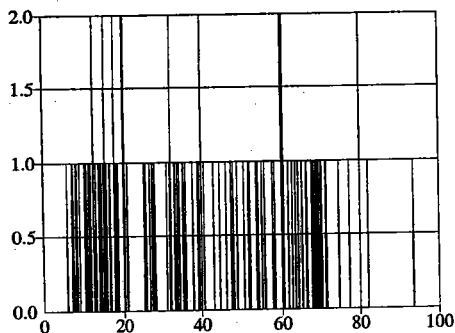
4	300	4/27/2005	5:10 AM	4	90.10	8038.80
					1615.60	



Counts  
Beta

0696-A

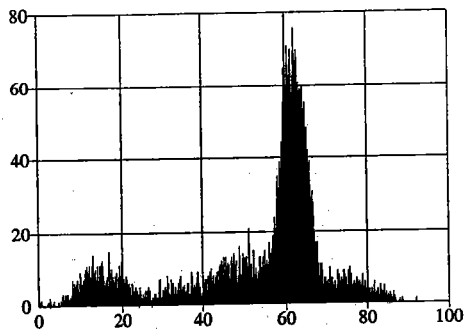
5	300	4/27/2005	5:15 AM	5	0.60	22.90
					11.90	



Counts  
Beta

Bkg

6	300	4/27/2005	5:21 AM	6	10.40	1711.00
					266.60	

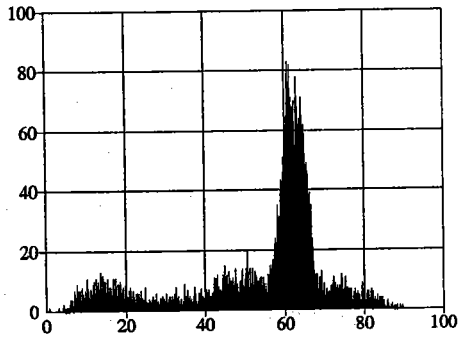


Counts  
Beta

0553-B

OLF 4/27/05

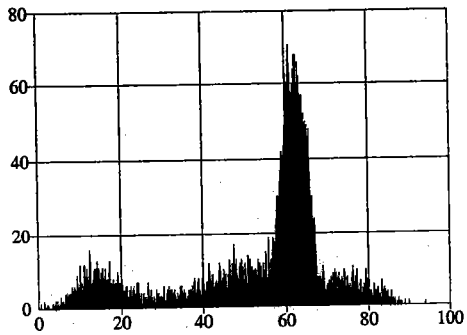
POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
7	300	4/27/2005	5:26 AM	7	18.10	1764.00
					275.10	



■ Counts  
Beta

0553-B

8	300	4/27/2005	5:32 AM	8	15.40	1715.80
					268.60	



■ Counts  
Beta

0553-B

QWF 4/27/05

## Alpha Spectroscopy Calibration Sources

The following is a summary of the procedure performed for preparing mixed alpha calibration standards:

A calibration stock solution was prepared by combining the following in a volumetric flask and diluting to 50 ml (51.4561 grams). These individual standards were first verified by direct precipitation of small aliquots of each standard (as described in Attachment I).

Isotope	Serial #	amount used (g)	dpm (note 1)
Gd-148	64445-278	0.2471	212.159287
Np-237	4341	1.8075	204.438594
Cm-244	4320A	7.2704	240.144737

Note 1: Dpm values are decay corrected to 2/7/2003.

Forty one weighted aliquots were then directly precipitated using Neodymium Flouride /HF system. The sources were then mounted on 0.1Poly-propylene filters and taped securely to 1 inch stainless steel planchettes for counting in an Alpha Spectroscopy system. The liquid fraction that passes through the filter is collected, traced with Am-241 and prepared for counting using the identical procedure. These samples are counted to ensure there is no more than 1% loss in the filtering processes. All sources pass this requirement. The DPM information for each source is listed in attachment II.

Certificate files were then created on the Alpha system used for acquisition and processing of data. Each source is assigned a name (AESS-001 through AESS-041). The information for the source activities is entered into the certificate files appropriate for the detector being used.

For example: If source AESS-001 is used for calibrating detector 25, the source data is entered into the certificate file name [env\_alpha.cer]U025.cer.

The computer software uses these certificate files to calculate an energy calibration and determine the efficiency of the detector after counting the source.

*Ante Hill*  
4/1/03

2002 Alpha Eff Source Stock Verification

Curium-244

Isotope	Value pCi/g
SSTOCK2002A2_AM	106.000
SSTOCK2002B2_AM	106.000
SSTOCK2002C2_AM	106.000

Mean Value (Counting) = 106.000 98.04%  
 Stdev = 0 pCi/g

Target = 108.1230  
 Lower Limit = 106  
 Upper Limit = 106  
 Rule 1 Pass/Fail Pass  
 Two sigma = 0  
 10 % of Mean = 10.6  
 Rule 2 (Pass/Fail) Pass

*PASS*  
 ① Fair 3/21/03

Neptunium-237

Isotope	Value pCi/g
SSTOCK2002A2_AM	90.100
SSTOCK2002B2_AM	87.200
SSTOCK2002C2_AM	93.500

Mean Value (Counting) = 90.267 98.02%  
 Stdev = 3.153305144 pCi/g

Target = 92.0900  
 Lower Limit = 83.96005638  
 Upper Limit = 96.57327696  
 Rule 1 Pass/Fail Pass  
 Two sigma = 6.306610289  
 10 % of Mean = 9.026666667  
 Rule 2 (Pass/Fail) Pass

Gadolinium-148

Isotope	Value pCi/g
SSTOCK2002A2_AM	95.080
SSTOCK2002B2_AM	93.750
SSTOCK2002C2_AM	96.560

Mean Value (Counting) = 95.463 99.81%  
 Stdev = 1.503074627 pCi/g

Target = 95.6460  
 Lower Limit = 92.45718408  
 Upper Limit = 98.46948259  
 Rule 1 Pass/Fail Pass  
 Two sigma = 3.006148253  
 10 % of Mean = 9.546333333  
 Rule 2 (Pass/Fail) Pass

The analyst prepared three standard verification sources for the mixed alpha stock standard using 0.1030 g for source #1, 0.1035 g for source #2 and 0.1028 g for source #3. Each standard was combined with 1.0 mL of Am-243 standard 0454-A and 0.1 mL of Nd carrier in a disposable centrifuge tube. Four mL of 2 M HCl was added to each standard and then diluted with 4 mL of DI water. 5 mL of ascorbic acid was added to each sample then one mL of 48% HF was added to precipitate Nd (and Curium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. pCi/L values for the Mixed Alpha Stock were calculated and compared to Am-243 certified values.

① The rule failed because the 3 results from 3 sources were the same. Therefore, the stdev was zero. The intent of this <sup>rule</sup> is to ensure an appropriate amount of counts are achieved for proper determinations. ~~Surfaces~~ For each standard the # of counts achieved was

Just under 10000 which has a counting error of nearly 1%. Because the standard's bias is < 2% from the known value the standard is acceptable.

*Robert J. ... 021203*

Attachment II

Mixed alpha Reference date = 2/7/2003		Stock Dpm/g	Reference date	Half-life (years)	amount used for mixed	Dpm/g mixed	Decay corr dpm/g
Isotope	Source						
Gd-148	64445-278 (0502)	44354.59289	9/5/2002	74.60	0.2471	212.9974853	212.159287
Np-237	Srm 4341 (0493)	5820	3/1/1992	2.14E+06	1.8075	204.4393182	204.438594
Cm-244	SRM 4320a (0490)	2223.6	2/1/1996	18.1	7.2704	314.1796879	240.144737
Source	Amount of standard used	dpm Gd-148	dpm Np-237	dpm Cm-244	dps Gd-148	dps Np-237	dps Cm-244
AESS-001	1.0362	219.839	211.839	248.838	3.664	3.531	4.147
AESS-002	1.0344	219.458	211.471	248.406	3.658	3.525	4.140
AESS-003	1.034	219.373	211.390	248.310	3.656	3.523	4.138
AESS-004	1.0331	219.182	211.206	248.094	3.653	3.520	4.135
AESS-005	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-006	1.0331	219.182	211.206	248.094	3.653	3.520	4.135
AESS-007	1.0348	219.542	211.553	248.502	3.659	3.526	4.142
AESS-008	1.0363	219.861	211.860	248.862	3.664	3.531	4.148
AESS-009	1.0352	219.627	211.635	248.598	3.660	3.527	4.143
AESS-010	1.0346	219.500	211.512	248.454	3.658	3.525	4.141
AESS-011	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-012	1.0367	219.946	211.941	248.958	3.666	3.532	4.149
AESS-013	1.0396	220.561	212.534	249.654	3.676	3.542	4.161
AESS-014	1.0368	219.967	211.962	248.982	3.666	3.533	4.150
AESS-015	1.0363	219.861	211.860	248.862	3.664	3.531	4.148
AESS-016	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-017	1.0356	219.712	211.717	248.694	3.662	3.529	4.145
AESS-018	1.0359	219.776	211.778	248.766	3.663	3.530	4.146
AESS-019	1.0349	219.564	211.574	248.526	3.659	3.526	4.142
AESS-020	1.0361	219.818	211.819	248.814	3.664	3.530	4.147
AESS-021	1.0348	219.542	211.553	248.502	3.659	3.526	4.142
AESS-022	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-023	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-024	1.0343	219.436	211.451	248.382	3.657	3.524	4.140
AESS-025	1.0364	219.882	211.880	248.886	3.665	3.531	4.148
AESS-026	1.0336	219.288	211.308	248.214	3.655	3.522	4.137
AESS-027	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-028	1.0366	219.924	211.921	248.934	3.665	3.532	4.149

Attachment II

AESS-029	1.0355	219.691	211.696	248.670	3.662	3.528	4.144
AESS-030	1.0349	219.564	211.574	248.526	3.659	3.526	4.142
AESS-031	1.0343	219.436	211.451	248.382	3.657	3.524	4.140
AESS-032	1.0326	219.076	211.103	247.973	3.651	3.518	4.133
AESS-033	1.0308	218.694	210.735	247.541	3.645	3.512	4.126
AESS-034	1.0314	218.821	210.858	247.685	3.647	3.514	4.128
AESS-035	1.0303	218.588	210.633	247.421	3.643	3.511	4.124
AESS-036	1.0343	219.436	211.451	248.382	3.657	3.524	4.140
AESS-037	1.0353	219.649	211.655	248.622	3.661	3.528	4.144
AESS-038	1.0373	220.073	212.064	249.102	3.668	3.534	4.152
AESS-039	1.0334	219.245	211.267	248.166	3.654	3.521	4.136
AESS-040	1.0346	219.500	211.512	248.454	3.658	3.525	4.141
AESS-041	1.0352	219.627	211.635	248.598	3.660	3.527	4.143



0490  
0491

# National Institute of Standards & Technology

## Certificate

### Standard Reference Material 4320A Curium-244 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive curium-244 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 curium-244 with a total activity of approximately 200 Bq. Curium-244 decays by alpha-particle emission to plutonium-240, which also decays by alpha-particle emission. None of the alpha particles escape from the SRM ampoule. During the decay process X-rays and gamma rays with energies from 40 keV to 1100 keV 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 ( $\text{HNO}_3$ ) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

#### Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least February 2006.

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  
February 1996 (Text only revised November 1997)

Thomas E. Gills, Chief  
Standard Reference Materials Program



### Recommended Procedure for Opening the SRM Ampoule

- 1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.
- 2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.
- 3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.
- 4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.
- 5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.
- 6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.
- 7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.
- 8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle.  
**NEVER PIPETTE BY MOUTH**
- 9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]\*.

PROPERTIES OF SRM 4320A  
(Certified values are shown in bold type)

Source identification number	NIST SRM 4320A		
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	(1.030 ± 0.002) g·mL <sup>-1</sup> at 22.8 °C [b]*		
Solution mass	Approximately 5.15 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L <sup>-1</sup> )	Mass Fraction (g·g <sup>-1</sup> )
	H <sub>2</sub> O	54	0.94
	HNO <sub>3</sub>	1.0	0.06
	HCl	<0.001	<4 × 10 <sup>-5</sup>
	<sup>244</sup> Cm +3	5 × 10 <sup>-11</sup>	1 × 10 <sup>-11</sup>
Radiological Properties:			
Radionuclide	Curium-244		
Reference time	1230 EST, 1 February 1996 [c]		
Massic activity of the solution [d]	37.06 Bq·g <sup>-1</sup> 24.12 Bq·g <sup>-1</sup>		
Relative expanded uncertainty (k=2)	0.68% [e] [f]		
Alpha-particle-emitting daughters	Plutonium-240: (0.22 ± 0.11) Bq·g <sup>-1</sup> [b] [c]		
Alpha-particle-emitting impurities	Curium-243: (0.005 ± 0.004) Bq·g <sup>-1</sup> [b] [g]		
Photon-emitting impurities	None detected [h]		
Half lives used in the decay corrections	Curium-244: (18.10 ± 0.02) a [i] Plutonium-240: (6563 ± 7) a [i]		
Calibration method	Two 4π liquid-scintillation counting systems		

- [i] The stated uncertainty is the standard uncertainty. See reference [5].
- [j] Relative standard uncertainty of the input quantity  $x_i$ .
- [k] 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  $y$ .
- [m] Relative component of combined standard uncertainty of output quantity  $y$ , rounded to two significant figures or less. The relative component of combined standard uncertainty of  $y$  is given by  $u_i(y)/y = |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$ . 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.
- [n] The relative standard uncertainty of  $\lambda \cdot t$  is determined by the relative standard uncertainty of  $\lambda$  (i.e., of the half life). The relative standard uncertainty of  $t$  is negligible.
- [p]  $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$
- [q] The live time is determined by counting the pulses from a gated oscillator.
- [r] The standard uncertainty given is for the detected Cm-243 impurity.  $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of Cm-244})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of Cm-244})\}$ .
- [s] 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.  $u(x_i)/x_i = 100\%$ .  $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of Cm-244})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of Cm-244})\}$ . 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, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.
- [5] Evaluated Nuclear Structure Data File (ENSDF), February 1996.



# CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

64445-278

Gd-148 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master liquid radionuclide solution source. The master source was calibrated by liquid scintillation counting.

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.

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

ISOTOPE:	Gd-148
ACTIVITY (dps):	<u>3.759 E3</u>
HALF-LIFE:	<u>74.6 years</u>
CALIBRATION DATE:	September 5, 2002 12:00 EST
TOTAL UNCERTAINTY*:	2.7%
SYSTEMATIC:	1.9%
RANDOM:	0.8%

99% confidence level.

5.08493 grams 0.1M HCl solution.

P O NUMBER 3207RD, Item 1

SOURCE PREPARED BY:

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

Q A APPROVED:

100. [Signature] 9-6-02

25  
31  
30  
31  
31  
7

0493



# National Institute of Standards & Technology

## Certificate

### Standard Reference Material 4341 Radioactivity Standard

Radionuclide	Neptunium-237
Source identification	SRM 4341
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule <sup>(1)</sup> *
Solution mass	Approximately 5 grams
Solution composition	Neptunium-237 in 2 mol·L <sup>-1</sup> nitric acid
Reference time	March 1992
Radioactivity concentration	97.0 Bq·g <sup>-1</sup>
Overall uncertainty	1.28 percent <sup>(2)</sup>
Photon-emitting impurities	None detected <sup>(3)</sup>
Alpha-particle-emitting impurities	None detected <sup>(4)</sup>
Half life	(2.14 ± 0.11) × 10 <sup>6</sup> years <sup>(5)</sup>
Measuring instrument	NIST "0.8π" α defined-solid-angle counter with scintillation detector

This standard reference material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M. Robin Hutchinson, Acting Group Leader.

Gaithersburg, MD  
January 1993

William P. Reed, Chief  
Standard Reference Materials Program

\*Notes on back

PC 5 075 000

## NOTES

(1) Approximately five milliliters of solution. Ampoule specifications:

body diameter	$16.5 \pm 0.5$ mm
wall thickness	$0.60 \pm 0.04$ mm
barium content	less than 2.5 percent
lead oxide content	less than 0.02 percent
other heavy elements	trace quantities

(2) The overall uncertainty was formed by taking three times the quadratic combination of the standard deviations of the mean, or approximations thereof, for the following:

a) alpha-particle-emission-rate measurements	0.34 percent
b) background	0.01 percent
c) livetime	0.10 percent
d) detection efficiency	0.16 percent
e) count-rate-vs-energy extrapolation to zero energy	0.10 percent
f) half life	0.00 percent
g) gravimetric measurements	0.10 percent
h) alpha-emitting impurities	0.10 percent

(3) The protactinium-233 daughter of neptunium-237 is approximately in equilibrium.  
The limit of detection for photon-emitting impurities is

$0.19 \text{ } \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 30 and 307 keV and  
 $0.01 \text{ } \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 317 and 1750 keV,

provided that the impurity photons are separated in energy by 5 keV or more from photons emitted in the decay of neptunium-237 and progeny.

(4) The limit of detection for alpha-particle-emitting impurities is

$0.10 \text{ } \alpha \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 1.0 and 4.3 MeV and  
 $0.05 \text{ } \alpha \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 4.9 and 10 MeV.

(5) Evaluated Nuclear Structure Data File (ENSDF), February 1990.

For further information please contact Dr. J.M. Robin Hutchinson at NIST.

Telephone: (301) 975-5532

FAX: (301) 926-7416

## Subsection 1: Energy Calibration

The Energy Calibration energy=Cal\_Zero+(e1\*C)+(e2\*C^2)

where : Cal\_Zero = Energy Calibration Zero  
 e1 = Energy Calibration Slope  
 e2 = Energy Calibration Quadratic  
 C = Channel

Instrument : CHAMBER 001  
 Detector : 33088  
 Calibration Date/Time : 3-APR-2006 16:30:52  
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.589
NP-237	4341	2/28/06	4768.800	4768.498
CM-244	4320A	2/28/06	5795.020	5794.859

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2394.447  
 Energy Calibration Slope : 4.976289  
 Energy Calibration Quadratic : 2.7050270E-04  
 Energy Calibration Range : 7774.000

Instrument : CHAMBER 003  
 Detector : 20659  
 Calibration Date/Time : 3-APR-2006 16:32:34  
 Calibration Source Id : AESS-003

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.813
NP-237	4341	2/28/06	4768.800	4768.688
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2371.253  
 Energy Calibration Slope : 5.028544  
 Energy Calibration Quadratic : 2.5955989E-04  
 Energy Calibration Range : 7793.000

Instrument : CHAMBER 004  
 Detector : 33077  
 Calibration Date/Time : 3-APR-2006 16:32:51  
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.835
NP-237	4341	2/28/06	4768.800	4768.419
CM-244	4320A	2/28/06	5795.020	5794.571

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2409.653  
 Energy Calibration Slope : 4.949907  
 Energy Calibration Quadratic : 2.7518670E-04  
 Energy Calibration Range : 7767.000

Instrument : CHAMBER 005  
 Detector : 28642  
 Calibration Date/Time : 3-APR-2006 16:33:05  
 Calibration Source Id : AESS-005  

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5794.893

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2356.725  
 Energy Calibration Slope : 4.952652  
 Energy Calibration Quadratic : 3.0983411E-04  
 Energy Calibration Range : 7753.000

Instrument : CHAMBER 007  
 Detector : 30416  
 Calibration Date/Time : 3-APR-2006 16:35:21  
 Calibration Source Id : AESS-007  

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.624
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2382.813  
 Energy Calibration Slope : 4.944474  
 Energy Calibration Quadratic : 3.1966669E-04  
 Energy Calibration Range : 7781.000

Instrument : CHAMBER 009  
 Detector : 13285  
 Calibration Date/Time : 3-APR-2006 16:39:51  
 Calibration Source Id : AESS-009  

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.700
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5794.917

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2406.029  
 Energy Calibration Slope : 4.889740  
 Energy Calibration Quadratic : 3.3907106E-04  
 Energy Calibration Range : 7769.000



Instrument : CHAMBER 010  
 Detector : 33083  
 Calibration Date/Time : 3-APR-2006 16:40:04  
 Calibration Source Id : AESS-010  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.328  
 NP-237 4341 2/28/06 4768.800 4768.118  
 CM-244 4320A 2/28/06 5795.020 5795.011

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2382.230  
 Energy Calibration Slope : 4.964393  
 Energy Calibration Quadratic : 2.9206229E-04  
 Energy Calibration Range : 7772.000

Instrument : CHAMBER 011  
 Detector : 9537  
 Calibration Date/Time : 3-APR-2006 16:40:58  
 Calibration Source Id : AESS-011  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.722  
 NP-237 4341 2/28/06 4768.800 4768.758  
 CM-244 4320A 2/28/06 5795.020 5794.941

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2401.574  
 Energy Calibration Slope : 4.894418  
 Energy Calibration Quadratic : 3.3610439E-04  
 Energy Calibration Range : 7766.000

Instrument : CHAMBER 012  
 Detector : 33085  
 Calibration Date/Time : 3-APR-2006 16:41:13  
 Calibration Source Id : AESS-012  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4768.403  
 CM-244 4320A 2/28/06 5795.020 5794.958

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2403.072  
 Energy Calibration Slope : 4.959775  
 Energy Calibration Quadratic : 2.8419620E-04  
 Energy Calibration Range : 7780.000

Instrument : CHAMBER 013  
 Detector : 21084  
 Calibration Date/Time : 3-APR-2006 16:41:26  
 Calibration Source Id : AESS-013  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.603  
 NP-237 4341 2/28/06 4768.800 4769.678  
 CM-244 4320A 2/28/06 5795.020 5795.297  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2372.215  
 Energy Calibration Slope : 4.879492  
 Energy Calibration Quadratic : 3.3235765E-04  
 Energy Calibration Range : 7717.000

Instrument : CHAMBER 016  
 Detector : 21086  
 Calibration Date/Time : 3-APR-2006 16:45:33  
 Calibration Source Id : AESS-016  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.993  
 NP-237 4341 2/28/06 4768.800 4768.792  
 CM-244 4320A 2/28/06 5795.020 5794.887  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2373.788  
 Energy Calibration Slope : 4.866085  
 Energy Calibration Quadratic : 3.4461656E-04  
 Energy Calibration Range : 7718.000

Instrument : CHAMBER 017  
 Detector : 33203  
 Calibration Date/Time : 3-APR-2006 16:45:52  
 Calibration Source Id : AESS-017  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.753  
 NP-237 4341 2/28/06 4768.800 4768.686  
 CM-244 4320A 2/28/06 5795.020 5795.002  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2381.283  
 Energy Calibration Slope : 4.983909  
 Energy Calibration Quadratic : 2.9758285E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 018  
 Detector : 21063  
 Calibration Date/Time : 3-APR-2006 16:46:43  
 Calibration Source Id : AESS-018  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.678  
 NP-237 4341 2/28/06 4768.800 4768.731  
 CM-244 4320A 2/28/06 5795.020 5795.019  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2340.789  
 Energy Calibration Slope : 4.900531  
 Energy Calibration Quadratic : 3.0987556E-04  
 Energy Calibration Range : 7684.000

Instrument : CHAMBER 019  
 Detector : 23882  
 Calibration Date/Time : 3-APR-2006 16:46:59  
 Calibration Source Id : AESS-019  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.344  
 NP-237 4341 2/28/06 4768.800 4769.286  
 CM-244 4320A 2/28/06 5795.020 5795.346  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2328.678  
 Energy Calibration Slope : 5.011906  
 Energy Calibration Quadratic : 2.4903595E-04  
 Energy Calibration Range : 7722.000

Instrument : CHAMBER 020  
 Detector : 33093  
 Calibration Date/Time : 3-APR-2006 16:47:46  
 Calibration Source Id : AESS-020  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4768.523  
 CM-244 4320A 2/28/06 5795.020 5795.020  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2351.189  
 Energy Calibration Slope : 4.985672  
 Energy Calibration Quadratic : 2.7204608E-04  
 Energy Calibration Range : 7742.000

Instrument : CHAMBER 021  
 Detector : 33893  
 Calibration Date/Time : 3-APR-2006 16:48:06  
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.276
NP-237	4341	2/28/06	4768.800	4768.355
CM-244	4320A	2/28/06	5795.020	5794.907

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2374.427  
 Energy Calibration Slope : 4.951159  
 Energy Calibration Quadratic : 3.0070700E-04  
 Energy Calibration Range : 7760.000

Instrument : CHAMBER 023  
 Detector : 22873  
 Calibration Date/Time : 3-APR-2006 16:49:38  
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3180.453
NP-237	4341	2/28/06	4768.800	4764.511
CM-244	4320A	2/28/06	5795.020	5793.157

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2403.611  
 Energy Calibration Slope : 4.972397  
 Energy Calibration Quadratic : 2.1793865E-04  
 Energy Calibration Range : 7724.000

Instrument : CHAMBER 026  
 Detector : 34427  
 Calibration Date/Time : 4-APR-2006 12:02:00  
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.743
NP-237	4341	2/28/06	4768.800	4768.458
CM-244	4320A	2/28/06	5795.020	5794.860

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2367.357  
 Energy Calibration Slope : 4.926605  
 Energy Calibration Quadratic : 3.3364003E-04  
 Energy Calibration Range : 7762.000

Instrument : CHAMBER 027  
 Detector : 31436  
 Calibration Date/Time : 4-APR-2006 12:02:17  
 Calibration Source Id : AESS-003

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.368
NP-237	4341	2/28/06	4768.800	4769.435
CM-244	4320A	2/28/06	5795.020	5795.142

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2385.802  
 Energy Calibration Slope : 4.966618  
 Energy Calibration Quadratic : 2.6491811E-04  
 Energy Calibration Range : 7749.000

Instrument : CHAMBER 028  
 Detector : 21056  
 Calibration Date/Time : 4-APR-2006 12:02:41  
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.801
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2320.544  
 Energy Calibration Slope : 4.935237  
 Energy Calibration Quadratic : 2.7769944E-04  
 Energy Calibration Range : 7665.000

Instrument : CHAMBER 029  
 Detector : 30419  
 Calibration Date/Time : 4-APR-2006 12:02:56  
 Calibration Source Id : AESS-005

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.690
NP-237	4341	2/28/06	4768.800	4770.051
CM-244	4320A	2/28/06	5795.020	5795.380

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2360.631  
 Energy Calibration Slope : 4.932264  
 Energy Calibration Quadratic : 2.8612607E-04  
 Energy Calibration Range : 7711.000

Instrument : CHAMBER 030  
 Detector : 30420  
 Calibration Date/Time : 4-APR-2006 12:03:11  
 Calibration Source Id : AESS-006

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.638
CM-244	4320A	2/28/06	5795.020	5794.905

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2379.492  
 Energy Calibration Slope : 4.942307  
 Energy Calibration Quadratic : 3.2948688E-04  
 Energy Calibration Range : 7786.000

Instrument : CHAMBER 032  
 Detector : 33207  
 Calibration Date/Time : 4-APR-2006 12:04:09  
 Calibration Source Id : AESS-008

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.162
NP-237	4341	2/28/06	4768.800	4769.075
CM-244	4320A	2/28/06	5795.020	5795.066

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2332.264  
 Energy Calibration Slope : 4.962142  
 Energy Calibration Quadratic : 2.9673061E-04  
 Energy Calibration Range : 7725.000

Instrument : CHAMBER 033  
 Detector : 28647  
 Calibration Date/Time : 4-APR-2006 12:04:20  
 Calibration Source Id : AESS-009

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.737
CM-244	4320A	2/28/06	5795.020	5794.927

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2371.926  
 Energy Calibration Slope : 4.915609  
 Energy Calibration Quadratic : 3.0408576E-04  
 Energy Calibration Range : 7724.000

Instrument : CHAMBER 034  
 Detector : 32697  
 Calibration Date/Time : 4-APR-2006 12:04:32  
 Calibration Source Id : AESS-010  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.670  
 NP-237 4341 2/28/06 4768.800 4768.840  
 CM-244 4320A 2/28/06 5795.020 5795.021  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2340.410  
 Energy Calibration Slope : 4.974835  
 Energy Calibration Quadratic : 3.3510773E-04  
 Energy Calibration Range : 7786.000

Instrument : CHAMBER 035  
 Detector : 29271  
 Calibration Date/Time : 4-APR-2006 12:04:44  
 Calibration Source Id : AESS-011  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4768.800  
 CM-244 4320A 2/28/06 5795.020 5795.020  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2347.646  
 Energy Calibration Slope : 4.986292  
 Energy Calibration Quadratic : 2.8726328E-04  
 Energy Calibration Range : 7755.000

Instrument : CHAMBER 036  
 Detector : 29275  
 Calibration Date/Time : 4-APR-2006 12:04:58  
 Calibration Source Id : AESS-012  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.797  
 NP-237 4341 2/28/06 4768.800 4767.041  
 CM-244 4320A 2/28/06 5795.020 5793.387  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2388.490  
 Energy Calibration Slope : 5.017391  
 Energy Calibration Quadratic : 3.2070087E-04  
 Energy Calibration Range : 7863.000

Instrument : CHAMBER 037  
 Detector : 32690  
 Calibration Date/Time : 4-APR-2006 12:05:37  
 Calibration Source Id : AESS-013

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.312
CM-244	4320A	2/28/06	5795.020	5794.990

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2422.263  
 Energy Calibration Slope : 4.994318  
 Energy Calibration Quadratic : 2.9049869E-04  
 Energy Calibration Range : 7841.000

Instrument : CHAMBER 038  
 Detector : 19323  
 Calibration Date/Time : 4-APR-2006 12:05:48  
 Calibration Source Id : AESS-014

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.338
NP-237	4341	2/28/06	4768.800	4769.033
CM-244	4320A	2/28/06	5795.020	5795.267

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2386.917  
 Energy Calibration Slope : 4.961154  
 Energy Calibration Quadratic : 3.4057652E-04  
 Energy Calibration Range : 7824.000

Instrument : CHAMBER 040  
 Detector : 30446  
 Calibration Date/Time : 4-APR-2006 12:06:33  
 Calibration Source Id : AESS-016

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.744
NP-237	4341	2/28/06	4768.800	4768.729
CM-244	4320A	2/28/06	5795.020	5794.990

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2361.522  
 Energy Calibration Slope : 4.912026  
 Energy Calibration Quadratic : 3.2777814E-04  
 Energy Calibration Range : 7735.000



Instrument : CHAMBER 041  
 Detector : 22834  
 Calibration Date/Time : 4-APR-2006 12:06:46  
 Calibration Source Id : AESS-017  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4769.004  
 CM-244 4320A 2/28/06 5795.020 5795.141  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2357.184  
 Energy Calibration Slope : 4.881192  
 Energy Calibration Quadratic : 3.4815943E-04  
 Energy Calibration Range : 7721.000

Instrument : CHAMBER 042  
 Detector : 32695  
 Calibration Date/Time : 4-APR-2006 12:07:02  
 Calibration Source Id : AESS-018  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4769.104  
 CM-244 4320A 2/28/06 5795.020 5795.107  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2418.706  
 Energy Calibration Slope : 4.890110  
 Energy Calibration Quadratic : 3.4867792E-04  
 Energy Calibration Range : 7792.000

Instrument : CHAMBER 043  
 Detector : 42470  
 Calibration Date/Time : 4-APR-2006 12:07:20  
 Calibration Source Id : AESS-019  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4769.388  
 CM-244 4320A 2/28/06 5795.020 5795.759  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2363.161  
 Energy Calibration Slope : 5.010756  
 Energy Calibration Quadratic : 2.3886505E-04  
 Energy Calibration Range : 7745.000

Instrument : CHAMBER 044  
 Detector : 34433  
 Calibration Date/Time : 4-APR-2006 12:07:31  
 Calibration Source Id : AESS-020

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2381.287  
 Energy Calibration Slope : 4.986757  
 Energy Calibration Quadratic : 2.9497029E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 045  
 Detector : 34430  
 Calibration Date/Time : 4-APR-2006 12:07:49  
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.799
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2396.370  
 Energy Calibration Slope : 4.975925  
 Energy Calibration Quadratic : 2.7766536E-04  
 Energy Calibration Range : 7783.000

Instrument : CHAMBER 046  
 Detector : 42471  
 Calibration Date/Time : 4-APR-2006 12:08:03  
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.981
NP-237	4341	2/28/06	4768.800	4768.475
CM-244	4320A	2/28/06	5795.020	5794.831

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2370.690  
 Energy Calibration Slope : 4.938850  
 Energy Calibration Quadratic : 3.0132200E-04  
 Energy Calibration Range : 7744.000

Instrument : CHAMBER 047  
 Detector : 30449  
 Calibration Date/Time : 4-APR-2006 12:08:14  
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.801
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2367.885  
 Energy Calibration Slope : 4.977801  
 Energy Calibration Quadratic : 2.7243813E-04  
 Energy Calibration Range : 7751.000

Instrument : CHAMBER 048  
 Detector : 42483  
 Calibration Date/Time : 4-APR-2006 12:08:24  
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2379.919  
 Energy Calibration Slope : 5.011742  
 Energy Calibration Quadratic : 2.4467456E-04  
 Energy Calibration Range : 7769.000

Instrument : CHAMBER 065  
 Detector : 21087  
 Calibration Date/Time : 3-APR-2006 12:05:24  
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.701
NP-237	4341	2/28/06	4768.800	4768.799
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2381.709  
 Energy Calibration Slope : 4.966328  
 Energy Calibration Quadratic : 3.2913609E-04  
 Energy Calibration Range : 7812.000

Instrument : CHAMBER 066  
 Detector : 38159  
 Calibration Date/Time : 3-APR-2006 12:05:41  
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.194
NP-237	4341	2/28/06	4768.800	4769.460
CM-244	4320A	2/28/06	5795.020	5795.202

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2361.937  
 Energy Calibration Slope : 4.956664  
 Energy Calibration Quadratic : 3.0704346E-04  
 Energy Calibration Range : 7760.000

Instrument : CHAMBER 068  
 Detector : 33204  
 Calibration Date/Time : 3-APR-2006 12:06:11  
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.734
NP-237	4341	2/28/06	4768.800	4768.288
CM-244	4320A	2/28/06	5795.020	5794.885

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2340.602  
 Energy Calibration Slope : 4.952214  
 Energy Calibration Quadratic : 2.9989655E-04  
 Energy Calibration Range : 7726.000

Instrument : CHAMBER 069  
 Detector : 39172  
 Calibration Date/Time : 3-APR-2006 12:06:22  
 Calibration Source Id : AESS-005

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.678
NP-237	4341	2/28/06	4768.800	4768.439
CM-244	4320A	2/28/06	5795.020	5794.953

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2383.433  
 Energy Calibration Slope : 4.992626  
 Energy Calibration Quadratic : 3.0025930E-04  
 Energy Calibration Range : 7811.000

Instrument : CHAMBER 070  
 Detector : 33207  
 Calibration Date/Time : 3-APR-2006 12:06:32  
 Calibration Source Id : AESS-006  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.583  
 NP-237 4341 2/28/06 4768.800 4768.687  
 CM-244 4320A 2/28/06 5795.020 5794.788  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2397.668  
 Energy Calibration Slope : 4.915377  
 Energy Calibration Quadratic : 3.6479929E-04  
 Energy Calibration Range : 7814.000

Instrument : CHAMBER 072  
 Detector : 33210  
 Calibration Date/Time : 3-APR-2006 12:07:20  
 Calibration Source Id : AESS-008  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3185.797  
 NP-237 4341 2/28/06 4768.800 4771.520  
 CM-244 4320A 2/28/06 5795.020 5795.709  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2429.633  
 Energy Calibration Slope : 4.970463  
 Energy Calibration Quadratic : 2.6446831E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 073  
 Detector : 33211  
 Calibration Date/Time : 3-APR-2006 12:07:31  
 Calibration Source Id : AESS-009  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.651  
 NP-237 4341 2/28/06 4768.800 4768.479  
 CM-244 4320A 2/28/06 5795.020 5794.623  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2374.705  
 Energy Calibration Slope : 4.961344  
 Energy Calibration Quadratic : 3.4754534E-04  
 Energy Calibration Range : 7820.000

Instrument : CHAMBER 075  
 Detector : 29976  
 Calibration Date/Time : 3-APR-2006 12:07:53  
 Calibration Source Id : AESS-011

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.693
NP-237	4341	2/28/06	4768.800	4768.668
CM-244	4320A	2/28/06	5795.020	5794.923

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2362.553  
 Energy Calibration Slope : 4.960943  
 Energy Calibration Quadratic : 3.2853242E-04  
 Energy Calibration Range : 7787.000

Instrument : CHAMBER 076  
 Detector : 33213  
 Calibration Date/Time : 3-APR-2006 12:08:02  
 Calibration Source Id : AESS-012

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.644
NP-237	4341	2/28/06	4768.800	4768.760
CM-244	4320A	2/28/06	5795.020	5794.972

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2372.898  
 Energy Calibration Slope : 4.983890  
 Energy Calibration Quadratic : 3.3487112E-04  
 Energy Calibration Range : 7828.000

Instrument : CHAMBER 077  
 Detector : 28239  
 Calibration Date/Time : 3-APR-2006 12:08:16  
 Calibration Source Id : AESS-013

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.346
NP-237	4341	2/28/06	4768.800	4769.262
CM-244	4320A	2/28/06	5795.020	5795.317

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2368.874  
 Energy Calibration Slope : 4.931313  
 Energy Calibration Quadratic : 3.2203639E-04  
 Energy Calibration Range : 7756.000

Instrument : CHAMBER 078  
 Detector : 34425  
 Calibration Date/Time : 3-APR-2006 12:08:26  
 Calibration Source Id : AESS-014  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.993  
 NP-237 4341 2/28/06 4768.800 4768.645  
 CM-244 4320A 2/28/06 5795.020 5794.911  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2393.754  
 Energy Calibration Slope : 4.904502  
 Energy Calibration Quadratic : 3.5731806E-04  
 Energy Calibration Range : 7791.000

Instrument : CHAMBER 079  
 Detector : 28408  
 Calibration Date/Time : 3-APR-2006 12:08:37  
 Calibration Source Id : AESS-015  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.266  
 NP-237 4341 2/28/06 4768.800 4768.567  
 CM-244 4320A 2/28/06 5795.020 5794.887  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2383.558  
 Energy Calibration Slope : 4.929332  
 Energy Calibration Quadratic : 3.0991141E-04  
 Energy Calibration Range : 7756.000

Instrument : CHAMBER 080  
 Detector : 29269  
 Calibration Date/Time : 3-APR-2006 12:08:46  
 Calibration Source Id : AESS-016  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.363  
 NP-237 4341 2/28/06 4768.800 4768.345  
 CM-244 4320A 2/28/06 5795.020 5794.711  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2360.141  
 Energy Calibration Slope : 5.008783  
 Energy Calibration Quadratic : 2.6339359E-04  
 Energy Calibration Range : 7765.000

Instrument : CHAMBER 081  
 Detector : 28243  
 Calibration Date/Time : 5-APR-2006 14:20:00  
 Calibration Source Id : AESS-017  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4769.124  
 CM-244 4320A 2/28/06 5795.020 5795.316  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2423.205  
 Energy Calibration Slope : 4.974538  
 Energy Calibration Quadratic : 2.3569762E-04  
 Energy Calibration Range : 7764.000

Instrument : CHAMBER 083  
 Detector : 34436  
 Calibration Date/Time : 3-APR-2006 12:09:35  
 Calibration Source Id : AESS-019  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4768.144  
 CM-244 4320A 2/28/06 5795.020 5794.581  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2370.701  
 Energy Calibration Slope : 5.018431  
 Energy Calibration Quadratic : 2.5893620E-04  
 Energy Calibration Range : 7781.000

Instrument : CHAMBER 084  
 Detector : 29953  
 Calibration Date/Time : 3-APR-2006 12:09:48  
 Calibration Source Id : AESS-020  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3182.067  
 NP-237 4341 2/28/06 4768.800 4768.425  
 CM-244 4320A 2/28/06 5795.020 5794.511  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2368.562  
 Energy Calibration Slope : 5.005028  
 Energy Calibration Quadratic : 3.0593007E-04  
 Energy Calibration Range : 7815.000



Instrument : CHAMBER 085  
 Detector : 30451  
 Calibration Date/Time : 3-APR-2006 12:10:02  
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.503
NP-237	4341	2/28/06	4768.800	4768.802
CM-244	4320A	2/28/06	5795.020	5795.019

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2385.228  
 Energy Calibration Slope : 4.990182  
 Energy Calibration Quadratic : 3.0125739E-04  
 Energy Calibration Range : 7811.000

Instrument : CHAMBER 086  
 Detector : 29278  
 Calibration Date/Time : 3-APR-2006 12:10:24  
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.313
CM-244	4320A	2/28/06	5795.020	5794.889

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2367.011  
 Energy Calibration Slope : 5.001186  
 Energy Calibration Quadratic : 2.4593988E-04  
 Energy Calibration Range : 7746.000

Instrument : CHAMBER 087  
 Detector : 34430  
 Calibration Date/Time : 3-APR-2006 12:10:36  
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.326
NP-237	4341	2/28/06	4768.800	4768.556
CM-244	4320A	2/28/06	5795.020	5794.574

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2363.815  
 Energy Calibration Slope : 5.009631  
 Energy Calibration Quadratic : 2.4977388E-04  
 Energy Calibration Range : 7756.000

Instrument : CHAMBER 088  
 Detector : 30434  
 Calibration Date/Time : 3-APR-2006 12:10:54  
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.313
NP-237	4341	2/28/06	4768.800	4767.746
CM-244	4320A	2/28/06	5795.020	5794.659

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2334.709  
 Energy Calibration Slope : 4.874549  
 Energy Calibration Quadratic : 2.1355411E-04  
 Energy Calibration Range : 7550.000

Instrument : CHAMBER 089  
 Detector : 21087  
 Calibration Date/Time : 3-APR-2006 23:05:32  
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.451
NP-237	4341	2/28/06	4768.800	4768.626
CM-244	4320A	2/28/06	5795.020	5794.917

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2349.260  
 Energy Calibration Slope : 4.948930  
 Energy Calibration Quadratic : 3.2322409E-04  
 Energy Calibration Range : 7756.000

Instrument : CHAMBER 090  
 Detector : 38159  
 Calibration Date/Time : 3-APR-2006 23:06:16  
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5794.866

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2386.311  
 Energy Calibration Slope : 4.986774  
 Energy Calibration Quadratic : 3.3244080E-04  
 Energy Calibration Range : 7841.000

Instrument : CHAMBER 091  
 Detector : 33205  
 Calibration Date/Time : 4-APR-2006 21:06:36  
 Calibration Source Id : AESS-003

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.391
NP-237	4341	2/28/06	4768.800	4769.357
CM-244	4320A	2/28/06	5795.020	5795.305

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2363.386  
 Energy Calibration Slope : 4.961743  
 Energy Calibration Quadratic : 3.2066394E-04  
 Energy Calibration Range : 7780.000

Instrument : CHAMBER 092  
 Detector : 33204  
 Calibration Date/Time : 3-APR-2006 23:08:02  
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.867
CM-244	4320A	2/28/06	5795.020	5795.175

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2358.222  
 Energy Calibration Slope : 4.950097  
 Energy Calibration Quadratic : 3.0710385E-04  
 Energy Calibration Range : 7749.000

Instrument : CHAMBER 093  
 Detector : 33206  
 Calibration Date/Time : 3-APR-2006 23:08:14  
 Calibration Source Id : AESS-005

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4769.063
CM-244	4320A	2/28/06	5795.020	5795.298

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2375.739  
 Energy Calibration Slope : 4.926612  
 Energy Calibration Quadratic : 3.1170124E-04  
 Energy Calibration Range : 7747.000

Instrument : CHAMBER 094  
 Detector : 33207  
 Calibration Date/Time : 3-APR-2006 23:08:34  
 Calibration Source Id : AESS-006

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.993
NP-237	4341	2/28/06	4768.800	4768.799
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2369.583  
 Energy Calibration Slope : 4.936423  
 Energy Calibration Quadratic : 3.2235958E-04  
 Energy Calibration Range : 7762.000

Instrument : CHAMBER 096  
 Detector : 30429  
 Calibration Date/Time : 3-APR-2006 23:09:48  
 Calibration Source Id : AESS-008

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.677
NP-237	4341	2/28/06	4768.800	4768.561
CM-244	4320A	2/28/06	5795.020	5794.869

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2346.092  
 Energy Calibration Slope : 4.863141  
 Energy Calibration Quadratic : 3.1486651E-04  
 Energy Calibration Range : 7656.000

Instrument : CHAMBER 098  
 Detector : 30431  
 Calibration Date/Time : 3-APR-2006 23:10:26  
 Calibration Source Id : AESS-010

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.647
NP-237	4341	2/28/06	4768.800	4768.514
CM-244	4320A	2/28/06	5795.020	5794.903

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2380.759  
 Energy Calibration Slope : 4.922705  
 Energy Calibration Quadratic : 3.2662629E-04  
 Energy Calibration Range : 7764.000

Instrument : CHAMBER 099  
 Detector : 30432  
 Calibration Date/Time : 4-APR-2006 21:07:16  
 Calibration Source Id : AESS-011  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4769.171  
 CM-244 4320A 2/28/06 5795.020 5795.241  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2411.170  
 Energy Calibration Slope : 4.859684  
 Energy Calibration Quadratic : 3.3678240E-04  
 Energy Calibration Range : 7741.000

Instrument : CHAMBER 101  
 Detector : 31696  
 Calibration Date/Time : 3-APR-2006 23:11:17  
 Calibration Source Id : AESS-013  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.759  
 NP-237 4341 2/28/06 4768.800 4767.478  
 CM-244 4320A 2/28/06 5795.020 5793.923  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2397.165  
 Energy Calibration Slope : 4.939373  
 Energy Calibration Quadratic : 2.7448736E-04  
 Energy Calibration Range : 7743.000

Instrument : CHAMBER 102  
 Detector : 30438  
 Calibration Date/Time : 3-APR-2006 23:11:38  
 Calibration Source Id : AESS-014  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3183.000  
 NP-237 4341 2/28/06 4768.800 4768.799  
 CM-244 4320A 2/28/06 5795.020 5795.021  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2390.065  
 Energy Calibration Slope : 4.967123  
 Energy Calibration Quadratic : 3.3759646E-04  
 Energy Calibration Range : 7830.000

Instrument : CHAMBER 103  
 Detector : 30437  
 Calibration Date/Time : 3-APR-2006 23:11:50  
 Calibration Source Id : AESS-015

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.632
NP-237	4341	2/28/06	4768.800	4768.780
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2378.634  
 Energy Calibration Slope : 4.949142  
 Energy Calibration Quadratic : 3.4029011E-04  
 Energy Calibration Range : 7803.000

Instrument : CHAMBER 104  
 Detector : 30436  
 Calibration Date/Time : 3-APR-2006 23:12:05  
 Calibration Source Id : AESS-016

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.656
NP-237	4341	2/28/06	4768.800	4768.710
CM-244	4320A	2/28/06	5795.020	5794.893

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2402.033  
 Energy Calibration Slope : 4.941638  
 Energy Calibration Quadratic : 3.3733863E-04  
 Energy Calibration Range : 7816.000

Instrument : CHAMBER 106  
 Detector : 45382  
 Calibration Date/Time : 3-APR-2006 23:13:35  
 Calibration Source Id : AESS-018

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.390
NP-237	4341	2/28/06	4768.800	4768.938
CM-244	4320A	2/28/06	5795.020	5795.081

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2377.948  
 Energy Calibration Slope : 4.942991  
 Energy Calibration Quadratic : 3.4093895E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 107  
 Detector : 31697  
 Calibration Date/Time : 3-APR-2006 23:13:46  
 Calibration Source Id : AESS-019

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2398.373  
 Energy Calibration Slope : 4.985534  
 Energy Calibration Quadratic : 2.7872290E-04  
 Energy Calibration Range : 7796.000

Instrument : CHAMBER 109  
 Detector : 31693  
 Calibration Date/Time : 3-APR-2006 23:14:12  
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4769.000
CM-244	4320A	2/28/06	5795.020	5795.208

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2387.754  
 Energy Calibration Slope : 4.924148  
 Energy Calibration Quadratic : 3.0788378E-04  
 Energy Calibration Range : 7753.000

Instrument : CHAMBER 110  
 Detector : 30447  
 Calibration Date/Time : 4-APR-2006 21:08:36  
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.635
NP-237	4341	2/28/06	4768.800	4768.800
CM-244	4320A	2/28/06	5795.020	5795.020

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2419.221  
 Energy Calibration Slope : 4.999035  
 Energy Calibration Quadratic : 2.2320703E-04  
 Energy Calibration Range : 7772.000

Instrument : CHAMBER 111  
 Detector : 30448  
 Calibration Date/Time : 3-APR-2006 23:15:36  
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.627
NP-237	4341	2/28/06	4768.800	4768.799
CM-244	4320A	2/28/06	5795.020	5795.021

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2388.052  
 Energy Calibration Slope : 4.962283  
 Energy Calibration Quadratic : 2.9634466E-04  
 Energy Calibration Range : 7780.000

Instrument : CHAMBER 112  
 Detector : 30449  
 Calibration Date/Time : 3-APR-2006 23:15:47  
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.664
CM-244	4320A	2/28/06	5795.020	5795.019

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2375.519  
 Energy Calibration Slope : 4.935473  
 Energy Calibration Quadratic : 2.8306872E-04  
 Energy Calibration Range : 7726.000

Instrument : CHAMBER 113  
 Detector : 45-111B4  
 Calibration Date/Time : 4-APR-2006 17:02:58  
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3182.303
NP-237	4341	2/28/06	4768.800	4767.615
CM-244	4320A	2/28/06	5795.020	5794.404

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2393.614  
 Energy Calibration Slope : 4.990646  
 Energy Calibration Quadratic : 3.0610454E-04  
 Energy Calibration Range : 7825.000



Instrument : CHAMBER 114  
 Detector : 45-111B5  
 Calibration Date/Time : 4-APR-2006 17:03:22  
 Calibration Source Id : AESS-007

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.771
NP-237	4341	2/28/06	4768.800	4767.996
CM-244	4320A	2/28/06	5795.020	5794.695

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2391.292  
 Energy Calibration Slope : 4.957956  
 Energy Calibration Quadratic : 3.2139214E-04  
 Energy Calibration Range : 7805.000

Instrument : CHAMBER 115  
 Detector : 45-132EE5  
 Calibration Date/Time : 4-APR-2006 17:03:37  
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3183.000
NP-237	4341	2/28/06	4768.800	4768.468
CM-244	4320A	2/28/06	5795.020	5794.664

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2372.417  
 Energy Calibration Slope : 4.988519  
 Energy Calibration Quadratic : 2.9488039E-04  
 Energy Calibration Range : 7790.000

Instrument : CHAMBER 116  
 Detector : 45-132FF2  
 Calibration Date/Time : 4-APR-2006 17:03:51  
 Calibration Source Id : AESS-008

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.985
NP-237	4341	2/28/06	4768.800	4767.986
CM-244	4320A	2/28/06	5795.020	5794.612

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2377.594  
 Energy Calibration Slope : 4.965635  
 Energy Calibration Quadratic : 3.1974592E-04  
 Energy Calibration Range : 7798.000

Instrument : CHAMBER 117  
 Detector : 45-132FF3  
 Calibration Date/Time : 4-APR-2006 17:04:04  
 Calibration Source Id : AESS-003

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.825
NP-237	4341	2/28/06	4768.800	4767.294
CM-244	4320A	2/28/06	5795.020	5794.289

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2399.138  
 Energy Calibration Slope : 4.995797  
 Energy Calibration Quadratic : 2.8692893E-04  
 Energy Calibration Range : 7816.000

Instrument : CHAMBER 118  
 Detector : 45-132FF4  
 Calibration Date/Time : 4-APR-2006 17:04:21  
 Calibration Source Id : AESS-009

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.738
NP-237	4341	2/28/06	4768.800	4767.705
CM-244	4320A	2/28/06	5795.020	5794.733

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2382.726  
 Energy Calibration Slope : 4.977871  
 Energy Calibration Quadratic : 3.1087140E-04  
 Energy Calibration Range : 7806.000

Instrument : CHAMBER 119  
 Detector : 45-132FF5  
 Calibration Date/Time : 4-APR-2006 17:04:33  
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.725
NP-237	4341	2/28/06	4768.800	4768.406
CM-244	4320A	2/28/06	5795.020	5794.422

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2394.460  
 Energy Calibration Slope : 4.945233  
 Energy Calibration Quadratic : 3.2115451E-04  
 Energy Calibration Range : 7795.000

Instrument : CHAMBER 120  
 Detector : 45-142F1  
 Calibration Date/Time : 4-APR-2006 17:05:08  
 Calibration Source Id : AESS-010  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.702  
 NP-237 4341 2/28/06 4768.800 4767.716  
 CM-244 4320A 2/28/06 5795.020 5794.385  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2370.954  
 Energy Calibration Slope : 4.969444  
 Energy Calibration Quadratic : 2.9560321E-04  
 Energy Calibration Range : 7770.000

Instrument : CHAMBER 121  
 Detector : 45-142J4  
 Calibration Date/Time : 4-APR-2006 17:05:19  
 Calibration Source Id : AESS-005  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.854  
 NP-237 4341 2/28/06 4768.800 4767.926  
 CM-244 4320A 2/28/06 5795.020 5794.359  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2388.517  
 Energy Calibration Slope : 4.957601  
 Energy Calibration Quadratic : 3.2604721E-04  
 Energy Calibration Range : 7807.000

Instrument : CHAMBER 122  
 Detector : 45-142J5  
 Calibration Date/Time : 4-APR-2006 17:05:33  
 Calibration Source Id : AESS-011  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.708  
 NP-237 4341 2/28/06 4768.800 4767.643  
 CM-244 4320A 2/28/06 5795.020 5794.644  
 Energy/Channel Equation : see above  
 Energy Calibration Zero : 2379.562  
 Energy Calibration Slope : 4.966173  
 Energy Calibration Quadratic : 3.1077259E-04  
 Energy Calibration Range : 7791.000

Instrument : CHAMBER 123  
 Detector : 45-142V1  
 Calibration Date/Time : 4-APR-2006 17:05:57  
 Calibration Source Id : AESS-006

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3180.927
NP-237	4341	2/28/06	4768.800	4767.132
CM-244	4320A	2/28/06	5795.020	5794.117

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2393.486  
 Energy Calibration Slope : 4.981727  
 Energy Calibration Quadratic : 2.8783656E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 124  
 Detector : 45-142V2  
 Calibration Date/Time : 4-APR-2006 17:06:12  
 Calibration Source Id : AESS-012

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.329
NP-237	4341	2/28/06	4768.800	4767.124
CM-244	4320A	2/28/06	5795.020	5794.622

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2394.312  
 Energy Calibration Slope : 4.963425  
 Energy Calibration Quadratic : 3.1662040E-04  
 Energy Calibration Range : 7809.000

Instrument : CHAMBER 125  
 Detector : 45-142V3  
 Calibration Date/Time : 4-APR-2006 17:06:28  
 Calibration Source Id : AESS-013

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.749
NP-237	4341	2/28/06	4768.800	4766.709
CM-244	4320A	2/28/06	5795.020	5794.138

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2389.743  
 Energy Calibration Slope : 4.991052  
 Energy Calibration Quadratic : 2.6156937E-04  
 Energy Calibration Range : 7775.000

Instrument : CHAMBER 126  
 Detector : 45-142V5  
 Calibration Date/Time : 4-APR-2006 17:06:44  
 Calibration Source Id : AESS-019

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.536
NP-237	4341	2/28/06	4768.800	4766.676
CM-244	4320A	2/28/06	5795.020	5794.299

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2392.589  
 Energy Calibration Slope : 5.019009  
 Energy Calibration Quadratic : 2.5404955E-04  
 Energy Calibration Range : 7798.000

Instrument : CHAMBER 127  
 Detector : 45-142W1  
 Calibration Date/Time : 4-APR-2006 17:07:12  
 Calibration Source Id : AESS-014

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.047
NP-237	4341	2/28/06	4768.800	4767.379
CM-244	4320A	2/28/06	5795.020	5794.462

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2390.982  
 Energy Calibration Slope : 4.949072  
 Energy Calibration Quadratic : 3.2237647E-04  
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 128  
 Detector : 45-142W2  
 Calibration Date/Time : 4-APR-2006 17:07:27  
 Calibration Source Id : AESS-020

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.794
NP-237	4341	2/28/06	4768.800	4767.351
CM-244	4320A	2/28/06	5795.020	5794.426

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2376.436  
 Energy Calibration Slope : 4.990520  
 Energy Calibration Quadratic : 2.8923506E-04  
 Energy Calibration Range : 7790.000

Instrument : CHAMBER 129  
 Detector : 45-142W3  
 Calibration Date/Time : 4-APR-2006 17:07:43  
 Calibration Source Id : AESS-015  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.920  
 NP-237 4341 2/28/06 4768.800 4767.431  
 CM-244 4320A 2/28/06 5795.020 5794.286

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2397.947  
 Energy Calibration Slope : 4.950837  
 Energy Calibration Quadratic : 3.2286491E-04  
 Energy Calibration Range : 7806.000

Instrument : CHAMBER 130  
 Detector : 45-142W5  
 Calibration Date/Time : 4-APR-2006 17:07:58  
 Calibration Source Id : AESS-021  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.779  
 NP-237 4341 2/28/06 4768.800 4767.779  
 CM-244 4320A 2/28/06 5795.020 5794.289

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2390.948  
 Energy Calibration Slope : 5.005381  
 Energy Calibration Quadratic : 2.9957382E-04  
 Energy Calibration Range : 7831.000

Instrument : CHAMBER 131  
 Detector : 45-145K1  
 Calibration Date/Time : 4-APR-2006 17:08:16  
 Calibration Source Id : AESS-016  
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy  
 GD-148 6445-278 2/28/06 3183.000 3181.832  
 NP-237 4341 2/28/06 4768.800 4767.927  
 CM-244 4320A 2/28/06 5795.020 5794.474

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2383.200  
 Energy Calibration Slope : 4.971618  
 Energy Calibration Quadratic : 3.1435001E-04  
 Energy Calibration Range : 7804.000

Instrument : CHAMBER 132  
 Detector : 45-145K2  
 Calibration Date/Time : 4-APR-2006 17:08:32  
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.897
NP-237	4341	2/28/06	4768.800	4767.248
CM-244	4320A	2/28/06	5795.020	5794.594

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2374.090  
 Energy Calibration Slope : 5.015432  
 Energy Calibration Quadratic : 2.7181130E-04  
 Energy Calibration Range : 7795.000

Instrument : CHAMBER 133  
 Detector : 45-145K3  
 Calibration Date/Time : 4-APR-2006 17:09:47  
 Calibration Source Id : AESS-017

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.967
NP-237	4341	2/28/06	4768.800	4767.767
CM-244	4320A	2/28/06	5795.020	5794.419

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2364.883  
 Energy Calibration Slope : 4.958282  
 Energy Calibration Quadratic : 2.8459914E-04  
 Energy Calibration Range : 7741.000

Instrument : CHAMBER 134  
 Detector : 45-145K4  
 Calibration Date/Time : 4-APR-2006 17:11:02  
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.715
NP-237	4341	2/28/06	4768.800	4767.525
CM-244	4320A	2/28/06	5795.020	5794.621

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2384.888  
 Energy Calibration Slope : 4.989409  
 Energy Calibration Quadratic : 2.7175582E-04  
 Energy Calibration Range : 7779.000

Instrument : CHAMBER 135  
 Detector : 45-145K5  
 Calibration Date/Time : 4-APR-2006 17:11:53  
 Calibration Source Id : AESS-018

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.833
NP-237	4341	2/28/06	4768.800	4768.171
CM-244	4320A	2/28/06	5795.020	5794.435

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2394.605  
 Energy Calibration Slope : 4.968740  
 Energy Calibration Quadratic : 2.9795556E-04  
 Energy Calibration Range : 7795.000

Instrument : CHAMBER 136  
 Detector : 45-145L1  
 Calibration Date/Time : 4-APR-2006 17:12:12  
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/06	3183.000	3181.493
NP-237	4341	2/28/06	4768.800	4767.151
CM-244	4320A	2/28/06	5795.020	5794.044

Energy/Channel Equation : see above  
 Energy Calibration Zero : 2384.309  
 Energy Calibration Slope : 5.003936  
 Energy Calibration Quadratic : 2.5798104E-04  
 Energy Calibration Range : 7779.000



## Subsection 2: Background Calibration

Instrument : CHAMBER 001  
 Detector : 33088  
 Background Analysis Date/Time : 2-APR-2006 11:38:32  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.456	3298.943	2.000000	0.4799997	70.71068	95.00000
NP-237	4433.436	4903.018	13.00000	3.119998	27.73501	95.00000
CM-244	5530.638	5887.374	28.00000	6.719995	18.89822	95.00000

Instrument : CHAMBER 003  
 Detector : 20659  
 Background Analysis Date/Time : 2-APR-2006 11:38:32  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.599	3300.169	5.000000	1.199999	44.72136	95.00000
NP-237	4434.674	4902.844	22.00000	5.279996	21.32007	95.00000
CM-244	5535.248	5883.783	33.00000	7.919994	17.40777	95.00000

Instrument : CHAMBER 004  
 Detector : 33077  
 Background Analysis Date/Time : 2-APR-2006 11:38:32  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.545	3299.456	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4433.646	4906.400	4.000000	0.9599993	50.00000	95.00000
CM-244	5531.494	5886.867	18.00000	4.319997	23.57022	95.00000

Instrument : CHAMBER 005  
 Detector : 28642  
 Background Analysis Date/Time : 2-APR-2006 11:38:32  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.709	3298.775	3.000000	0.7199995	57.73503	95.00000
NP-237	4434.190	4905.248	19.00000	4.559997	22.94157	95.00000
CM-244	5530.463	5883.921	31.00000	7.439995	17.96053	95.00000

Instrument : CHAMBER 007  
 Detector : 30416  
 Background Analysis Date/Time : 2-APR-2006 11:38:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.797	3298.358	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.556	4903.394	25.00000	5.999996	20.00000	95.00000
CM-244	5533.897	5887.491	49.00000	11.75999	14.28572	95.00000

Instrument : CHAMBER 009  
 Detector : 13285  
 Background Analysis Date/Time : 2-APR-2006 11:38:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.740	3302.180	3.000000	0.7199995	57.73503	95.00000
NP-237	4436.826	4904.306	10.00000	2.399998	31.62278	95.00000
CM-244	5530.853	5882.488	30.00000	7.199995	18.25742	95.00000

Instrument : CHAMBER 010  
 Detector : 33083  
 Background Analysis Date/Time : 2-APR-2006 11:38:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.233	3300.495	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.514	4905.914	11.00000	2.639998	30.15113	95.00000
CM-244	5535.151	5882.345	27.00000	6.479995	19.24501	95.00000

Instrument : CHAMBER 011  
 Detector : 9537  
 Background Analysis Date/Time : 2-APR-2006 11:38:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.769	3298.475	1.000000	0.2399998	100.0000	95.00000
NP-237	4433.776	4901.438	2.000000	0.4799997	70.71068	95.00000
CM-244	5533.457	5885.193	35.00000	8.399994	16.90309	95.00000

Instrument : CHAMBER 012  
 Detector : 33085  
 Background Analysis Date/Time : 2-APR-2006 11:38:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.283	3299.978	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.454	4901.598	3.000000	0.7199995	57.73503	95.00000
CM-244	5534.285	5885.751	13.00000	3.119998	27.73501	95.00000

Instrument : CHAMBER 013  
 Detector : 21084  
 Background Analysis Date/Time : 2-APR-2006 11:38:34  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.308	3301.307	1.000000	0.2399998	100.0000	95.00000
NP-237	4433.829	4905.476	4.000000	0.9599993	50.00000	95.00000
CM-244	5530.551	5886.625	27.00000	6.479995	19.24501	95.00000

Instrument : CHAMBER 016  
 Detector : 21086  
 Background Analysis Date/Time : 2-APR-2006 11:38:34  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.386	3300.792	3.000000	0.7199995	57.73503	95.00000
NP-237	4437.111	4903.407	9.000000	2.159998	33.33334	95.00000
CM-244	5533.819	5884.776	38.00000	9.119993	16.22214	95.00000

Instrument : CHAMBER 017  
 Detector : 33203  
 Background Analysis Date/Time : 2-APR-2006 11:38:34  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.693	3298.212	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.905	4905.400	9.000000	2.159998	33.33334	95.00000
CM-244	5532.198	5886.394	44.00000	10.55999	15.07557	95.00000

Instrument : CHAMBER 018  
 Detector : 21063  
 Background Analysis Date/Time : 2-APR-2006 11:38:34  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.076	3298.134	1.000000	0.2399998	100.0000	95.00000
NP-237	4433.036	4905.011	4.000000	0.9599993	50.00000	95.00000
CM-244	5535.243	5885.674	34.00000	8.159994	17.14986	95.00000

Instrument : CHAMBER 019  
 Detector : 23882  
 Background Analysis Date/Time : 2-APR-2006 11:38:35  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.511	3300.144	16916.00	4059.841	0.7688669	95.00000
NP-237	4435.855	4902.151	5184.000	1244.160	1.388889	95.00000
CM-244	5531.789	5884.041	1897.000	455.2801	2.295970	95.00000

Instrument : CHAMBER 020  
 Detector : 33093  
 Background Analysis Date/Time : 2-APR-2006 11:38:35  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.758	3298.111	2.000000	0.4800001	70.71068	95.00000
NP-237	4435.838	4901.523	7.000000	1.680000	37.79645	95.00000
CM-244	5530.915	5883.311	45.00000	10.80000	14.90712	95.00000

Instrument : CHAMBER 021  
 Detector : 33893  
 Background Analysis Date/Time : 2-APR-2006 11:38:35  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.969	3300.683	1.000000	0.2400001	100.0000	95.00000
NP-237	4434.165	4904.181	5.000000	1.200000	44.72136	95.00000
CM-244	5533.125	5885.623	21.00000	5.040001	21.82179	95.00000

Instrument : CHAMBER 023  
 Detector : 22873  
 Background Analysis Date/Time : 2-APR-2006 11:38:35  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.365	3300.653	2.000000	0.4800001	70.71068	95.00000
NP-237	4432.587	4902.786	9.000000	2.160001	33.33334	95.00000
CM-244	5533.585	5885.616	41.00000	9.840002	15.61738	95.00000

Instrument : CHAMBER 026  
 Detector : 34427  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.396	3300.299	1.000000	0.2400001	100.0000	95.00000
NP-237	4432.951	4903.551	14.00000	3.360001	26.72612	95.00000
CM-244	5534.085	5882.486	27.00000	6.480001	19.24501	95.00000

Instrument : CHAMBER 027  
 Detector : 31436  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.641	3298.501	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.554	4903.960	9.000000	2.160001	33.33334	95.00000
CM-244	5535.178	5885.600	13.00000	3.120001	27.73501	95.00000

Instrument : CHAMBER 028  
 Detector : 21056  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.862	3298.519	1.000000	0.2400001	100.0000	95.00000
NP-237	4437.162	4904.527	5.000000	1.200000	44.72136	95.00000
CM-244	5534.678	5884.670	3.000000	0.7200001	57.73503	95.00000

Instrument : CHAMBER 029  
 Detector : 30419  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.643	3298.009	4.000000	0.9600002	50.00000	95.00000
NP-237	4436.124	4903.513	4.000000	0.9600002	50.00000	95.00000
CM-244	5533.909	5884.139	20.00000	4.800001	22.36068	95.00000

Instrument : CHAMBER 030  
 Detector : 30420  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.381	3300.032	2.000000	0.4800001	70.71068	95.00000
NP-237	4435.171	4901.399	1.000000	0.2400001	100.0000	95.00000
CM-244	5532.938	5887.226	28.00000	6.720002	18.89822	95.00000

Instrument : CHAMBER 032  
 Detector : 33207  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.438	3301.011	4.000000	0.9599994	50.00000	95.00000
NP-237	4437.450	4903.298	8.000000	1.919999	35.35534	95.00000
CM-244	5533.518	5886.674	40.00000	9.599994	15.81139	95.00000

Instrument : CHAMBER 033  
 Detector : 28647  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.128	3301.778	10.00000	2.399998	31.62278	95.00000
NP-237	4433.277	4905.752	9.000000	2.159999	33.33334	95.00000
CM-244	5531.202	5887.135	39.00000	9.359994	16.01282	95.00000

Instrument : CHAMBER 034  
 Detector : 32697  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.740	3297.727	18.00000	4.319997	23.57022	95.00000
NP-237	4436.424	4906.295	31.00000	7.439995	17.96053	95.00000
CM-244	5532.067	5883.683	33.00000	7.919995	17.40777	95.00000

Instrument : CHAMBER 035  
 Detector : 29271  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.597	3300.316	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.093	4902.062	25.00000	5.999996	20.00000	95.00000
CM-244	5533.546	5887.289	24.00000	5.759996	20.41241	95.00000

Instrument : CHAMBER 036  
 Detector : 29275  
 Background Analysis Date/Time : 2-APR-2006 11:38:36  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.101	3302.011	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4436.212	4902.690	21.00000	5.039997	21.82179	95.00000
CM-244	5530.586	5883.211	28.00000	6.719995	18.89822	95.00000

Instrument : CHAMBER 037  
 Detector : 32690  
 Background Analysis Date/Time : 2-APR-2006 11:38:37  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.331	3300.070	3.000000	0.7200001	57.73503	95.00000
NP-237	4435.120	4902.289	15.00000	3.600001	25.81989	95.00000
CM-244	5534.121	5882.713	34.00000	8.160002	17.14986	95.00000

Instrument : CHAMBER 038  
 Detector : 19323  
 Background Analysis Date/Time : 2-APR-2006 11:38:37  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.203	3301.129	4.000000	0.9600002	50.00000	95.00000
NP-237	4436.340	4904.950	11.00000	2.640001	30.15113	95.00000
CM-244	5534.574	5885.451	22.00000	5.280001	21.32007	95.00000

Instrument : CHAMBER 040  
 Detector : 30446  
 Background Analysis Date/Time : 2-APR-2006 11:38:37  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.636	3301.603	3.000000	0.7200001	57.73503	95.00000
NP-237	4435.733	4904.719	11.00000	2.640001	30.15113	95.00000
CM-244	5532.976	5885.423	19.00000	4.560001	22.94157	95.00000

Instrument : CHAMBER 041  
 Detector : 22834  
 Background Analysis Date/Time : 2-APR-2006 11:38:37  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.681	3302.193	2.000000	0.4800001	70.71068	95.00000
NP-237	4432.502	4905.743	8.000000	1.920000	35.35534	95.00000
CM-244	5533.298	5885.604	23.00000	5.520001	20.85144	95.00000

Instrument : CHAMBER 042  
 Detector : 32695  
 Background Analysis Date/Time : 2-APR-2006 11:38:37  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.651	3300.194	4.000000	0.9600002	50.00000	95.00000
NP-237	4435.708	4903.810	19.00000	4.560001	22.94157	95.00000
CM-244	5531.417	5883.758	26.00000	6.240001	19.61161	95.00000



Instrument : CHAMBER 043  
 Detector : 42470  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.168	3298.326	1.000000	0.2399998	100.0000	95.00000
NP-237	4436.901	4902.013	2.000000	0.4799997	70.71068	95.00000
CM-244	5535.121	5886.262	19.00000	4.559997	22.94157	95.00000

Instrument : CHAMBER 044  
 Detector : 34433  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.004	3298.648	28.00000	6.719995	18.89822	95.00000
NP-237	4433.632	4906.174	35.00000	8.399995	16.90309	95.00000
CM-244	5532.967	5887.129	38.00000	9.119994	16.22214	95.00000

Instrument : CHAMBER 045  
 Detector : 34430  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.438	3301.033	4.000000	0.9599994	50.00000	95.00000
NP-237	4436.365	4906.490	17.00000	4.079998	24.25356	95.00000
CM-244	5535.004	5886.982	17.00000	4.079998	24.25356	95.00000

Instrument : CHAMBER 046  
 Detector : 42471  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.741	3299.741	14.00000	3.359998	26.72612	95.00000
NP-237	4435.900	4904.967	49.00000	11.75999	14.28572	95.00000
CM-244	5532.671	5884.488	25.00000	5.999996	20.00000	95.00000

Instrument : CHAMBER 047  
 Detector : 30449  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.322	3298.103	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4433.780	4903.899	14.00000	3.359998	26.72612	95.00000
CM-244	5532.276	5884.114	29.00000	6.959996	18.56953	95.00000

Instrument : CHAMBER 048  
 Detector : 42483  
 Background Analysis Date/Time : 2-APR-2006 11:38:38  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.922	3300.161	1.000000	0.2399998	100.0000	95.00000
NP-237	4434.180	4904.923	20.00000	4.799997	22.36068	95.00000
CM-244	5533.436	5885.010	24.00000	5.759996	20.41241	95.00000

Instrument : CHAMBER 065  
 Detector : 21087  
 Background Analysis Date/Time : 2-APR-2006 11:38:39  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.500	3301.569	5.000000	1.199999	44.72136	95.00000
NP-237	4436.593	4904.814	10.00000	2.399998	31.62278	95.00000
CM-244	5533.641	5883.942	18.00000	4.319997	23.57022	95.00000

Instrument : CHAMBER 066  
 Detector : 38159  
 Background Analysis Date/Time : 2-APR-2006 11:38:39  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.351	3299.570	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.367	4906.503	12.00000	2.879998	28.86751	95.00000
CM-244	5531.751	5885.195	19.00000	4.559997	22.94157	95.00000

Instrument : CHAMBER 068  
 Detector : 33204  
 Background Analysis Date/Time : 2-APR-2006 11:38:39  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.458	3302.482	2.000000	0.4799997	70.71068	95.00000
NP-237	4437.019	4902.188	5.000000	1.199999	44.72136	95.00000
CM-244	5531.579	5884.315	15.00000	3.599998	25.81989	95.00000

Instrument : CHAMBER 069  
 Detector : 39172  
 Background Analysis Date/Time : 2-APR-2006 11:38:39  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.937	3302.037	1.000000	0.2399998	100.0000	95.00000
NP-237	4433.758	4901.912	5.000000	1.199999	44.72136	95.00000
CM-244	5535.302	5884.863	13.00000	3.119998	27.73501	95.00000

Instrument : CHAMBER 070  
 Detector : 33207  
 Background Analysis Date/Time : 2-APR-2006 11:38:39  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.764	3299.302	3.000000	0.7199996	57.73503	95.00000
NP-237	4432.603	4904.338	13.00000	3.119998	27.73501	95.00000
CM-244	5531.790	5887.167	12.00000	2.879998	28.86751	95.00000

Instrument : CHAMBER 072  
 Detector : 33210  
 Background Analysis Date/Time : 2-APR-2006 11:38:40  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.642	3302.500	4.000000	0.9599994	50.00000	95.00000
NP-237	4434.229	4902.517	7.000000	1.679999	37.79645	95.00000
CM-244	5533.565	5883.889	14.00000	3.359998	26.72612	95.00000

Instrument : CHAMBER 073  
 Detector : 33211  
 Background Analysis Date/Time : 2-APR-2006 11:38:40  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.209	3299.359	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.813	4905.119	6.000000	1.439999	40.82483	95.00000
CM-244	5530.447	5887.394	15.00000	3.599998	25.81989	95.00000

Instrument : CHAMBER 075  
 Detector : 29976  
 Background Analysis Date/Time : 2-APR-2006 11:38:40  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.804	3301.738	1.000000	0.2399998	100.0000	95.00000
NP-237	4436.078	4904.005	18.00000	4.319997	23.57022	95.00000
CM-244	5532.428	5882.500	16.00000	3.839998	25.00000	95.00000

Instrument : CHAMBER 076  
 Detector : 33213  
 Background Analysis Date/Time : 2-APR-2006 11:38:40  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.982	3301.271	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.792	4906.032	9.000000	2.159999	33.33334	95.00000
CM-244	5532.284	5884.164	16.00000	3.839998	25.00000	95.00000

Instrument : CHAMBER 077  
 Detector : 28239  
 Background Analysis Date/Time : 2-APR-2006 11:38:41  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.320	3302.291	3.000000	0.7200001	57.73503	95.00000
NP-237	4434.458	4904.534	18.00000	4.320001	23.57022	95.00000
CM-244	5534.090	5887.188	14.00000	3.360001	26.72612	95.00000

Instrument : CHAMBER 078  
 Detector : 34425  
 Background Analysis Date/Time : 2-APR-2006 11:38:41  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.430	3298.209	2.000000	0.4800001	70.71068	95.00000
NP-237	4433.493	4903.776	8.000000	1.920000	35.35534	95.00000
CM-244	5534.483	5883.260	14.00000	3.360001	26.72612	95.00000

Instrument : CHAMBER 079  
 Detector : 28408  
 Background Analysis Date/Time : 2-APR-2006 11:38:41  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.549	3301.048	4.000000	0.9600002	50.00000	95.00000
NP-237	4435.951	4904.750	7.000000	1.680000	37.79645	95.00000
CM-244	5532.313	5884.158	23.00000	5.520001	20.85144	95.00000

Instrument : CHAMBER 080  
 Detector : 29269  
 Background Analysis Date/Time : 2-APR-2006 11:38:41  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.355	3300.887	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4437.124	4904.027	11.00000	2.640001	30.15113	95.00000
CM-244	5534.833	5882.541	24.00000	5.760001	20.41241	95.00000

Instrument : CHAMBER 081  
 Detector : 28243  
 Background Analysis Date/Time : 2-APR-2006 11:38:41  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.337	3300.967	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.244	4901.705	5.000000	1.199999	44.72136	95.00000
CM-244	5534.853	5883.115	9.000000	2.159999	33.33334	95.00000

Instrument : CHAMBER 083  
 Detector : 34436  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.885	3297.745	2.000000	0.4799997	70.71068	95.00000
NP-237	4435.182	4902.448	13.00000	3.119998	27.73501	95.00000
CM-244	5533.629	5886.856	19.00000	4.559997	22.94157	95.00000

Instrument : CHAMBER 084  
 Detector : 29953  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.809	3299.845	2.000000	0.4799997	70.71068	95.00000
NP-237	4435.274	4905.090	36.00000	8.639995	16.66667	95.00000
CM-244	5535.465	5886.345	11.00000	2.639998	30.15113	95.00000

Instrument : CHAMBER 085  
 Detector : 30451  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.388	3298.321	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.734	4902.750	2.000000	0.4799997	70.71068	95.00000
CM-244	5530.623	5885.465	16.00000	3.839998	25.00000	95.00000

Instrument : CHAMBER 086  
 Detector : 29278  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.939	3300.647	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4432.832	4902.859	8.000000	1.919999	35.35534	95.00000
CM-244	5530.458	5886.876	7.000000	1.679999	37.79645	95.00000

Instrument : CHAMBER 087  
 Detector : 34430  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.850	3299.145	8.000000	1.919999	35.35534	95.00000
NP-237	4433.685	4904.783	101.0000	24.23998	9.950372	95.00000
CM-244	5533.892	5885.860	3.000000	0.7199996	57.73503	95.00000

Instrument : CHAMBER 088  
 Detector : 30434  
 Background Analysis Date/Time : 2-APR-2006 11:38:42  
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.733	3298.324	1.000000	0.2399998	100.0000	95.00000
NP-237	4434.854	4901.741	3.000000	0.7199996	57.73503	95.00000
CM-244	5531.597	5882.583	6.000000	1.439999	40.82483	95.00000

Instrument : CHAMBER 089  
 Detector : 21087  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.018	3301.225	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4432.655	4904.531	3.000000	0.7199995	57.73503	95.00000
CM-244	5531.146	5885.550	1.000000	0.2399998	100.0000	95.00000

Instrument : CHAMBER 090  
 Detector : 38159  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.511	3299.809	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.211	4904.337	4.000000	0.9599993	50.00000	95.00000
CM-244	5530.381	5887.548	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

Instrument : CHAMBER 091  
 Detector : 33205  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.614	3302.446	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.933	4903.299	6.000000	1.439999	40.82483	95.00000
CM-244	5530.786	5885.646	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 092  
 Detector : 33204  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.837	3299.694	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.184	4904.789	3.000000	0.7199995	57.73503	95.00000
CM-244	5534.672	5882.398	1.000000	0.2399998	100.0000	95.00000

Instrument : CHAMBER 093  
 Detector : 33206  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.432	3297.831	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.503	4906.496	4.000000	0.9599993	50.00000	95.00000
CM-244	5534.120	5886.021	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 094  
 Detector : 33207  
 Background Analysis Date/Time : 2-APR-2006 11:38:43  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.673	3298.910	1.000000	0.2399998	100.0000	95.00000
NP-237	4437.305	4902.611	3.000000	0.7199995	57.73503	95.00000
CM-244	5532.741	5886.161	1.000000	0.2399998	100.0000	95.00000



Instrument : CHAMBER 096  
 Detector : 30429  
 Background Analysis Date/Time : 2-APR-2006 11:38:44  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.567	3301.392	2.000000	0.4800001	70.71068	95.00000
NP-237	4433.899	4903.007	4.000000	0.9600002	50.00000	95.00000
CM-244	5534.841	5883.364	8.000000	1.920000	35.35534	95.00000

Instrument : CHAMBER 098  
 Detector : 30431  
 Background Analysis Date/Time : 2-APR-2006 11:38:44  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.193	3297.595	2.000000	0.4800001	70.71068	95.00000
NP-237	4433.217	4902.776	10.00000	2.400000	31.62278	95.00000
CM-244	5531.761	5884.598	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 099  
 Detector : 30432  
 Background Analysis Date/Time : 2-APR-2006 11:38:44  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.302	3301.806	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.583	4904.427	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5532.529	5887.439	1.000000	0.2399998	100.0000	95.00000

Instrument : CHAMBER 101  
 Detector : 31696  
 Background Analysis Date/Time : 2-APR-2006 11:38:45  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.838	3300.184	2.000000	0.4800001	70.71068	95.00000
NP-237	4437.473	4904.200	4.000000	0.9600002	50.00000	95.00000
CM-244	5533.420	5882.862	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 102  
 Detector : 30438  
 Background Analysis Date/Time : 2-APR-2006 11:38:45  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.981	3300.175	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4436.167	4905.013	14.00000	3.360001	26.72612	95.00000
CM-244	5534.874	5885.847	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

Instrument : CHAMBER 103  
 Detector : 30437  
 Background Analysis Date/Time : 2-APR-2006 11:38:45  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.494	3300.797	2.000000	0.4800001	70.71068	95.00000
NP-237	4433.628	4906.553	4.000000	0.9600002	50.00000	95.00000
CM-244	5534.963	5885.168	3.000000	0.7200001	57.73503	95.00000

Instrument : CHAMBER 104  
 Detector : 30436  
 Background Analysis Date/Time : 2-APR-2006 11:38:45  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.844	3302.458	1.000000	0.2400000	100.0000	95.00000
NP-237	4432.663	4904.432	2.000000	0.4800001	70.71068	95.00000
CM-244	5531.252	5885.942	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 106  
 Detector : 45382  
 Background Analysis Date/Time : 2-APR-2006 11:38:45  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.094	3299.001	2.000000	0.4800001	70.71068	95.00000
NP-237	4435.781	4902.986	7.000000	1.680000	37.79645	95.00000
CM-244	5530.755	5886.020	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

Instrument : CHAMBER 107  
 Detector : 31697  
 Background Analysis Date/Time : 2-APR-2006 11:38:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.547	3299.714	1.000000	0.2400000	100.0000	95.00000
NP-237	4437.183	4902.948	1.000000	0.2400000	100.0000	95.00000
CM-244	5532.612	5885.240	6.000000	1.440000	40.82483	95.00000

Instrument : CHAMBER 109  
 Detector : 31693  
 Background Analysis Date/Time : 2-APR-2006 11:38:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.084	3299.184	3.000000	0.7200001	57.73503	95.00000
NP-237	4432.535	4905.875	1.000000	0.2400000	100.0000	95.00000
CM-244	5532.554	5883.883	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 110  
 Detector : 30447  
 Background Analysis Date/Time : 2-APR-2006 11:38:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.012	3300.888	1.000000	0.2400000	100.0000	95.00000
NP-237	4433.842	4901.474	1.000000	0.2400000	100.0000	95.00000
CM-244	5530.607	5884.669	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 111  
 Detector : 30448  
 Background Analysis Date/Time : 2-APR-2006 11:38:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.793	3301.004	3.000000	0.7200001	57.73503	95.00000
NP-237	4435.981	4906.484	6.000000	1.440000	40.82483	95.00000
CM-244	5530.639	5883.341	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 112  
 Detector : 30449  
 Background Analysis Date/Time : 2-APR-2006 11:38:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.870	3298.269	1.000000	0.2400000	100.0000	95.00000
NP-237	4436.313	4903.586	3.000000	0.7200001	57.73503	95.00000
CM-244	5533.752	5883.818	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 113  
 Detector : 45-111B4  
 Background Analysis Date/Time : 2-APR-2006 10:57:16  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.835	3301.848	1.000000	0.2400000	100.0000	95.00000
NP-237	4433.613	4901.946	2.000000	0.4800001	70.71068	95.00000
CM-244	5530.358	5885.560	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 114  
 Detector : 45-111B5  
 Background Analysis Date/Time : 2-APR-2006 10:57:20  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.875	3299.211	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4436.329	4903.130	1.000000	0.2400000	100.0000	95.00000
CM-244	5535.235	5884.346	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 115  
 Detector : 45-132EE5  
 Background Analysis Date/Time : 2-APR-2006 10:57:23  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.466	3300.287	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.908	4903.427	1.000000	0.2400000	100.0000	95.00000
CM-244	5530.487	5884.796	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 116  
 Detector : 45-132FF2  
 Background Analysis Date/Time : 2-APR-2006 10:57:26  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.161	3302.097	1.000000	0.2400000	100.0000	95.00000
NP-237	4435.898	4903.366	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5530.965	5885.878	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 117  
 Detector : 45-132FF3  
 Background Analysis Date/Time : 2-APR-2006 10:57:29  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.574	3297.481	2.000000	0.4800001	70.71068	95.00000
NP-237	4432.916	4905.417	3.000000	0.7200001	57.73503	95.00000
CM-244	5531.962	5885.886	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 118  
 Detector : 45-132FF4  
 Background Analysis Date/Time : 2-APR-2006 10:57:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.600	3298.996	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.069	4901.807	2.000000	0.4800001	70.71068	95.00000
CM-244	5534.903	5884.430	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 119  
 Detector : 45-132FF5  
 Background Analysis Date/Time : 2-APR-2006 10:57:36  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.490	3300.068	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.344	4905.254	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5530.554	5884.197	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 120  
 Detector : 45-142F1  
 Background Analysis Date/Time : 2-APR-2006 10:57:39  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.710	3300.418	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4437.274	4903.259	1.000000	0.2400000	100.0000	95.00000
CM-244	5533.634	5886.862	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 121  
 Detector : 45-142J4  
 Background Analysis Date/Time : 2-APR-2006 10:57:42  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.124	3301.600	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.163	4906.581	1.000000	0.2400000	100.0000	95.00000
CM-244	5533.976	5883.453	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 122  
 Detector : 45-142J5  
 Background Analysis Date/Time : 2-APR-2006 10:57:46  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.061	3298.780	1.000000	0.2400000	100.0000	95.00000
NP-237	4436.620	4903.419	1.000000	0.2400000	100.0000	95.00000
CM-244	5535.258	5884.098	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 123  
 Detector : 45-142V1  
 Background Analysis Date/Time : 2-APR-2006 10:57:49  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.387	3299.522	2.000000	0.4800001	70.71068	95.00000
NP-237	4437.442	4903.641	1.000000	0.2400000	100.0000	95.00000
CM-244	5534.110	5887.297	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 124  
 Detector : 45-142V2  
 Background Analysis Date/Time : 2-APR-2006 10:57:52  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.443	3297.987	2.000000	0.4800001	70.71068	95.00000
NP-237	4435.559	4902.411	2.000000	0.4800001	70.71068	95.00000
CM-244	5534.467	5883.494	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 125  
 Detector : 45-142V3  
 Background Analysis Date/Time : 2-APR-2006 10:57:55  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.436	3301.693	1.000000	0.2400000	100.0000	95.00000
NP-237	4433.216	4903.410	2.000000	0.4800001	70.71068	95.00000
CM-244	5531.615	5883.226	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 126  
 Detector : 45-142V5  
 Background Analysis Date/Time : 2-APR-2006 10:57:59  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.369	3299.131	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4435.618	4902.366	1.000000	0.2400000	100.0000	95.00000
CM-244	5532.732	5885.449	3.000000	0.7200001	57.73503	95.00000

Instrument : CHAMBER 127  
 Detector : 45-142W1  
 Background Analysis Date/Time : 2-APR-2006 10:58:02  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.513	3302.392	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4432.606	4903.961	1.000000	0.2400000	100.0000	95.00000
CM-244	5535.216	5883.874	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 128  
 Detector : 45-142W2  
 Background Analysis Date/Time : 2-APR-2006 10:58:05  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.584	3299.388	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.590	4901.786	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5533.622	5887.583	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 129  
 Detector : 45-142W3  
 Background Analysis Date/Time : 2-APR-2006 10:58:09  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.668	3299.558	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4435.149	4901.376	2.000000	0.4800001	70.71068	95.00000
CM-244	5532.751	5886.867	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 130  
 Detector : 45-142W5  
 Background Analysis Date/Time : 2-APR-2006 10:58:13  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.831	3301.623	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4435.787	4904.916	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5534.223	5884.439	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 131  
 Detector : 45-145K1  
 Background Analysis Date/Time : 2-APR-2006 10:58:17  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.369	3298.448	1.000000	0.2400000	100.0000	95.00000
NP-237	4432.591	4905.330	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5532.857	5887.665	1.000000	0.2400000	100.0000	95.00000



Instrument : CHAMBER 132  
 Detector : 45-145K2  
 Background Analysis Date/Time : 2-APR-2006 10:58:20  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.018	3301.016	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.219	4902.195	2.000000	0.4800001	70.71068	95.00000
CM-244	5534.644	5883.351	4.000000	0.9600002	50.00000	95.00000

Instrument : CHAMBER 133  
 Detector : 45-145K3  
 Background Analysis Date/Time : 2-APR-2006 10:58:23  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.115	3302.033	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4435.237	4904.688	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5532.486	5884.151	1.000000	0.2400000	100.0000	95.00000

Instrument : CHAMBER 134  
 Detector : 45-145K4  
 Background Analysis Date/Time : 2-APR-2006 10:58:26  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.530	3301.962	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.547	4905.459	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5534.869	5887.271	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

Instrument : CHAMBER 135  
 Detector : 45-145K5  
 Background Analysis Date/Time : 2-APR-2006 10:58:30  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.104	3298.632	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.981	4906.088	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5531.074	5884.261	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

Instrument : CHAMBER 136  
 Detector : 45-145L1  
 Background Analysis Date/Time : 2-APR-2006 10:58:33  
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.496	3298.473	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4437.582	4903.436	1.000000	0.240000	100.0000	95.00000
CM-244	5532.704	5884.860	0.000000E+00	0.000000E+00	0.000000E+00	95.00000

### Subsection 3: Efficiency Calibration

Instrument : CHAMBER 001  
 Detector : 33088  
 Standard ID : AESS-001  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:15  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:30:52  
 Average Efficiency : 0.2781914  
 Average Efficiency Error : 7.6626688E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2990.456	3298.943	14076.00	0.2746735	1.1824497E-02	65.35928
NP-237	211.8600	28-FEB-2006	4433.436	4903.018	14340.00	0.2819934	1.4295015E-02	71.99430
CM-244	248.8200	28-FEB-2006	5530.638	5887.374	14794.00	0.2795064	1.4163047E-02	64.69388

Instrument : CHAMBER 003  
 Detector : 20659  
 Standard ID : AESS-003  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:15  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:32:34  
 Average Efficiency : 0.2880620  
 Average Efficiency Error : 7.9304650E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.3600	28-FEB-2006	2988.599	3300.169	14554.00	0.2846224	1.2245077E-02	49.78555
NP-237	211.3800	28-FEB-2006	4434.674	4902.844	14694.00	0.2895928	1.4675476E-02	61.61686
CM-244	248.2800	28-FEB-2006	5535.248	5883.783	15396.00	0.2915129	1.4763834E-02	53.23063

Instrument : CHAMBER 004  
 Detector : 33077  
 Standard ID : AESS-004  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:15  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:32:51  
 Average Efficiency : 0.3098668  
 Average Efficiency Error : 8.5239913E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2987.545	3299.456	15401.00	0.3014340	1.2955099E-02	59.94693
NP-237	211.2000	28-FEB-2006	4433.646	4906.400	15919.00	0.3140544	1.5898786E-02	66.99142
CM-244	248.1000	28-FEB-2006	5531.494	5886.867	16816.00	0.3186174	1.6119311E-02	64.44215

Instrument : CHAMBER 005  
 Detector : 28642  
 Standard ID : AESS-005  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:15  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:33:05  
 Average Efficiency : 0.3158097  
 Average Efficiency Error : 8.6822659E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.709	3298.775	16078.00	0.3139968	1.3485039E-02	54.11107
NP-237	211.6800	28-FEB-2006	4434.190	4905.248	16264.00	0.3200765	1.6199514E-02	58.77632
CM-244	248.6400	28-FEB-2006	5530.463	5883.921	16620.00	0.3142197	1.5898999E-02	55.82949

Instrument : CHAMBER 007  
 Detector : 30416  
 Standard ID : AESS-007  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:16  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:35:21  
 Average Efficiency : 0.3047189  
 Average Efficiency Error : 8.3812820E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2990.797	3298.358	15695.00	0.3066845	1.3176420E-02	50.85197
NP-237	211.5600	28-FEB-2006	4432.556	4903.394	15403.00	0.3033007	1.5360770E-02	59.57014
CM-244	248.5200	28-FEB-2006	5533.897	5887.491	16043.00	0.3034657	1.5361345E-02	53.08852

Instrument : CHAMBER 009  
 Detector : 13285  
 Standard ID : AESS-009  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:16  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:39:51  
 Average Efficiency : 0.3341929  
 Average Efficiency Error : 9.1806399E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6000	28-FEB-2006	2987.740	3302.180	16955.00	0.3312147	1.4212075E-02	53.77267
NP-237	211.6200	28-FEB-2006	4436.826	4904.306	17080.00	0.3362575	1.7008657E-02	68.28894
CM-244	248.5800	28-FEB-2006	5530.853	5882.488	17788.00	0.3363935	1.7007809E-02	56.00669

Instrument : CHAMBER 010  
 Detector : 33083  
 Standard ID : AESS-010  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:16  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:40:04  
 Average Efficiency : 0.3340436  
 Average Efficiency Error : 9.1786785E-03  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2992.233	3300.495	16676.00	0.3259426	1.3989601E-02	68.92194
NP-237	211.5000	28-FEB-2006	4435.514	4905.914	17301.00	0.3408116	1.7236479E-02	78.65460
CM-244	248.4600	28-FEB-2006	5535.151	5882.345	17946.00	0.3395274	1.7164614E-02	63.81354

Instrument : CHAMBER 011  
 Detector : 9537  
 Standard ID : AESS-011  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:16  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:40:58  
 Average Efficiency : 0.3105724  
 Average Efficiency Error : 8.5400529E-03  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2988.769	3298.475	15819.00	0.3089387	1.3271471E-02	48.37308
NP-237	211.6800	28-FEB-2006	4433.776	4901.438	15834.00	0.3116739	1.5779305E-02	60.99158
CM-244	248.6400	28-FEB-2006	5533.457	5885.193	16490.00	0.3117799	1.5776988E-02	49.82006

Instrument : CHAMBER 012  
 Detector : 33085  
 Standard ID : AESS-012  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:16  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:41:13  
 Average Efficiency : 0.2681623  
 Average Efficiency Error : 7.3903115E-03  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2992.283	3299.978	13668.00	0.2665664	1.1482058E-02	61.90531
NP-237	211.9200	28-FEB-2006	4432.454	4901.598	13787.00	0.2710549	1.3747970E-02	71.13239
CM-244	248.9400	28-FEB-2006	5534.285	5885.751	14169.00	0.2675734	1.3566247E-02	62.43946

Instrument : CHAMBER 013  
 Detector : 21084  
 Standard ID : AESS-013  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:17  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:41:26  
 Average Efficiency : 0.3412675  
 Average Efficiency Error : 9.3716113E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	220.5600	28-FEB-2006	2992.308	3301.307	17507.00	0.3405094	1.4603521E-02	45.62738
NP-237	212.5200	28-FEB-2006	4433.829	4905.476	17346.00	0.3400816	1.7199026E-02	62.98444
CM-244	249.6600	28-FEB-2006	5530.551	5886.625	18245.00	0.3435482	1.7364752E-02	51.62660

Instrument : CHAMBER 016  
 Detector : 21086  
 Standard ID : AESS-016  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:17  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:45:33  
 Average Efficiency : 0.3303408  
 Average Efficiency Error : 9.0769110E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2992.386	3300.792	16669.00	0.3255388	1.3972365E-02	50.42868
NP-237	211.6800	28-FEB-2006	4437.111	4903.407	16820.00	0.3310585	1.6748626E-02	58.68690
CM-244	248.6400	28-FEB-2006	5533.819	5884.776	17810.00	0.3367283	1.7024504E-02	54.94007

Instrument : CHAMBER 017  
 Detector : 33203  
 Standard ID : AESS-017  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:17  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:45:52  
 Average Efficiency : 0.2902693  
 Average Efficiency Error : 7.9895537E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7200	28-FEB-2006	2988.693	3298.212	15015.00	0.2931568	1.2605052E-02	49.49680
NP-237	211.7400	28-FEB-2006	4432.905	4905.400	14650.00	0.2882629	1.4608623E-02	61.60561
CM-244	248.7000	28-FEB-2006	5532.198	5886.394	15257.00	0.2883977	1.4607739E-02	50.89099

Instrument : CHAMBER 018  
 Detector : 21063  
 Standard ID : AESS-018  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:17  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 16:46:43  
 Average Efficiency : 0.2559204  
 Average Efficiency Error : 7.0582652E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7800	28-FEB-2006	2988.076	3298.134	13144.00	0.2565568	1.1059588E-02	50.10976
NP-237	211.8000	28-FEB-2006	4433.036	4905.011	12933.00	0.2544221	1.2916340E-02	58.60687
CM-244	248.7600	28-FEB-2006	5535.243	5885.674	13576.00	0.2565605	1.3015677E-02	54.43167

Instrument : CHAMBER 019  
 Detector : 23882  
 Standard ID : AESS-019  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:18  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 16:46:59  
 Average Efficiency : 0.2848921  
 Average Efficiency Error : 7.8617986E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2989.511	3300.144	15017.00	0.2934360	1.2617028E-02	46.50811
NP-237	211.5600	28-FEB-2006	4435.855	4902.151	15150.00	0.2626681	1.3361575E-02	61.07557
CM-244	248.5200	28-FEB-2006	5531.789	5884.041	15932.00	0.3013749	1.5256786E-02	50.77583

Instrument : CHAMBER 020  
 Detector : 33093  
 Standard ID : AESS-020  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:18  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 16:47:46  
 Average Efficiency : 0.3374673  
 Average Efficiency Error : 9.2702135E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2988.758	3298.111	16991.00	0.3315554	1.4226208E-02	58.22562
NP-237	211.8000	28-FEB-2006	4435.838	4901.523	17420.00	0.3426790	1.7329575E-02	71.40521
CM-244	248.8200	28-FEB-2006	5530.915	5883.311	18048.00	0.3409902	1.7237470E-02	64.18688

Instrument : CHAMBER 021  
 Detector : 33893  
 Standard ID : AESS-021  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:18  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 16:48:06  
 Average Efficiency : 0.3097920  
 Average Efficiency Error : 8.5189342E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2987.969	3300.683	16019.00	0.3130153	1.3443721E-02	48.52213
NP-237	211.5600	28-FEB-2006	4434.165	4904.181	15665.00	0.3085031	1.5620876E-02	57.03367
CM-244	248.5200	28-FEB-2006	5533.125	5885.623	16217.00	0.3067660	1.5526365E-02	49.52942

Instrument : CHAMBER 023  
 Detector : 22873  
 Standard ID : AESS-023  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 12:02:18  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 16:49:38  
 Average Efficiency : 0.2765626  
 Average Efficiency Error : 7.6345578E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2988.365	3300.653	13199.00	0.2577709	1.1110976E-02	64.03100
NP-237	211.6800	28-FEB-2006	4432.587	4902.786	15014.00	0.2955187	1.4971492E-02	68.68533
CM-244	248.6400	28-FEB-2006	5533.585	5885.616	15406.00	0.2912842	1.4752124E-02	67.86546

Instrument : CHAMBER 026  
 Detector : 34427  
 Standard ID : AESS-002  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:51  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:02:00  
 Average Efficiency : 0.3111628  
 Average Efficiency Error : 5.9400578E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2988.396	3300.299	15946.00	0.3116805	7.0337788E-03	55.54451
NP-237	211.5000	28-FEB-2006	4432.951	4903.551	15774.00	0.3107190	1.5731754E-02	60.78556
CM-244	248.4000	28-FEB-2006	5534.085	5882.486	16328.00	0.3090416	1.5640259E-02	54.94981



Instrument : CHAMBER 027  
 Detector : 31436  
 Standard ID : AESS-003  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:51  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:02:17  
 Average Efficiency : 0.2851310  
 Average Efficiency Error : 5.4681562E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.3600	28-FEB-2006	2990.641	3298.501	14516.00	0.2838850	6.4452491E-03	62.80336
NP-237	211.3800	28-FEB-2006	4435.554	4903.960	14590.00	0.2875520	1.4573419E-02	61.53238
CM-244	248.2800	28-FEB-2006	5535.178	5885.600	15268.00	0.2891185	1.4644115E-02	66.27240

Instrument : CHAMBER 028  
 Detector : 21056  
 Standard ID : AESS-004  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:51  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:02:41  
 Average Efficiency : 0.2688177  
 Average Efficiency Error : 5.1718531E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2991.862	3298.519	13660.00	0.2673638	6.0955230E-03	60.48663
NP-237	211.2000	28-FEB-2006	4437.162	4904.527	13850.00	0.2732216	1.3856977E-02	78.59827
CM-244	248.1000	28-FEB-2006	5534.678	5884.670	14348.00	0.2718943	1.3782959E-02	69.00627

Instrument : CHAMBER 029  
 Detector : 30419  
 Standard ID : AESS-005  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:51  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:02:56  
 Average Efficiency : 0.2803768  
 Average Efficiency Error : 5.3804033E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2991.643	3298.009	14347.00	0.2801967	6.3665169E-03	50.13651
NP-237	211.6800	28-FEB-2006	4436.124	4903.513	14180.00	0.2791024	1.4150602E-02	62.17907
CM-244	248.6400	28-FEB-2006	5533.909	5884.139	14945.00	0.2825924	1.4317507E-02	55.61591

Instrument : CHAMBER 030  
 Detector : 30420  
 Standard ID : AESS-006  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:51  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:03:11  
 Average Efficiency : 0.3032622  
 Average Efficiency Error : 5.7966388E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2992.381	3300.032	15532.00	0.3040040	6.8717906E-03	53.70943
NP-237	211.2000	28-FEB-2006	4435.171	4901.399	15235.00	0.3005646	1.5224237E-02	63.92149
CM-244	248.1000	28-FEB-2006	5532.938	5887.226	15953.00	0.3023090	1.5303830E-02	56.83110

Instrument : CHAMBER 032  
 Detector : 33207  
 Standard ID : AESS-008  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:53  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:04:09  
 Average Efficiency : 0.3210600  
 Average Efficiency Error : 9.3805837E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2992.438	3301.011	16394.00	0.3199127	1.6193897E-02	48.92264
NP-237	211.8600	28-FEB-2006	4437.450	4903.298	16174.00	0.3180676	1.6098870E-02	62.34297
CM-244	248.8800	28-FEB-2006	5533.518	5886.674	17224.00	0.3253718	1.6456470E-02	58.56594

Instrument : CHAMBER 033  
 Detector : 28647  
 Standard ID : AESS-009  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:53  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:04:20  
 Average Efficiency : 0.3189350  
 Average Efficiency Error : 9.3192765E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6000	28-FEB-2006	2991.128	3301.778	16210.00	0.3166678	1.6031807E-02	50.20483
NP-237	211.6200	28-FEB-2006	4433.277	4905.752	16119.00	0.3173501	1.6063211E-02	65.81153
CM-244	248.5800	28-FEB-2006	5531.202	5887.135	17074.00	0.3229274	1.6334468E-02	56.14278

Instrument : CHAMBER 034  
 Detector : 32697  
 Standard ID : AESS-010  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:53  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:04:32  
 Average Efficiency : 0.3285644  
 Average Efficiency Error : 9.5973080E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2987.740	3297.727	16717.00	0.3267508	1.6536236E-02	46.19645
NP-237	211.5000	28-FEB-2006	4436.424	4906.295	16590.00	0.3267619	1.6533978E-02	65.57603
CM-244	248.4600	28-FEB-2006	5532.067	5883.683	17561.00	0.3322987	1.6803153E-02	52.60378

Instrument : CHAMBER 035  
 Detector : 29271  
 Standard ID : AESS-011  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:53  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:04:44  
 Average Efficiency : 0.3070081  
 Average Efficiency Error : 8.9746779E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.597	3300.316	15823.00	0.3090232	1.5649391E-02	58.07399
NP-237	211.6800	28-FEB-2006	4435.093	4902.062	15491.00	0.3048278	1.5437050E-02	77.73704
CM-244	248.6400	28-FEB-2006	5533.546	5887.289	16248.00	0.3072308	1.5549533E-02	61.23973

Instrument : CHAMBER 036  
 Detector : 29275  
 Standard ID : AESS-012  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:53  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:04:58  
 Average Efficiency : 0.3204660  
 Average Efficiency Error : 9.3638916E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2990.101	3302.011	16111.00	0.3142187	1.5908994E-02	70.87608
NP-237	211.9200	28-FEB-2006	4436.212	4902.690	16497.00	0.3243046	1.6410707E-02	86.38094
CM-244	248.9400	28-FEB-2006	5530.586	5883.211	17117.00	0.3232544	1.6350558E-02	83.27386

Instrument : CHAMBER 037  
 Detector : 32690  
 Standard ID : AESS-013  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:55  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:05:37  
 Average Efficiency : 0.3298278  
 Average Efficiency Error : 6.2852711E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	220.5600	28-FEB-2006	2990.331	3300.070	16648.00	0.3238085	7.2884769E-03	65.32179
NP-237	212.5200	28-FEB-2006	4435.120	4902.289	17586.00	0.3447773	1.7433835E-02	73.49030
CM-244	249.6600	28-FEB-2006	5534.121	5882.713	18584.00	0.3498755	1.7681209E-02	65.58303

Instrument : CHAMBER 038  
 Detector : 19323  
 Standard ID : AESS-014  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:55  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:05:48  
 Average Efficiency : 0.3550652  
 Average Efficiency Error : 6.7386958E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2992.203	3301.129	18140.00	0.3537907	7.9244133E-03	44.64486
NP-237	211.9800	28-FEB-2006	4436.340	4904.950	18294.00	0.3595673	1.8173877E-02	68.25054
CM-244	249.0000	28-FEB-2006	5534.574	5885.451	18924.00	0.3572362	1.8049749E-02	49.98671

Instrument : CHAMBER 040  
 Detector : 30446  
 Standard ID : AESS-016  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:55  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:06:33  
 Average Efficiency : 0.3232525  
 Average Efficiency Error : 6.1597549E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.636	3301.603	16579.00	0.3237876	7.2898054E-03	47.52289
NP-237	211.6800	28-FEB-2006	4435.733	4904.719	16163.00	0.3181213	1.6101720E-02	60.46703
CM-244	248.6400	28-FEB-2006	5532.976	5885.423	17235.00	0.3258936	1.6482741E-02	51.53939

Instrument : CHAMBER 041  
 Detector : 22834  
 Standard ID : AESS-017  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:55  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:06:46  
 Average Efficiency : 0.3322699  
 Average Efficiency Error : 6.3254358E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7200	28-FEB-2006	2987.681	3302.193	16913.00	0.3302204	7.4258945E-03	49.34238
NP-237	211.7400	28-FEB-2006	4432.502	4905.743	17206.00	0.3385508	1.7123217E-02	64.06297
CM-244	248.7000	28-FEB-2006	5533.298	5885.604	17818.00	0.3368361	1.7029859E-02	51.09551

Instrument : CHAMBER 042  
 Detector : 32695  
 Standard ID : AESS-018  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:55  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 12:07:02  
 Average Efficiency : 0.3361240  
 Average Efficiency Error : 6.3955071E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7800	28-FEB-2006	2990.651	3300.194	17115.00	0.3340732	7.5073489E-03	62.01425
NP-237	211.8000	28-FEB-2006	4435.708	4903.810	17181.00	0.3379442	1.7092843E-02	71.83335
CM-244	248.7600	28-FEB-2006	5531.417	5883.758	18276.00	0.3453112	1.7453661E-02	58.83952

Instrument : CHAMBER 043  
 Detector : 42470  
 Standard ID : AESS-019  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:07:20  
 Average Efficiency : 0.3229622  
 Average Efficiency Error : 6.1558355E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2988.168	3298.326	16460.00	0.3216395	7.2445576E-03	53.07267
NP-237	211.5600	28-FEB-2006	4436.901	4902.013	16611.00	0.3271490	1.6553231E-02	63.02407
CM-244	248.5200	28-FEB-2006	5535.121	5886.262	17214.00	0.3256539	1.6470846E-02	50.82504

Instrument : CHAMBER 044  
 Detector : 34433  
 Standard ID : AESS-020  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:07:31  
 Average Efficiency : 0.3240791  
 Average Efficiency Error : 6.1765807E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2989.004	3298.648	16495.00	0.3218836	7.2491337E-03	50.22718
NP-237	211.8000	28-FEB-2006	4433.632	4906.174	16705.00	0.3285425	1.6622754E-02	66.23325
CM-244	248.8200	28-FEB-2006	5532.967	5887.129	17532.00	0.3312699	1.6751442E-02	56.69666

Instrument : CHAMBER 045  
 Detector : 34430  
 Standard ID : AESS-021  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:07:49  
 Average Efficiency : 0.2941546  
 Average Efficiency Error : 5.6320531E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2992.438	3301.033	14988.00	0.2928756	6.6353632E-03	49.71279
NP-237	211.5600	28-FEB-2006	4436.365	4906.490	15086.00	0.2970952	1.5050440E-02	64.58119
CM-244	248.5200	28-FEB-2006	5535.004	5886.982	15743.00	0.2978074	1.5078431E-02	59.00225

Instrument : CHAMBER 046  
 Detector : 42471  
 Standard ID : AESS-022  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:08:03  
 Average Efficiency : 0.3344716  
 Average Efficiency Error : 6.3659614E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2987.741	3299.741	16999.00	0.3319905	7.4634906E-03	48.96851
NP-237	211.6800	28-FEB-2006	4435.900	4904.967	17273.00	0.3399139	1.7191468E-02	65.78371
CM-244	248.6400	28-FEB-2006	5532.671	5884.488	18104.00	0.3422939	1.7302830E-02	53.33138

Instrument : CHAMBER 047  
 Detector : 30449  
 Standard ID : AESS-023  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:08:14  
 Average Efficiency : 0.2966904  
 Average Efficiency Error : 5.6765815E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2989.322	3298.103	15222.00	0.2972857	6.7285444E-03	49.84683
NP-237	211.6800	28-FEB-2006	4433.780	4903.899	15016.00	0.2955441	1.4972775E-02	59.65280
CM-244	248.6400	28-FEB-2006	5532.276	5884.114	15597.00	0.2948985	1.4932883E-02	51.68388

Instrument : CHAMBER 048  
 Detector : 42483  
 Standard ID : AESS-024  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 07:45:57  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 12:08:24  
 Average Efficiency : 0.3119769  
 Average Efficiency Error : 5.9553082E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4200	28-FEB-2006	2989.922	3300.161	15954.00	0.3119224	7.0390208E-03	55.83012
NP-237	211.4400	28-FEB-2006	4434.180	4904.923	15787.00	0.3110589	1.5748808E-02	72.44879
CM-244	248.4000	28-FEB-2006	5533.436	5885.010	16547.00	0.3131823	1.5847316E-02	61.06746

Instrument : CHAMBER 065  
 Detector : 21087  
 Standard ID : AESS-001  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:10  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:05:24  
 Average Efficiency : 0.3027465  
 Average Efficiency Error : 5.7869283E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2992.500	3301.569	15511.00	0.3026739	6.8422910E-03	49.27271
NP-237	211.8600	28-FEB-2006	4436.593	4904.814	15341.00	0.3016613	1.5278513E-02	63.47648
CM-244	248.8200	28-FEB-2006	5533.641	5883.942	16102.00	0.3042169	1.5398668E-02	52.45229

Instrument : CHAMBER 066  
 Detector : 38159  
 Standard ID : AESS-002  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:10  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:05:41  
 Average Efficiency : 0.2898386  
 Average Efficiency Error : 5.5523221E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2991.351	3299.570	14848.00	0.2902116	6.5790205E-03	54.22055
NP-237	211.5000	28-FEB-2006	4435.367	4906.503	14731.00	0.2901337	1.4702437E-02	64.20898
CM-244	248.4000	28-FEB-2006	5531.751	5885.195	15203.00	0.2877176	1.4573953E-02	57.41096

Instrument : CHAMBER 068  
 Detector : 33204  
 Standard ID : AESS-004  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:10  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:06:11  
 Average Efficiency : 0.2982503  
 Average Efficiency Error : 5.7051168E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2989.458	3302.482	15312.00	0.2996904	6.7803976E-03	66.72219
NP-237	211.2000	28-FEB-2006	4437.019	4902.188	15036.00	0.2966104	1.5026535E-02	82.73407
CM-244	248.1000	28-FEB-2006	5531.579	5884.315	15461.00	0.2929541	1.4836024E-02	72.39137

Instrument : CHAMBER 069  
 Detector : 39172  
 Standard ID : AESS-005  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:10  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:06:22  
 Average Efficiency : 0.2872442  
 Average Efficiency Error : 5.5063334E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2991.937	3302.037	14638.00	0.2858726	6.4867456E-03	52.69576
NP-237	211.6800	28-FEB-2006	4433.758	4901.912	14877.00	0.2928176	1.4836427E-02	60.78927
CM-244	248.6400	28-FEB-2006	5535.302	5884.863	15275.00	0.2888012	1.4627955E-02	53.21272



Instrument : CHAMBER 070  
 Detector : 33207  
 Standard ID : AESS-006  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:10  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:06:32  
 Average Efficiency : 0.3410026  
 Average Efficiency Error : 6.4845588E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2987.764	3299.302	17333.00	0.3392459	7.6180245E-03	53.32024
NP-237	211.2000	28-FEB-2006	4432.603	4904.338	17596.00	0.3470635	1.7549409E-02	63.32718
CM-244	248.1000	28-FEB-2006	5531.790	5887.167	18166.00	0.3442082	1.7398918E-02	55.68260

Instrument : CHAMBER 072  
 Detector : 33210  
 Standard ID : AESS-008  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:11  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:07:20  
 Average Efficiency : 0.2718624  
 Average Efficiency Error : 5.2260533E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2989.642	3302.500	13882.00	0.2708864	6.1688591E-03	78.20691
NP-237	211.8600	28-FEB-2006	4434.229	4902.517	13764.00	0.2706604	1.3728318E-02	68.85778
CM-244	248.8800	28-FEB-2006	5533.565	5883.889	14730.00	0.2782284	1.4099089E-02	58.98390

Instrument : CHAMBER 073  
 Detector : 33211  
 Standard ID : AESS-009  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:11  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:07:31  
 Average Efficiency : 0.3248378  
 Average Efficiency Error : 6.1892127E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6000	28-FEB-2006	2990.209	3299.359	16628.00	0.3248250	7.3118629E-03	52.98417
NP-237	211.6200	28-FEB-2006	4435.813	4905.119	16178.00	0.3184740	1.6119437E-02	62.15504
CM-244	248.5800	28-FEB-2006	5530.447	5887.394	17545.00	0.3317996	1.6778087E-02	56.17911

Instrument : CHAMBER 075  
 Detector : 29976  
 Standard ID : AESS-011  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:11  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:07:53  
 Average Efficiency : 0.3238373  
 Average Efficiency Error : 6.1713755E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2987.804	3301.738	16526.00	0.3227443	7.2676861E-03	50.99773
NP-237	211.6800	28-FEB-2006	4436.078	4904.005	16602.00	0.3267108	1.6531264E-02	64.22369
CM-244	248.6400	28-FEB-2006	5532.428	5882.500	17275.00	0.3266147	1.6518781E-02	59.07774

Instrument : CHAMBER 076  
 Detector : 33213  
 Standard ID : AESS-012  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:11  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:08:02  
 Average Efficiency : 0.3136021  
 Average Efficiency Error : 5.9847333E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2990.982	3301.271	16036.00	0.3127477	7.0554069E-03	52.31974
NP-237	211.9200	28-FEB-2006	4435.792	4906.032	16070.00	0.3159233	1.5991600E-02	63.89199
CM-244	248.9400	28-FEB-2006	5532.284	5884.164	16716.00	0.3156649	1.5971025E-02	56.41280

Instrument : CHAMBER 077  
 Detector : 28239  
 Standard ID : AESS-013  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:12  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 12:08:16  
 Average Efficiency : 0.3282876  
 Average Efficiency Error : 6.2494567E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	220.5600	28-FEB-2006	2990.320	3302.291	16964.00	0.3299461	7.4184034E-03	49.98071
NP-237	212.5200	28-FEB-2006	4434.458	4904.534	16485.00	0.3231252	1.6351206E-02	66.72607
CM-244	249.6600	28-FEB-2006	5534.090	5887.188	17279.00	0.3253554	1.6455045E-02	48.65668

Instrument : CHAMBER 078  
 Detector : 34425  
 Standard ID : AESS-014  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:12  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 12:08:26  
 Average Efficiency : 0.3266231  
 Average Efficiency Error : 6.2230360E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2992.430	3298.209	16615.00	0.3240396	7.2945217E-03	49.76765
NP-237	211.9800	28-FEB-2006	4433.493	4903.776	16900.00	0.3321434	1.6802609E-02	62.23470
CM-244	249.0000	28-FEB-2006	5534.483	5883.260	17741.00	0.3349401	1.6934805E-02	53.02275

Instrument : CHAMBER 079  
 Detector : 28408  
 Standard ID : AESS-015  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:12  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 12:08:37  
 Average Efficiency : 0.3381511  
 Average Efficiency Error : 6.4334050E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2989.549	3301.048	17162.00	0.3348904	7.5245029E-03	58.89482
NP-237	211.8600	28-FEB-2006	4435.951	4904.750	17588.00	0.3458672	1.7488951E-02	69.24126
CM-244	248.8800	28-FEB-2006	5532.313	5884.158	18433.00	0.3481725	1.7596556E-02	62.07035

Instrument : CHAMBER 080  
 Detector : 29269  
 Standard ID : AESS-016  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:12  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 12:08:46  
 Average Efficiency : 0.3413618  
 Average Efficiency Error : 6.4887921E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.355	3300.887	17518.00	0.3421173	7.6778606E-03	54.84035
NP-237	211.6800	28-FEB-2006	4437.124	4904.027	17076.00	0.3360595	1.6998719E-02	70.53491
CM-244	248.6400	28-FEB-2006	5534.833	5882.541	18143.00	0.3430255	1.7339373E-02	59.19316

Instrument : CHAMBER 081  
 Detector : 28243  
 Standard ID : AESS-017  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 5-APR-2006 09:52:15  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 5-APR-2006 14:20:00  
 Average Efficiency : 0.2709154  
 Average Efficiency Error : 5.2182535E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7200	28-FEB-2006	2988.337	3300.967	13526.00	0.2640979	6.0252789E-03	74.73094
NP-237	211.7400	28-FEB-2006	4435.244	4901.705	14659.00	0.2884400	1.4617478E-02	76.53771
CM-244	248.7000	28-FEB-2006	5534.853	5883.115	15575.00	0.2944268	1.4909291E-02	67.72768

Instrument : CHAMBER 083  
 Detector : 34436  
 Standard ID : AESS-019  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:09:35  
 Average Efficiency : 0.3063384  
 Average Efficiency Error : 5.8566006E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2991.885	3297.745	15476.00	0.3024036	6.8371557E-03	53.97715
NP-237	211.5600	28-FEB-2006	4435.182	4902.448	16168.00	0.3183721	1.6114395E-02	65.19810
CM-244	248.5200	28-FEB-2006	5533.629	5886.856	16706.00	0.3160093	1.5988560E-02	59.26429

Instrument : CHAMBER 084  
 Detector : 29953  
 Standard ID : AESS-020  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:09:48  
 Average Efficiency : 0.3377420  
 Average Efficiency Error : 6.4240936E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2988.809	3299.845	17241.00	0.3364322	7.5571463E-03	45.28139
NP-237	211.8000	28-FEB-2006	4435.274	4905.090	17241.00	0.3390163	1.7146526E-02	64.38337
CM-244	248.8200	28-FEB-2006	5535.465	5886.345	18173.00	0.3433445	1.7355187E-02	52.99788

Instrument : CHAMBER 085  
 Detector : 30451  
 Standard ID : AESS-021  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:10:02  
 Average Efficiency : 0.2997026  
 Average Efficiency Error : 5.7319975E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2988.388	3298.321	15330.00	0.2995507	6.7767296E-03	51.54943
NP-237	211.5600	28-FEB-2006	4434.734	4902.750	15266.00	0.3006592	1.5228639E-02	59.35664
CM-244	248.5200	28-FEB-2006	5530.623	5885.465	15834.00	0.2995146	1.5163762E-02	54.82895

Instrument : CHAMBER 086  
 Detector : 29278  
 Standard ID : AESS-022  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:10:24  
 Average Efficiency : 0.2629639  
 Average Efficiency Error : 5.0652758E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.939	3300.647	13365.00	0.2610116	5.9599294E-03	51.29673
NP-237	211.6800	28-FEB-2006	4432.832	4902.859	13621.00	0.2680805	1.3599468E-02	59.09101
CM-244	248.6400	28-FEB-2006	5530.458	5886.876	14175.00	0.2680037	1.3587984E-02	51.32809

Instrument : CHAMBER 087  
 Detector : 34430  
 Standard ID : AESS-023  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:10:36  
 Average Efficiency : 0.2783446  
 Average Efficiency Error : 5.3436500E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2988.850	3299.145	14228.00	0.2778656	6.3170986E-03	45.75569
NP-237	211.6800	28-FEB-2006	4433.685	4904.783	14271.00	0.2804829	1.4219985E-02	56.29552
CM-244	248.6400	28-FEB-2006	5533.892	5885.860	14737.00	0.2786293	1.4119316E-02	52.11374

Instrument : CHAMBER 088  
 Detector : 30434  
 Standard ID : AESS-024  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 06:54:13  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 12:10:54  
 Average Efficiency : 0.2708718  
 Average Efficiency Error : 5.2093272E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4200	28-FEB-2006	2991.733	3298.324	13762.00	0.2690588	6.1309491E-03	70.44978
NP-237	211.4400	28-FEB-2006	4434.854	4901.741	13876.00	0.2734241	1.3866881E-02	84.52332
CM-244	248.4000	28-FEB-2006	5531.597	5882.583	14679.00	0.2778009	1.4078071E-02	70.46585

Instrument : CHAMBER 089  
 Detector : 21087  
 Standard ID : AESS-001  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:42  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 23:05:32  
 Average Efficiency : 0.2906057  
 Average Efficiency Error : 8.5010817E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2988.018	3301.225	14810.00	0.2889985	1.4647639E-02	48.13472
NP-237	211.8600	28-FEB-2006	4432.655	4904.531	14711.00	0.2893088	1.4660804E-02	59.05686
CM-244	248.8200	28-FEB-2006	5531.146	5885.550	15539.00	0.2935953	1.4867556E-02	51.89399

Instrument : CHAMBER 090  
 Detector : 38159  
 Standard ID : AESS-002  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:42  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 23:06:16  
 Average Efficiency : 0.3262078  
 Average Efficiency Error : 9.5290253E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2989.511	3299.809	16611.00	0.3246745	1.6432377E-02	43.47319
NP-237	211.5000	28-FEB-2006	4434.211	4904.337	16570.00	0.3264199	1.6516838E-02	66.74939
CM-244	248.4000	28-FEB-2006	5530.381	5887.548	17307.00	0.3275529	1.6565884E-02	47.20604

Instrument : CHAMBER 091  
 Detector : 33205  
 Standard ID : AESS-003  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 16:38:39  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 21:06:36  
 Average Efficiency : 0.3295136  
 Average Efficiency Error : 9.6244970E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.3600	28-FEB-2006	2988.614	3302.446	16877.00	0.3300617	1.6701948E-02	49.16127
NP-237	211.3800	28-FEB-2006	4435.933	4903.299	16753.00	0.3302219	1.6707057E-02	67.62949
CM-244	248.2800	28-FEB-2006	5530.786	5885.646	17335.00	0.3282727	1.6601983E-02	54.15368

Instrument : CHAMBER 092  
 Detector : 33204  
 Standard ID : AESS-004  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:42  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 23:08:02  
 Average Efficiency : 0.3230760  
 Average Efficiency Error : 9.4387615E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2991.837	3299.694	16466.00	0.3222808	1.6312918E-02	54.19599
NP-237	211.2000	28-FEB-2006	4434.184	4904.789	16328.00	0.3221140	1.6301801E-02	61.31636
CM-244	248.1000	28-FEB-2006	5534.672	5882.398	17144.00	0.3248603	1.6431469E-02	53.39663

Instrument : CHAMBER 093  
 Detector : 33206  
 Standard ID : AESS-005  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:42  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 23:08:14  
 Average Efficiency : 0.3278230  
 Average Efficiency Error : 9.5757600E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2991.432	3297.831	16618.00	0.3245451	1.6425749E-02	53.44844
NP-237	211.6800	28-FEB-2006	4432.503	4906.496	16789.00	0.3304530	1.6718345E-02	71.37048
CM-244	248.6400	28-FEB-2006	5534.120	5886.021	17378.00	0.3285792	1.6617021E-02	55.20338

Instrument : CHAMBER 094  
 Detector : 33207  
 Standard ID : AESS-006  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:42  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 3-APR-2006 23:08:34  
 Average Efficiency : 0.3064194  
 Average Efficiency Error : 8.9583928E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2991.673	3298.910	15769.00	0.3086388	1.5630580E-02	47.47134
NP-237	211.2000	28-FEB-2006	4437.305	4902.611	15693.00	0.3095863	1.5675372E-02	59.32807
CM-244	248.1000	28-FEB-2006	5532.741	5886.161	15901.00	0.3013068	1.5253706E-02	48.40099

Instrument : CHAMBER 096  
 Detector : 30429  
 Standard ID : AESS-008  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:43  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:09:48  
 Average Efficiency : 0.3211957  
 Average Efficiency Error : 9.3840715E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2988.567	3301.392	16420.00	0.3204154	1.6219035E-02	48.33763
NP-237	211.8600	28-FEB-2006	4433.899	4903.007	16366.00	0.3218482	1.6287910E-02	62.84891
CM-244	248.8800	28-FEB-2006	5534.841	5883.364	17011.00	0.3213297	1.6254338E-02	53.34020

Instrument : CHAMBER 098  
 Detector : 30431  
 Standard ID : AESS-010  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:43  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:10:26  
 Average Efficiency : 0.3423861  
 Average Efficiency Error : 9.9960957E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2991.193	3297.595	17461.00	0.3412881	1.7263338E-02	48.27054
NP-237	211.5000	28-FEB-2006	4433.217	4902.776	17377.00	0.3422896	1.7310398E-02	71.89059
CM-244	248.4600	28-FEB-2006	5531.761	5884.598	18159.00	0.3435947	1.7367978E-02	56.75472



Instrument : CHAMBER 099  
 Detector : 30432  
 Standard ID : AESS-011  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 16:38:43  
 Calibration Count Time : 239.9998  
 Efficiency Calibration Date/Time : 4-APR-2006 21:07:16  
 Average Efficiency : 0.3424250  
 Average Efficiency Error : 9.9976454E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2989.302	3301.806	17277.00	0.3374230	1.7069872E-02	61.73035
NP-237	211.6800	28-FEB-2006	4434.583	4904.427	17554.00	0.3455301	1.7472234E-02	70.83485
CM-244	248.6400	28-FEB-2006	5532.529	5887.439	18221.00	0.3445468	1.7415471E-02	58.75341

Instrument : CHAMBER 101  
 Detector : 31696  
 Standard ID : AESS-013  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:11:17  
 Average Efficiency : 0.3289411  
 Average Efficiency Error : 6.2637404E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	220.5600	28-FEB-2006	2988.838	3300.184	16815.00	0.3270522	7.3571443E-03	74.97670
NP-237	212.5200	28-FEB-2006	4437.473	4904.200	16905.00	0.3314256	1.6766205E-02	82.64299
CM-244	249.6600	28-FEB-2006	5533.420	5882.862	17869.00	0.3364823	1.7011438E-02	82.36337

Instrument : CHAMBER 102  
 Detector : 30438  
 Standard ID : AESS-014  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:11:38  
 Average Efficiency : 0.3398052  
 Average Efficiency Error : 6.4618774E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2990.981	3300.175	17329.00	0.3379689	7.5894571E-03	50.78636
NP-237	211.9800	28-FEB-2006	4436.167	4905.013	17442.00	0.3427780	1.7334390E-02	60.55743
CM-244	249.0000	28-FEB-2006	5534.874	5885.847	18355.00	0.3465500	1.7515350E-02	55.09371

Instrument : CHAMBER 103  
 Detector : 30437  
 Standard ID : AESS-015  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:11:50  
 Average Efficiency : 0.3428698  
 Average Efficiency Error : 6.5169050E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2987.494	3300.797	17526.00	0.3419976	7.6749846E-03	52.55986
NP-237	211.8600	28-FEB-2006	4433.628	4906.553	17575.00	0.3456304	1.7477097E-02	70.84139
CM-244	248.8800	28-FEB-2006	5534.963	5885.168	18244.00	0.3446204	1.7418953E-02	56.82663

Instrument : CHAMBER 104  
 Detector : 30436  
 Standard ID : AESS-016  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:12:05  
 Average Efficiency : 0.3178734  
 Average Efficiency Error : 6.0614208E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2989.844	3302.458	16342.00	0.3191546	7.1916869E-03	48.79966
NP-237	211.6800	28-FEB-2006	4432.663	4904.432	16000.00	0.3149317	1.5942214E-02	61.83171
CM-244	248.6400	28-FEB-2006	5531.252	5885.942	16635.00	0.3145305	1.5914533E-02	54.39241

Instrument : CHAMBER 106  
 Detector : 45382  
 Standard ID : AESS-018  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:13:35  
 Average Efficiency : 0.3366815  
 Average Efficiency Error : 6.4043794E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7800	28-FEB-2006	2991.094	3299.001	17214.00	0.3360010	7.5481492E-03	67.49383
NP-237	211.8000	28-FEB-2006	4435.781	4902.986	17151.00	0.3373776	1.7064495E-02	78.07959
CM-244	248.7600	28-FEB-2006	5530.755	5886.020	17964.00	0.3394951	1.7162759E-02	66.37016

Instrument : CHAMBER 107  
 Detector : 31697  
 Standard ID : AESS-019  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:45  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:13:46  
 Average Efficiency : 0.3279476  
 Average Efficiency Error : 6.2480466E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2990.547	3299.714	16632.00	0.3249958	7.3156110E-03	56.35443
NP-237	211.5600	28-FEB-2006	4437.183	4902.948	17025.00	0.3353024	1.6960930E-02	65.36469
CM-244	248.5200	28-FEB-2006	5532.612	5885.240	17789.00	0.3365124	1.7013798E-02	57.27279

Instrument : CHAMBER 109  
 Detector : 31693  
 Standard ID : AESS-021  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:45  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:14:12  
 Average Efficiency : 0.3172656  
 Average Efficiency Error : 6.0536368E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2988.084	3299.184	16099.00	0.3145808	7.0950659E-03	55.32108
NP-237	211.5600	28-FEB-2006	4432.535	4905.875	16551.00	0.3259623	1.6493894E-02	66.04156
CM-244	248.5200	28-FEB-2006	5532.554	5883.883	17073.00	0.3229679	1.6336529E-02	53.16661

Instrument : CHAMBER 110  
 Detector : 30447  
 Standard ID : AESS-022  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 16:38:46  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 21:08:36  
 Average Efficiency : 0.2903691  
 Average Efficiency Error : 5.5707125E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2992.012	3300.888	14540.00	0.2839686	6.4464426E-03	65.21424
NP-237	211.6800	28-FEB-2006	4433.842	4901.474	15514.00	0.3053748	1.5464325E-02	67.45113
CM-244	248.6400	28-FEB-2006	5530.607	5884.669	16569.00	0.3133079	1.5853422E-02	61.19852

Instrument : CHAMBER 111  
 Detector : 30448  
 Standard ID : AESS-023  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:45  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:15:36  
 Average Efficiency : 0.3388006  
 Average Efficiency Error : 6.4431382E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2987.793	3301.004	17314.00	0.3381375	7.5936201E-03	56.34806
NP-237	211.6800	28-FEB-2006	4435.981	4906.484	17500.00	0.3444386	1.7417673E-02	71.36749
CM-244	248.6400	28-FEB-2006	5530.639	5883.341	17810.00	0.3367471	1.7025441E-02	55.06728

Instrument : CHAMBER 112  
 Detector : 30449  
 Standard ID : AESS-024  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 3-APR-2006 18:48:45  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 3-APR-2006 23:15:47  
 Average Efficiency : 0.3139323  
 Average Efficiency Error : 5.9938701E-03  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4200	28-FEB-2006	2991.870	3298.269	15891.00	0.3106862	7.0128250E-03	50.73674
NP-237	211.4400	28-FEB-2006	4436.313	4903.586	16308.00	0.3213587	1.6263809E-02	62.04948
CM-244	248.4000	28-FEB-2006	5533.752	5883.818	17126.00	0.3241271	1.6394578E-02	52.78824

Instrument : CHAMBER 113  
 Detector : 45-111B4  
 Standard ID : AESS-001  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:36  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:02:58  
 Average Efficiency : 0.3703099  
 Average Efficiency Error : 1.0161426E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2991.835	3301.848	18597.00	0.3629034	1.5549773E-02	64.50990
NP-237	211.8600	28-FEB-2006	4433.613	4901.946	18886.00	0.3714283	1.8767057E-02	90.91785
CM-244	248.8200	28-FEB-2006	5530.358	5885.560	20134.00	0.3804419	1.9210188E-02	71.11305

Instrument : CHAMBER 114  
 Detector : 45-111B5  
 Standard ID : AESS-007  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:40  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:03:22  
 Average Efficiency : 0.3901447  
 Average Efficiency Error : 1.0698882E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2990.875	3299.211	19570.00	0.3824124	1.6373768E-02	64.95810
NP-237	211.5600	28-FEB-2006	4436.329	4903.130	20139.00	0.3966328	2.0027624E-02	80.48977
CM-244	248.5200	28-FEB-2006	5535.235	5884.346	20889.00	0.3951845	1.9947579E-02	69.68978

Instrument : CHAMBER 115  
 Detector : 45-132EE5  
 Standard ID : AESS-002  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:44  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:03:37  
 Average Efficiency : 0.3799683  
 Average Efficiency Error : 1.0422695E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2990.466	3300.287	19152.00	0.3743467	1.6033292E-02	67.16986
NP-237	211.5000	28-FEB-2006	4435.908	4903.427	19268.00	0.3795908	1.9175535E-02	85.64700
CM-244	248.4000	28-FEB-2006	5530.487	5884.796	20541.00	0.3887886	1.9627862E-02	69.09605

Instrument : CHAMBER 116  
 Detector : 45-132FF2  
 Standard ID : AESS-008  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:47  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:03:51  
 Average Efficiency : 0.3906634  
 Average Efficiency Error : 1.0711731E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2988.161	3302.097	19763.00	0.3856568	1.6510434E-02	61.93254
NP-237	211.8600	28-FEB-2006	4435.898	4903.366	20060.00	0.3945222	1.9921809E-02	83.61416
CM-244	248.8800	28-FEB-2006	5530.965	5885.878	20861.00	0.3940839	1.9892277E-02	67.87167

Instrument : CHAMBER 117  
 Detector : 45-132FF3  
 Standard ID : AESS-003  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:52  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:04:04  
 Average Efficiency : 0.3838457  
 Average Efficiency Error : 1.0529065E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.3600	28-FEB-2006	2987.574	3297.481	19157.00	0.3746493	1.6046192E-02	69.46350
NP-237	211.3800	28-FEB-2006	4432.916	4905.417	19746.00	0.3892191	1.9657088E-02	87.03203
CM-244	248.2800	28-FEB-2006	5531.962	5885.886	20722.00	0.3924041	1.9808734E-02	73.89016

Instrument : CHAMBER 118  
 Detector : 45-132FF4  
 Standard ID : AESS-009  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:56  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:04:21  
 Average Efficiency : 0.3946549  
 Average Efficiency Error : 1.0820382E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6000	28-FEB-2006	2989.600	3298.996	19935.00	0.3894384	1.6670343E-02	63.05709
NP-237	211.6200	28-FEB-2006	4434.069	4901.807	20060.00	0.3949601	1.9943934E-02	82.03598
CM-244	248.5800	28-FEB-2006	5534.903	5884.430	21258.00	0.4020683	2.0291740E-02	65.29355

Instrument : CHAMBER 119  
 Detector : 45-132FF5  
 Standard ID : AESS-004  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:00:59  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:04:33  
 Average Efficiency : 0.3958072  
 Average Efficiency Error : 1.0851006E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2987.490	3300.068	20085.00	0.3931205	1.6826242E-02	64.97130
NP-237	211.2000	28-FEB-2006	4434.344	4905.254	20104.00	0.3966229	2.0027457E-02	79.50690
CM-244	248.1000	28-FEB-2006	5530.554	5884.197	21046.00	0.3988287	2.0130115E-02	68.84389

Instrument : CHAMBER 120  
 Detector : 45-142F1  
 Standard ID : AESS-010  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:03  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:05:08  
 Average Efficiency : 0.3892356  
 Average Efficiency Error : 1.0674394E-02  
 Confidence : 95.00000

Cal. Istds	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4800	28-FEB-2006	2991.710	3300.418	19511.00	0.3813637	1.6329555E-02	65.80540
NP-237	211.5000	28-FEB-2006	4437.274	4903.259	19969.00	0.3933960	1.9865829E-02	87.35593
CM-244	248.4600	28-FEB-2006	5533.634	5886.862	20972.00	0.3968505	2.0030931E-02	68.58372

Instrument : CHAMBER 121  
 Detector : 45-142J4  
 Standard ID : AESS-005  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:07  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:05:19  
 Average Efficiency : 0.3879517  
 Average Efficiency Error : 1.0639026E-02  
 Confidence : 95.00000

Cal. Istds	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2988.124	3301.600	19515.00	0.3811294	1.6319472E-02	66.81467
NP-237	211.6800	28-FEB-2006	4434.163	4906.581	19891.00	0.3915263	1.9772179E-02	83.76527
CM-244	248.6400	28-FEB-2006	5533.976	5883.453	20862.00	0.3944832	1.9912424E-02	67.69315

Instrument : CHAMBER 122  
 Detector : 45-142J5  
 Standard ID : AESS-011  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:10  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:05:33  
 Average Efficiency : 0.3964319  
 Average Efficiency Error : 1.0868002E-02  
 Confidence : 95.00000

Cal. Istds	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.061	3298.780	20106.00	0.3926716	1.6806791E-02	65.77823
NP-237	211.6800	28-FEB-2006	4436.620	4903.419	20147.00	0.3965701	2.0024376E-02	83.48605
CM-244	248.6400	28-FEB-2006	5535.258	5884.098	21247.00	0.4017632	2.0276442E-02	70.88770

Instrument : CHAMBER 123  
 Detector : 45-142V1  
 Standard ID : AESS-006  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:15  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:05:57  
 Average Efficiency : 0.3805304  
 Average Efficiency Error : 1.0439763E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.1800	28-FEB-2006	2990.387	3299.522	18959.00	0.3710815	1.5895747E-02	68.66263
NP-237	211.2000	28-FEB-2006	4437.442	4903.641	19446.00	0.3836367	1.9378122E-02	86.99185
CM-244	248.1000	28-FEB-2006	5534.110	5887.297	20682.00	0.3919307	1.9785201E-02	66.84405

Instrument : CHAMBER 124  
 Detector : 45-142V2  
 Standard ID : AESS-012  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:18  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:06:12  
 Average Efficiency : 0.3873872  
 Average Efficiency Error : 1.0623961E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2989.443	3297.987	19472.00	0.3797709	1.6261807E-02	64.41782
NP-237	211.9200	28-FEB-2006	4435.559	4902.411	19887.00	0.3909993	1.9745609E-02	86.15575
CM-244	248.9400	28-FEB-2006	5534.467	5883.494	20923.00	0.3951599	1.9946033E-02	70.30408

Instrument : CHAMBER 125  
 Detector : 45-142V3  
 Standard ID : AESS-013  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:21  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:06:28  
 Average Efficiency : 0.3867655  
 Average Efficiency Error : 1.0609177E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	220.5600	28-FEB-2006	2992.436	3301.693	19282.00	0.3750422	1.6061539E-02	55.83823
NP-237	212.5200	28-FEB-2006	4433.216	4903.410	20074.00	0.3935665	1.9873424E-02	88.64875
CM-244	249.6600	28-FEB-2006	5531.615	5883.226	21143.00	0.3981633	2.0095672E-02	68.92764



Instrument : CHAMBER 126  
 Detector : 45-142V5  
 Standard ID : AESS-019  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:25  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:06:44  
 Average Efficiency : 0.3776715  
 Average Efficiency Error : 1.0360188E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2988.369	3299.131	19021.00	0.3716846	1.5920833E-02	61.61137
NP-237	211.5600	28-FEB-2006	4435.618	4902.366	19293.00	0.3799706	1.9194474E-02	87.82700
CM-244	248.5200	28-FEB-2006	5532.732	5885.449	20309.00	0.3842119	1.9398922E-02	63.11655

Instrument : CHAMBER 127  
 Detector : 45-142W1  
 Standard ID : AESS-014  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:29  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:07:12  
 Average Efficiency : 0.3934290  
 Average Efficiency Error : 1.0787830E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.9600	28-FEB-2006	2989.513	3302.392	19757.00	0.3853294	1.6496489E-02	64.47871
NP-237	211.9800	28-FEB-2006	4432.606	4903.961	20292.00	0.3988588	2.0138543E-02	84.68309
CM-244	249.0000	28-FEB-2006	5535.216	5883.874	21190.00	0.4001061	2.0193312E-02	70.60645

Instrument : CHAMBER 128  
 Detector : 45-142W2  
 Standard ID : AESS-020  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:34  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:07:27  
 Average Efficiency : 0.3859246  
 Average Efficiency Error : 1.0586893E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2989.584	3299.388	19162.00	0.3739288	1.6015276E-02	59.93734
NP-237	211.8000	28-FEB-2006	4434.590	4901.786	20058.00	0.3945944	1.9925477E-02	79.19832
CM-244	248.8200	28-FEB-2006	5533.622	5887.583	20951.00	0.3958796	1.9982109E-02	66.89229

Instrument : CHAMBER 129  
 Detector : 45-142W3  
 Standard ID : AESS-015  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:38  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:07:43  
 Average Efficiency : 0.3895081  
 Average Efficiency Error : 1.0681822E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.8400	28-FEB-2006	2991.668	3299.558	19525.00	0.3810124	1.6314350E-02	61.82140
NP-237	211.8600	28-FEB-2006	4435.149	4901.376	20156.00	0.3964100	2.0016206E-02	81.45658
CM-244	248.8800	28-FEB-2006	5532.751	5886.867	20929.00	0.3953595	1.9956063E-02	71.15770

Instrument : CHAMBER 130  
 Detector : 45-142W5  
 Standard ID : AESS-021  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:42  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:07:58  
 Average Efficiency : 0.3877107  
 Average Efficiency Error : 1.0633443E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.5400	28-FEB-2006	2990.831	3301.623	19394.00	0.3789733	1.6228566E-02	61.42154
NP-237	211.5600	28-FEB-2006	4435.787	4904.916	20099.00	0.3958496	1.9988457E-02	82.39708
CM-244	248.5200	28-FEB-2006	5534.223	5884.439	20760.00	0.3927440	1.9825550E-02	67.39270

Instrument : CHAMBER 131  
 Detector : 45-145K1  
 Standard ID : AESS-016  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:46  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:08:16  
 Average Efficiency : 0.3897060  
 Average Efficiency Error : 1.0686211E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2989.369	3298.448	19647.00	0.3837073	1.6428316E-02	64.42750
NP-237	211.6800	28-FEB-2006	4432.591	4905.330	20018.00	0.3940307	1.9897401E-02	82.42314
CM-244	248.6400	28-FEB-2006	5532.857	5887.665	20846.00	0.3941807	1.9897297E-02	71.83934

Instrument : CHAMBER 132  
 Detector : 45-145K2  
 Standard ID : AESS-022  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:49  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:08:32  
 Average Efficiency : 0.3905833  
 Average Efficiency Error : 1.0710652E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2990.018	3301.016	19613.00	0.3830433	1.6400279E-02	65.20789
NP-237	211.6800	28-FEB-2006	4434.219	4902.195	20056.00	0.3947787	1.9934803E-02	89.44299
CM-244	248.6400	28-FEB-2006	5534.644	5883.351	21028.00	0.3976221	2.0069377E-02	68.53607

Instrument : CHAMBER 133  
 Detector : 45-145K3  
 Standard ID : AESS-017  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:52  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:09:47  
 Average Efficiency : 0.3868218  
 Average Efficiency Error : 1.0608377E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7200	28-FEB-2006	2989.115	3302.033	19459.00	0.3799319	1.6268853E-02	67.58065
NP-237	211.7400	28-FEB-2006	4435.237	4904.688	19979.00	0.3931513	1.9853372E-02	78.76342
CM-244	248.7000	28-FEB-2006	5532.486	5884.151	20667.00	0.3907017	1.9723292E-02	68.61700

Instrument : CHAMBER 134  
 Detector : 45-145K4  
 Standard ID : AESS-023  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:56  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:11:02  
 Average Efficiency : 0.3909511  
 Average Efficiency Error : 1.0721575E-02  
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.6600	28-FEB-2006	2987.530	3301.962	19533.00	0.3814809	1.6334314E-02	58.87649
NP-237	211.6800	28-FEB-2006	4434.547	4905.459	20169.00	0.3970030	2.0046022E-02	84.02620
CM-244	248.6400	28-FEB-2006	5534.869	5887.271	21114.00	0.3992483	2.0150691E-02	67.90365

Instrument : CHAMBER 135  
 Detector : 45-145K5  
 Standard ID : AESS-018  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:01:59  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:11:53  
 Average Efficiency : 0.3932157  
 Average Efficiency Error : 1.0781703E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.7800	28-FEB-2006	2990.104	3298.632	19831.00	0.3870894	1.6570982E-02	66.57359
NP-237	211.8000	28-FEB-2006	4434.981	4906.088	20001.00	0.3934731	1.9869408E-02	92.58358
CM-244	248.7600	28-FEB-2006	5531.074	5884.261	21277.00	0.4021365	2.0295015E-02	73.11333

Instrument : CHAMBER 136  
 Detector : 45-145L1  
 Standard ID : AESS-024  
 Standard Reference Date : 7-FEB-2003 00:00:00  
 Calibration Analysis Date/Time : 4-APR-2006 12:02:04  
 Calibration Count Time : 240.0000  
 Efficiency Calibration Date/Time : 4-APR-2006 17:12:12  
 Average Efficiency : 0.3798372  
 Average Efficiency Error : 1.0422947E-02  
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	219.4200	28-FEB-2006	2988.496	3298.473	18764.00	0.3668631	1.5717393E-02	63.35145
NP-237	211.4400	28-FEB-2006	4437.582	4903.436	19751.00	0.3892161	1.9656880E-02	93.25786
CM-244	248.4000	28-FEB-2006	5532.704	5884.860	20649.00	0.3908328	1.9730078E-02	69.15901

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(803)556-8171

## Gamma Spectrometer Geometry Calibration Package

Detector: GAMMA 6

Geometry: ZL-MB

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the second standard(s) documentation? the nuclide library used? the VMS certificate file?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the detector efficiency curve printout included?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3) Is the efficiency calibration report included and reviewed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Is the raw count data included for: the calibration peak report? the calibration verification PEAK report? the calibration verification NID report? the last instrument background?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the calibration verification calculations included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Are the instrument settings included: amp, HVPS, ADC settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Michael Patten

Date: 12/29/05

Reviewed By: John J. Lavett

Date: 12/29/2005

Effective Date: 12/29/05

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(803)556-8171

## Gamma Spectrometer Front End Electronics Setup

Detector: GAMMA b

Date Performed: 12/27/05

Performed By: Mikhael Pitta

<p><b>High Voltage Power Supply</b></p> <p>Model No. <u>3106D</u> High Voltage <u>3000V</u></p>	<p><b>Spectroscopy Amplifier</b></p> <p>Model No. <u>2026</u> Course Gain <u>100</u> Fine Gain <u>0.577</u> Time Constant <u>6 <math>\mu</math>sec.</u> Input polarity <u>POSITIVE</u> BSLR rate <u>N/A</u> BSLR mode <u>N/A</u> Threshold <u>N/A</u></p>
<p><b>ADC</b></p> <p>Model No. <u>8701</u> Gain <u>4000</u></p>	
<p><b>AIM Module</b></p> <p>Model No. <u>ND556</u> Address <u>NI4DC:1</u></p>	

**Gamma Spectroscopy Calibration Verification**Instrument: Gamma 6Calibration Date: 12/29/2005Geometry: 2L\_MBStandard Id: 70528-278

Isotope		CALIBRATED ACTIVITY (PCI)	MEASURED ACTIVITY (PCI)	DIFFERENCE %
Pb-210		8.2015E+05	8.572E+05	4.52
Am-241		6.2561E+04	6.197E+04	-0.94
Cd-109		8.2579E+05	7.723E+05	-6.48
Co-57		1.9081E+04	1.907E+04	-0.06
Ce-139		2.8981E+04	3.023E+04	4.31
Sn-113		4.8349E+04	4.902E+04	1.39
Cs-137		2.4325E+04	2.423E+04	-0.39
Y-88	1836.06	8.6210E+04	8.618E+04	-0.03
Co-60	1332.5	3.8845E+04	3.974E+04	2.30

Prepared By: *Michael Nations*Date: 12/29/05Reviewed By: *Jh Lanoie*Date: 12/29/2005

Verified:

QA filename : DKA300:[CANBERRA.GAMMA]QC\_BKG\_GAMMA6.QAF;2

Sample ID : BKG\_GAMMA6 Sample quantity : 1.80 LITER  
Sample date : 24-DEC-2005 00:00:00 Acquisition date : 24-DEC-2005 19:01:51  
Elapsed live time: 0 16:40:00.00 Elapsed real time: 0 16:40:04.45

Out-of-range Test: BOUNDARY

Parameter Description	Lower	Upper	Value	Flag
BACKGROUND (GROSS COUNTS)	1.07E+05	1.24E+05	1.10E+05	
BACKGROUND (CPS)	1.79	2.07	1.84	

Flags: "\*" means the out-of-range test is parameter-dependent

Approved by: SRB

Approval Date: 12 / 25 / 05



\*\*\*\*\*  
 \* GENERAL ENG. LABS, LLC. \*  
 \* 2040 Savage Road \*  
 \* Charleston, SC 29414 \*  
 \*\*\*\*\*

Configuration : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER\_GAMMA6\_2LMB.CNF;1  
 Sample date : 1-APR-2005 12:00:00. Acquisition date : 29-DEC-2005 05:34:59  
 Sample ID : VER\_GAMMA6\_2LMB Sample quantity : 1.00000E+00 LITER  
 Detector name : GAMMA6 Detector geometry: 2L\_MB  
 Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:53.92 0.7%  
 Energy tolerance : 2.00000 KEV Analyst Initials : MJH1  
 Abundance limit : 75.00000 Sensitivity : 3.00000  
 Batch ID : Detector SN# : 1922827  
 Matrix Spike DPM : LCS DPM :  
 \*\*\*\*\*

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.40*	17259	33023	1.02	94.07	89	9	2.40E+00	2.0	
2	4	57.32	1924	15819	1.37	115.86	114	11	2.67E-01	9.2	2.72E+01
3	4	59.51	42854	20590	0.95	120.23	114	11	5.95E+00	0.7	
4	0	66.73*	615	25393	2.01	134.64	132	7	8.55E-02	43.0	
5	0	70.50	587	22915	1.80	142.16	140	6	8.15E-02	41.0	
6	0	88.01	99704	37187	0.99	177.10	172	11	1.38E+01	0.5	
7	0	122.04	51226	25234	1.01	245.03	239	12	7.11E+00	0.8	
8	0	136.48	6598	15797	1.05	273.83	270	9	9.16E-01	3.7	
9	0	165.87*	36739	19666	1.11	332.49	325	13	5.10E+00	0.9	
10	0	255.32	970	8225	1.14	511.02	508	8	1.35E-01	16.5	
11	0	279.23	3904	7800	1.18	558.75	555	9	5.42E-01	4.4	
12	0	341.00	156	5215	1.37	682.03	679	8	2.16E-02	80.8	
13	0	366.83	210	4201	1.61	733.60	731	7	2.92E-02	51.5	
14	0	391.77	22191	6497	1.26	783.38	778	11	3.08E+00	1.0	
15	0	446.46*	218	4180	1.84	892.55	889	8	3.03E-02	51.7	
16	0	465.52	216	4353	1.62	930.60	928	8	3.00E-02	53.3	
17	0	510.83*	157	4145	1.59	1021.05	1017	9	2.19E-02	74.7	
18	0	603.30	34	2613	0.56	1205.65	1203	7	4.72E-03	249.9	
19	0	661.72*	50415	5892	1.48	1322.28	1314	16	7.00E+00	0.6	
20	0	777.51	163	1908	1.25	1553.48	1551	7	2.27E-02	45.0	
21	0	814.25	382	2683	1.44	1626.84	1622	9	5.31E-02	25.0	
22	0	821.51	131	2062	1.46	1641.34	1639	7	1.82E-02	58.3	
23	0	898.08*	26605	5337	1.59	1794.24	1786	16	3.70E+00	0.9	
24	0	1086.05	76	1740	1.35	2169.62	2167	7	1.06E-02	91.8	
25	0	1173.20	54911	2988	1.82	2343.69	2334	19	7.63E+00	0.5	
26	0	1183.47	61	693	1.06	2364.20	2362	6	8.46E-03	69.8	
27	0	1325.19*	145	858	2.81	2647.28	2645	8	2.02E-02	36.6	
28	0	1332.41	50394	1355	1.91	2661.72	2652	18	7.00E+00	0.5	
29	0	1445.89	23	376	1.40	2888.40	2884	7	3.19E-03	141.6	
30	0	1594.55	79	466	2.05	3185.42	3182	7	1.10E-02	46.8	
31	0	1598.22	32	421	0.87	3192.75	3188	6	4.45E-03	102.7	
32	0	1617.97*	45	204	1.42	3232.21	3230	5	6.30E-03	49.8	
33	0	1727.18*	41	113	1.95	3450.44	3447	7	5.72E-03	45.6	
34	0	1836.18	16739	376	2.21	3668.26	3657	22	2.32E+00	0.8	
35	0	1877.53	39	61	2.42	3750.88	3747	10	5.47E-03	40.2	
36	0	1973.63	47	79	4.75	3942.95	3935	16	6.59E-03	44.5	
37	0	2000.75	22	21	1.37	3997.15	3995	5	3.05E-03	38.0	
38	1	2024.69	64	67	2.19	4045.00	4039	26	8.94E-03	25.1	4.79E+00

Peak Search Report (continued)  
Sample ID : VER\_GAMMA6\_2LMB

Page : 2  
Acquisition date : 29-DEC-2005 05:34:59

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	1	2027.19*	30	73	2.19	4050.00	4039	26	4.16E-03	63.0	

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

VAX/VMS Nuclide Identification Report Generated

```

*****
*                                     General Eng. Labs, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                               *
*****

```

DETECTOR DATA

```

* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER GAMMA6_2
* Acquisition date   : 29-DEC-2005 05:34:59 Detector SN#      : 1922827
* Detector ID        : GAMMA6          Sensitivity             : 3.000
* Geometry           : 2L_MB          Energy tolerance      : 2.000
* Elapsed live time  : 0 02:00:00.00 Abundance limit     : 75.000
* Elapsed real time  : 0 02:00:53.92 Half life ratio      : 8.000
*****

```

SAMPLE DATA

```

* Sample date       : 1-APR-2005 12:00:00 Nuclide Library   : FERMC
* Sample ID        : VER_GAMMA6_2LMB      Analyst initials   : MJH1
* Batch Number     :                      Sample Quantity   : 1.0000E+00 LITER
* Recovery         : 1.00000              Carrier Weight    : 0.00000
*****

```

QC DATA

```

* Standard Weight   : 0.00000
* CALIB. DATE/TIME : 29-DEC-2005 05:08:19 MS Isotope       :
* MSD DPM           : *****              MSD Isotope      :
* LCS DPM           : 0.000                 LCS Isotope       :
* LCSD DPM          : 0.000                 LCSD Isotope     :
*****

```

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
CO-57	1.907E+04	2.909E+02	1.820E+02	0.000E+00
CO-60	3.974E+04	3.790E+02	1.098E+02	0.000E+00
Y-88	8.618E+04	1.426E+03	3.030E+02	0.000E+00
CD-109	7.723E+05	7.634E+03	4.738E+03	0.000E+00
SN-113	4.902E+04	9.538E+02	6.617E+02	0.000E+00
CS-137	2.423E+04	2.716E+02	1.211E+02	0.000E+00
CE-139	3.023E+04	5.702E+02	3.514E+02	0.000E+00
HG-203	6.460E+04	5.665E+03	5.695E+03	0.000E+00
PB-210	8.572E+05	3.512E+04	2.870E+04	0.000E+00
AM-241	6.197E+04	8.989E+02	8.638E+02	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )
---------	--------------------------------------	--------------------------	---------------------

```

*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA6_2LMB.CNF;1
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 29-DEC-2005 05:34:59
Sample ID          : VER_GAMMA6_2LMB          Sample quantity : 1.00000E+00 LITER
Detector name      : GAMMA6                  Detector geometry: 2L_MB
Elapsed live time  : 0 02:00:00.00          Elapsed real time: 0 02:00:53.92  0.7%
Energy tolerance   : 2.00000 KEV            Analyst Initials  : MJH1
Abundance limit    : 75.00000              Sensitivity       : 3.00000
Batch ID           :                        Detector SN#      : 1922827
Matrix Spike DPM   :                        LCS DPM        :
*****

```

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CO-57	122.06	51226	85.51*	2.359E+00	9.534E+03	1.907E+04	1.53
	136.47	6598	10.47	2.355E+00	1.005E+04	2.009E+04	7.30
CO-60	1173.24	54911	99.90	5.826E-01	3.541E+04	3.906E+04	0.98
	1332.50	50394	99.98*	5.251E-01	3.603E+04	3.974E+04	0.95
Y-88	898.04	26605	93.40	7.308E-01	1.463E+04	8.561E+04	1.74
	1836.06	16739	99.38*	4.293E-01	1.473E+04	8.618E+04	1.65
CD-109	88.03	99704	3.79*	1.923E+00	5.134E+05	7.723E+05	0.99
SN-113	391.70	22191	64.90*	1.345E+00	9.539E+03	4.902E+04	1.95
CS-137	661.66	50415	85.12*	9.336E-01	2.381E+04	2.423E+04	1.12
CE-139	165.85	36739	80.35*	2.231E+00	7.693E+03	3.023E+04	1.89
HG-203	70.83	587	4.75	1.263E+00	3.674E+03	2.093E+05	82.05
	72.87	-----	8.00	1.371E+00	-----	Line Not Found	-----
	82.60	-----	3.55	1.756E+00	-----	Line Not Found	-----
	279.20	3904	77.30*	1.672E+00	1.134E+03	6.460E+04	8.77
PB-210	46.50	17259	4.05*	1.910E-01	8.376E+05	8.572E+05	4.10
AM-241	59.54	42854	35.90*	7.239E-01	6.190E+04	6.197E+04	1.45

Flag: "\*" = Keyline

Total number of lines in spectrum 39  
 Number of unidentified lines 25  
 Number of lines tentatively identified by NID 14 35.90%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.74D	2.00	9.534E+03	1.907E+04	0.029E+04	1.53	
CO-60	5.27Y	1.10	3.603E+04	3.974E+04	0.038E+04	0.95	
Y-88	106.63D	5.85	1.473E+04	8.618E+04	0.143E+04	1.65	
CD-109	461.40D	1.50	5.134E+05	7.723E+05	0.076E+05	0.99	
SN-113	115.09D	5.14	9.539E+03	4.902E+04	0.095E+04	1.95	
CS-137	30.00Y	1.02	2.381E+04	2.423E+04	0.027E+04	1.12	
CE-139	137.64D	3.93	7.693E+03	3.023E+04	0.057E+04	1.89	
HG-203	46.60D	57.0	1.134E+03	6.460E+04	0.567E+04	8.77	
PB-210	22.26Y	1.02	8.376E+05	8.572E+05	0.351E+05	4.10	
AM-241	432.20Y	1.00	6.190E+04	6.197E+04	0.090E+04	1.45	
Total Activity :			1.515E+06	2.005E+06			

Grand Total Activity : 1.515E+06 2.005E+06

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
4	57.32	1924	15819	1.37	115.86	114	11	2.67E-01	18.5	6.19E-01	
0	66.73	615	25393	2.01	134.64	132	7	8.55E-02	86.0	1.08E+00	
0	255.32	970	8225	1.14	511.02	508	8	1.35E-01	33.0	1.77E+00	
0	341.00	156	5215	1.37	682.03	679	8	2.16E-02	****	1.47E+00	
0	366.83	210	4201	1.61	733.60	731	7	2.92E-02	****	1.40E+00	
0	446.46	218	4180	1.84	892.55	889	8	3.03E-02	****	1.23E+00	
0	465.52	216	4353	1.62	930.60	928	8	3.00E-02	****	1.20E+00	
0	510.83	157	4145	1.59	1021.05	1017	9	2.19E-02	****	1.13E+00	
0	603.30	34	2613	0.56	1205.65	1203	7	4.72E-03	****	1.00E+00	
0	777.51	163	1908	1.25	1553.48	1551	7	2.27E-02	90.0	8.23E-01	
0	814.25	382	2683	1.44	1626.84	1622	9	5.31E-02	50.0	7.93E-01	
0	821.51	131	2062	1.46	1641.34	1639	7	1.82E-02	****	7.87E-01	
0	1086.05	76	1740	1.35	2169.62	2167	7	1.06E-02	****	6.22E-01	
0	1183.47	61	693	1.06	2364.20	2362	6	8.46E-03	****	5.78E-01	
0	1325.19	145	858	2.81	2647.28	2645	8	2.02E-02	73.3	5.27E-01	
0	1445.89	23	376	1.40	2888.40	2884	7	3.19E-03	****	4.93E-01	
0	1594.55	79	466	2.05	3185.42	3182	7	1.10E-02	93.5	4.62E-01	
0	1598.22	32	421	0.87	3192.75	3188	6	4.45E-03	****	4.61E-01	
0	1617.97	45	204	1.42	3232.21	3230	5	6.30E-03	99.6	4.58E-01	
0	1727.18	41	113	1.95	3450.44	3447	7	5.72E-03	91.2	4.41E-01	
0	1877.53	39	61	2.42	3750.88	3747	10	5.47E-03	80.4	4.26E-01	
0	1973.63	47	79	4.75	3942.95	3935	16	6.59E-03	89.1	4.20E-01	
0	2000.75	22	21	1.37	3997.15	3995	5	3.05E-03	75.9	4.18E-01	
1	2024.69	64	67	2.19	4045.00	4039	26	8.94E-03	50.3	4.17E-01	
1	2027.19	30	73	2.19	4050.00	4039	26	4.16E-03	****	4.17E-01	

Flags: "T" = Tentatively associated

```
*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****
```

DETECTOR DATA

```
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA6_2LMB.CNF;1*
* Acquisition date   : 29-DEC-2005 05:34:59  Detector SN#      : 1922827
* Detector ID        : GAMMA6                  Sensitivity         : 3.00000
* Geometry           : 2L_MB                   Energy tolerance    : 2.00000
* Elapsed live time  : 0 02:00:00.00           Abundance limit    : 75.00000
* Elapsed real time  : 0 02:00:53.92           Half life ratio     : 8.00000
*****
```

SAMPLE DATA

```
* Sample date        : 1-APR-2005 12:00:00.  Nuclide Library   : CAL
* Sample ID          : VER_GAMMA6_2LMB       Analyst initials  : MJH1
* Batch Number       :                      Sample Quantity   : 1.00000E+00 LITER
*****
```

QC DATA

```
* CALIB. DATE/TIME  : 29-DEC-2005 05:08:19.2MS Isotope      :
* MSD DPM           :                      MSD Isotope      :
* LCS DPM           :                      LCS Isotope      :
*****
```

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
CO-57	1.907E+04	2.909E+02	1.820E+02	0.000E+00	104.758
CO-60	3.974E+04	3.790E+02	1.098E+02	0.000E+00	361.821
Y-88	8.618E+04	1.426E+03	3.030E+02	0.000E+00	284.472
CD-109	7.723E+05	7.634E+03	4.738E+03	0.000E+00	163.003
SN-113	4.902E+04	9.538E+02	6.617E+02	0.000E+00	74.080
CS-137	2.423E+04	2.716E+02	1.211E+02	0.000E+00	200.130
CE-139	3.023E+04	5.702E+02	3.514E+02	0.000E+00	86.044
HG-203	6.460E+04	5.665E+03	5.695E+03	0.000E+00	11.342
PB-210	8.572E+05	3.512E+04	2.870E+04	0.000E+00	29.864
AM-241	6.197E+04	8.989E+02	8.638E+02	0.000E+00	71.739

\*\*\*\*\*  
 \* GENERAL ENG. LABS, LLC. \*  
 \* 2040 Savage Road \*  
 \* Charleston, SC 29414 \*  
 \*\*\*\*\*

Configuration : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]CAL\_GAMMA6\_2L\_MB.CNF;3  
 Sample date : 1-APR-2005 12:00:00. Acquisition date : 28-DEC-2005 16:02:00  
 Sample ID : CAL\_GAMMA6\_2L\_MB Sample quantity : 1.00000E+00 LITER  
 Detector name : GAMMA6 Detector geometry: 2L MB  
 Elapsed live time: 0 08:00:00.00 Elapsed real time: 0 08:03:35.88 0.7%  
 Energy tolerance : 2.00000 KEV Analyst Initials : MJH1  
 Abundance limit : 75.00000 Sensitivity : 3.00000  
 Batch ID : Detector SN# : 1922827  
 Matrix Spike DPM : LCS DPM :  
 \*\*\*\*\*

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.38*	65073	152559	1.04	94.03	88	10	2.26E+00	1.2	
2	2	55.89*	6858	78352	0.93	113.00	99	26	2.38E-01	6.7	4.54E+02
3	2	59.53	183650	73569	1.07	120.28	99	26	6.38E+00	0.3	
4	10	68.68*	6559	156832	2.48	138.53	133	19	2.28E-01	11.9	1.51E+01
5	10	72.49	2085	147084	1.71	146.13	133	19	7.24E-02	34.4	
6	10	81.50	11427	211154	2.54	164.12	156	27	3.97E-01	8.5	3.30E+02
7	10	84.38*	28152	161612	1.92	169.87	156	27	9.78E-01	2.9	
8	10	88.07	411454	68944	1.04	177.22	156	27	1.43E+01	0.2	
9	7	120.52*	4535	74408	2.04	241.98	238	13	1.57E-01	13.0	2.50E+00
10	7	122.12	197963	51209	1.00	245.17	238	13	6.87E+00	0.3	
11	0	136.51	26079	63217	1.02	273.90	270	9	9.06E-01	1.8	
12	0	165.92*	145537	72180	1.11	332.59	327	12	5.05E+00	0.5	
13	0	187.98*	484	31182	1.96	376.62	374	6	1.68E-02	58.1	
14	0	255.15	4015	32963	1.16	510.69	507	8	1.39E-01	8.0	
15	0	279.27	16778	34760	1.18	558.81	554	10	5.83E-01	2.2	
16	0	310.76	444	17697	1.49	621.68	619	6	1.54E-02	47.6	
17	0	391.76	88976	30447	1.26	783.36	777	13	3.09E+00	0.5	
18	0	398.67*	150	17944	1.23	797.16	794	8	5.20E-03	155.5	
19	0	443.59	299	17663	1.93	886.82	885	8	1.04E-02	77.1	
20	0	491.34	113	12841	0.83	982.13	979	7	3.92E-03	167.0	
21	0	510.92*	1995	21126	1.97	1021.22	1016	12	6.93E-02	14.9	
22	5	657.01	1426	13443	2.48	1312.87	1308	21	4.95E-02	14.7	2.06E+01
23	5	661.66*	200294	13106	1.46	1322.17	1308	21	6.95E+00	0.2	
24	0	743.72	257	8163	1.19	1486.02	1484	7	8.93E-03	58.6	
25	0	764.62*	135	6916	0.90	1527.73	1525	6	4.70E-03	97.8	
26	0	813.98	1335	10911	1.36	1626.30	1622	9	4.64E-02	14.4	
27	0	822.79	308	9724	0.70	1643.89	1641	8	1.07E-02	56.0	
28	0	875.78	178	6299	0.82	1749.69	1748	5	6.20E-03	67.1	
29	0	897.95*	105971	24434	1.61	1793.98	1785	18	3.68E+00	0.5	
30	0	1173.02	220671	11794	1.86	2343.34	2334	19	7.66E+00	0.2	
31	0	1204.15	82	3135	0.60	2405.50	2402	8	2.85E-03	118.8	
32	0	1230.90*	60	2565	0.70	2458.94	2457	8	2.08E-03	147.3	
33	4	1324.88*	2057	4244	2.78	2646.67	2639	31	7.14E-02	7.2	3.30E+01
34	4	1332.21	200753	3198	1.97	2661.31	2639	31	6.97E+00	0.2	
35	0	1391.50	154	1759	2.44	2779.76	2776	9	5.34E-03	49.7	
36	0	1608.53	110	2313	0.59	3213.36	3211	9	3.83E-03	79.4	
37	0	1645.52	96	1410	1.20	3287.26	3284	9	3.33E-03	71.3	
38	0	1650.94*	79	1444	1.32	3298.09	3295	9	2.76E-03	87.1	



Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1742.50	51	430	0.98	3481.04	3478	6	1.78E-03	65.4	
40	2	1789.53	88	473	1.77	3575.03	3571	15	3.06E-03	45.6	1.25E+00
41	2	1792.94	87	409	1.70	3581.85	3571	15	3.03E-03	41.3	
42	0	1835.87	66461	1581	2.27	3667.64	3657	22	2.31E+00	0.4	
43	0	1921.94	33	275	1.72	3839.65	3835	9	1.15E-03	92.3	

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

Configuration : MCA0:[GAMMA]GAMMA6\$1  
 Analyses by : CALIBRATE V1.7,PEAK V16.4  
 Detector Name : GAMMA6 Energy Calib Time: 28-DEC-2005 15:47:34  
 Efficiency type : Empirical Effncy Calib Time: 29-DEC-2005 05:08:19  
 Detector Geometry: GAMMA6 Shelf :

Energy Calibration Report

$$\text{Energy} = -0.7387 + 0.5011 \cdot \text{Channel} + -9.9579\text{E-}08 \cdot (\text{Channel}^2)$$

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	94.29	46.50	46.51	-0.012
2	120.03	59.54	59.41	0.126
3	177.11	88.03	88.01	0.019
4	245.08	122.06	122.07	-0.009
5	332.57	165.85	165.91	-0.056
6	783.42	391.70	391.79	-0.089
7	1322.31	661.66	661.73	-0.070
8	1794.17	898.04	898.05	-0.007
9	2343.66	1173.24	1173.18	0.056
10	2661.69	1332.50	1332.40	0.103
11	3668.14	1836.06	1836.12	-0.062

FWHM Calibration Report

$$\text{FWHM} = 0.6805 + 3.3519\text{E-}02 \cdot (\text{Energy}^{1/2})$$

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	46.50	0.93	0.91	0.023
2	59.54	1.04	0.94	0.096
3	88.03	1.00	0.99	0.008
4	122.06	1.02	1.05	-0.031
5	165.85	1.12	1.11	0.006
6	391.70	1.28	1.34	-0.064
7	661.66	1.44	1.54	-0.104
8	898.04	1.65	1.68	-0.037
9	1173.24	1.81	1.83	-0.020
10	1332.50	1.94	1.90	0.035
11	1836.06	2.20	2.12	0.087

Efficiency Calibration Report

$$\text{Eff} = \exp(a_2 + a_3 \cdot x + a_4 \cdot x^2 + a_5 \cdot x^3 + a_6 \cdot x^4 + a_7 \cdot x^5), \quad x = \ln(a_1 / \text{energy})$$

a1      a2      a3      a4      a5      a6      a7  
 941.3   -4.958   0.8460   -6.6067E-02   -0.1874   0.1945   -5.7096E-02

Average Deviation = 2.69 %      Reduced Chi-Square = 2.29

Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/Error	% Diff
-----	--------------	---------------------	------------------	---------------------	------------	--------

1	46.50	1.88E-03	6.07E-05	1.94E-03	-0.90	-2.89
---	-------	----------	----------	----------	-------	-------

Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
2	59.54	7.68E-03	2.32E-04	7.25E-03	1.85	5.60
3	88.03	1.85E-02	6.12E-04	1.92E-02	-1.16	-3.85
4	122.06	2.27E-02	6.86E-04	2.36E-02	-1.23	-3.70
5	165.85	2.30E-02	6.53E-04	2.23E-02	1.08	3.06
6	391.70	1.36E-02	3.62E-04	1.35E-02	0.50	1.32
7	661.66	9.23E-03	2.78E-04	9.34E-03	-0.36	-1.10
8	898.04	7.08E-03	1.87E-04	7.31E-03	-1.23	-3.25
9	1173.24	5.94E-03	1.61E-04	5.83E-03	0.72	1.94
10	1332.50	5.35E-03	1.40E-04	5.25E-03	0.70	1.83
11	1836.06	4.25E-03	1.12E-04	4.29E-03	-0.38	-1.01

Approved by: *Michael Hutton*

Approval Date: 12 / 29 / 05

```

Library Title      :
Library file name : DKA300:[CANBERRA.GAMMA]CAL.NLB;1
Date printed      : 6-DEC-2004 10:31:17.67
Number of nuclides : 10
Number of lines   : 17

```

Nuclide Name	Half-Life	Nuclide Type	Key Line	Energy	Abundance
CO-57	271.74D		*	122.06 keV	85.51 %
				136.47 keV	10.47 %
CO-60	5.27Y		*	1173.24 keV	99.90 %
				1332.50 keV	99.98 %
Y-88	106.63D		*	898.04 keV	93.40 %
				1836.06 keV	99.38 %
CD-109	461.40D		*	88.03 keV	3.79 %
SN-113	115.09D		*	391.70 keV	64.90 %
CS-137	30.00Y		*	661.66 keV	85.12 %
CE-139	137.64D		*	165.85 keV	80.35 %
HG-203	46.60D			70.83 keV	4.75 %
				72.87 keV	8.00 %
				82.60 keV	3.55 %
				279.20 keV	77.30 %
PB-210	22.26Y		*	46.50 keV	4.05 %
AM-241	432.20Y		*	59.54 keV	35.90 %

Print Time : 14-JUN-2005 17:33:53.22  
 Certificate file name : DKA300:[CANBERRA.GAMMA]70528-278.CER;1  
 Certificate title : 2L\_MB  
 Certificate date : 1-APR-2005 12:00:00.00  
 Certificate quantity : 1.00000E+00

Rcd	Nuclide	Halflife	CAL/ INIT	Energy	Rate	%Abun	Activity (uCi)
1	AM-241	432.20Y	Yes	59.54	8.3100E+02	35.90	6.2561E-02
2	CD-109	462.60D	No	88.03	1.1580E+03	3.79	8.2579E-01
3	Co-57	271.79D	No	122.06	6.0370E+02	85.51	1.9081E-02
4	CE-139	137.60D	No	165.85	8.6160E+02	80.35	2.8981E-02
5	SN-113	115.10D	No	391.70	1.1610E+03	64.90	4.8349E-02
6	CS-137	30.07Y	Yes	661.66	7.6610E+02	85.12	2.4325E-02
7	Y-88	106.60D	No	898.04	3.0350E+03	93.40	8.7823E-02
8	Y-88	106.60D	Yes	1836.06	3.1700E+03	99.38	8.6210E-02
9	CO-60	5.27Y	Yes	1173.24	1.4220E+03	99.90	3.8471E-02
10	CO-60	5.27Y	No	1332.50	1.4370E+03	99.98	3.8845E-02
11	PB-210	22.30Y	No	46.50	1.2290E+03	4.05	8.2015E-01



**CERTIFICATE OF CALIBRATION**  
**Standard Radionuclide Source**

70528-278

2.0 Liter Solid in 230G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 and Pb-210 were 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 US NRC Regulatory Guide 4.15, Revision 1, February 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.  
Density of solid matrix 1.15 g/cc.

Calibration Date: April 1, 2005 12:00 EST

ISOTOPE	GAMMA ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Pb-210	46.5	22.3	y	1229	3.0
Am-241	59.5	432.2	y	831.0	3.0
Cd-109	88	462.6	d	1158	3.3
Co-57	122	271.79	d	603.7	3.0
Ce-139	166	137.6	d	861.6	2.8
Hg-203	279	46.61	d	1864	2.7
Sn-113	392	115.1	d	1161	2.6
Cs-137	662	30.07	y	766.1	3.0
Y-88	898	106.6	d	3035	2.6
Co-60	1173	5.271	y	1422	2.7
Co-60	1332	5.271	y	1437	2.6
Y-88	1836	106.6	d	3170	2.6

P O NUMBER 2832RD, Item 1

SOURCE PREPARED BY: M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED: W.M. [Signature] 5-12-05

This standard will expire one year after the calibration date.

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Gamma Spectrometer Geometry Calibration Package

Detector: Gamma 17

Geometry: 2L-MB

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the secondary standard(s) documentation? the nuclide library used? the VMS certificate file?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the detector efficiency curve printout included?	<input type="checkbox"/>	<input type="checkbox"/>	<i>~</i>
3) Is the efficiency calibration report included and reviewed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Is the raw count data included for: the calibration peak report? the calibration verification PEAK report? the calibration verification NID report? the last instrument background?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the calibration verification calculations included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Are the instrument settings included: amp, HVPS, ADC settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: *J. Havel*

Date: 1/14/06

Reviewed By: *J. L. Austin*

Date: 1/11/2006

Effective Date: 1/6/06



TJA  
1/19/05  
843

**Gamma Spectrometer Front End Electronics Setup**

**Detector:** Gamma 17

Date Performed: 12/21/05

Performed By: Jay Harrelly

<p><b>High Voltage Power Supply</b></p> <p>Model No. <u>3106D</u> High Voltage <u>2.5 KV</u></p>	<p><b>Spectroscopy Amplifier</b></p> <p>Model No. <u>2026</u> Course Gain <u>50</u> Fine Gain <u>734</u> Time Constant <u>6.44 seconds</u> Input polarity <u>negative</u> BSLR rate <u>N/A</u> BSLR mode <u>N/A</u> Threshold <u>N/A</u></p>
<p><b>ADC</b></p> <p>Model No. <u>8701</u> Gain <u>4000</u></p>	
<p><b>AIM Module</b></p> <p>Model No. <u>556A</u> Address <u>N1E07:2</u></p>	

**Gamma Spectroscopy Calibration Verification**

Instrument: GAMMA17

Calibration Date: 1/6/2006

Geometry: 2L\_MB

Standard Id: 70528-278

Isotope		CALIBRATED ACTIVITY (PCI)	MEASURED ACTIVITY (PCI)	DIFFERENCE %
Pb-210		8.2015E+05	8.259E+05	0.70
Am-241		6.2561E+04	6.446E+04	3.04
Cd-109		8.2579E+05	8.367E+05	1.32
Co-57		1.9081E+04	1.983E+04	3.93
Ce-139		2.8981E+04	2.867E+04	-1.07
Sn-113		4.8349E+04	4.719E+04	-2.40
Cs-137		2.4325E+04	2.455E+04	0.92
Y-88	1836.06	8.6210E+04	8.510E+04	-1.29
Co-60	1332.5	3.8845E+04	3.941E+04	1.45

Prepared By: *J. Handley*

Date: 1/11/06

Reviewed By: *D. Austin*

Date: 1/11/2006

QA filename : DKA300:[CANBERRA.GAMMA]QC\_BKG\_GAMMA17.QAF;2

Sample ID : BKG\_GAMMA17 Sample quantity : 1.80 LITER  
Sample date : 31-DEC-2005 00:00:00 Acquisition date : 31-DEC-2005 22:53:29  
Elapsed live time: 0 16:40:00.00 Elapsed real time: 0 16:40:04.27

Out-of-range Test: BOUNDARY

Parameter Description	Lower	Upper	Value	Flag
BACKGROUND (GROSS COUNTS)	1.02E+05	1.09E+05	1.06E+05	
BACKGROUND (CPS)	1.70	1.81	1.76	

Flags: "\*" means the out-of-range test is parameter-dependent

Approved by: TM94 Approval Date: 1 / 3 / 06

```

*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                               *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA17_2LMB.CNF;3
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 10-JAN-2006 13:55:28
Sample ID          : VER_GAMMA17_2LMB          Sample quantity : 1.00000E+00 LITER
Detector name      : GAMMA17                  Detector geometry: 2L_MB
Elapsed live time  : 0 03:00:00.00           Elapsed real time: 0 03:01:35.06 0.9%
Energy tolerance   : 2.00000 KEV             Analyst Initials  : JPH1
Abundance limit    : 75.00000                Sensitivity       : 3.00000
Batch ID           :                          Detector SN#     : 30-TN10348
Matrix Spike DPM   :                          LCS DPM      :
*****

```

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	36.71	8791	57295	1.12	61.20	59	26	8.14E-01	4.4	2.92E+03
2	1	40.20	26168	81764	1.13	68.21	59	26	2.42E+00	2.1	
3	1	46.54*	287955	87247	1.14	80.95	59	26	2.67E+01	0.3	
4	0	50.16	6103	95341	1.45	88.22	86	7	5.65E-01	8.5	
5	0	59.55	237575	116562	1.08	107.06	101	12	2.20E+01	0.4	
6	0	68.41*	7567	102062	4.40	124.85	120	12	7.01E-01	8.5	
7	0	88.08	234223	85246	1.13	164.36	157	14	2.17E+01	0.3	
8	0	122.14	89502	40974	1.13	232.77	226	13	8.29E+00	0.6	
9	0	136.57	11036	22718	1.14	261.75	257	9	1.02E+00	2.6	
10	0	165.98	53449	24865	1.15	320.80	315	12	4.95E+00	0.7	
11	0	199.19*	1074	12647	1.49	387.49	385	7	9.95E-02	17.7	
12	0	203.65*	435	10692	1.56	396.45	394	6	4.03E-02	38.0	
13	0	221.92	395	12582	1.34	433.15	431	7	3.66E-02	47.4	
14	0	255.24	1268	11592	1.30	500.07	496	8	1.17E-01	15.0	
15	0	279.33*	4765	10990	1.22	548.45	544	9	4.41E-01	4.2	
16	0	391.88	29145	9195	1.33	774.52	769	11	2.70E+00	0.9	
17	0	511.11*	668	6772	2.88	1014.01	1009	11	6.19E-02	24.3	
18	0	575.99	180	3086	1.60	1144.32	1142	6	1.67E-02	49.4	
19	0	654.45	106	3250	0.67	1301.94	1300	6	9.79E-03	85.8	
20	0	661.88*	67395	8050	1.54	1316.87	1309	15	6.24E+00	0.5	
21	0	720.37	156	2553	1.17	1434.37	1432	6	1.44E-02	51.9	
22	0	731.04	141	2478	1.28	1455.79	1453	6	1.31E-02	56.4	
23	0	735.15	148	3437	1.00	1464.05	1461	8	1.37E-02	69.1	
24	0	813.93	630	4176	1.66	1622.32	1618	10	5.84E-02	19.6	
25	0	875.93*	73	3242	1.19	1746.88	1745	7	6.78E-03	129.6	
26	0	898.31	32135	8873	1.66	1791.84	1783	18	2.98E+00	0.9	
27	0	931.06	153	3580	1.40	1857.65	1855	7	1.42E-02	65.1	
28	0	1046.66	206	2810	1.83	2089.91	2087	8	1.91E-02	45.1	
29	0	1173.52	71806	4188	1.83	2344.83	2335	19	6.65E+00	0.4	
30	5	1325.68	847	1596	3.23	2650.60	2641	33	7.85E-02	12.1	9.85E+00
31	5	1332.82	64468	1014	1.97	2664.95	2641	33	5.97E+00	0.4	
32	0	1462.61	88	670	2.29	2925.79	2922	10	8.16E-03	55.9	
33	0	1499.41*	73	780	3.18	2999.74	2993	11	6.75E-03	75.2	
34	0	1640.37	113	398	1.87	3283.05	3279	8	1.04E-02	32.1	
35	0	1665.35	18	555	1.58	3333.26	3330	11	1.70E-03	250.0	
36	0	1694.73	27	378	0.95	3392.31	3391	10	2.53E-03	134.7	
37	0	1719.03	47	501	6.32	3441.16	3434	16	4.32E-03	108.2	
38	0	1836.51*	19510	432	2.25	3677.31	3666	21	1.81E+00	0.8	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1960.88	24	124	4.66	3927.33	3922	14	2.21E-03	101.9	
40	0	1976.02*	14	97	1.29	3957.76	3953	10	1.32E-03	133.4	
41	0	2014.38	24	77	3.28	4034.90	4029	11	2.26E-03	72.5	

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

VAX/VMS Nuclide Identification Report Generated

```
*****
*                               General Eng. Labs, LLC.                               *
*                               2040 Savage Road                                       *
*                               Charleston, SC 29414                                   *
*****
```

DETECTOR DATA

```
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA17_
* Acquisition date   : 10-JAN-2006 13:55:28 Detector SN#      : 30-TN10348
* Detector ID        : GAMMA17          Sensitivity           : 3.000
* Geometry           : 2L_MB            Energy tolerance     : 2.000
* Elapsed live time  : 0 03:00:00.00    Abundance limit     : 75.000
* Elapsed real time  : 0 03:01:35.06    Half life ratio     : 8.000
*****
```

SAMPLE DATA

```
* Sample date       : 1-APR-2005 12:00:00 Nuclide Library :
* Sample ID        : VER_GAMMA17_2LMB      Analyst initials: JPH1
* Batch Number     :                      Sample Quantity  : 1.0000E+00 LITER
* Recovery         : 1.00000              Carrier Weight   : 0.00000
*****
```

QC DATA

```
* Standard Weight   : 0.00000
* CALIB. DATE/TIME : 6-JAN-2006 16:48:24 MS Isotope      :
* MSD DPM           : 0.000              MSD Isotope      :
* LCS DPM           : 0.000              LCS Isotope      :
* LCSD DPM          : 0.000              LCSD Isotope     :
*****
```

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
CO-57	1.983E+04	1.783E+03	1.422E+02	0.000E+00
CO-60	3.941E+04	2.170E+03	8.560E+01	0.000E+00
Y-88	8.510E+04	5.587E+03	3.086E+02	0.000E+00
CD-109	8.367E+05	7.488E+04	3.073E+03	0.000E+00
SN-113	4.719E+04	4.170E+03	5.952E+02	0.000E+00
CS-137	2.455E+04	1.596E+03	1.130E+02	0.000E+00
CE-139	2.867E+04	1.734E+03	2.855E+02	0.000E+00
HG-203	6.066E+04	6.888E+03	5.442E+03	0.000E+00
PB-210	8.259E+05	6.090E+04	3.552E+03	0.000E+00
AM-241	6.446E+04	4.646E+03	2.928E+02	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )
---------	--------------------------------------	--------------------------	---------------------

```

*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA17_2LMB.CNF;3
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 10-JAN-2006 13:55:28
Sample ID          : VER_GAMMA17_2LMB      Sample quantity  : 1.00000E+00 LITER
Detector name     : GAMMA17                Detector geometry: 2L MB
Elapsed live time : 0 03:00:00.00         Elapsed real time: 0 03:01:35.06  0.9%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : JPH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          :                       Detector SN#     : 30-TN10348
Matrix Spike DPM  :                       LCS DPM        :
*****

```

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CO-57	122.06	89502	85.51*	2.727E+00	9.604E+03	1.983E+04	8.99
	136.47	11036	10.47	2.636E+00	1.001E+04	2.066E+04	10.15
CO-60	1173.24	71806	99.90	5.002E-01	3.596E+04	3.983E+04	7.76
	1332.50	64468	99.98*	4.535E-01	3.558E+04	3.941E+04	5.51
Y-88	898.04	32135	93.40	6.253E-01	1.377E+04	8.732E+04	5.72
	1836.06	19510	99.38*	3.661E-01	1.342E+04	8.510E+04	6.57
CD-109	88.03	234223	3.79*	2.833E+00	5.460E+05	8.367E+05	8.95
SN-113	391.70	29145	64.90*	1.318E+00	8.524E+03	4.719E+04	8.84
CS-137	661.66	67395	85.12*	8.218E-01	2.411E+04	2.455E+04	6.50
CE-139	165.85	53449	80.35*	2.428E+00	6.855E+03	2.867E+04	6.05
HG-203	70.83	-----	4.75	2.741E+00	-----	Line Not Found	-----
	72.87	-----	8.00	2.761E+00	-----	Line Not Found	-----
	82.60	-----	3.55	2.820E+00	-----	Line Not Found	-----
	279.20	4765	77.30*	1.741E+00	8.858E+02	6.066E+04	11.36
PB-210	46.50	287955	4.05*	2.207E+00	8.062E+05	8.259E+05	7.37
AM-241	59.54	237575	35.90*	2.572E+00	6.438E+04	6.446E+04	7.21

Flag: "\*" = Keyline

Total number of lines in spectrum 41  
 Number of unidentified lines 28  
 Number of lines tentatively identified by NID 13 31.71%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.74D	2.06	9.604E+03	1.983E+04	0.178E+04	8.99	
CO-60	5.27Y	1.11	3.558E+04	3.941E+04	0.217E+04	5.51	
Y-88	106.63D	6.34	1.342E+04	8.510E+04	0.559E+04	6.57	
CD-109	461.40D	1.53	5.460E+05	8.367E+05	0.749E+05	8.95	
SN-113	115.09D	5.54	8.524E+03	4.719E+04	0.417E+04	8.84	
CS-137	30.00Y	1.02	2.411E+04	2.455E+04	0.160E+04	6.50	
CE-139	137.64D	4.18	6.855E+03	2.867E+04	0.173E+04	6.05	
HG-203	46.60D	68.5	8.858E+02	6.066E+04	0.689E+04	11.36	
PB-210	22.26Y	1.02	8.062E+05	8.259E+05	0.609E+05	7.37	
AM-241	432.20Y	1.00	6.438E+04	6.446E+04	0.465E+04	7.21	
Total Activity :			1.516E+06	2.033E+06			

Grand Total Activity : 1.516E+06 2.033E+06

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



It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	36.71	8791	57295	1.12	61.20	59	26	8.14E-01	8.7	1.76E+00	
1	40.20	26168	81764	1.13	68.21	59	26	2.42E+00	4.1	1.94E+00	
0	50.16	6103	95341	1.45	88.22	86	7	5.65E-01	17.0	2.33E+00	
0	68.41	7567	102062	4.40	124.85	120	12	7.01E-01	17.0	2.71E+00	
0	199.19	1074	12647	1.49	387.49	385	7	9.95E-02	35.3	2.20E+00	
0	203.65	435	10692	1.56	396.45	394	6	4.03E-02	75.9	2.17E+00	
0	221.92	395	12582	1.34	433.15	431	7	3.66E-02	94.7	2.05E+00	
0	255.24	1268	11592	1.30	500.07	496	8	1.17E-01	30.0	1.86E+00	
0	511.11	668	6772	2.88	1014.01	1009	11	6.19E-02	48.6	1.04E+00	
0	575.99	180	3086	1.60	1144.32	1142	6	1.67E-02	98.9	9.33E-01	
0	654.45	106	3250	0.67	1301.94	1300	6	9.79E-03	****	8.30E-01	
0	720.37	156	2553	1.17	1434.37	1432	6	1.44E-02	****	7.61E-01	
0	731.04	141	2478	1.28	1455.79	1453	6	1.31E-02	****	7.51E-01	
0	735.15	148	3437	1.00	1464.05	1461	8	1.37E-02	****	7.47E-01	
0	813.93	630	4176	1.66	1622.32	1618	10	5.84E-02	39.2	6.82E-01	
0	875.93	73	3242	1.19	1746.88	1745	7	6.78E-03	****	6.39E-01	
0	931.06	153	3580	1.40	1857.65	1855	7	1.42E-02	****	6.06E-01	
0	1046.66	206	2810	1.83	2089.91	2087	8	1.91E-02	90.1	5.49E-01	
5	1325.68	847	1596	3.23	2650.60	2641	33	7.85E-02	24.2	4.55E-01	
0	1462.61	88	670	2.29	2925.79	2922	10	8.16E-03	****	4.24E-01	
0	1499.41	73	780	3.18	2999.74	2993	11	6.75E-03	****	4.17E-01	
0	1640.37	113	398	1.87	3283.05	3279	8	1.04E-02	64.3	3.92E-01	
0	1665.35	18	555	1.58	3333.26	3330	11	1.70E-03	****	3.89E-01	
0	1694.73	27	378	0.95	3392.31	3391	10	2.53E-03	****	3.84E-01	
0	1719.03	47	501	6.32	3441.16	3434	16	4.32E-03	****	3.81E-01	
0	1960.88	24	124	4.66	3927.33	3922	14	2.21E-03	****	3.53E-01	
0	1976.02	14	97	1.29	3957.76	3953	10	1.32E-03	****	3.51E-01	
0	2014.38	24	77	3.28	4034.90	4029	11	2.26E-03	****	3.48E-01	

Flags: "T" = Tentatively associated

```

*****
*                                     GENERAL ENG. LABS, LLC.                               *
*                                     2040 Savage Road                                   *
*                                     Charleston, SC 29414                             *
*****

```

DETECTOR DATA

```

* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_GAMMA17_2LMB.CNF;*
* Acquisition date   : 10-JAN-2006 13:55:28  Detector SN#      : 30-TN10348      *
* Detector ID        : GAMMA17                Sensitivity         : 3.00000        *
* Geometry           : 2L_MB                  Energy tolerance:    2.00000        *
* Elapsed live time  : 0 03:00:00.00         Abundance limit    : 75.00000        *
* Elapsed real time  : 0 03:01:35.06         Half life ratio    : 8.00000        *
*****

```

SAMPLE DATA

```

* Sample date        : 1-APR-2005 12:00:00.  Nuclide Library   : CAL                *
* Sample ID          : VER_GAMMA17_2LMB       Analyst initials  : JPH1                *
* Batch Number       :                       Sample Quantity  : 1.00000E+00 LITER *
*****

```

QC DATA

```

* CALIB. DATE/TIME  : 6-JAN-2006 16:48:24.61MS Isotope       :                *
* MSD DPM            :                       MSD Isotope       :                *
* LCS DPM            :                       LCS Isotope       :                *
*****

```

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
CO-57	1.983E+04	1.783E+03	1.422E+02	1.269E+01	139.443
CO-60	3.941E+04	2.170E+03	8.560E+01	4.661E+00	460.459
Y-88	8.510E+04	5.587E+03	3.086E+02	1.970E+01	275.793
CD-109	8.367E+05	7.488E+04	3.073E+03	2.742E+02	272.271
SN-113	4.719E+04	4.170E+03	5.952E+02	5.157E+01	79.280
CS-137	2.455E+04	1.596E+03	1.130E+02	7.264E+00	217.296
CE-139	2.867E+04	1.734E+03	2.855E+02	1.675E+01	100.414
HG-203	6.066E+04	6.888E+03	5.442E+03	4.127E+02	11.145
PB-210	8.259E+05	6.090E+04	3.552E+03	2.612E+02	232.552
AM-241	6.446E+04	4.646E+03	2.928E+02	2.100E+01	220.196

```

*****
*                                     *
*                               GENERAL ENG. LABS, LLC.                       *
*                               2040 Savage Road                             *
*                               Charleston, SC 29414                         *
*                                     *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]CAL_GAMMA17_2LMB.CNF;2
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 6-JAN-2006 09:59:23.
Sample ID          : CAL_GAMMA17_2LMB      Sample quantity  : 1.00000E+00 LITER
Detector name     : GAMMA17                Detector geometry: 2L_MB
Elapsed live time : 0 04:00:00.00         Elapsed real time: 0 04:02:07.60 0.9%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : MJH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          :                        Detector SN#     : 30-TN10348
Matrix Spike DPM  :                        LCS DPM        :
*****

```

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	36.71	12402	73833	1.12	61.20	59	26	8.61E-01	3.5	5.00E+03
2	1	38.21	15956	104274	1.12	64.20	59	26	1.11E+00	3.7	
3	1	40.20	35457	105723	1.13	68.21	59	26	2.46E+00	1.7	
4	1	46.67*	380467	114021	1.14	81.21	59	26	2.64E+01	0.2	
5	0	50.08*	8259	127472	1.42	88.05	86	7	5.74E-01	7.3	
6	5	58.17	10894	99704	1.71	104.30	101	12	7.57E-01	4.8	5.21E+00
7	5	59.71	304014	79356	1.02	107.38	101	12	2.11E+01	0.2	
8	10	66.91*	11424	69376	2.23	121.84	118	24	7.93E-01	4.0	5.70E+01
9	10	69.01	8515	119962	1.93	126.06	118	24	5.91E-01	8.4	
10	10	72.60*	4379	91221	1.46	133.27	118	24	3.04E-01	12.6	
11	10	75.10*	752	51104	0.90	138.29	118	24	5.22E-02	45.1	
12	0	88.20*	312355	106651	1.11	164.60	158	13	2.17E+01	0.3	
13	0	122.26	119776	59959	1.11	233.00	226	14	8.32E+00	0.5	
14	0	136.73	14268	31249	1.15	262.07	258	9	9.91E-01	2.4	
15	0	166.09	73078	36314	1.15	321.03	315	13	5.07E+00	0.7	
16	0	199.43*	1036	17319	1.54	387.98	385	7	7.20E-02	21.3	
17	0	204.09*	264	14643	1.42	397.33	395	6	1.83E-02	72.9	
18	0	227.50*	261	16445	1.46	444.36	442	7	1.81E-02	81.8	
19	0	255.44	2061	15068	1.27	500.48	497	8	1.43E-01	10.6	
20	0	279.47	7109	14744	1.19	548.74	544	9	4.94E-01	3.3	
21	0	295.63*	176	5783	0.85	581.19	580	4	1.22E-02	61.9	
22	0	310.33	140	9753	0.53	610.72	609	7	9.69E-03	117.7	
23	0	320.40*	210	6401	1.34	630.94	629	5	1.46E-02	57.7	
24	0	322.82	267	7594	1.41	635.80	634	6	1.86E-02	51.9	
25	0	392.05	39518	13086	1.32	774.86	769	12	2.74E+00	0.8	
26	0	504.02	176	4776	1.36	999.75	997	6	1.22E-02	62.6	
27	0	511.56*	771	9098	1.80	1014.91	1010	11	5.35E-02	24.4	
28	0	662.12*	89939	10713	1.51	1317.34	1310	15	6.25E+00	0.4	
29	0	814.63	966	7312	1.82	1623.73	1618	13	6.71E-02	18.5	
30	0	898.59	44170	9286	1.68	1792.42	1785	14	3.07E+00	0.7	
31	0	962.09*	213	3971	0.91	1919.99	1917	6	1.48E-02	47.5	
32	0	964.75	191	4944	1.64	1925.34	1923	8	1.32E-02	64.4	
33	0	990.38	143	3661	1.66	1976.84	1974	7	9.94E-03	70.6	
34	0	1039.47	170	3944	1.78	2075.48	2073	8	1.18E-02	64.4	
35	0	1105.97	222	3558	2.22	2209.09	2206	7	1.54E-02	45.2	
36	0	1147.58*	136	2653	1.42	2292.69	2289	8	9.41E-03	66.5	
37	0	1173.88	95081	5101	1.86	2345.55	2337	18	6.60E+00	0.4	
38	0	1198.59	81	1357	1.02	2395.21	2392	7	5.61E-03	76.6	

Sample ID : CAL\_GAMMA17\_2LMB

Acquisition date : 6-JAN-2006 09:59:23

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	0	1265.66	89	1057	0.92	2529.99	2526	8	6.17E-03	64.4	
40	5	1325.84	1086	2032	3.23	2650.91	2643	32	7.54E-02	9.2	8.38E+00
41	5	1333.22	85423	1444	1.95	2665.75	2643	32	5.93E+00	0.4	
42	0	1420.37	44	625	1.24	2840.90	2840	7	3.02E-03	96.3	
43	0	1479.65	54	562	1.46	2960.02	2958	6	3.78E-03	70.1	
44	0	1527.23*	50	941	0.76	3055.66	3052	9	3.48E-03	111.5	
45	0	1698.19	30	494	1.24	3399.28	3395	9	2.12E-03	133.1	
46	0	1837.03	26578	603	2.24	3678.35	3668	20	1.85E+00	0.7	
47	0	1996.44*	12	62	0.97	3998.82	3997	5	8.12E-04	107.5	
48	0	2016.44*	157	192	3.02	4039.02	4028	27	1.09E-02	25.8	

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

Configuration : MCA0:[GAMMA]GAMMA17\$1  
 Analyses by : CALIBRATE V1.7,PEAK V16.4  
 Detector Name : GAMMA17 Energy Calib Time: 4-JAN-2006 11:17:00  
 Efficiency type : Empirical Effncy Calib Time: 6-JAN-2006 16:48:24  
 Detector Geometry: GAMMA17 Shelf :

Energy Calibration Report

$$\text{Energy} = 6.233 + 0.4980 * \text{Channel} + -7.0017\text{E-}08 * (\text{Channel} ** 2)$$

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	80.83	46.50	46.48	0.016
2	106.97	59.54	59.50	0.036
3	164.29	88.03	88.04	-0.008
4	232.63	122.06	122.08	-0.014
5	320.58	165.85	165.87	-0.013
6	774.21	391.70	391.73	-0.028
7	1316.46	661.66	661.68	-0.020
8	1791.27	898.04	898.02	0.019
9	2344.23	1173.24	1173.22	0.017
10	2664.29	1332.50	1332.49	0.006
11	3676.44	1836.06	1836.07	-0.011

FWHM Calibration Report

$$\text{FWHM} = 0.8169 + 3.2641\text{E-}02 * (\text{Energy} ** 1/2)$$

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	46.50	1.23	1.04	0.191
2	59.54	1.09	1.07	0.018
3	88.03	1.09	1.12	-0.038
4	122.06	1.16	1.18	-0.017
5	165.85	1.20	1.24	-0.034
6	391.70	1.36	1.46	-0.102
7	661.66	1.58	1.66	-0.081
8	898.04	1.72	1.80	-0.079
9	1173.24	1.92	1.93	-0.019
10	1332.50	2.04	2.01	0.034
11	1836.06	2.34	2.22	0.126

Efficiency Calibration Report

$$\text{Eff} = \exp(a2 + a3 * x + a4 * x ** 2 + a5 * x ** 3 + a6 * x ** 4 + a7 * x ** 5), \quad x = \ln(a1 / \text{energy})$$

a1      a2      a3      a4      a5      a6      a7  
 941.3   -5.115   0.8593   0.1197   -8.6969E-02   0.0000E+00   0.0000E+00

Average Deviation = 1.37 %      Reduced Chi-Square = 0.610

Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ Error	% Diff
-----	--------------	---------------------	------------------	---------------------	-------------	--------

1	46.50	2.20E-02	6.63E-04	2.21E-02	-0.04	-0.13
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Sample ID : CAL\_GAMMA17\_2LMB

Acquisition date : 6-JAN-2006 09:59:23

Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
2	59.54	2.54E-02	7.65E-04	2.57E-02	-0.37	-1.11
3	88.03	2.85E-02	9.44E-04	2.83E-02	0.18	0.60
4	122.06	2.81E-02	8.57E-04	2.73E-02	1.00	3.06
5	165.85	2.41E-02	6.94E-04	2.43E-02	-0.22	-0.64
6	391.70	1.28E-02	3.46E-04	1.32E-02	-1.24	-3.35
7	661.66	8.30E-03	2.51E-04	8.22E-03	0.31	0.95
8	898.04	6.24E-03	1.68E-04	6.25E-03	-0.08	-0.20
9	1173.24	5.14E-03	1.40E-04	5.00E-03	0.95	2.58
10	1332.50	4.57E-03	1.20E-04	4.54E-03	0.25	0.66
11	1836.06	3.60E-03	9.64E-05	3.66E-03	-0.68	-1.82

Approved by: *f. Hault*Approval Date: 1 / 11 / 06

Print Time : 14-JUN-2005 17:33:53.22  
 Certificate file name : DKA300:[CANBERRA.GAMMA]70528-278.CER;1  
 Certificate title : 2L\_MB  
 Certificate date : 1-APR-2005 12:00:00.00  
 Certificate quantity : 1.00000E+00

Rcd	Nuclide	Halflife	CAL/ INIT	Energy	Rate	%Abun	Activity (uCi)
1	AM-241	432.20Y	Yes	59.54	8.3100E+02	35.90	6.2561E-02
2	CD-109	462.60D	No	88.03	1.1580E+03	3.79	8.2579E-01
3	Co-57	271.79D	No	122.06	6.0370E+02	85.51	1.9081E-02
4	CE-139	137.60D	No	165.85	8.6160E+02	80.35	2.8981E-02
5	SN-113	115.10D	No	391.70	1.1610E+03	64.90	4.8349E-02
6	CS-137	30.07Y	Yes	661.66	7.6610E+02	85.12	2.4325E-02
7	Y-88	106.60D	No	898.04	3.0350E+03	93.40	8.7823E-02
8	Y-88	106.60D	Yes	1836.06	3.1700E+03	99.38	8.6210E-02
9	CO-60	5.27Y	Yes	1173.24	1.4220E+03	99.90	3.8471E-02
10	CO-60	5.27Y	No	1332.50	1.4370E+03	99.98	3.8845E-02
11	PB-210	22.30Y	No	46.50	1.2290E+03	4.05	8.2015E-01



Library Title :  
 Library file name : DKA300:[CANBERRA.GAMMA]CAL.NLB;1  
 Date printed : 6-DEC-2004 10:31:17.67  
 Number of nuclides : 10  
 Number of lines : 17

Nuclide Name	Half-Life	Nuclide Type	Key Line	Energy	Abundance
CO-57	271.74D		*	122.06 keV	85.51 %
				136.47 keV	10.47 %
CO-60	5.27Y		*	1173.24 keV	99.90 %
				1332.50 keV	99.98 %
Y-88	106.63D		*	898.04 keV	93.40 %
				1836.06 keV	99.38 %
CD-109	461.40D		*	88.03 keV	3.79 %
SN-113	115.09D		*	391.70 keV	64.90 %
CS-137	30.00Y		*	661.66 keV	85.12 %
CE-139	137.64D		*	165.85 keV	80.35 %
HG-203	46.60D			70.83 keV	4.75 %
				72.87 keV	8.00 %
				82.60 keV	3.55 %
				279.20 keV	77.30 %
PB-210	22.26Y		*	46.50 keV	4.05 %
AM-241	432.20Y		*	59.54 keV	35.90 %

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

70528-278

2.0 Liter Solid in 230G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 and Pb-210 were 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. Analytix maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in US NRC Regulatory Guide 4.15, Revision 1, February 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.  
Density of solid matrix 1.15 g/cc.

Calibration Date: April 1, 2005 12:00 EST

ISOTOPE	GAMMA ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Pb-210	46.5	22.3	y	1229	3.0
Am-241	59.5	432.2	y	831.0	3.0
Cd-109	88	462.6	d	1158	3.3
Co-57	122	271.79	d	603.7	3.0
Ce-139	166	137.6	d	861.6	2.8
Hg-203	279	46.61	d	1864	2.7
Sn-113	392	115.1	d	1161	2.6
Cs-137	662	30.07	y	766.1	3.0
Y-88	898	106.6	d	3035	2.6
Co-60	1173	5.271	y	1422	2.7
Co-60	1332	5.271	y	1437	2.6
Y-88	1836	106.6	d	3170	2.6

P O NUMBER 2832RD, Item 1

SOURCE PREPARED BY:

M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED:

UM. May 5-12-05

This standard will expire one year after the calibration date.

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Gamma Spectrometer Geometry Calibration Package

Detector: GAMMA 19

Geometry: 2L-MB

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the second standard(s) documentation? the nuclide library used? the VMS certificate file?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the detector efficiency curve printout included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Is the efficiency calibration report included and reviewed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Is the raw count data included for: the calibration peak report? the calibration verification PEAK report? the calibration verification NID report? the last instrument background?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the calibration verification calculations included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Are the instrument settings included: amp, HVPS, ADC settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: [Signature]

Date: 2/21/06

Reviewed By: [Signature]

Date: 3/23/06

Effective Date: 2/20/05 06  
3/23/06



**CERTIFICATE OF CALIBRATION**  
**Standard Radionuclide Source**

70528-278

2.0 Liter Solid in 230G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 and Pb-210 were 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. Analytical maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in US NRC Regulatory Guide 4.15, Revision 1, February 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.  
Density of solid matrix 1.15 g/cc.

Calibration Date: April 1, 2005 12:00 EST

ISOTOPE	GAMMA ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Pb-210	46.5	22.3	y	1229	3.0
Am-241	59.5	432.2	y	831.0	3.0
Cd-109	88	462.6	d	1158	3.3
Co-57	122	271.79	d	603.7	3.0
Ce-139	166	137.6	d	861.6	2.8
Hg-203	279	46.61	d	1864	2.7
Sn-113	392	115.1	d	1161	2.6
Cs-137	662	30.07	y	766.1	3.0
Y-88	898	106.6	d	3035	2.6
Co-60	1173	5.271	y	1422	2.7
Co-60	1332	5.271	y	1437	2.6
Y-88	1836	106.6	d	3170	2.6

P O NUMBER 2832RD, Item 1

SOURCE PREPARED BY: M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED: LM. M. J. 5-12-05

This standard will expire one year after the calibration date.

*LM*  
12/10/06

Title: Mixed Gamma + Am-241 & Pb-210

Nuclide Name	Nuclide Type	Half Life	Key Line?	No Wtmean?	Energy (keV)	%Abn
CO-57		271.74D	*		122.06	85.51
					136.47	10.47
CO-60		5.27Y	*		1173.24	99.90
					1332.50	99.98
Y-88		106.63D	*		898.04	93.40
					1836.06	99.38
CD-109		461.40D	*		88.03	3.79
SN-113		115.09D	*		391.70	64.90
CS-137		30.00Y	*		661.66	85.12
CE-139		137.64D	*		165.85	80.35
HG-203		46.60D			70.83	4.75
					72.87	8.00
					82.60	3.55
PB-210		22.26Y	*		279.20	77.30
					46.50	4.05
AM-241		432.20Y	*		59.54	35.90
					0.00	0.00

*Handwritten signature*

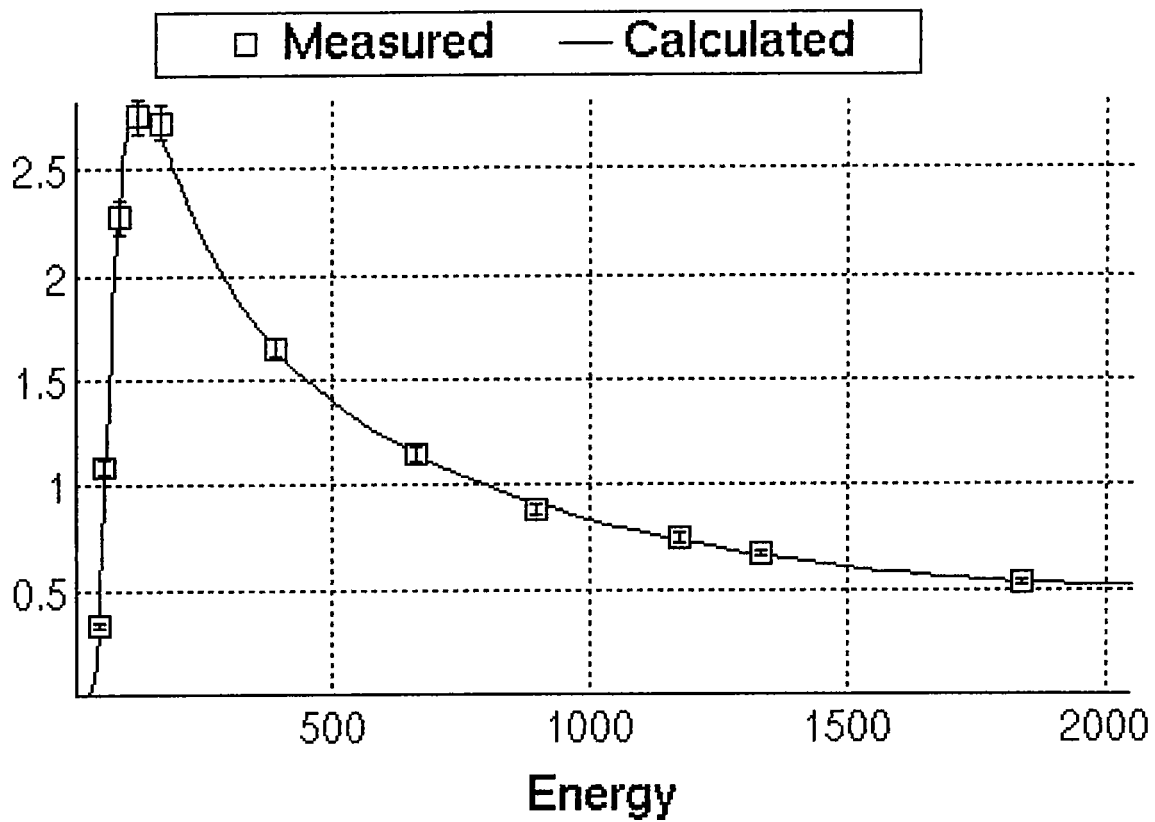
Title: 2L\_MB

Quantity: 1.00

Assay date: 1-APR-2005 12:00:00.0

Nuclide Name	Half Life	Energy (keV)	Rate	% Err	% Abn	CAL/INIT
AM-241	432.20Y	59.5	831	3.00	35.9	Yes
CD-109	462.60D	88.0	1158	3.30	3.8	No
Co-57	271.79D	122.1	604	3.00	85.5	No
CE-139	137.60D	165.9	862	2.80	80.3	No
SN-113	115.10D	391.7	1161	2.60	64.9	No
CS-137	30.07Y	661.7	766	3.00	85.1	Yes
Y-88	106.60D	898.0	3035	2.60	93.4	No
Y-88	106.60D	1836.1	3170	2.60	99.4	Yes
CO-60	5.27Y	1173.2	1422	2.70	99.9	Yes
CO-60	5.27Y	1332.5	1437	2.60	100.0	No
PB-210	22.30Y	46.5	1229	3.00	4.1	No

*Handwritten signature*



Datasource: DKA0: [CANBERRA.GAMMA.SCUSR.ARCHIVE] CAL\_GAM19\_2LMB\_36.CNF;1  
 $\ln(\text{Eff}) = -4.739e+00 + 8.129e-01X + -5.933e-02X^2 + -1.512e-01X^3$   
 $+ 1.529e-01X^4 + -4.565e-02X^5$   
 where:  $X = \ln(9.413e+02/E \text{ [keV]})$ ; [CHISQ = 1.288e+00]

*Handwritten signature*  
22/04

$$\text{Energy} = 0.1048 + 0.5006 * \text{Channel} + -9.3161\text{E-}08 * (\text{Channel} ** 2)$$

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	92.90	46.50	46.61	-0.112
2	118.77	59.54	59.56	-0.026
3	175.71	88.03	88.07	-0.032
4	243.60	122.06	122.05	0.011
5	331.05	165.85	165.82	0.029
6	781.92	391.70	391.48	0.217
7	1321.69	661.66	661.60	0.065
8	1794.43	898.04	898.12	-0.077
9	2344.55	1173.24	1173.30	-0.063
10	2663.01	1332.50	1332.58	-0.078
11	3669.79	1836.06	1836.00	0.067

FWHM Calibration Report

$$\text{FWHM} = 1.116 + 2.5220\text{E-}02 * (\text{Energy} ** 1/2)$$

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	46.50	1.30	1.29	0.007
2	59.54	1.38	1.31	0.071
3	88.03	1.38	1.35	0.027
4	122.06	1.37	1.40	-0.023
5	165.85	1.43	1.44	-0.008
6	391.70	1.55	1.62	-0.066
7	661.66	1.70	1.77	-0.066
8	898.04	1.85	1.87	-0.025
9	1173.24	1.98	1.98	0.000
10	1332.50	2.09	2.04	0.048
11	1836.06	2.23	2.20	0.035

*mgk  
2/23/06*



$$\text{Eff} = \exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), \quad x=\ln(a1/\text{energy})$$

a1	a2	a3	a4	a5	a6	a7
941.3	-4.739	0.8129	-5.9331E-02	-0.1512	0.1529	-4.5650E-02

Average Deviation = 1.98 %      Reduced Chi-Square = 1.29

Nbr	Energy (keV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ Error	% Diff
1	46.50	3.37E-03	1.14E-04	3.44E-03	-0.68	-2.29
2	59.54	1.08E-02	3.37E-04	1.04E-02	1.42	4.40
3	88.03	2.28E-02	7.60E-04	2.36E-02	-1.06	-3.54
4	122.06	2.74E-02	8.58E-04	2.80E-02	-0.63	-1.98
5	165.85	2.71E-02	8.13E-04	2.65E-02	0.73	2.20
6	391.70	1.66E-02	4.72E-04	1.65E-02	0.26	0.74
7	661.66	1.15E-02	3.50E-04	1.15E-02	0.00	-0.01
8	898.04	8.82E-03	2.46E-04	9.09E-03	-1.10	-3.07
9	1173.24	7.42E-03	2.03E-04	7.31E-03	0.55	1.52
10	1332.50	6.69E-03	1.76E-04	6.61E-03	0.49	1.29
11	1836.06	5.33E-03	1.46E-04	5.37E-03	-0.28	-0.76

Configuration : DKA0:[CANBERRA.GAMMA.SCUSR.ARCHIVE]CAL\_GAM19\_2LMB\_36.CNF;1

----- Sample Information -----

Sample Title : 2L\_MB Calibration  
 Sample ID : 70528-278 Sample Quantity : 1.00000E+00 EACH  
 Sample Type : 2L\_MB Sample Geometry :  
 Sample Number : -3 Spctrm Collector : GAMMA  
 Sample Collector : Sample Analyst : GAMMA

----- Sample Deposition Information -----

Dep. Correction? : No Dep. Duration :  
 Deposition Start : Deposition End : 1-APR-2005 12:00:00.

----- Sample Decay/Count Information -----

Sample Date : 1-APR-2005 12:00:00. Acquisition date : 17-FEB-2006 14:03:15  
 Decay time : 322 02:03:15.27 % dead time : 0.8%  
 Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:59.10

----- Detector Parameters -----

Energy cal. time : 16-FEB-2006 08:01:15 Energy cal. oper.: GAMMA  
 Detector name : GAMMA19 Counting geometry: 2LMB  
 Effic. cal. time : 17-FEB-2006 16:09:06 Effic. cal. oper.: GAMMA

----- Processing Parameters -----

Start channel : 1 End channel : 4096  
 Sensitivity : 3.00000 Gaussian Sens. : 10.00000  
 Critical level? : No Propagate Errors?: No  
 Efficiency Type : EMPIRICA Library-based eff: No  
 Energy tolerance : 2.00000 Half life ratio : 8.00000  
 Abundance limit : 75.00000 WTM error limit : 3.00000  
 MDA Width (FWHM) : 3.00000 MDA Confid Level : 5.00000 %

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	8.59	8365	43193	2.26	16.95	14	8	1.16E+00	4.4	
2	0	19.92	555	25436	1.49	39.58	37	6	7.71E-02	45.7	
3	0	46.47	28976	45324	1.40	92.62	86	12	4.02E+00	1.6	
4	0	59.52	64794	47535	1.43	118.69	111	13	9.00E+00	0.8	
5	0	66.67	880	29545	1.66	132.96	130	8	1.22E-01	33.9	
6	0	88.07	117061	50871	1.43	175.71	168	15	1.63E+01	0.5	
7	0	122.05	52420	32805	1.43	243.60	236	16	7.28E+00	0.9	
8	0	136.52	6709	18787	1.41	272.50	268	11	9.32E-01	4.1	
9	0	165.85	33231	20252	1.47	331.11	324	14	4.62E+00	1.1	
10	0	245.75	235	8771	1.52	490.73	488	8	3.27E-02	69.3	
11	0	255.09	1071	10274	1.78	509.40	505	10	1.49E-01	18.0	
12	0	271.30	268	5342	1.81	541.78	539	6	3.72E-02	43.6	
13	0	279.10	2407	8726	1.49	557.36	553	10	3.34E-01	7.5	
14	0	391.50	19916	7830	1.61	781.94	776	13	2.77E+00	1.2	
15	0	458.00	796	7253	2.64	914.83	909	12	1.11E-01	21.7	
16	0	510.99	621	5391	2.67	1020.72	1015	12	8.63E-02	24.0	
17	0	587.28	121	2130	1.28	1173.16	1171	6	1.69E-02	60.7	
18	0	647.71	110	2514	1.40	1293.93	1291	7	1.52E-02	76.5	
19	0	661.62	62216	6261	1.74	1321.73	1314	17	8.64E+00	0.5	
20	0	814.54	400	3365	1.44	1627.37	1622	11	5.56E-02	28.5	
21	0	888.42	204	3112	1.97	1775.05	1771	9	2.83E-02	49.9	

*Handwritten signature/initials*

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
22	0	898.17	23719	6219	1.89	1794.52	1785	18	3.29E+00	1.0	
23	0	968.03	100	2653	1.68	1934.18	1932	8	1.38E-02	90.4	
24	0	1173.37	67643	3195	2.03	2344.68	2335	20	9.39E+00	0.4	
25	4	1325.44	447	1208	2.98	2648.73	2640	37	6.21E-02	17.6	5.22E+00
26	4	1332.65	61653	682	2.10	2663.15	2640	37	8.56E+00	0.4	
27	0	1390.45	31	471	1.53	2778.72	2771	11	4.33E-03	136.3	
28	0	1836.16	14975	326	2.28	3670.13	3660	22	2.08E+00	0.9	
29	0	1930.34	30	91	1.38	3858.52	3852	12	4.14E-03	67.0	
30	0	2032.34	41	82	4.00	4062.58	4056	13	5.73E-03	47.7	

Configuration : DKA0:[CANBERRA.GAMMA.SCUSR.ARCHIVE]SMP\_70528278\_GAM19\_2LMB\_38.CNF;1

---- Sample Information ----

Sample Title : 2L\_MB Calibration Verification  
 Sample ID : 70528-278 Sample Quantity : 1.00000E+00 ea  
 Sample Type : 2L Marinelli Sample Geometry :  
 Sample Number : 38 Spctrm Collector : GAMMA  
 Sample Collector : Sample Analyst : GAMMA

---- Sample Deposition Information ----

Dep. Correction? : No Dep. Duration :  
 Deposition Start : Deposition End : 1-APR-2005 12:00:00.

---- Sample Decay/Count Information ----

Sample Date : 1-APR-2005 12:00:00. Acquisition date : 20-FEB-2006 08:57:46  
 Decay time : 324 20:57:46.89 % dead time : 0.8%  
 Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:58.65

---- Detector Parameters ----

Energy cal. time : 16-FEB-2006 08:01:15 Energy cal. oper.: GAMMA  
 Detector name : GAMMA19 Counting geometry: 2LMB  
 Effic. cal. time : 17-FEB-2006 16:09:06 Effic. cal. oper.: GAMMA

---- Processing Parameters ----

Start channel : 1 End channel : 4080  
 Sensitivity : 3.00000 Gaussian Sens. : 10.00000  
 Critical level? : No Propagate Errors?: Yes  
 Efficiency Type : EMPIRICA Library-based eff: No  
 Energy tolerance : 2.00000 Half life ratio : 8.00000  
 Abundance limit : 75.00000 WTM error limit : 3.00000  
 MDA Width (FWHM) : 3.00000 MDA Confid Level : 5.00000 %

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
10	7.16	18866	11319	2.26	14.09	9	20	3.6	1.44E+01	
10	8.88*	21801	31843	2.58	17.54	9	20	4.5		
10	11.05*	11969	48966	2.57	21.87	9	20	8.4		
0	46.46*	28986	44652	1.31	92.61	86	12	3.1		BI-210 PB-210
0	59.52	64043	49915	1.35	118.68	111	14	1.7		AM-241
0	67.03*	658	26288	1.85	133.69	131	7	81.8		
0	75.68*	442	29971	1.24	150.97	148		8136.2		
0	88.09	116197	50595	1.34	175.77	168	15	1.0		NP-237 SN-126 SN-126 CD-109
0	122.09	51997	27386	1.35	243.68	236	13	1.6		PM-147 CO-57
0	136.54	6349	17159	1.32	272.55	268	10	8.1		CO-57
0	165.88	32978	19831	1.37	331.16	324	14	2.1		CE-139
0	228.55	206	7558	0.58	456.38	454		6134.3		
0	255.01	769	9311	1.32	509.23	505	9	45.8		
0	279.07	2171	8742	1.41	557.30	553	10	16.7		HG-203

*Handwritten signature/initials*

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	379.35	299	4827	2.15	757.66	755	8	81.3		
0	391.58	19691	9597	1.53	782.10	773	16	2.6		SN-113
0	457.58	1089	10170	2.50	913.99	904	18	43.8		
0	480.70	144	3896	1.71	960.18	958		8151.4		
0	511.03*	420	4832	3.33	1020.79	1015	11	65.2		ANH-511
0	515.55	118	3360	1.45	1029.82	1026		8171.0		KR-85 SR-85
0	577.37	66	2996	0.96	1153.37	1150		8288.9		
0	661.80	61954	5716	1.65	1322.11	1313	16	1.0		BA-137M CS-137
0	667.58	126	2381	0.75	1333.64	1331		7129.6		
0	814.27	294	2746	2.19	1626.84	1623	9	65.2		
0	898.45	23525	6545	1.76	1795.09	1786	19	2.1		Y-88
0	1017.49	130	2288	0.65	2033.05	2030		8128.2		
0	1036.09	87	2227	1.18	2070.24	2068		8189.6		
0	1052.41	95	1899	2.31	2102.87	2102		7153.5		
0	1102.27	137	2179	1.22	2202.53	2200		8118.8		
0	1109.89	173	2424	3.31	2217.76	2214		9104.0		
0	1173.73	67361	2879	1.96	2345.40	2336	18	0.9		CO-60
4	1325.67	458	1131	2.98	2649.18	2641	33	32.2	4.16E+00	
4	1333.06	61340	713	2.03	2663.98	2641	33	0.8		CO-60
0	1510.27	16	751	3.39	3018.32	3011		14736.2		
0	1535.13	46	595	3.76	3068.04	3062		12212.3		
0	1614.39	8	498	0.90	3226.55	3220		10*****		
0	1675.18*	16	467	3.55	3348.13	3338		14584.8		
0	1742.02	21	222	3.85	3481.81	3476		15305.1		
0	1836.69	14792	232	2.31	3671.19	3659	21	1.7		Y-88
0	1946.10	66	124	4.73	3890.04	3880	19	85.0		

Sample ID : 70528-278

Acquisition date : 20-FEB-2006 08:57:46

Total number of lines in spectrum 40  
 Number of unidentified lines 16  
 Number of lines tentatively identified by NID 24 60.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr	2-Sigma Error	%Error	
			pCi/ea	pCi/ea			
CO-57	270.90D	2.30	8.162E+03	1.874E+04	0.204E+04	10.91	
CO-60	5.27Y	1.12	3.477E+04	3.909E+04	0.171E+04	4.38	
KR-85	10.72Y	1.06	7.443E+03	7.884E+03	13.49E+03	171.09	
SR-85	64.84D	32.2	3.254E+01	1.049E+03	1.795E+03	171.09	
Y-88	106.60D	8.27	1.041E+04	8.608E+04	0.416E+04	4.84	
CD-109	464.00D	1.62	4.882E+05	7.932E+05	0.749E+05	9.44	
SN-113	115.10D	7.08	6.920E+03	4.896E+04	0.339E+04	6.92	
SN-126	1.00E+05Y	1.00	5.001E+04	5.001E+04	0.678E+04	13.56	
BA-137M	30.17Y	1.02	2.245E+04	2.292E+04	0.141E+04	6.16	
CS-137	30.17Y	1.02	2.374E+04	2.423E+04	0.150E+04	6.18	
CE-139	137.66D	5.13	5.804E+03	2.980E+04	0.235E+04	7.90	
PM-147	2.62Y	1.27	6.792E+05	8.595E+05	*****338796.75		
HG-203	46.61D	125.	5.195E+02	6.517E+04	1.197E+04	18.37	
BI-210	22.26Y	1.03	7.838E+05	8.059E+05	0.778E+05	9.65	
PB-210	22.26Y	1.03	7.838E+05	8.059E+05	0.778E+05	9.65	
NP-237	2.14E+06Y	1.00	1.469E+05	1.469E+05	0.333E+05	22.69	
AM-241	432.20Y	1.00	6.467E+04	6.476E+04	0.769E+04	11.87	
ANH-511	1.00E+09Y	1.00	1.142E+02	1.142E+02	0.748E+02	65.50	
Total Activity :			3.117E+06	3.870E+06			

Grand Total Activity : 3.117E+06 3.870E+06

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

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

Configuration : DKA0:[CANBERRA.GAMMA.SCUSR.ARCHIVE]BKG\_BKG\_GAM19\_\_37.CNF;1

---- Sample Information ----

Sample Title : Weekly Background  
 Sample ID : Bkg Sample Quantity : 1.00000E+00 ea  
 Sample Type : bkg Sample Geometry :  
 Sample Number : 37 Spctrm Collector : GAMMA  
 Sample Collector : Sample Analyst : GAMMA

---- Sample Deposition Information ----

Dep. Correction? : No Dep. Duration :  
 Deposition Start : Deposition End : 17-FEB-2006 00:00:00

---- Sample Decay/Count Information ----

Sample Date : 17-FEB-2006 00:00:00 Acquisition date : 17-FEB-2006 16:13:26  
 Decay time : 0 16:13:26.29 % dead time : 0.0%  
 Elapsed live time: 0 16:40:00.00 Elapsed real time: 0 16:40:05.25

---- Detector Parameters ----

Energy cal. time : 16-FEB-2006 08:01:15 Energy cal. oper.: GAMMA  
 Detector name : GAMMA19 Counting geometry:  
 Effic. cal. time : 17-FEB-2006 16:09:06 Effic. cal. oper.: GAMMA

---- Processing Parameters ----

Start channel : 1 End channel : 4096  
 Sensitivity : 3.00000 Gaussian Sens. : 10.00000  
 Critical level? : No Propagate Errors?: No  
 Efficiency Type : SPLINE Library-based eff: No  
 Energy tolerance : 2.00000 Half life ratio : 8.00000  
 Abundance limit : 75.00000 WTM error limit : 3.00000  
 MDA Width (FWHM) : 3.00000 MDA Confid Level : 5.00000 %

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4.87	22944	5059	1.20	9.52	6	10	3.82E-01	0.9	
2	0	10.77	503	3192	1.83	21.31	19	7	8.38E-03	19.5	
3	0	46.07	162	828	0.70	91.82	88	11	2.70E-03	35.3	
4	3	63.47	279	609	1.34	126.58	121	16	4.66E-03	16.4	4.64E-01
5	3	66.08	96	630	1.44	131.78	121	16	1.61E-03	50.8	
6	0	77.22	78	489	1.08	154.05	152	6	1.29E-03	46.6	
7	0	92.66	684	846	1.38	184.88	179	12	1.14E-02	9.3	
8	0	109.37	110	541	1.85	218.26	214	9	1.84E-03	39.2	
9	0	124.25	98	415	2.48	248.00	245	8	1.63E-03	37.5	
10	0	140.18	31	504	0.89	279.82	277	7	5.19E-04	121.0	
11	0	143.61	56	491	1.14	286.68	284	7	9.25E-04	67.6	
12	0	185.75	432	670	1.60	370.85	365	11	7.21E-03	12.6	
13	0	197.66	116	582	2.08	394.66	390	10	1.94E-03	39.8	
14	0	203.91	94	497	1.62	407.14	404	9	1.56E-03	44.0	
15	0	238.82	292	600	1.73	476.88	472	11	4.87E-03	17.3	
16	0	343.60	45	261	1.07	686.23	683	7	7.56E-04	61.4	
17	0	351.92	103	307	1.89	702.86	699	9	1.71E-03	32.3	
18	0	361.10	91	271	2.46	721.20	717	9	1.52E-03	34.1	
19	0	511.03	1376	426	2.54	1020.79	1012	19	2.29E-02	4.5	
20	0	567.19	56	191	1.18	1133.01	1129	8	9.41E-04	44.6	
21	0	583.57	99	224	1.51	1165.76	1161	10	1.65E-03	30.2	
22	0	608.13	63	323	3.71	1214.84	1209	13	1.05E-03	59.9	
23	0	626.63	45	174	2.11	1251.81	1248	10	7.58E-04	56.4	

*W. W. W. W. W.*

24	0	698.96	55	131	1.54	1396.36	1393	7	9.16E-04	37.2
25	0	771.13	26	73	1.38	1540.60	1539	6	4.31E-04	55.3
26	0	803.34	33	132	1.19	1604.98	1602	8	5.45E-04	63.6
27	0	822.83	25	156	3.42	1643.93	1638	13	4.10E-04	106.7
28	0	948.27	18	102	1.73	1894.68	1891	9	2.92E-04	106.4
29	0	970.17	36	139	3.54	1938.46	1930	14	6.02E-04	71.4
30	0	1001.96	48	98	1.56	2002.00	1997	10	7.96E-04	42.0
31	0	1042.67	40	112	1.68	2083.39	2074	14	6.70E-04	58.7
32	0	1048.72	76	125	6.87	2095.48	2087	19	1.27E-03	36.8
33	0	1176.74	22	68	3.74	2351.42	2345	10	3.63E-04	75.6
34	0	1193.55	26	60	1.92	2385.03	2379	9	4.36E-04	57.1
35	0	1258.51	26	68	0.64	2514.91	2507	12	4.29E-04	67.5
36	0	1376.00	38	65	2.57	2749.83	2745	13	6.41E-04	45.3
37	0	1387.60	85	50	7.25	2773.02	2763	22	1.42E-03	23.8
38	0	1661.33	25	54	0.63	3320.44	3310	18	4.17E-04	71.8
39	0	1673.84	34	61	2.90	3345.45	3335	17	5.70E-04	56.0
40	0	1757.47	12	39	1.37	3512.72	3506	11	1.99E-04	105.1
41	0	1765.51	35	52	2.17	3528.81	3523	14	5.83E-04	47.0
42	0	1810.02	14	50	0.98	3617.83	3610	11	2.25E-04	106.5
43	0	1915.09	24	33	3.17	3828.01	3823	13	3.93E-04	54.1
44	0	1956.19	20	24	0.83	3910.24	3903	11	3.36E-04	46.8
45	0	1966.94	7	23	1.26	3931.74	3927	9	1.18E-04	122.7



**Gamma Spectroscopy Calibration Verification**Instrument: Gamma 19Calibration Date: 2/20/2005Geometry: 2L\_MBStandard Id: 70528-278

Isotope		CALIBRATED ACTIVITY (PCI)	MEASURED ACTIVITY (PCI)	DIFFERENCE %
Pb-210		8.2015E+05	8.059E+05	-1.74
Am-241		6.2561E+04	6.476E+04	3.51
Cd-109		8.2579E+05	7.932E+05	-3.95
Co-57		1.9081E+04	1.874E+04	-1.79
Ce-139		2.8981E+04	2.980E+04	2.83
Sn-113		4.8349E+04	4.896E+04	1.26
Cs-137		2.4325E+04	2.423E+04	-0.39
Y-88	1836.06	8.6210E+04	8.608E+04	-0.15
Co-60	1332.5	3.8845E+04	3.909E+04	0.63

Prepared By: Date: 2/20/06Reviewed By: Date: 3/23/06

Preset Time and Totals Parameters

Preset Times

Live: 0 00:05:00.00  
Real:  
Maximum Live Time:

Preset Totals

Total: 0  
Start Channel: 1  
End Channel: 4096

Front-End Setup Summary

HVPS Address: NI82E1:1 HVPS ID: 0  
HVPS Voltage: 3000.000  
  
Amp Address: Amp Id: 0  
Amp Gain: 4.05204  
  
ADC Address: ADC Id: 0  
ADC Conv. Gain: 8192 ADC Range: 8192  
  
DSP Address: NI82E1:1 DSP ID: 0

Sample Changer Addr:  
Negative Sample Changer polarity No

ICB Nim Error: No Bad Calibration: No

High Voltage Power Supply Module

Address: NI82E1:1 Type: DSA-2000 ID: 0  
  
Limit: 4000.000 Overload latch enable No  
Voltage: 3000.000 Inhibit latch enable No  
Status: On Negative Output polarity No  
5V/12V inhibit: 5V Rely on module for ramp No

DSA-2000 HVPS Range: 5000.0

ADC Module

Address: Type: DSA-2000 ID: 0  
  
Conv. Gain: 8192 Acq. Mode: PHA  
Range: 8192 Coinc. Mode: Early  
Offset: 0 Peak Detect: Auto  
LLD: 0.10 Anti-coincidence No  
ULD: 100.00 Non-overlap transfer No  
Zero: 0.00

Amplifier Module

Address:                   Type: DSA-2000       ID: 0

Coarse gain: 5.0                   BLR Mode:           Auto  
Fine gain: 0.80                   LTC Mode:           On  
S-fine gain: 0.01                 Input Mode:         Normal  
Shape Mode:                       Input Polarity: Positive  
Pole Zero: 3255                   Inh. Polarity: Positive  
Time Const: 0.0                   Pileup Reject: Off       usec

DSP Module

Address: NI82E1:1       Type: DSA-2000       ID: 0

Coarse gain: 5.0                   Gain Centroid: 7680  
Fine gain: 0.7967                 Gain Window: 8  
S-fine gain: 0.013729             Gain Spacing: 64  
Pole Zero: 3255                   Gain Ratio: 1.000  
Coinc. mode: Anti.               Zero Centroid: 512  
Offset: 0                         Zero Window: 8  
LLD: 0.10                         Zero Spacing: 64  
Zero: 0.000                       Zero Ratio: 1.000  
Conv. Gain: 8192                  Gain Rate div: 1  
ADC Range: 8192                  Zero Rate div: 1  
FDisc Mode: Auto                 Gain Corr. rng: Ge  
Fast Disc.: 1.000                 Zero Corr. rng: Ge  
Inp. Polarity: Positive           Zero Mode: Off  
Inh. Polarity: Positive           Gain Mode: Off  
Rise Time: 18.400                Preamp Type: RC  
Flat Top: 1.200                  PUR Mode: On  
BLR Mode: Auto                   PUR Guard: 1.1  
Live Time Trim: 250               TRP Inhibit: Reset

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(803)556-8171

## Gamma Spectrometer Geometry Calibration Package

Detector: WELL

Geometry: ZL\_MB

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the secondard standard(s) documentation? the nuclide library used? the VMS certificate file?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the detector efficiency curve printout included?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3) Is the efficiency calibration report included and reviewed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Is the raw count data included for: the calibration peak report? the calibration verification PEAK report? the calibration verification NID report? the last instrument background?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the calibration verification calculations included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Are the instrument settings included: amp, HVPS, ADC settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Michael J. Hite

Date: 12/14/05

Reviewed By: John C. Hite

Date: 12/14/05

Effective Date: 12/13/05

# General Engineering Laboratories, LLC

2040 Savage Road, Charleston, SC 29414  
(803)556-8171

## Gamma Spectrometer Front End Electronics Setup

Detector: Well

Date Performed: 12/12/05

Performed By: Muhafitton

<b>High Voltage Power Supply</b>  Model No. <u>3106D</u> High Voltage <u>2.5KV</u>	<b>Spectroscopy Amplifier</b>  Model No. <u>2026</u> Course Gain <u>20</u> Fine Gain <u>0.542</u> Time Constant <u>4 <math>\mu</math> sec.</u> Input polarity <u>POSITIVE</u> BSLR rate <u>N/A</u> BSLR mode <u>N/A</u> Threshold <u>N/A</u>
<b>ADC</b>  Model No. <u>8701</u> Gain <u>4000</u>	
<b>AIM Module</b>  Model No. <u>556A</u> Address <u>NIE04:2</u>	

**Gamma Spectroscopy Calibration Verification**Instrument: WellCalibration Date: 12/13/2005Geometry: 2L\_MBStandard Id: 70528-278

Isotope		CALIBRATED ACTIVITY (PCI)	MEASURED ACTIVITY (PCI)	DIFFERENCE %
Pb-210		8.2015E+05	7.874E+05	-3.99
Am-241		6.2561E+04	6.587E+04	5.29
Cd-109		8.2579E+05	8.252E+05	-0.07
Co-57		1.9081E+04	1.870E+04	-2.00
Ce-139		2.8981E+04	2.896E+04	-0.07
Sn-113		4.8349E+04	4.870E+04	0.73
Cs-137		2.4325E+04	2.518E+04	3.51
Y-88	1836.06	8.6210E+04	8.641E+04	0.23
Co-60	1332.5	3.8845E+04	3.874E+04	-0.27

Prepared By: Muchup [Signature]Date: 12/13/05Reviewed By: [Signature]Date: 12/14/05

Verified:

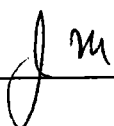
QA filename : DKA300:[CANBERRA.GAMMA]QC\_BKG\_WELL.QAF;2

Sample ID : BKG\_WELL Sample quantity : 1.80 LITER  
Sample date : 10-DEC-2005 00:00:00 Acquisition date : 10-DEC-2005 19:27:01  
Elapsed live time: 0 16:40:00.00 Elapsed real time: 0 16:40:12.72

Out-of-range Test: BOUNDARY

Parameter Description	Lower	Upper	Value	Flag
BACKGROUND (GROSS COUNTS)	8.07E+04	1.24E+05	1.01E+05	
BACKGROUND (CPS)	1.34	2.06	1.68	

Flags: "\*" means the out-of-range test is parameter-dependent

Approved by:  Approval Date: 12 / 11 / 05

```

*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_WELL_2LMB.CNF;2
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 13-DEC-2005 11:29:45
Sample ID          : VER_WELL_2LMB          Sample quantity  : 1.00000E+00 LITER
Detector name     : WELL                    Detector geometry: 2L_MB
Elapsed live time : 0 02:30:00.00          Elapsed real time: 0 02:31:43.86  1.1%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : MJH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          :                        Detector SN#     : 3941466
Matrix Spike DPM :                        LCS DPM        :
*****

```

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	33.09	1432	52446	1.30	65.14	63	7	1.59E-01	26.6	
2	1	38.18*	1164	31197	1.37	75.25	73	24	1.29E-01	21.4	2.24E+02
3	1	40.69*	4583	61276	1.37	80.25	73	24	5.09E-01	9.5	
4	1	46.50*	52806	57740	1.39	91.79	73	24	5.87E+00	0.9	
5	0	50.00	934	50839	1.88	98.74	97	7	1.04E-01	40.1	
6	0	59.39	81406	92583	1.34	117.40	110	15	9.05E+00	0.9	
7	10	67.14	2659	27609	2.19	132.80	130	18	2.95E-01	9.6	3.07E+00
8	10	70.36	3216	100881	3.40	139.18	130	18	3.57E-01	23.3	
9	0	88.03*	137668	71721	1.33	174.29	167	15	1.53E+01	0.5	
10	0	122.11	63509	37512	1.37	242.00	236	13	7.06E+00	0.7	
11	0	136.53	7730	21196	1.33	270.65	266	9	8.59E-01	3.6	
12	0	165.91*	46765	29021	1.40	329.03	321	15	5.20E+00	0.9	
13	0	222.40	203	12987	1.28	441.27	438	8	2.25E-02	97.8	
14	0	254.88	1317	12753	1.71	505.82	502	10	1.46E-01	16.3	
15	0	279.30*	5604	11863	1.49	554.34	549	11	6.23E-01	4.0	
16	0	297.77*	75	6443	1.41	591.04	590	7	8.28E-03	179.3	
17	0	343.13*	75	5547	0.98	681.17	679	7	8.35E-03	165.1	
18	0	348.63	205	3815	1.43	692.11	690	5	2.27E-02	45.9	
19	0	391.73*	26457	9321	1.57	777.76	772	13	2.94E+00	1.0	
20	0	415.30	148	3973	1.43	824.61	823	6	1.65E-02	67.6	
21	0	432.51	223	5208	0.71	858.80	856	8	2.47E-02	56.5	
22	0	466.83*	289	5167	1.56	927.02	924	8	3.21E-02	43.5	
23	0	487.16	341	4927	1.64	967.42	964	9	3.79E-02	37.5	
24	0	510.88*	598	5898	2.43	1014.56	1009	11	6.65E-02	25.3	
25	0	661.65*	52330	7856	1.75	1314.25	1306	17	5.81E+00	0.6	
26	0	707.69	257	3271	1.59	1405.77	1402	9	2.86E-02	40.5	
27	0	770.29*	112	2701	0.85	1530.22	1527	8	1.24E-02	81.0	
28	0	774.63	183	2373	1.51	1538.86	1536	7	2.03E-02	44.8	
29	0	799.95*	68	2408	1.38	1589.19	1588	7	7.60E-03	119.7	
30	0	813.73*	624	3838	1.30	1616.58	1611	11	6.93E-02	19.7	
31	0	819.82*	79	2143	1.39	1628.69	1627	6	8.78E-03	93.2	
32	0	897.98*	29940	7548	1.92	1784.10	1774	19	3.33E+00	0.9	
33	0	924.35	149	2774	1.91	1836.53	1834	7	1.66E-02	59.0	
34	0	959.15	92	3358	0.67	1905.73	1904	8	1.02E-02	109.5	
35	0	1070.18	153	2302	1.40	2126.51	2123	8	1.70E-02	54.8	
36	0	1144.88*	21	1819	0.53	2275.07	2274	9	2.28E-03	375.5	
37	0	1173.19*	56593	3919	2.12	2331.38	2320	23	6.29E+00	0.5	
38	4	1325.83	897	1524	3.22	2634.98	2623	36	9.97E-02	11.5	2.33E+01



Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	4	1332.46*	50796	1062	2.32	2648.17	2623	36	5.64E+00	0.5	
40	0	1686.14	76	324	2.38	3351.82	3349	9	8.41E-03	44.5	
41	0	1690.00	42	158	1.23	3359.49	3357	5	4.65E-03	47.7	
42	0	1744.42	28	148	1.19	3467.77	3464	9	3.16E-03	79.7	
43	0	1813.79	15	257	3.86	3605.82	3601	13	1.61E-03	229.0	
44	0	1836.05*	18059	625	2.51	3650.13	3638	24	2.01E+00	0.8	
45	0	1954.67	16	37	1.33	3886.21	3884	5	1.78E-03	62.5	

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

VAX/VMS Nuclide Identification Report Generated

\*\*\*\*\*  
 \* General Eng. Labs, LLC. \*  
 \* 2040 Savage Road \*  
 \* Charleston, SC 29414 \*  
 \*\*\*\*\*

DETECTOR DATA

\* Configuration : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER\_WELL\_2LM \*  
 \* Acquisition date : 13-DEC-2005 11:29:45 Detector SN# : 3941466 \*  
 \* Detector ID : WELL Sensitivity : 3.000 \*  
 \* Geometry : 2L\_MB Energy tolerance: 2.000 \*  
 \* Elapsed live time: 0 02:30:00.00 Abundance limit : 75.000 \*  
 \* Elapsed real time: 0 02:31:43.86 Half life ratio : 8.000 \*  
 \*\*\*\*\*

SAMPLE DATA

\* Sample date : 1-APR-2005 12:00:00 Nuclide Library : FERMC \*  
 \* Sample ID : VER\_WELL\_2LMB Analyst initials: MJH1 \*  
 \* Batch Number : Sample Quantity : 1.0000E+00 LITER \*  
 \* Recovery : 1.00000 Carrier Weight : 0.00000 \*  
 \*\*\*\*\*

QC DATA

\* Standard Weight : 0.00000 \*  
 \* CALIB. DATE/TIME : 13-DEC-2005 09:34:01 MS Isotope : \*  
 \* MSD DPM : \*\*\*\*\* MSD Isotope : \*  
 \* LCS DPM : 0.000 LCS Isotope : \*  
 \* LCSD DPM : 0.000 LCSD Isotope : \*  
 \*\*\*\*\*

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER )	Act error	MDA (pCi/LITER )	
CO-57	1.870E+04	2.791E+02	1.953E+02	0.000E+00
CO-60	3.874E+04	3.608E+02	1.054E+02	0.000E+00
Y-88	8.641E+04	1.434E+03	3.479E+02	0.000E+00
CD-109	8.252E+05	8.358E+03	5.046E+03	0.000E+00
SN-113	4.870E+04	9.472E+02	6.806E+02	0.000E+00
CS-137	2.518E+04	2.947E+02	1.497E+02	0.000E+00
CE-139	2.896E+04	5.322E+02	3.423E+02	0.000E+00
HG-203	6.242E+04	4.989E+03	4.823E+03	0.000E+00
PB-210	7.874E+05	1.451E+04	1.518E+04	0.000E+00
AM-241	6.587E+04	1.177E+03	7.545E+02	0.000E+00

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

Nuclide	Key-Line Activity (pCi/LITER )	K.L. Act error ) Ided	MDA (pCi/LITER )
---------	--------------------------------------	--------------------------	---------------------

```

*****
*                               GENERAL ENG. LABS, LLC.                               *
*                               2040 Savage Road                                   *
*                               Charleston, SC 29414                               *
*****
Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_WELL_2LMB.CNF;2
Sample date        : 1-APR-2005 12:00:00. Acquisition date : 13-DEC-2005 11:29:45
Sample ID          : VER_WELL_2LMB          Sample quantity  : 1.00000E+00 LITER
Detector name     : WELL                   Detector geometry: 2L_MB
Elapsed live time : 0 02:30:00.00          Elapsed real time: 0 02:31:43.86  1.1%
Energy tolerance  : 2.00000 KEV           Analyst Initials  : MJH1
Abundance limit   : 75.00000              Sensitivity       : 3.00000
Batch ID          :                       Detector SN#      : 3941466
Matrix Spike DPM  :                       LCS DPM         :
*****

```

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CO-57	122.06	63509	85.51*	2.292E+00	9.731E+03	1.870E+04	1.49
	136.47	7730	10.47	2.297E+00	9.654E+03	1.855E+04	7.17
CO-60	1173.24	56593	99.90	4.757E-01	3.576E+04	3.922E+04	1.02
	1332.50	50796	99.98*	4.318E-01	3.533E+04	3.874E+04	0.93
Y-88	898.04	29940	93.40	5.833E-01	1.650E+04	8.717E+04	1.81
	1836.06	18059	99.38*	3.336E-01	1.636E+04	8.641E+04	1.66
CD-109	88.03	137668	3.79*	1.942E+00	5.617E+05	8.252E+05	1.01
SN-113	391.70	26457	64.90*	1.175E+00	1.042E+04	4.870E+04	1.95
CS-137	661.66	52330	85.12*	7.452E-01	2.478E+04	2.518E+04	1.17
CE-139	165.85	46765	80.35*	2.191E+00	7.976E+03	2.896E+04	1.84
HG-203	70.83	3216	4.75	1.453E+00	1.399E+04	6.305E+05	46.57
	72.87	-----	8.00	1.538E+00	-----	Line Not Found	-----
	82.60	-----	3.55	1.818E+00	-----	Line Not Found	-----
	279.20	5604	77.30*	1.572E+00	1.385E+03	6.242E+04	7.99
PB-210	46.50	52806	4.05*	5.082E-01	7.704E+05	7.874E+05	1.84
AM-241	59.54	81406	35.90*	1.035E+00	6.579E+04	6.587E+04	1.79

Flag: "\*" = Keyline

Summary of Nuclide Activity

Sample ID : VER\_WELL\_2LMB

Acquisition date : 13-DEC-2005 11:29:45

Total number of lines in spectrum 45  
 Number of unidentified lines 31  
 Number of lines tentatively identified by NID 14 31.11%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.74D	1.92	9.731E+03	1.870E+04	0.028E+04	1.49	
CO-60	5.27Y	1.10	3.533E+04	3.874E+04	0.036E+04	0.93	
Y-88	106.63D	5.28	1.636E+04	8.641E+04	0.143E+04	1.66	
CD-109	461.40D	1.47	5.617E+05	8.252E+05	0.084E+05	1.01	
SN-113	115.09D	4.67	1.042E+04	4.870E+04	0.095E+04	1.95	
CS-137	30.00Y	1.02	2.478E+04	2.518E+04	0.029E+04	1.17	
CE-139	137.64D	3.63	7.976E+03	2.896E+04	0.053E+04	1.84	
HG-203	46.60D	45.1	1.385E+03	6.242E+04	0.499E+04	7.99	
PB-210	22.26Y	1.02	7.704E+05	7.874E+05	0.145E+05	1.84	
AM-241	432.20Y	1.00	6.579E+04	6.587E+04	0.118E+04	1.79	
Total Activity :			1.504E+06	1.988E+06			

Grand Total Activity : 1.504E+06 1.988E+06

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

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	33.09	1432	52446	1.30	65.14	63	7	1.59E-01	53.3	1.11E-01	
1	38.18	1164	31197	1.37	75.25	73	24	1.29E-01	42.7	2.29E-01	
1	40.69	4583	61276	1.37	80.25	73	24	5.09E-01	19.0	3.03E-01	
0	50.00	934	50839	1.88	98.74	97	7	1.04E-01	80.2	6.47E-01	
10	67.14	2659	27609	2.19	132.80	130	18	2.95E-01	19.1	1.34E+00	
0	222.40	203	12987	1.28	441.27	438	8	2.25E-02	****	1.87E+00	
0	254.88	1317	12753	1.71	505.82	502	10	1.46E-01	32.6	1.69E+00	
0	297.77	75	6443	1.41	591.04	590	7	8.28E-03	****	1.49E+00	
0	343.13	75	5547	0.98	681.17	679	7	8.35E-03	****	1.32E+00	
0	348.63	205	3815	1.43	692.11	690	5	2.27E-02	91.8	1.30E+00	
0	415.30	148	3973	1.43	824.61	823	6	1.65E-02	****	1.12E+00	
0	432.51	223	5208	0.71	858.80	856	8	2.47E-02	****	1.08E+00	
0	466.83	289	5167	1.56	927.02	924	8	3.21E-02	87.1	1.01E+00	
0	487.16	341	4927	1.64	967.42	964	9	3.79E-02	75.0	9.69E-01	
0	510.88	598	5898	2.43	1014.56	1009	11	6.65E-02	50.7	9.29E-01	
0	707.69	257	3271	1.59	1405.77	1402	9	2.86E-02	81.0	7.05E-01	
0	770.29	112	2701	0.85	1530.22	1527	8	1.24E-02	****	6.58E-01	
0	774.63	183	2373	1.51	1538.86	1536	7	2.03E-02	89.7	6.55E-01	
0	799.95	68	2408	1.38	1589.19	1588	7	7.60E-03	****	6.39E-01	
0	813.73	624	3838	1.30	1616.58	1611	11	6.93E-02	39.3	6.30E-01	
0	819.82	79	2143	1.39	1628.69	1627	6	8.78E-03	****	6.26E-01	
0	924.35	149	2774	1.91	1836.53	1834	7	1.66E-02	****	5.70E-01	
0	959.15	92	3358	0.67	1905.73	1904	8	1.02E-02	****	5.54E-01	
0	1070.18	153	2302	1.40	2126.51	2123	8	1.70E-02	****	5.10E-01	
0	1144.88	21	1819	0.53	2275.07	2274	9	2.28E-03	****	4.85E-01	
4	1325.83	897	1524	3.22	2634.98	2623	36	9.97E-02	23.0	4.33E-01	
0	1686.14	76	324	2.38	3351.82	3349	9	8.41E-03	89.0	3.58E-01	
0	1690.00	42	158	1.23	3359.49	3357	5	4.65E-03	95.3	3.58E-01	
0	1744.42	28	148	1.19	3467.77	3464	9	3.16E-03	****	3.48E-01	
0	1813.79	15	257	3.86	3605.82	3601	13	1.61E-03	****	3.37E-01	
0	1954.67	16	37	1.33	3886.21	3884	5	1.78E-03	****	3.16E-01	

Flags: "T" = Tentatively associated

```
*****
*                                     *
*                               GENERAL ENG. LABS, LLC.                       *
*                               2040 Savage Road                             *
*                               Charleston, SC 29414                         *
*****
```

DETECTOR DATA

```
* Configuration      : DKA300:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_WELL_2LMB.CNF;2 *
* Acquisition date   : 13-DEC-2005 11:29:45  Detector SN#      : 3941466      *
* Detector ID        : WELL                    Sensitivity       : 3.00000    *
* Geometry           : 2L_MB                   Energy tolerance: 2.00000    *
* Elapsed live time  : 0 02:30:00.00          Abundance limit  : 75.00000    *
* Elapsed real time  : 0 02:31:43.86          Half life ratio  : 8.00000    *
*****
```

SAMPLE DATA

```
* Sample date        : 1-APR-2005 12:00:00.  Nuclide Library : CAL          *
* Sample ID          : VER_WELL_2LMB          Analyst initials: MJH1         *
* Batch Number       :                       Sample Quantity : 1.00000E+00 LITER *
*****
```

QC DATA

```
* CALIB. DATE/TIME  : 13-DEC-2005 09:34:01.1MS Isotope      :          *
* MSD DPM           :                       MSD Isotope      :          *
* LCS DPM           :                       LCS Isotope      :          *
*****
```

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act error	MDA (pCi/LITER)	MDA error	Act/MDA
CO-57	1.870E+04	2.791E+02	1.953E+02	0.000E+00	95.764
CO-60	3.874E+04	3.608E+02	1.054E+02	0.000E+00	367.458
Y-88	8.641E+04	1.434E+03	3.479E+02	0.000E+00	248.354
CD-109	8.252E+05	8.358E+03	5.046E+03	0.000E+00	163.524
SN-113	4.870E+04	9.472E+02	6.806E+02	0.000E+00	71.551
CS-137	2.518E+04	2.947E+02	1.497E+02	0.000E+00	168.230
CE-139	2.896E+04	5.322E+02	3.423E+02	0.000E+00	84.587
HG-203	6.242E+04	4.989E+03	4.823E+03	0.000E+00	12.942
PB-210	7.874E+05	1.451E+04	1.518E+04	0.000E+00	51.866
AM-241	6.587E+04	1.177E+03	7.545E+02	0.000E+00	87.303

\*\*\*\*\*  
 \* GENERAL ENG. LABS, LLC. \*  
 \* 2040 Savage Road \*  
 \* Charleston, SC 29414 \*  
 \*\*\*\*\*

Configuration : MCA0:[GAMMA]WELL\$1  
 Sample date : 1-APR-2005 12:00:00. Acquisition date : 12-DEC-2005 13:33:22  
 Sample ID : CAL\_WELL\_2LMB Sample quantity : 1.00000E+00 LITER  
 Detector name : WELL Detector geometry: WELL  
 Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:01:23.60 1.1%  
 Energy tolerance : 2.00000 KEV Analyst Initials : MJH1  
 Abundance limit : 75.00000 Sensitivity : 3.00000  
 Batch ID : Detector SN# : 3941466  
 Matrix Spike DPM : LCS DPM :

\*\*\*\*\*

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	32.59	1042	48353	1.44	64.15	63	8	1.45E-01	36.7	
2	1	39.69	1232	26337	1.37	78.25	76	21	1.71E-01	18.5	1.32E+02
3	1	46.49	42811	48105	1.39	91.77	76	21	5.95E+00	1.0	
4	0	59.42	65118	69944	1.33	117.44	110	14	9.04E+00	1.0	
5	10	68.76	3875	53665	3.39	136.01	130	20	5.38E-01	12.1	2.72E+00
6	10	72.74	1216	49822	1.84	143.92	130	20	1.69E-01	35.7	
7	0	88.04	108976	58670	1.33	174.31	167	15	1.51E+01	0.6	
8	0	122.09	52212	36478	1.37	241.97	234	16	7.25E+00	0.9	
9	0	136.53	6296	19037	1.33	270.66	266	10	8.74E-01	4.3	
10	0	165.93	37138	20508	1.39	329.06	322	13	5.16E+00	0.9	
11	0	184.11	120	10693	0.55	365.18	362	8	1.67E-02	149.3	
12	0	207.62	181	6366	1.28	411.90	410	5	2.51E-02	66.7	
13	0	255.23	1017	8126	1.42	506.51	503	8	1.41E-01	15.7	
14	0	279.22	4771	9449	1.41	554.17	549	11	6.63E-01	4.2	
15	0	310.35	183	3477	1.40	616.04	614	5	2.54E-02	48.9	
16	0	321.38	135	5518	0.91	637.96	636	8	1.87E-02	95.8	
17	0	391.76	21207	8213	1.53	777.81	771	14	2.95E+00	1.1	
18	0	419.40	180	3614	1.60	832.74	829	7	2.50E-02	55.8	
19	0	510.70	794	4500	1.82	1014.21	1009	11	1.10E-01	16.7	
20	0	532.76	51	2635	1.22	1058.06	1055	7	7.04E-03	168.5	
21	0	584.01	135	2080	1.29	1159.92	1157	6	1.88E-02	54.1	
22	0	639.97	247	2426	1.83	1271.16	1268	7	3.43E-02	33.6	
23	0	652.34	155	2536	0.91	1295.74	1293	7	2.15E-02	54.5	
24	0	661.67	41764	6504	1.76	1314.30	1305	17	5.80E+00	0.7	
25	0	813.96	451	2793	1.98	1617.04	1613	10	6.26E-02	22.5	
26	0	848.57	111	2636	0.92	1685.85	1683	9	1.54E-02	83.9	
27	0	854.51	160	2194	1.59	1697.67	1694	8	2.22E-02	51.3	
28	0	876.44	147	2353	1.97	1741.27	1737	8	2.04E-02	57.7	
29	0	898.03	23855	4660	1.92	1784.19	1777	14	3.31E+00	0.9	
30	0	981.35	217	2537	1.52	1949.86	1946	10	3.01E-02	44.0	
31	0	1082.73	96	1364	0.97	2151.46	2150	6	1.33E-02	61.9	
32	0	1128.22	173	1847	1.56	2241.95	2237	11	2.41E-02	48.6	
33	0	1173.19	44711	3264	2.09	2331.38	2320	21	6.21E+00	0.6	
34	0	1258.60	29	443	1.04	2501.25	2496	7	4.04E-03	122.0	
35	1	1325.06	439	1159	2.42	2633.44	2624	35	6.09E-02	16.2	1.61E+01
36	1	1332.49	40523	955	2.33	2648.23	2624	35	5.63E+00	0.5	
37	0	1489.27	31	301	0.53	2960.11	2958	6	4.28E-03	90.6	
38	1	1645.30	102	290	2.56	3270.54	3266	19	1.41E-02	31.0	3.60E+00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
39	1	1648.31	129	439	2.56	3276.54	3266	19	1.79E-02	37.8	
40	1	1651.29	117	132	2.57	3282.46	3266	19	1.63E-02	17.1	
41	0	1775.32	21	103	1.47	3529.28	3526	9	2.93E-03	90.0	
42	0	1836.09	14647	430	2.53	3650.20	3639	25	2.03E+00	0.9	
43	0	1933.32	17	91	1.46	3843.72	3843	13	2.35E-03	117.4	
44	0	1958.91	14	19	0.95	3894.64	3892	6	1.98E-03	56.3	
45	0	2008.67	27	23	0.68	3993.69	3990	8	3.68E-03	37.3	



Configuration : MCA0:[GAMMA]WELL\$1  
 Analyses by : CALIBRATE V1.7,PEAK V16.4  
 Detector Name : WELL Energy Calib Time: 13-DEC-2005 09:34:01  
 Efficiency type : Empirical Effncy Calib Time: 13-DEC-2005 09:34:01  
 Detector Geometry: WELL Shelf : 0

Energy Calibration Report

$$\text{Energy} = 0.2987 + 0.5034 * \text{Channel} + -1.2315E-07 * (\text{Channel} ** 2)$$

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	91.73	46.50	46.47	0.026
2	117.44	59.54	59.42	0.121
3	174.31	88.03	88.04	-0.006
4	242.00	122.06	122.11	-0.050
5	329.06	165.85	165.93	-0.073
6	777.81	391.70	391.76	-0.055
7	1314.30	661.66	661.67	-0.014
8	1784.19	898.04	898.03	0.016
9	2331.37	1173.24	1173.19	0.051
10	2648.23	1332.50	1332.49	0.008
11	3650.20	1836.06	1836.09	-0.024

FWHM Calibration Report

$$\text{FWHM} = 1.046 + 3.1639E-02 * (\text{Energy} ** 1/2)$$

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	46.50	1.48	1.26	0.215
2	59.54	1.33	1.29	0.036
3	88.03	1.33	1.34	-0.010
4	122.06	1.37	1.40	-0.028
5	165.85	1.39	1.45	-0.064
6	391.70	1.52	1.67	-0.148
7	661.66	1.76	1.86	-0.102
8	898.04	1.92	1.99	-0.075
9	1173.24	2.09	2.13	-0.043
10	1332.50	2.30	2.20	0.094
11	1836.06	2.53	2.40	0.124

Efficiency Calibration Report

$$\text{Eff} = \exp(a2 + a3 * x + a4 * x ** 2 + a5 * x ** 3 + a6 * x ** 4 + a7 * x ** 5), \quad x = \ln(a1 / \text{energy})$$

a1      a2      a3      a4      a5      a6      a7  
 941.3   -5.181   0.7697   6.0649E-02   7.6903E-02   -6.1801E-02   0.0000E+00

Average Deviation = 1.73 %      Reduced Chi-Square = 0.889

Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ Error	% Diff
-----	--------------	---------------------	------------------	---------------------	-------------	--------

1	46.50	4.95E-03	1.58E-04	5.08E-03	-0.83	-2.65
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Nbr	Energy (KEV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
2	59.54	1.09E-02	3.43E-04	1.04E-02	1.42	4.47
3	88.03	1.92E-02	6.42E-04	1.94E-02	-0.41	-1.39
4	122.06	2.28E-02	7.15E-04	2.29E-02	-0.15	-0.46
5	165.85	2.16E-02	6.40E-04	2.19E-02	-0.43	-1.27
6	391.70	1.18E-02	3.35E-04	1.18E-02	0.12	0.33
7	661.66	7.69E-03	2.36E-04	7.45E-03	1.03	3.16
8	898.04	5.73E-03	1.58E-04	5.83E-03	-0.62	-1.72
9	1173.24	4.79E-03	1.32E-04	4.76E-03	0.22	0.61
10	1332.50	4.24E-03	1.12E-04	4.32E-03	-0.72	-1.90
11	1836.06	3.37E-03	9.29E-05	3.34E-03	0.38	1.04

Approved by: *Michael P. ...*  
*Let's check*

Approval Date: 12 / 14 / 05  
*12/14/05*

Print Time : 14-JUN-2005 17:33:53.22  
 Certificate file name : DKA300:[CANBERRA.GAMMA]70528-278.CER;1  
 Certificate title : 2L MB  
 Certificate date : 1-APR-2005 12:00:00.00  
 Certificate quantity : 1.00000E+00

Rcd	Nuclide	Halflife	CAL/ INIT	Energy	Rate	%Abun	Activity (uCi)
1	AM-241	432.20Y	Yes	59.54	8.3100E+02	35.90	6.2561E-02
2	CD-109	462.60D	No	88.03	1.1580E+03	3.79	8.2579E-01
3	Co-57	271.79D	No	122.06	6.0370E+02	85.51	1.9081E-02
4	CE-139	137.60D	No	165.85	8.6160E+02	80.35	2.8981E-02
5	SN-113	115.10D	No	391.70	1.1610E+03	64.90	4.8349E-02
6	CS-137	30.07Y	Yes	661.66	7.6610E+02	85.12	2.4325E-02
7	Y-88	106.60D	No	898.04	3.0350E+03	93.40	8.7823E-02
8	Y-88	106.60D	Yes	1836.06	3.1700E+03	99.38	8.6210E-02
9	CO-60	5.27Y	Yes	1173.24	1.4220E+03	99.90	3.8471E-02
10	CO-60	5.27Y	No	1332.50	1.4370E+03	99.98	3.8845E-02
11	PB-210	22.30Y	No	46.50	1.2290E+03	4.05	8.2015E-01

```

Library Title      :
Library file name : DKA300:[CANBERRA.GAMMA]CAL.NLB;1
Date printed      : 6-DEC-2004 10:31:17.67
Number of nuclides : 10
Number of lines   : 17

```

Nuclide Name	Half-Life	Nuclide Type	Key Line	Energy	Abundance
CO-57	271.74D		*	122.06 keV	85.51 %
				136.47 keV	10.47 %
CO-60	5.27Y		*	1173.24 keV	99.90 %
				1332.50 keV	99.98 %
Y-88	106.63D		*	898.04 keV	93.40 %
				1836.06 keV	99.38 %
CD-109	461.40D		*	88.03 keV	3.79 %
SN-113	115.09D		*	391.70 keV	64.90 %
CS-137	30.00Y		*	661.66 keV	85.12 %
CE-139	137.64D		*	165.85 keV	80.35 %
HG-203	46.60D			70.83 keV	4.75 %
				72.87 keV	8.00 %
				82.60 keV	3.55 %
				279.20 keV	77.30 %
PB-210	22.26Y		*	46.50 keV	4.05 %
AM-241	432.20Y		*	59.54 keV	35.90 %

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

70528-278

2.0 Liter Solid in 230G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 and Pb-210 were 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. Analytix maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in US NRC Regulatory Guide 4.15, Revision 1, February 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.  
Density of solid matrix 1.15 g/cc.

Calibration Date: April 1, 2005 12:00 EST

ISOTOPE	GAMMA ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Pb-210	46.5	22.3	y	1229	3.0
Am-241	59.5	432.2	y	831.0	3.0
Cd-109	88	462.6	d	1158	3.3
Co-57	122	271.79	d	603.7	3.0
Ce-139	166	137.6	d	861.6	2.8
Hg-203	279	46.61	d	1864	2.7
Sn-113	392	115.1	d	1161	2.6
Cs-137	662	30.07	y	766.1	3.0
Y-88	898	106.6	d	3035	2.6
Co-60	1173	5.271	y	1422	2.7
Co-60	1332	5.271	y	1437	2.6
Y-88	1836	106.6	d	3170	2.6

P O NUMBER 2832RD, Item 1

SOURCE PREPARED BY:

M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED:

W.M. May 5-12-05

This standard will expire one year after the calibration date.

# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414

(843)556-8171

## Lucas Cell Calibration Package

101-112

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the secondary standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the efficiency calibration report included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Is the raw count data included for: Cell constant determination? Plateau generation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Are the calibration verifications included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the instrument settings included: HVPS settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Has the CELLEFF.xls file been updated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7) Have the calibration dates been updated in ALPHALIMS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Aidan Baul

Date: 3/14/06

Reviewed By: Amanda L. Lehn

Date: 3/27/06

Effective Date: 3/27/06

# Ra-226 Cell Constants

Standard ID: 0299-G  
Volume added (mL): 0.1  
Standard Reference Activity (DPM/mL): 2446.35

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	Bkg Counts	cpm	cpm	activity dpm	Known	t1 (days) end-degas to flush	t2 (days) end-flush to count	t3 (days) Std Ref Date to count	Decay from Std Ref Date to count
101	1.835	Average	3/18/2006 10:15	3/18/2006 7:05	3/15/2006 10:20	6	0.200	176.97	244.63	2.86458	0.13194	2285	0.9973	
101	2.017	Stdev	2/8/2006 12:50	2/8/2006 9:40	2/5/2006 11:00	8	0.267	198.73	244.63	2.94444	0.13194	2248	0.9973	
101	1.727	1	2/13/2006 12:30	2/13/2006 8:35	2/10/2006 7:30	6	0.200	173.50	244.63	3.04514	0.16319	2253	0.9973	
102	1.712	Average	2/3/2006 11:45	2/3/2006 8:40	1/31/2006 13:10	6	0.200	162.93	244.63	2.81250	0.12847	2242	0.9973	
102	2.003	Stdev	3/18/2006 10:45	3/18/2006 7:35	3/15/2006 10:20	5	0.167	194.17	244.63	2.88542	0.13194	2285	0.9973	
102	1.906	2	2/13/2006 13:05	2/13/2006 9:20	2/10/2006 7:30	7	0.233	193.13	244.63	3.07639	0.15625	2253	0.9973	
103	1.864	Average	2/3/2006 17:10	2/3/2006 9:15	1/31/2006 13:10	5	0.167	172.13	244.63	2.83681	0.32966	2243	0.9973	
103	1.773	Stdev	3/18/2006 14:34	3/18/2006 7:50	3/15/2006 10:20	7	0.233	172.13	244.63	2.89583	0.28056	2286	0.9973	
103	1.782	3	2/13/2006 13:40	2/13/2006 10:00	2/10/2006 7:30	5	0.167	181.90	244.63	3.10417	0.15278	2253	0.9973	
104	1.869	Average	2/3/2006 17:52	2/3/2006 9:40	1/31/2006 13:10	2	0.087	182.20	244.63	2.85417	0.34167	2243	0.9973	
104	1.997	Stdev	2/8/2006 14:50	2/8/2006 11:50	2/5/2006 11:00	2	0.067	201.33	244.63	3.03472	0.12500	2248	0.9973	
104	1.903	4	2/13/2006 14:15	2/13/2006 10:35	2/10/2006 7:30	5	0.167	195.40	244.63	3.12847	0.15278	2253	0.9973	
105	1.486	Average	2/3/2006 18:37	2/3/2006 10:20	1/31/2006 13:10	1	0.033	138.37	244.63	2.88194	0.34514	2243	0.9973	
105	1.581	Stdev	2/8/2006 15:30	2/8/2006 12:30	2/5/2006 11:00	1	0.033	160.47	244.63	3.06250	0.12500	2248	0.9973	
105	1.587	2	2/13/2006 15:55	2/13/2006 8:50	2/10/2006 7:30	4	0.133	153.70	244.63	2.87847	0.12847	2262	0.9973	
106	1.638	Average	3/18/2006 15:17	3/18/2006 8:15	3/15/2006 10:20	1	0.033	155.27	244.63	2.91319	0.28306	2266	0.9973	
106	1.850	Stdev	2/8/2006 16:20	2/8/2006 13:15	2/5/2006 11:00	6	0.200	189.20	244.63	3.09375	0.12847	2248	0.9973	
106	1.667	6	2/13/2006 15:55	2/13/2006 12:20	2/10/2006 7:30	5	0.167	174.17	244.63	3.20139	0.14931	2253	0.9973	
107	1.658	Average	2/3/2006 19:45	2/3/2006 11:15	1/31/2006 13:10	4	0.133	155.87	244.63	2.92014	0.36417	2243	0.9973	
107	1.733	Stdev	2/8/2006 17:00	2/8/2006 14:00	2/5/2006 11:00	4	0.133	178.60	244.63	3.12500	0.12500	2248	0.9973	
107	1.745	7	2/13/2006 16:37	2/13/2006 13:15	2/10/2006 7:30	6	0.200	184.23	244.63	3.23958	0.14028	2253	0.9973	
108	2.011	Average	3/18/2006 16:14	3/18/2006 8:45	3/15/2006 10:20	1	0.033	191.00	244.63	2.93403	0.31181	2286	0.9973	
108	1.794	Stdev	2/9/2006 10:05	2/9/2006 6:55	2/5/2006 11:00	6	0.200	213.80	244.63	3.82986	0.13194	2248	0.9973	
108	1.826	8	2/13/2006 17:10	2/13/2006 13:55	2/10/2006 7:30	8	0.267	204.90	244.63	3.26736	0.19542	2253	0.9973	
109	1.784	Average	2/4/2006 9:05	2/3/2006 11:55	1/31/2006 13:10	6	0.200	153.57	244.63	2.84792	0.88194	2243	0.9973	
109	1.851	Stdev	2/9/2006 10:45	2/9/2006 7:45	2/5/2006 11:00	6	0.200	198.27	244.63	3.86458	0.12500	2248	0.9973	
109	1.764	9	2/13/2006 17:40	2/13/2006 14:20	2/10/2006 7:30	5	0.167	188.17	244.63	3.28472	0.13889	2253	0.9973	
110	1.593	Average	2/4/2006 13:17	2/3/2006 12:15	1/31/2006 13:10	6	0.200	142.60	244.63	2.96181	1.04306	2244	0.9973	
110	1.583	Stdev	2/20/2006 10:20	2/20/2006 7:25	2/14/2006 7:00	7	0.233	262.37	244.63	6.01736	0.12153	2259	0.9973	
110	1.649	3	2/23/2006 9:30	2/23/2006 6:20	2/20/2006 8:40	8	0.267	160.77	244.63	2.90278	0.13194	2262	0.9973	
111	1.537	Average	2/4/2006 14:06	2/3/2006 12:30	1/31/2006 13:10	4	0.133	128.73	244.63	2.97222	1.06667	2244	0.9973	
111	1.583	Stdev	2/17/2006 15:10	2/17/2006 10:55	2/14/2006 7:00	7	0.233	163.20	244.63	3.16319	0.17708	2267	0.9973	
111	1.649	4	2/23/2006 10:05	2/23/2006 6:55	2/20/2006 8:40	1	0.033	484.49	244.63	2.92708	0.13194	2262	0.9973	
112	1.639	Average	2/23/2006 10:45	2/23/2006 7:30	2/20/2006 8:40	6	0.200	161.63	244.63	2.95139	0.13542	2262	0.9973	
112	1.774	Stdev	2/17/2006 15:45	2/17/2006 11:50	2/14/2006 7:00	8	0.267	185.03	244.63	3.20139	0.16319	2257	0.9973	
112	1.503	12	2/13/2006 20:40	2/13/2006 15:30	2/10/2006 7:30	6	0.200	159.93	244.63	3.33333	0.21628	2253	0.9973	

Ad Bawl 3/14/06  
 Amanda J. Feh 3/27/06



Ra-226 Verification Sheet

Sample ID	Vol (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Bkg CPM	Total Counts
CAL 1	500	3-15-06 1020	3/18/06 705	3/18/06 1015	101	1	6	5309
CAL 2	500	3-15-06 1020	3/18/06 735	3/18/06 1045	102	1	5	5825
CAL 3	500	3-15-06 1020	3/18/06 750	3/18/06 1474	103	1	7	5037
CAL 4	500	3-15-06 1020	3/18/06 815	3/18/06 1577	106	1	1	4658
CAL 5	500	3-15-06 1020	3/18/06 845	3/18/06 1614	108	1	1	5730
CAL 6	500	3-15-06 1020						
CAL 7	500	3-15-06 1020						
CAL 8	500	3-15-06 1020						
CAL 9	500	3-15-06 1020						
CAL 10	500	3-15-06 1020						
CAL 11	500	3-15-06 1020						
CAL 12	500	3-15-06 1020						
				3/14/06				

AB1 3/14/06  
 AB1 3/12/06

20 min  
Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
Cal 1	500	1/31/06 1310	2/3/06 710	2/3/06 1040	101	1	1	24
Cal 2	500	1/21/04 1310	2/3/06 840	2/3/06 1145	102	1	6	4868
Cal 3	500	1/31/06 1310	2/3/06 845	2/3/06 1710	103	1	5	5164 <del>5114</del> 5466 <del>5013</del>
Cal 4	500	1/31/06 1310	2/3/06 940	2/3/06 1752	104	1	2	4151 <del>4224</del> 4275 <del>4203</del>
Cal 5	500	1/31/06 1310	2/3/06 1050	2/3/06 1837	105	1	1	4676
Cal 6	500	1/31/06 1310	2/3/06 1050	2/3/06 1911	106	1	6	4794
Cal 7	500	1/31/06 1310	2/3/06 1115	2/3/06 1945	107	1	4	4607
Cal 8	500	1/31/06 1310	2/3/06 1135	2/3/06 2015	108	1	6	4278
Cal 9	500	1/31/06 1310	2/3/06 1155	2/3/06 2140	109	1	6	3862
Cal 10	500	1/31/06 1310	2/3/06 1215	2/3/06 2140	110	1	4	3731
Cal 11	500	1/31/06 1310	2/3/06 1230	2/3/06 2140	111	1	4	
Cal 12	500	1/31/06 1310	2/3/06 1240	2/3/06 2140	112	1	8	

ABI 2/14/06

ABI 2/27/06

ABI 2/27/06

ABI 2/14/06

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ABI 2/27/06

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CAL 1</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 835</del>	<del>2/13/06 / 1230</del>	<del>101</del>	<del>1</del>	<del>6</del>	<del>5205</del>
<del>CAL 2</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 920</del>	<del>2/13/06 / 1205</del>	<del>102</del>	<del>1</del>	<del>7</del>	<del>5794</del>
<del>CAL 3</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1000</del>	<del>2/13/06 / 1340</del>	<del>103</del>	<del>1</del>	<del>5</del>	<del>5457</del>
<del>CAL 4</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1035</del>	<del>2/13/06 / 1415</del>	<del>104</del>	<del>1</del>	<del>5</del>	<del>5862</del>
<del>CAL 5</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1120</del>	<del>2/13/06 / 1445</del>	<del>105</del>	<del>1</del>	<del>3</del>	<del>4380</del>
<del>CAL 6</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1220</del>	<del>2/13/06 1555</del>	<del>106</del>	<del>1</del>	<del>5</del>	<del>5225</del>
<del>CAL 7</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1315</del>	<del>2/13/06 1637</del>	<del>107</del>	<del>1</del>	<del>6</del>	<del>5527</del>
<del>CAL 8</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1355</del>	<del>2/13/06 1710</del>	<del>108</del>	<del>1</del>	<del>8</del>	<del>6147</del>
<del>CAL 9</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1420</del>	<del>2/13/06 1740</del>	<del>109</del>	<del>1</del>	<del>5</del>	<del>5645</del>
<del>CAL 10</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1440</del>	<del>2/13/06 1810</del>	<del>110</del>	<del>1</del>	<del>5</del>	<del>4774</del>
<del>CAL 11</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1510</del>	<del>2/13/06 2000</del>	<del>111</del>	<del>1</del>	<del>8</del>	<del>4641</del>
<del>CAL 12</del>	<del>500</del>	<del>2-10-06 0730</del>	<del>2/13/06 1530</del>	<del>2/13/06 2040</del>	<del>112</del>	<del>1</del>	<del>6</del>	<del>4798</del>

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Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	2/5/06 1100 <small>SXEL 9/10/06</small>	2/8/06 940	2/8/06 1250	101	1	8	5962
CAL 2	500	2/5/06 1100 <small>SXEL 11/00</small>	2/8/06 1020	2/8/06 1530	102	1	8	7256
CAL 3	500	2/5/06 1100	2/8/06 1105	2/8/06 1405	103	1	5	7066
CAL 4	500	2/5/06 1100 <small>SXEL 2/2/06</small>	2/8/06 1115 <small>AB 2/2/06</small>	2/8/06 1450	104	1	2	6040
CAL 5	500	2/5/06 1100	2/8/06 1230	2/8/06 1530 <small>2/8/06 1525</small>	105	1	1	4814
CAL 6	500	2/5/06 1100	2/8/06 1315	2/8/06 1620 <small>2/8/06</small>	106	1	6	5676 <del>6625</del> <small>SXEL 2/2/06</small>
CAL 7	500	2/5/06 1100	2/8/06 1400	2/8/06 1700	107	1	4	5358
CAL 8	500	2-5-06 1100	2-9-06 0655	2-9-06 1005	108	1	6	6414
CAL 9	500	2-5-06 1100	2-9-06 0745	2-9-06 1045	109	1	6	5948
CAL 10	500	2-5-06 1100	2-9-06 0815	2-9-06 1220	110	1	6	7216
CAL 11	500	2-5-06 1100	2-9-06 1010	2-9-06 1350	111	1	4	7447
CAL 12	500	2-5-06 1100	2-9-06 1100	2-9-06 1405	112	1	8	7363
			ABI					
			3/14/06					

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Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
Cal 11	500	2/14/06 700	2/17/06 1055	2/17/06 1510	111	1	7	4896
Cal 12	500	2/14/06 700	2/17/06 1650	2/17/06 1545	112	1	8	5551
Cal 4	500	<del>2-14-06 0700</del> 2-20-06 0700	2-20-06 0450	<del>2-20-06 0750</del> 2-20-06 0750	101	1	5	7807
Cal 6	500	2-14-06 0700	2-20-06 0515	2-20-06 0805	102	1	5	7189
Cal 7	500	2-14-06 0700	2-20-06 0600	2-20-06 0900 2-20-06 0935	103	1	6	7663
Cal 8	500	2-14-06 0700	2-20-06 0645	2-20-06 0955	105	1	3	5557
Cal 9	500	2-14-06 0700	2-20-06 0725	2-20-06 1020	110	1	7	7571
/								

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AP 3/27/06

Ra-226 Verification Sheet

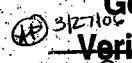
Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CAL 1</del>	<del>500</del>	<del>2-20-06 0840</del>	<del>2-23-06 0500</del>	<del>2-23-06 0940</del>	<del>101</del>	<del>1</del>	<del>8</del>	<del>4649</del>
<del>CAL 2</del>	<del>500</del>	<del>2-20-06 0840</del>	<del>2-23-06 0545</del>	<del>2-23-06 0950</del>	<del>105</del>	<del>1</del>	<del>4</del>	<del>4611</del>
<del>CAL 3</del>	<del>500</del>	<del>2-20-06 0840</del>	<del>2-23-06 0620</del>	<del>2-23-06 0950</del>	<del>110</del>	<del>1</del>	<del>8</del>	<del>4823</del>
<del>CAL 4</del>	<del>500</del>	<del>2-20-06 0840</del>	<del>2-23-06 0655</del>	<del>2-23-06 1005</del>	<del>111</del>	<del>1</del>	<del>1</del>	<del>4845</del>
<del>CAL 5</del>	<del>500</del>	<del>2-20-06 0840</del>	<del>2-23-06 0730</del>	<del>2-23-06 1045</del>	<del>112</del>	<del>1</del>	<del>6</del>	<del>4849</del>
<del>CAL 6</del>								
<del>CAL 7</del>								
<del>CAL 8</del>								
<del>CAL 9</del>								
<del>CAL 10</del>								
<del>CAL 11</del>								
<del>CAL 12</del>								

AB1 3/14/06

AB1

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AB1 3/14/06  
CAL 3/17/06


**General Engineering Laboratories**  
**Verification Source Preparation Sheet**  
 Calibration

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 4/5/05 Cocktail Type Used N/A  
 Standard ID 0299-6 Matrix of Vial/Planchett N/A  
 Amount Used (g or ml) 0.1 N/A  
 Standard Activity (DPM/g or ml) 2446.3471 Type of Scintillation Vial N/A  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 4/6/06 Balance ID Used 36040216  
 Residue/Carrier Agent 0.5 M HCL Quenching Agent N/A

	Standard Number	Quenching Vol (uL) Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL 1				
2	CAL 2				
3	CAL 3				
4	CAL 4				
5	CAL 5				
6	CAL 6				
7	CAL 7		ABI		
8	CAL 8			3/14/06	
9	CAL 9				
10	CAL 10				
11	CAL 11				
12	CAL 12				
13	CAL 13				
14	CAL 14				
15	CAL 15				

Prepared By: Ad Bal Date: 3/14/06  
 Reviewed By: Amanda L. Tehe Date: 3/27/06

Rev 1 RLM 9/10/97

AP 31271a
**General Engineering Laboratories**  
**Verification-Source Preparation Sheet**  
 Calibration

Applicable SOP Number <u>GL-RAD-A-008</u>	Isotope <u>Ra-226</u>
Date Standards Prepared <u>4/5/05</u>	Cocktail Type Used <u>NIA</u>
Standard ID <u>0299-G</u>	Matrix of Vial/Planchett <u>NIA</u>
Amount Used (g or ml) <u>0.1</u>	<u>NIA</u>
Standard Activity (DPM/g or ml) <u>2446.3471</u>	Type of Scintillation Vial <u>NIA</u>
Reference Date <u>12/15/99</u>	Pipette ID Used <u>1429303</u>
Expiration Date <u>4/6/06</u>	Balance ID Used <u>36040214</u>
Residue/Carrier Agent <u>0.5 M HCl</u>	Quenching Agent <u>NIA</u>

	Standard Number	Quenching Vol (uL) Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
16	CAL 16				
17	CAL 17				
18	CAL 18				
19	CAL 19				
20	CAL 20				
21	CAL 21	ABI			
22	CAL 22		3/14/06		
23	CAL 23				
24	CAL 24				

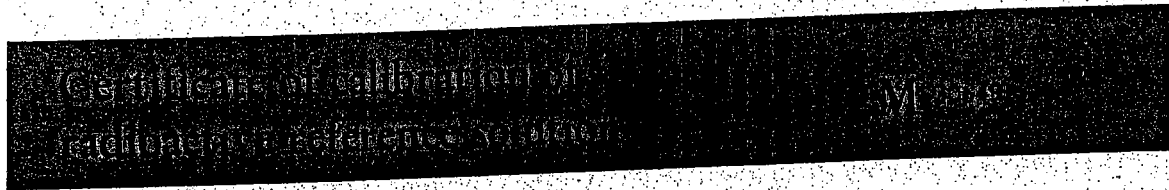
Prepared By: Ad Bail Date: 3/14/06  
 Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_



8-21-00

Nycomed Amersham plc  
Amersham Laboratories

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Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED  
FOR:

AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ion. Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

ment Reference time: 1200 GMT on 15 December 1999

data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

ion of The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which  
inties for a  $t$ -distribution with  $\nu_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately  
95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard  
uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

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Date of  
issue

17<sup>th</sup> December 1999

Nycomed  
Amersham

AGP  
3/27/00

0299

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:  
The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999

The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5\%$

Combined Type A uncertainty:  $\pm 0.2\%$

Combined Type B uncertainty:  $\pm 1.3\%$

Radionuclidic The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Chemical composition Carrier free in 0.5M HCl

Remarks This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0299	Isotope:	Radium-226
Prepared By:	Angela Johnson	Prepared By:	Angela Johnson
Carrier Conc:	0.5 M HCL	Prep Date:	09/15/2000
Reference Date:	12/15/1999	Verification Date:	12/15/2005
Ampoule Mass (g):	5.0368 g	Expiration Date:	12/15/2006
Uncertainty:	+/- 2.5 %	Primary Code:	0299-A
LogBook No:	RC S 027 128	Dilution(mL):	100 mL
		Mass of Parent(g):	4.6634 g
		Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Johnson	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Johnson	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Johnson	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Johnson	1.9909	100	0299-E	2434.34 dpm/mL	11/04/2004	11/04/2005
08/26/2003	Angela Johnson	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005
04/05/2005	Amanda Fehr	5.0018	250	0299-G	2446.3471 dpm/mL	04/06/2005	04/06/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ra-226 Standard 0299-G

4/6/2005	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Mass. Used (G)	Source DPM/G
A.Fehr	0299-G N1	515.6000	31.0000	484.6000	3.38485694	0.0626	2287.013657
	0299-G N2	531.0000	31.0000	500.0000	3.38485694	0.0621	2378.691308
	0299-G N3	534.1000	31.0000	503.1000	3.38485694	0.0624	2381.932275
						Average =	2349.212414

Mean Value (Counting) = 2349.212414      Pass  
 Stdev = 53.89007259      Rule 3 (Pass/Fail)

Certificate Value = 2440.7      dpm/mL  
 Lower Limit = 2241.432269      dpm/mL  
 Upper Limit = 2456.992559      dpm/mL  
 Rule 1 Pass/Fail      Pass  
 Two sigma = 107.7801452      dpm/mL  
 10 % of Mean = 234.9212414      dpm/mL  
 Rule 2 (Pass/Fail)      Pass

### Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-G by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 8/26/04 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD.SOP.M-001

*Amanda L. Fehr 417105*  
*Alicia Tucker 417105*

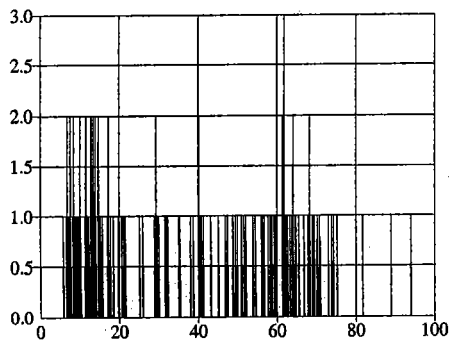
PROTOCOL : 23 Radium Std Ver.  
DATE : 2005/04/06  
TIME : 17:42  
ID : P23AS008

Wallac 1414 WinSpectral v1.40 S/N 4140127  
Counting mode : CPM  
Isotope(s) : H3  
H3 = 5- 350,12.43 y  
Protocol name : Radium Std Ver.  
Counting time : 300  
Repeats : 1  
Cycles : 1  
Replicates : 1  
2 sigma % : 0.01  
Minimum cpm : 0.00 Checking time: 10  
Output to Display :  
POS,CTIME,DATE,TIME,RACKPOS,CPMw1,CPM,SQPI,CPM1  
Additions to Display : Spectrum,Header,Listing  
Spectrum : Beta  
Window 1 : 1-1024 /Beta  
Window 2 : 1-1024 /Beta  
Window 3 : 1-1024 /Beta  
Window 4 : 1-1024 /Beta  
Window 5 : 1-1024 /Beta  
Window 6 : 1-1024 /Beta  
FNCT1 = FNCT1 :  
FNCT2 = FNCT2 :  
FNCT3 = FNCT3 :  
FNCT4 = FNCT4 :

Total count rate:  
H3 284.2 CPM

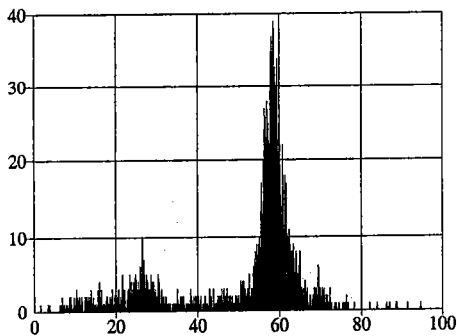
*all 417105*  
*HU 417105*

POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
1	300	4/6/2005	5:42 PM	1	31.00	31.00
					15.60	



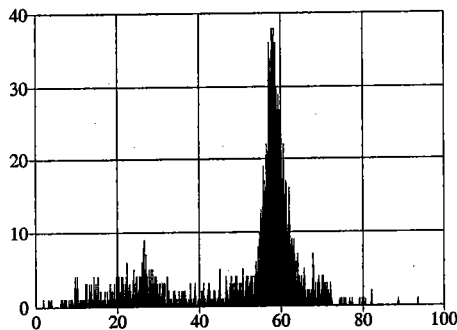
Counts Beta

2	300	4/6/2005	5:48 PM	2	515.60	515.60
					90.00	



Counts Beta

3	300	4/6/2005	5:53 PM	3	531.00	531.00
					92.50	



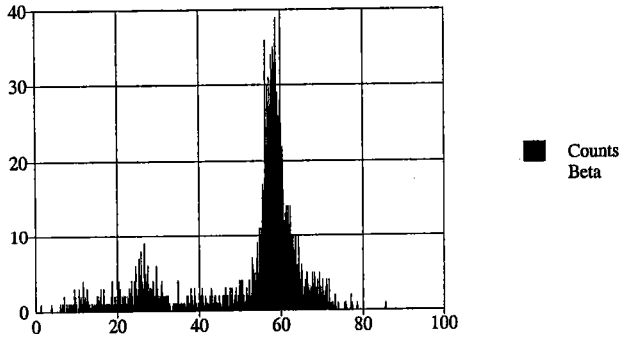
Counts Beta

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POS	CTIME	DATE	TIME	RACKPOS	CPMW1	CPM
4	300	4/6/2005	5:59 PM	4	534.10	534.10
					86.20	



OLF 417105

Hu 417105

Voltage Curve Ludlum # 1				
Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	2/1/2006	7:45	1
0.25	0	2/1/2006	7:45	1
0.30	0	2/1/2006	7:45	1
0.35	0	2/1/2006	7:45	1
0.40	0	2/1/2006	7:45	1
0.45	45	2/1/2006	7:45	1
0.50	2701	2/1/2006	7:46	1
0.55	6850	2/1/2006	7:46	1
0.60	10154	2/1/2006	7:46	1
0.65	12384	2/1/2006	7:46	1
0.70	13645	2/1/2006	7:46	1
0.75	14504	2/1/2006	7:46	1
0.80	15361	2/1/2006	7:46	1
0.85	16335	2/1/2006	7:47	1
0.90	16652	2/1/2006	7:47	1
0.95	16751	2/1/2006	7:47	1
1.00	17566	2/1/2006	7:47	1
1.05	20727	2/1/2006	7:47	1
1.10	27536	2/1/2006	7:47	1
1.15	44772	2/1/2006	7:47	1
1.20	74675	2/1/2006	7:47	1
1.25	121633	2/1/2006	7:48	1
1.30	182981	2/1/2006	7:48	1
1.35	243485	2/1/2006	7:48	1
1.40	307154	2/1/2006	7:48	1

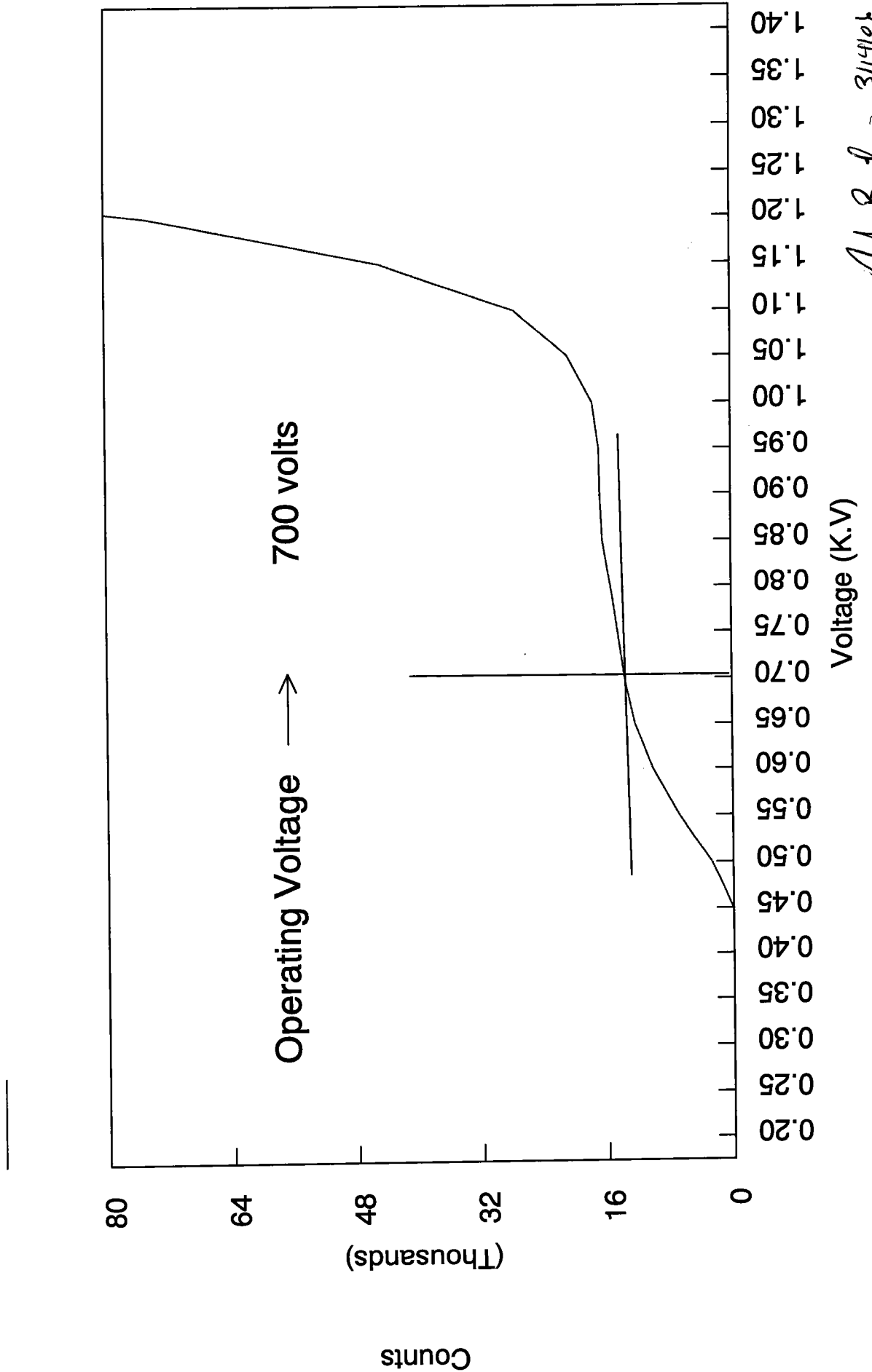
Ad Baul 3/14/06

Amanda L. Lech 3/27/06



# Plateau February, 2006

Ludlum # 1



Adl Baid 3/14/06  
Amanda D. Fuku 3/22/06

# Ra-226 WATER

Batch : LCSVER  
 Date : 3/2/2006  
 Analyst : AB1

Procedure Code : LUC26RAL  
 Parmname : Radium-226

MDA : 1 pCi/L  
 Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME
V1	0.800	30	928	101	1.860	6	0.200	0.1941	12.6693	0.8231	3/2/2006 15:05
V2	0.800	30	485	102	1.873	5	0.167	0.3520	12.8686	1.1632	2/22/2006 8:30
V3	0.800	30	524	103	1.806	6	0.200	0.3912	14.3454	1.2496	2/22/2006 9:30
V4	0.800	30	671	104	1.957	3	0.100	0.2736	16.9491	1.2911	2/22/2006 10:00
V5	0.800	30	420	105	1.551	7	0.233	0.4780	13.1260	1.2872	2/22/2006 10:35
V6	0.800	30	510	106	1.718	8	0.267	0.4532	14.3158	1.2721	2/22/2006 11:15
V7	0.800	30	572	107	1.712	2	0.067	0.2638	16.1682	1.3320	2/22/2006 11:45
V8	0.800	30	596	108	1.910	4	0.133	0.3046	14.9906	1.2157	2/22/2006 12:30
V9	0.800	30	899	109	1.733	2	0.067	0.1388	13.3841	0.8778	3/2/2006 17:05
V10	0.800	30	544	110	1.647	8	0.267	0.4619	15.5819	1.3387	2/22/2006 13:40
V11	0.800	30	567	111	1.590	8	0.267	0.4781	16.8197	1.4141	2/22/2006 14:20
V12	0.800	30	592	112	1.639	3	0.100	0.3141	17.1591	1.3928	2/22/2006 14:55

*Ad Bail 3/14/06*  
*Amanda L. Fuhr 3/27/06*

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
V1		1	3/2/2006 15:05	LCS	0638-B	15.70	pCi/L	81%
V2		1	2/22/2006 8:30	LCS	0638-B	15.70	pCi/L	82%
V3		1	2/22/2006 9:30	LCS	0638-B	15.70	pCi/L	91%
V4		1	2/22/2006 10:00	LCS	0638-B	15.70	pCi/L	108%
V5		1	2/22/2006 10:35	LCS	0638-B	15.70	pCi/L	84%
V6		1	2/22/2006 11:15	LCS	0638-B	15.70	pCi/L	91%
V7		1	2/22/2006 11:45	LCS	0638-B	15.70	pCi/L	103%
V8		1	2/22/2006 12:30	LCS	0638-B	15.70	pCi/L	96%
V9		1	3/2/2006 17:05	LCS	0638-B	15.70	pCi/L	85%
V10		1	2/22/2006 13:40	LCS	0638-B	15.70	pCi/L	99%
V11		1	2/22/2006 14:20	LCS	0638-B	15.70	pCi/L	107%
V12		1	2/22/2006 14:55	LCS	0638-B	15.70	pCi/L	109%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM cpm	Ingrowth constant
2/22/2006 13:25	3/2/2006 10:20	188.92	4.75	0.7598	0.9648	1.0019	30.7333	0.7344
2/19/2006 13:35	2/22/2006 5:20	63.75	3.17	0.3820	0.9764	1.0019	16.0000	0.3737
2/19/2006 13:35	2/22/2006 5:55	64.33	3.58	0.3847	0.9733	1.0019	17.2667	0.3752
2/19/2006 13:35	2/22/2006 6:30	64.92	3.50	0.3874	0.9739	1.0019	22.2667	0.3781
2/19/2006 13:35	2/22/2006 7:05	65.50	3.50	0.3901	0.9739	1.0019	13.7667	0.3807
2/19/2006 13:35	2/22/2006 7:40	66.08	3.58	0.3928	0.9733	1.0019	16.7333	0.3831
2/19/2006 13:35	2/22/2006 8:20	66.75	3.42	0.3959	0.9745	1.0019	19.0000	0.3865
2/19/2006 13:35	2/22/2006 8:50	67.25	3.67	0.3981	0.9727	1.0019	19.7333	0.3880
2/22/2006 13:25	3/2/2006 10:40	189.25	6.42	0.7604	0.9527	1.0019	29.9000	0.7258
2/19/2006 13:35	2/22/2006 9:50	68.25	3.83	0.4027	0.9715	1.0019	17.8667	0.3919
2/19/2006 13:35	2/22/2006 10:10	68.58	4.17	0.4042	0.9690	1.0019	18.6333	0.3924
2/19/2006 13:35	2/22/2006 10:30	68.92	4.42	0.4057	0.9672	1.0019	19.6333	0.3931

*Ad Bail 3/14/06*  
*Amanda F. Feh 3/17/06*

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>VER 1</del>	<del>800</del>	<del>2-19-06 1335</del>	<del>2-22-06 0445</del>	<del>2-22-06 0755</del>	<del>101</del>	<del>1</del>	<del>5</del>	<del>425</del>
VER 2	800	2-19-06 1335	2-22-06 0520	2-22-06 0830	102	1	5	485
VER 3	800	2-19-06 1335	2-22-06 0555	2-22-06 0930	103	1	6	524
VER 4	800	2-19-06 1335	2-22-06 0630	2-22-06 1000	104	1	3	671
VER 5	800	2-19-06 1335	2-22-06 0705	2-22-06 1035	105	1	7	470
VER 6	800	2-19-06 1335	2-22-06 0740	2-22-06 1115	106	1	8	510
VER 7	800	2-19-06 1335	2-22-06 0820	2-22-06 1145	107	1	2	572
VER 8	800	2-19-06 1335	2-22-06 0850	2-22-06 1200	108	1	4	596
<del>VER 9</del>	<del>800</del>	<del>2-19-06 1335</del>	<del>2-22-06 0910</del>	<del>2-22-06 1300</del>	<del>109</del>	<del>1</del>	<del>5</del>	<del>742</del>
VER 10	800	2-19-06 1335	2-22-06 0950	2-22-06 1340	110	1	8	544
VER 11	800	2-19-06 1335	2-22-06 1010	2-22-06 1420	111	1	8	567
VER 12	800	2-19-06 1335	2-22-06 1030	2-22-06 1455	112	1	5	552
			ABI					
				3/14/06				

ABI 3/14/06

3/14/06 ABI

ABI 3/14/06  
091213+230  
03/12/06

Ra-226 Verification Sheet

Sample ID	Vol (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Bkg CPM	Total Counts
VER 1	800	2/22/06 1325	3-2-06 1020	3/2/06 1505 <del>3/1/06 1505</del>	101	1	6	928
VER 2	800	2-22-06 1325	3-2-06 1040	3/2/06 1705	109	1	2	999

ABI  
3/14/06

901 L21 E + F D  
3/14/06  
ABI

**General Engineering Laboratories  
Verification Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 1/17/06 Cocktail Type Used NIA  
 Standard ID Abi 3/14/06  
~~03210638-B~~ Matrix of Vial/Planchett NIA  
NIA  
NIA  
 Amount Used (g or ml) 0.1 Type of Scintillation Vial NIA  
 Standard Activity (DPM/g or ml) 279.0211 Pipette ID Used 1429303  
 Reference Date 1/23/04 Balance ID Used 36040216  
 Expiration Date 1/17/07 Quenching Agent NIA  
 Residue/Carrier Agent 0.5M HCl

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER 1				
2	VER 2				
3	VER 3				
4	VER 4				
5	VER 5		Abi		
6	VER 6			3/14/06	
7	VER 7				
8	VER 8				
9	VER 9				
10	VER 10				
11	VER 11				
12	VER 12				
Abi					
	3/14/06				

Prepared By: Ad Bail Date 3/14/06  
 Reviewed By: Amanda L. Lehe Date 3/27/06

Rev 1 RLM 9/10/97

# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0638	Isotope:	Radium-226
Prepared By:	Amanda Fehr	Prepared By:	Amanda Fehr
Carrier Conc:	0.1M HCl	Prep Date:	01/16/2006
Reference Date:	01/23/2004	Verification Date:	01/16/2006
Ampoule Mass (g):	5.01065 g	Expiration Date:	01/16/2007
Uncertainty:	+/- 3.3 %	Primary Code:	0638-A
LogBook No:	RC-S-037-037	Dilution(mL):	100 mL
		Mass of Parent(g):	4.8398 g
		Density(g/mL):	1.0266

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

$(\text{Mass of parent(g)} * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)} * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.8398 \text{ g}) * (23530 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13613.8856 \text{ dpm/mL}$
$(4.8398 \text{ g}) * (23530 \text{ dps}) * (59.9 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13260.8293 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
01/17/2006	Amanda Fehr	2.1041	100	0638-B	279.0211 dpm/mL	01/17/2006	01/17/2007

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ra-226 Standard 0638-B

A. Fehr  
1/20/2006

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass, Used (mL)	Standard Source DPM/mL
0638-B N1	534.4000	3.1000	531.3000	1.88956511	1.0000 281.1758103
0638-B N2	544.4000	3.1000	541.3000	1.88956511	1.0000 286.4680333
0638-B N3	539.1000	3.1000	536.0000	1.88956511	1.0000 283.6631551
Average =					283.7689996

Mean Value (Counting) = 283.7689996      101.789218      Pass  
 Stdev = 2.647698713      0.00933047      Rule 3 (Pass/Fail)

Certificate Value = 278.8  
 Lower Limit = 278.4736022  
 Upper Limit = 289.064397  
 Rule 1 Pass/Fail Pass  
 Two sigma = 5.295397425  
 10 % of Mean = 28.37689996  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0638-B by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 1/20/06 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda L. Fehr 1/20/06*



# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Lucas Cell Calibration Package

CALIBRATION 201-212

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the secondard standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the efficiency calibration report included ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Is the raw count data included for: Cell constant determination? Plateau generation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Are the calibration verifications included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the instrument settings included: HVPS settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Has the CELLEFF.xls file been updated ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7) Have the calibration dates been updated in ALPHALIMS ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Ad Beal

Date: 5/6/05

Reviewed By: Cezela A. Johnson

Date: 5/9/05

Effective Date: 5/9/05

### Ra-226 Cell Constants

Standard Reference date: 12/15/1999  
 Standard ID: 0299-E  
 Volume added (mL): 0.1  
 Standard Reference Activity (DPM/mL): 2434.34

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	bkg cpm	total counts	count time min	cpm	Known activity dpm	11 (days) end-degas to flush	12 (days) end-flush to count	13 (days) Std Ref Date to count	Decay from Std Ref Date to count		
201	1.890	Average	1.872	CAL 1	4/25/2005 14:05	4/25/2005 10:15	4/22/2005 17:15	0.267	5180	30	172.67	243.02	2.70833	0.15972	1959	0.9977
201	1.999	Stdev	0.137	CAL 7	5/2/2005 17:10	5/2/2005 14:10	4/29/2005 15:00	0.233	5908	30	196.83	243.02	2.96528	0.12500	1966	0.9977
201	1.727			CAL 1	4/28/2005 12:20	4/28/2005 9:05	4/25/2005 16:00	0.287	4759	30	158.63	243.02	2.71181	0.13542	1962	0.9977
202	1.855	Average	1.775	CAL 8	5/2/2005 17:45	5/2/2005 14:40	4/29/2005 15:00	0.233	5508	30	183.60	243.02	2.98611	0.12847	1966	0.9977
202	1.706	Stdev	0.075	CAL 14	4/26/2005 15:30	4/26/2005 11:40	4/22/2005 17:15	0.167	5960	30	198.67	243.02	3.76736	0.15972	1960	0.9977
202	1.763			CAL 13	4/29/2005 15:20	4/29/2005 12:05	4/26/2005 15:00	0.287	5086	30	169.53	243.02	2.87847	0.13542	1963	0.9977
203	1.910	Average	1.823	CAL 3	4/25/2005 15:40	4/25/2005 11:50	4/22/2005 17:15	0.267	5333	30	177.77	243.02	2.77431	0.15972	1959	0.9977
203	1.788	Stdev	0.076	CAL 9	5/2/2005 20:40	5/2/2005 15:15	4/29/2005 15:00	0.267	5249	30	174.97	243.02	3.01042	0.22569	1966	0.9977
203	1.771			CAL 14	4/29/2005 15:55	4/29/2005 12:45	4/26/2005 15:00	0.267	5149	30	171.63	243.02	2.90625	0.13194	1963	0.9977
204	1.713	Average	1.753	CAL 4	4/25/2005 16:15	4/25/2005 12:40	4/22/2005 17:15	0.167	4836	30	161.20	243.02	2.80903	0.14981	1959	0.9977
204	1.762	Stdev	0.036	CAL 16	4/26/2005 16:35	4/26/2005 12:50	4/22/2005 17:15	0.267	6218	30	207.27	243.02	3.81597	0.15625	1960	0.9977
204	1.783			CAL 10	5/2/2005 22:05	5/2/2005 15:45	4/29/2005 15:00	0.200	5222	30	174.07	243.02	3.03125	0.26389	1966	0.9977
205	1.949	Average	1.967	CAL 5	4/25/2005 16:50	4/25/2005 13:20	4/22/2005 17:15	0.200	5847	30	184.90	243.02	2.86881	0.14583	1959	0.9977
205	1.964	Stdev	0.020	CAL 17	4/26/2005 17:50	4/26/2005 13:30	4/22/2005 17:15	0.267	6932	30	231.07	243.02	3.84375	0.18056	1960	0.9977
205	1.989			CAL 16	4/29/2005 17:05	4/29/2005 14:00	4/26/2005 15:00	0.267	5865	30	195.50	243.02	2.95633	0.12847	1963	0.9977
206	1.840	Average	1.880	CAL 6	4/25/2005 17:35	4/25/2005 13:55	4/22/2005 17:15	0.133	5263	30	175.43	243.02	2.86111	0.15278	1959	0.9977
206	1.943	Stdev	0.056	CAL 11	5/3/2005 8:30	5/2/2005 16:20	4/29/2005 15:00	0.267	5319	30	177.30	243.02	3.05556	0.67361	1966	0.9977
206	1.855			CAL 17	4/29/2005 17:35	4/29/2005 14:35	4/26/2005 15:00	0.200	5505	30	183.50	243.02	2.98264	0.12500	1963	0.9977
207	1.805	Average	1.725	CAL 7	4/25/2005 18:05	4/25/2005 14:25	4/22/2005 17:15	0.200	5192	30	173.07	243.02	2.88194	0.15278	1959	0.9977
207	1.826	Stdev	0.081	CAL 19	4/27/2005 15:15	4/27/2005 11:10	4/22/2005 17:15	0.267	6615	30	220.50	243.02	4.74653	0.17014	1961	0.9977
207	1.743			CAL 1	5/2/2005 13:35	5/2/2005 9:20	4/29/2005 15:00	0.267	4838	30	161.27	243.02	2.76389	0.17708	1966	0.9977
208	1.796	Average	1.786	CAL 8	4/25/2005 18:45	4/25/2005 14:55	4/22/2005 17:15	0.267	5192	30	173.07	243.02	2.90278	0.15972	1959	0.9977
208	1.713	Stdev	0.068	CAL 2	5/2/2005 14:15	5/2/2005 10:05	4/29/2005 15:00	0.133	4794	30	159.80	243.02	2.79514	0.17361	1966	0.9977
208	1.848			CAL 8	4/28/2005 17:30	4/28/2005 14:20	4/25/2005 16:00	0.133	5403	30	180.10	243.02	2.93056	0.13194	1962	0.9977
209	1.832	Average	1.744	CAL 9	4/25/2005 21:45	4/25/2005 15:25	4/22/2005 17:15	0.267	5223	30	174.10	243.02	2.92361	0.26389	1959	0.9977
209	1.693	Stdev	0.076	CAL 21	4/27/2005 16:25	4/27/2005 12:15	4/22/2005 17:15	0.233	6921	30	230.70	243.02	4.79167	0.17361	1961	0.9977
209	1.707			CAL 6	5/2/2005 16:30	5/2/2005 13:15	4/29/2005 15:00	0.267	4988	30	166.27	243.02	2.92708	0.13542	1966	0.9977
210	1.702	Average	1.726	CAL 10	4/26/2005 12:45	4/26/2005 8:30	4/22/2005 17:15	0.033	5778	30	192.60	243.02	3.63542	0.17708	1960	0.9977
210	1.679	Stdev	0.063	CAL 22	4/27/2005 17:00	4/27/2005 12:45	4/22/2005 17:15	0.267	6879	30	229.30	243.02	4.81250	0.17708	1961	0.9977
210	1.798			CAL 3	5/2/2005 14:50	5/2/2005 10:50	4/29/2005 15:00	0.200	5084	30	169.47	243.02	2.82639	0.16667	1966	0.9977
211	1.559	Average	1.703	CAL 12	5/3/2005 14:35	5/3/2005 10:10	4/29/2005 15:00	0.267	5457	30	181.90	243.02	3.79861	0.18403	1967	0.9977
211	1.776	Stdev	0.124	CAL 4	5/2/2005 15:25	5/2/2005 11:40	4/29/2005 15:00	0.167	5078	30	169.27	243.02	2.86111	0.15625	1966	0.9977
211	1.772			CAL 11	4/29/2005 13:35	4/29/2005 10:25	4/26/2005 15:00	0.267	5021	30	167.37	243.02	2.80903	0.13194	1963	0.9977
212	1.708	Average	1.808	CAL 12	4/26/2005 14:10	4/26/2005 10:00	4/22/2005 17:15	0.133	5875	30	195.83	243.02	3.69792	0.17361	1960	0.9977
212	1.905	Stdev	0.098	CAL 5	5/2/2005 16:00	5/2/2005 12:30	4/29/2005 15:00	0.267	5509	30	183.63	243.02	2.89583	0.14583	1966	0.9977
212	1.809			CAL 12	4/29/2005 14:15	4/29/2005 11:15	4/26/2005 15:00	0.267	5181	30	172.70	243.02	2.84375	0.12500	1963	0.9977

*Angela D. Johnson*  
 5/19/05  
*Ad Beard*  
 5/19/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	4/22/05 1715	4/25/05 1015	4/25/05 1405	201	2	8=0.227	5180
<del>CAL 2</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/25/05 1055</del>	<del>4/25/05 1410</del>	<del>202</del>	<del>2</del>	<del>7=0.220</del>	<del>47744</del>
CAL 3	500	4/22/05 1715	4/25/05 1150	4/25/05 <sup>1540</sup> <del>1445</del> AB1 4/25/05	203	2	8=0.227	5333
CAL 4	500	4/22/05 1715	4/25/05 1240	4/25/05 1615	204	2	5=0.167	4836
CAL 5	500	4/22/05 1715	4/25/05 1320	4/25/05 1650	205	2	6=0.200	5547
CAL 6	500	4/22/05 1715	4/25/05 1355	4/25/05 1735	206	2	4=0.133	5263
CAL 7	500	4/22/05 1715	4/25/05 1425	4/25/05 1805	207	2	6=0.200	5192
CAL 8	500	4/22/05 1715	4/25/05 1455	4/25/05 1845	208	2	8=0.227	5192
CAL 9	500	4/22/05 1715	4/25/05 1525	4/25/05 2145	209	2	8=0.227	8223
CAL 10	500	4/22/05 1715	<sup>4/24/05</sup> <del>4/25/05</del> 830 AB1 4/24/05	4/25/05 <sup>1245</sup> <del>1245</del> AB1 4/25/05	210	2	1=0.033	5778
<del>CAL 11</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/26/05 915</del>	<del>4/26/05 1335</del>	<del>211</del>	<del>2</del>	<del>6=0.200</del>	<del>5261</del>
CAL 12	500	4/22/05 1715	4/26/05 1000	4/26/05 1410	212	2	4=0.133	5875

AB1 5/6/05  
 5/6/05  
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 5/6/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CAL 13</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/26/05 1040</del>	<del>4/26/05 1455</del>	<del>201</del>	<del>2</del>	<del>5791</del> AB1 5/16/05	<del>5791</del>
CAL 14	500	4/22/05 1715	4/26/05 1140	4/26/05 1530	202	2	5760 5:00 AB1 5/16/05	5760
<del>CAL 15</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/26/05 1220</del>	<del>4/26/05 1600</del>	<del>203</del>	<del>2</del>	<del>8:00</del> 8:00 AB1 5/16/05	<del>5854</del>
CAL 16	500	4/22/05 1715	4/26/05 1250	4/26/05 1635	204	2	8:00 8:00	6218
CAL 17	500	4/22/05 1715	4/26/05 1330	4/26/05 1750	205	2	8:00 8:00	6932
<del>CAL 18</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/27/05 1045</del>	<del>4/27/05 1440</del>	<del>206</del>	<del>2</del>	<del>8:00</del> 8:00 AB1 5/16/05	<del>6555</del>
CAL 19	500	4/22/05 1715	4/27/05 1110	4/27/05 1515	207	2	8:00 8:00	6615
<del>CAL 20</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/27/05 1145</del>	<del>4/27/05 1550</del>	<del>208</del>	<del>2</del>	<del>6:00</del> 6:00 AB1 5/16/05	<del>3323</del>
CAL 21	500	4/22/05 1715	4/27/05 1215	4/27/05 1625	209	2	7:00 7:00	6921
CAL 22	500	4/22/05 1715	4/27/05 1245	4/27/05 1700	210	2	8:00 8:00	6879
<del>CAL 23</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/27/05 1315</del>	<del>4/27/05 1735</del>	<del>211</del>	<del>2</del>	<del>4:00</del> 4:00 AB1 5/16/05	<del>5803</del>
<del>CAL 24</del>	<del>500</del>	<del>4/22/05 1715</del>	<del>4/27/05 1350</del>	<del>4/27/05 1815</del>	<del>212</del>	<del>2</del>	<del>7:00</del> 7:00 AB1 5/16/05	<del>6942</del>

AB1 5/16/05  
AB1 5/16/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	4/25/05 1600	4/28/05 905	4/28/05 1220	201	2	8=0.267	41759
CAL 2	500	4/25/05 1600	4/28/05 945	4/28/05 1310	202	2	8=0.267	3237
<del>CAL 3</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1035</del>	<del>4/28/05 1350</del>	<del>203</del>	<del>2</del>	<del>8=0.267</del>	<del>38141</del>
<del>CAL 4</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1120</del>	<del>4/28/05 1425</del>	<del>204</del>	<del>2</del>	<del>8=0.267</del>	<del>3379</del>
<del>CAL 5</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1200</del>	<del>4/28/05 1505</del>	<del>205</del>	<del>2</del>	<del>8=0.267</del>	<del>3268</del>
<del>CAL 6</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1245</del>	<del>4/28/05 1545</del>	<del>206</del>	<del>2</del>	<del>5=0.112</del>	<del>3608</del>
<del>CAL 7</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1335</del>	<del>4/28/05 1635</del>	<del>207</del>	<del>2</del>	<del>8=0.267</del>	<del>41643</del>
CAL 8	500	4/25/05 1600	4/28/05 1420	4/28/05 1730	208	2	4=0.113	5403
<del>CAL 9</del>	<del>500</del>	<del>4/25/05 1600</del>	<del>4/28/05 1500</del>	<del>4/28/05 2120</del>	<del>209</del>	<del>2</del>	<del>8=0.267</del>	<del>4903</del>
<del>CAL 10</del>	<del>500</del>	<del>4/26/05 1500</del>	<del>4/29/05 920</del>	<del>4/29/05 1255</del>	<del>210</del>	<del>2</del>	<del>8=0.267</del>	<del>1113</del>
CAL 11	500	4/26/05 1500	4/29/05 1025	4/29/05 1335	211	2	8=0.267	5021
CAL 12	500	4/26/05 1500	4/29/05 1115	4/29/05 1415	212	2	8=0.267	5181

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AB1 5/6/05

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~~AB1 5/6/05~~  
~~AB1 5/6/05~~

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 13	500	4/26/05 1500	4/29/05 1205	4/29/05 1520	202	2	8=0.267	5086
CAL 14	500	4/26/05 1500	4/29/05 1245	4/29/05 1555	203	2	8=0.267	5149
CAL 15	500	4/26/05 1500	4/29/05 1320	4/29/05 1630	204	2	8=0.267	4907
CAL 16	500	4/26/05 1500	4/29/05 1400	4/29/05 1705	205	2	8=0.267	5865
CAL 17	500	4/26/05 1500	4/29/05 1435	4/29/05 1735	206	2	6=0.200	5505
				5/2/05				
CAL 1	500	4/29/05 1500	5/2/05 920	5/2/05 1335	207	2	8=0.267	4838
CAL 2	500	4/29/05 1500	5/2/05 1005	5/2/05 1450	208	2	4=0.132	4774
CAL 3	500	4/29/05 1500	5/2/05 1050	5/2/05 1450	210	2	6=0.200	5084
CAL 4	500	4/29/05 1500	5/2/05 1140	5/2/05 1525	211	2	5=0.167	5078
CAL 5	500	4/29/05 1500	5/2/05 1230	5/2/05 1600	212	2	8=0.267	5509
CAL 6	500	4/29/05 1500	5/2/05 1315	5/2/05 1630	209	2	8=0.267	4989
CAL 7	500	4/29/05 1500	5/2/05 1410	5/2/05 1710	201	2	7=0.233	5908
CAL 8	500	4/29/05 1500	5/2/05 1440	5/2/05 1745	202	2	7=0.233	5508
CAL 9	500	4/29/05 1500	5/2/05 1515	5/2/05 2040	203	2	8=0.267	5249
CAL 10	500	4/29/05 1500	5/2/05 1545	5/2/05 2805	204	2	6=0.200	5222
CAL 11	500	4/29/05 1500	5/2/05 1620	5/2/05 2815	206	2	8=0.267	5319
				5/3/05 8:30				
CAL 12	500	4/29/05 1500	5/3/05 1010	5/3/05 1435	211	2	8=0.267	5457

ABI 5/6/05  
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 ABI 5/6/05

## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008, Rev. 2 Isotope Ra-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used N/A  
 Standard ID 0299-E Matrix of Vial/Planchett N/A  
 Amount Used (g or ml) 0.1 N/A  
 Standard Activity (DPM/g or ml) 2434.34 Type of Scintillation Vial N/A  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 8/26/05 Balance ID Used 36040216  
 Residue/Carrier Agent 0.5 M HCl Quenching Agent N/A

	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL 1				
2	CAL 2				
3	CAL 3				
4	CAL 4				
5	CAL 5				
6	CAL 6				
7	CAL 7				
8	CAL 8				
9	CAL 9				
10	CAL 10				
11	CAL 11				
12	CAL 12				
13	CAL 13				
14	CAL 14				
15	CAL 15				

ADL 5/6/05

Prepared By: Ad Beil Date: 5/6/05  
 Reviewed By: Angela A. Johnson Date: 5/9/05

Rev 1 RLM.9/10/97

## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-608, Rev. 8 Isotope Ra-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used N/A  
 Standard ID 0299-E Matrix of Vial/Planchett N/A  
 Amount Used (g or ml) 0.1 N/A  
 Standard Activity (DPM/g or ml) 2434.34 Type of Scintillation Vial N/A  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 8/26/05 Balance ID Used 36040216  
 Residue/Carrier Agent 0.5 m HCl Quenching Agent N/A

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
16	CAL 16				
17	CAL 17				
18	CAL 18				
19	CAL 19				
20	CAL 20				
21	CAL 21				
22	CAL 22				
23	CAL 23				
24	CAL 24	ABJ 5/6/05			

Prepared By: Ad Bail Date 5/6/05  
 Reviewed By: Angela A. Johnson Date 5/9/05

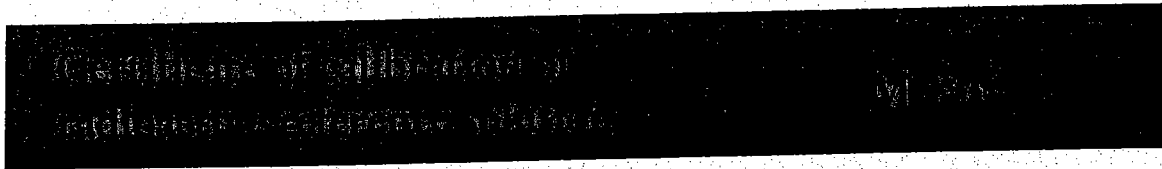
Rev 1 RLM 9/10/97



8-21-00

Nycomed Amersham plc  
Amersham Laboratories

029



Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED  
FOR:

AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ion Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

ment Reference time: 1200 GMT on 15 December 1999

data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

ion of The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which  
inties for a  $t$ -distribution with  $\nu_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately  
95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard  
uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

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Page 472 of 788

Date of  
issue

17<sup>th</sup> December 1999

Nycomed  
Amersham

0299



UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:

The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999

The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5\%$

Combined Type A uncertainty:  $\pm 0.2\%$

Combined Type B uncertainty:  $\pm 1.3\%$

The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Carrier free in 0.5M HCl.

This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0299	Isotope:	Radium-226
Prepared By:	Angela Albee	Prepared By:	Angela Albee
Carrier Conc:	0.5 M HCL	Prep Date:	09/15/2000
Reference Date:	12/15/1999	Verification Date:	08/26/2004
Ampoule Mass (g):	5.0368 g	Expiration Date:	08/26/2005
Uncertainty:	+/- 2.5 %	Primary Code:	0299-A
LogBook No:	RC S 027 128	Dilution(mL):	100 mL
		Mass of Parent(g):	4.6634 g
		Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Albee	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Albee	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Albee	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Albee	1.9909	100	0299-E	2434.34 dpm/mL	08/26/2004	08/26/2005
08/26/2003	Angela Albee	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ra-226 Standard 0299-E

8/26/2004	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard Mass. Used (G)	Source DPM/G
A. Fehr	0299-F N1	561.0000	26.9000	534.1000	3.38485694	0.0645	2446.372267
	0299-F N2	567.3000	26.9000	540.4000	3.38485694	0.0658	2426.325867
	0299-F N3	540.4000	26.9000	513.5000	3.38485694	0.0652	2326.765061

Mean Value (Counting) = 2399.821065 % of known  
 Stdev = 64.05739118 0.02669257

Certificate Value = 2429.4 dpm/mL  
 Lower Limit = 2271.706283 dpm/mL  
 Upper Limit = 2527.935847 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 128.1147824 dpm/mL  
 10 % of Mean = 239.9821065 dpm/mL  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-E by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 8/26/04 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

Source dpm/g = (A - B)/(C)(D)  
 where:  
 A = Ver. source cpm,  
 B = BKG cpm,  
 C = System efficiency, (cpm/dpm), and  
 D = mass used for standard verification.

RAD SOP M-001

Amanda L. Fehr 8/26/04  
 Heather W. Coe  
 8/26/04

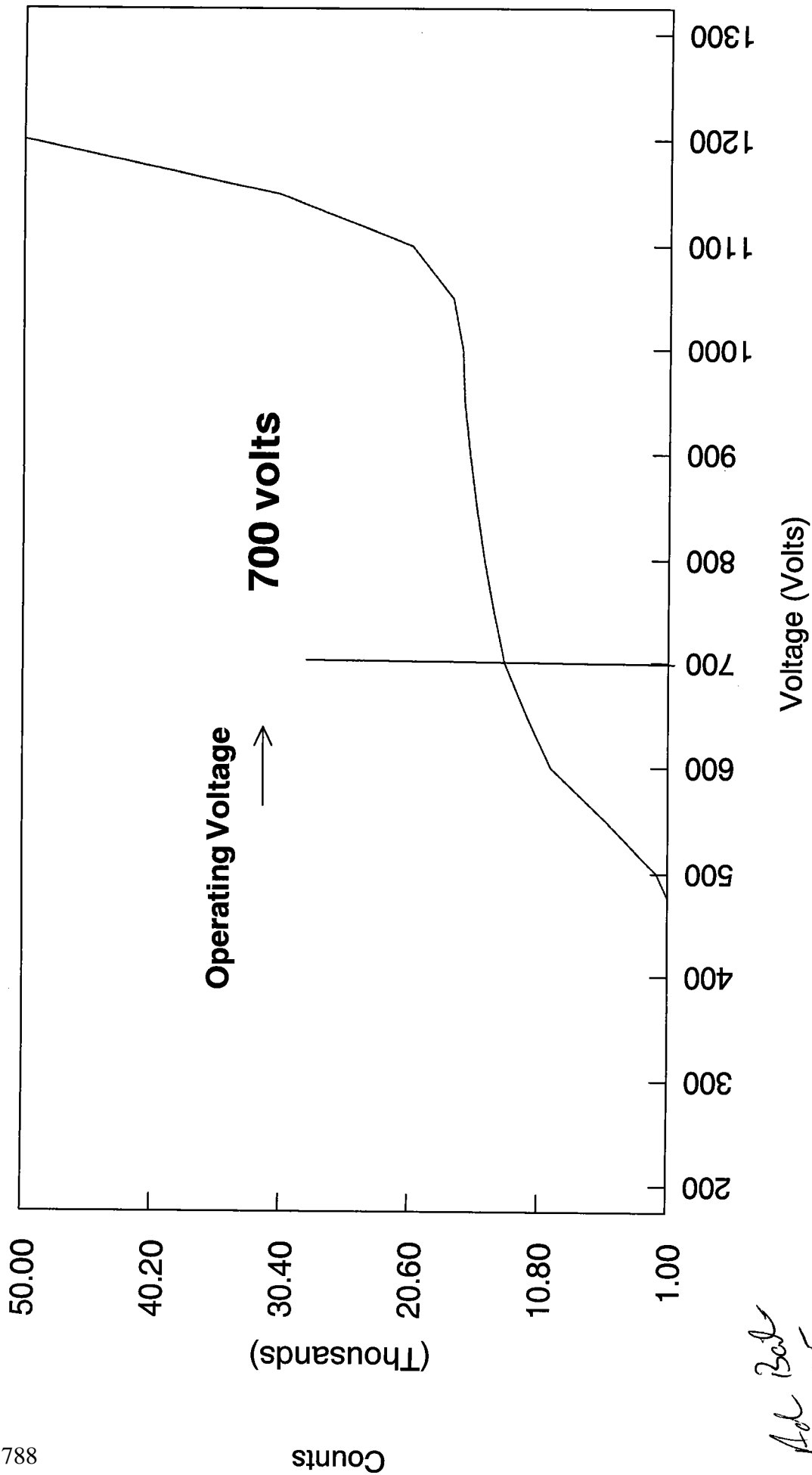
Voltage Curve Ludlum # 2				
Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	4/22/2005	10:00	2
0.25	0	4/22/2005	10:00	2
0.30	0	4/22/2005	10:00	2
0.35	0	4/22/2005	10:00	2
0.40	0	4/22/2005	10:00	2
0.45	36	4/22/2005	10:00	2
0.50	1860	4/22/2005	10:00	2
0.55	5751	4/22/2005	10:00	2
0.60	9916	4/22/2005	10:00	2
0.65	11761	4/22/2005	10:00	2
0.70	13431	4/22/2005	10:00	2
0.75	14254	4/22/2005	10:00	2
0.80	14984	4/22/2005	10:00	2
0.85	15598	4/22/2005	10:00	2
0.90	16129	4/22/2005	10:00	2
0.95	16562	4/22/2005	10:00	2
1.00	16711	4/22/2005	10:00	2
1.05	17428	4/22/2005	10:00	2
1.10	20558	4/22/2005	10:00	2
1.15	30722	4/22/2005	10:00	2
1.20	49527	4/22/2005	10:00	2
1.25	71509	4/22/2005	10:00	2
1.30	115018	4/22/2005	10:00	2

*Adl Barb 5/6/05*

*ADQ  
5/9/05*

# Plateau April, 2005

## Ludlum # 2



Operating Voltage

700 volts

*Ad. Beck*  
*5/6/05*

*ADD*  
*5/9/05*

**Ra-226 WATER**

**Sample ID**

Batch : LCSVER  
 Date : 5/4/2005  
 Analyst : AB1

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 MDA : 1 pCi/L  
 Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

- 201
- 202
- 203
- 204
- 205
- 206
- 207
- 208
- 209
- 210
- 211
- 212

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME	DEGASSING DATE/TIME
VER 1	0.500	30	506	201	1.87	0.267	0.6922	21.6828	1.9348	5/6/2005 12:10	5/3/2005 18:00
VER 8	0.500	30	780	202	1.78	0.167	0.3911	23.0678	1.6346	5/4/2005 13:00	4/29/2005 15:00
VER 2	0.500	30	544	203	1.82	0.267	0.7034	23.7135	2.0374	5/6/2005 12:45	5/3/2005 18:00
VER 10	0.500	30	797	204	1.75	0.200	0.4221	23.6367	1.6597	5/4/2005 14:35	4/29/2005 15:00
VER 2	0.500	30	766	205	1.97	0.167	0.4096	23.7204	1.6964	5/3/2005 16:00	4/29/2005 15:00
VER 11	0.500	30	860	206	1.88	0.167	0.3650	23.7490	1.6012	5/4/2005 15:10	4/29/2005 15:00
VER 3	0.500	30	732	207	1.73	0.267	0.5609	25.5427	1.8811	5/3/2005 16:30	4/29/2005 15:00
VER 3	0.500	30	484	208	1.79	0.233	0.6728	21.3535	1.9442	5/6/2005 13:20	5/3/2005 18:00
VER 4	0.500	30	582	209	1.74	0.267	0.7214	26.0445	2.1602	5/6/2005 13:55	5/3/2005 18:00
VER 6	0.500	30	663	210	1.73	0.267	0.5649	23.2734	1.8040	5/3/2005 22:05	4/29/2005 15:00
VER 5	0.500	30	545	211	1.70	0.067	0.4293	25.0218	2.1124	5/6/2005 15:10	5/3/2005 18:00
VER 6	0.500	30	610	212	1.81	0.067	0.4014	26.1947	2.0891	5/6/2005 15:40	5/3/2005 18:00

*AN Bob 5/19/05*

*Omega A. Johnson 5/19/05*

Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
	2	5/6/2005 12:10	LCS	0321-G	25.42	pCi/L	85%
	2	5/4/2005 13:00	LCS	0321-G	25.42	pCi/L	91%
	2	5/6/2005 12:45	LCS	0321-G	25.42	pCi/L	93%
	2	5/4/2005 14:35	LCS	0321-G	25.42	pCi/L	93%
	2	5/3/2005 16:00	LCS	0321-G	25.42	pCi/L	93%
	2	5/4/2005 15:10	LCS	0321-G	25.42	pCi/L	93%
	2	5/3/2005 16:30	LCS	0321-G	25.42	pCi/L	100%
	2	5/6/2005 13:20	LCS	0321-G	25.42	pCi/L	84%
	2	5/6/2005 13:55	LCS	0321-G	25.42	pCi/L	102%
	2	5/3/2005 22:05	LCS	0321-G	25.42	pCi/L	92%
	2	5/6/2005 15:10	LCS	0321-G	25.42	pCi/L	98%
	2	5/6/2005 15:40	LCS	0321-G	25.42	pCi/L	103%
DE-EMAN. DATE/TIME	DEGASS- DE-EM	dE-EM- COUNT	constant	constant	constant	Net CPM	Ingrowth constant
5/6/2005 8:45	62.75	3.42	0.3773	0.9745	1.0019	16.5997	0.3684
5/4/2005 10:00	115.00	3.00	0.5803	0.9776	1.0019	25.8330	0.5684
5/6/2005 9:30	63.50	3.25	0.3809	0.9758	1.0019	17.8663	0.3723
5/4/2005 11:35	116.58	3.00	0.5853	0.9776	1.0019	26.3667	0.5733
5/3/2005 11:55	92.92	4.08	0.5042	0.9696	1.0019	25.3663	0.4898
5/4/2005 12:10	117.17	3.00	0.5871	0.9776	1.0019	28.4997	0.5751
5/3/2005 12:40	93.67	3.83	0.5070	0.9715	1.0019	24.1330	0.4934
5/6/2005 10:10	64.17	3.17	0.3840	0.9764	1.0019	15.9003	0.3756
5/6/2005 10:55	64.92	3.00	0.3874	0.9776	1.0019	19.1330	0.3795
5/3/2005 15:00	96.00	7.08	0.5156	0.9479	1.0019	21.8330	0.4897
5/6/2005 11:50	65.83	3.33	0.3917	0.9751	1.0019	18.0997	0.3827
5/6/2005 12:25	66.42	3.25	0.3943	0.9758	1.0019	20.2663	0.3855

5/19/05  
Add Data

Angela J. Johnson 5/19/05



CALIBRATION STANDARD DETECTOR # 2

CELL #	END DEGAS TIME	END DE-EM TIME	COUNT TIME	DET #	BKG COUNTS	TOTAL COUNTS	SAMPLE #
201	4/29/05 1500	5/23/05 1055	5/30/05 1515	2	8	637	VER 1
202	4/29/05 1500	5/4/05 1000	5/4/05 1300	2	5	780	VER 8
203	4/29/05 1500	5/4/05 1045	5/4/05 1345	2	6	731	VER 9
204	4/29/05 1500	5/4/05 1135	5/4/05 1435	2	6	797	VER 10
205	4/29/05 1500	5/26/05 1155	5/26/05 1600	2	5	766	VER 2
206	4/29/05 1500	5/4/05 1210	5/4/05 1510	2	5	860	VER 11
207	4/29/05 1500	5/3/05 1240	5/3/05 1630	2	8	732	VER 3
208	4/29/05 1500	5/3/05 1330	5/3/05 1745	2	8	844	VER 4
209	4/29/05 1500	5/3/05 1430	5/3/05 1755	2	8	853	VER 5
210	4/29/05 1500	5/3/05 1500	5/3/05 1805	2	8	663	VER 6
211	4/29/05 1500	5/4/05 1240	5/4/05 1540	2	5	719	VER 12
212	5/29/05 1500	5/27/05 1540	5/27/05 2055	2	6	903	VER 7

ABI 5/6/05

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ABI 5/6/05

ABI 5/6/05

ABI 5/6/05

ABI 5/6/05

AT 5/6/05

CALIBRATION STANDARD DETECTOR # 2

CELL #	END DEGAS TIME	END DE-EM TIME	COUNT TIME	DET #	BKG COUNTS	TOTAL COUNTS	SAMPLE #
201	5/2/05 18:00	5/6/05 845	5/6/05 1210	2	8	506	VER 1
203	5/3/05 18:00	5/6/05 930	5/6/05 1245	2	8	544	VER 2
208	5/3/05 1800	5/6/05 1010	5/6/05 1320	2	7	484	VER 3
209	5/3/05 1800	5/6/05 1055	5/6/05 1355	2	8	582	VER 4
211	5/3/05 1800	5/6/05 1150	5/6/05 1510	2	2	545	VER 5
212	5/3/05 1800	5/6/05 1225	5/6/05 1540	2	2	610	VER 6

ARI 5/6/05

ARI  
5/6/05

## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008, Rev. 8 Isotope Ra-226  
 Date Standards Prepared 9/13/04 Cocktail Type Used N/A  
 Standard ID 0321-G Matrix of Vial/Planchett N/A  
 Amount Used (g or mL) 0.1 N/A  
 Standard Activity (DPM/g or mL) 283.81 Type of Scintillation Vial N/A  
 Reference Date 9/9/91 Pipette ID Used 1429303  
 Expiration Date 9/13/05 Balance ID Used 36040216  
 Residue/Carrier Agent 1 M HCl Quenching Agent N/A

	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER 1				
2	VER 2				
3	VER 3				
4	VER 4				
5	VER 5				
6	VER 6				
7	VER 7				
8	VER 8				
9	VER 9		ABI 51615		
10	VER 10				
11	VER 11				
12	VER 12				
	ABI 516105				

Prepared By: Ade Baird Date: 5/6/05  
 Reviewed By: Angela J. Johnson Date: 5/9/05

Rev 1 RLM.9/10/97

# Verification for Ra-226 Standard 0321-G

A. Fehr  
9/14/2004

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Mass. Used (g)	Standard	Source DPM/g
0321-E N1	1049.0000	68.4000	980.6000	3.416301	1.0000		287.0355979
0321-E N2	1051.6000	68.4000	983.2000	3.416301	1.0000		287.7966549
0321-E N3	1036.2000	68.4000	967.8000	3.416301	1.0000		283.2888554
					Average =		286.0403694

Mean Value (Counting) = 286.0403694  
Stdev = 2.413073537

Certificate Value = 282.2  
Lower Limit = 281.2142223  
Upper Limit = 290.8665165  
Rule 1 Pass/Fail Pass Pass  
Two sigma = 4.826147074  
10 % of Mean = 28.60403694  
Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0321-G by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 1/9/04 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:  
A = Ver. source cpm,  
B = BKG cpm,  
C = System efficiency, (cpm/dpm), and  
D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda J. Fehr*  
9/14/04

*Amelia S. Johnson*  
10/20/04

**General Engineering Laboratories**

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

Lucas Cell Calibration Package

301-311

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate?	✓		
the secondary standard(s) documentation?	✓		
standard preparation information?	✓		
standard < 1 Year old or verified?	✓		
2) Is the efficiency calibration report included ?	✓		
3) Is the raw count data included for: Cell constant determination?	✓		
Plateau generation?	✓		
4) Are the calibration verifications included?	✓		
5) Are the instrument settings included: HVPS settings?	✓		
6) Has the CELLEFF.xls file been updated ?	✓		
7) Have the calibration dates been updated in ALPHALIMS ?	✓		

Prepared By: Angela L. Johnson

Date: 11/23/05

Reviewed By: [Signature]

Date: 11/23/05

Effective Date: 11/23/05

# Ra-226 Cell Constants

Standard Reference date: 12/15/1999  
 standard ID: 0299-E  
 Volume added (mL): 0.1  
 Standard Reference Activity (DPM/mL): 2434.34

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/time flushed to cell	Date/time end of degas	bkg cpm	total counts	count time min	Known activity dpm	t1 (days) end-degas to flush	t2 (days) end-flush to count	t3 (days) Std Ref Date to count	Decay from Std Ref Date to count
301	1.779	Average	11/15/2005 7:20	11/15/2005 4:20	11/9/2005 15:30	0.267	7998	30	266.60	5.53472	0.12500	2162	0.9974
301	1.673	Stdev	11/22/2005 16:50	11/22/2005 8:45	11/15/2005 12:40	0.267	8118	30	270.60	6.83681	0.33681	2170	0.9974
301	1.835		11/9/2005 6:30	11/9/2005 5:15	10/30/2005 13:15	0.267	6316	30	210.53	3.66667	0.13542	2150	0.9975
302	1.770	Average	11/15/2005 9:20	11/15/2005 5:00	11/9/2005 15:30	0.267	7901	30	263.37	5.56250	0.18056	2162	0.9974
302	1.796	Stdev	11/9/2005 8:50	11/9/2005 5:40	11/4/2005 14:20	0.133	7237	30	241.23	4.63889	0.13194	2156	0.9974
302	1.891		11/2/2005 11:25	11/2/2005 8:05	10/30/2005 13:15	0.267	5309	30	176.97	2.78472	0.13889	2149	0.9975
303	1.980	Average	11/22/2005 17:20	11/22/2005 9:25	11/15/2005 12:40	0.267	9639	30	321.30	6.86458	0.32986	2170	0.9974
303	2.103	Stdev	11/8/2005 7:50	11/8/2005 4:30	11/4/2005 14:20	0.267	7124	30	237.47	3.59028	0.13889	2155	0.9974
303	2.104		11/2/2005 10:50	11/2/2005 7:30	10/30/2005 13:15	0.267	5867	30	195.57	2.76042	0.13889	2149	0.9975
304	1.777	Average	11/15/2005 10:05	11/15/2005 5:30	11/9/2005 15:30	0.267	7935	30	264.50	5.58333	0.19097	2162	0.9974
304	1.867	Stdev	11/8/2005 11:35	11/8/2005 8:35	11/4/2005 14:20	0.200	6549	30	218.30	3.76042	0.12500	2155	0.9974
304	1.999		11/3/2005 10:40	11/3/2005 7:40	10/30/2005 13:15	0.267	7022	30	234.07	3.76736	0.12500	2150	0.9975
305	1.763	Average	10/31/2005 11:10	10/31/2005 7:30	10/16/2005 14:30	0.267	11585	30	386.17	14.70883	0.15278	2147	0.9975
305	1.787	Stdev	11/8/2005 8:25	11/8/2005 5:10	11/4/2005 14:20	0.133	6089	30	202.97	3.61806	0.13542	2155	0.9974
305	1.728		11/15/2005 10:40	11/15/2005 6:30	11/9/2005 15:30	0.267	7776	30	259.20	5.62500	0.17361	2162	0.9974
306	1.845	Average	11/15/2005 11:10	11/15/2005 7:10	11/9/2005 15:30	0.267	8332	30	277.73	5.65278	0.16667	2162	0.9974
306	1.779	Stdev	11/8/2005 12:10	11/8/2005 9:10	11/4/2005 14:20	0.267	6270	30	209.00	3.78472	0.12500	2156	0.9974
306	1.854		11/22/2005 17:35	11/22/2005 10:15	11/15/2005 12:40	0.267	9139	30	304.63	6.89931	0.30556	2170	0.9974
307	1.908	Average	11/15/2005 11:45	11/15/2005 7:45	11/9/2005 15:30	0.267	8637	30	287.90	5.67708	0.16667	2162	0.9974
307	1.850	Stdev	11/8/2005 9:55	11/8/2005 6:55	11/4/2005 14:20	0.267	6409	30	213.63	3.69097	0.12500	2155	0.9974
307	1.949		11/3/2005 10:10	11/3/2005 7:10	10/30/2005 13:15	0.267	6822	30	227.40	3.74653	0.12500	2150	0.9975
308	1.914	Average	11/15/2005 15:30	11/15/2005 8:20	11/9/2005 15:30	0.267	8483	30	282.77	5.70139	0.29861	2163	0.9974
308	1.746	Stdev	11/8/2005 10:25	11/8/2005 7:25	11/4/2005 14:20	0.133	6089	30	202.30	3.71181	0.12500	2155	0.9974
308	2.059		11/2/2005 9:30	11/2/2005 5:55	10/30/2005 13:15	0.267	5626	30	187.53	2.69444	0.14931	2149	0.9975
309	1.831	Average	11/15/2005 15:30	11/15/2005 9:00	11/9/2005 15:30	0.267	8177	30	272.57	5.72917	0.27083	2163	0.9974
309	1.921	Stdev	11/22/2005 19:30	11/22/2005 12:15	11/15/2005 12:40	0.267	9480	30	316.00	6.98264	0.30208	2170	0.9974
309	1.934		11/3/2005 13:10	11/3/2005 9:15	10/30/2005 13:15	0.267	6829	30	227.63	3.83333	0.16319	2151	0.9975
310	1.834	Average	11/22/2005 19:30	11/22/2005 14:50	11/15/2005 12:40	0.200	9298	30	309.93	7.09028	0.19444	2170	0.9974
310	2.007	Stdev	11/8/2005 13:10	11/8/2005 9:50	11/4/2005 14:20	0.267	7093	30	236.43	3.81250	0.13889	2156	0.9974
310	2.125		11/2/2005 7:50	11/2/2005 4:30	10/30/2005 13:15	0.267	5717	30	190.57	2.63542	0.13889	2149	0.9975
311	1.916	Average	11/18/2005 7:40	11/18/2005 7:40	11/15/2005 12:40	0.267	5527	30	184.23	2.79167	0.00000	2165	0.9974
311	1.783	Stdev	11/8/2005 14:15	11/8/2005 10:30	11/4/2005 14:20	0.267	6315	30	210.50	3.84028	0.15625	2156	0.9974
311	1.882		11/2/2005 8:25	11/2/2005 5:15	10/30/2005 13:15	0.267	5118	30	170.60	2.66667	0.13194	2149	0.9975

*Owens*  
 11/23/05

# CALS 3

AAQ  
11/23/05

## Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 12	500	10/16/05 1430	10/31/05 450	10/31/05 850	301	3	8	9387
CAL 13	500	10/16/05 1430	10/31/05 530	10/31/05 930	302	3	8	10818
CAL 17	500	10/16/05 1430	10/31/05 625	10/31/05 1010	303	3	8	12225
CAL 18	500	10/16/05 1430	10/31/05 700	10/31/05 1040	304	3	8	11119
CAL 19	500	10/16/05 1430	10/31/05 730	10/31/05 1110	305	3	8	11585
CAL 20	500	10/16/05 1430	10/31/05 800	10/31/05 1145	306	3	8	10159
CAL 21	500	10/16/05 1430	10/31/05 830	10/31/05 1230	307	3	8	9445
CAL 22	500	10/16/05 1430	10/31/05 930	10/31/05 1415	308	3	8	9343
CAL 24	500	10/16/05 1430	11/1/05 415	11/1/05 725	309	3	8	10301
CAL 14	500	10/16/05 1430	11/5/05 1030	11/5/05 1420	310	3	6	7913
CAL 15	500	10/16/05 1430	11/5/05 1110	11/5/05 1550	311	3	8	6007
/								

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~~CALS 3~~

ADG 11/23/05 Ra-226 Verification Sheet

ADG 11/23/05

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ADG 11/23/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1		10/30/05 1315	11/21/05 430	11/21/05 750	310	3	8	5717
CAL 2		10/30/05 1315	11/21/05 515	11/21/05 825	311	3	8	5118
CAL 3		10/30/05 1315	11/21/05 555	11/21/05 930	308	3	8	5626
<del>CAL 4</del>		<del>10/30/05 1315</del>	<del>11/21/05 655</del>	<del>11/21/05 1005</del>	<del>306</del>	<del>3</del>	<del>8</del>	<del>6292</del>
CAL 5		10/30/05 1315	11/21/05 730	11/21/05 1050	303	3	8	5867
CAL 6		10/30/05 1315	11/21/05 805	11/21/05 1125	302	3	8	5309
CAL 7		10/30/05 1315	11/21/05 515	11/21/05 830	301	3	8	6316
<del>CAL 8</del>		<del>10/30/05 1315</del>	<del>11/21/05 630</del>	<del>11/21/05 930</del>	<del>305</del>	<del>3</del>	<del>8</del>	<del>7239</del>
CAL 9		10/30/05 1315	11/21/05 710	11/21/05 1010	307	3	8	4822
CAL 10		10/30/05 1315	11/21/05 740	11/21/05 1040	304	3	8	7022
CAL 11		10/30/05 1315	11/21/05 915	11/21/05 1310	309	3	8	6829
/								



CAL-3 ADQ 11/23/05

Ra-226 Verification Sheet

ADQ 11/23/05

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ADQ 11/23/05

ADQ 11/23/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1		11/4/05 1420	11/8/05 430	11/8/05 750	303	3	8	7124
CAL 2		11/4/05 1420	11/8/05 510	11/8/05 825	305	3	4	6089
CAL 3		11/4/05 1420	11/8/05 545	11/8/05 900	307	3	2	6349
CAL 4		11/4/05 1420	11/8/05 655	11/8/05 955	307	3	8	6409
CAL 5		11/4/05 1420	11/8/05 725	11/8/05 1025	308	3	4	6069
CAL 6		11/4/05 1420	11/8/05 800	11/8/05 1105	309	3	7	6116
CAL 7		11/4/05 1420	11/8/05 835	11/8/05 1135	304	3	6	6549
CAL 8		11/4/05 1420	11/8/05 910	11/8/05 1210	306	3	8	6270
CAL 9		11/4/05 1420	11/8/05 950	11/8/05 1310	310	3	8	7093
CAL 10		11/4/05 1420	11/8/05 1030	11/8/05 1415	311	3	8	6315
CAL 11		11/4/05 1420	11/9/05 540	11/9/05 850	302	3	4	7237
/								

CALS 3

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 10		11/9/05 1530	11/15/05 420	11/15/05 720	301	3	8	7998
CAL 12		11/9/05 1530	11/15/05 860	11/15/05 920	302	3	8	7901
CAL 14		11/9/05 1530	11/15/05 6530	11/15/05 1005	304	3	8	7935
CAL 15		11/9/05 1530	11/15/05 630	11/15/05 1040	305	3	8	7776
CAL 16		11/9/05 1530	11/15/05 710	11/15/05 1110	306	3	8	8332
CAL 17		11/9/05 1530	11/15/05 745	11/15/05 1145	307	3	8	8637
CAL 18		11/9/05 1530	11/15/05 820	11/15/05 1415	308	3	8	8483
CAL 19		11/9/05 1530	11/15/05 900	11/15/05 1530	309	3	8	9177
CAL 20		11/9/05 1530	11/15/05 950	11/15/05 1600	311	3	8	7127
/								

ADD  
11/23/05

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Ra-226 Verification Sheet

AF  
11/23/05

AF 11/23/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CALI		11/15/05 1240	11/18/05 440	11/18/05 740	311	3	8	5527

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 12	500	11/15/05 1240	11/22/05 845	11/22/05 1650	301	3	8 = 0.267	8118
CAL 13	500	11/15/05 1240	11/22/05 925	11/22/05 1720	303	3	8 = 0.267	9639
CAL 14	500	11/15/05 1240	11/22/05 1015	11/22/05 1735	304	3	8 = 0.267	9139
<del>CAL 15</del>	<del>500</del>	<del>11/15/05 1240</del>	<del>11/22/05 1105</del>	<del>11/22/05 1840</del>	<del>308</del>	<del>3</del>	<del>8 = 0.267</del>	<del>8234</del>
CAL 16	500	11/15/05 1240	11/22/05 1215	11/22/05 1930	309	3	8 = 0.267	9480
CAL 17	500	11/15/05 1240	11/22/05 1450	11/22/05 2000	310	3	8 = 0.267	9298
/								

JAH 11/23/05

JAH 11/23/05

JAH 11/23/05

**General Engineering Laboratories  
Calibration Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used NA  
 Standard ID 0299-E Matrix of Vial/Planchett NA  
 Amount Used (g or  $\text{mL}$ ) 0.1 NA  
 Standard Activity (DPM/g or  $\text{mL}$ ) 2434.34 Type of Scintillation Vial NA  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 11/4/06 Balance ID Used 28488  
 Residue/Carrier Agent 0.5 M HCl Quenching Agent NA

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL1				
2	CAL2				
3	CAL3				
4	CAL4				
5	CAL5				
6	CAL6				
7	CAL7				
8	CAL8				
9	CAL9				
10	CAL10				
11	CAL11				
12	CAL12				
13	CAL13				
14	CAL14				
15	CAL15				

JLQ 11/23/05

Prepared By: Angela J. Johnson Date 11/23/05  
 Reviewed By: John C. Smith Date 11/23/05

Rev 1 RLM 9/10/97

## General Engineering Laboratories Calibration Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008 Isotope Ra-224  
 Date Standards Prepared 8/26/03 Cocktail Type Used NA  
 Standard ID 0299-E Matrix of Vial/Planchett NA  
 Amount Used (g or ml) 0.1 NA  
 Standard Activity (DPM/g or ml) 2434.34 Type of Scintillation Vial NA  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 11/4/06 Balance ID Used 28488  
 Residue/Carrier Agent 0.5M HCl Quenching Agent NA

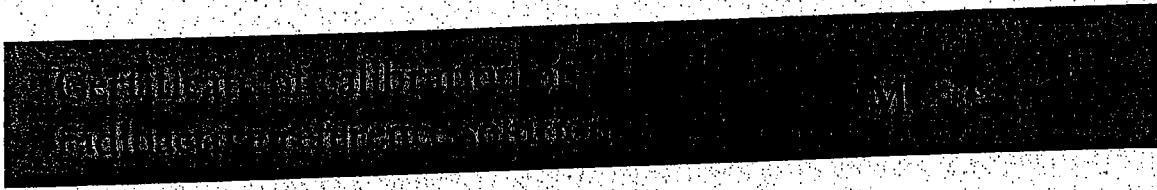
	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
16	CAL 16				
17	CAL 17				
18	CAL 18				
19	CAL 19				
20	CAL 20				
21	CAL 21				
22	CAL 22				
23	CAL 23				
24	CAL 24				

AQ 11/23/05

AQ 11/23/05

Prepared By: Angela F. Johnson Date 11/23/05  
 Reviewed By: Let C. ... Date 11/23/05

02.7



Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED  
FOR:

AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

Reference time: 1200 GMT on 15 December 1999

Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which for a  $t$ -distribution with  $\nu_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

*[Handwritten signature]*  
Page 494 of 788

Date of  
issue

17<sup>th</sup> December 1999

0299

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:  
The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999

The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5 \%$

Combined Type A uncertainty:  $\pm 0.2 \%$

Combined Type B uncertainty:  $\pm 1.3 \%$

Radiochemical The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Chemical Carrier free in 0.5M HCl  
position

Remarks This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.



# Verification for Ra-226 Standard 0299-E

Standard	Source DPM/G
0.2000	2461.082289
0.2000	2411.298509
0.2000	2383.559208
0.2000	2418.646669

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	mL used
0299-F N1	1340.3000	0.6000	1339.7000	2.72177002	0.2000
0299-F N2	1313.2000	0.6000	1312.6000	2.72177002	0.2000
0299-F N3	1298.1000	0.6000	1297.5000	2.72177002	0.2000

Mean Value (Counting) = 2418.646669  
 Stdev = 39.28044852  
 % of known = 99.6090287  
 0.01624067

Certificate Value = 2428.1 dpm/mL  
 Lower Limit = 2340.085772 dpm/mL  
 Upper Limit = 2497.207566 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 78.56089703 dpm/mL  
 10 % of Mean = 241.8646669 dpm/mL  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-E by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 8 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 11/4/05 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD SOP M-001

*Amenda J. Feher 11/4/05  
 Amenda J. Feher 11/4/05*

**PROTOCOL** : 8 Ra-226 ver  
**DATE** : 2005/11/04  
**TIME** : 11:47  
**ID** : P08AS001

**Ra226**

**Wallac 1414 WinSpectral v1.40 S/N 4140127**  
**Counting mode** : CPM  
**Isotope(s)** : Ra226  
**Ra226** = 400- 900,Alpha,1602.12 y  
**Protocol name** : Ra-226 ver  
**Counting time** : 300  
**Repeats** : 1  
**Cycles** : 1  
**Replicates** : 1  
**2 sigma %** : 0.01  
**Minimum cpm** : 0.00 **Checking time: 10**  
**Advanced modes** : Halflife,PSA,Chemilum  
**Halflife zerotime** : Start of assay  
**PSA level** : low  
**Output to Display** :  
**POS,DATE,CTIME,RACK,RACKPOS,ETIME,SQPE,CPM1,CPM**  
**Additions to Display** : Spectrum,Header,Listing  
**Header** : Ra226  
**Spectrum** : Rnd.Cos,Alpha  
**Window 1** : 1-1024 /Alpha  
**Window 2** : 1-1024 /Beta  
**Window 3** : 1-1024 /Beta  
**Window 4** : 1-1024 /Beta  
**Window 5** : 1-1024 /Beta  
**Window 6** : 1-1024 /Beta  
**FNCT1 = FNCT1** :  
**FNCT2 = FNCT2** :  
**FNCT3 = FNCT3** :  
**FNCT4 = FNCT4** :

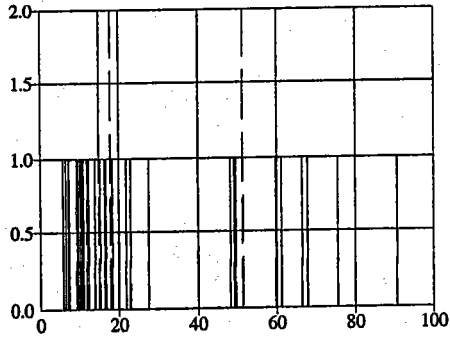
**Total count rate:**  
**Ra226 10537.9 CPM**

*Amanda L. Feh*  
 11/4/05

*AQ*  
 11/4/05

POS	CTIME	SQPI	CPM	CPM1
-----	-------	------	-----	------

1	300		23.50	1.90
---	-----	--	-------	------

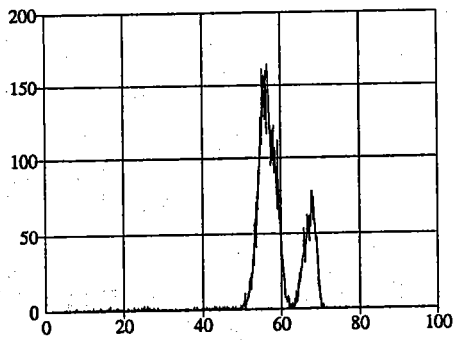


Counts Chem

Counts Alpha

*Blg*

2	300		4697.50	2217.70
---	-----	--	---------	---------

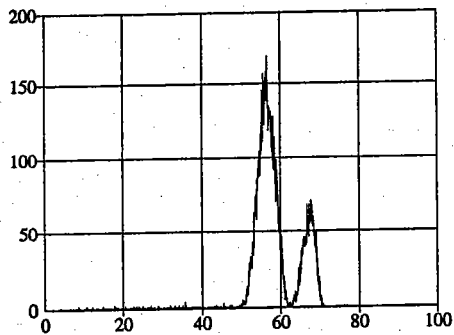


Counts Chem

Counts Alpha

*0321-A*

3	300		4542.00	2191.80
---	-----	--	---------	---------



Counts Chem

Counts Alpha

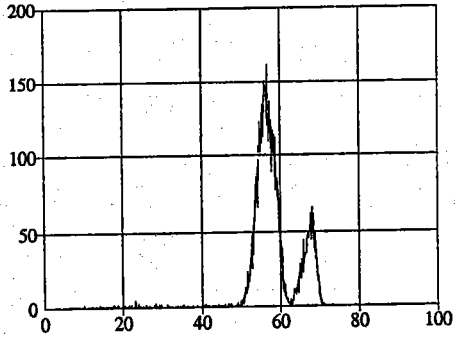
*0321-A*

*ALF 11/4/05*

*ALF 11/4/05*

POS CTIME SQPI CPM CPM1

4 300 4376.00 2174.30

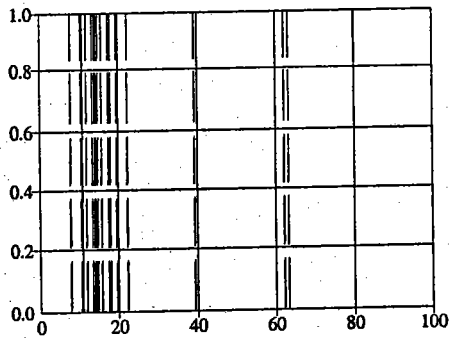


Counts Chem

Counts Alpha

0321-A

5 300 19.50 0.60

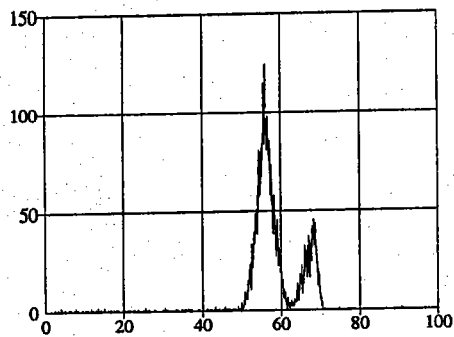


Counts Chem

Counts Alpha

Bkg

6 300 1930.20 1340.30



Counts Chem

Counts Alpha

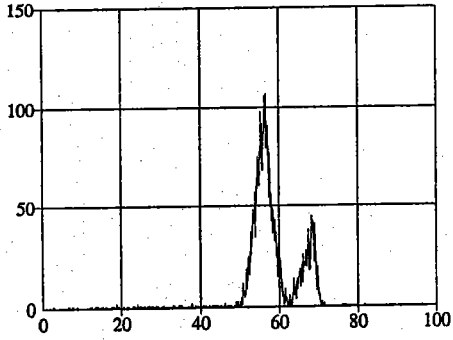
0299-E

ALF 11/4/05

AQ  
11/4/05

POS CTIME SQPI CPM CPM1

7 300 1906.90 1313.20

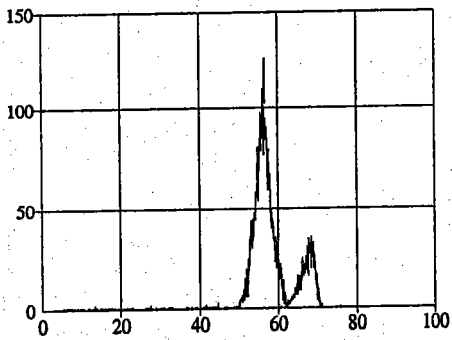


Counts Chem

Counts Alpha

0299-E

8 300 1835.40 1298.10



Counts Chem

Counts Alpha

0299-E

JKQ  
11/4/05

# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0299	Isotope:	Radium-226
Prepared By:	Angela Albee	Prepared By:	Angela Albee
Carrier Conc:	0.5 M HCL	Prep Date:	09/15/2000
Reference Date:	12/15/1999	Verification Date:	08/26/2004
Ampoule Mass (g):	5.0368 g	Expiration Date:	08/26/2005
Uncertainty:	+/- 2.5 %	Primary Code:	0299-A
LogBook No:	RC S 027 128	Dilution(mL):	100 mL
		Mass of Parent(g):	4.6634 g
		Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Albee	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Albee	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Albee	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Albee	1.9909	100	0299-E	2434.34 dpm/mL	11/04/2004	11/04/2005
08/26/2003	Angela Albee	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005
04/05/2005	Amanda Fehr	5.0018	250	0299-G	2446.3471 dpm/mL	04/06/2005	04/06/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

AIQ  
11/4/05

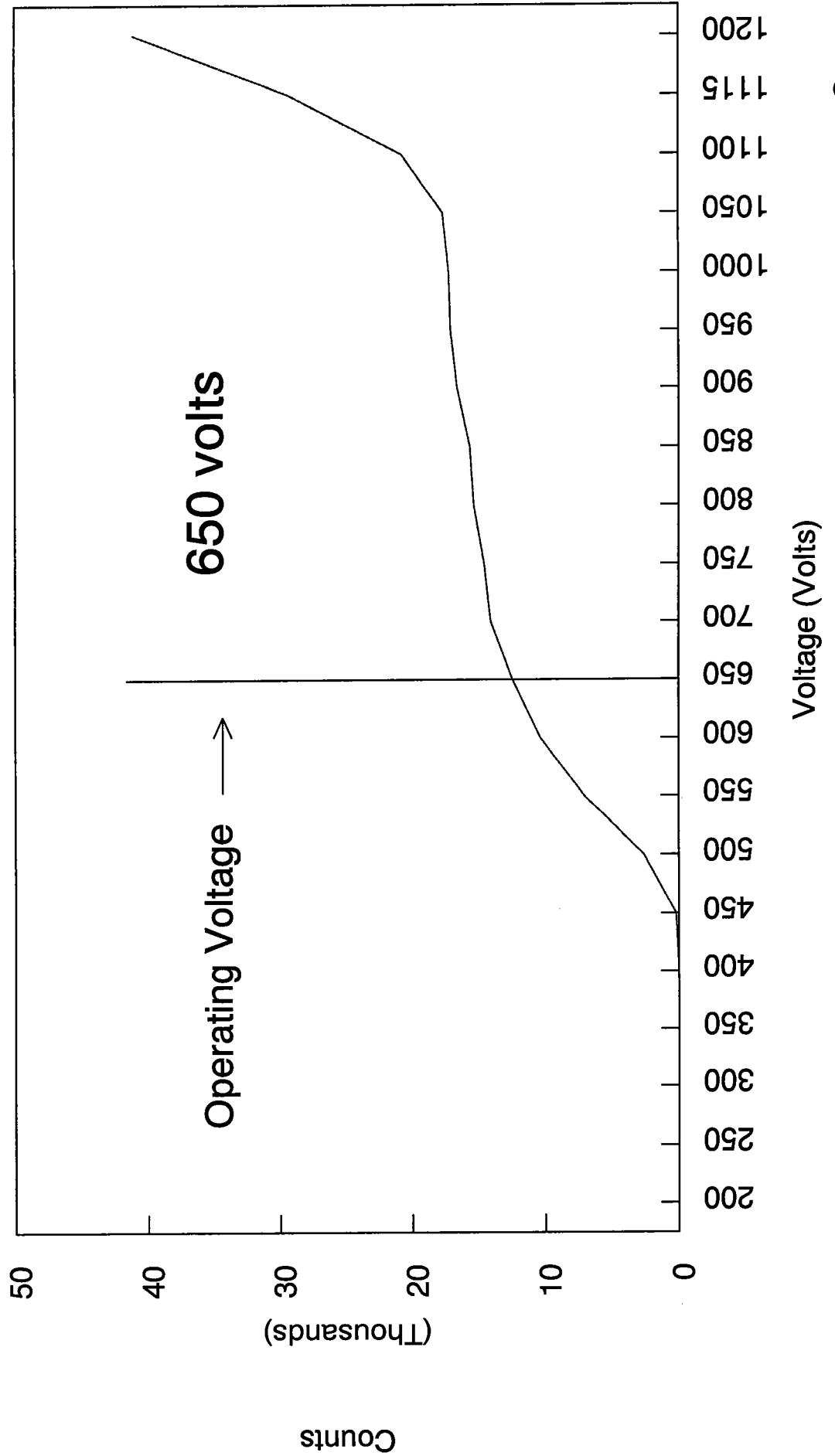
VOLTAGE CURVE DET 10-03

Voltage Curve Ludlum # 3				
Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	11/14/2005	14:00	3
0.25	0	11/14/2005	14:01	3
0.30	0	11/14/2005	14:02	3
0.35	0	11/14/2005	14:03	3
0.40	0	11/14/2005	14:04	3
0.45	5	11/14/2005	14:05	3
0.50	235	11/14/2005	14:06	3
0.55	329	11/14/2005	14:07	3
0.60	412	11/14/2005	14:08	3
0.65	452	11/14/2005	14:09	3
0.70	463	11/14/2005	14:10	3
0.75	448	11/14/2005	14:11	3
0.80	483	11/14/2005	14:12	3
0.85	511	11/14/2005	14:13	3
0.90	465	11/14/2005	14:14	3
0.95	491	11/14/2005	14:15	3
1.00	495	11/14/2005	14:16	3
1.05	506	11/14/2005	14:17	3
1.10	733	11/14/2005	14:18	3
1.15	1398	11/14/2005	14:19	3
1.20	2869	11/14/2005	14:20	3

*Handwritten signature*  
11/23/05

# Plateau November, 2005

Ludlum # 3



AD  
11/23/05



# Ra-226 WATER

Sample ID

Batch : LCSVER  
 Date : 11/1/2005  
 Analyst : JMB1

Procedure Code : LUC26RAL  
 Parminame : Radium-226  
 MDA : 1 pCi/L

Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

- 1
- 2
- 3
- 4
- 5
- 4
- 7
- 5
- 6
- 10
- 11

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME	DEGASSING DATE/TIME
1	0.500	30	694	301	1.762	0.267	0.5476	23.6277	1.7887	11/5/2005 13:14	11/1/2005 12:15
2	0.500	30	594	302	1.819	0.267	0.5181	19.0959	1.5671	11/5/2005 13:50	11/1/2005 12:15
3	0.500	30	911	303	2.062	0.200	0.4087	26.1845	1.7173	11/18/2005 13:00	11/14/2005 12:00
4	0.500	30	1120	304	1.881	0.233	0.3092	22.8964	1.3536	11/10/2005 7:30	11/1/2005 12:15
5	0.500	30	1017	305	1.759	0.267	0.3662	23.2385	1.4452	11/9/2005 10:45	11/1/2005 12:15
4	0.500	30	836	306	1.829	0.233	0.4975	27.4401	1.8836	11/18/2005 15:45	11/14/2005 12:00
7	0.500	30	987	307	1.902	0.267	0.3353	20.6474	1.3039	11/9/2005 10:25	11/1/2005 12:15
5	0.500	30	920	308	1.907	0.267	0.5062	29.0398	1.9012	11/18/2005 17:15	11/14/2005 12:00
6	0.500	30	885	309	1.895	0.267	0.5070	27.9649	1.8677	11/18/2005 17:46	11/14/2005 12:00
10	0.500	30	981	310	1.989	0.267	0.3079	18.8463	1.1939	11/10/2005 10:35	11/1/2005 12:15
11	0.500	30	965	311	1.861	0.233	0.3113	19.8446	1.2658	11/10/2005 9:55	11/1/2005 12:15

*Angela L. Johnson*  
 11/23/05

Cell #	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
301	3	11/5/2005 13:14	LCS	0321-H	24.14	pCi/L	98%
302	3	11/5/2005 13:50	LCS	0321-H	24.14	pCi/L	79%
303	3	11/18/2005 13:00	LCS	0321-H	24.14	pCi/L	108%
304	3	11/10/2005 7:30	LCS	0321-H	24.14	pCi/L	95%
305	3	11/9/2005 10:45	LCS	0321-H	24.14	pCi/L	96%
306	3	11/18/2005 15:45	LCS	0321-H	24.14	pCi/L	114%
307	3	11/9/2005 10:25	LCS	0321-H	24.14	pCi/L	86%
308	3	11/18/2005 17:15	LCS	0321-H	24.14	pCi/L	120%
309	3	11/18/2005 17:46	LCS	0321-H	24.14	pCi/L	116%
310	3	11/10/2005 10:35	LCS	0321-H	24.14	pCi/L	78%
311	3	11/10/2005 9:55	LCS	0321-H	24.14	pCi/L	82%

DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
11/5/2005 9:50	93.58	3.40	0.5067	0.9747	1.0019	22.8663	0.4948
11/5/2005 11:45	95.50	2.08	0.5137	0.9844	1.0019	19.5330	0.5067
11/18/2005 10:45	94.75	2.25	0.5110	0.9832	1.0019	30.1667	0.5033
11/10/2005 4:30	208.25	3.00	0.7924	0.9776	1.0019	37.1003	0.7761
11/9/2005 7:40	187.42	3.08	0.7571	0.9770	1.0019	33.6330	0.7411
11/18/2005 11:10	95.17	4.58	0.5125	0.9660	1.0019	27.6337	0.4960
11/9/2005 8:25	188.17	2.00	0.7584	0.9850	1.0019	32.6330	0.7485
11/18/2005 11:45	95.75	5.50	0.5147	0.9598	1.0019	30.3997	0.4947
11/18/2005 12:20	96.33	5.43	0.5168	0.9598	1.0019	29.2330	0.4970
11/10/2005 7:25	211.17	3.17	0.7970	0.9764	1.0019	32.4330	0.7796
11/10/2005 6:50	210.58	3.08	0.7961	0.9770	1.0019	31.9337	0.7792

*Angelica Johnson*  
11/23/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VER 2	500	11/1/05 12:15	11/5/05 9:50	11/5/05 13:14	301	3	8	694
VER 3	500	11/1/05 12:15	11/5/05 11:45	11/5/05 13:50	302	3	8	594
VER 4	500	11/1/05 12:15	11/9/05 7:00	11/9/05 10:00 11/9/05 10:00	303	3	4	990
VER 5	500	11/1/05 12:15	11/9/05 7:40	11/9/05 10:45	305	3	8	1017
VER 6	500	11/1/05 12:15	11/9/05 8:25	11/9/05 10:35	307	3	8	987
VER 7	500	11/1/05 12:15	11/9/05 9:00	11/9/05 12:00	308	3	5	705
VER 8	500	11/1/05 12:15	11/10/05 4:30	11/10/05 7:30	304	3	8	1120
VER 9	500	11/1/05 12:15	11/10/05 5:05	11/10/05 8:20	306	3	8	951
VER 10	500	11/1/05 12:15	11/10/05 5:40	11/10/05 9:00	309	3	8	888
VER 11	500	11/1/05 12:15	11/10/05 6:50	11/10/05 9:55	311	3	8	966
VER 12	500	11/1/05 12:15	11/10/05 7:25	11/10/05 10:35	310	3	8	981
/								

AKD 11/23/05

AKD 11/23/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VER-1	500	11/14/05 1200	11/17/05 625	11/17/05 1030	302	3	8 = 0.267	954
VER-3	500	11/14/05 1200	11/18/05 1045	11/18/05 1300	303	3	8 = 0.267	911
VER-4	500	11/14/05 1200	11/18/05 1110	11/18/05 1545	306	3	8 = 0.267	834
VER-5	500	11/14/05 1200	11/18/05 1145	11/18/05 1715	308	3	8 = 0.267	920
VER-6	500	11/14/05 1200	11/18/05 1220	11/18/05 1746	309	3	8 = 0.267	885

11/23/11  
JJA

5014211 DAK

## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number EL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 5/18/05 Cocktail Type Used NA  
 Standard ID 0321-H Matrix of Vial/Planchett NA  
 Amount Used (g or ml) 0.1 NA  
 Standard Activity (DPM/g or ml) 269.6188 Type of Scintillation Vial NA  
 Reference Date 9/9/91 Pipette ID Used 1429303  
 Expiration Date 5/20/06 Balance ID Used 28488  
 Residue/Carrier Agent 1M HCl Quenching Agent NA

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER1				
2	VER2				
3	VER3				
4	VER4				
5	VER5				
6	VER6				
7	VER7				
8	VER8				
9	VER9				
10	VER10				
11	VER11				
12	VER12				

AQ 11/23/05

AQ 11/23/05

Prepared By: Angela J. Johnson Date 11/23/05  
 Reviewed By: W.C. Hall Date 11/24/05

# Verification for Ra-226 Standard 0321-H

A. Fehr  
5/20/2005

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source DPM/mL
0321-H N1	1170.1000	34.2000	1135.9000	4.20643586	270.0385881
0321-H N2	1137.8000	34.2000	1103.6000	4.20643586	262.3598783
0321-H N3	1149.6000	34.2000	1115.4000	4.20643586	265.1651036
					Average = 265.8545233

Mean Value (Counting) = 265.8545233  
Stdev = 3.885501322

99.1905663  
0.01461514 Rule 3 (Pass/Fail)

Certificate Value = 268.0  
Lower Limit = 258.0835207  
Upper Limit = 273.625526  
Rule 1 Pass/Fail Pass  
Two sigma = 7.771002644  
10 % of Mean = 26.58545233  
Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0321-H by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 5/20/05 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

Amanda L. Fehr 5/20/05  
Angela A. Johnson 5/24/05

# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414  
 (843)556-8171

## Lucas Cell Calibration Package

401 - 412

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the secondard standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the efficiency calibration report included ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Is the raw count data included for: Cell constant determination? Plateau generation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Are the calibration verifications included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the instrument settings included: HVPS settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Has the CELLEFF.xls file been updated ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7) Have the calibration dates been updated in ALPHALIMS ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Adh Bal Date: 11/4/05  
 Reviewed By: Angela Johnson Date: 11/4/05  
 Effective Date: 11/4/05

# Ra-226 Cell Constants

Standard Reference date: 12/15/1999  
standard ID: 0.299-E  
Volume added (mL): 0.1  
Standard Reference Activity (DPM/mL): 2434.34

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	bkg cpm	total counts	count time min	cpm	activity dpm	t1 (days) end-to-flush to count	t2 (days) end-flush to count	t3 (days) Std Ref Date to count	Decay from Std Ref Date to count
401	1.984	1.913	9/29/2005 8:40	9/29/2005 5:30	9/26/2005 12:30	0.033	5453	30	181.77	242.82	2.70833	0.13194	2115	0.9975
401	1.871	0.062	10/3/2005 10:45	10/3/2005 5:00	9/30/2005 11:15	0.267	5096	30	169.87	242.82	2.73958	0.23958	2119	0.9975
401	1.882		10/20/2005 9:55	10/20/2005 6:35	10/16/2005 14:30	0.267	6477	30	215.90	242.82	3.67014	0.13889	2136	0.9975
402	1.914	1.999	9/29/2005 10:05	9/29/2005 6:50	9/26/2005 12:30	0.133	5343	30	178.10	242.82	2.76389	0.13542	2115	0.9975
402	1.952	0.116	10/4/2005 8:25	10/4/2005 5:05	9/30/2005 11:15	0.267	6812	30	227.07	242.82	3.74306	0.13889	2120	0.9975
402	2.131		10/19/2005 12:50	10/19/2005 8:30	10/16/2005 14:30	0.267	5880	30	196.00	242.82	2.75000	0.18056	2136	0.9975
403	1.895	1.891	9/30/2005 8:20	9/30/2005 5:10	9/26/2005 12:30	0.167	6556	30	218.53	242.82	3.69444	0.13194	2116	0.9975
403	1.838	0.052	10/13/2005 10:40	10/13/2005 7:40	10/7/2005 12:40	0.267	8481	30	282.70	242.82	5.79167	0.12500	2129	0.9975
403	1.941		10/20/2005 8:55	10/20/2005 5:20	10/16/2005 14:30	0.133	6597	30	219.90	242.82	3.61806	0.14931	2136	0.9975
404	1.731	1.770	10/14/2005 8:35	10/14/2005 5:00	10/7/2005 12:40	0.200	8589	30	286.30	242.82	6.68056	0.14931	2130	0.9975
404	1.730	0.068	10/19/2005 8:55	10/19/2005 5:50	10/16/2005 14:30	0.033	4662	30	155.40	242.82	2.63889	0.12847	2135	0.9975
404	1.848		10/24/2005 8:35	10/24/2005 5:05	10/16/2005 14:30	0.267	9777	30	325.90	242.82	7.60764	0.14583	2140	0.9975
405	1.911	1.878	9/29/2005 11:15	9/29/2005 8:15	9/26/2005 12:30	0.267	5435	30	181.17	242.82	2.82292	0.12500	2115	0.9975
405	1.917	0.062	9/30/2005 10:55	9/30/2005 9:25	9/27/2005 11:00	0.200	5679	30	189.30	242.82	2.93403	0.06250	2116	0.9975
405	1.807		10/3/2005 13:15	10/3/2005 6:20	9/30/2005 11:15	0.267	4953	30	165.10	242.82	2.79514	0.28819	2120	0.9975
406	1.782	1.908	10/12/2005 9:20	10/12/2005 5:50	10/7/2005 12:40	0.200	7239	30	241.30	242.82	4.71528	0.14583	2128	0.9975
406	2.074	0.151	10/19/2005 12:05	10/19/2005 7:50	10/16/2005 14:30	0.267	5684	30	189.47	242.82	2.72222	0.17708	2136	0.9975
406	1.867		10/24/2005 10:10	10/24/2005 6:45	10/16/2005 14:30	0.267	9925	30	330.83	242.82	7.67708	0.14236	2140	0.9975
407	1.808	1.803	9/29/2005 11:55	9/29/2005 8:55	9/26/2005 12:30	0.200	5179	30	172.63	242.82	2.85069	0.12500	2115	0.9975
407	1.820	0.020	9/30/2005 9:50	9/30/2005 5:45	9/26/2005 12:30	0.267	6285	30	209.50	242.82	3.71875	0.17014	2116	0.9975
407	1.781		10/4/2005 9:00	10/4/2005 5:45	9/30/2005 11:15	0.067	6245	30	208.17	242.82	3.77083	0.13542	2120	0.9975
408	1.866	1.914	10/3/2005 7:10	10/3/2005 4:05	9/30/2005 11:15	0.033	5121	30	170.70	242.82	2.70139	0.12847	2119	0.9975
408	1.886	0.068	10/12/2005 8:30	10/12/2005 5:15	10/7/2005 12:40	0.200	7651	30	255.03	242.82	4.69097	0.13542	2128	0.9975
408	1.991		10/19/2005 13:50	10/19/2005 10:10	10/16/2005 14:30	0.267	5631	30	187.70	242.82	2.81944	0.15278	2136	0.9975
409	1.950	1.877	9/29/2005 12:40	9/29/2005 9:30	9/26/2005 12:30	0.267	5619	30	187.30	242.82	2.87500	0.13194	2116	0.9975
409	1.986	0.160	10/20/2005 7:50	10/20/2005 4:40	10/16/2005 14:30	0.200	6737	30	224.57	242.82	3.59028	0.13194	2136	0.9975
409	1.693		11/1/2005 7:25	11/1/2005 4:15	10/16/2005 14:30	0.267	11289	30	376.30	242.81	15.57292	0.13194	2148	0.9975
410	1.752	1.791	10/13/2005 9:25	10/13/2005 6:25	10/7/2005 12:40	0.267	8042	30	268.07	242.82	5.73958	0.12500	2129	0.9975
410	1.793	0.039	10/19/2005 8:00	10/19/2005 5:00	10/16/2005 14:30	0.267	4793	30	159.77	242.82	2.60417	0.12500	2135	0.9975
410	1.829		10/24/2005 7:50	10/24/2005 4:25	10/16/2005 14:30	0.267	9669	30	322.30	242.82	7.57986	0.14236	2140	0.9975
411	1.928	1.882	9/30/2005 11:25	9/30/2005 8:10	9/27/2005 11:00	0.133	5558	30	185.27	242.82	2.88194	0.13542	2116	0.9975
411	1.775	0.093	10/13/2005 10:05	10/13/2005 7:00	10/7/2005 12:40	0.033	8158	30	271.93	242.82	5.76389	0.12847	2129	0.9975
411	1.944		10/19/2005 13:20	10/19/2005 9:00	10/16/2005 14:30	0.267	5396	30	179.87	242.82	2.77083	0.18056	2136	0.9975
412	1.856	1.827	9/30/2005 10:25	9/30/2005 6:50	9/26/2005 12:30	0.033	6483	30	216.10	242.82	3.76389	0.14931	2116	0.9975
412	1.921	0.111	10/19/2005 9:55	10/19/2005 6:50	10/16/2005 14:30	0.067	5241	30	174.70	242.82	2.68056	0.12847	2135	0.9975
412	1.704		10/24/2005 9:30	10/24/2005 5:45	10/16/2005 14:30	0.267	9016	30	300.53	242.82	7.63542	0.15625	2140	0.9975

*Adl Bird* 11/4/05  
*Margaret Johnson* 11/4/05



CAL

Ra-226 Verification Sheet

Adl Back 11/4/05

ADG 11/11/05

ADG 11/4/05

ADG 11/4/05

ADG 11/4/05

ADG 11/4/05

ADG 11/4/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	9/26/05 1230	9/29/05 530	9/29/05 840	401	4	1	5453
CAL 2	500	9/26/05 1230	9/29/05 650	9/29/05 1005	402	4	4	5343
<del>CAL 3</del>	<del>500</del>	<del>9/26/05 1230</del>	<del>9/29/05 730</del>	<del>9/29/05 1040</del>	<del>404</del>	<del>4</del>	<del>8</del>	<del>---</del>
CAL 4	500	9/26/05 1230	9/29/05 815	9/29/05 1115	405	4	8	5435
CAL 5	500	9/26/05 1230	9/29/05 855	9/29/05 1155	407	4	6	5179
CAL 6	500	9/26/05 1230	9/29/05 930	9/29/05 1240	409	4	8	5619
<del>CAL 7</del>	<del>500</del>	<del>9/26/05 1230</del>	<del>9/30/05 435</del>	<del>9/30/05 740</del>	<del>401</del>	<del>4</del>	<del>8</del>	<del>5503</del>
CAL 8	500	9/26/05 1230	9/30/05 510	9/30/05 810 830 ADG 11/4/05	403	4	5	6556
CAL 9	500	9/26/05 1230	9/30/05 545	9/30/05 950	407	4	8	6285
CAL 10	500	9/26/05 1230	9/30/05 650	9/30/05 1025	412	4	1	6483
CAL 11	500	9/27/05 1100	9/30/05 725	9/30/05 1055	405	4	6	5679
CAL 12	500	9/27/05 1100	9/30/05 810	9/30/05 1125	411	4	4	5558
CAL 1	500	9/30/05 1115	10/31/05 405	10/31/05 710	408	4	1	5121
CAL 2	500	9/30/05 1115	10/31/05 500	10/31/05 1045	401	4	8	5096
<del>CAL 3</del>	<del>500</del>	<del>9/30/05 1115</del>	<del>10/31/05 540</del>	<del>10/31/05 1240</del>	<del>409</del>	<del>4</del>	<del>8</del>	<del>5241</del>
CAL 4	500	9/30/05 1115	10/31/05 620	10/31/05 1315	405	4	8	4953
CAL 5	500	9/30/05 1115	10/14/05 505	10/14/05 825	402	4	8	6812
CAL 6	500	9/30/05 1115	10/14/05 545	10/14/05 900	407	4	2	6245
<del>CAL 7</del>	<del>500</del>	<del>9/30/05 1115</del>	<del>10/15/05 800</del>	<del>10/15/05 1340</del> <del>1350</del>	<del>401</del>	<del>4</del>	<del>8</del>	<del>6812</del>
CAL 8	500	9/30/05 1115	10/16/05 875	10/16/05 1225	403	4	6	3217

Ra-226 Verification Sheet

Adc BCL 11/14/05

APR 11/14/05

APR 11/14/05

APR 11/14/05

APR 11/14/05

APR 11/14/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CAL 1</del>	500	<del>1017105 1240</del>	<del>1017105 435</del>	<del>1017105 745</del>	<del>405</del>	<del>4</del>	<del>8</del>	<del>7984</del>
CAL 2	500	1017105 1240	1017105 515	1017105 830	408	4	6	7651
CAL 3	500	1017105 1240	1017105 550	1017105 920	406	4	6	7239
<del>CAL 4</del>	500	<del>1017105 1240</del>	<del>1017105 680</del>	<del>1017105 955</del>	<del>407</del>	<del>4</del>	<del>8</del>	<del>---</del>
<del>CAL 5</del>	500	<del>1017105 1240</del>	<del>1017105 730</del>	<del>1017105 1030</del>	<del>409</del>	<del>4</del>	<del>1</del>	<del>6608</del>
CAL 6	500	1017105 1240	1017105 625	1017105 925	416	4	8	8042
CAL 7	500	1017105 1240	1017105 700	1017105 1005	411	4	1	8158
CAL 8	500	1017105 1240	1017105 740	1017105 1040	403	4	8	8481
<del>CAL 9</del>	500	<del>1017105 1240</del>	<del>1017105 425</del>	<del>1017105 800</del>	<del>407</del>	<del>4</del>	<del>1</del>	<del>8694</del>
CAL 10	500	1017105 1240	1017105 500	1017105 835	404	4	6	8589
CAL 11	500	1017105 1430	1017105 500	1017105 800	416	4	18	4773
CAL 12	500	1017105 1430	1017105 550	1017105 855	404	4	1	4662
CAL 13	500	1017105 1430	1017105 650	1017105 955	412	4	2	5241
CAL 14	500	1017105 1430	1017105 750	1017105 1205	406	4	8	5684
CAL 15	500	1017105 1430	1017105 830	1017105 1250	402	4	8	5880
CAL 16	500	1017105 1430	1017105 900	1017105 1320	411	4	8	5396
CAL 17	500	1017105 1430	1017105 1010	1017105 1350	408	4	8	5631
CAL 18	500	1017105 1430	1017105 440	1017105 750	409	4	6	6737
CAL 19	500	1017105 1430	1017105 520	1017105 855	403	4	4	4597
CAL 10	500	1017105 1430	1017105 635	1017105 955	401	4	8	6477

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CA19</del>	<del>500</del>	<del>9/30/05 1415</del>	<del>10/15/05 935</del>		<del>409</del>	<del>4</del>		
CAL13	500	10/16/05 1430	10/24/05 425	10/24/05 730	410	4	8	9669
CAL14	500	10/16/05 1430	10/24/05 505	10/24/05 835	404	4	8	9777
CAL15	500	10/16/05 1430	10/24/05 545	10/24/05 930	412	4	8	9016
CAL16	500	10/16/05 1430	10/24/05 645	10/24/05 1010	406	4	8	9925
CAL23	500	10/16/05 1430	11/1/05 415	11/1/05 725	409	4	8	11289

AB1 11/4/05

AB1 11/4/05

Ad Bil 11/4/05

AB1 11/4/05

**General Engineering Laboratories  
Verification Source Preparation Sheet**

401-412

Applicable SOP Number GL-RAD-A-028 Isotope Ra-226

Date Standards Prepared 8/26/03 Cocktail Type Used \_\_\_\_\_

Standard ID 0299-E Matrix of Vial/Planchett \_\_\_\_\_

Amount Used (g or ml) 0.1 ml \_\_\_\_\_

Standard Activity (DPM/g or ml) 2434.34 Type of Scintillation Vial \_\_\_\_\_

Reference Date 12/15/99 Pipette ID Used 1429303

Expiration Date 11/4/06 Balance ID Used 28488

Residue/Carrier Agent 0.5M HCl Quenching Agent \_\_\_\_\_

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL 1				
2	CAL 2				
3	CAL 3				
4	CAL 4				
5	CAL 5				
6	CAL 6				
7	CAL 7				
8	CAL 8				
9	CAL 9				
10	CAL 10				
11	CAL 11				
12	CAL 12				
13	CAL 13				
14	CAL 14				
15	CAL 15				

*AB1*  
*11/4/05*

Prepared By: Ad Bail Date: 11/4/05

Reviewed By: Angela A. Johnson Date: 11/4/05

Rev 1 RLM 9/10/97

**General Engineering Laboratories  
Verification Source Preparation Sheet**

401 - 412

Applicable SOP Number (G) - RAD - A - 028

Isotope Po-226

Date Standards Prepared 8/26/03

Cocktail Type Used ---

Standard ID 0299-E

Matrix of Vial/Planchett ---

Amount Used (g or mL) 0.1 ml

Standard Activity (DPM/g or mL) 2434.34

Type of Scintillation Vial ---

Reference Date 12/15/99

Pipette ID Used 1429303

Expiration Date 11/4/06

Balance ID Used 28488

Residue/Carrier Agent 0.5 m Hcl

Quenching Agent ---

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
16	CAL 16				
17	CAL 17				
18	CAL 18				
19	CAL 19				
20	CAL 20				
21	CAL 21				
22	CAL 22				
23	CAL 23				
24	CAL 24	Abi 11/4/05			

Prepared By: Ad Bil Date: 11/4/05

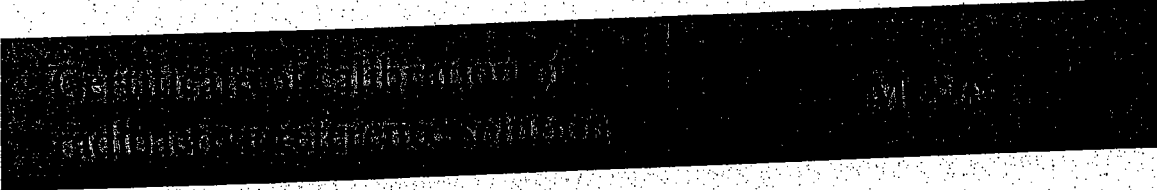
Reviewed By: Angela Johnson Date: 11/4/05

Rev 1 RLM 9/10/97

8-21-00

Nycomed Amersham plc  
Amersham Laboratories

02.9



Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED  
FOR:

AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ion Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

ment Reference time: 1200 GMT on 15 December 1999

data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

ion of The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which  
inties for a  $t$ -distribution with  $v_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately  
95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard  
uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

ved  
ory

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Date of  
issue

17<sup>th</sup> December 1999

**Nycomed  
Amersham**

0299

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:  
The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999

The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5 \%$

Combined Type A uncertainty:  $\pm 0.2 \%$

Combined Type B uncertainty:  $\pm 1.3 \%$

Radiochemical The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Chemical composition Carrier free in 0.5M HCl.

Remarks This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.

# Verification for Ra-226 Standard 0299-E

11/4/2005  
A. Fehr

Standard mL used	Source DPM/G
0.2000	2461.082289
0.2000	2411.298509
0.2000	2383.559208
	2418.646669

Detector CPM	BKG CPM	NET CPM	Detector Eff
1340.3000	0.6000	1339.7000	2.72177002
1313.2000	0.6000	1312.6000	2.72177002
1298.1000	0.6000	1297.5000	2.72177002

Isotope  
0299-F N1  
0299-F N2  
0299-F N3

Mean Value (Counting) = 2418.646669  
Stdev = 39.28044852

99.6090287 % of known  
0.01624067

Certificate Value =	2428.1	dpm/mL
Lower Limit =	2340.085772	dpm/mL
Upper Limit =	2497.207566	dpm/mL
Rule 1 Pass/Fail	Pass	Pass
Two sigma =	78.56089703	dpm/mL
10 % of Mean =	241.8646669	dpm/mL
Rule 2 (Pass/Fail)	Pass	

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-E by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 8 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 11/4/05 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD SOP M-001

*Amanda J. Fehr 11/4/05*  
*Angela J. Johnson 11/4/05*



**PROTOCOL** : 8 Ra-226 ver  
**DATE** : 2005/11/04  
**TIME** : 11:47  
**ID** : P08AS001

**Ra226**

Wallac 1414 WinSpectral v1.40 S/N 4140127

**Counting mode** : CPM  
**Isotope(s)** : Ra226  
**Ra226** = 400- 900,Alpha,1602.12 y  
**Protocol name** : Ra-226 ver  
**Counting time** : 300  
**Repeats** : 1  
**Cycles** : 1  
**Replicates** : 1  
**2 sigma %** : 0.01  
**Minimum cpm** : 0.00 Checking time: 10  
**Advanced modes** : Halflife,PSA,Chemilum  
**Halflife zerotime** : Start of assay  
**PSA level** : low  
**Output to Display** :  
 POS,DATE,CTIME,RACK,RACKPOS,ETIME,SQPE,CPM1,CPM  
**Additions to Display** : Spectrum,Header,Listing  
**Header** : Ra226  
**Spectrum** : Rnd.Cos,Alpha  
**Window 1** : 1-1024 /Alpha  
**Window 2** : 1-1024 /Beta  
**Window 3** : 1-1024 /Beta  
**Window 4** : 1-1024 /Beta  
**Window 5** : 1-1024 /Beta  
**Window 6** : 1-1024 /Beta  
**FNCT1 = FNCT1** :  
**FNCT2 = FNCT2** :  
**FNCT3 = FNCT3** :  
**FNCT4 = FNCT4** :

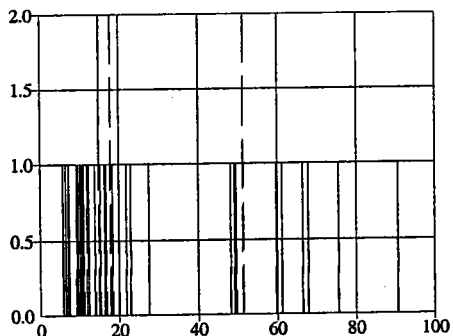
**Total count rate:**  
 Ra226 10537.9 CPM

*Amanda L. Leh*  
11/4/05

*AQ*  
11/4/05

POS CTIME SQPI CPM CPM1

1 300 23.50 1.90

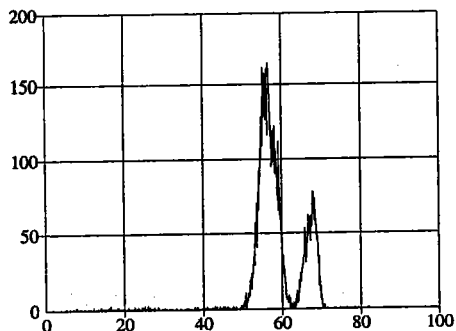


Counts Chem

Counts Alpha

Bkg

2 300 4697.50 2217.70

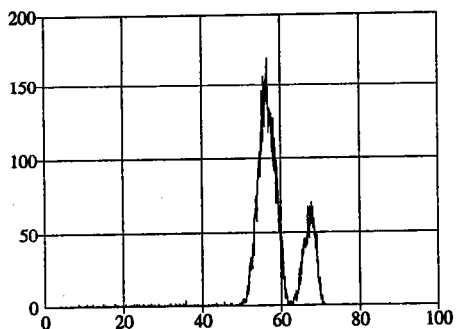


Counts Chem

Counts Alpha

0321-A

3 300 4542.00 2191.80



Counts Chem

Counts Alpha

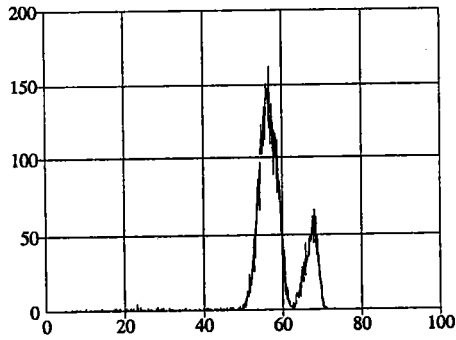
0321-A

ALF 11/4/05

HQ  
11/4/05

POS CTIME SQPI CPM CPM1

4 300 4376.00 2174.30

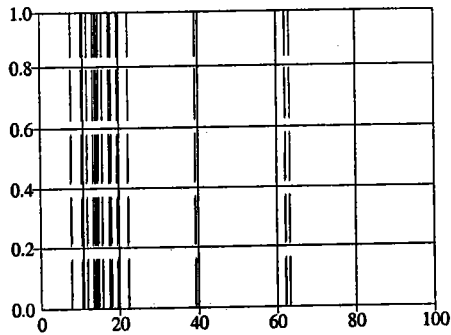


Counts Chem

Counts Alpha

0321-A

5 300 19.50 0.60

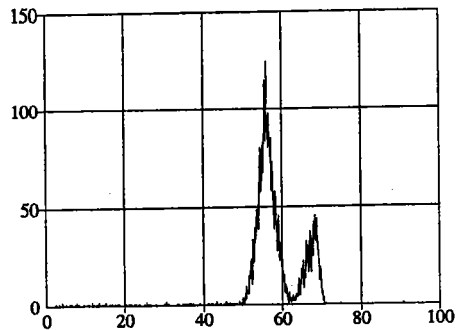


Counts Chem

Counts Alpha

Blkg

6 300 1930.20 1340.30



Counts Chem

Counts Alpha

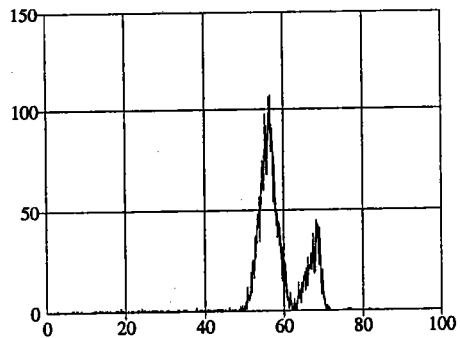
0299-E

ALF 11/4/05

AQ  
11/4/05

POS CTIME SQPI CPM CPM1

7 300 1906.90 1313.20

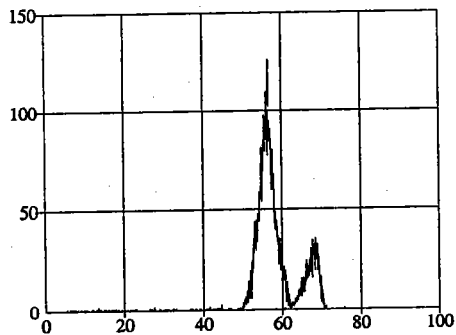


Counts Chem

Counts Alpha

0299-E

8 300 1835.40 1298.10



Counts Chem

Counts Alpha

0299-E

ADQ  
11/4/05



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0299	Isotope:	Radium-226
Prepared By:	Angela Albee	Prepared By:	Angela Albee
Carrier Conc:	0.5 M HCL	Prep Date:	09/15/2000
Reference Date:	12/15/1999	Verification Date:	08/26/2004
Ampoule Mass (g):	5.0368 g	Expiration Date:	08/26/2005
Uncertainty:	+/- 2.5 %	Primary Code:	0299-A
LogBook No:	RC S 027 128	Dilution(mL):	100 mL
		Mass of Parent(g):	4.6634 g
		Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

## Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Albee	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Albee	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Albee	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Albee	1.9909	100	0299-E	2434.34 dpm/mL	11/04/2004	11/04/2005
08/26/2003	Angela Albee	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005
04/05/2005	Amanda Fehr	5.0018	250	0299-G	2446.3471 dpm/mL	04/06/2005	04/06/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

AD  
11/4/05

VoltageCurve

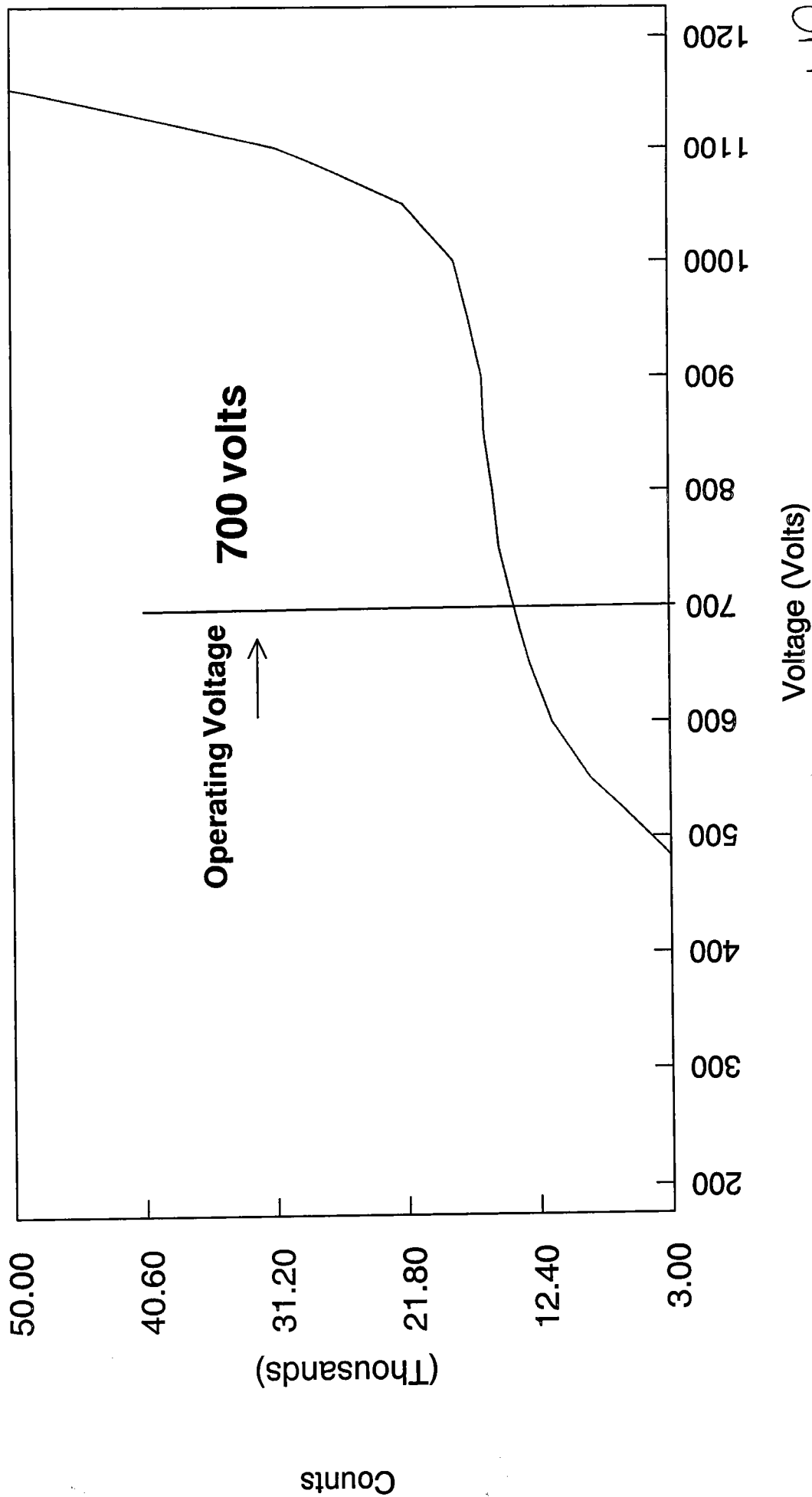
Voltage Curve Ludlum # 4

Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	9/28/2005	5:00	4
0.25	0	9/28/2005	5:00	4
0.30	0	9/28/2005	5:00	4
0.35	0	9/28/2005	5:00	4
0.40	0	9/28/2005	5:00	4
0.45	412	9/28/2005	5:00	4
0.50	4405	9/28/2005	5:00	4
0.55	8652	9/28/2005	5:00	4
0.60	11406	9/28/2005	5:00	4
0.65	12952	9/28/2005	5:00	4
0.70	14079	9/28/2005	5:00	4
0.75	15092	9/28/2005	5:00	4
0.80	15535	9/28/2005	5:00	4
0.85	16113	9/28/2005	5:00	4
0.90	16272	9/28/2005	5:00	4
0.95	17183	9/28/2005	5:00	4
1.00	18234	9/28/2005	5:00	4
1.05	21861	9/28/2005	5:00	4
1.10	30890	9/28/2005	5:00	4
1.15	48646	9/28/2005	5:00	4
1.20	70725	9/28/2005	5:00	4

AQ  
11/4/05

# Plateau September, 2005

Ludlum # 4



ADD  
9/14/05

# Ra-226 WATER

Batch : LCSVER  
 Date : 11/4/2005  
 Analyst : JMB

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 MDA : 1 pCi/L

Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME
1	0.500	30	840	401	1.91	0.267	0.3963	20.7520	1.4236	10/31/2005 9:30
2	0.500	30	1132	402	2.00	0.267	0.3774	26.6781	1.5707	10/31/2005 10:10
3	0.500	30	881	403	1.89	0.267	0.3975	21.8387	1.4619	10/31/2005 10:40
4	0.500	30	893	404	1.77	0.267	0.4238	23.6048	1.5692	10/31/2005 11:10
5	0.500	30	888	405	1.88	0.267	0.3989	22.0913	1.4728	10/31/2005 11:45
6	0.500	30	834	406	1.91	0.267	0.3926	20.4075	1.4051	10/31/2005 12:30
7	0.500	30	826	407	1.80	0.267	0.4162	21.4235	1.4824	10/31/2005 14:15
8	0.500	30	1050	408	1.91	0.267	0.3614	23.6991	1.4500	11/1/2005 8:05
9	0.500	30	603	409	1.88	0.267	0.6681	25.0149	2.0368	11/4/2005 9:05
10	0.500	30	879	410	1.79	0.267	0.4245	23.2686	1.5594	10/31/2005 8:50
11	0.500	30	1087	411	1.88	0.267	0.3696	25.0943	1.5084	11/1/2005 9:45
12	0.500	30	976	412	1.83	0.267	0.3783	23.0455	1.4637	11/1/2005 10:20

*Ach Bail* 11/4/05  
*Angela Johnson* 11/4/05



*Adh Beite 11/4/05*

*Angela S. Johnson  
11/4/05*

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
401		4	10/31/2005 9:30	LCS	0321-H	24.14	pCi/L	86%
402		4	10/31/2005 10:10	LCS	0321-H	24.14	pCi/L	111%
403		4	10/31/2005 10:40	LCS	0321-H	24.14	pCi/L	90%
404		4	10/31/2005 11:10	LCS	0321-H	24.14	pCi/L	98%
405		4	10/31/2005 11:45	LCS	0321-H	24.14	pCi/L	92%
406		4	10/31/2005 12:30	LCS	0321-H	24.14	pCi/L	85%
407		4	10/31/2005 14:15	LCS	0321-H	24.14	pCi/L	89%
408		4	11/1/2005 8:05	LCS	0321-H	24.14	pCi/L	98%
409		4	11/4/2005 9:05	LCS	0321-H	24.14	pCi/L	104%
410		4	10/31/2005 8:50	LCS	0321-H	24.14	pCi/L	96%
411		4	11/1/2005 9:45	LCS	0321-H	24.14	pCi/L	104%
412		4	11/1/2005 10:20	LCS	0321-H	24.14	pCi/L	95%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
10/25/2005 11:25	10/31/2005 5:30	138.08	4.00	0.6474	0.9703	1.0019	27.7333	0.6294
10/25/2005 11:25	10/31/2005 6:25	139.00	3.75	0.6499	0.9721	1.0019	37.4663	0.6329
10/25/2005 11:25	10/31/2005 7:00	139.58	3.67	0.6514	0.9727	1.0019	29.1000	0.6348
10/25/2005 11:25	10/31/2005 7:30	140.08	3.67	0.6527	0.9727	1.0019	29.5000	0.6361
10/25/2005 11:25	10/31/2005 8:00	140.58	3.75	0.6540	0.9721	1.0019	29.3333	0.6370
10/25/2005 11:25	10/31/2005 8:30	141.08	4.00	0.6553	0.9703	1.0019	27.5333	0.6370
10/25/2005 11:25	10/31/2005 9:30	142.08	4.75	0.6579	0.9648	1.0019	27.2667	0.6359
10/25/2005 11:25	11/1/2005 5:00	161.58	3.08	0.7048	0.9770	1.0019	34.7333	0.6898
11/1/2005 12:15	11/4/2005 5:40	65.42	3.42	0.3898	0.9745	1.0019	19.8333	0.3805
10/25/2005 11:25	10/31/2005 4:50	137.42	4.00	0.6457	0.9703	1.0019	29.0333	0.6276
10/25/2005 11:25	11/1/2005 5:40	162.25	4.08	0.7062	0.9696	1.0019	35.9667	0.6861
10/25/2005 11:25	11/1/2005 6:40	163.25	3.67	0.7084	0.9727	1.0019	32.2667	0.6904

CALIBRATION STANDARD DETECTOR # 4

CELL #	END DEGAS TIME	END DE-EM TIME	COUNT TIME	DET #	BKG COUNTS	TOTAL COUNTS	SAMPLE #
401	10/25/05 1125	10/31/05 530	10/31/05 930	4	8	840	VER 1
402	10/25/05 1125	10/31/05 625	10/31/05 1010	4	8	1132	VER 2
403	10/25/05 1125	10/31/05 700	10/31/05 1040	4	8	881	VER 3
404	10/25/05 1125	10/31/05 730	10/31/05 1110	4	8	893	VER 4
405	10/25/05 1125	10/31/05 800	10/31/05 1145	4	4	888	VER 5
406	10/25/05 1125	10/31/05 830	10/31/05 1230	4	8	834	VER 6
407	10/25/05 1125	10/31/05 930	10/31/05 1415	4	8	826	VER 7
408	10/25/05 1125	11/1/05 500	11/1/05 805	4	8	1050	VER 8
409	11/1/05 1215	11/4/05 540	11/4/05 905	4	0	603	VER 9
410	10/25/05 1125	10/31/05 450	10/31/05 850 <del>10/31/05 1015</del>	4	8	879	VER 10
411	10/25/05 1125	11/1/05 540	11/1/05 945	4	8	1087	VER 11
412	10/25/05 1125	11/1/05 640	11/1/05 1020	4	8	976	VER 12

10/31/05

Ad. Belt 11/4/05

Angela A. Johnson  
11/4/05

## General Engineering Laboratories Verification Source Preparation Sheet

401-412

Applicable SOP Number GL-RAD-A-028 Isotope Po-226

Date Standards Prepared 5/18/05 Cocktail Type Used \_\_\_\_\_

Standard ID 0321-14 Matrix of Vial/Planchett \_\_\_\_\_

Amount Used (g or mL) 0.1 ml \_\_\_\_\_

Standard Activity (DPM/g or  $\mu$ L) 269.6188 Type of Scintillation Vial \_\_\_\_\_

Reference Date 9/9/91 Pipette ID Used 1429303

Expiration Date 5/20/06 Balance ID Used 28488

Residue/Carrier Agent 1 m HCl Quenching Agent \_\_\_\_\_

	Standard Number	Quenching Vol (uL)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER 1				
2	VER 2				
3	VER 3				
4	VER 4				
5	VER 5				
6	VER 6				
7	VER 7			Abt	
8	VER 8			11/4/05	
9	VER 9				
10	VER 10				
11	VER 11				
12	VER 12				
<del>Abt 11/4/05</del>					

Prepared By: Ad Bail Date: 11/4/05

Reviewed By: Angela Johnson Date: 11/4/05

Rev 1 RLM 9/10/97

# Verification for Ra-226 Standard 0321-H

A. Fehr  
5/20/2005

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source DPM/mL
0321-H N1	1170.1000	34.2000	1135.9000	4.20643586	270.0385881
0321-H N2	1137.8000	34.2000	1103.6000	4.20643586	262.3598783
0321-H N3	1149.6000	34.2000	1115.4000	4.20643586	265.1651036
					Average = 265.8545233

Mean Value (Counting) = 265.8545233  
Stdev = 3.885501322

99.1905663  
0.01461514 Rule 3 (Pass/Fail)

Pass

Certificate Value = 268.0  
Lower Limit = 258.0835207  
Upper Limit = 273.625526  
Rule 1 Pass/Fail Pass  
Two sigma = 7.771002644  
10 % of Mean = 26.58545233  
Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0321-H by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 5/20/05 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda L. Fehr 5/20/05*  
*Angela A. Johnson 5/24/05*

# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414

(843)556-8171

## Lucas Cell Calibration Package

501-512

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate?	✓		
the second standard(s) documentation?	✓		
standard preparation information?	✓		
standard < 1 Year old or verified?	✓		
2) Is the efficiency calibration report included ?	✓		
3) Is the raw count data included for: Cell constant determination?	✓		
Plateau generation?	✓		
4) Are the calibration verifications included?	✓		
5) Are the instrument settings included: HVPS settings?	✓		
6) Has the CELLEFF.xls file been updated ?	✓		
7) Have the calibration dates been updated in ALPHALIMS ?	✓		

Prepared By: Ad Bail

Date: 12/9/05

Reviewed By: Angela Johnson

Date: 12/8/05

Effective Date: 12/9/05

# Ra-226 Cell Constants

standard ID: 0299-E  
Volume added (mL): 0.1  
Standard Reference Activity (DPM/mL): 2434.34

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/time flushed to cell	Date/time end of degas	bkg cpm	total counts	count time min	cpm	Known activity dpm	t1 (days)		t2 (days)		t3 (days)		Decay from Std Ref Date to count
											end-degas to flush	end-flush to count	Std Ref Date to count	Std Ref Date to count			
501	1.919	Average	11/14/2005 7:20	11/14/2005 4:20	11/19/2005 15:30	0.267	7643	30	254.77	243.03	4.53472	0.12500	2161	0.9974			
501	1.814	Stdev	11/15/2005 9:20	11/15/2005 5:00	11/19/2005 15:30	0.267	8103	30	270.10	243.03	5.56250	0.18056	2162	0.9974			
501	1.933		11/10/2005 7:30	11/10/2005 4:30	11/14/2005 14:20	0.233	8747	30	291.57	243.03	5.59028	0.12500	2157	0.9974			
502	2.003	Average	11/18/2005 7:40	11/18/2005 4:40	11/15/2005 12:40	0.200	5456	30	181.87	243.03	2.66667	0.12500	2165	0.9974			
502	1.878	Stdev	11/14/2005 8:15	11/14/2005 5:10	11/19/2005 15:30	0.267	7511	30	250.37	243.03	4.56944	0.12847	2161	0.9974			
502	1.830		11/9/2005 8:50	11/9/2005 5:40	11/14/2005 14:20	0.133	7380	30	246.00	243.03	4.63889	0.13194	2156	0.9974			
503	2.039	Average	11/18/2005 10:20	11/18/2005 5:15	11/15/2005 12:40	0.267	5507	30	183.57	243.03	2.89097	0.21181	2165	0.9974			
503	1.891	Stdev	11/14/2005 9:00	11/14/2005 5:40	11/19/2005 15:30	0.267	7511	30	252.37	243.03	4.59028	0.13889	2161	0.9974			
503	1.896		11/9/2005 10:00	11/9/2005 7:00	11/14/2005 14:20	0.200	7717	30	257.23	243.03	4.69444	0.12500	2156	0.9974			
504	1.774	Average	11/18/2005 12:40	11/18/2005 5:50	11/15/2005 12:40	0.033	4757	30	158.57	243.03	2.71528	0.28472	2166	0.9974			
504	1.742	Stdev	11/15/2005 7:20	11/15/2005 4:20	11/19/2005 15:30	0.267	7838	30	261.27	243.03	5.53472	0.12500	2162	0.9974			
504	1.692		11/10/2005 8:20	11/10/2005 5:05	11/14/2005 14:20	0.133	7658	30	255.27	243.03	5.61458	0.13542	2157	0.9974			
505	2.103	Average	11/18/2005 11:25	11/18/2005 7:00	11/15/2005 12:40	0.200	5826	30	194.20	243.03	2.76389	0.18403	2165	0.9974			
505	2.090	Stdev	11/19/2005 10:45	11/19/2005 7:40	11/14/2005 14:20	0.267	8534	30	284.47	243.03	4.72222	0.12847	2156	0.9974			
505	2.186		12/1/2005 9:50	12/1/2005 5:20	11/28/2005 15:15	0.267	5750	30	191.67	243.03	2.58681	0.18750	2178	0.9974			
506	2.134	Average	11/18/2005 12:00	11/18/2005 7:45	11/15/2005 12:40	0.267	5973	30	199.10	243.03	2.79514	0.17708	2166	0.9974			
506	2.038	Stdev	12/1/2005 11:10	12/1/2005 6:05	11/28/2005 15:15	0.267	5389	30	179.63	243.03	2.61806	0.21181	2178	0.9974			
506	1.990		12/2/2005 12:20	12/2/2005 7:30	11/28/2005 15:15	0.267	6786	30	226.20	243.03	3.67708	0.20139	2180	0.9974			
508	2.090	Average	11/18/2005 12:45	11/18/2005 8:20	11/15/2005 12:40	0.067	5874	30	195.80	243.03	2.81944	0.18403	2166	0.9974			
508	1.847	Stdev	11/14/2005 10:35	11/14/2005 7:15	11/19/2005 15:30	0.267	7462	30	248.73	243.03	4.65625	0.13889	2161	0.9974			
508	1.890		11/9/2005 10:25	11/9/2005 8:25	11/14/2005 14:20	0.200	7813	30	260.43	243.03	4.75347	0.08333	2156	0.9974			
509	2.082	Average	11/18/2005 13:20	11/18/2005 9:20	11/15/2005 12:40	0.267	5942	30	198.07	243.03	2.86111	0.16667	2166	0.9974			
509	1.906	Stdev	11/14/2005 11:10	11/14/2005 7:50	11/19/2005 15:30	0.267	7726	30	257.53	243.03	4.68056	0.13889	2161	0.9974			
509	1.973		11/10/2005 9:00	11/10/2005 5:40	11/14/2005 14:20	0.267	8953	30	298.43	243.03	5.63889	0.13889	2157	0.9974			
510	2.063	Average	11/18/2005 13:50	11/18/2005 10:05	11/15/2005 12:40	0.033	5942	30	198.07	243.03	2.89236	0.15625	2166	0.9974			
510	2.009	Stdev	11/14/2005 11:40	11/14/2005 8:30	11/19/2005 15:30	0.267	8185	30	272.83	243.03	4.70833	0.13194	2161	0.9974			
510	2.027		11/9/2005 12:00	11/9/2005 9:00	11/14/2005 14:20	0.167	8342	30	278.07	243.03	4.77778	0.12500	2157	0.9974			
511	2.033	Average	12/1/2005 12:05	12/1/2005 6:45	11/28/2005 15:15	0.267	5409	30	180.30	243.03	2.64583	0.22222	2179	0.9974			
511	2.112	Stdev	11/14/2005 12:10	11/14/2005 9:10	11/19/2005 15:30	0.267	8645	30	288.17	243.03	4.73611	0.12500	2162	0.9974			
511	1.837		11/9/2005 15:00	11/9/2005 9:55	11/14/2005 14:20	0.133	7480	30	249.33	243.03	4.81597	0.21181	2157	0.9974			
512	1.934	Average	12/1/2005 7:30	12/1/2005 12:40	11/28/2005 15:15	0.267	5966	30	198.87	243.03	2.89236	-0.21528	2178	0.9974			
512	2.119	Stdev	11/14/2005 13:20	11/14/2005 10:00	11/19/2005 15:30	0.267	8693	30	289.77	243.03	4.77083	0.13889	2162	0.9974			
512	1.809		11/10/2005 9:55	11/10/2005 6:50	11/14/2005 14:20	0.067	8259	30	275.30	243.03	5.68750	0.12847	2157	0.9974			

Ad. Bal 12/9/05  
 Angela A. Johnson 12/18/05

CAL 5 AB1 12/8/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 12	500	11/4/05 1420	11/4/05 540	11/4/05 850	502	5	4	7380
CAL 13	500	11/4/05 1420	11/4/05 700	11/4/05 1000	503	5	6	7717
CAL 17	500	11/4/05 1420	11/4/05 740	11/4/05 1045	505	5	8	8534
CAL 18	500	11/4/05 1420	11/4/05 825	11/4/05 1025	508	5	6	7813
CAL 19	500	11/4/05 1420	11/4/05 900	11/4/05 1200	510	5	5	8342
CAL 20	500	11/4/05 1420	11/4/05 955	11/4/05 1500	511	5	4	7480
CAL 21	500	11/4/05 1420	11/10/05 430	11/10/05 730	501	5	7	8747
CAL 22	500	11/4/05 1420	11/10/05 505	11/10/05 820	504	5	4	7658
CAL 23	500	11/4/05 1420	11/10/05 540	11/10/05 900	509	5	8	8953
CAL 24	500	11/4/05 1420	11/10/05 650	11/10/05 955	512	5	2	8259
/								

AB1 12/8/05

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JAG 12/8/05

**CALS 5** *ADQ*  
12/18/05

Ra-226 Verification Sheet

*ADQ*  
12/19/05

*ADQ*  
12/19/05

*ADQ*  
12/19/05

*ADQ*  
12/18/05

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	11/9/05 1530	11/14/05 420	11/14/05 720	501	5	8	7643
CAL 2	500	11/9/05 1530	11/14/05 510	11/14/05 815	502	5	8	7511
CAL 3	500	11/9/05 1530	11/14/05 540	11/14/05 900	503	5	8	7571
<del>CAL 4</del>		<del>11/9/05 1530</del>	<del>11/14/05</del>					
CAL 5	500	11/9/05 1530	11/14/05 715	11/14/05 1035	508	5	8	7462
CAL 6	500	11/9/05 1530	11/14/05 750	11/14/05 1110	509	5	8	7726
CAL 7	500	11/9/05 1530	11/14/05 830	11/14/05 1140	510	5	8	8185
CAL 9	500	11/9/05 1530	11/14/05 910	11/14/05 1210	511	5	8	8645
CAL 8	500	11/9/05 1530	11/14/05 1000	11/14/05 1320	512	5	8	8693
CAL 11	500	11/9/05 1530	11/15/05 420	11/15/05 720	504	5	8	7828
CAL 13	500	11/9/05 1530	11/15/05 500	11/14/05 920	501	5	8	8103
/								



Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 2	500	11/15/05 1240	11/18/05 440	11/18/05 740	502	5	6	5456
CAL 3	500	11/15/05 1240	11/18/05 515	11/18/05 1020	503	5	8	5507
CAL 4	500	11/15/05 1240	11/18/05 550	11/18/05 1055	504	5	1	4757
CAL 5	500	11/15/05 1240	11/18/05 700	11/18/05 1125	505	5	6	5826
CAL 6	500	11/15/05 1240	11/18/05 745	11/18/05 1200	506	5	8	5973
CAL 7	500	11/15/05 1240	11/18/05 820	11/18/05 1245	508	5	2	5874
CAL 8	500	11/15/05 1240	11/18/05 920	11/16/05 1320	509	5	8	5942
CAL 9	500	11/15/05 1240	11/18/05 1005	11/18/05 1350	510	5	1	5942
CAL 10		11/15/05 1240	11/18/05 1045	11/18/05 1420	511	5	6	5942
CAL 11		11/15/05 1240	11/18/05 1110	11/18/05 1545	512	5	8	4618

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12/18/05

4926  
12/18/05

AB1 12/18/05

AB1 12/18/05

AB1 12/18/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 18	500	11/28/05 1515	12/1/05 605	12/1/05 950	505	5	8	5750
CAL 19	500	11/28/05 1515	12/1/05 605	12/1/05 1110	506	5	8	5389
CAL 22	500	11/28/05 1515	12/1/05 6745	12/1/05 1205	511	5	8	56409
CAL 23	500	11/28/05 1515	12/1/05 730	12/1/05 1240	512	5	8	5964
CAL 24	500	11/28/05 1515	12/2/05 730	12/2/05 1220	506	5	8	6623
CAL 8	500	11/28/05 1515	12/2/05 650	12/2/05 1150	511	5	8	6786
CAL 12	500	11/28/05 1515	12/2/05 550	12/2/05 1110	512	5	8	6578

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ADG 12/18/05  
ADG 12/18/05  
ADG 12/18/05

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ADG 12/18/05

## General Engineering Laboratories Calibration Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used NA  
 Standard ID 0299-E Matrix of Vial/Planchett NA  
 Amount Used (g or (mL)) 0.1 NA  
 Standard Activity (DPM/g or (mL)) 2434.34 Type of Scintillation Vial NA  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 11/4/06 Balance ID Used 28488  
 Residue/Carrier Agent NA Quenching Agent NA

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL1				
2	CAL2				
3	CAL3				
4	CAL4				
5	CAL5				
6	CAL6				
7	CAL7				
8	CAL8				
9	CAL9				
10	CAL10				
11	CAL11				
12	CAL12				
13	CAL13				
14	CAL14				
15	CAL15				

Prepared By: Ad Burt Date 12/8/05  
 Reviewed By: Angela Johnson Date 12/8/05  
 Rev 1 RLM 9/10/97 12/8/05

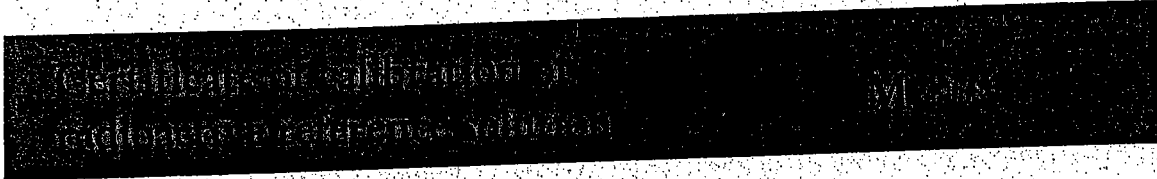
## General Engineering Laboratories Calibration Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used NA  
 Standard ID 0299-E Matrix of Vial/Planchett NA  
 Amount Used (g or  $\mu$ l) 0.1 NA  
 Standard Activity (DPM/g or  $\mu$ l) 2434.34 Type of Scintillation Vial NA  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 11/4/04 Balance ID Used 28488  
 Residue/Carrier Agent NA Quenching Agent NA

	Standard Number	Quenching Vol ( $\mu$ L)/ Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)																																																																		
16	CAL 16	<del> <table border="1" style="width: 100%; height: 100%;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> </del>																																																																					
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Prepared By: Adl Basil Date 12/8/05  
 Reviewed By: Angela J. Johnson Date 12/8/05

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Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED FOR: AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

Reference time: 1200 GMT on 15 December 1999

Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.  
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which for a  $t$ -distribution with  $\nu_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

17<sup>th</sup> December 1999

0299

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:

The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999

The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5\%$

Combined Type A uncertainty:  $\pm 0.2\%$

Combined Type B uncertainty:  $\pm 1.3\%$

The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Carrier free in 0.5M HCl

This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.

# Verification for Ra-226 Standard 0299-E

11/4/2005	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard mL used	Source DPM/G
A.Fehr	0299-F N1	1340.3000	0.6000	1339.7000	2.72177002	0.2000	2461.082289
	0299-F N2	1313.2000	0.6000	1312.6000	2.72177002	0.2000	2411.298509
	0299-F N3	1298.1000	0.6000	1297.5000	2.72177002	0.2000	2383.559208
				99.6090287	% of known		2418.646669
				0.01624067			

Mean Value (Counting) = 2418.646669  
 Stdev = 39.28044852

Certificate Value = 2428.1 dpm/mL  
 Lower Limit = 2340.085772 dpm/mL  
 Upper Limit = 2497.207566 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 78.56089703 dpm/mL  
 10 % of Mean = 241.8646669 dpm/mL  
 Rule 2 (Pass/Fail) Pass

### Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-E by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 8 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 11/4/05 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD SOP M-001

*Amanda J. Feehe 11/4/05*  
*Amanda J. Feehe 11/4/05*

**PROTOCOL** : 8 Ra-226 ver  
**DATE** : 2005/11/04  
**TIME** : 11:47  
**ID** : P08AS001

**Ra226**

Wallac 1414 WinSpectral v1.40 S/N 4140127

**Counting mode** : CPM  
**Isotope(s)** : Ra226  
**Ra226** = 400- 900,Alpha,1602.12 y  
**Protocol name** : Ra-226 ver  
**Counting time** : 300  
**Repeats** : 1  
**Cycles** : 1  
**Replicates** : 1  
**2 sigma %** : 0.01  
**Minimum cpm** : 0.00 Checking time: 10  
**Advanced modes** : Halflife,PSA,Chemilum  
**Halflife zerotime** : Start of assay  
**PSA level** : low  
**Output to Display** :  
 POS,DATE,CTIME,RACK,RACKPOS,ETIME,SQPE,CPM1,CPM  
**Additions to Display** : Spectrum,Header,Listing  
**Header** : Ra226  
**Spectrum** : Rnd.Cos,Alpha  
**Window 1** : 1-1024 /Alpha  
**Window 2** : 1-1024 /Beta  
**Window 3** : 1-1024 /Beta  
**Window 4** : 1-1024 /Beta  
**Window 5** : 1-1024 /Beta  
**Window 6** : 1-1024 /Beta  
**FNCT1 = FNCT1** :  
**FNCT2 = FNCT2** :  
**FNCT3 = FNCT3** :  
**FNCT4 = FNCT4** :

**Total count rate:**  
 Ra226 10537.9 CPM

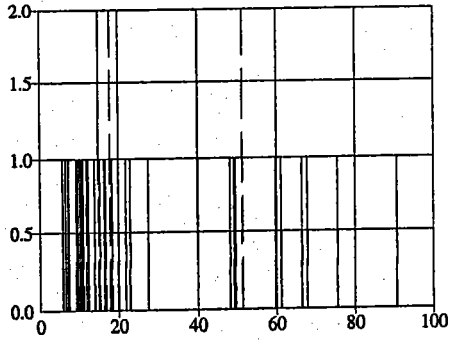
*Amanda L. Lehn*  
11/4/05

*ALQ*  
11/4/05



POS CTIME SQPI CPM CPM1

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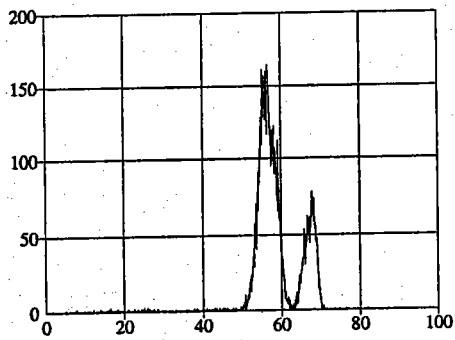


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Counts Alpha

*Blcg*

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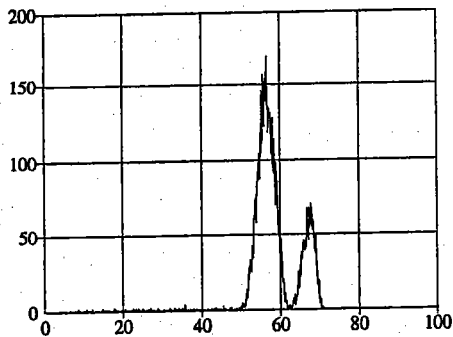


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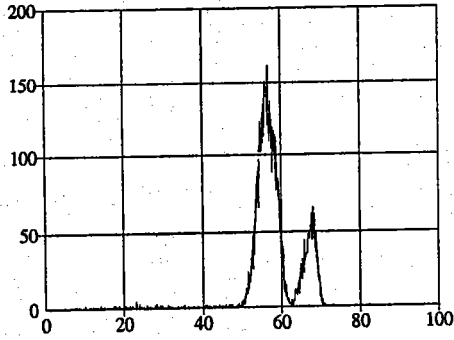
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*ALF 11/4/05*

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11/4/05*

POS CTIME SQPI CPM CPM1

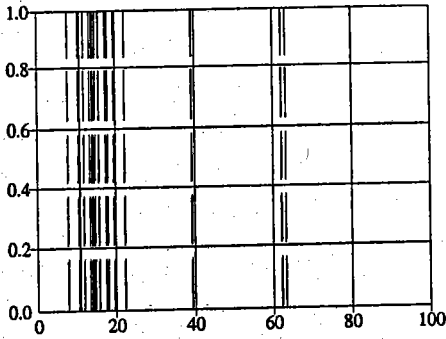
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0321-A

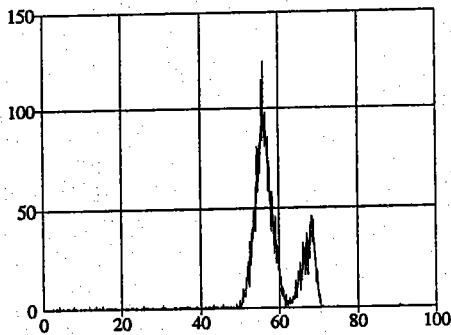
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Counts Chem  
Counts Alpha

Blky

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Counts Chem  
Counts Alpha

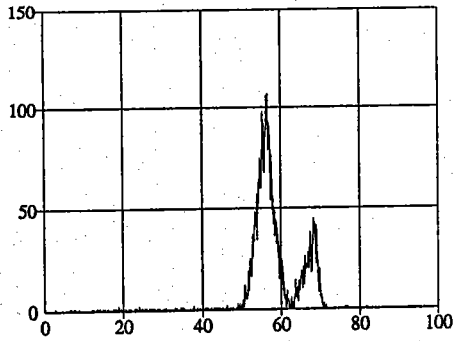
0299-E

ALF 11/4/05

AHQ  
11/4/05

POS CTIME SQPI CPM CPM1

7 300 1906.90 1313.20

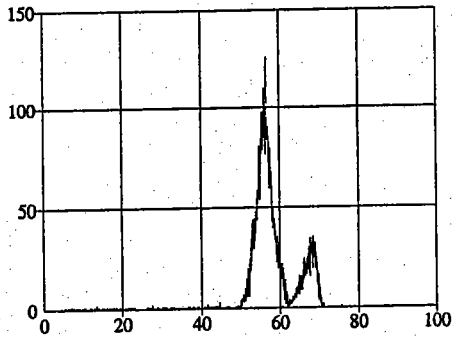


Counts Chem

Counts Alpha

0299-E

8 300 1835.40 1298.10



Counts Chem

Counts Alpha

0299-E

*Handwritten signature*  
11/4/05



# Standard Traceability Log Rad

Source Material Info	
Parent Code:	0299
Prepared By:	Angela Albee
Carrier Conc:	0.5 M HCL
Reference Date:	12/15/1999
Ampoule Mass (g):	5.0368 g
Uncertainty:	+/- 2.5 %
LogBook No:	RC S 027 128

A Solution Material Info	
Isotope:	Radium-226
Prepared By:	Angela Albee
Prep Date:	09/15/2000
Verification Date:	08/26/2004
Expiration Date:	08/26/2005
Primary Code:	0299-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.6634 g
Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Albee	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Albee	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Albee	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Albee	1.9909	100	0299-E	2434.34 dpm/mL	11/04/2004	11/04/2005
08/26/2003	Angela Albee	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005
04/05/2005	Amanda Fehr	5.0018	250	0299-G	2446.3471 dpm/mL	04/06/2005	04/06/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

*Handwritten signature:* AJQ  
11/4/05

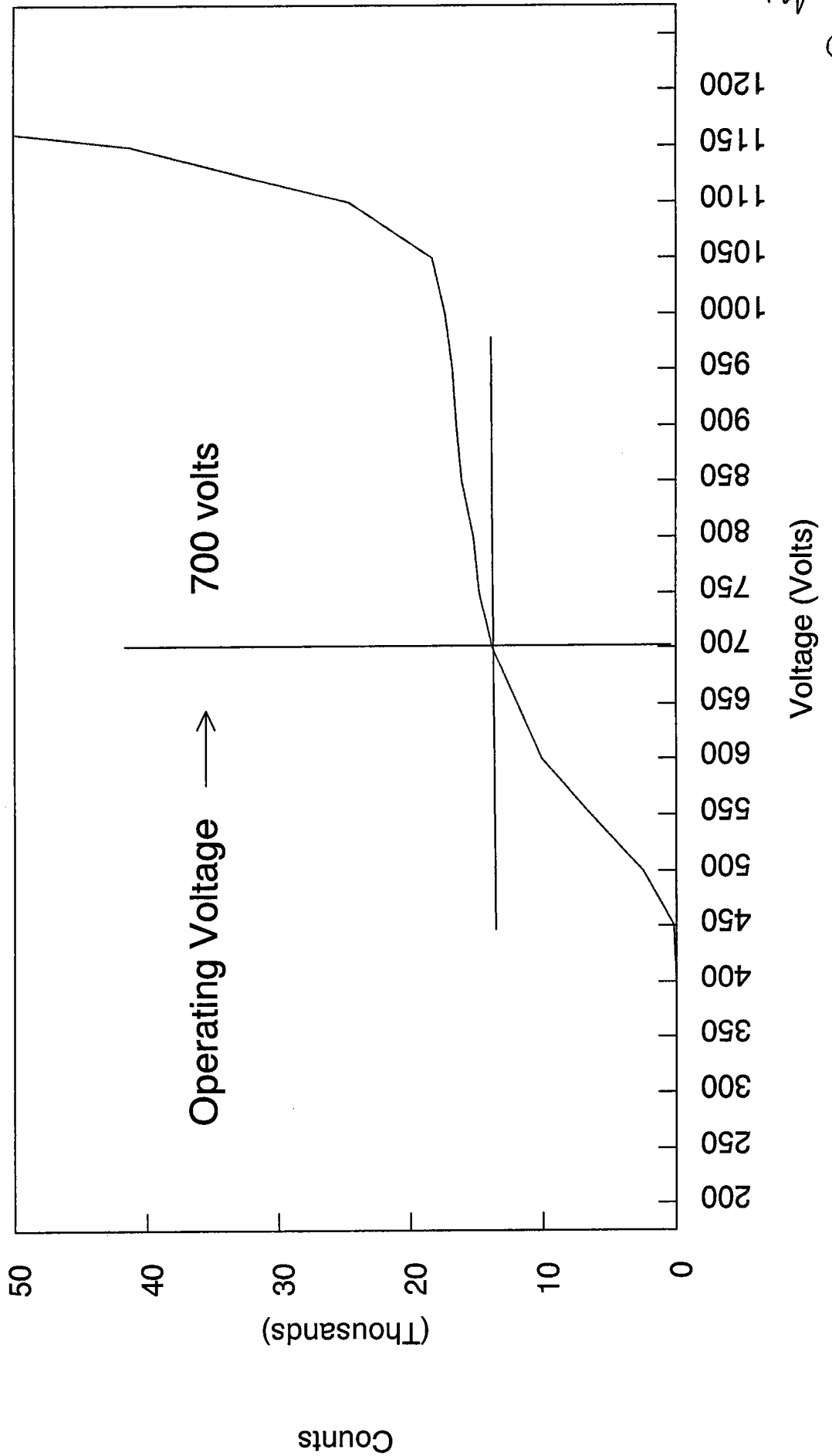
Voltage Curve Ludlum # 5				
Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	11/4/2005	10:01	5
0.25	0	11/4/2005	10:02	5
0.30	0	11/4/2005	10:03	5
0.35	0	11/4/2005	10:04	5
0.40	0	11/4/2005	10:05	5
0.45	188	11/4/2005	10:06	5
0.50	2505	11/4/2005	10:07	5
0.55	6400	11/4/2005	10:08	5
0.60	10095	11/4/2005	10:09	5
0.65	11888	11/4/2005	10:10	5
0.70	13799	11/4/2005	10:11	5
0.75	14773	11/4/2005	10:12	5
0.80	15200	11/4/2005	10:13	5
0.85	16084	11/4/2005	10:14	5
0.90	16485	11/4/2005	10:15	5
0.95	16792	11/4/2005	10:16	5
1.00	17342	11/4/2005	10:17	5
1.05	18321	11/4/2005	10:18	5
1.10	24605	11/4/2005	10:19	5
1.15	41208	11/4/2005	10:20	5
1.20	79240	11/4/2005	10:21	5

ABI 12/8/05

JLJ  
12/8/05

# Plateau Novemver, 2005

Ludlum # 5



12/18/05  
HBI  
5018/121  
ATD

# Ra-226 WATER

Batch : LCSVER  
 Date : 12/6/2005  
 Analyst : JMB1

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 MDA : 1 pCi/L

Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME
VER 2	0.500	30	634	501	1.889	0.267	0.5139	20.2337	1.6052	12/6/2005 14:30
VER 3	0.500	30	784	502	1.904	0.133	0.3824	24.7965	1.7491	12/6/2005 15:00
VER 4	0.500	30	678	503	1.942	0.267	0.4931	20.7902	1.5930	12/6/2005 15:35
VER 5	0.500	30	650	504	1.736	0.200	0.4891	22.3018	1.7384	12/6/2005 16:15
VER 6	0.500	30	953	505	2.126	0.133	0.3308	26.0930	1.6671	12/6/2005 16:45
VER 12	0.500	30	951	506	2.054	0.267	0.3693	21.9160	1.4106	12/8/2005 13:05
VER 7	0.500	30	769	508	1.942	0.133	0.3321	21.1178	1.5043	12/7/2005 12:55
VER 8	0.500	30	778	509	1.987	0.267	0.4287	20.7621	1.4817	12/7/2005 13:50
VER 9	0.500	30	986	510	2.033	0.200	0.3706	25.7153	1.6199	12/7/2005 14:25
VER 10	0.500	30	915	511	1.994	0.267	0.4227	24.1275	1.5840	12/7/2005 15:05
VER 11	0.500	30	1016	512	1.954	0.267	0.4296	27.2513	1.6956	12/7/2005 15:50

*Ad Bail* 12/8/05  
 12/9/05  
 12/9/05  
 12/19/05  
*Angela Johnson* 12/18/05

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
VER 2		5	12/6/2005 14:30	LCS	0321-H	24.14	pCi/L	84%
VER 3		5	12/6/2005 15:00	LCS	0321-H	24.14	pCi/L	103%
VER 4		5	12/6/2005 15:35	LCS	0321-H	24.14	pCi/L	86%
VER 5		5	12/6/2005 16:15	LCS	0321-H	24.14	pCi/L	92%
VER 6		5	12/6/2005 16:45	LCS	0321-H	24.14	pCi/L	108%
VER 12		5	12/8/2005 13:05	LCS	0321-H	24.14	pCi/L	91%
VER 7		5	12/7/2005 12:55	LCS	0321-H	24.14	pCi/L	87%
VER 8		5	12/7/2005 13:50	LCS	0321-H	24.14	pCi/L	86%
VER 9		5	12/7/2005 14:25	LCS	0321-H	24.14	pCi/L	107%
VER 10		5	12/7/2005 15:05	LCS	0321-H	24.14	pCi/L	100%
VER 11		5	12/7/2005 15:50	LCS	0321-H	24.14	pCi/L	113%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
12/2/2005 14:25	12/6/2005 11:10	92.75	3.33	0.5035	0.9751	1.0019	20.8663	0.4920
12/2/2005 14:25	12/6/2005 12:00	93.58	3.00	0.5067	0.9776	1.0019	26.0000	0.4962
12/2/2005 14:25	12/6/2005 12:35	94.17	3.00	0.5088	0.9776	1.0019	22.3333	0.4984
12/2/2005 14:25	12/6/2005 13:05	94.67	3.17	0.5107	0.9764	1.0019	21.4667	0.4996
12/2/2005 14:25	12/6/2005 15:15	96.83	1.50	0.5186	0.9887	1.0019	31.6333	0.5137
12/2/2005 14:25	12/8/2005 8:50	138.42	4.25	0.6483	0.9684	1.0019	31.4333	0.6290
12/2/2005 14:25	12/7/2005 8:35	114.17	4.33	0.5777	0.9678	1.0019	25.5000	0.5601
12/2/2005 14:25	12/7/2005 9:10	114.75	4.67	0.5795	0.9654	1.0019	25.6663	0.5605
12/2/2005 14:25	12/7/2005 9:50	115.42	4.58	0.5816	0.9660	1.0019	32.6667	0.5629
12/2/2005 14:25	12/7/2005 10:40	116.25	4.42	0.5843	0.9672	1.0019	30.2333	0.5662
12/2/2005 14:25	12/7/2005 11:25	117.00	4.42	0.5866	0.9672	1.0019	33.6000	0.5684

12/8/05  
~~12/9/05~~ #B1 12/9/05  
*Ad Bail*  
*Cingela S. Johnson 12/8/05*



Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VER 2	500	12/2/05 1425	12/6/05 1110	12/6/05 1430	501	5	8	634
VER 3	500	12/2/05 1425	12/6/05 1200	12/6/05 1500	502	5	4	784
VER 4	500	12/2/05 1425	12/6/05 1235	12/6/05 1535	503	5	8	678
VER 5	500	12/2/05 1425	12/6/05 1205	12/6/05 1615	504	5	4	650
VER 6	500	12/2/05 1425	12/6/05 1315	12/6/05 1645	505	5	4	953
VER 7	500	12/2/05 1425	12/7/05 835	12/7/05 1255	508	5	4	769
VER 8	500	12/2/05 1425	12/7/05 910	12/7/05 1350	509	5	8	778
VER 9	500	12/2/05 1425	12/7/05 950	12/7/05 1425	510	5	6	986
VER 10	500	12/2/05 1425	12/7/05 1040	12/7/05 1505	511	5	8	915
VER 11	500	12/2/05 1425	12/7/05 1125	12/7/05 1550	512	5	8	1016

AB 12/7/05

JAL 12/18/05

5 10/18/12/12/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
Ver-12		12/2/05 1425	12/8/05 850	12/8/05 1305	506	5	8	951
(The remainder of the table is crossed out with a diagonal line.)								

AD 12/14/05

AD 11/15/05

AD 12/18/05

**General Engineering Laboratories  
Verification Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-008 Isotope Ra-226  
 Date Standards Prepared 5/18/05 Cocktail Type Used NA  
 Standard ID 0321-H Matrix of Vial/Planchett NA  
 Amount Used (g or ml) 0.1 NA  
 Standard Activity (DPM/g or ml) 269.6188 Type of Scintillation Vial NA  
 Reference Date 9/9/91 Pipette ID Used 1429303  
 Expiration Date 5/20/04 Balance ID Used 28488  
 Residue/Carrier Agent NA Quenching Agent NA

	Standard Number	Quenching Vol (uL)/ Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER 1				
2	VER 2				
3	VER 3				
4	VER 4				
5	VER 5				
6	VER 6				
7	VER 7				
8	VER 8				
9	VER 9				
10	VER 10				
11	VER 11				
12	VER 12				
<del>12/18/05</del>					

Prepared By: Adri Bail Date 12/9/05  
 Reviewed By: Angela Johnson Date 12/8/05

Rev 1 RLM 9/10/97

# Verification for Ra-226 Standard 0321-H

A. Fehr 5/20/2005	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source DPM/mL
	0321-H N1	1170.1000	34.2000	1135.9000	4.20643586	270.0385881
	0321-H N2	1137.8000	34.2000	1103.6000	4.20643586	262.3598783
	0321-H N3	1149.6000	34.2000	1115.4000	4.20643586	265.1651036
						Average = 265.8545233

Mean Value (Counting) = 265.8545233      99.1905663      Pass  
 Stdev = 3.895501322      0.01461514      Rule 3 (Pass/Fail)

Certificate Value = 268.0  
 Lower Limit = 258.0835207  
 Upper Limit = 273.625526  
 Rule 1 Pass/Fail = Pass  
 Two sigma = 7.771002644  
 10 % of Mean = 26.58545233  
 Rule 2 (Pass/Fail) = Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0321-H by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 5/20/05 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda L. Fehr 5/20/05*  
*Angela A. Johnson 5/24/05*

# General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414  
(843)556-8171

## Lucas Cell Calibration Package

601-612

	YES	NO	Comments
1) Is all calibration standard information enclosed for: the primary standard certificate? the second standard standard(s) documentation? standard preparation information? standard < 1 Year old or verified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Is the efficiency calibration report included ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Is the raw count data included for: Cell constant determination? Plateau generation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Are the calibration verifications included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Are the instrument settings included: HVPS settings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6) Has the CELLEFF.xls file been updated ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7) Have the calibration dates been updated in ALPHALIMS ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Prepared By: Ad Bait

Date: 12/29/05

Reviewed By: Angela Johnson

Date: 12/29/05

Effective Date: 12/29/05

# Ra-226 Cell Constants

standard ID: 0299-E  
Volume added (mL): 0.1  
Standard Reference Activity (DPM/mL): 2434.34

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/time flushed to cell	Date/time end of degas	bkg cpm	total counts	count time min	Known activity dpm	t1 (days) end-degas to flush	t2 (days) end-flush to count	t3 (days) Std Ref Date to count	Decay from Std Ref Date to count			
														degas	cpm	min
601	1.935	Average	2.064	10	12/9/2005 12:35	12/9/2005 6:40	12/2/2005 13:20	0.133	4742	15	316.13	243.02	6.72222	0.24653	2187	0.9974
601	2.050	Stdev	0.137	1	12/6/2005 15:05	12/6/2005 9:50	12/2/2005 13:20	0.033	7192	30	239.73	243.02	3.85417	0.21875	2184	0.9974
601	2.207			1	12/1/2005 11:00	12/1/2005 5:20	11/28/2005 15:15	0.267	5755	30	191.83	243.02	2.58681	0.23611	2178	0.9974
602	1.968	Average	1.884	11	12/9/2005 13:40	12/9/2005 6:00	12/2/2005 13:20	0.133	4750	15	316.67	243.02	6.69444	0.31944	2187	0.9974
602	1.842	Stdev	0.073	2	12/6/2005 15:35	12/6/2005 10:35	12/2/2005 13:20	0.133	6515	30	217.17	243.02	3.88542	0.20833	2184	0.9974
602	1.842			13	8/24/2005 7:30	8/24/2005 4:25	8/19/2005 16:30	0.133	7286	30	242.87	243.02	4.49653	0.12847	2079	0.9975
603	1.933	Average	1.798	3	12/6/2005 16:15	12/6/2005 11:10	12/2/2005 13:20	0.267	6864	30	228.80	243.02	3.90972	0.21181	2184	0.9974
603	1.754	Stdev	0.118	3	8/22/2005 17:40	8/22/2005 11:35	8/19/2005 16:30	0.267	4842	30	161.40	243.02	2.79514	0.25347	2078	0.9975
603	1.709			12	12/9/2005 13:25	12/9/2005 9:00	12/2/2005 13:20	0.200	4269	15	284.60	243.02	6.81944	0.18403	2187	0.9974
604	1.845	Average	1.798	13	12/9/2005 14:00	12/9/2005 9:40	12/2/2005 13:20	0.200	4620	15	308.00	243.02	6.84722	0.18056	2187	0.9974
604	1.750	Stdev	0.048	4	8/22/2005 18:15	8/22/2005 12:25	8/19/2005 16:30	0.267	4886	30	162.87	243.02	2.82986	0.24306	2078	0.9975
604	1.800			4	12/4/2005 9:00	12/2/2005 5:50	11/28/2005 15:15	0.267	4271	30	142.37	243.02	3.60764	2.13194	2181	0.9974
605	1.828	Average	1.843	11	8/19/2005 14:50	8/19/2005 10:35	8/12/2005 8:30	0.233	9306	30	310.20	243.02	7.06681	0.17708	2075	0.9975
605	1.909	Stdev	0.060	14	12/9/2005 14:30	12/9/2005 5:20	12/2/2005 13:20	0.200	4547	15	303.13	243.02	6.66667	0.38194	2187	0.9974
605	1.791			5	12/4/2005 11:50	12/2/2005 9:30	11/28/2005 15:15	0.267	4404	30	146.80	243.02	3.76042	2.09722	2181	0.9974
607	1.876	Average	1.985	15	12/9/2005 15:05	12/9/2005 7:25	12/2/2005 13:20	0.267	4551	15	303.40	243.02	6.75347	0.31944	2187	0.9974
607	1.886	Stdev	0.179	4	12/6/2005 16:45	12/6/2005 12:00	12/2/2005 13:20	0.267	6758	30	225.27	243.02	3.94444	0.19792	2184	0.9974
607	2.192			3	12/1/2005 12:15	12/1/2005 6:45	11/28/2005 15:15	0.267	5824	30	194.13	243.02	2.64583	0.22917	2179	0.9974
608	1.868	Average	1.958	16	12/9/2005 15:20	12/9/2005 11:00	12/2/2005 13:20	0.267	4899	15	313.27	243.02	6.90278	0.18056	2187	0.9974
608	2.036	Stdev	0.085	5	12/6/2005 17:20	12/6/2005 12:35	12/2/2005 13:20	0.267	7324	30	244.13	243.02	3.96875	0.19792	2184	0.9974
608	1.971			13	12/4/2005 12:25	12/2/2005 10:50	11/28/2005 15:15	0.267	4921	30	164.03	243.02	3.81597	2.06597	2182	0.9974
609	1.848	Average	1.984	17	12/9/2005 15:45	12/9/2005 11:25	12/2/2005 13:20	0.133	4651	15	310.07	243.02	6.92014	0.18056	2187	0.9974
609	2.015	Stdev	0.124	6	12/6/2005 18:00	12/6/2005 13:05	12/2/2005 13:20	0.267	7266	30	242.20	243.02	3.98958	0.20486	2184	0.9974
609	2.090			9	12/1/2005 13:25	12/1/2005 10:05	11/28/2005 15:15	0.267	5872	30	195.73	243.02	2.78472	0.13889	2179	0.9974
610	1.774	Average	1.792	7	12/6/2005 18:35	12/6/2005 15:15	12/2/2005 13:20	0.200	6570	30	219.00	243.02	4.07986	0.13889	2184	0.9974
610	1.762	Stdev	0.043	10	8/23/2005 11:15	8/23/2005 8:15	8/19/2005 16:30	0.267	6068	30	202.27	243.02	3.65625	0.12500	2078	0.9975
610	1.841			18	12/9/2005 16:05	12/9/2005 11:45	12/2/2005 13:20	0.067	4638	15	309.20	243.02	6.93403	0.18056	2187	0.9974
611	1.963	Average	1.944	8	12/7/2005 14:25	12/7/2005 8:35	12/2/2005 13:20	0.267	7936	30	264.53	243.02	4.80208	0.24306	2185	0.9974
611	1.843	Stdev	0.093	11	8/23/2005 15:10	8/23/2005 9:10	8/19/2005 16:30	0.233	6248	30	208.27	243.02	3.69444	0.25000	2079	0.9975
611	2.026			11	12/1/2005 14:10	12/1/2005 8:15	11/28/2005 15:15	0.267	5464	30	182.13	243.02	2.70633	0.24653	2179	0.9974
612	2.041	Average	1.927	16	12/2/2005 10:30	12/2/2005 11:30	11/28/2005 15:15	0.267	5223	30	174.10	243.02	3.84375	1.95833	2181	0.9974
612	1.867	Stdev	0.099	20	12/9/2005 16:25	12/9/2005 12:20	12/2/2005 13:20	0.067	4720	15	314.67	243.02	6.95833	0.17014	2187	0.9974
612	1.873			9	12/7/2005 13:50	12/7/2005 9:10	12/2/2005 13:20	0.267	7663	30	255.43	243.02	4.82639	0.19444	2185	0.9974

*Ad Baik 12/29/05*  
*Angela A. Johnson 12/29/05*

Ra-226 Verification Sheet

Count time 15 min

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 10	500	12/2/05 1320	12/9/05 0640	12/9/05 1235	601	6	4	4742
CAL 11	500	12/2/05 1320 12/15/05 1320	12/9/05 0600	12/9/05 1340	602	6	4	4750
CAL 12	500	12/2/05 1320	12/9/05 0900	12/9/05 1325	603	6	6	4269
CAL 13	500	12/2/05 1320	12/9/05 0940	12/9/05 1400	604	6	6	4620
CAL 14	500	12/2/05 1320	12/9/05 0520	12/9/05 1430	605	6	6	4547
CAL 15	500	12/2/05 1320	12/9/05 0725	12/9/05 1505	607	6	8	4551
CAL 16	500	12/2/05 1320	12/9/05 1100	12/9/05 1520	608	6	8	4699
CAL 17	500	12/2/05 1320	12/9/05 1125	12/9/05 1545	609	6	4	4651
CAL 18	500	12/2/05 1320	12/9/05 1145	12/9/05 1605	610	6	2	4638
CAL 19	500	12/2/05 1320	12/9/05 1220	12/9/05 1625	612	6	2	4720
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Abi 12/21/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	12/2/05 1320	12/6/05 950	12/6/05 1505	601	6	1	7192
CAL 2	500	12/2/05 1320	12/6/05 1035	12/6/05 1535	602	4	4	6515
CAL 3	500	12/2/05 1320	12/6/05 1110	12/6/05 1615	603	4	6	6864
CAL 4	500	12/2/05 1320	12/6/05 1200	12/6/05 1645	607	6	8	6708
CAL 5	500	12/2/05 1320	12/6/05 1235	12/6/05 1720	608	6	8	7324
CAL 6	500	12/2/05 1320	12/6/05 1305	12/6/05 1800	609	6	8	7266
CAL 7	500	12/2/05 1320	12/6/05 1515	12/6/05 1835	610	6	6	6570
<del>CAL 8</del>	<del>500</del>	<del>12/2/05 1320</del>	<del>12/6/05 835</del>	<del>12/6/05 1255</del>	<del>611</del>	<del>6</del>	<del>6</del>	<del>3920</del> <del>269</del>
CAL 9	500	12/2/06 1320	12/7/05 910	12/7/05 1350	612	4	8	7463
CAL 8	500	12/2/05 1320	12/7/05 835	12/7/05 1425	611	6	8	7936

15 min - A1  
12/21/05

11/19/05  
12/21/05

12/21/05  
A10

A1  
12/20/05



Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	11/28/05 1515	12/1/05 520	12/1/05 1100	601	6	8	5755
CAL 4	500	11/28/05 1515	12/2/05 550	12/4/05 900	604	6	8	4271
CAL 5	500	11/28/05 1515	12/2/05 930	12/4/05 1150	605	6	8	4409
CAL 3	500	11/28/05 1515	12/1/05 645	12/1/05 1215	607	6	8	5824
CAL 13	500	11/28/05 1515	12/2/05 1050	12/4/05 1225	608	6	8	4921
CAL 9	500	11/28/05 1515	12/1/05 1005	12/1/05 1325	609	6	8	5872
CAL 11	500	11/28/05 1515	12/1/05 815	12/1/05 1410	611	6	8	5464
CAL 16	500	11/28/05 1515	12/2/05 1130	12/4/05 1030	612	6	8	5223

12/29/05

12/29/05

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AB1

12/20/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 13	500	8/19/05 1630	8/24/05 425	8/24/05 730	602	6	4	7286
<del>CAL 14</del>	<del>500</del>	<del>8/24/05 1630</del>	<del>8/24/05 455</del>	<del>8/24/05 755</del>	<del>600</del>	<del>6</del>	<del>8</del>	<del>7449</del>
<del>CAL 1</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 423</del>	<del>9/10/05 730</del>	<del>601</del>	<del>6</del>	<del>3</del>	<del>8623</del>
<del>CAL 2</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 505</del>	<del>9/10/05 805</del>	<del>602</del>	<del>6</del>	<del>6</del>	<del>8170</del>
<del>CAL 3</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 545</del>	<del>9/10/05 845</del>	<del>603</del>	<del>6</del>	<del>8</del>	<del>8730</del>
<del>CAL 4</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 655</del>	<del>9/10/05 955</del>	<del>606</del>	<del>6</del>	<del>6</del>	<del>8603</del>
<del>CAL 5</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 735</del>	<del>9/10/05 1035</del>	<del>607</del>	<del>6</del>	<del>7</del>	<del>8462</del>
<del>CAL 6</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 810</del>	<del>9/10/05 1110</del>	<del>608</del>	<del>6</del>	<del>8</del>	<del>8080</del>
<del>CAL 7</del>	<del>500</del>	<del>8/24/05 1140</del>	<del>9/10/05 850</del>	<del>9/10/05 1150</del>	<del>609</del>	<del>6</del>	<del>8</del>	<del>7578</del>

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Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
CAL 1	500	8/17/05 8:30	8/17/05 5:10	8/17/05 10:05	607	6	8	6837
CAL 2	500	8/17/05 8:30	8/17/05 6:25	8/17/05 10:45	608	6	9	7369
CAL 3	500	8/17/05 8:30	8/17/05 7:30	8/17/05 11:20	609	6	2	6289
CAL 4	500	8/17/05 8:30	8/17/05 8:20	8/17/05 11:55	610	6	6	6945
CAL 5	500	8/17/05 8:30	8/17/05 9:55	8/17/05 13:15	611	6	8	6811
CAL 6	500	8/17/05 8:30	8/17/05 10:00	8/17/05 16:15	612	6	5	3252
CAL 7	500	8/17/05 8:30	8/17/05 11:05	8/17/05 16:00	601	6	1	7261
CAL 8	500	8/17/05 8:30	8/17/05 11:40	8/17/05 16:40	603	6	8	6542
CAL 9	500	8/17/05 8:30	8/17/05 9:10	8/19/05 13:35	602	6	5	7636
CAL 10	500	8/17/05 8:30	8/17/05 9:55	8/19/05 14:15	604	6	6	8361
CAL 11	500	8/12/05 8:30	8/19/05 10:35	8/19/05 14:50	605	6	7	9306
CAL 12	500	8/17/05 8:30	8/19/05 11:05	8/19/05 15:25	606	6	5	7361
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Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
<del>CAL 1</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/20/05 1005</del>	<del>8/20/05 1305</del>	<del>601</del>	<del>6</del>	<del>8</del>	<del>5175</del>
<del>CAL 2</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/20/05 1040</del>	<del>8/20/05 1350</del>	<del>602</del>	<del>6</del>	<del>4</del>	<del>4515</del>
<del>CAL 3</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/22/05 1135</del>	<del>8/22/05 1740</del>	<del>603</del>	<del>6</del>	<del>8</del>	<del>4842</del>
<del>CAL 4</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/22/05 1225</del>	<del>8/22/05 1815</del>	<del>604</del>	<del>6</del>	<del>8</del>	<del>4886</del>
<del>CAL 5</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/22/05 1310</del>	<del>8/22/05 2340</del>	<del>605</del>	<del>6</del>	<del>8</del>	<del>4467</del>
<del>CAL 6</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/20/05 430</del>	<del>8/20/05 740</del>	<del>606</del>	<del>6</del>	<del>8</del>	<del>5573</del>
<del>CAL 7</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/20/05 510</del>	<del>8/23/05 815</del>	<del>607</del>	<del>6</del>	<del>8</del>	<del>5367</del>
<del>CAL 8</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/23/05 620</del>	<del>8/23/05 925</del>	<del>608</del>	<del>6</del>	<del>8</del>	<del>5786</del>
<del>CAL 9</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/23/05 715</del>	<del>8/23/05 1045</del>	<del>609</del>	<del>6</del>	<del>8</del>	<del>4991</del>
<del>CAL 10</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/23/05 815</del>	<del>8/23/05 1115</del>	<del>610</del>	<del>6</del>	<del>8</del>	<del>6068</del>
<del>CAL U</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/23/05 910</del>	<del>8/23/05 1245</del> <del>1510</del> <del>1245</del>	<del>611</del>	<del>6</del>	<del>7</del>	<del>6248</del>
<del>CAL 12</del>	<del>500</del>	<del>8/19/05 1630</del>	<del>8/20/05 1015</del>	<del>8/23/05 1420</del>	<del>612</del>	<del>6</del>	<del>7</del>	<del>5899</del>
<del>CAL</del>								

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## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008

Isotope Ra-226

Date Standards Prepared 8/26/03

Cocktail Type Used N/A

Standard ID 0299-E

Matrix of Vial/Planchett N/A

Amount Used (g or ml) 0.1

N/A  
N/A

Standard Activity (DPM/g or mb) 2434.34

Type of Scintillation Vial N/A

Reference Date 12/15/99

Pipette ID Used 1429303

Expiration Date 11/4/06

Balance ID Used 3640216

Residue/Carrier Agent 0.5 m HCl

Quenching Agent N/A

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	CAL 1				
2	CAL 2				
3	CAL 3				
4	CAL 4				
5	CAL 5				
6	CAL 6				
7	CAL 7				
8	CAL 8				
9	CAL 9				
10	CAL 10				
11	CAL 11				
12	CAL 12				
13	CAL 13				
14	CAL 14				
15	CAL 15				

Prepared By: Ad Bail Date 12/29/05

Reviewed By: Angela A. Johnson Date 12/29/05

Rev 1 RLM 9/10/97

## General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-009 Isotope Po-226  
 Date Standards Prepared 8/26/03 Cocktail Type Used N/A  
 Standard ID 0299-E Matrix of Vial/Planchett N/A  
 Amount Used (g or ml) 0.1 N/A  
 Standard Activity (DPM/g or ml) 2434.34 Type of Scintillation Vial N/A  
 Reference Date 12/15/99 Pipette ID Used 1429303  
 Expiration Date 11/4/06 Balance ID Used 36040216  
 Residue/Carrier Agent 0.5 M HCl Quenching Agent N/A

	Standard Number	Quenching Vol (uL) Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
16	CAL 16				
17	CAL 17				
18	CAL 18				
19	CAL 19				
20	CAL 20				
21	CAL 21				
22	CAL 22				
23	CAL 23				
24	CAL 24	<u>AB1</u>			
		<u>12/29/05</u>			

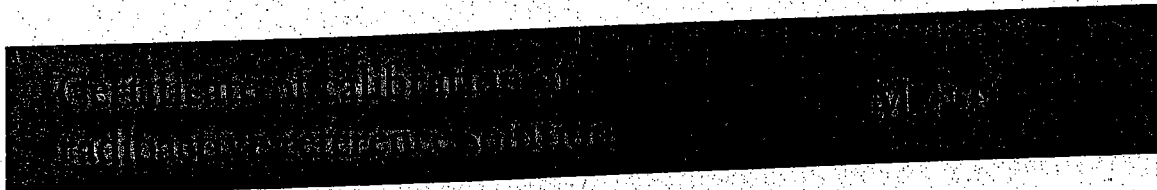
Prepared By: Ad Beck Date 12/29/05  
 Reviewed By: Angela A. Johnson Date 12/29/05

Rev 1 RLM 9/10/97

8-21-00

Nycomed Amersham plc  
Amersham Laboratories

0279



Nycomed Amersham plc  
Radiation & Radioactivity  
Calibration Laboratory  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ISSUED  
FOR:

AEA Technology plc  
Isotrak  
Amersham Laboratories  
White Lion Road  
Amersham  
Buckinghamshire  
HP7 9LL

ion Principal radionuclide: Radium-226

Product code: RAY44  
Solution number: R4/131/89

ment Reference time: 1200 GMT on 15 December 1999

data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

ion of The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$ , which  
inties for a  $t$ -distribution with  $v_{eff} = \infty$  effective degrees of freedom corresponds to a coverage probability of approximately  
95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard  
uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	-	6.5 ± 2.1
6.54(21)	-	6.54 ± 0.21
6.543(21)	-	6.543 ± 0.021

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Date of  
issue

17<sup>th</sup> December 1999

**Nycomed  
Amersham**

0299

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Reference time for solution number R4/131/89:	1200 GMT on 15 December 1999
Radioactive concentration of radium-226:	43.75 kilobecquerels per gram of solution
which is equivalent to:	1.183 microcuries per gram of solution
Mass of solution:	5.0368 grams
Total activity of radium-226:	220.4 kilobecquerels
which is equivalent to:	5.956 microcuries
Recommended half life:	1600 years

Method of measurement:  
The activity of the solution was measured using a high pressure re-entrant ionisation chamber calibrated with a large number of absolutely standardised solutions.

Calibration date: 15 December 1999  
The calibration date is provided for added information only, and must not be confused with the reference date on pages 1 and 2 of the certificate. It is the reference date that must be used in all calculations relating to the values of activity.

- Expanded uncertainty in the radioactive concentration quoted above:  $\pm 2.5 \%$
- Combined Type A uncertainty:  $\pm 0.2 \%$
- Combined Type B uncertainty:  $\pm 1.3 \%$

Radiochemical The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Carrier free in 0.5M HCl

This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.





# Standard Traceability Log Rad

Source Material Info	
Parent Code:	0299
Prepared By:	Angela Albee
Carrier Conc:	0.5 M HCL
Reference Date:	12/15/1999
Ampoule Mass (g):	5.0368 g
Uncertainty:	+/- 2.5 %
LogBook No:	RC S 027 128

A Solution Material Info	
Isotope:	Radium-226
Prepared By:	Angela Albee
Prep Date:	09/15/2000
Verification Date:	08/26/2004
Expiration Date:	08/26/2005
Primary Code:	0299-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.6634 g
Density(g/mL):	1.0012

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

$(\text{Mass of parent(g)}) * (\text{Parent Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/26/2000	Angela Albee	2.1096	100	0299-C	2579.62 dpm/mL	10/10/2002	10/10/2003
09/15/2000	Angela Albee	.2004	100	0299-B	245.05 dpm/mL	09/15/2000	09/15/2001
08/23/2002	Angela Albee	2.0443	100	0299-D	2499.77 dpm/mL	08/23/2002	08/23/2003
08/26/2003	Angela Albee	1.9909	100	0299-E	2434.34 dpm/mL	08/26/2004	08/26/2005
08/26/2003	Angela Albee	1.9872	100	0299-F	2429.82 dpm/mL	08/26/2004	08/26/2005

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ra-226 Standard 0299-E

Standard	Mass. Used (G)	Source DPM/G
	0.0645	2446.372267
	0.0658	2426.325867
	0.0652	2326.765061
		2399.821065

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Source DPM/G
0299-F N1	561.0000	26.9000	534.1000	3.38485694	2446.372267
0299-F N2	567.3000	26.9000	540.4000	3.38485694	2426.325867
0299-F N3	540.4000	26.9000	513.5000	3.38485694	2326.765061
Mean Value (Counting) =	2399.821065	98.7828559	% of known		
Stdev =	64.05739118	0.02669257			

Certificate Value =	2429.4	dpm/mL
Lower Limit =	2271.706283	dpm/mL
Upper Limit =	2527.935847	dpm/mL
Rule 1 Pass/Fail	Pass	Pass
Two sigma =	128.1147824	dpm/mL
10 % of Mean =	239.9821065	dpm/mL
Rule 2 (Pass/Fail)	Pass	Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0299-E by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and ten mLs of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 8/26/04 using source 0321-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0321. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C/D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD SOP M-001

Amanda L. Fehr 8/26/04  
 Heather B. Co  
 8/26/04

Voltage Curve Ludlum # 6				
Volts (K.V.)	Counts	Date	Time	Detector
0.20	0	8/22/2005	9:15	6
0.25	0	8/22/2005	9:16	6
0.30	0	8/22/2005	9:17	6
0.35	0	8/22/2005	9:18	6
0.40	0	8/22/2005	9:19	6
0.45	0	8/22/2005	9:20	6
0.50	0	8/22/2005	9:21	6
0.55	76	8/22/2005	9:22	6
0.60	1407	8/22/2005	9:23	6
0.65	5153	8/22/2005	9:24	6
0.70	8502	8/22/2005	9:25	6
0.75	11150	8/22/2005	9:26	6
0.80	12291	8/22/2005	9:27	6
0.85	13641	8/22/2005	9:28	6
0.90	14585	8/22/2005	9:29	6
0.95	15162	8/22/2005	9:30	6
1.00	15489	8/22/2005	9:31	6
1.05	16151	8/22/2005	9:32	6
1.10	16340	8/22/2005	9:33	6
1.15	16607	8/22/2005	9:34	6
1.20	16845	8/22/2005	9:35	6
1.25	18048	8/22/2005	9:36	6
1.30	21465	8/22/2005	9:37	6
1.35	31258	8/22/2005	9:38	6

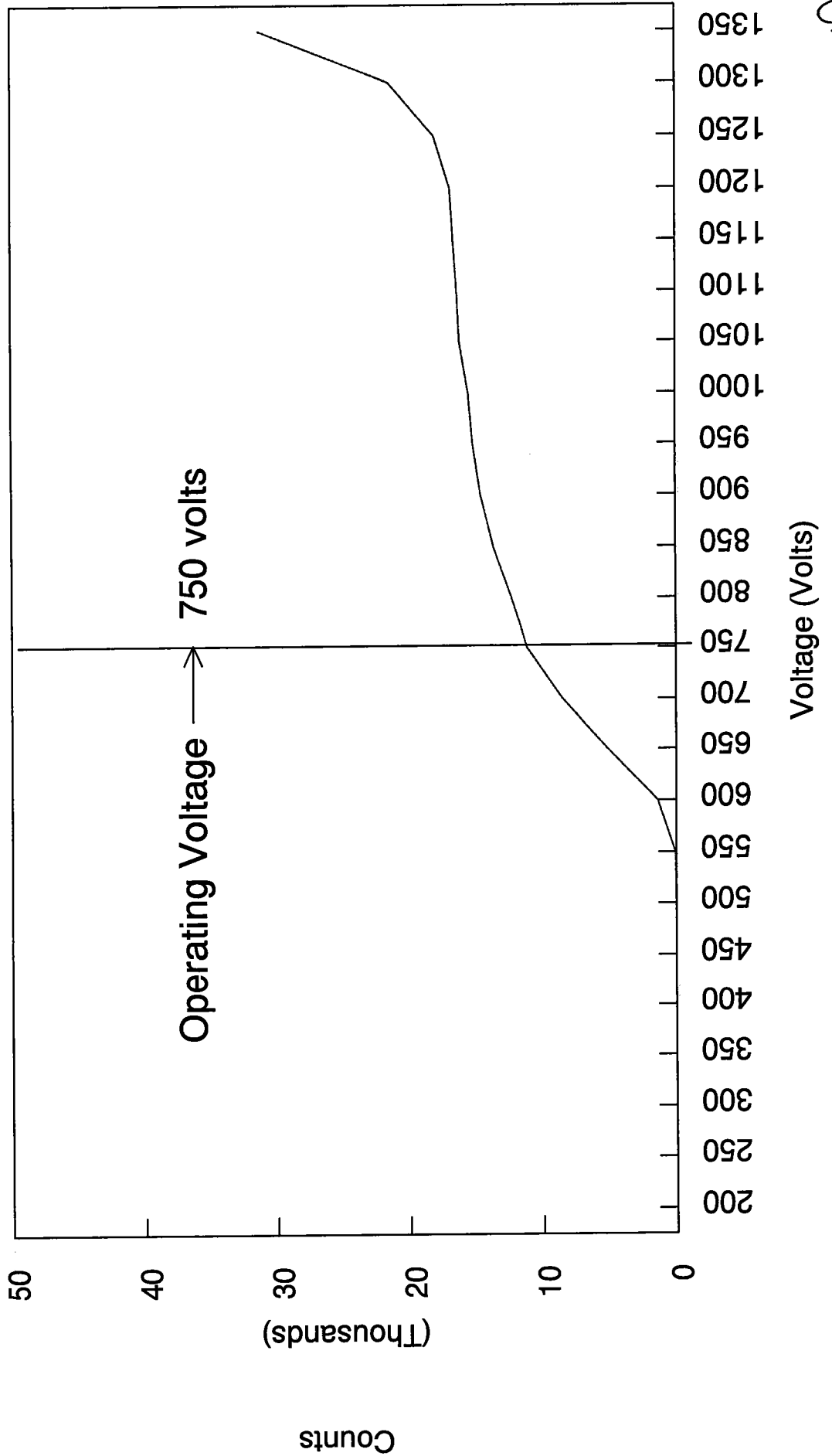
*Ad Bal - 12/29/05*

*AdQ  
12/29/05*

# Plateau August, 2005

## Ludlum # 6

*Hot Bank 12/29/05*



*AT  
12/29/05*

# Ra-226 WATER

Batch : LCSVER  
 Date : 12/27/2005  
 Analyst : SSE

Procedure Code : LUC26RAL  
 Parmname : Radium-226  
 MDA : 1 pCi/L

Instrument Used : LUCAS CELL DETECTOR

Bkg Count Time: 30 min

Sample ID	Sample Vol L	Count Time min	Gross counts cts	Cell # num	Cell Const. num	BKG cpm	Ra-226 MDA pCi/L	Ra-226 RESULT pCi/L	Ra-226 ERROR pCi/L	COUNT DATE/TIME
5	0.500	30	967	601	2.064	0.267	0.3672	22.1465	1.4134	12/28/2005 17:20
7	0.500	30	1032	602	1.884	0.267	0.4018	25.8803	1.5975	12/28/2005 18:20
8	0.500	30	947	603	1.798	0.267	0.4161	24.5773	1.5854	12/22/2005 14:00
9	0.500	30	816	604	1.798	0.167	0.3429	21.1635	1.4656	12/22/2005 14:45
10	0.500	30	803	605	1.843	0.267	0.4043	20.2180	1.4195	12/22/2005 15:30
4	0.500	30	819	607	1.985	0.267	0.4100	20.9156	1.4537	12/27/2005 16:30
6	0.500	30	791	608	1.958	0.200	0.4514	25.0896	1.7685	12/20/2005 10:50
8	0.500	30	844	609	1.984	0.267	0.3807	20.0188	1.3700	12/28/2005 18:55
7	0.500	30	767	610	1.792	0.200	0.4913	26.4718	1.8956	12/20/2005 11:20
2	0.500	30	608	611	1.944	0.167	0.5458	25.0449	2.0156	12/19/2005 10:00
3	0.500	30	561	612	1.927	0.200	0.5861	23.0297	1.9366	12/19/2005 10:40

*Adl Bark* 12/29/05

*Angela D. Johnson* 12/29/05

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
5		6	12/28/2005 17:20	LCS	0321-H	24.14	pCi/L	92%
7		6	12/28/2005 18:20	LCS	0321-H	24.14	pCi/L	107%
8		6	12/22/2005 14:00	LCS	0321-H	24.14	pCi/L	102%
9		6	12/22/2005 14:45	LCS	0321-H	24.14	pCi/L	88%
10		6	12/22/2005 15:30	LCS	0321-H	24.14	pCi/L	84%
4		6	12/27/2005 16:30	LCS	0321-H	24.14	pCi/L	87%
6		6	12/20/2005 10:50	LCS	0321-H	24.14	pCi/L	104%
8		6	12/28/2005 18:55	LCS	0321-H	24.14	pCi/L	83%
7		6	12/20/2005 11:20	LCS	0321-H	24.14	pCi/L	110%
2		6	12/19/2005 10:00	LCS	0321-H	24.14	pCi/L	104%
3		6	12/19/2005 10:40	LCS	0321-H	24.14	pCi/L	95%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
12/22/2005 12:30	12/28/2005 11:05	142.58	6.25	0.6592	0.9539	1.0019	31.9663	0.6300
12/22/2005 12:30	12/28/2005 11:50	143.33	6.50	0.6611	0.9521	1.0019	34.1330	0.6307
12/16/2005 14:40	12/22/2005 10:45	140.08	3.25	0.6527	0.9758	1.0019	31.2997	0.6381
12/16/2005 14:40	12/22/2005 11:30	140.83	3.25	0.6547	0.9758	1.0019	27.0330	0.6400
12/16/2005 14:40	12/22/2005 12:05	141.42	3.42	0.6562	0.9745	1.0019	26.4997	0.6407
12/22/2005 12:30	12/27/2005 13:30	121.00	3.00	0.5989	0.9776	1.0019	27.0330	0.5866
12/16/2005 14:40	12/20/2005 7:50	89.17	3.00	0.4899	0.9776	1.0019	26.1667	0.4799
12/22/2005 12:30	12/28/2005 12:25	143.92	6.50	0.6626	0.9521	1.0019	27.8663	0.6321
12/16/2005 14:40	12/20/2005 8:20	89.67	3.00	0.4919	0.9776	1.0019	25.3667	0.4817
12/16/2005 14:40	12/19/2005 6:20	63.67	3.67	0.3816	0.9727	1.0019	20.0997	0.3719
12/16/2005 14:40	12/19/2005 7:05	64.42	3.58	0.3851	0.9733	1.0019	18.5000	0.3756

*Ad Bail 12/29/05*

*Angela D. Johnson 12/29/05*

Ra-226 Verification Sheet

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Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VER 1	500	12/14/05 1440	12/19/05 540	12/19/05 9:00	602	6	8	487
VER 2	500	12/16/05 1440	12/19/05 620	12/19/05 1000	611	6	5	608
VER 3	500	12/16/05 1440	12/19/05 705	12/19/05 1040	612	6	6	561
VER 4	500	12/16/05 1440	12/20/05 610	12/20/05 910	601	6	8	678
VER 5	500	12/16/05 1440	12/20/05 640	12/20/05 945	607	6	8	602
VER 6	500	12/16/05 1440	12/20/05 750	12/20/05 1050 1220 1220	608	6	6	791
VER 7	500	12/16/05 1440	12/20/05 820	12/20/05 1120	610	6	6	767
VER 8	500	12/16/05 1440 12/22/05 1445	12/22/05 1045	12/22/05 1400	603	6	8	947
VER 9	500	12/16/05 1440	12/22/05 1130	12/22/05 1445	604	6	5	816
VER 10	500	12/16/05 1440	12/22/05 1205	12/22/05 1530	605	6	8	803
VER 11					<del>607</del>	6		
VER 12						6		

AB1 12/27/05

AB1 12/27/05

AB1  
12/29/05

AB1  
12/27/05

Ra-226 Verification Sheet

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VER 1	500	12/22/05 1230	12/22/05 1135	12/22/05 1445	602	6	8	557
VER 2	500	12/22/05 1230	12/22/05 1210	12/22/05 1520	609	6	8	633
VER 3	500	12/22/05 1230	12/22/05 1250	12/22/05 1600	601	6	4	601
VER 4	500	12/22/05 1230	12/22/05 1330	12/22/05 1630	607	6	8	819
ABI								
12/29/05								
VER 5	500	12/22/05 1230	12/28/05 1105	12/20/05 1720	601	6	8	967
VER 6	500	12/22/05 1230	12/28/05 1150	12/28/05 1820	602	6	8	1032
VER 8	500	12/22/05 1230	12/28/05 1225	12/28/05 1855	609	6	8	844
ABI								
12/29/05								
12/29/05								

ABI 12/27/05  
 ABI 12/29/05  
 ABI 12/29/05

ABI  
 12/29/05



**General Engineering Laboratories  
Verification Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-008

Isotope Ra-226

Date Standards Prepared 5/18/05

Cocktail Type Used N/A

Standard ID 0321-H

Matrix of Vial/Planchett N/A

Amount Used (g or mL) 0.1

N/A  
N/A

Standard Activity (DPM/g or mL) 269.6188

Type of Scintillation Vial N/A

Reference Date 9/9/91

Pipette ID Used 1429303

Expiration Date 5/20/06

Balance ID Used 36040216

Residue/Carrier Agent 1M HCl

Quenching Agent N/A

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VER 1				
2	VER 2				
3	VER 3				
4	VER 4				
5	VER 5				
6	VER 6		ABI		
7	VER 7			12/29/05	
8	VER 8				
9	VER 9				
10	VER 10				
11	VER 11				
12	VER 12				
	ABI				
	12/29/05				

Prepared By: Ad Bail Date 12/29/05

Reviewed By: Angela Johnson Date 12/29/05

Rev 1 RLM 9/10/97

# Verification for Ra-226 Standard 0321-H

A. Fehr  
5/20/05

Standard	Detector Eff Mass. Used (mL)	Source DPM/mL
1.0000	4.20643586	270.0385881
1.0000	4.20643586	262.3598783
1.0000	4.20643586	265.1651036
Average =		265.8545233

isotope	Detector CPM	BKG CPM	NET CPM	Pass
0321-H N1	1170.1000	34.2000	1135.9000	Pass
0321-H N2	1137.8000	34.2000	1103.6000	Pass
0321-H N3	1149.6000	34.2000	1115.4000	Pass
Mean Value (Counting) =	265.8545233	99.1905663		Pass
Stdev =	3.885501322	0.01461514		Rule 3 (Pass/Fail)

Certificate Value = 268.0  
 Lower Limit = 258.0835207  
 Upper Limit = 273.625526  
 Rule 1 Pass/Fail Pass  
 Two sigma = 7.771002644  
 10 % of Mean = 26.58545233  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0321-H by transferring portions of the standard into tared glass liquid scintillation vials. One mL of DI Water and 10 mL Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 5/20/05 using source 0299-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0299-A). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda L. Fehr 5/20/05*  
*Angela A. Johnson 5/24/05*

# CONTINUING CALIBRATION DATA

# Gas Flow Proportional Counter Checks for 25-APR-2006

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LB4100A1	ALPHA BKG	09:40	60	2.00	0.03	-0.7	GOOD	
	BETA BKG	09:40	60	63.0	1.05	0.82	GOOD	
	ALPHA EFF	10:15	30	24213	807	0.61	GOOD	
	BETA EFF	10:15	30	1.77E+05	5890	0.14	GOOD	
LB4100A2	ALPHA BKG	09:40	60	3.00	0.05	-0.51	GOOD	
	BETA BKG	09:40	60	56.0	0.93	0.51	GOOD	
	ALPHA EFF	10:15	30	16050	535	-0.21	GOOD	
	BETA EFF	10:15	30	1.29E+05	4290	0.11	GOOD	
LB4100A3	ALPHA BKG	09:40	60	2.00	0.03	-0.6	GOOD	
	BETA BKG	09:40	60	51.0	0.85	-0.51	GOOD	
	ALPHA EFF	10:15	30	22984	766	0.34	GOOD	
	BETA EFF	10:15	30	1.55E+05	5160	-0.36	GOOD	
<u>LB4100A4</u>	ALPHA BKG	09:40	60	0	0	-1.1	GOOD	
	BETA BKG	09:40	60	1169	19.5	53.5	DETL	Outside 3 sigma for > 2 days
	ALPHA EFF	10:15	30	19396	647	-1.6	GOOD	
	BETA EFF	10:15	30	1.73E+05	5780	2.05	DETL	Outside 2 sigma for >= 2 days
LB4100B1	ALPHA BKG	09:40	60	2.00	0.03	-0.11	GOOD	
	BETA BKG	09:40	60	49.0	0.82	-0.48	GOOD	
	ALPHA EFF	10:15	30	21400	713	0.37	DETL	Outside 3 sigma for > 2 days Not a lockout condition w/ 4/25/06
	BETA EFF	10:15	30	1.86E+05	6200	-0.11	GOOD	
LB4100B2	ALPHA BKG	09:40	60	0	0	-1.2	GOOD	
	BETA BKG	09:40	60	52.0	0.87	-0.16	GOOD	
	ALPHA EFF	10:15	30	20980	699	0	DETL	Outside 3 sigma for >= 2 days Not a lockout condition w/ 4/25/06
	BETA EFF	10:15	30	1.62E+05	5390	-0.14	GOOD	
LB4100B3	ALPHA BKG	09:40	60	2.00	0.03	-0.42	GOOD	
	BETA BKG	09:40	60	88.0	1.47	1.83	GOOD	
	ALPHA EFF	10:15	30	16244	541	0.86	DETL	Outside 3 sigma for > 2 days Not a lockout condition w/ 4/25/06
	BETA EFF	10:15	30	1.23E+05	4100	0.7	GOOD	
<u>LB4100B4</u>	ALPHA BKG	09:40	60	1.00	0.02	-0.74	GOOD	
	BETA BKG	09:40	60	238	3.97	29	DETL	Outside 2 sigma for >= 2 days
	ALPHA EFF	10:15	30	19028	634	0.46	DETL	Outside 3 sigma for > 2 days
	BETA EFF	10:15	30	1.54E+05	5130	0.51	GOOD	
LB4100C1	ALPHA BKG	09:40	60	15.0	0.25	0.12	GOOD	
	BETA BKG	09:40	60	67.0	1.12	-0.56	GOOD	
	ALPHA EFF	10:15	30	22149	738	1.02	DETL	Outside 3 sigma for > 2 days Not a lockout condition w/ 4/25/06
	BETA EFF	10:15	30	1.34E+05	4470	-0.09	DETL	Outside 3 sigma for > 2 days
LB4100C2	ALPHA BKG	09:40	60	5.00	0.08	0.21	GOOD	
	BETA BKG	09:40	60	51.0	0.85	-0.41	GOOD	
	ALPHA EFF	10:15	30	21999	733	0.76	GOOD	
	BETA EFF	10:15	30	1.91E+05	6360	0.08	DETL	Outside 3 sigma for > 2 days Not a lockout condition w/ 4/25/06

LB4100C3	ALPHA BKG	09:40	60	1.00	0.02	-1.1	GOOD	
	BETA BKG	09:40	60	54.0	0.9	0.19	GOOD	
	ALPHA EFF	10:15	30	16882	563	0.44	GOOD	
	BETA EFF	10:15	30	1.36E+05	4550	0.72	GOOD	
LB4100C4	ALPHA BKG	09:40	60	3.00	0.05	-0.13	GOOD	
	BETA BKG	09:40	60	55.0	0.92	0.55	GOOD	
	ALPHA EFF	10:15	30	25090	836	0.91	GOOD	
	BETA EFF	10:15	30	2.17E+05	7244	0.44	GOOD	
<u>LB4100D1</u>	ALPHA BKG	09:40	60	17.0	0.28	4.4	DETL	Outside 2 sigma for >= 2 days
	BETA BKG	09:40	60	54.0	0.9	0.55	GOOD	
	ALPHA EFF	10:15	30	26568	886	-0.4	GOOD	
	BETA EFF	10:15	30	2.38E+05	7930	0.25	GOOD	
LB4100D2	ALPHA BKG	09:40	60	8.00	0.13	-0.23	GOOD	
	BETA BKG	09:40	60	64.0	1.07	0.49	GOOD	
	ALPHA EFF	10:15	30	19295	643	-0.26	GOOD	
	BETA EFF	10:15	30	1.49E+05	4960	-0.47	GOOD	
LB4100D3	ALPHA BKG	09:40	60	4.00	0.07	0.31	GOOD	
	BETA BKG	09:40	60	55.0	0.92	1.2	GOOD	
	ALPHA EFF	10:15	30	18683	623	0.12	GOOD	
	BETA EFF	10:15	30	1.48E+05	4950	0.19	GOOD	
LB4100D4	ALPHA BKG	09:40	60	3.00	0.05	-0.57	GOOD	
	BETA BKG	09:40	60	58.0	0.97	0.28	GOOD	
	ALPHA EFF	10:15	30	20867	696	-0.81	GOOD	
	BETA EFF	10:15	30	1.82E+05	6070	0.77	GOOD	
LB4100E1	ALPHA BKG	09:29	60	10.0	0.17	-0.3	GOOD	
	BETA BKG	09:29	60	73.0	1.22	-0.53	GOOD	
	ALPHA EFF	10:03	30	32731	1090	-1.2	GOOD	
	BETA EFF	10:03	30	2.12E+05	7080	0.25	GOOD	
LB4100E2	ALPHA BKG	09:29	60	3.00	0.05	-1.5	GOOD	
	BETA BKG	09:29	60	82.0	1.37	-0.86	GOOD	
	ALPHA EFF	10:03	30	34819	1160	-0.27	GOOD	
	BETA EFF	10:03	30	2.86E+05	9540	0.05	GOOD	
LB4100E3	ALPHA BKG	09:29	60	3.00	0.05	-0.61	GOOD	
	BETA BKG	09:29	60	54.0	0.9	-1.3	GOOD	
	ALPHA EFF	10:03	30	35785	1190	-0.04	GOOD	
	BETA EFF	10:03	30	2.26E+05	7520	-1.1	GOOD	
LB4100E4	ALPHA BKG	09:29	60	5.00	0.08	-0.83	GOOD	
	BETA BKG	09:29	60	105	1.75	-0.53	GOOD	
	ALPHA EFF	10:03	30	30084	1000	-0.58	GOOD	
	BETA EFF	10:03	30	2.24E+05	7470	-0.29	GOOD	
LB4100F1	ALPHA BKG	09:29	60	3.00	0.05	-0.67	GOOD	
	BETA BKG	09:29	60	65.0	1.08	1.14	GOOD	
	ALPHA EFF	10:03	30	29113	970	0.74	GOOD	
	BETA EFF	10:03	30	2.03E+05	6780	0.44	GOOD	

<u>LB4100F2</u>	ALPHA BKG	09:29	60	4.00	0.07	-0.98	GOOD	
	BETA BKG	09:29	60	95.0	1.58	3.77	RERUN	
	ALPHA EFF	10:03	30	28124	937	2.66	DETL	Outside 2 sigma for >= 2 days
	BETA EFF	10:03	30	2.13E+05	7110	-1.2	GOOD	
LB4100F3	ALPHA BKG	09:29	60	14.0	0.23	0.76	GOOD	
	BETA BKG	09:29	60	101	1.68	1.89	GOOD	
	ALPHA EFF	10:03	30	27405	914	0.15	GOOD	
	BETA EFF	10:03	30	2.64E+05	8790	1.56	GOOD	
LB4100F4	ALPHA BKG	09:29	60	0	0	-1.1	GOOD	
	BETA BKG	09:29	60	41.0	0.68	-0.67	GOOD	
	ALPHA EFF	10:03	30	25176	839	-1.2	GOOD	
	BETA EFF	10:03	30	1.99E+05	6620	0.73	GOOD	
<u>LB4100G1</u>	ALPHA BKG	09:29	60	6.00	0.1	-1	GOOD	
	BETA BKG	09:29	60	121	2.02	3.08	DETL	Outside 2 sigma for >= 2 days
	ALPHA EFF	10:03	30	31774	1060	0.43	GOOD	
	BETA EFF	10:03	30	2.22E+05	7390	-0.17	GOOD	
LB4100G2	ALPHA BKG	09:29	60	6.00	0.1	1.11	GOOD	
	BETA BKG	09:29	60	58.0	0.97	1.66	GOOD	
	ALPHA EFF	10:03	30	30870	1029	-1	GOOD	
	BETA EFF	10:03	30	2.81E+05	9350	-0.82	GOOD	
LB4100G3	ALPHA BKG	09:29	60	12.0	0.2	-0.09	GOOD	
	BETA BKG	09:29	60	75.0	1.25	1.87	GOOD	
	ALPHA EFF	10:03	30	22614	754	0.68	GOOD	
	BETA EFF	10:03	30	2.42E+05	8070	-2.2	GOOD	
LB4100G4	ALPHA BKG	09:29	60	1.00	0.02	-0.85	GOOD	
	BETA BKG	09:29	60	55.0	0.92	-0.2	GOOD	
	ALPHA EFF	10:03	30	15296	510	0.65	GOOD	
	BETA EFF	10:03	30	1.51E+05	5020	-0.36	GOOD	
LB4100H1	ALPHA BKG	09:29	60	6.00	0.1	0.21	GOOD	
	BETA BKG	09:29	60	40.0	0.67	-0.49	GOOD	
	ALPHA EFF	10:03	30	29921	997	-0.39	GOOD	
	BETA EFF	10:03	30	1.39E+05	4650	-0.81	GOOD	
LB4100H2	ALPHA BKG	09:29	60	4.00	0.07	-0.16	GOOD	
	BETA BKG	09:29	60	39.0	0.65	-1.8	PEND	
	ALPHA EFF	10:03	30	18632	621	-0.06	GOOD	
	BETA EFF	10:03	30	1.46E+05	4870	-0.41	GOOD	
LB4100H3	ALPHA BKG	09:29	60	6.00	0.1	-0.34	GOOD	
	BETA BKG	09:29	60	52.0	0.87	0.43	GOOD	
	ALPHA EFF	10:03	30	18916	631	-0.42	GOOD	
	BETA EFF	10:03	30	1.52E+05	5055	-0.28	GOOD	
LB4100H4	ALPHA BKG	09:29	60	5.00	0.08	0.25	GOOD	
	BETA BKG	09:29	60	32.0	0.53	-2.5	GOOD	
	ALPHA EFF	10:03	30	18286	610	-0.54	GOOD	
	BETA EFF	10:03	30	1.23E+05	4100	-0.06	GOOD	

<u>PIC1A</u>	ALPHA BKG	09:08	60	2.00	0.03	-2	DETL	Outside 2 sigma for >= 2 days
	BETA BKG	09:08	60	16.0	0.27	-1.6	GOOD	
	ALPHA EFF	09:43	30	9573	319	-1.6	GOOD	
	BETA EFF	09:43	30	1.93E+05	6440	-3.9	RERUN	
PIC1B	ALPHA BKG	09:08	60	1.00	0.02	-1.8	GOOD	
	BETA BKG	09:08	60	21.0	0.35	-0.19	GOOD	
	ALPHA EFF	09:43	30	11001	367	-1.6	GOOD	
	BETA EFF	09:43	30	2.13E+05	7100	-1.5	GOOD	
PIC1C	ALPHA BKG	09:08	60	1.00	0.02	-1.5	GOOD	
	BETA BKG	09:08	60	11.0	0.18	-1.2	GOOD	
	ALPHA EFF	09:43	30	15968	532	0.02	GOOD	
	BETA EFF	09:43	30	2.43E+05	8110	-2.2	GOOD	
PIC1D	ALPHA BKG	09:08	60	7.00	0.12	-0.53	GOOD	
	BETA BKG	09:08	60	36.0	0.6	1.11	GOOD	
	ALPHA EFF	09:43	30	16570	552	-0.47	GOOD	
	BETA EFF	09:43	30	1.88E+05	6270	-0.56	GOOD	
PIC2A	ALPHA BKG	09:08	60	5.00	0.08	-0.31	GOOD	
	BETA BKG	09:08	60	23.0	0.38	-0.44	GOOD	
	ALPHA EFF	09:44	30	15581	519	-1.4	GOOD	
	BETA EFF	09:44	30	2.31E+05	7710	-0.14	GOOD	
<u>PIC2B</u>	ALPHA BKG	09:08	60	5.00	0.08	0.02	GOOD	
	BETA BKG	09:08	60	21.0	0.35	-0.18	GOOD	
	ALPHA EFF	09:44	30	13366	446	-2.6	DETL	Outside 2 sigma for >= 2 days
	BETA EFF	09:44	30	2.29E+05	7640	0.14	GOOD	
PIC2C	ALPHA BKG	09:08	60	3.00	0.05	-1.3	GOOD	
	BETA BKG	09:08	60	12.0	0.2	-1.1	GOOD	
	ALPHA EFF	09:44	30	18873	629	-0.84	GOOD	
	BETA EFF	09:44	30	1.93E+05	6430	-0.17	GOOD	
PIC2D	ALPHA BKG	09:09	60	7.00	0.12	0.11	GOOD	
	BETA BKG	09:09	60	28.0	0.47	0.39	GOOD	
	ALPHA EFF	09:44	30	16907	564	-1.4	GOOD	
	BETA EFF	09:44	30	2.23E+05	7450	0.06	GOOD	
PIC3A	ALPHA BKG	09:09	60	7.00	0.12	-0.14	GOOD	
	BETA BKG	09:09	60	19.0	0.32	-0.84	GOOD	
	ALPHA EFF	09:44	30	22073	736	-1.5	DETL	Outside 2 sigma for >= 2 days
	BETA EFF	09:44	30	1.77E+05	5900	0.29	GOOD	
PIC3B	ALPHA BKG	09:09	60	7.00	0.12	-0.12	GOOD	
	BETA BKG	09:09	60	31.0	0.52	0.43	GOOD	
	ALPHA EFF	09:44	30	20635	688	-0.98	GOOD	
	BETA EFF	09:44	30	1.96E+05	6530	-0.01	GOOD	
PIC3C	ALPHA BKG	09:09	60	1.00	0.02	-1.8	GOOD	
	BETA BKG	09:09	60	24.0	0.4	-0.08	GOOD	
	ALPHA EFF	09:44	30	17594	586	-0.89	GOOD	
	BETA EFF	09:44	30	2.12E+05	7070	0.6	GOOD	

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Not a lockout condition  
M 4/25/06

PIC3D	ALPHA BKG	09:09	60	6.00	0.1	-0.29	GOOD	
	BETA BKG	09:09	60	31.0	0.52	0.64	GOOD	
	ALPHA EFF	09:45	30	24886	830	-1.3	GOOD	
	BETA EFF	09:45	30	2.13E+05	7100	-1.3	GOOD	
PIC4A	ALPHA BKG	09:09	60	2.00	0.03	-1.5	GOOD	
	BETA BKG	09:09	60	22.0	0.37	-0.78	GOOD	
	ALPHA EFF	09:45	30	12971	432	-0.77	GOOD	
	BETA EFF	09:45	30	1.75E+05	5830	-0.2	GOOD	
PIC4B	ALPHA BKG	09:09	60	5.00	0.08	-0.11	GOOD	
	BETA BKG	09:09	60	19.0	0.32	-0.56	GOOD	
	ALPHA EFF	09:45	30	17555	585	-2.9	GOOD	
	BETA EFF	09:45	30	2.22E+05	7400	-1.6	GOOD	
PIC4C	ALPHA BKG	09:10	60	6.00	0.1	-0.57	GOOD	
	BETA BKG	09:10	60	25.0	0.42	-0.26	GOOD	
	ALPHA EFF	09:45	30	20181	673	-1.5	GOOD	
	BETA EFF	09:45	30	2.01E+05	6710	0.23	GOOD	
PIC4D	ALPHA BKG	09:10	60	7.00	0.12	-0.17	GOOD	
	BETA BKG	09:10	60	23.0	0.38	-0.38	GOOD	
	ALPHA EFF	09:45	30	20328	678	-1.4	GOOD	
	BETA EFF	09:45	30	2.12E+05	7080	1.3	GOOD	
<u>PIC5A</u>	ALPHA BKG	09:10	60	3.00	0.05	-0.55	GOOD	
	BETA BKG	09:10	60	31.0	0.52	0.54	GOOD	
	ALPHA EFF	09:46	30	11165	372	-0.91	GOOD	
	BETA EFF	09:46	30	3.97E+05	13200	-2.5	DETL	Outside 2 sigma for >= 2 days
PIC5B	ALPHA BKG	09:10	60	7.00	0.12	0.73	GOOD	
	BETA BKG	09:10	60	112	1.87	0.23	GOOD	
	ALPHA EFF	09:46	30	10069	336	-0.24	GOOD	
	BETA EFF	09:46	30	3.49E+05	11600	0.08	GOOD	
PIC5C	ALPHA BKG	09:10	60	2.00	0.03	-0.19	GOOD	
	BETA BKG	09:10	60	21.0	0.35	-0.24	GOOD	
	ALPHA EFF	09:46	30	10243	341	-0.68	GOOD	
	BETA EFF	09:46	30	3.86E+05	12900	-2.3	GOOD	
<u>PIC5D</u>	ALPHA BKG	09:10	60	7.00	0.12	2.22	DETL	Outside 2 sigma for >= 2 days
	BETA BKG	09:10	60	19.0	0.32	-0.15	GOOD	
	ALPHA EFF	09:46	30	8798	293	-0.84	GOOD	
	BETA EFF	09:46	30	3.07E+05	10200	-3.1	DETL	Outside 2 sigma for >= 2 days
PIC6A	ALPHA BKG	09:10	60	5.00	0.08	0.38	GOOD	
	BETA BKG	09:10	60	29.0	0.48	1.05	GOOD	
	ALPHA EFF	09:46	30	7782	259	-0.95	GOOD	
	BETA EFF	09:46	30	2.79E+05	9310	-2.3	DETL	Outside 2 sigma for >= 2 days
PIC6B	ALPHA BKG	09:11	60	2.00	0.03	-0.4	GOOD	
	BETA BKG	09:11	60	22.0	0.37	1.3	GOOD	
	ALPHA EFF	09:46	30	10154	338	-0.77	GOOD	
	BETA EFF	09:46	30	2.89E+05	9640	-1.5	GOOD	

*Not a lockstep condition  
NW 4/25/06*



PIC6C	ALPHA BKG	09:11	60	1.00	0.02	-0.93	GOOD	
	BETA BKG	09:11	60	19.0	0.32	0.32	GOOD	
	ALPHA EFF	09:46	30	14237	475	-0.82	GOOD	
	BETA EFF	09:46	30	3.49E+05	11600	-2.4	GOOD	
<u>PIC6D</u>	ALPHA BKG	09:11	60	1.00	0.02	-0.65	GOOD	
	BETA BKG	09:11	60	29.0	0.48	0.85	GOOD	
	ALPHA EFF	09:47	30	11072	369	-0.78	GOOD	
	BETA EFF	09:47	30	3.58E+05	11900	-2.1	DETL	Outside 2 sigma for >= 2 days
PIC7A	ALPHA BKG	09:11	60	4.00	0.07	-0.57	GOOD	
	BETA BKG	09:11	60	33.0	0.55	-0.36	GOOD	
	ALPHA EFF	09:47	30	9725	324	-0.61	GOOD	
	BETA EFF	09:47	30	3.77E+05	12600	-1.5	GOOD	
PIC7B	ALPHA BKG	09:11	60	18.0	0.3	-0.35	GOOD	
	BETA BKG	09:11	60	26.0	0.43	-0.59	GOOD	
	ALPHA EFF	09:47	30	10103	337	-0.75	GOOD	
	BETA EFF	09:47	30	3.16E+05	10500	-0.8	GOOD	
PIC7C	ALPHA BKG	09:11	60	4.00	0.07	-0.84	GOOD	
	BETA BKG	09:11	60	22.0	0.37	-0.82	GOOD	
	ALPHA EFF	09:47	30	11299	377	-0.69	GOOD	
	BETA EFF	09:47	30	3.80E+05	12700	-0.65	GOOD	
PIC7D	ALPHA BKG	09:12	60	6.00	0.1	-0.74	GOOD	
	BETA BKG	09:12	60	23.0	0.38	-0.57	GOOD	
	ALPHA EFF	09:47	30	8211	274	-0.6	GOOD	
	BETA EFF	09:47	30	2.82E+05	9390	-0.39	GOOD	
PIC8A	ALPHA BKG	09:12	60	3.00	0.05	-0.83	GOOD	
	BETA BKG	09:12	60	34.0	0.57	-0.7	GOOD	
	ALPHA EFF	09:47	30	12828	428	-0.22	GOOD	
	BETA EFF	09:47	30	3.72E+05	12400	-1.9	GOOD	
PIC8B	ALPHA BKG	09:12	60	2.00	0.03	-0.65	GOOD	
	BETA BKG	09:12	60	48.0	0.8	-0.44	GOOD	
	ALPHA EFF	09:47	30	9320	311	-1.1	GOOD	
	BETA EFF	09:47	30	3.70E+05	12300	-0.41	GOOD	
<u>PIC8C</u>	ALPHA BKG	09:12	60	20.0	0.33	-0.25	RERUN	
	BETA BKG	09:12	60	25.0	0.42	-0.53	GOOD	
	ALPHA EFF	09:48	30	14694	490	-0.23	GOOD	
	BETA EFF	09:48	30	4.28E+05	14300	-0.4	GOOD	
PIC8D	ALPHA BKG	09:12	60	15.0	0.25	-0.2	GOOD	
	BETA BKG	09:12	60	88.0	1.47	-0.21	GOOD	
	ALPHA EFF	09:48	30	10896	363	1.31	GOOD	
	BETA EFF	09:48	30	3.72E+05	12400	0.16	GOOD	

Reviewed by 

Date 4/25/06

General Engineering Laboratories, LLC

# Gas Flow Proportional Counter Checks for 26-APR-2006

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LB4100A1	ALPHA BKG	09:49	60	7.00	0.12	1.7	GOOD	<i>α only lockout</i>
	BETA BKG	09:49	60	64.0	1.07	0.94	GOOD	
	ALPHA EFF	10:21	30	23430	781	-0.3	GOOD	
	BETA EFF	10:21	30	1.78E+05	5930	0.54	GOOD	
LB4100A2	ALPHA BKG	09:49	60	2.00	0.03	-0.95	GOOD	
	BETA BKG	09:49	60	51.0	0.85	-0.04	GOOD	
	ALPHA EFF	10:21	30	15486	516	-1	GOOD	
	BETA EFF	10:21	30	1.31E+05	4370	1.02	GOOD	
LB4100A3	ALPHA BKG	09:49	60	7.00	0.12	0.22	GOOD	
	BETA BKG	09:49	60	49.0	0.82	-0.68	GOOD	
	ALPHA EFF	10:21	30	20122	671	-2.3	GOOD	
	BETA EFF	10:21	30	1.65E+05	5520	2.28	GOOD	
<u>LB4100A4</u>	ALPHA BKG	09:49	60	0	0	-1.1	GOOD	
	BETA BKG	09:49	60	70.0	1.17	0.65	PEND	
	ALPHA EFF	10:21	30	18130	604	-4.2	RERUN	
	BETA EFF	10:21	30	1.76E+05	5870	3.26	DETL	Outside 2 sigma for >= 2 days
LB4100B1	ALPHA BKG	09:49	60	0	0	-1.1	GOOD	
	BETA BKG	09:49	60	70.0	1.17	1.68	GOOD	
	ALPHA EFF	10:21	30	21364	712	0.29	PEND	
	BETA EFF	10:21	30	1.85E+05	6180	-0.29	GOOD	
LB4100B2	ALPHA BKG	09:49	60	1.00	0.02	-0.74	GOOD	
	BETA BKG	09:49	60	48.0	0.8	-0.25	GOOD	
	ALPHA EFF	10:21	30	20873	696	-0.16	GOOD	
	BETA EFF	10:21	30	1.62E+05	5410	-0.06	GOOD	
LB4100B3	ALPHA BKG	09:49	60	0	0	-1.3	GOOD	
	BETA BKG	09:49	60	60.0	1	-1.5	GOOD	
	ALPHA EFF	10:21	30	15856	529	0.01	PEND	
	BETA EFF	10:21	30	1.22E+05	4070	0.41	GOOD	
<u>LB4100B4</u>	ALPHA BKG	09:49	60	4.00	0.07	0.86	GOOD	
	BETA BKG	09:49	60	232	3.87	28.1	DETL	Outside 2 sigma for >= 2 days
	ALPHA EFF	10:21	30	19133	638	0.67	PEND	
	BETA EFF	10:21	30	1.54E+05	5130	0.5	GOOD	
LB4100C1	ALPHA BKG	09:49	60	16.0	0.27	0.39	GOOD	
	BETA BKG	09:49	60	66.0	1.1	-0.62	GOOD	
	ALPHA EFF	10:21	30	22226	741	1.09	PEND	
	BETA EFF	10:21	30	1.35E+05	4500	0.22	PEND	
LB4100C2	ALPHA BKG	09:49	60	4.00	0.07	-0.14	GOOD	
	BETA BKG	09:49	60	43.0	0.72	-1.4	GOOD	
	ALPHA EFF	10:21	30	21916	731	0.68	GOOD	
	BETA EFF	10:21	30	1.91E+05	6360	0.13	PEND	

LB4100C3	ALPHA BKG	09:49	60	1.00	0.02	-1.1	GOOD	
	BETA BKG	09:49	60	55.0	0.92	0.33	GOOD	
	ALPHA EFF	10:21	30	16960	565	0.54	GOOD	
	BETA EFF	10:21	30	1.36E+05	4540	0.67	GOOD	
LB4100C4	ALPHA BKG	09:49	60	1.00	0.02	-1.2	GOOD	
	BETA BKG	09:49	60	28.0	0.47	-2.1	GOOD	
	ALPHA EFF	10:21	30	24728	824	0.75	GOOD	
	BETA EFF	10:21	30	2.20E+05	7320	0.71	GOOD	
<u>LB4100D1</u>	ALPHA BKG	09:49	60	22.0	0.37	6.14	DETL	Outside 2 sigma for >= 2 days
	BETA BKG	09:49	60	56.0	0.93	0.77	GOOD	
	ALPHA EFF	10:21	30	26583	886	-0.38	GOOD	
	BETA EFF	10:21	30	2.38E+05	7950	0.3	GOOD	
LB4100D2	ALPHA BKG	09:49	60	10.0	0.17	0.26	GOOD	
	BETA BKG	09:49	60	65.0	1.08	0.6	GOOD	
	ALPHA EFF	10:21	30	19466	649	0.1	GOOD	
	BETA EFF	10:21	30	1.47E+05	4920	-1	GOOD	
LB4100D3	ALPHA BKG	09:49	60	6.00	0.1	1.02	GOOD	
	BETA BKG	09:49	60	47.0	0.78	0.12	GOOD	
	ALPHA EFF	10:21	30	18434	614	-0.36	GOOD	
	BETA EFF	10:21	30	1.48E+05	4940	0.07	GOOD	
LB4100D4	ALPHA BKG	09:49	60	1.00	0.02	-1.3	GOOD	
	BETA BKG	09:49	60	39.0	0.65	-1.5	GOOD	
	ALPHA EFF	10:21	30	20767	692	-0.96	GOOD	
	BETA EFF	10:21	30	1.82E+05	6050	0.65	GOOD	
LB4100E1	ALPHA BKG	09:26	60	13.0	0.22	0.59	GOOD	
	BETA BKG	09:26	60	81.0	1.35	0.48	GOOD	
	ALPHA EFF	10:10	30	33167	1110	-0.69	GOOD	
	BETA EFF	10:10	30	2.13E+05	7100	0.43	GOOD	
LB4100E2	ALPHA BKG	09:26	60	6.00	0.1	-0.52	GOOD	
	BETA BKG	09:26	60	105	1.75	0.32	GOOD	
	ALPHA EFF	10:10	30	35074	1170	-0.03	GOOD	
	BETA EFF	10:10	30	2.88E+05	9600	0.28	GOOD	
LB4100E3	ALPHA BKG	09:26	60	2.00	0.03	-1.1	GOOD	
	BETA BKG	09:26	60	67.0	1.12	0.37	GOOD	
	ALPHA EFF	10:10	30	35451	1180	-0.34	GOOD	
	BETA EFF	10:10	30	2.26E+05	7540	-0.99	GOOD	
LB4100E4	ALPHA BKG	09:26	60	7.00	0.12	-0.21	GOOD	
	BETA BKG	09:26	60	108	1.8	-0.29	GOOD	
	ALPHA EFF	10:10	30	30748	1020	0.19	GOOD	
	BETA EFF	10:10	30	2.24E+05	7470	-0.28	GOOD	
<u>LB4100F1</u>	ALPHA BKG	09:26	60	1.00	0.02	-1.5	GOOD	
	BETA BKG	09:26	60	74.0	1.23	2.48	GOOD	
	ALPHA EFF	10:10	30	29117	971	0.74	GOOD	
	BETA EFF	10:10	30	207	6.9	-34	DETL	Outside 3 sigma for > 2 days

<u>LB4100F2</u>	ALPHA BKG	09:26	60	2.00	0.03	-1.6	GOOD	
	BETA BKG	09:26	60	79.0	1.32	1.7	PEND	
	ALPHA EFF	10:10	30	27901	930	<u>2.36</u>	DETL	Outside 2 sigma for >= 2 days
	BETA EFF	10:10	30	2.14E+05	7130	-1.1	GOOD	
LB4100F3	ALPHA BKG	09:26	60	5.00	0.08	-1.3	GOOD	
	BETA BKG	09:26	60	100	1.67	1.79	GOOD	
	ALPHA EFF	10:10	30	27411	914	0.16	GOOD	
	BETA EFF	10:10	30	2.62E+05	8740	1.39	GOOD	
LB4100F4	ALPHA BKG	09:26	60	2.00	0.03	-0.25	GOOD	
	BETA BKG	09:26	60	53.0	0.88	-0.05	GOOD	
	ALPHA EFF	10:10	30	25102	837	-1.3	GOOD	
	BETA EFF	10:10	30	1.99E+05	6630	0.8	GOOD	
<u>LB4100G1</u>	ALPHA BKG	09:26	60	6.00	0.1	-1	GOOD	
	BETA BKG	09:26	60	120	2	<u>3.02</u>	DETL	Outside 2 sigma for >= 2 days
	ALPHA EFF	10:10	30	32099	1070	0.88	GOOD	
	BETA EFF	10:10	30	2.21E+05	7370	-0.4	GOOD	
LB4100G2	ALPHA BKG	09:26	60	2.00	0.03	-0.79	GOOD	
	BETA BKG	09:26	60	51.0	0.85	0.61	GOOD	
	ALPHA EFF	10:10	30	31533	1050	-0.21	GOOD	
	BETA EFF	10:10	30	2.81E+05	9370	-0.73	GOOD	
LB4100G3	ALPHA BKG	09:26	60	12.0	0.2	-0.09	GOOD	
	BETA BKG	09:26	60	61.0	1.02	0.14	GOOD	
	ALPHA EFF	10:10	30	22621	754	0.71	GOOD	
	BETA EFF	10:10	30	2.44E+05	8140	-1.1	GOOD	
LB4100G4	ALPHA BKG	09:26	60	8.00	0.13	1.84	GOOD	
	BETA BKG	09:26	60	57.0	0.95	0.01	GOOD	
	ALPHA EFF	10:10	30	15439	515	1.6	GOOD	
	BETA EFF	10:10	30	1.51E+05	5040	0.06	GOOD	
LB4100H1	ALPHA BKG	09:26	60	5.00	0.08	-0.19	GOOD	
	BETA BKG	09:26	60	46.0	0.77	0.55	GOOD	
	ALPHA EFF	10:10	30	29137	971	-0.92	GOOD	
	BETA EFF	10:10	30	1.39E+05	4630	-0.97	GOOD	
LB4100H2	ALPHA BKG	09:26	60	2.00	0.03	-0.77	GOOD	
	BETA BKG	09:26	60	51.0	0.85	-0.37	GOOD	
	ALPHA EFF	10:10	30	18262	609	-0.42	GOOD	
	BETA EFF	10:10	30	1.45E+05	4850	-0.6	GOOD	
LB4100H3	ALPHA BKG	09:26	60	6.00	0.1	-0.34	GOOD	
	BETA BKG	09:26	60	42.0	0.7	-0.89	GOOD	
	ALPHA EFF	10:10	30	19378	646	0.06	GOOD	
	BETA EFF	10:10	30	1.52E+05	5080	-0.04	GOOD	
LB4100H4	ALPHA BKG	09:26	60	7.00	0.12	1.14	GOOD	
	BETA BKG	09:26	60	41.0	0.68	-0.9	GOOD	
	ALPHA EFF	10:10	30	18492	616	-0.35	GOOD	
	BETA EFF	10:10	30	1.24E+05	4140	0.43	GOOD	

PIC1A	ALPHA BKG	09:15	60	3.00	0.05	-1.7	GOOD	
	BETA BKG	09:15	60	26.0	0.43	-0.63	GOOD	
	ALPHA EFF	09:56	30	9792	326	-0.99	GOOD	
	BETA EFF	09:56	30	1.95E+05	6510	-0.96	PEND	
PIC1B	ALPHA BKG	09:15	60	5.00	0.08	-0.36	GOOD	
	BETA BKG	09:15	60	15.0	0.25	-1.1	GOOD	
	ALPHA EFF	09:57	30	10974	366	-1.7	GOOD	
	BETA EFF	09:57	30	2.14E+05	7120	-0.64	GOOD	
PIC1C	ALPHA BKG	09:16	60	3.00	0.05	-0.89	GOOD	
	BETA BKG	09:16	60	34.0	0.57	1.08	GOOD	
	ALPHA EFF	09:57	30	15656	522	-0.59	GOOD	
	BETA EFF	09:57	30	2.44E+05	8130	-1.6	GOOD	
PIC1D	ALPHA BKG	09:16	60	5.00	0.08	-0.97	GOOD	
	BETA BKG	09:16	60	38.0	0.63	1.35	GOOD	
	ALPHA EFF	09:57	30	16272	542	-0.84	GOOD	
	BETA EFF	09:57	30	1.88E+05	6250	-0.94	GOOD	
PIC2A	ALPHA BKG	09:16	60	4.00	0.07	-0.61	GOOD	
	BETA BKG	09:16	60	28.0	0.47	-0.17	GOOD	
	ALPHA EFF	09:57	30	15445	515	-1.5	GOOD	
	BETA EFF	09:57	30	2.31E+05	7700	-0.47	GOOD	
<u>PIC2B</u>	ALPHA BKG	09:16	60	5.00	0.08	0.02	GOOD	
	BETA BKG	09:16	60	17.0	0.28	-0.51	GOOD	
	ALPHA EFF	09:57	30	13473	449	2.2	DETL	Outside 2 sigma for >= 2 days
	BETA EFF	09:57	30	2.28E+05	7600	-1.3	GOOD	
PIC2C	ALPHA BKG	09:16	60	5.00	0.08	-0.69	GOOD	
	BETA BKG	09:16	60	20.0	0.33	-0.28	GOOD	
	ALPHA EFF	09:57	30	19133	638	-0.48	GOOD	
	BETA EFF	09:57	30	1.93E+05	6430	-0.47	GOOD	
PIC2D	ALPHA BKG	09:16	60	2.00	0.03	-1.6	GOOD	
	BETA BKG	09:16	60	18.0	0.3	-0.74	GOOD	
	ALPHA EFF	09:57	30	16837	561	-1.4	GOOD	
	BETA EFF	09:57	30	2.24E+05	7460	0.37	GOOD	
PIC3A	ALPHA BKG	09:16	60	6.00	0.1	-0.51	GOOD	
	BETA BKG	09:16	60	18.0	0.3	-0.94	GOOD	
	ALPHA EFF	09:57	30	21922	731	-1.6	GOOD	
	BETA EFF	09:57	30	1.77E+05	5910	0.4	GOOD	
PIC3B	ALPHA BKG	09:16	60	3.00	0.05	-1.5	GOOD	
	BETA BKG	09:16	60	18.0	0.3	-0.94	GOOD	
	ALPHA EFF	09:58	30	20717	691	-0.91	GOOD	
	BETA EFF	09:58	30	1.96E+05	6550	0.47	GOOD	
PIC3C	ALPHA BKG	09:17	60	5.00	0.08	-0.66	GOOD	
	BETA BKG	09:17	60	19.0	0.32	-0.74	GOOD	
	ALPHA EFF	09:58	30	17513	584	-0.98	GOOD	
	BETA EFF	09:58	30	2.11E+05	7030	-0.4	GOOD	

PIC3D	ALPHA BKG	09:17	60	3.00	0.05	-1.5	GOOD	
	BETA BKG	09:17	60	16.0	0.27	-1.3	GOOD	
	ALPHA EFF	09:58	30	24881	829	-1.3	GOOD	
	BETA EFF	09:58	30	2.14E+05	7130	-0.67	GOOD	
PIC4A	ALPHA BKG	09:17	60	6.00	0.1	-0.25	GOOD	
	BETA BKG	09:17	60	23.0	0.38	-0.69	GOOD	
	ALPHA EFF	09:58	30	12769	426	-1.2	GOOD	
	BETA EFF	09:58	30	1.75E+05	5820	-0.35	GOOD	
PIC4B	ALPHA BKG	09:17	60	14.0	0.23	2.44	GOOD	
	BETA BKG	09:17	60	26.0	0.43	-0.06	GOOD	
	ALPHA EFF	09:58	30	17786	593	-1.9	GOOD	
	BETA EFF	09:58	30	2.22E+05	7410	-0.97	GOOD	
PIC4C	ALPHA BKG	09:17	60	10.0	0.17	0.57	GOOD	
	BETA BKG	09:17	60	18.0	0.3	-0.7	GOOD	
	ALPHA EFF	09:58	30	20086	670	-1.7	GOOD	
	BETA EFF	09:58	30	2.01E+05	6710	0.24	GOOD	
PIC4D	ALPHA BKG	09:17	60	5.00	0.08	-0.62	GOOD	
	BETA BKG	09:17	60	16.0	0.27	-1.1	GOOD	
	ALPHA EFF	09:59	30	20236	675	-1.5	GOOD	
	BETA EFF	09:59	30	2.11E+05	7050	0.66	GOOD	
<u>PIC5A</u>	ALPHA BKG	09:17	60	5.00	0.08	0.05	GOOD	
	BETA BKG	09:17	60	17.0	0.28	-0.97	GOOD	
	ALPHA EFF	09:59	30	11363	379	-0.6	GOOD	
	BETA EFF	09:59	30	3.97E+05	13200	-2.7	DETL	Outside 2 sigma for >= 2 days
<u>PIC5B</u>	ALPHA BKG	09:18	60	3.00	0.05	-0.64	GOOD	
	BETA BKG	09:18	60	129	2.15	0.55	RERUN	
	ALPHA EFF	09:59	30	10243	341	-0.13	GOOD	
	BETA EFF	09:59	30	3.48E+05	11600	0.06	GOOD	
<u>PIC5C</u>	ALPHA BKG	09:18	60	3.00	0.05	0.41	GOOD	
	BETA BKG	09:18	60	14.0	0.23	-1.5	GOOD	
	ALPHA EFF	09:59	30	10120	337	-0.87	GOOD	
	BETA EFF	09:59	30	3.85E+05	12800	3.1	DETL	Outside 2 sigma for >= 2 days
PIC5D	ALPHA BKG	09:18	60	2.00	0.03	-0.36	GOOD	
	BETA BKG	09:18	60	20.0	0.33	0.04	GOOD	
	ALPHA EFF	09:59	30	8726	291	-0.97	GOOD	
	BETA EFF	09:59	30	3.09E+05	10300	-1.1	GOOD	
<u>PIC6A</u>	ALPHA BKG	09:18	60	5.00	0.08	0.38	GOOD	
	BETA BKG	09:18	60	22.0	0.37	0	GOOD	
	ALPHA EFF	09:59	30	8019	267	-0.47	GOOD	
	BETA EFF	09:59	30	2.79E+05	9310	-2.5	DETL	Outside 2 sigma for >= 2 days
PIC6B	ALPHA BKG	09:18	60	3.00	0.05	0.22	GOOD	
	BETA BKG	09:18	60	21.0	0.35	1.07	GOOD	
	ALPHA EFF	10:00	30	10229	341	-0.66	GOOD	
	BETA EFF	10:00	30	2.89E+05	9630	-1.9	GOOD	

PIC6C	ALPHA BKG	09:18	60	2.00	0.03	-0.42	GOOD
	BETA BKG	09:18	60	22.0	0.37	0.89	GOOD
	ALPHA EFF	10:00	30	14504	483	-0.53	GOOD
	BETA EFF	10:00	30	3.50E+05	11700	-1.9	GOOD
PIC6D	ALPHA BKG	09:19	60	6.00	0.1	1.09	GOOD
	BETA BKG	09:19	60	29.0	0.48	0.85	GOOD
	ALPHA EFF	10:00	30	11114	370	-0.72	GOOD
	BETA EFF	10:00	30	3.58E+05	11900	-2	GOOD
PIC7A	ALPHA BKG	09:19	60	6.00	0.1	-0.2	GOOD
	BETA BKG	09:19	60	29.0	0.48	-0.47	GOOD
	ALPHA EFF	10:00	30	9833	328	-0.5	GOOD
	BETA EFF	10:00	30	3.76E+05	12500	-2.4	GOOD
PIC7B	ALPHA BKG	09:19	60	16.0	0.27	-0.5	GOOD
	BETA BKG	09:19	60	33.0	0.55	-0.47	GOOD
	ALPHA EFF	10:00	30	10200	340	-0.62	GOOD
	BETA EFF	10:00	30	3.17E+05	10600	-0.68	GOOD
PIC7C	ALPHA BKG	09:19	60	6.00	0.1	-0.56	GOOD
	BETA BKG	09:19	60	15.0	0.25	-1	GOOD
	ALPHA EFF	10:00	30	11661	389	-0.31	GOOD
	BETA EFF	10:00	30	3.79E+05	12600	-0.97	GOOD
PIC7D	ALPHA BKG	09:19	60	5.00	0.08	-0.8	GOOD
	BETA BKG	09:19	60	19.0	0.32	-0.66	GOOD
	ALPHA EFF	10:00	30	8179	273	-0.65	GOOD
	BETA EFF	10:00	30	2.81E+05	9380	-0.42	GOOD
PIC8A	ALPHA BKG	09:19	60	3.00	0.05	-0.83	GOOD
	BETA BKG	09:19	60	27.0	0.45	-0.75	GOOD
	ALPHA EFF	10:01	30	13226	441	0.28	GOOD
	BETA EFF	10:01	30	3.71E+05	12400	-2.2	GOOD
PIC8B	ALPHA BKG	09:19	60	2.00	0.03	-0.65	GOOD
	BETA BKG	09:19	60	61.0	1.02	-0.24	GOOD
	ALPHA EFF	10:01	30	9345	312	-1.1	GOOD
	BETA EFF	10:01	30	3.69E+05	12300	-0.52	GOOD
PIC8C	ALPHA BKG	09:20	60	16.0	0.27	-0.5	GOOD
	BETA BKG	09:20	60	30.0	0.5	-0.35	GOOD
	ALPHA EFF	10:01	30	14622	487	-0.31	GOOD
	BETA EFF	10:01	30	4.25E+05	14200	-0.86	GOOD
PIC8D	ALPHA BKG	09:20	60	12.0	0.2	-0.46	GOOD
	BETA BKG	09:20	60	61.0	1.02	-0.55	GOOD
	ALPHA EFF	10:01	30	10965	366	1.41	GOOD
	BETA EFF	10:01	30	3.70E+05	12300	-0.04	GOOD

Reviewed by 

Date 4/26/06

General Engineering Laboratories, LLC

Starting with bank 1

Ending with bank 19

	Detector	Parameter	Flag
20-APR-2006	6	PSFWHM-5000	Below
20-APR-2006	6	PSENERGY-5000	Above
20-APR-2006	6	PSCENTRD-5000	Above
20-APR-2006	14	PSFWHM-5000	Below
20-APR-2006	14	PSENERGY-5000	Above
20-APR-2006	22	PSENERGY-5000	Above
20-APR-2006	24	PSFWHM-5000	Below
20-APR-2006	25	PSFWHM-5000	Below
20-APR-2006	25	PSCENTRD-5000	Below
20-APR-2006	28	PSFWHM-5000	Above
20-APR-2006	39	PSENERGY-5000	Above
20-APR-2006	66	PSFWHM-5000	Above
20-APR-2006	67	PSFWHM-5000	Above
20-APR-2006	68	PSFWHM-5000	Above
20-APR-2006	71	PSFWHM-5000	Below
20-APR-2006	71	PSENERGY-5000	Above
20-APR-2006	74	PSENERGY-5000	Above
20-APR-2006	84	PSENERGY-5000	Above
20-APR-2006	97	PSENERGY-5000	Above
20-APR-2006	105	PSENERGY-5000	Above
20-APR-2006	106	PSFWHM-5000	Above
20-APR-2006	109	PSFWHM-5000	Above

*MA 4/20/06*



20-APR-2006

115

PSFWMH-5000

Above

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

APPROVAL DATE: 4/20/06

APPROVAL TIME: 1620

APPROVED BY: *[Signature]*

PROCEDURE # GL-RAD-I-009

Report completed at 20-APR-2006 16:17:59.07

Review of QA results ( Daily checks ) 20-APR-2006 16:18:00.20

Starting with bank 1

Ending with bank 19

This is a list of Detectors that may not have properly transferred to the QA file

APPROVAL DATE: 4/20/06 APPROVAL TIME: 1620

APPROVED BY: *JLD* PROCEDURE # GL-RAD-I-009

Report completed at 20-APR-2006 16:18:46.01

Starting with bank 1

Ending with bank 19

	Detector	Parameter	Flag
21-APR-2006	6	PSFWHM-5000	Below
21-APR-2006	6	PSENERGY-5000	Above
21-APR-2006	6	PSCENTRD-5000	Above
21-APR-2006	14	PSFWHM-5000	Below
21-APR-2006	14	PSENERGY-5000	Above
21-APR-2006	22	PSENERGY-5000	Above
21-APR-2006	24	PSFWHM-5000	Below
21-APR-2006	25	PSFWHM-5000	Below
21-APR-2006	25	PSCENTRD-5000	Below
21-APR-2006	28	PSFWHM-5000	Above
21-APR-2006	39	PSENERGY-5000	Above
21-APR-2006	66	PSFWHM-5000	Above
21-APR-2006	67	PSFWHM-5000	Above
21-APR-2006	68	PSFWHM-5000	Above
21-APR-2006	71	PSFWHM-5000	Below
21-APR-2006	71	PSENERGY-5000	Above
21-APR-2006	84	PSENERGY-5000	Above
21-APR-2006	96	PSFWHM-5000	Above
21-APR-2006	97	PSENERGY-5000	Above
21-APR-2006	99	PSFWHM-5000	Above
21-APR-2006	101	PSFWHM-5000	Above
21-APR-2006	105	PSENERGY-5000	Above

*gzo 4/21/06*

21-APR-2006	106	PSFWHM-5000	Above
21-APR-2006	108	PSFWHM-5000	Above
21-APR-2006	109	PSFWHM-5000	Above
21-APR-2006	115	PSFWHM-5000	Above
21-APR-2006	131	PSFWHM-5000	Above

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

APPROVAL DATE: *4/21/06* APPROVAL TIME: *1005*

APPROVED BY: *GLD* PROCEDURE # GL-RAD-I-009

Report completed at 21-APR-2006 10:01:23.18

Review of QA results ( Daily checks ) 21-APR-2006 10:01:24.55

Starting with bank 1

Ending with bank 19

This is a list of Detectors that may not have properly transferred to the QA file

APPROVAL DATE: 4/21/06 APPROVAL TIME: 1005

APPROVED BY: *GLD* PROCEDURE # GL-RAD-I-009

Report completed at 21-APR-2006 10:02:10.65

Starting with bank 1

Ending with bank 19

	Detector	Parameter	Flag
22-APR-2006	6	PSFWHM-5000	Below
22-APR-2006	6	PSENERGY-5000	Above
22-APR-2006	6	PSCENTRD-5000	Above
22-APR-2006	14	PSFWHM-5000	Below
22-APR-2006	14	PSENERGY-5000	Above
22-APR-2006	22	PSENERGY-5000	Above
22-APR-2006	24	PSFWHM-5000	Below
22-APR-2006	25	PSFWHM-5000	Below
22-APR-2006	25	PSCENTRD-5000	Below
22-APR-2006	28	PSFWHM-5000	Above
22-APR-2006	39	PSENERGY-5000	Above
22-APR-2006	66	PSFWHM-5000	Above
22-APR-2006	67	PSFWHM-5000	Above
22-APR-2006	68	PSFWHM-5000	Above
22-APR-2006	71	PSENERGY-5000	Above
22-APR-2006	84	PSENERGY-5000	Above
22-APR-2006	96	PSFWHM-5000	Above
22-APR-2006	97	PSENERGY-5000	Above
22-APR-2006	99	PSFWHM-5000	Above
22-APR-2006	101	PSFWHM-5000	Above
22-APR-2006	105	PSENERGY-5000	Above
22-APR-2006	106	PSFWHM-5000	Above

22-APR-2006	108	PSFWHM-5000	Above
22-APR-2006	109	PSFWHM-5000	Above
22-APR-2006	115	PSFWHM-5000	Above
22-APR-2006	131	PSFWHM-5000	Above

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

APPROVAL DATE: 4.22.06

APPROVAL TIME: 9:03

APPROVED BY: SRS

PROCEDURE # GL-RAD-I-009

Report completed at 22-APR-2006 08:57:38.65

Review of QA results ( Daily checks ) 22-APR-2006 08:57:39.83

Starting with bank 1

Ending with bank 19

This is a list of Detectors that may not have properly transferred to the QA file

APPROVAL DATE: 4.22.06

APPROVAL TIME: 9:03

APPROVED BY: SRS

PROCEDURE # GL-RAD-I-009

Report completed at 22-APR-2006 08:58:25.59





QA filename : DKA0:[CANBERRA.GAMMA.SCUSR.QA]QCC\_GAM19\_CAN.QAF;5

Sample ID : Calib Check Sample quantity : 1.00 EACH  
Sample date : 1-APR-2005 12:00:00 Acquisition date : 25-APR-2006 09:08:19  
Elapsed live time: 0 00:05:00.00 Elapsed real time: 0 00:05:02.95


Out-of-range Test: N-SIGMA

Parameter Description	Value	Deviation	Flag
[Mean+/-Stdev]			
*DECAY CORRECTED ACTIVITY CD-109 [4.5528E+05+/-6559]	4.5325E+05	-0.31	
*DECAY CORRECTED ACTIVITY CS-137 [2.4788E+04+/-427.4]	2.5724E+04	2.19	Investigate
*DECAY CORRECTED ACTIVITY CO-60 [3.4880E+04+/-552.9]	3.4794E+04	-0.16	

Out-of-range Test: BOUNDARY

Parameter Description	Lower	Upper	Value	Flag
*PEAK CENTROID CD-109	1.7400E+02	1.8200E+02	1.7592E+02	
*PEAK CENTROID CS-137	1.3170E+03	1.3250E+03	1.3228E+03	
*PEAK CENTROID CO-60	2.6590E+03	2.6670E+03	2.6654E+03	
*PEAK ENERGY CD-109	8.6030E+01	9.0030E+01	8.8170E+01	
*PEAK ENERGY CS-137	6.5964E+02	6.6364E+02	6.6216E+02	
*PEAK ENERGY CO-60	1.3305E+03	1.3345E+03	1.3338E+03	
*PEAK FWHM CD-109	1.0000E+00	1.5000E+00	1.2882E+00	
*PEAK FWHM CS-137	1.0000E+00	2.0000E+00	1.6613E+00	
*PEAK FWHM CO-60	1.5000E+00	2.5000E+00	2.0191E+00	

Flags: "\*" means the out-of-range test is parameter-dependent

Approved by:  Approval Date: 4 / 25 / 06



QA filename : DKA300:[CANBERRA.GAMMA]QC\_GAMMA6.QAF;5

Sample ID : QC\_GAMMA6 Sample quantity : 1.00 LITER  
 Sample date : 1-JAN-2001 12:00:00 Acquisition date : 26-APR-2006 04:52:35  
 Elapsed live time: 0 00:05:00.00 Elapsed real time: 0 00:05:00.98

Out-of-range Test: BOUNDARY

Parameter Description	Lower	Upper	Value	Flag
PEAK CENTROID (CHANS) CD-109	172	180	177	
PEAK CENTROID (CHANS) CS-137	1319	1327	1323	
PEAK CENTROID (CHANS) CO-60	2661	2669	2662	
*PEAK ENERGY (keV) CD-109	86	90	88	
*PEAK ENERGY (keV) CS-137	660	664	662	
*PEAK ENERGY (keV) CO-60	1330	1334	1333	
*PEAK FWHM (keV) CD-109	0.1	2.0	1.1	
*PEAK FWHM (keV) CS-137	0.1	3.0	1.4	
*PEAK FWHM (keV) CO-60	0.1	3.0	2.0	
DECAY CORR ACTIVITY (pCi) CD-109	7.32E+05	8.94E+05	8.44E+05	
DECAY CORR ACTIVITY (pCi) CS-137	2.42E+04	2.96E+04	2.79E+04	
DECAY CORR. ACTIVITY (pCi) CO-60	3.64E+04	4.45E+04	4.07E+04	

Flags: "\*" means the out-of-range test is parameter-dependent

Approved by:                                 jmm                                 Approval Date: 4 / 26 / 06





## Ludlum Alpha Scintillation Counter Checks for 10-APR-2006

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	10:01	.1	12672	126720	0.96	GOOD	
LUCAS2	EFF	10:01	.1	12771	127710	1.81	GOOD	
LUCAS3	EFF	10:01	.1	12656	126560	0.66	GOOD	
LUCAS4	EFF	10:01	.1	13928	139280	1.18	GOOD	
LUCAS5	EFF	10:01	.1	13697	136970	0.79	GOOD	
LUCAS6	EFF	10:01	.1	12600	126000	1.25	GOOD	

Reviewed by

Date

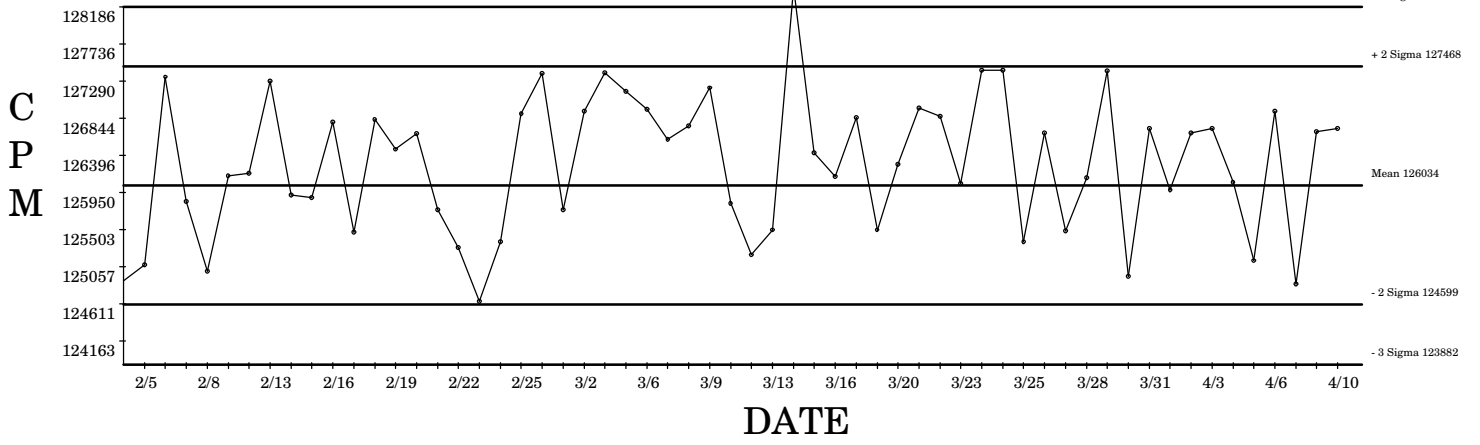
4/10/06

General Engineering Laboratories, LLC

# BACKGROUND AND EFFICIENCY DATA

# LUCAS1 04/10/2006

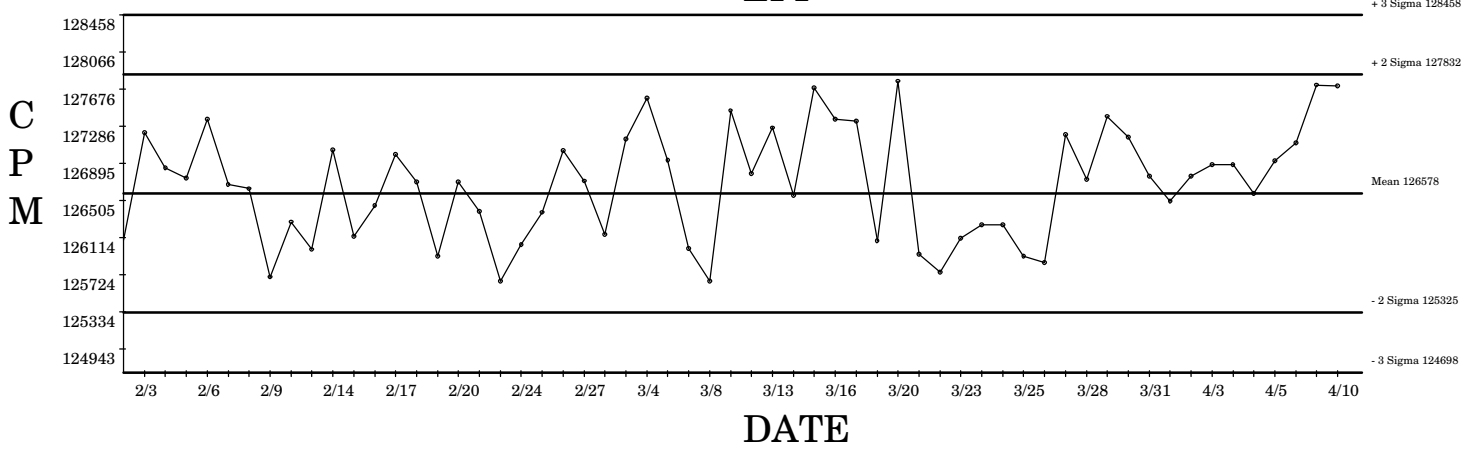
## EFF



○ Denotes Outlier

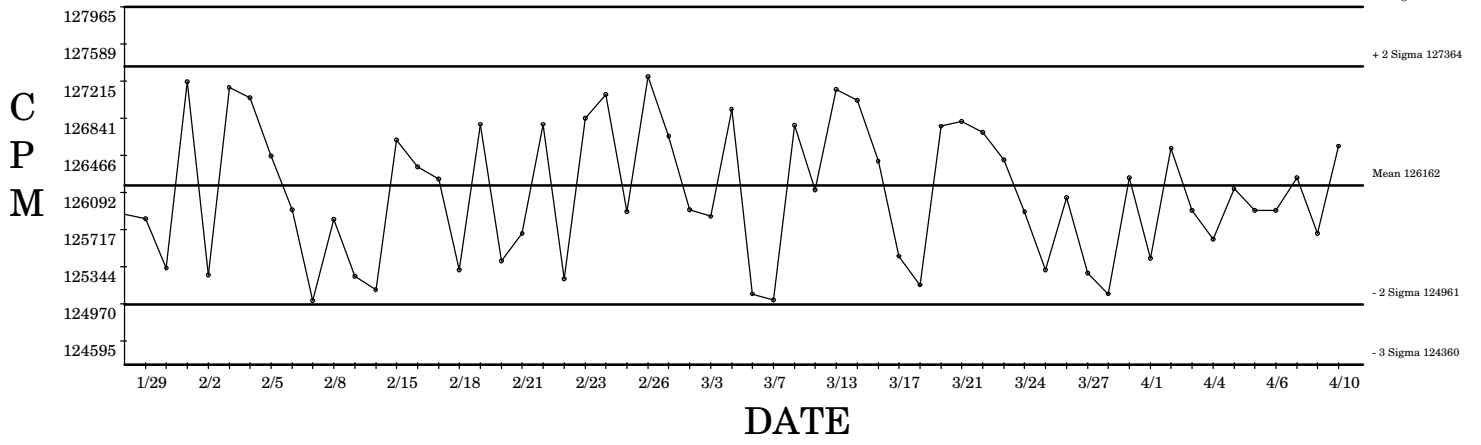


# LUCAS2 04/10/2006 EFF

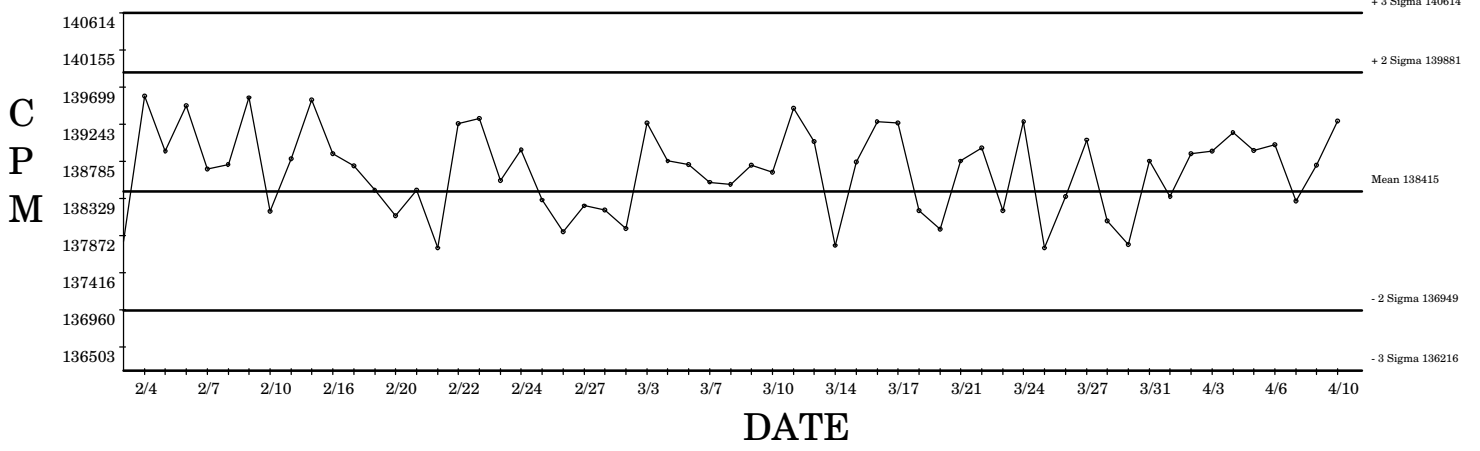


○ Denotes Outlier

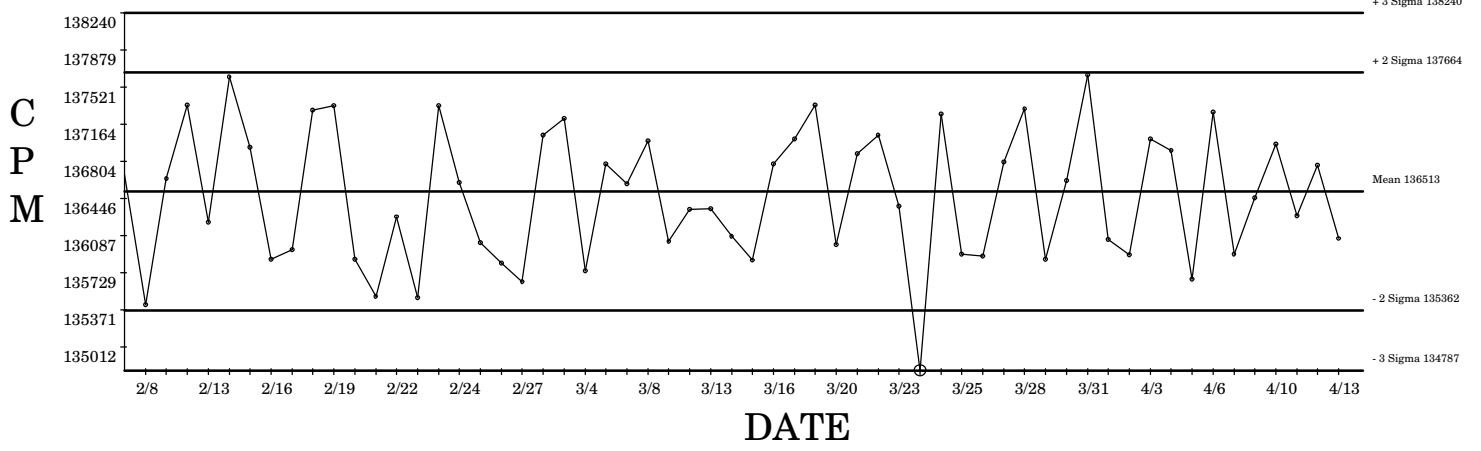
# LUCAS3 04/10/2006 EFF



# LUCAS4 04/10/2006 EFF

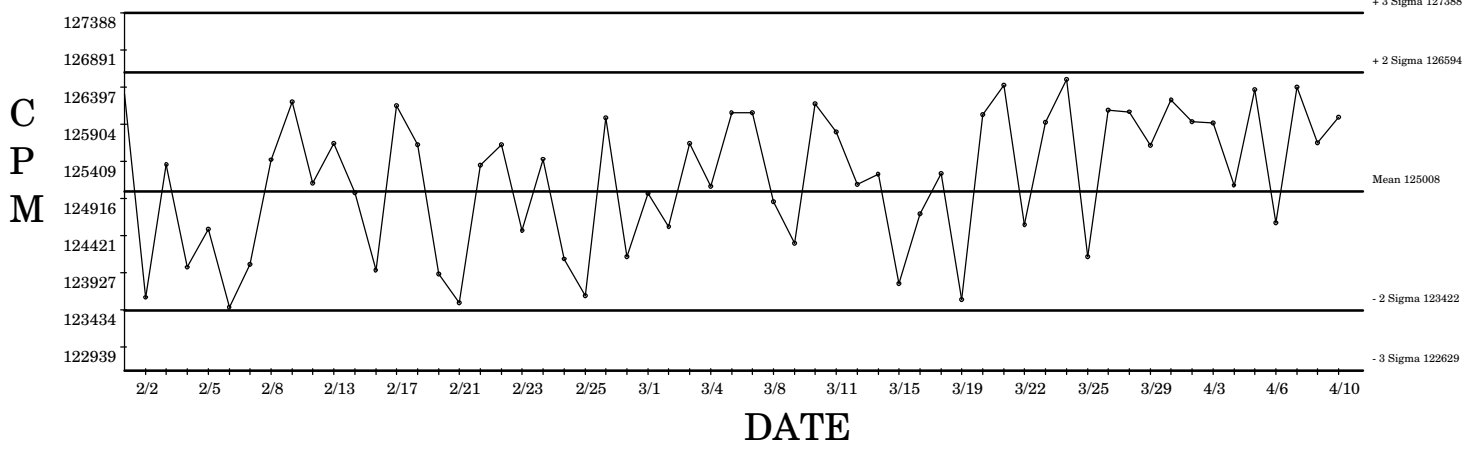


# LUCAS5 04/13/2006 EFF

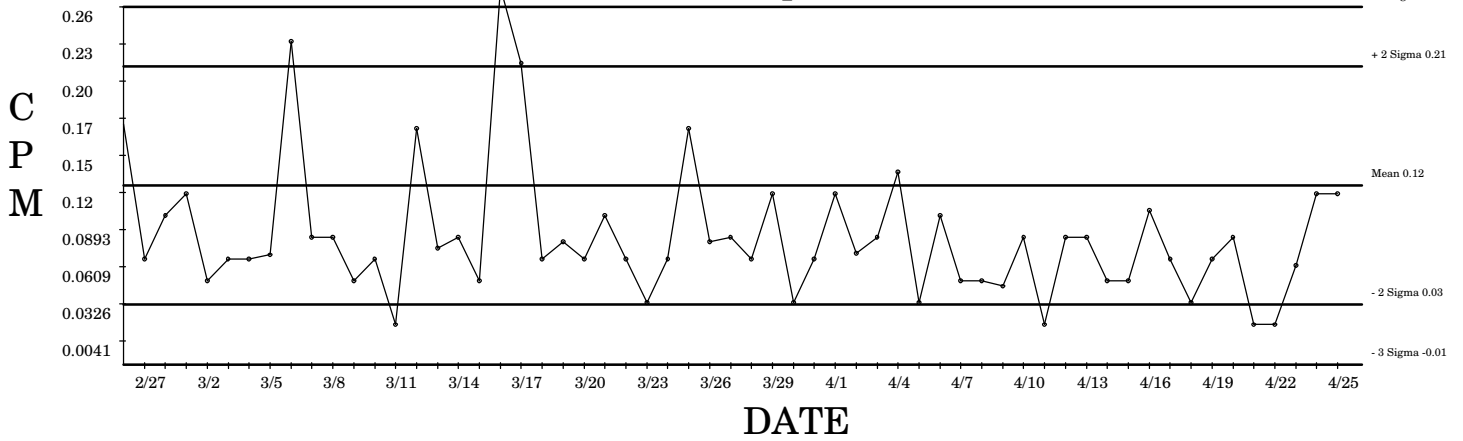


○ Denotes Outlier

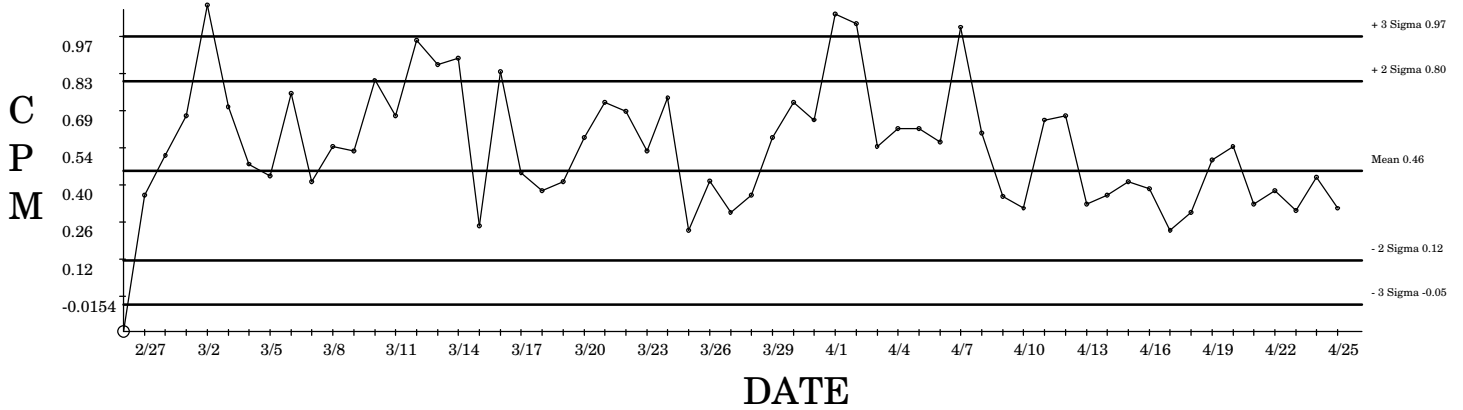
# LUCAS6 04/10/2006 EFF



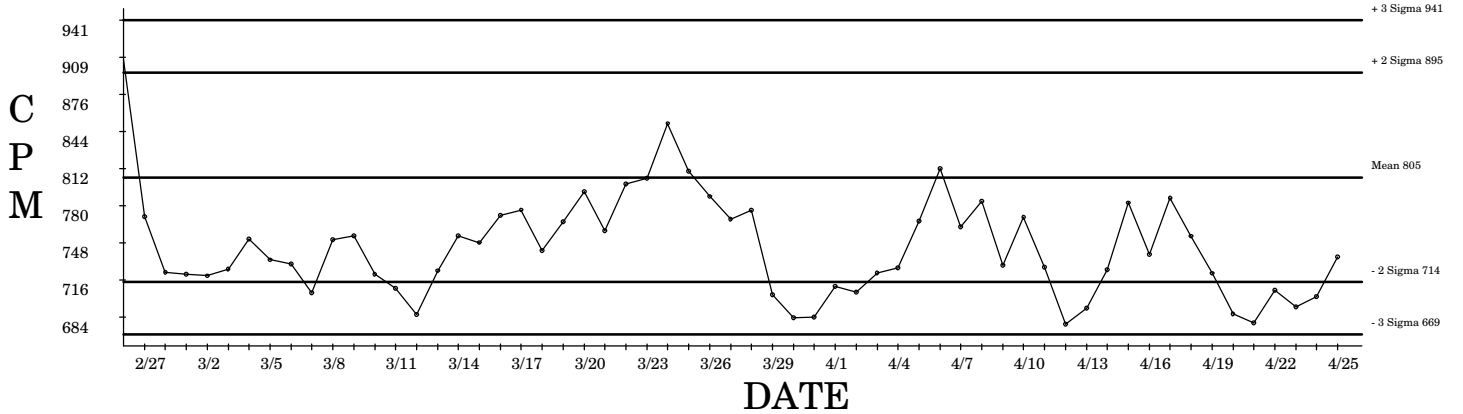
PIC3A 04/25/2006  
Alpha BKG



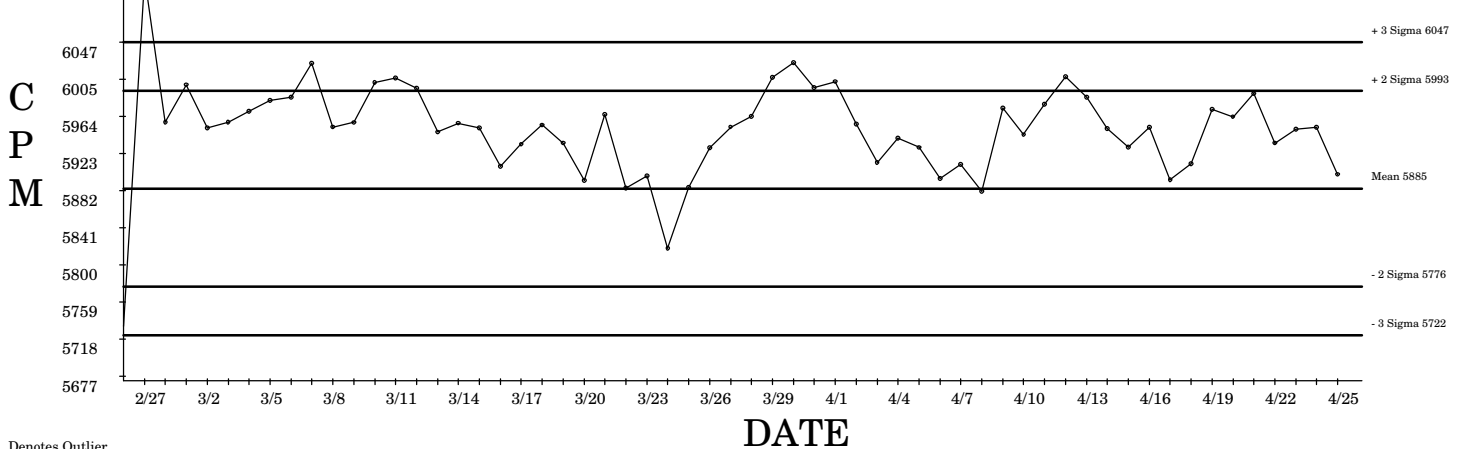
Beta BKG



Alpha EFF

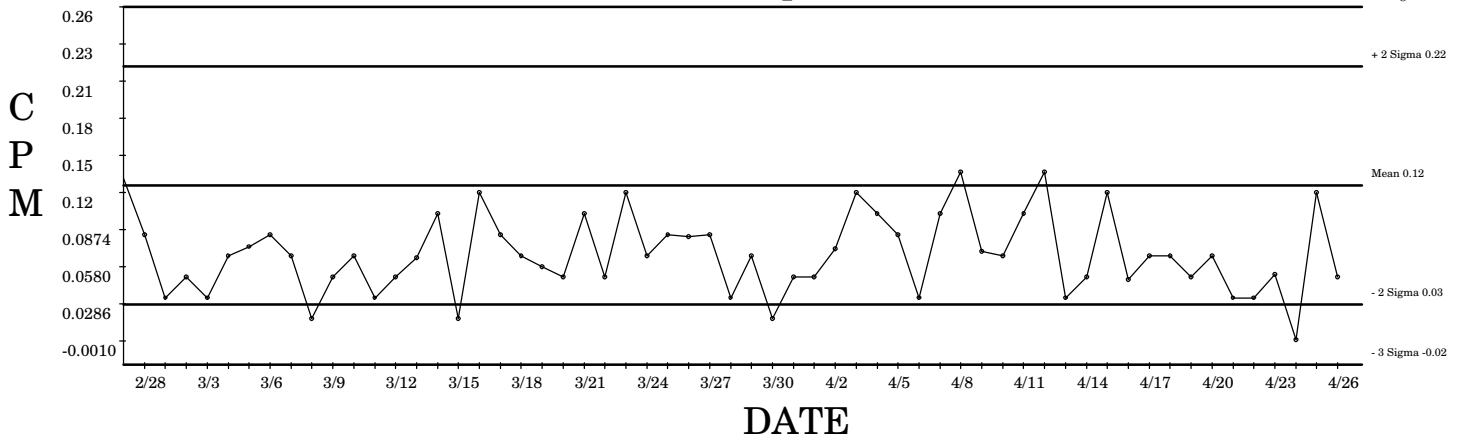


Beta EFF

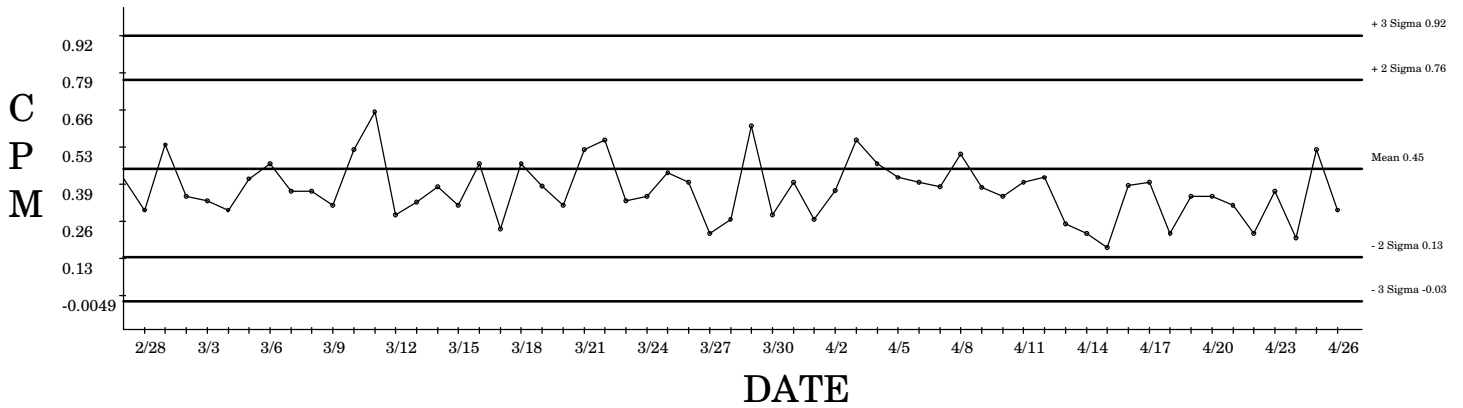


○ Denotes Outlier

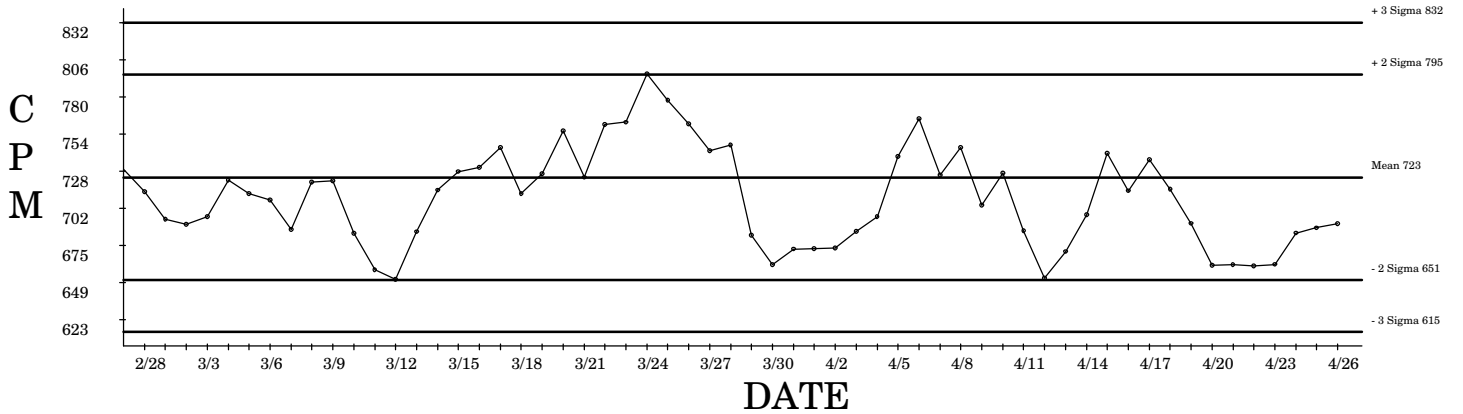
PIC3B 04/26/2006  
Alpha BKG



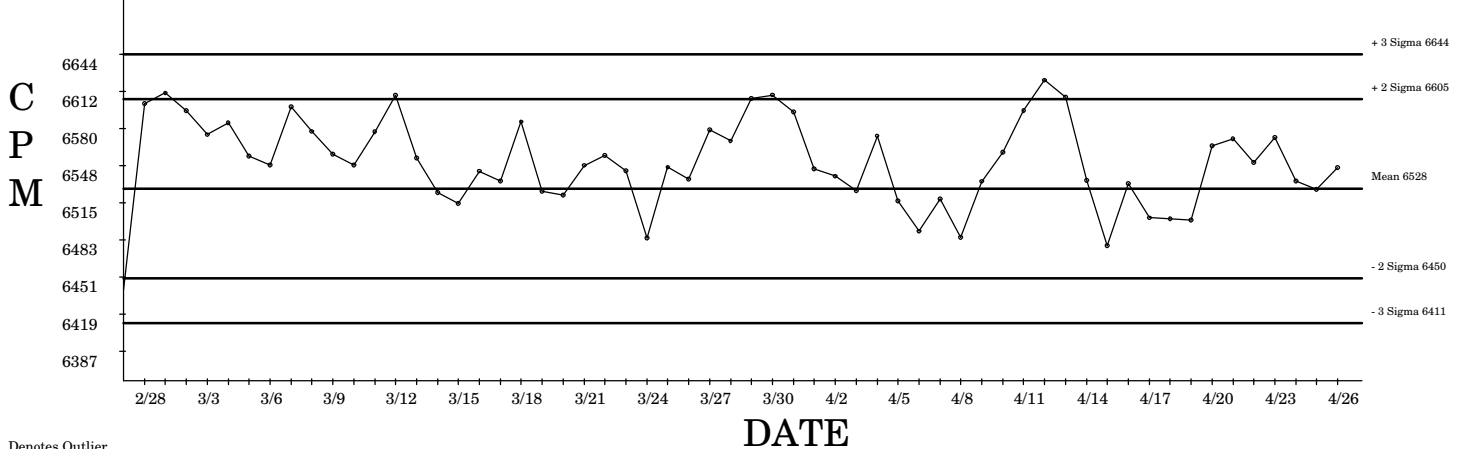
Beta BKG



Alpha EFF



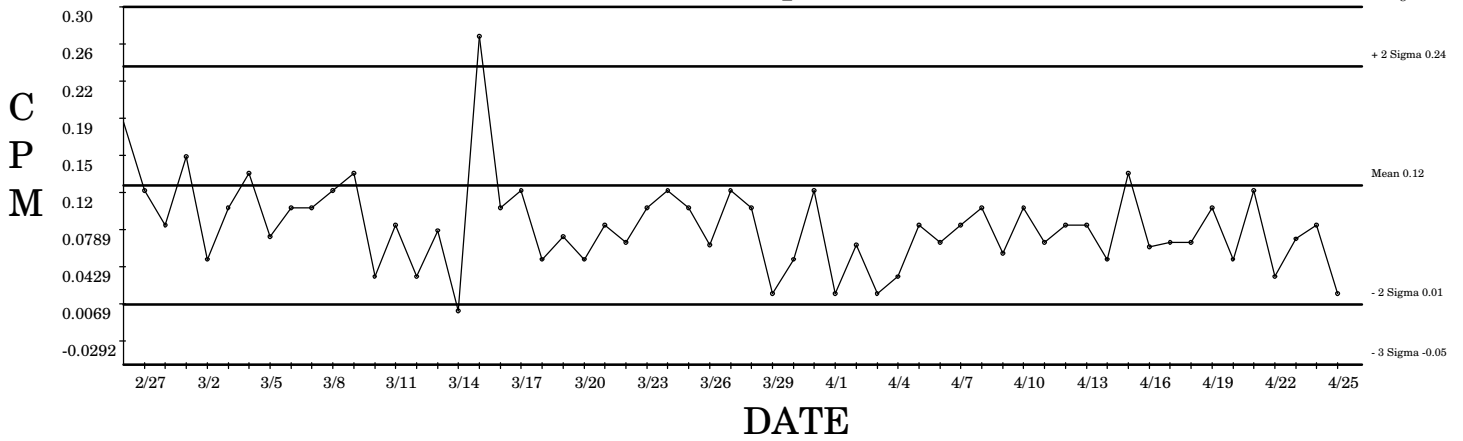
Beta EFF



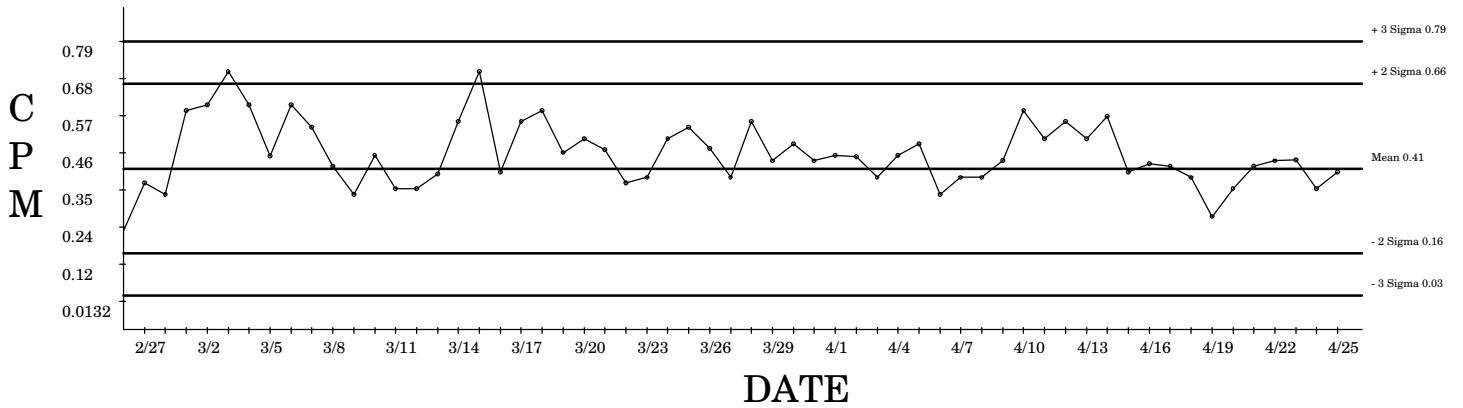
○ Denotes Outlier

# PIC3C 04/25/2006

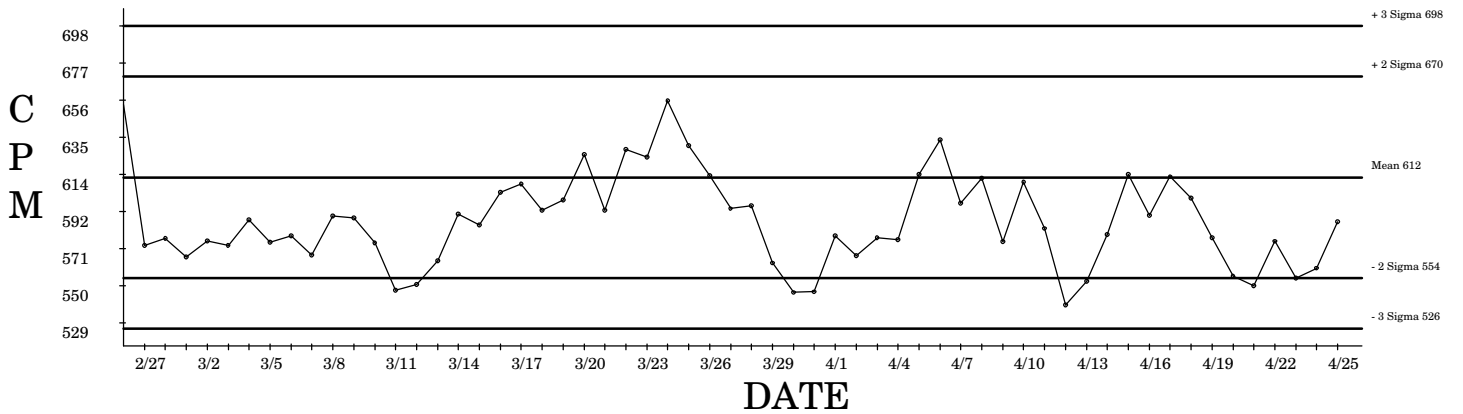
## Alpha BKG



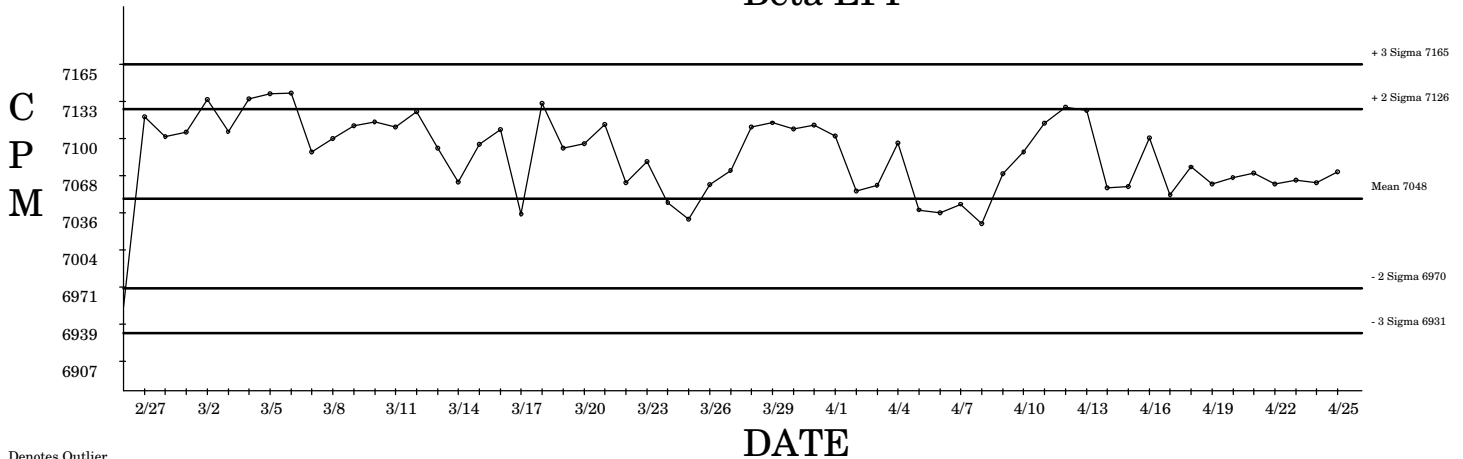
## Beta BKG



## Alpha EFF



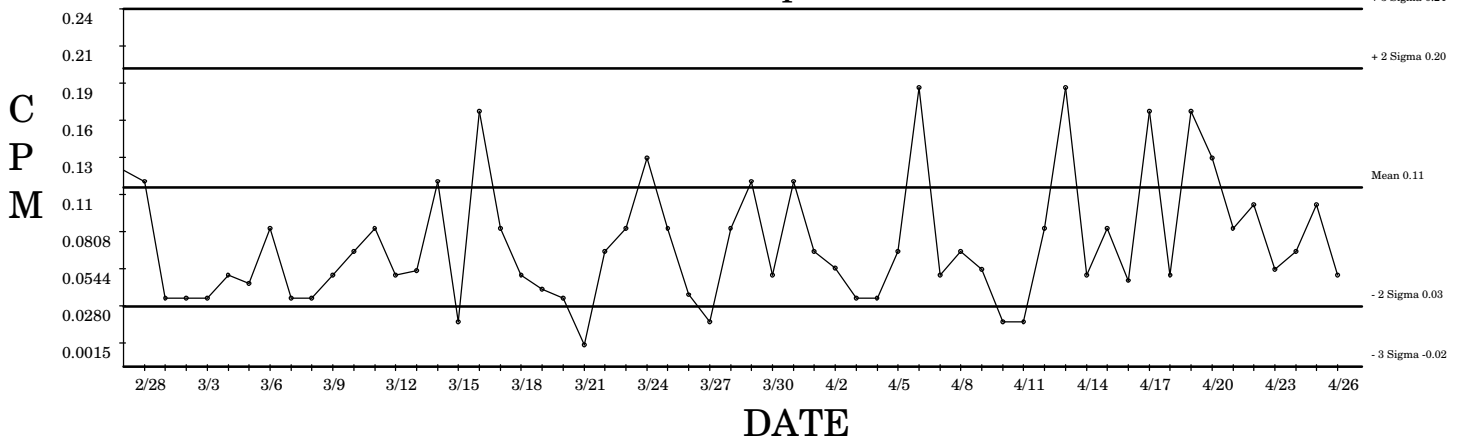
## Beta EFF



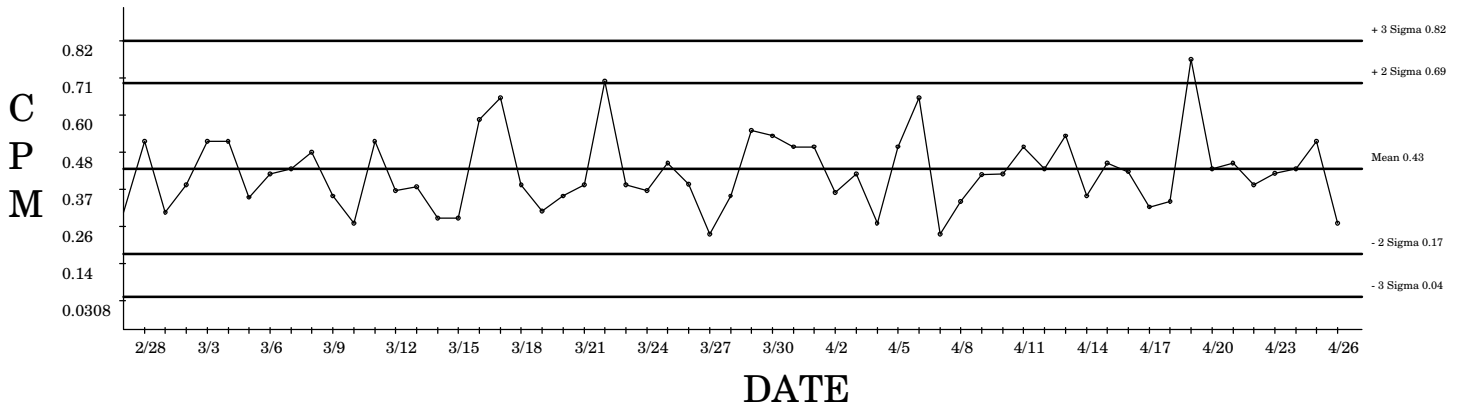
○ Denotes Outlier



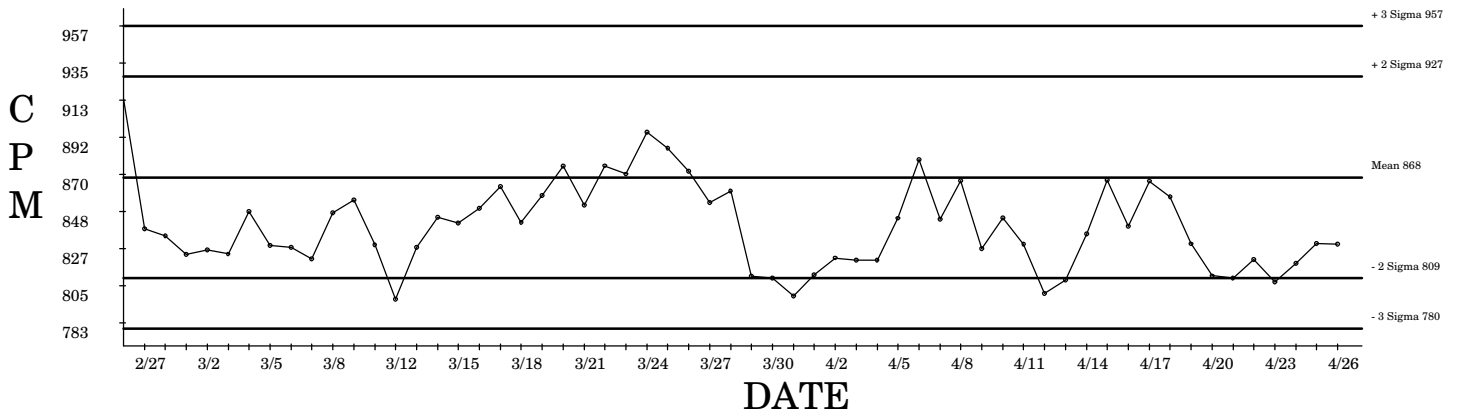
PIC3D 04/26/2006  
Alpha BKG



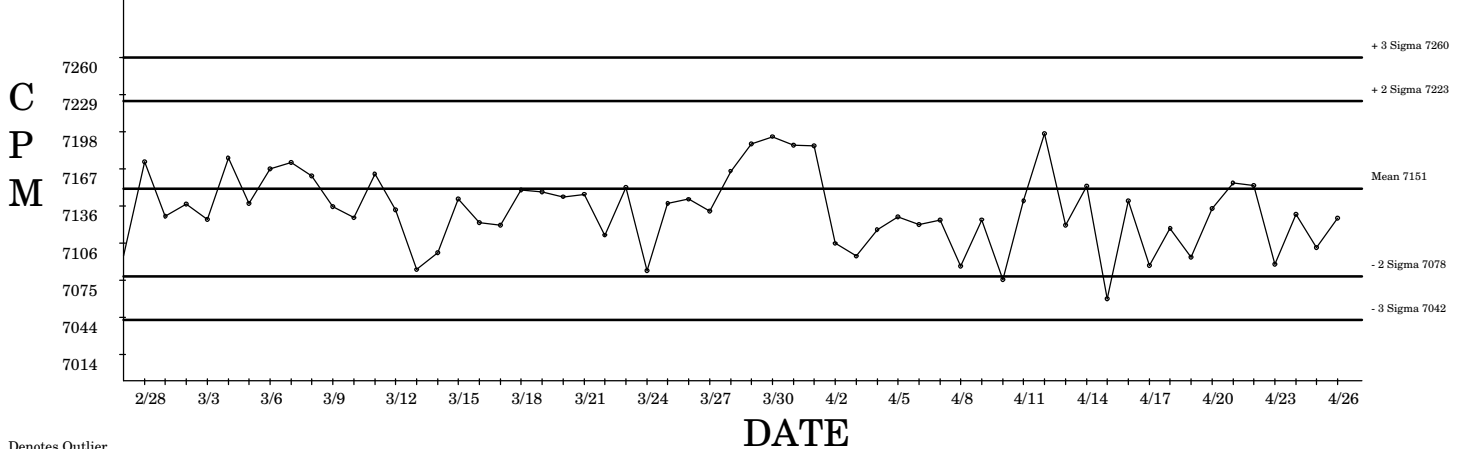
Beta BKG



Alpha EFF



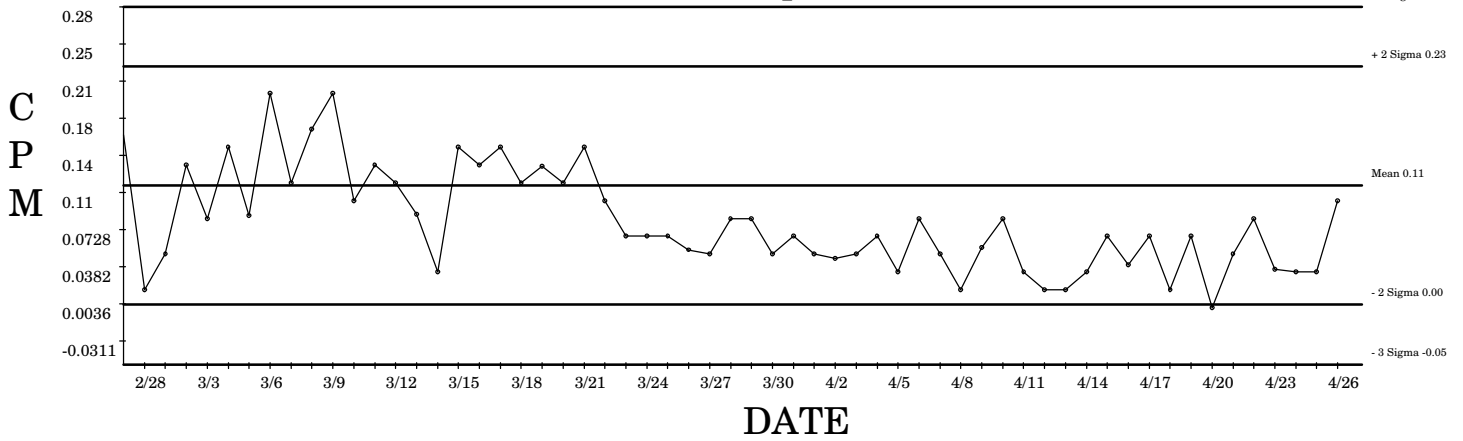
Beta EFF



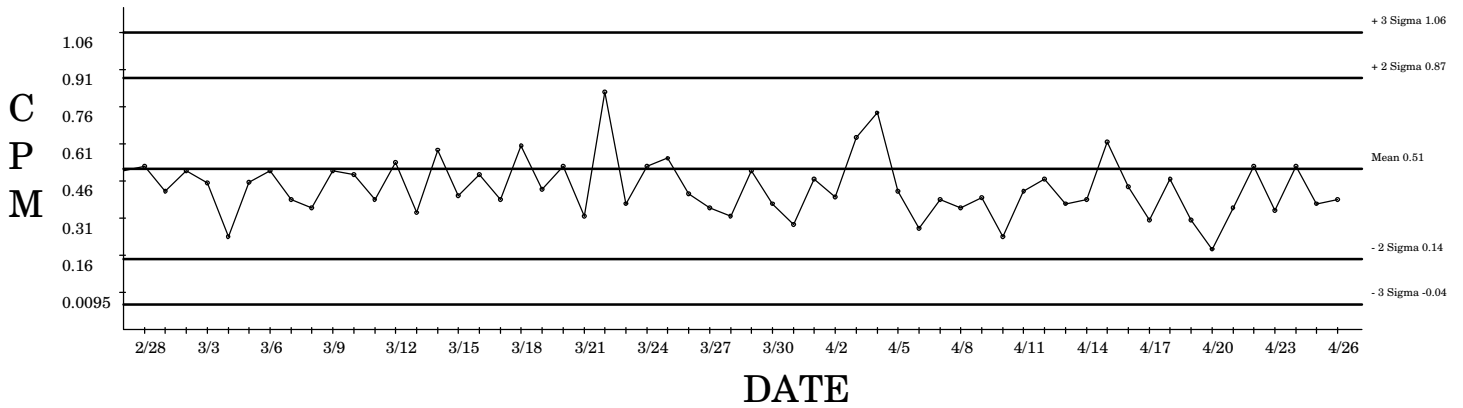
○ Denotes Outlier

# PIC4A 04/26/2006

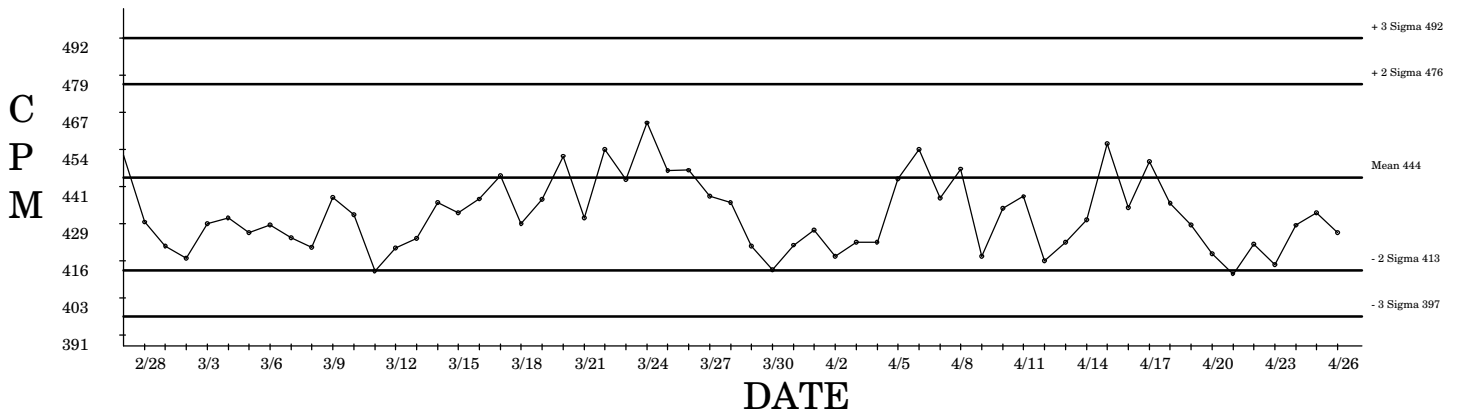
## Alpha BKG



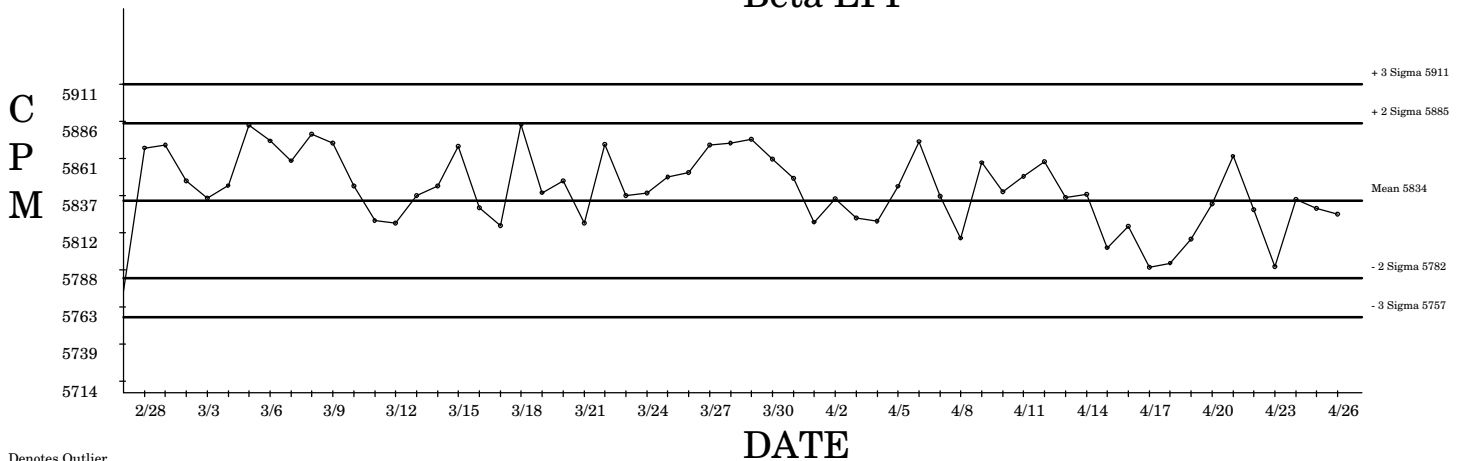
## Beta BKG



## Alpha EFF



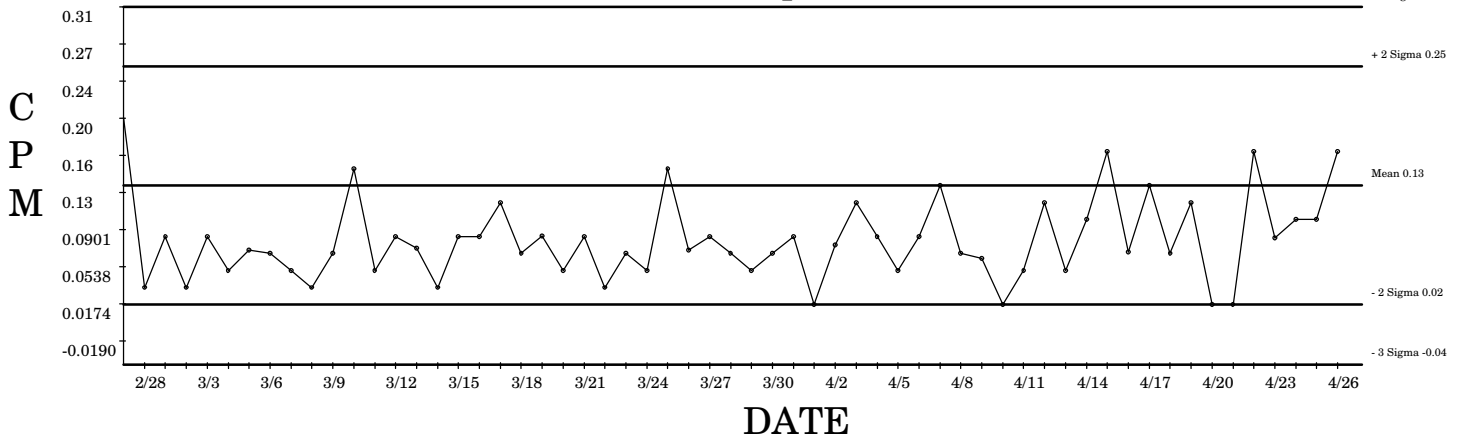
## Beta EFF



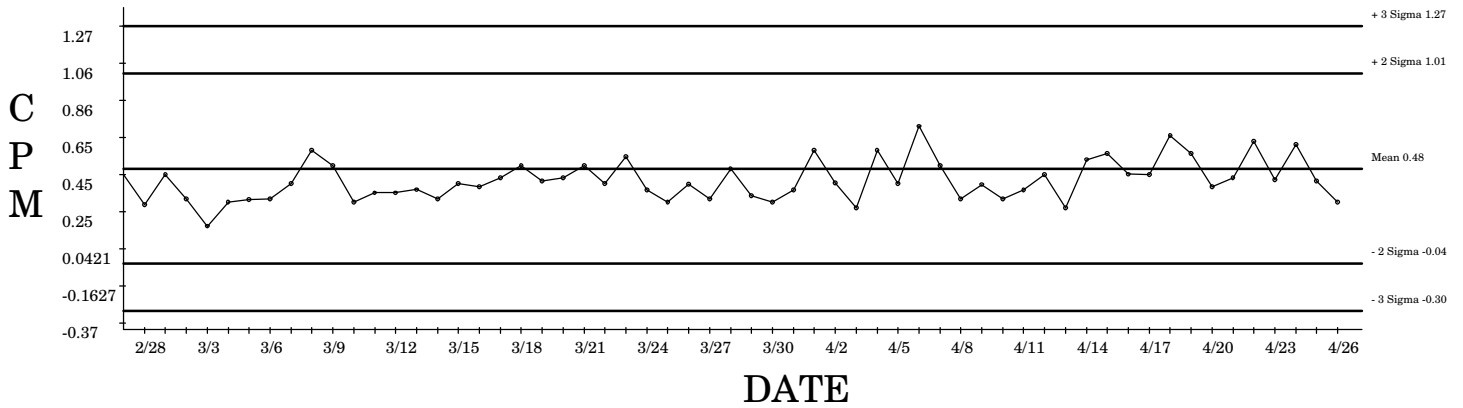
○ Denotes Outlier

# PIC4C 04/26/2006

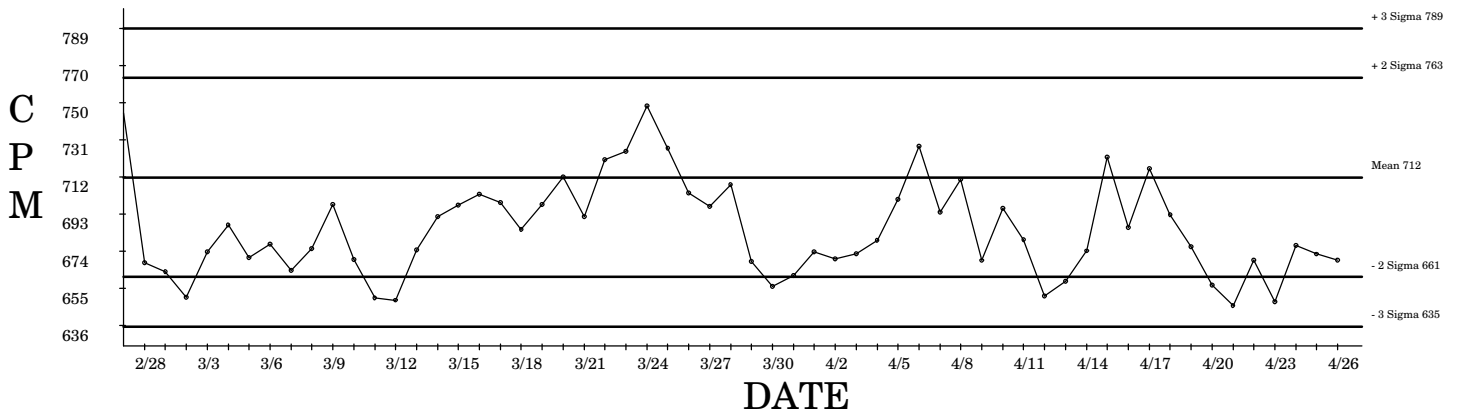
## Alpha BKG



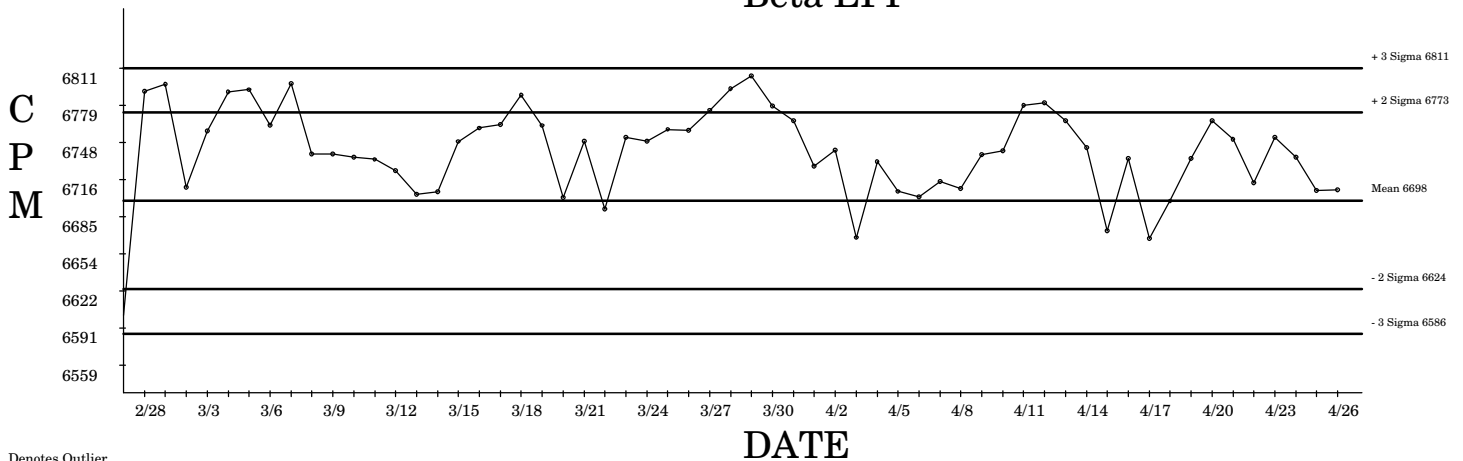
## Beta BKG



## Alpha EFF



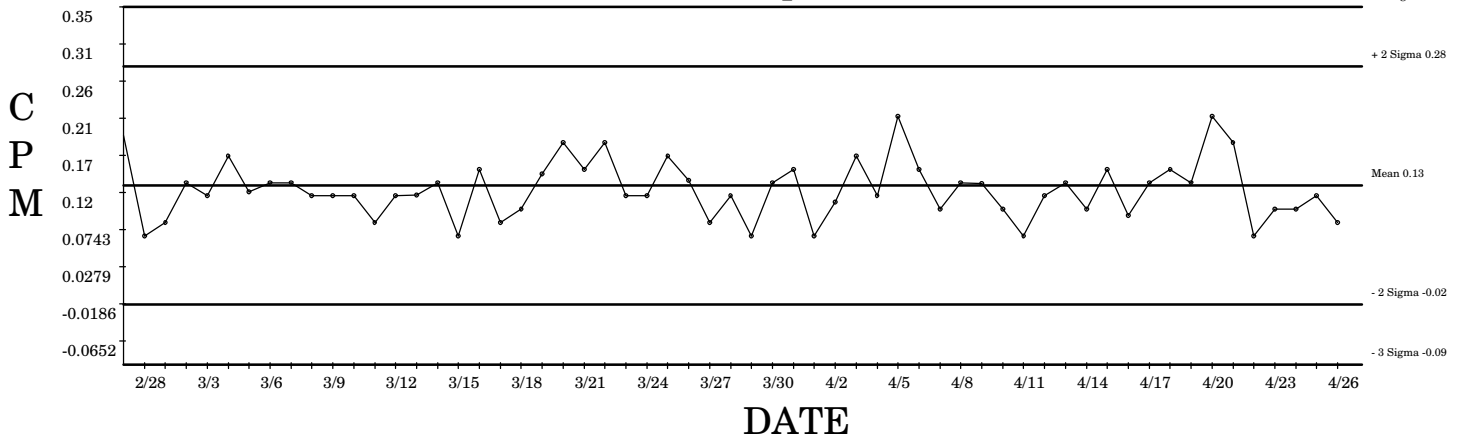
## Beta EFF



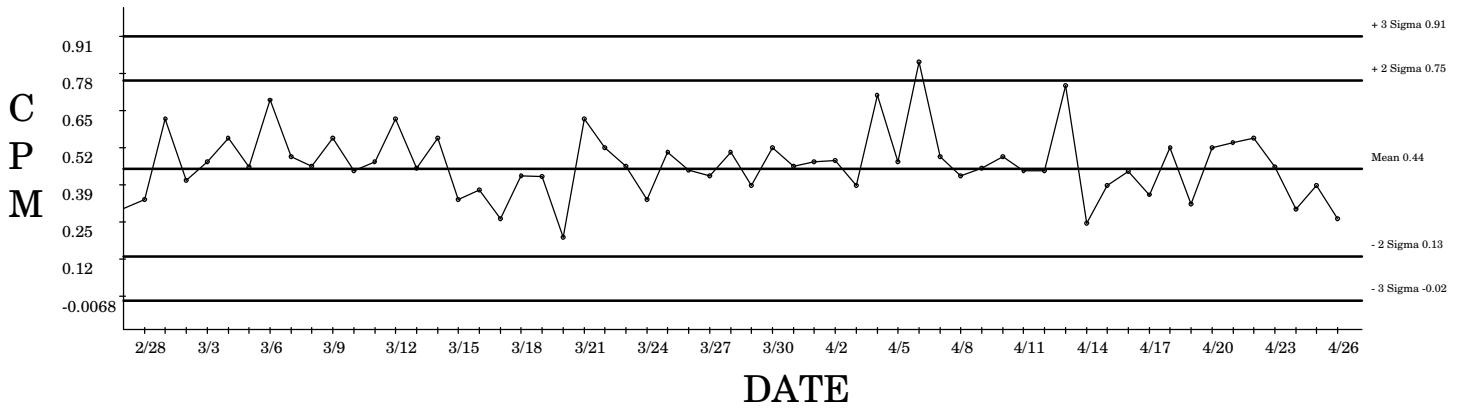
○ Denotes Outlier

# PIC4D 04/26/2006

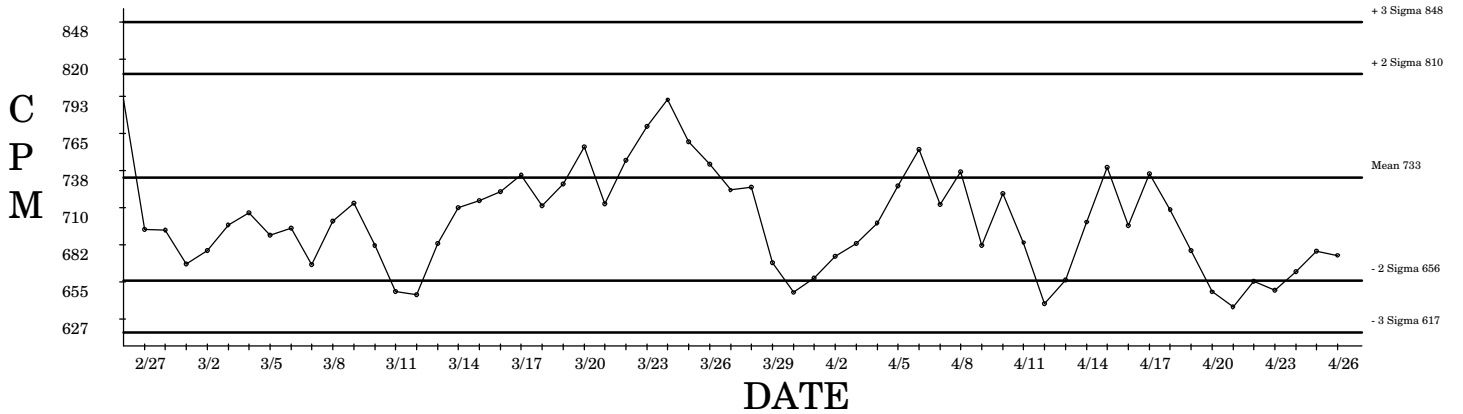
## Alpha BKG



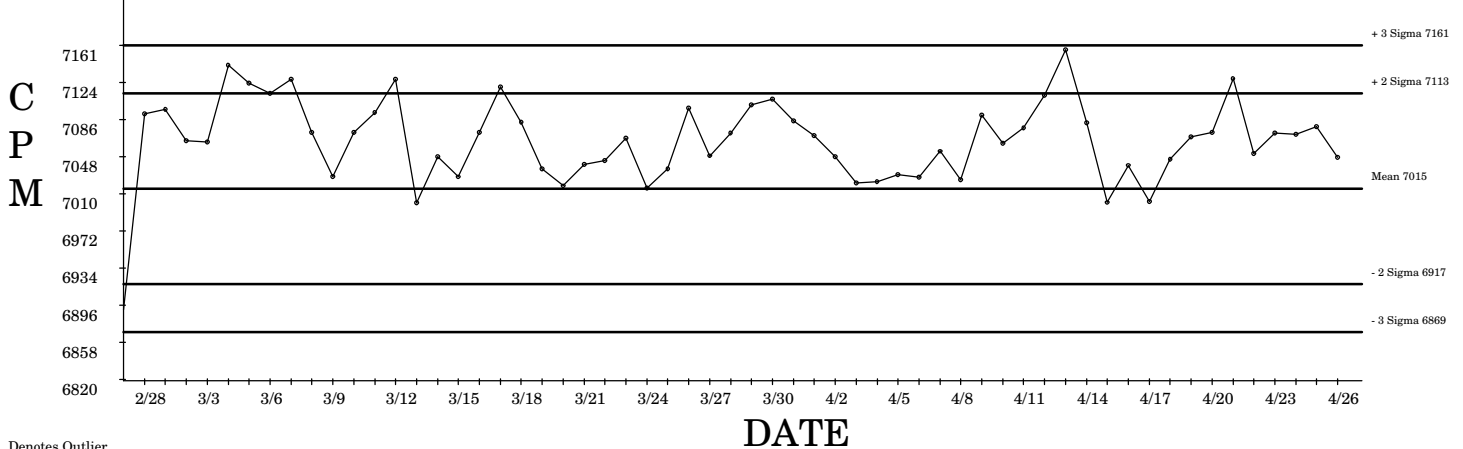
## Beta BKG



## Alpha EFF

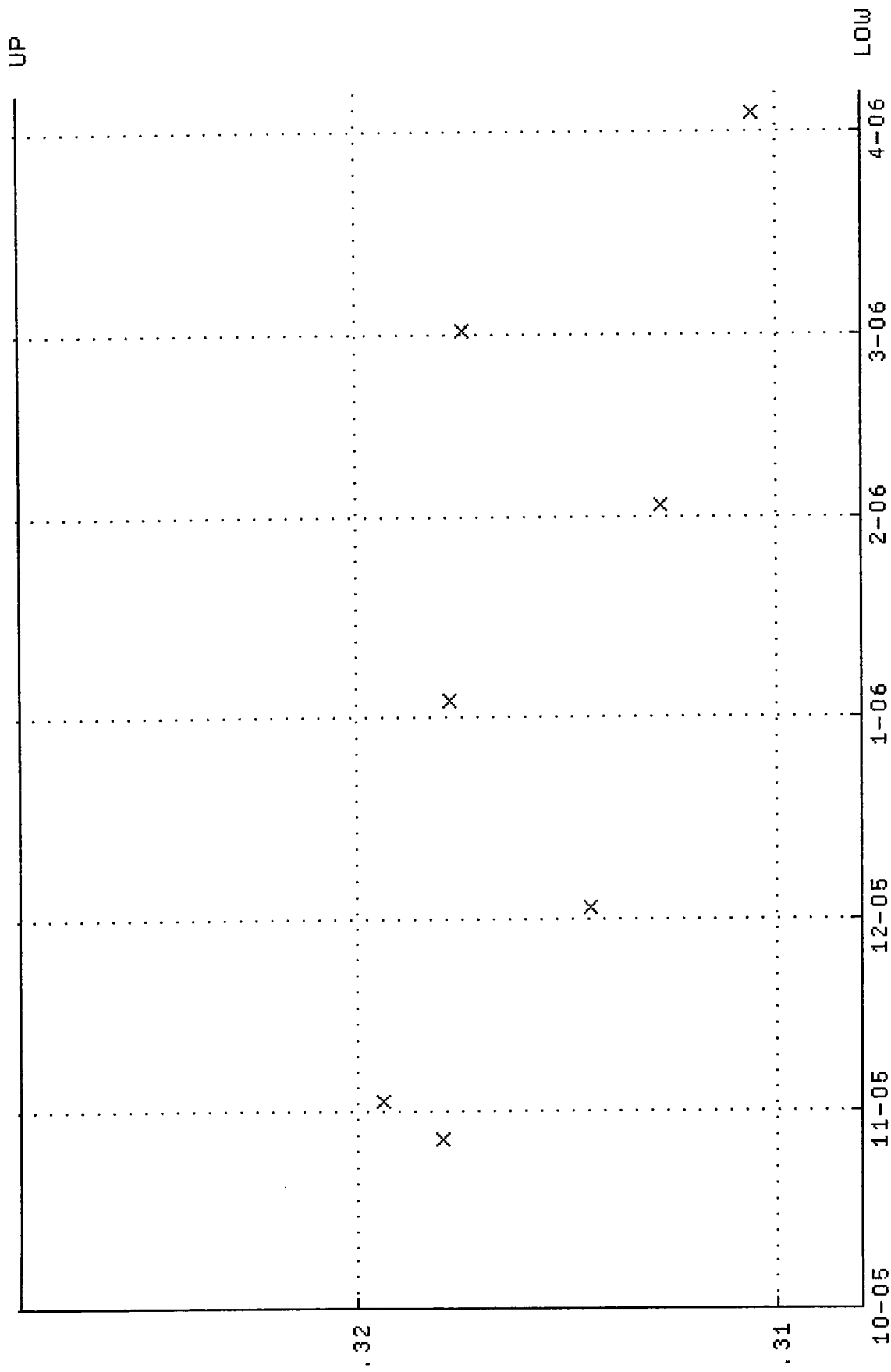


## Beta EFF

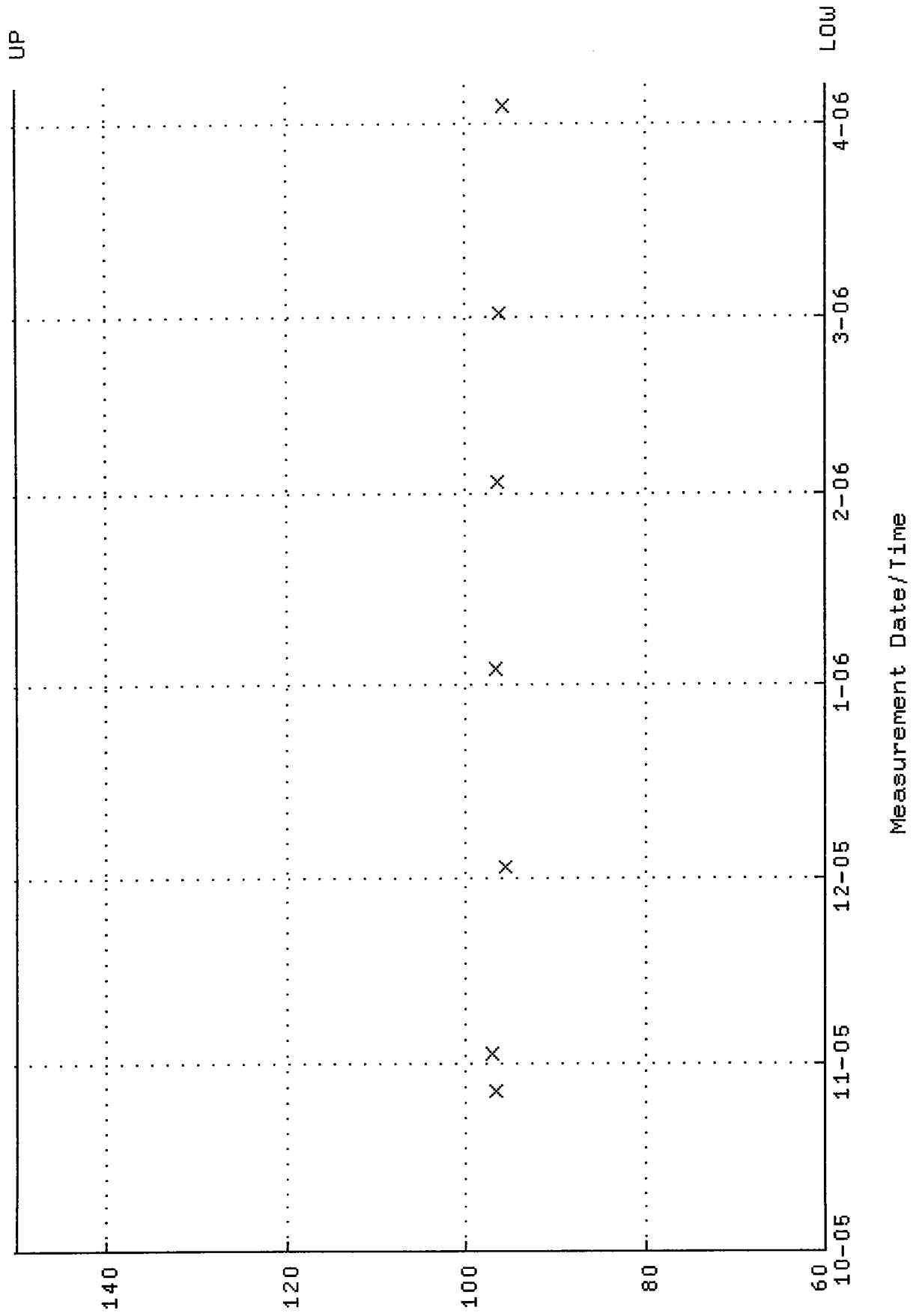


○ Denotes Outlier

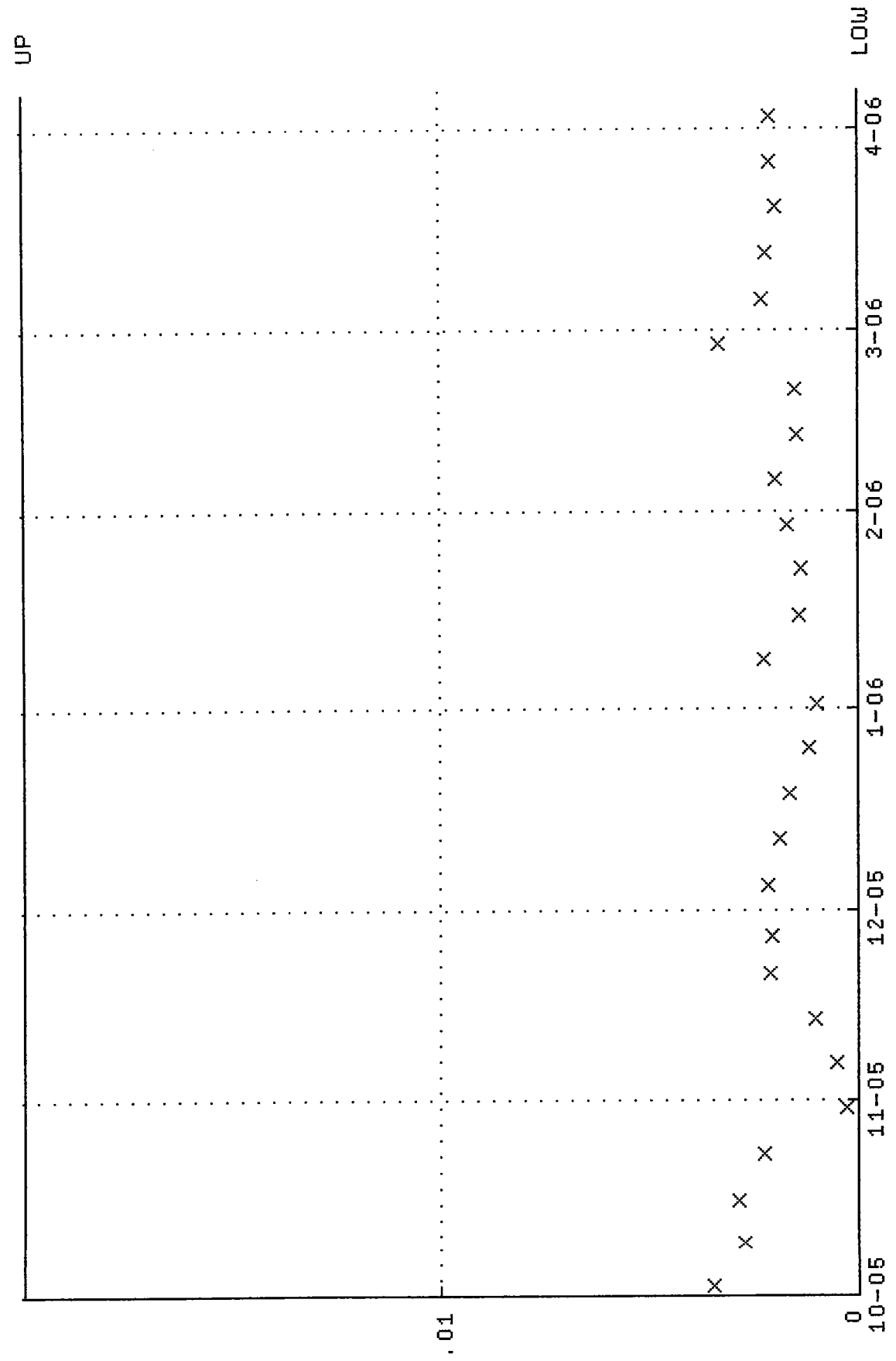
QA filename : DKA100:[ENV\_ALPHA.QA.W]W011.QAF;4  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 27-OCT-2005 08:48:47 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.308000 through 0.328000



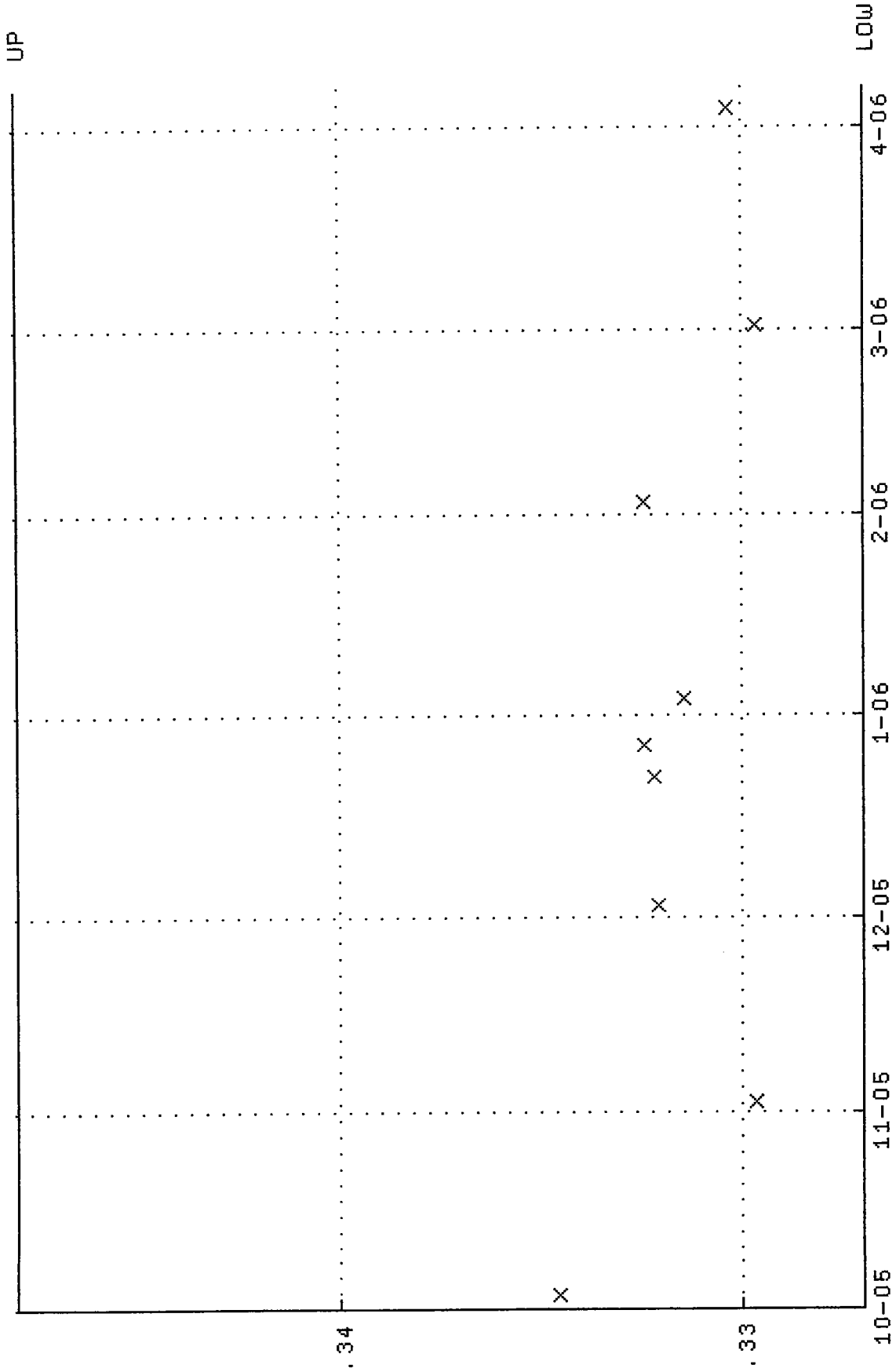
QA filename : DKA100:[ENV\_ALPHA.QA.W]W011.QAF;4  
 Parameter Name : NACTIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 27-OCT-2005 08:48:47 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



QA filename : DKA100:[ENV\_ALPHA.QA,B]B011.QAF;2  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:25:39 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02

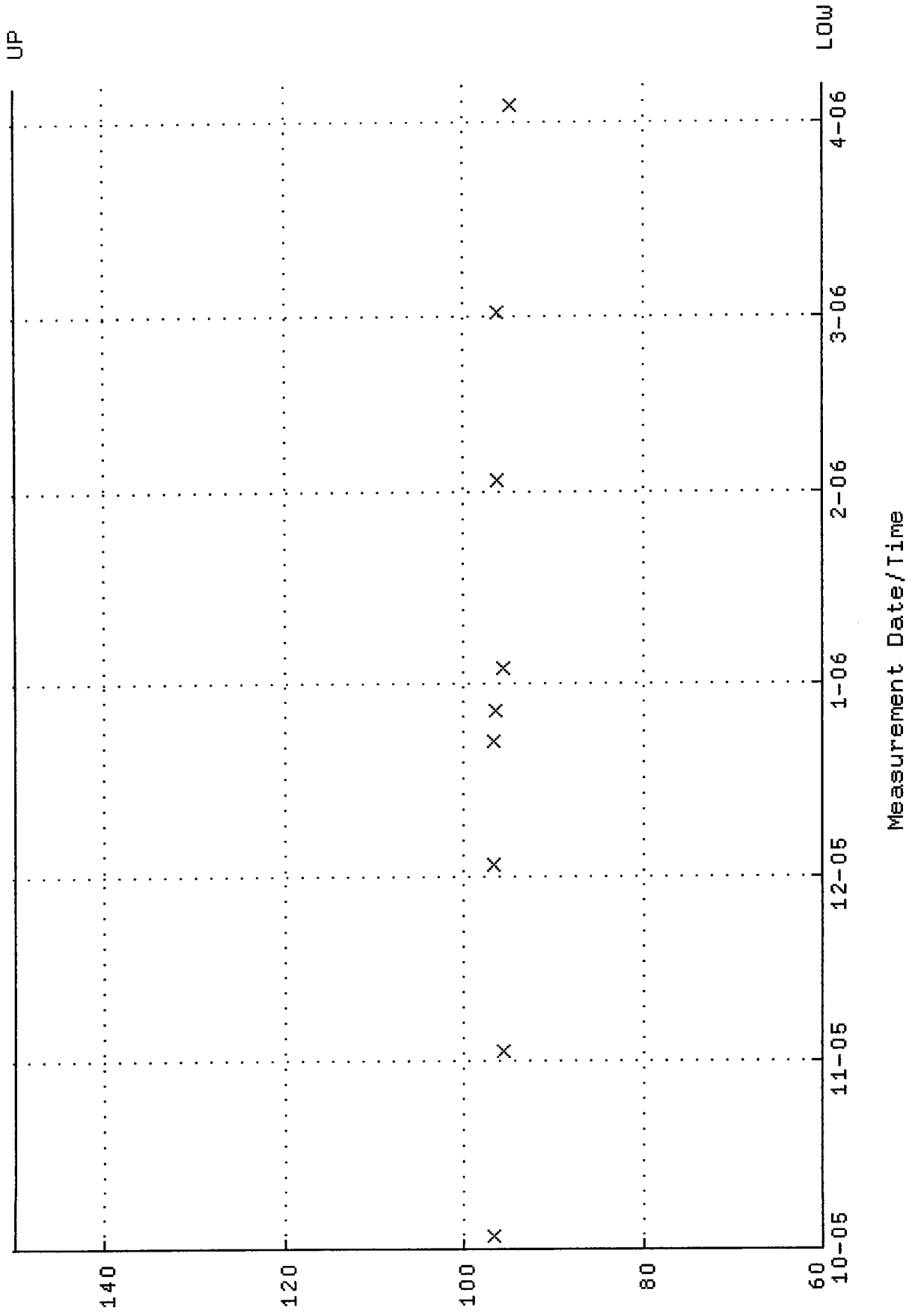


QA filename : DKA100:[ENV\_ALPHA.QA.W]W016.QAF;3  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 3-OCT-2005 07:10:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.327000 through 0.348000

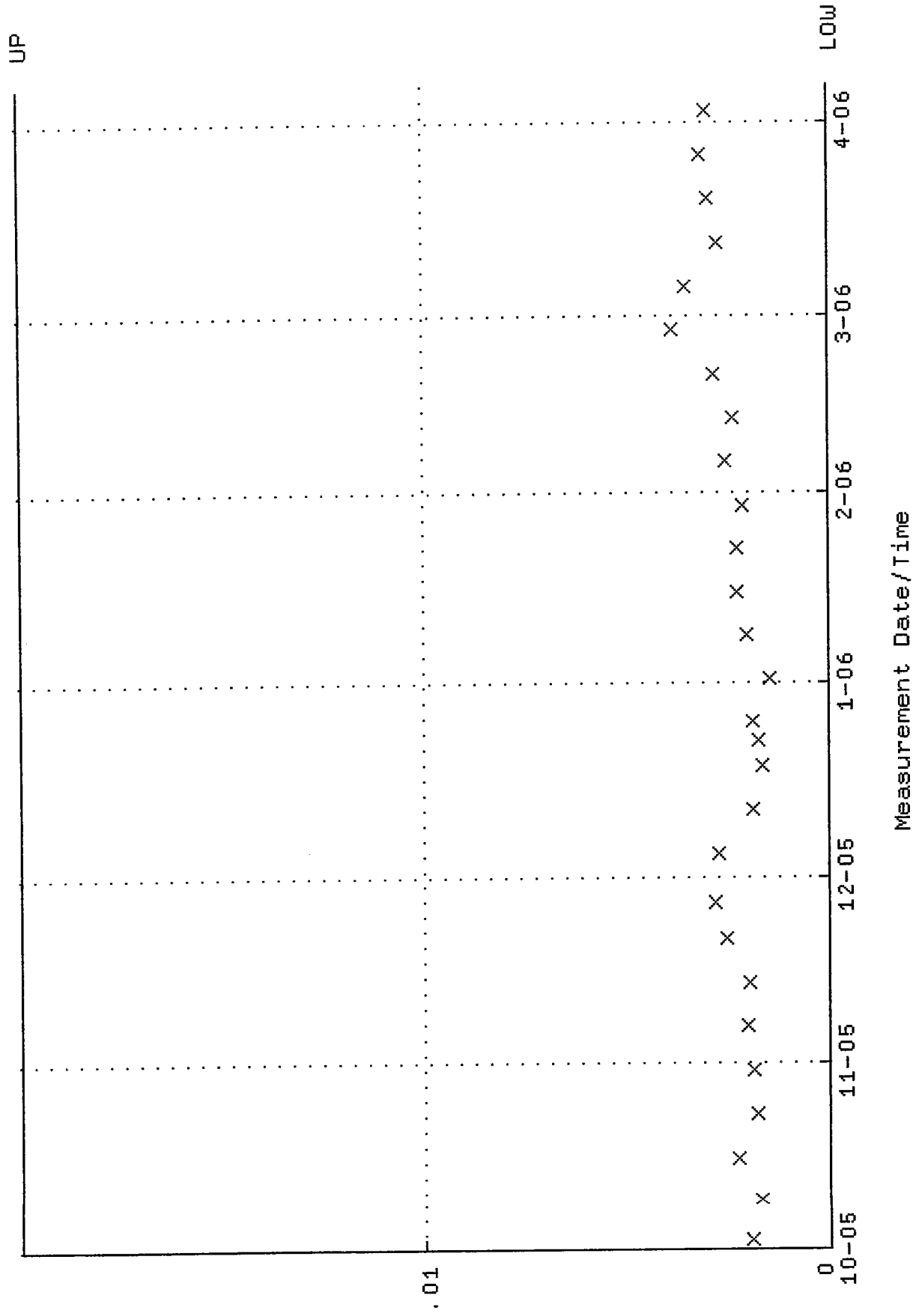




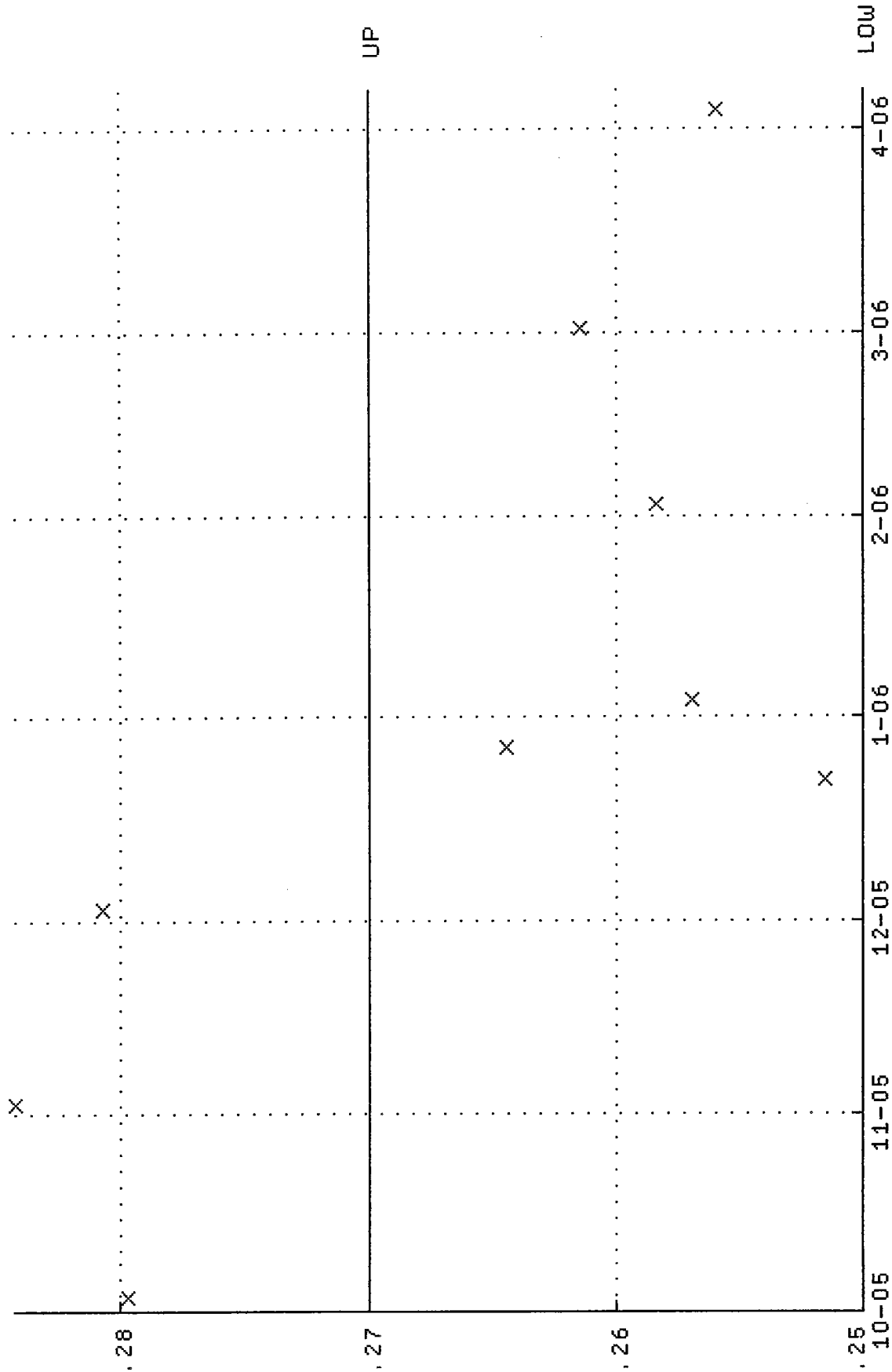
QA filename : DKA100:[ENV\_ALPHA.QA.W]W016.QAF;3  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 3-OCT-2005 07:10:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



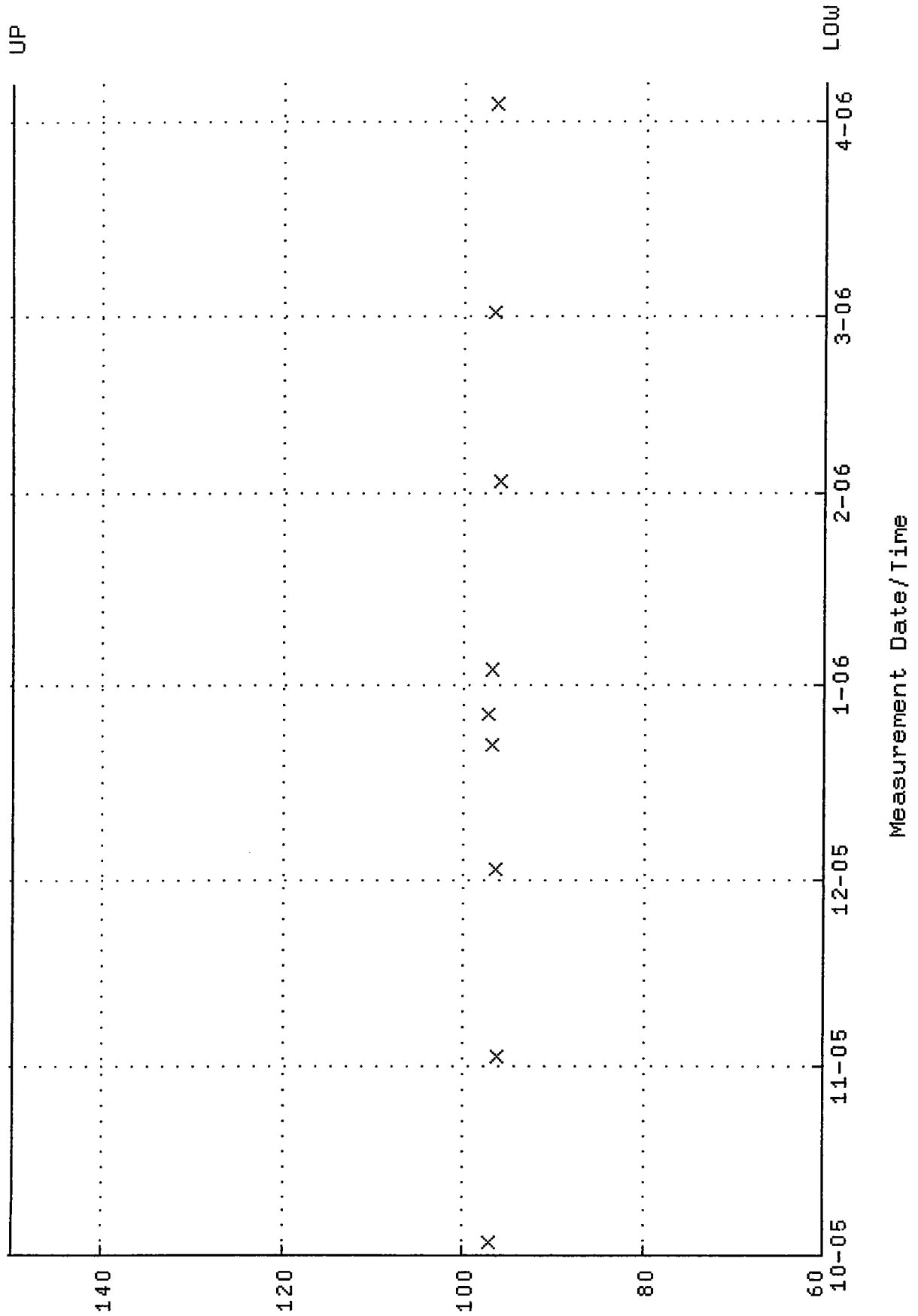
QA filename : DKA100:[ENV\_ALPHA.QA.B]B016.QAF;2  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:25:40 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



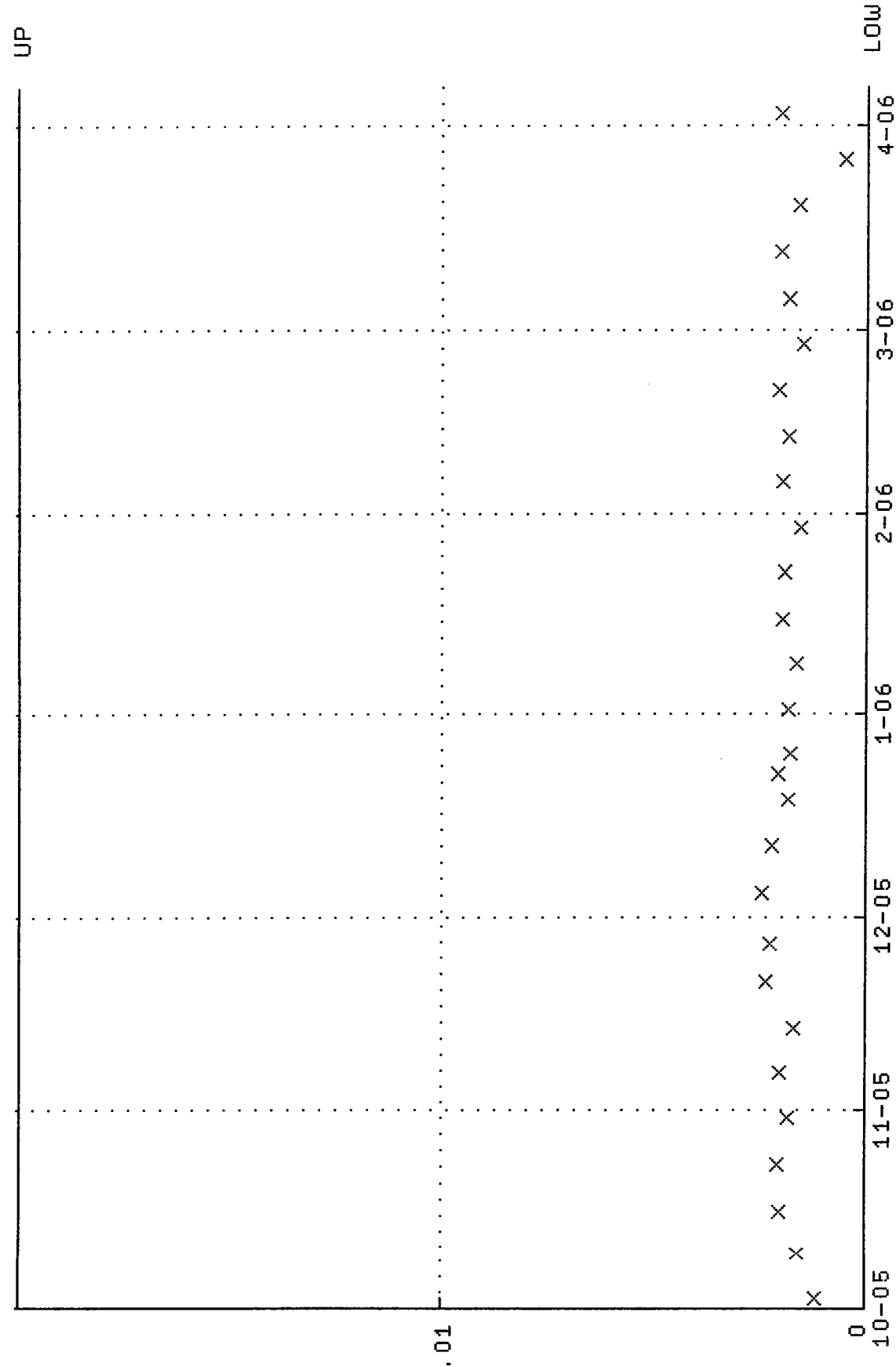
QA filename : DKA100:[ENV\_ALPHA.QA.W]W018.QAF;3  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 3-OCT-2005 07:10:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.250000 through 0.270000



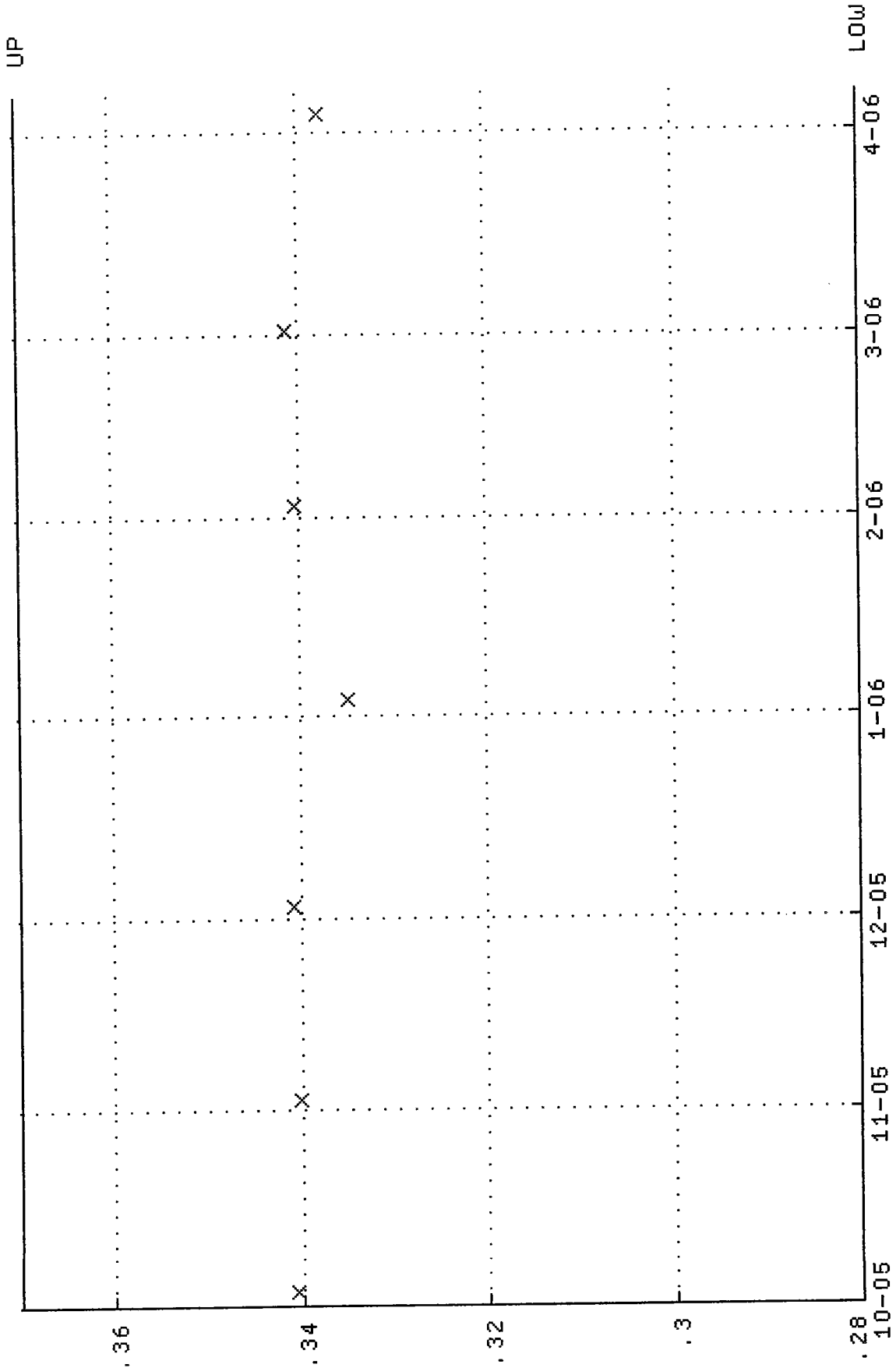
QA filename : DKA100:[ENV\_ALPHA.QA.W]W018.QAF;3  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 3-OCT-2005 07:10:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



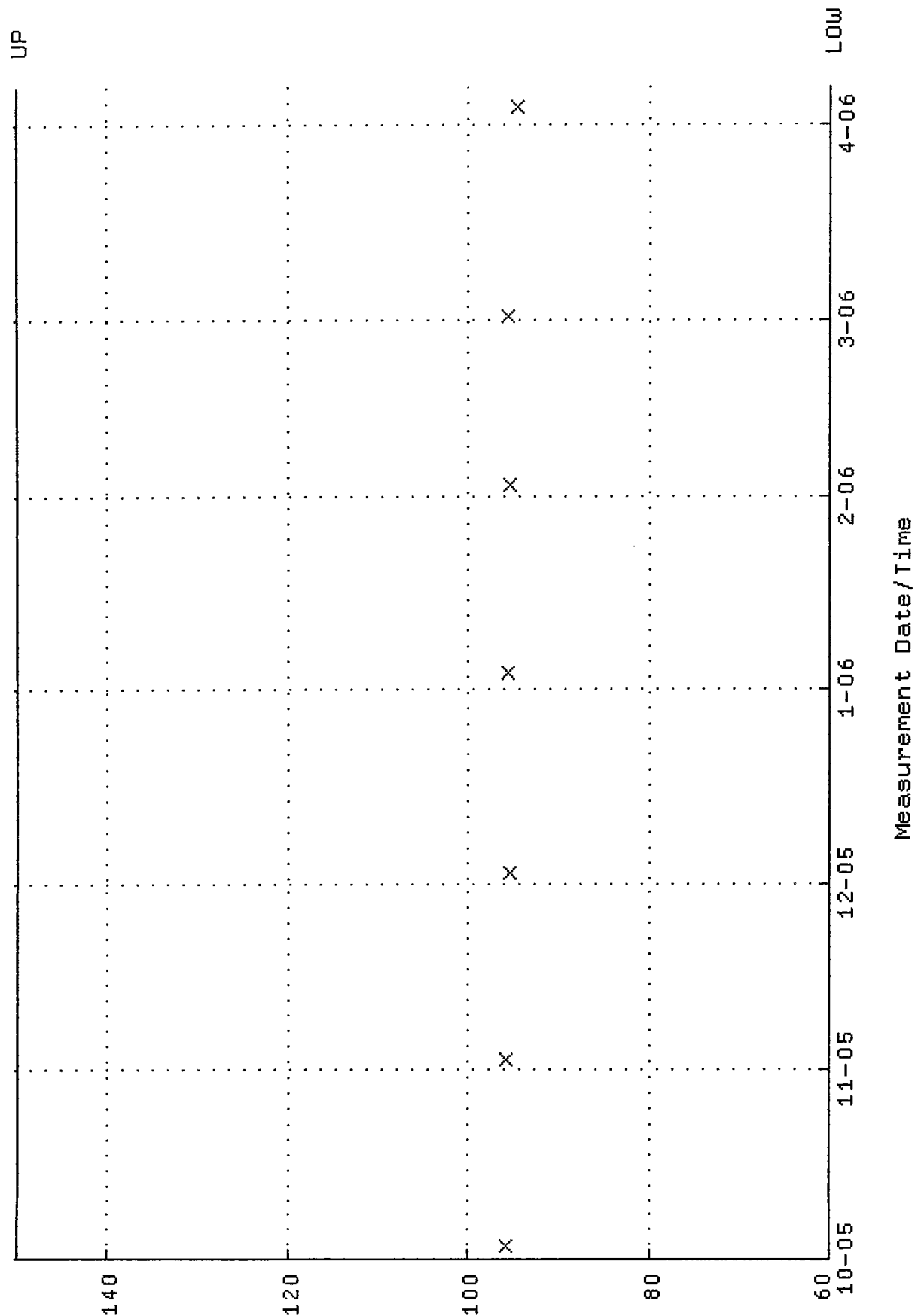
QA filename : DKA100:[ENV\_ALPHA,QA,B]B018.QAF;1  
Parameter Name : BACKRATE (Background Rate)  
Start/End Dates : 2-OCT-2005 13:25:40 through 6-APR-2006 12:00:00  
Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



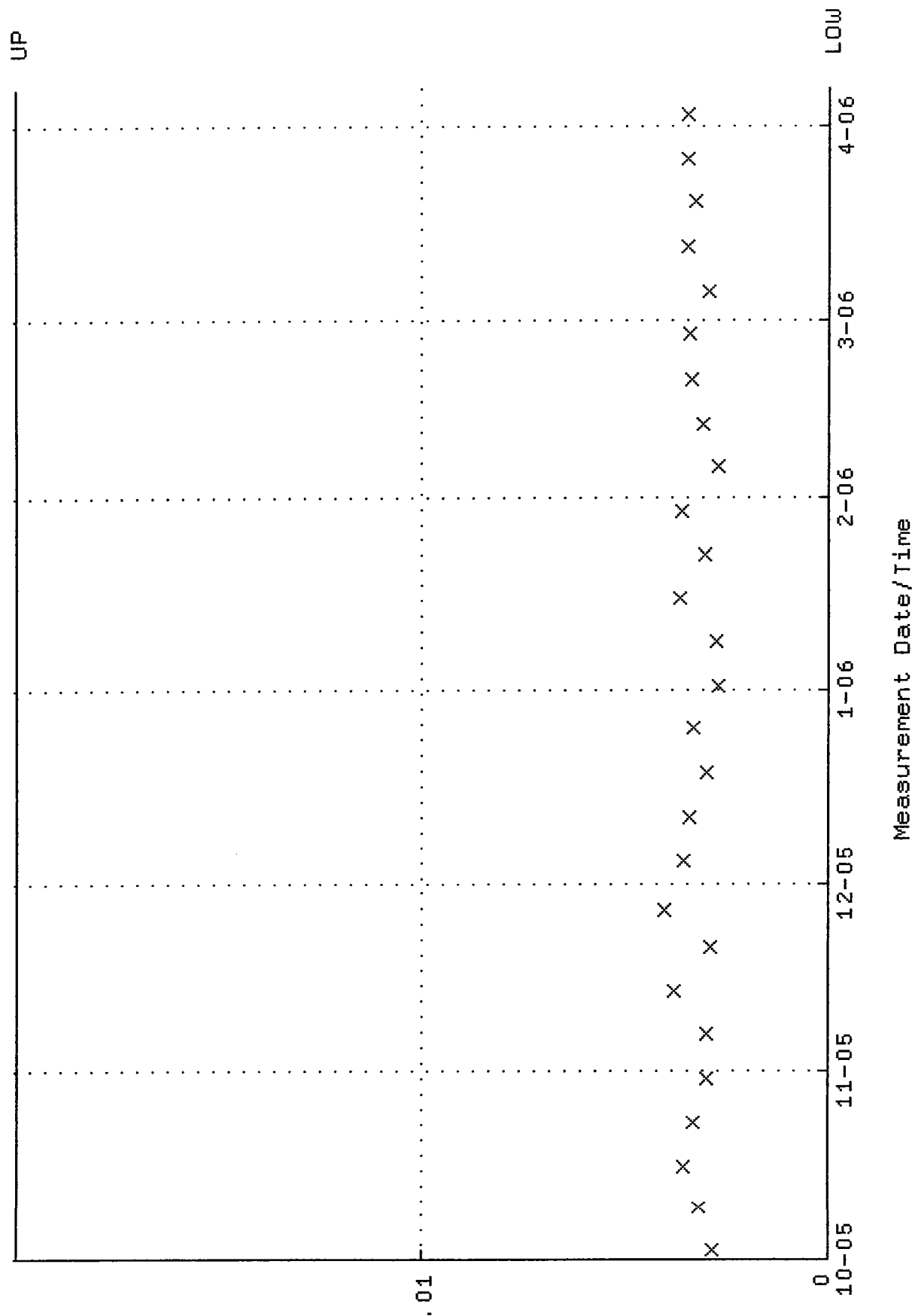
QA filename : DKA100:[ENV\_ALPHA.QA.W]W020.QAF;3  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 3-OCT-2005 07:10:43 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.280000 through 0.370000



QA filename : DKA100:[ENV\_ALPHA.QA.W]W020.QAF;3  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 3-OCT-2005 07:10:43 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.000

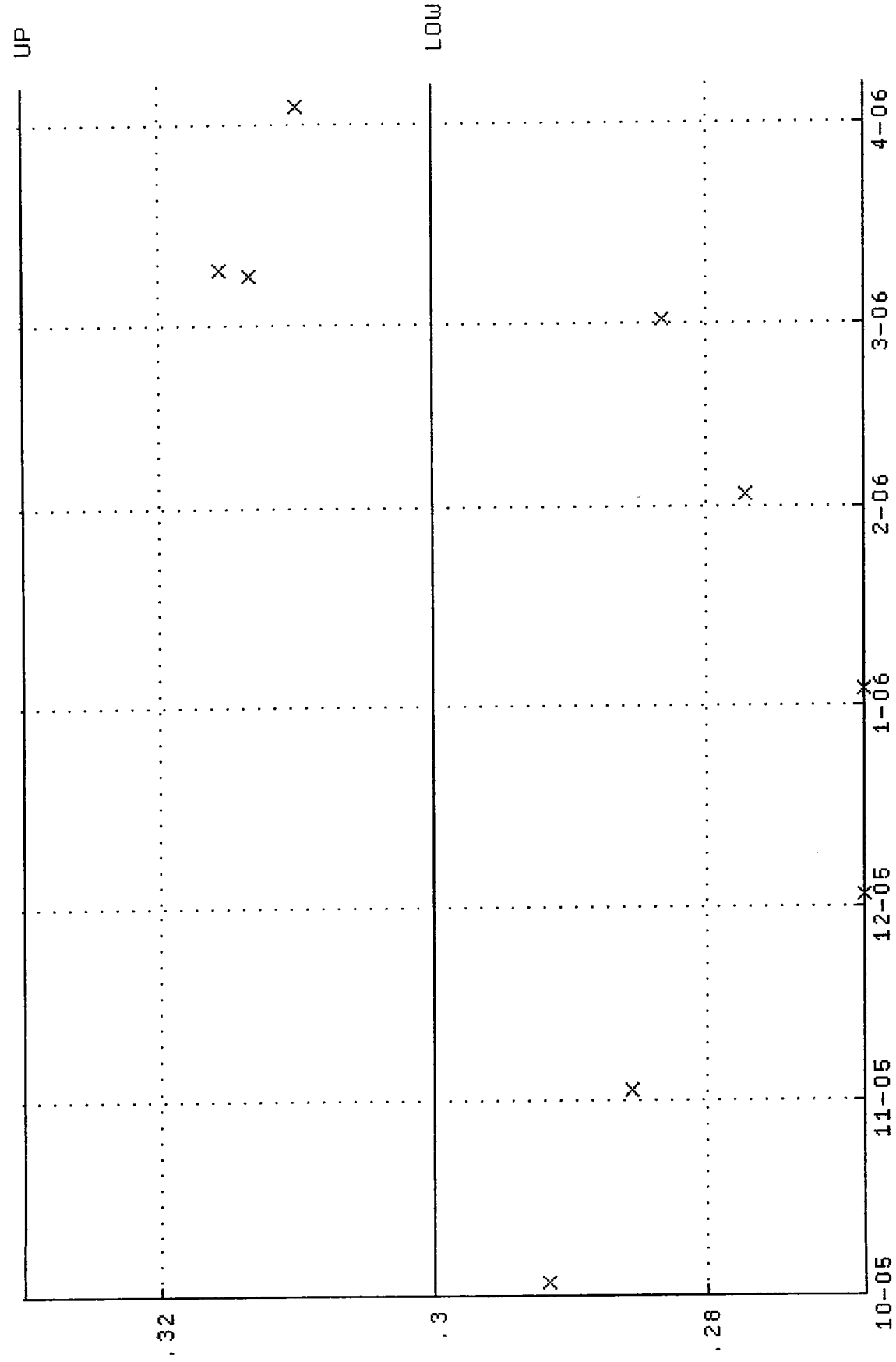


QA filename : DKA100:[ENV\_ALPHA.QA.B]B020.QAF;1  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:25:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02

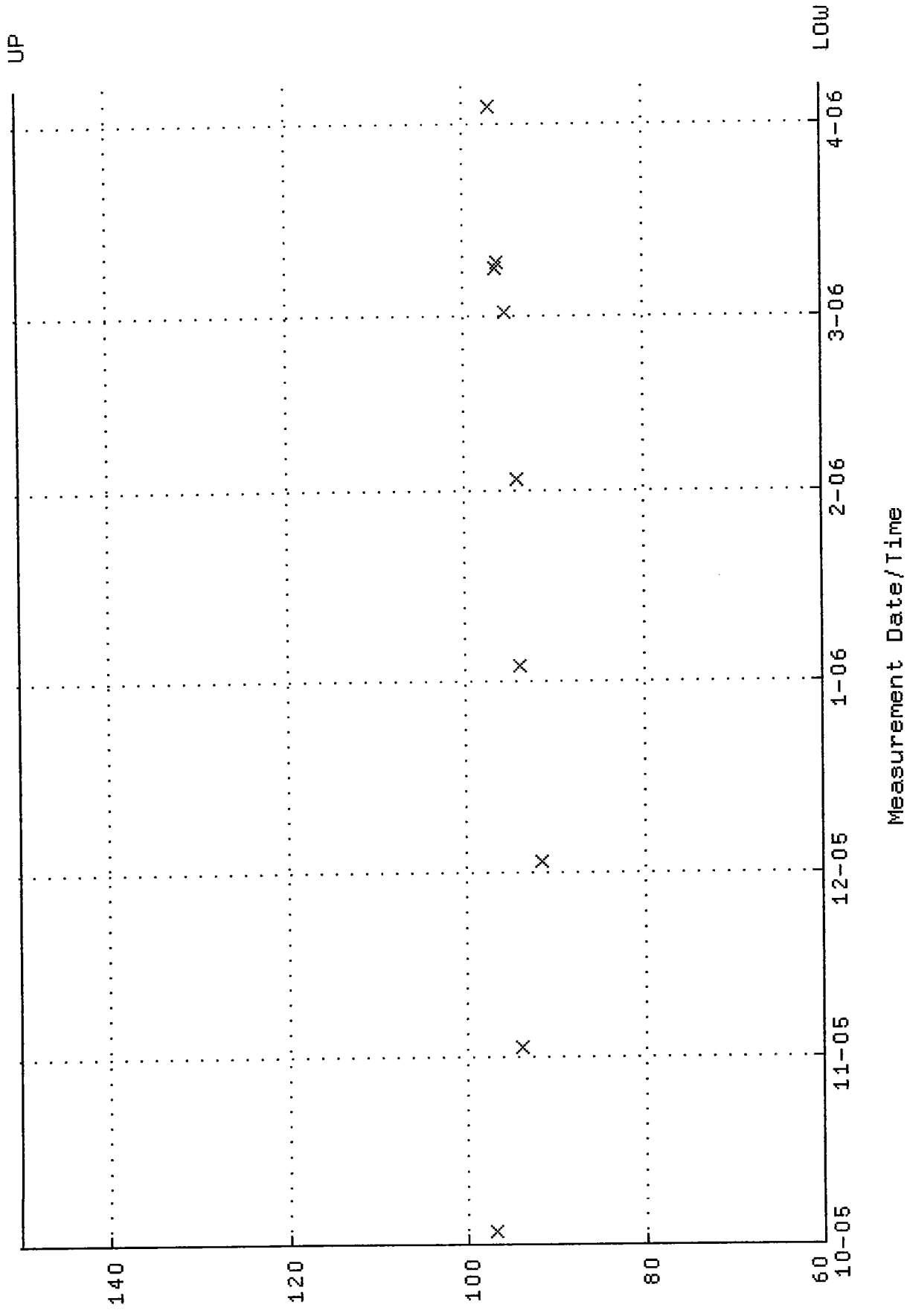




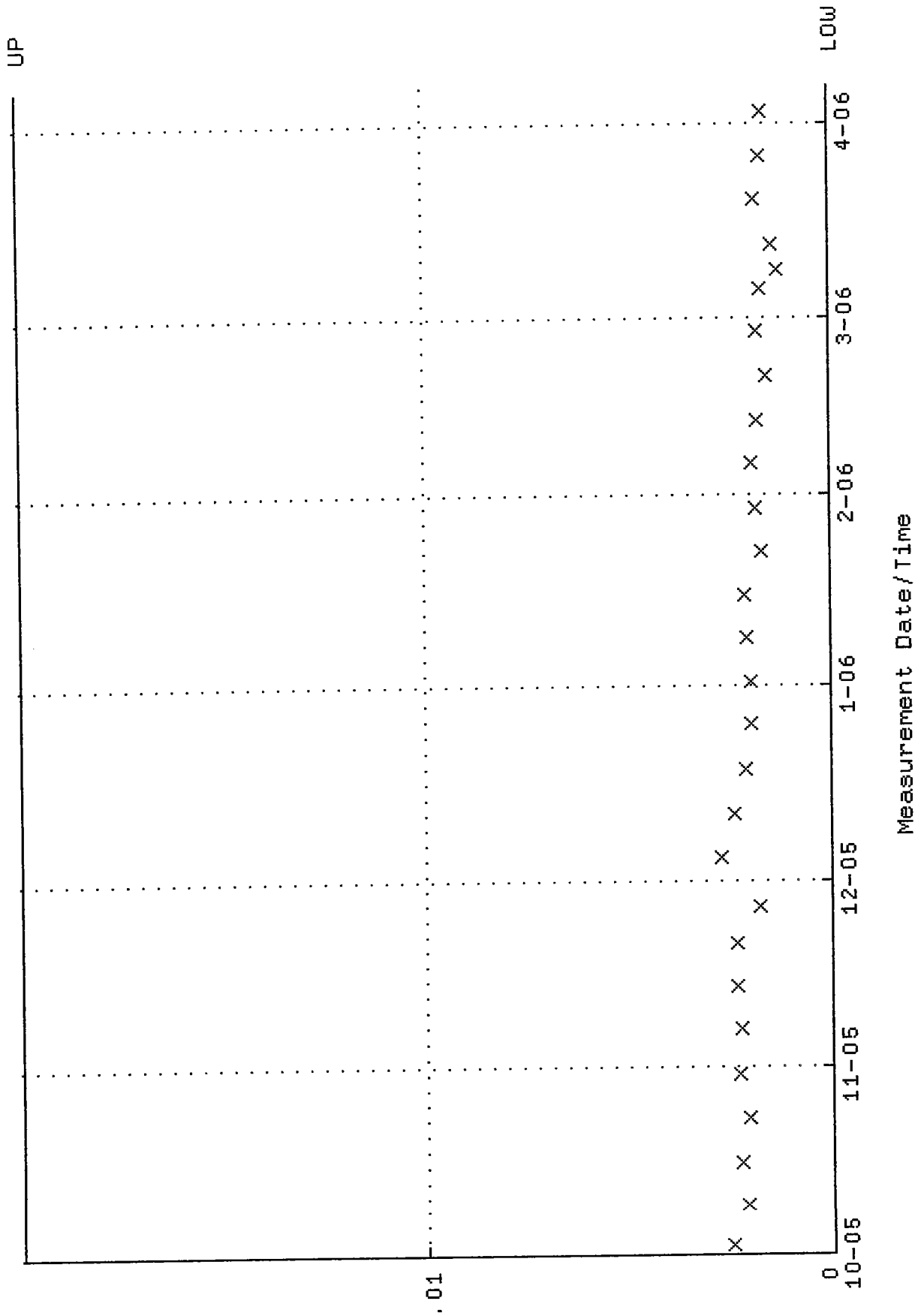
QA filename : DKA100:[ENV\_ALPHA.QA.W]W021.QAF;4  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 3-OCT-2005 07:10:43 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.300000 through 0.330000



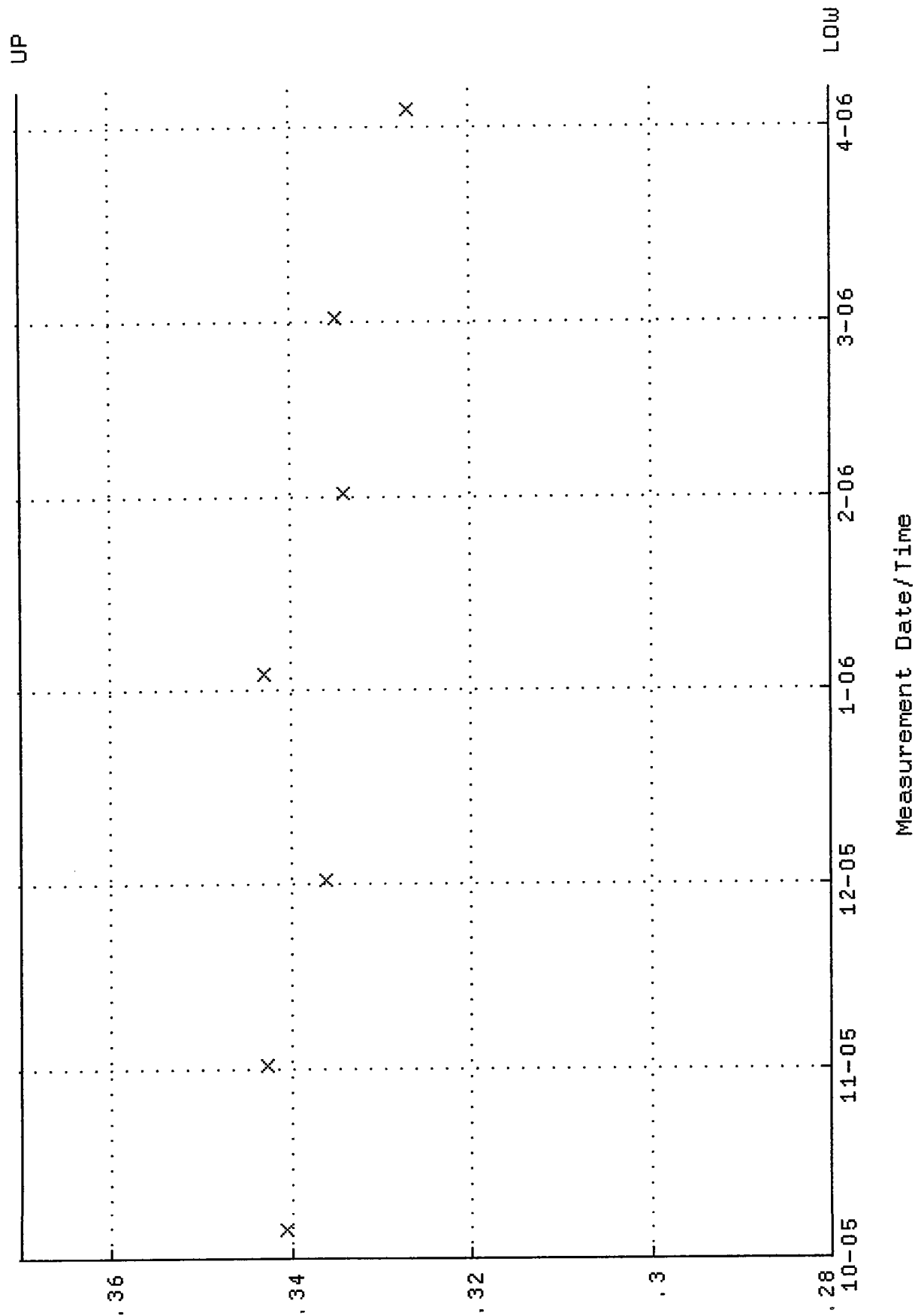
QA filename : DKA100:[ENV\_ALPHA.QA.W]W021.QAF;4  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 3-OCT-2005 07:10:43 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



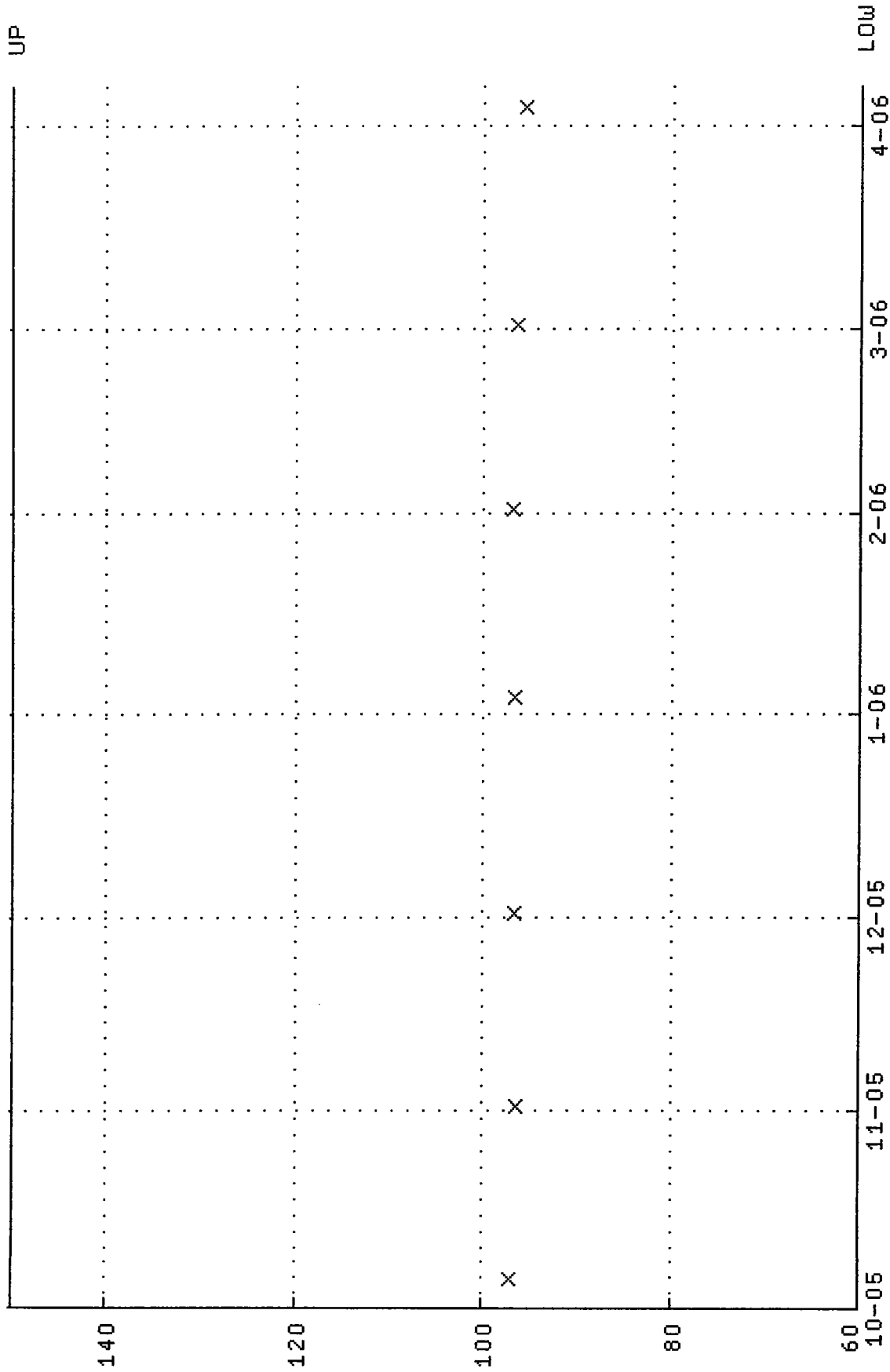
QA filename : DKA100:[ENV\_ALPHA.QA.B]B021.QAF;1  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:25:41 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



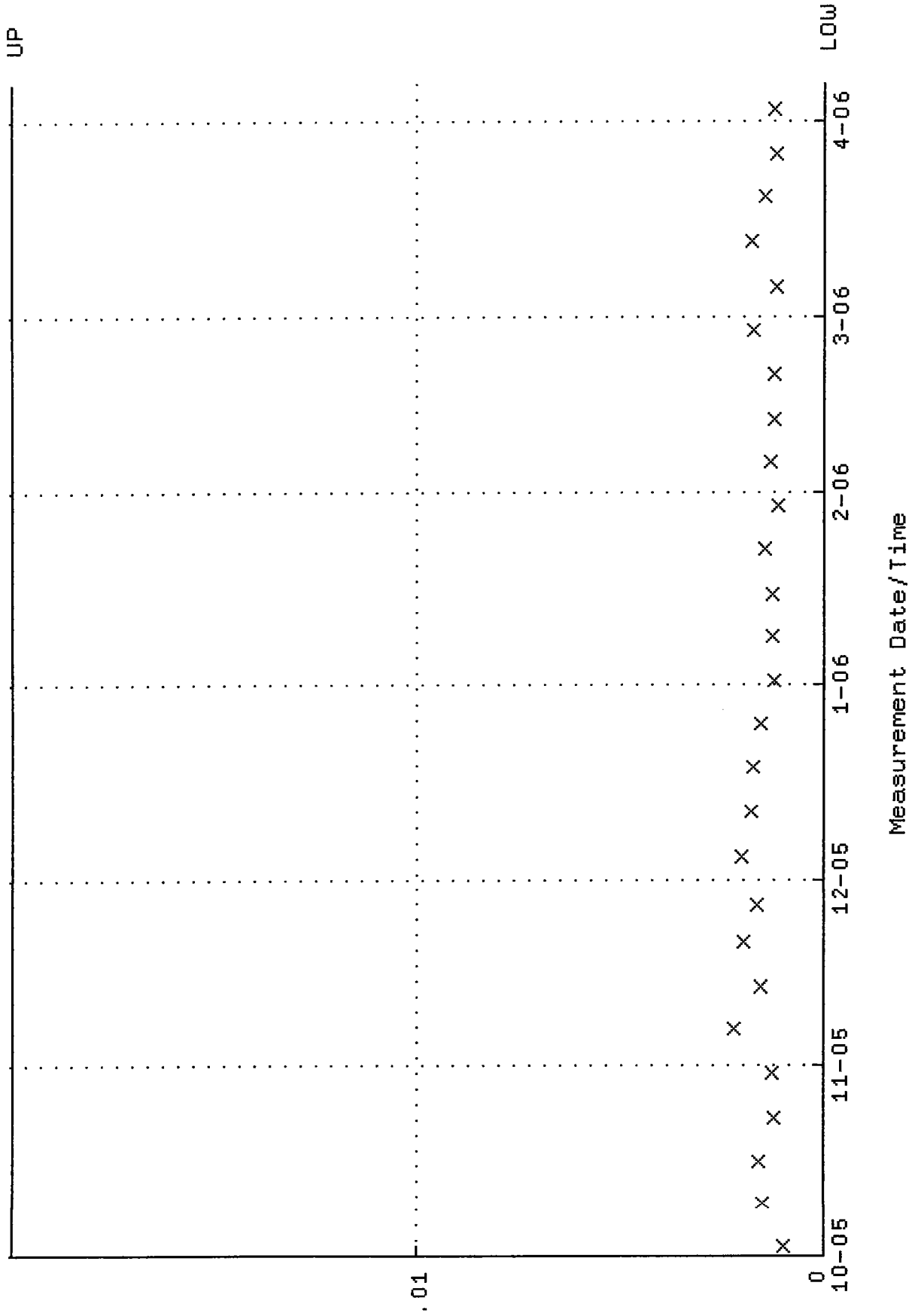
QA filename : DKA100:[ENV\_ALPHA.QA.W]W078.QAF;6  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:53 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.280000 through 0.370000



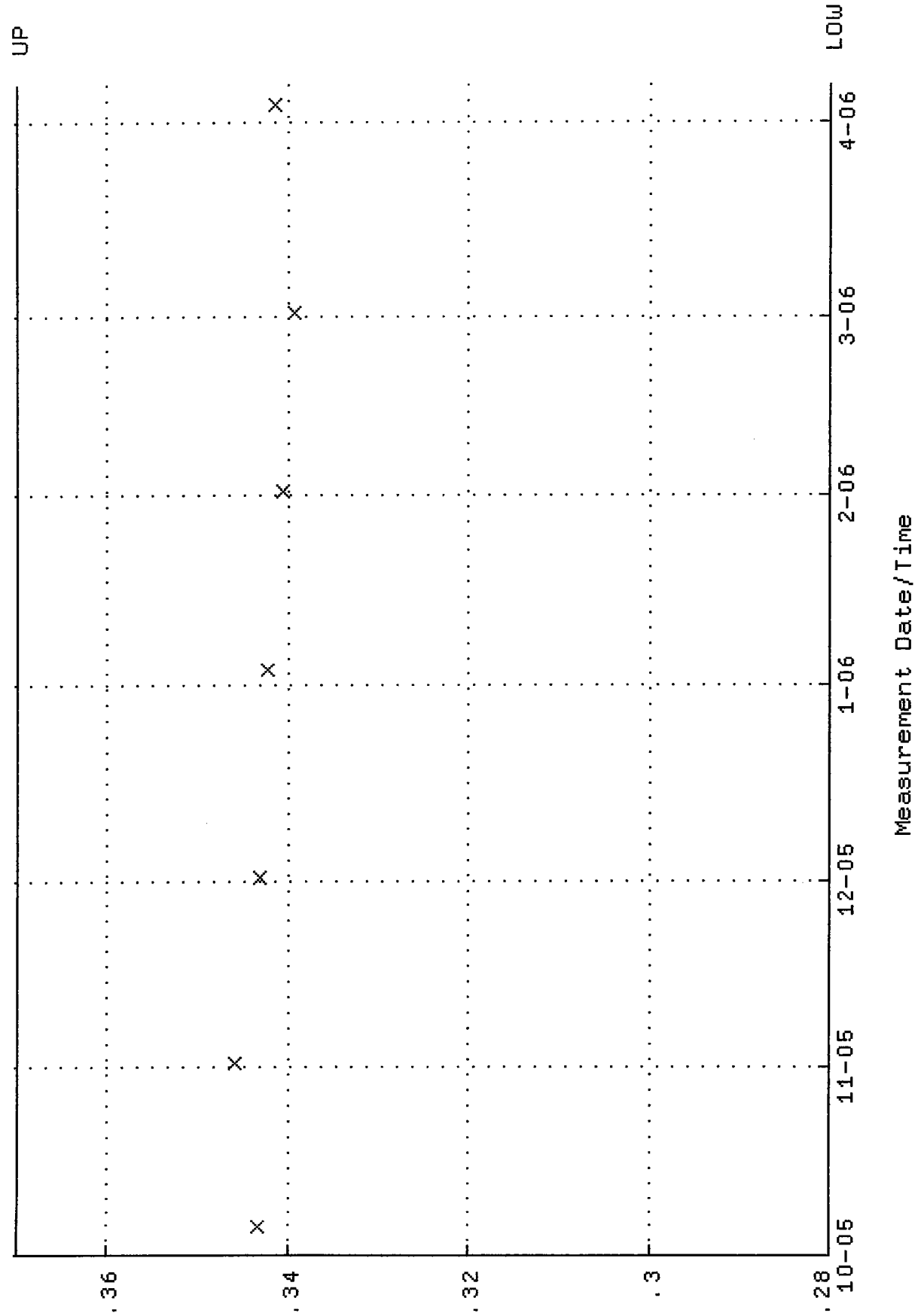
QA filename : DKA100:[ENV\_ALPHA.QA.W]W078.QAF;6  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:53 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



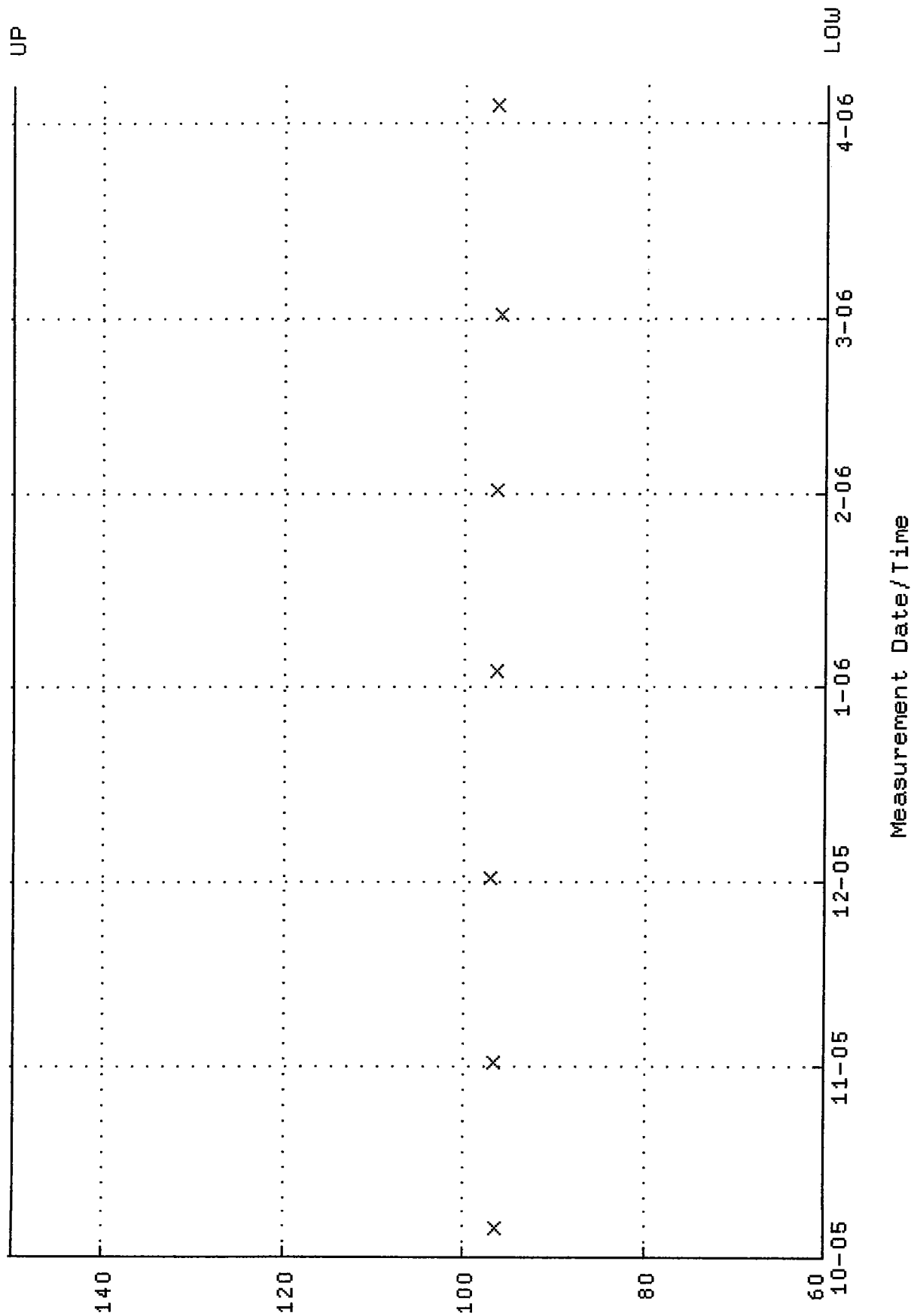
QA filename : DKA100:[ENV\_ALPHA.QA.B]B078.QAF;2  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:18 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



QA filename : DKA100:[ENV\_ALPHA.QA.W]W080.QAF;4  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:53 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.280000 through 0.370000

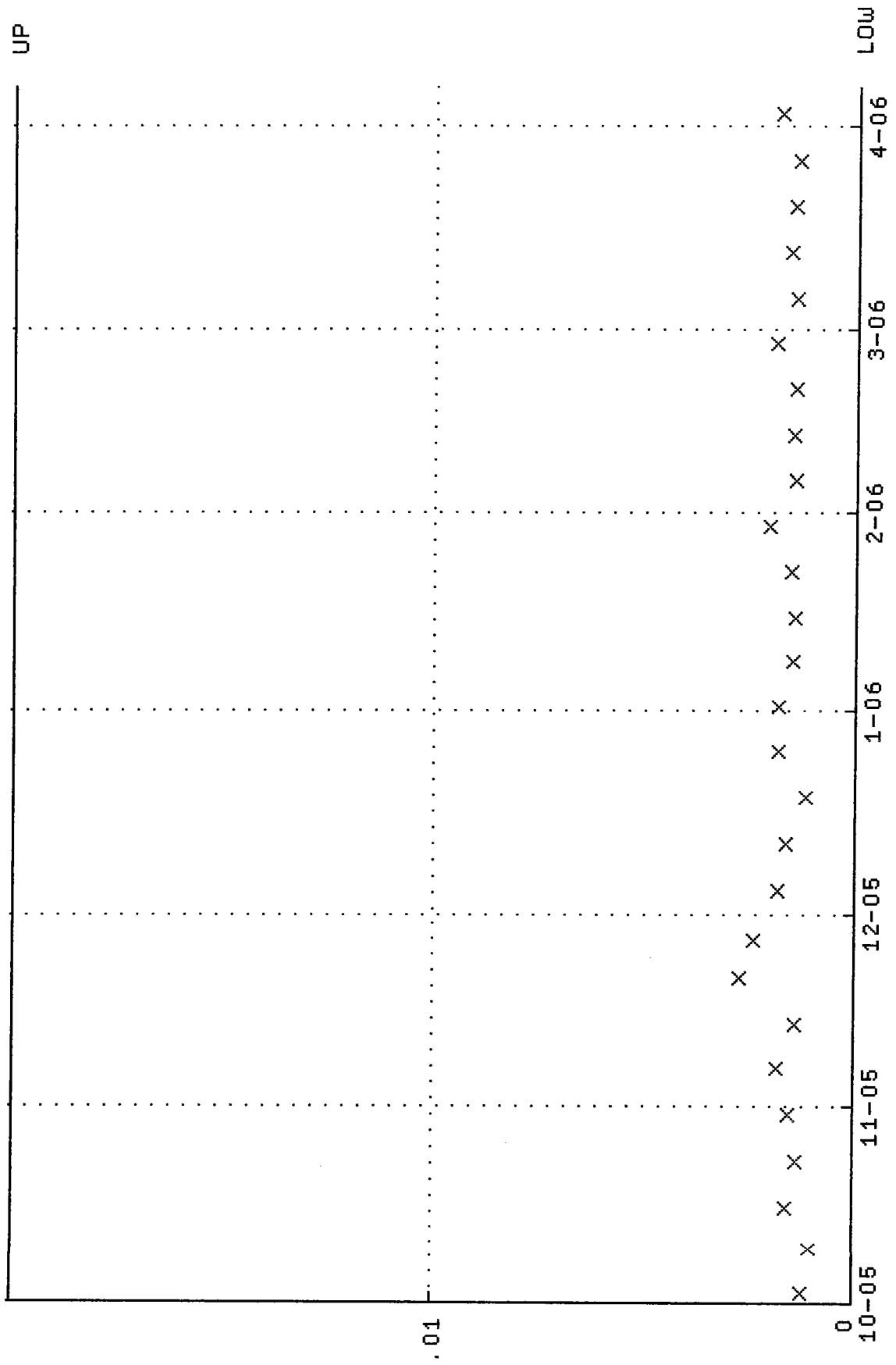


QA filename : DKA100:[ENV\_ALPHA.QA.W]W080.QAF;4  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:53 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000

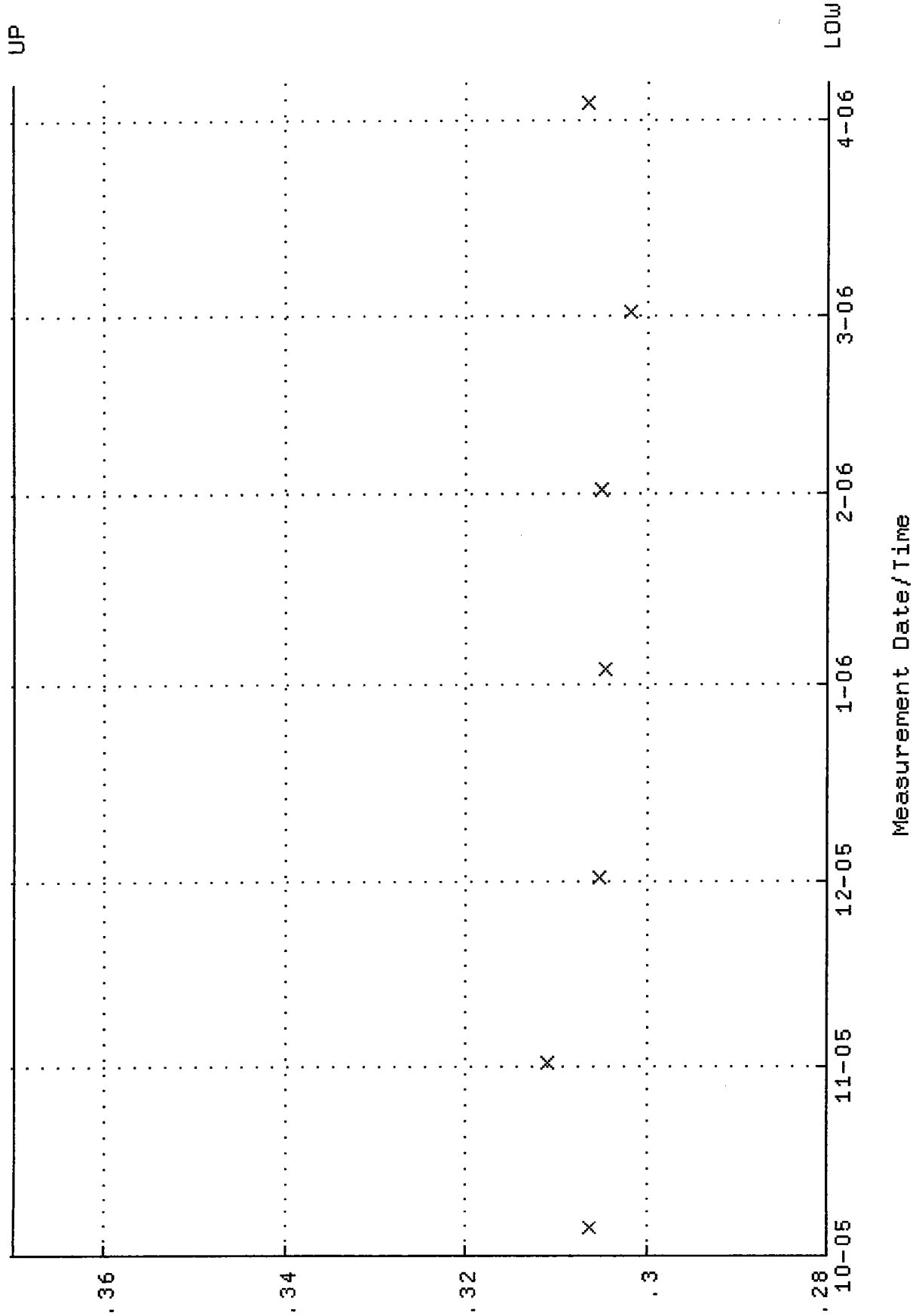




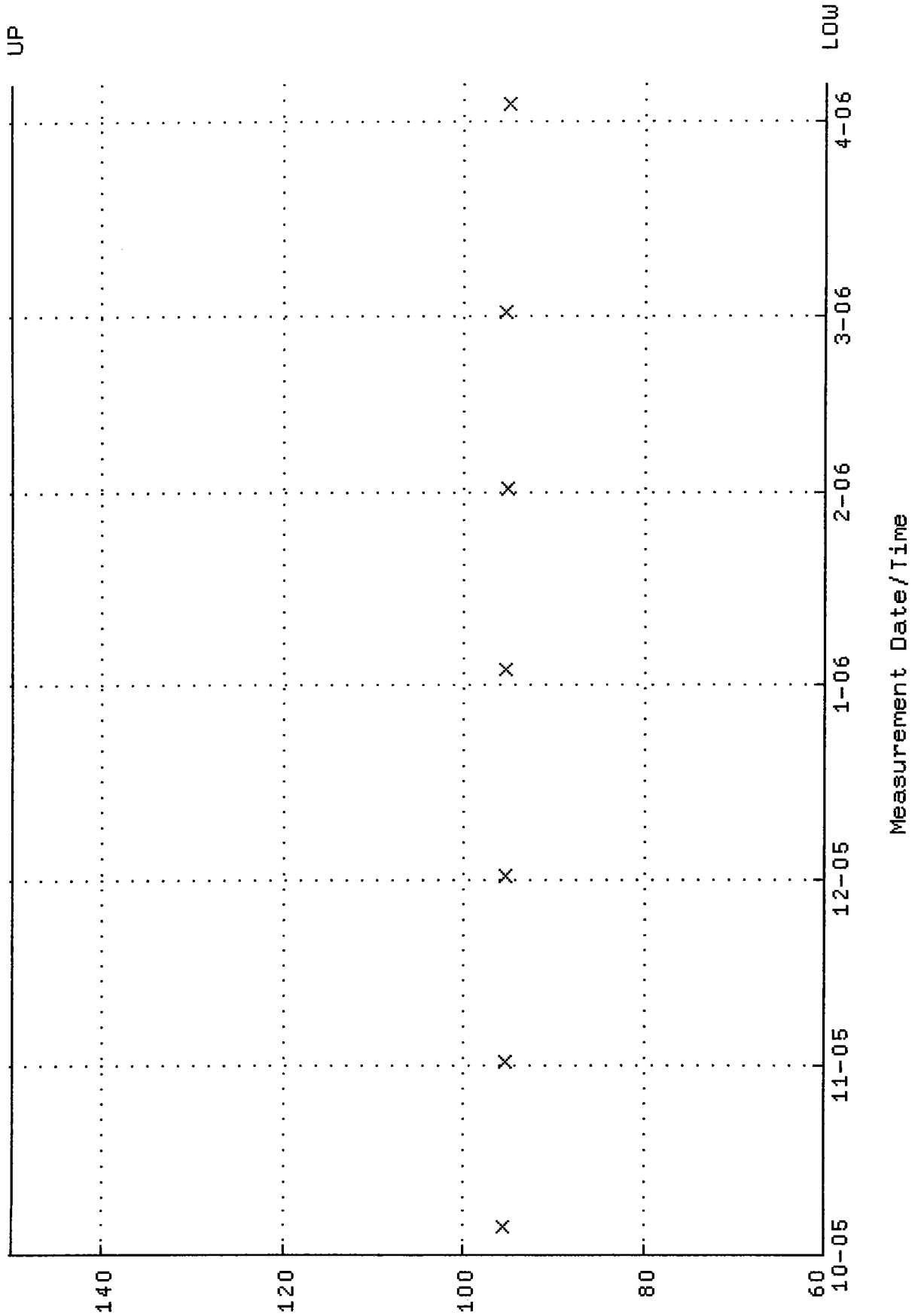
QA filename : DKA100:[ENV\_ALPHA.QA.B]B080.QAF;2  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:18 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



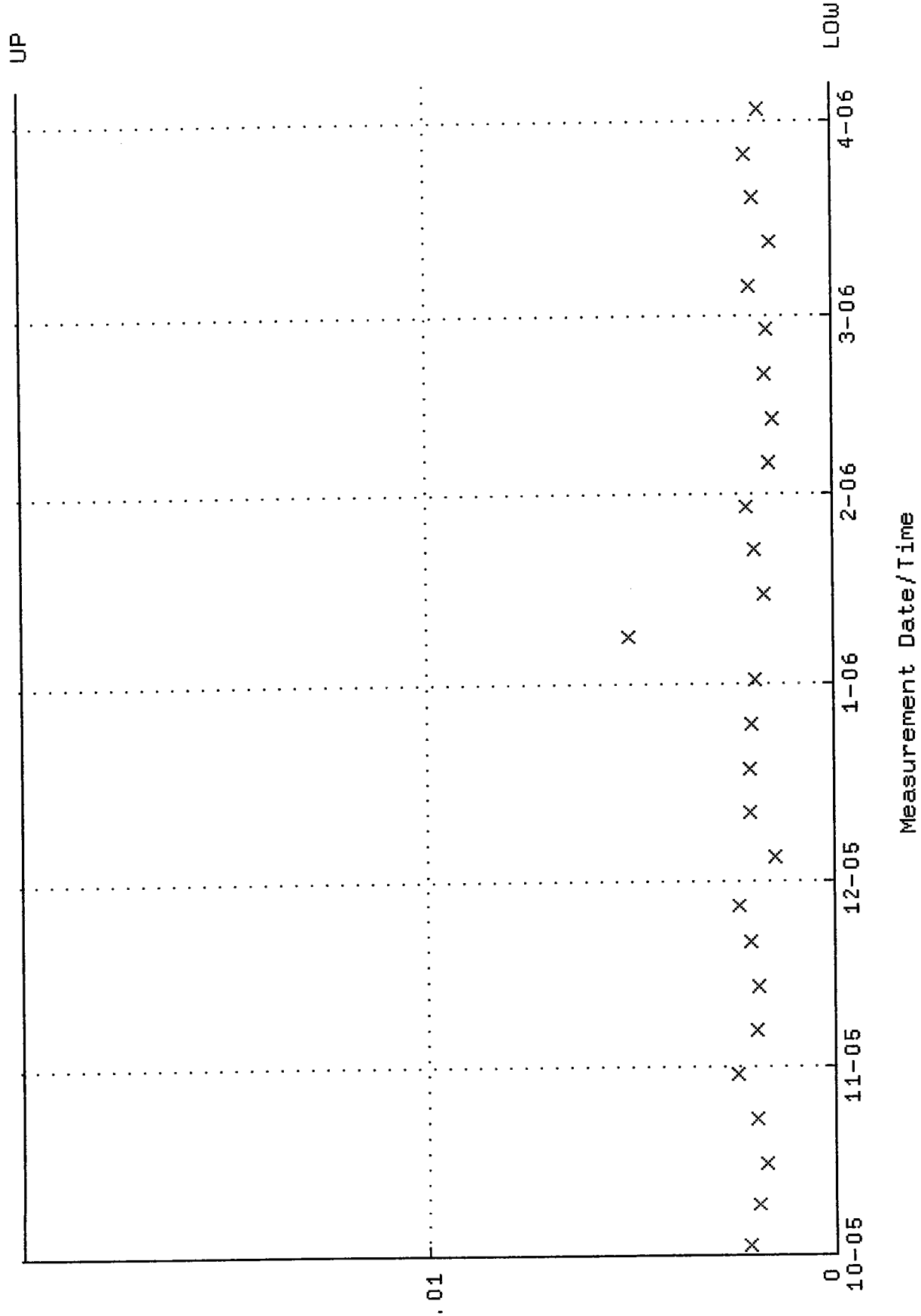
QA filename : DKA100:[ENV\_ALPHA.QA.W]W083.QAF;5  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.280000 through 0.370000



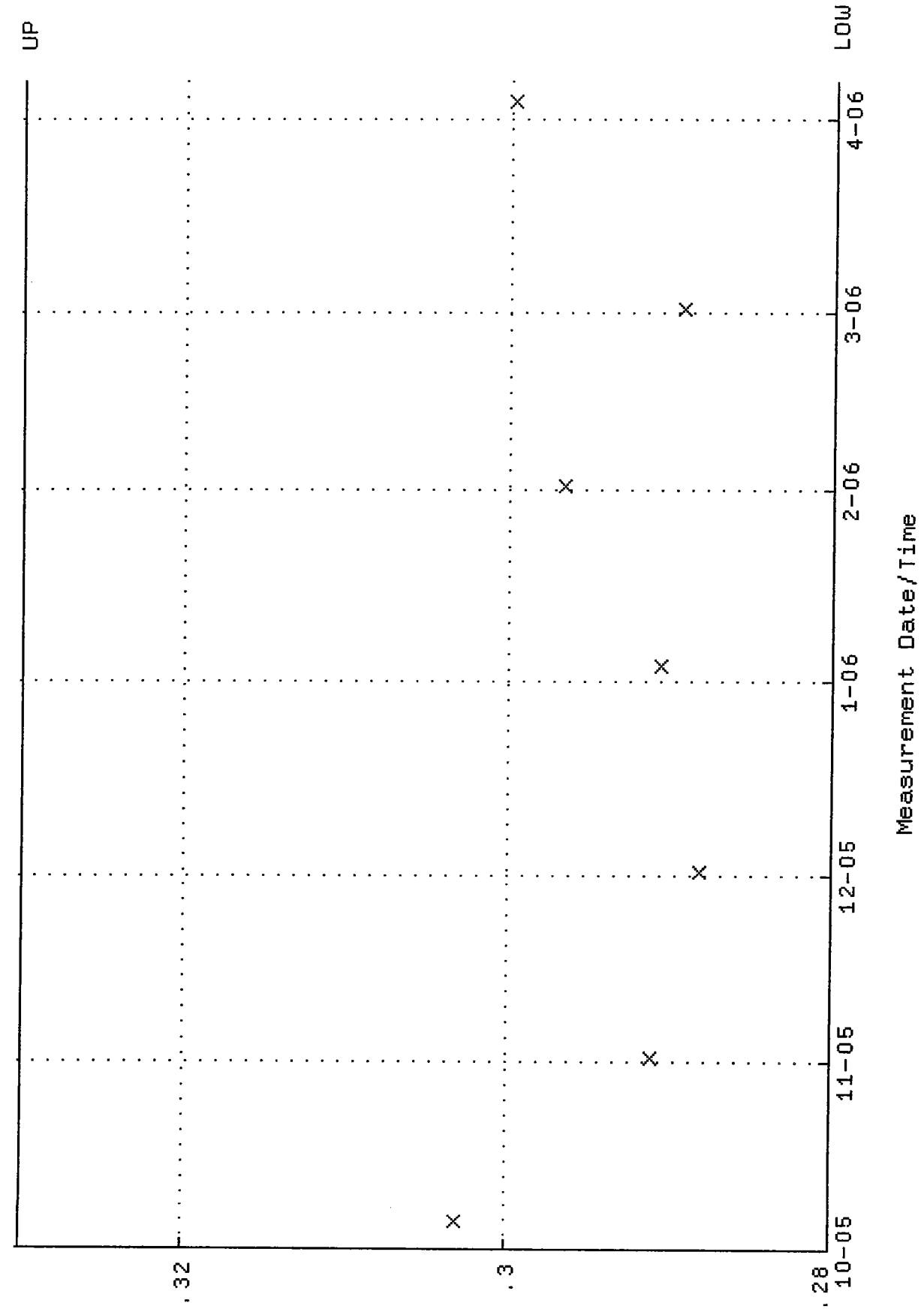
QA filename : DKA100:[ENV\_ALPHA.QA.W]W083.QAF;5  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



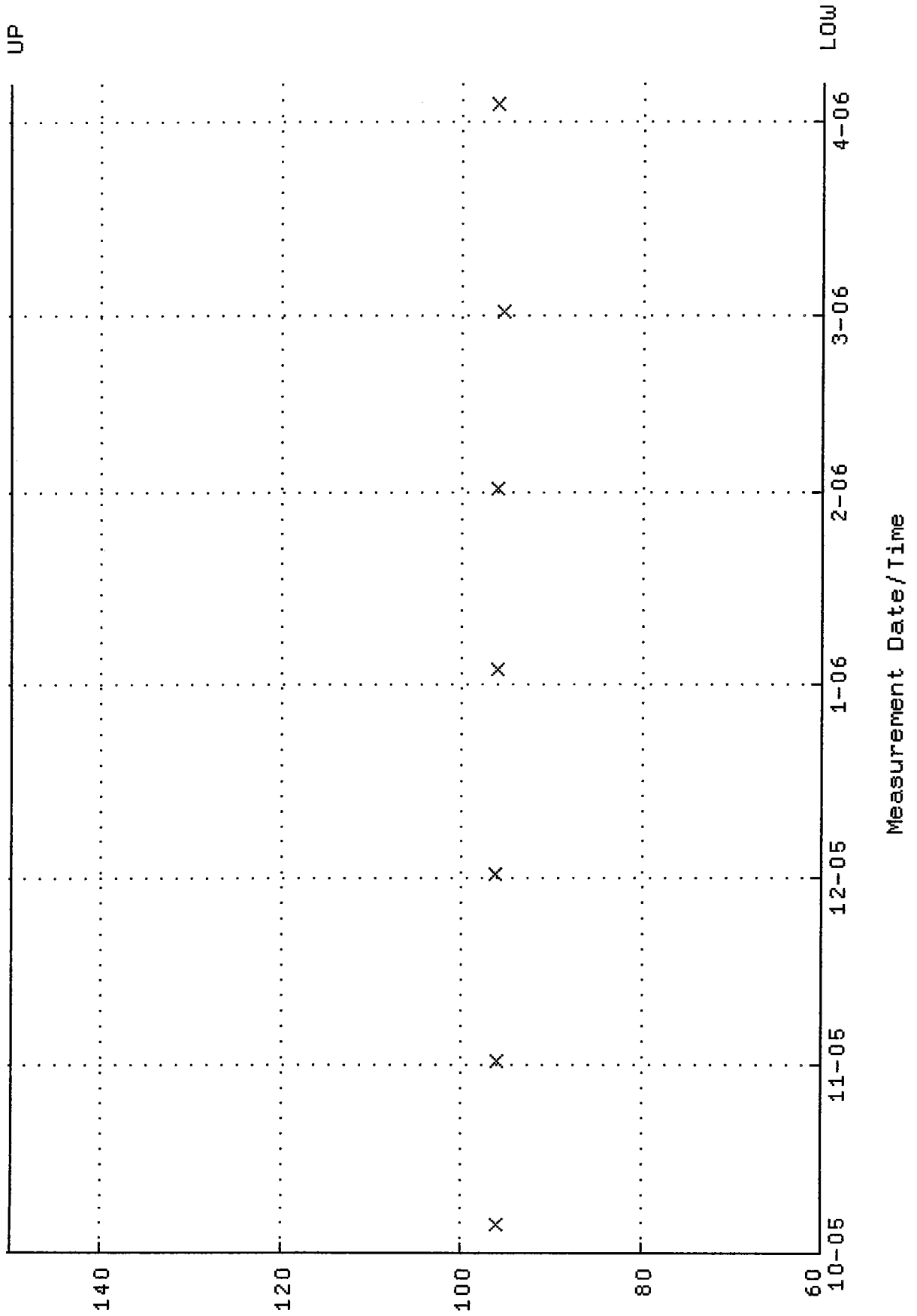
QA filename : DKA100: [ENV\_ALPHA,QA,B]B083.QAF; 3  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:19 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



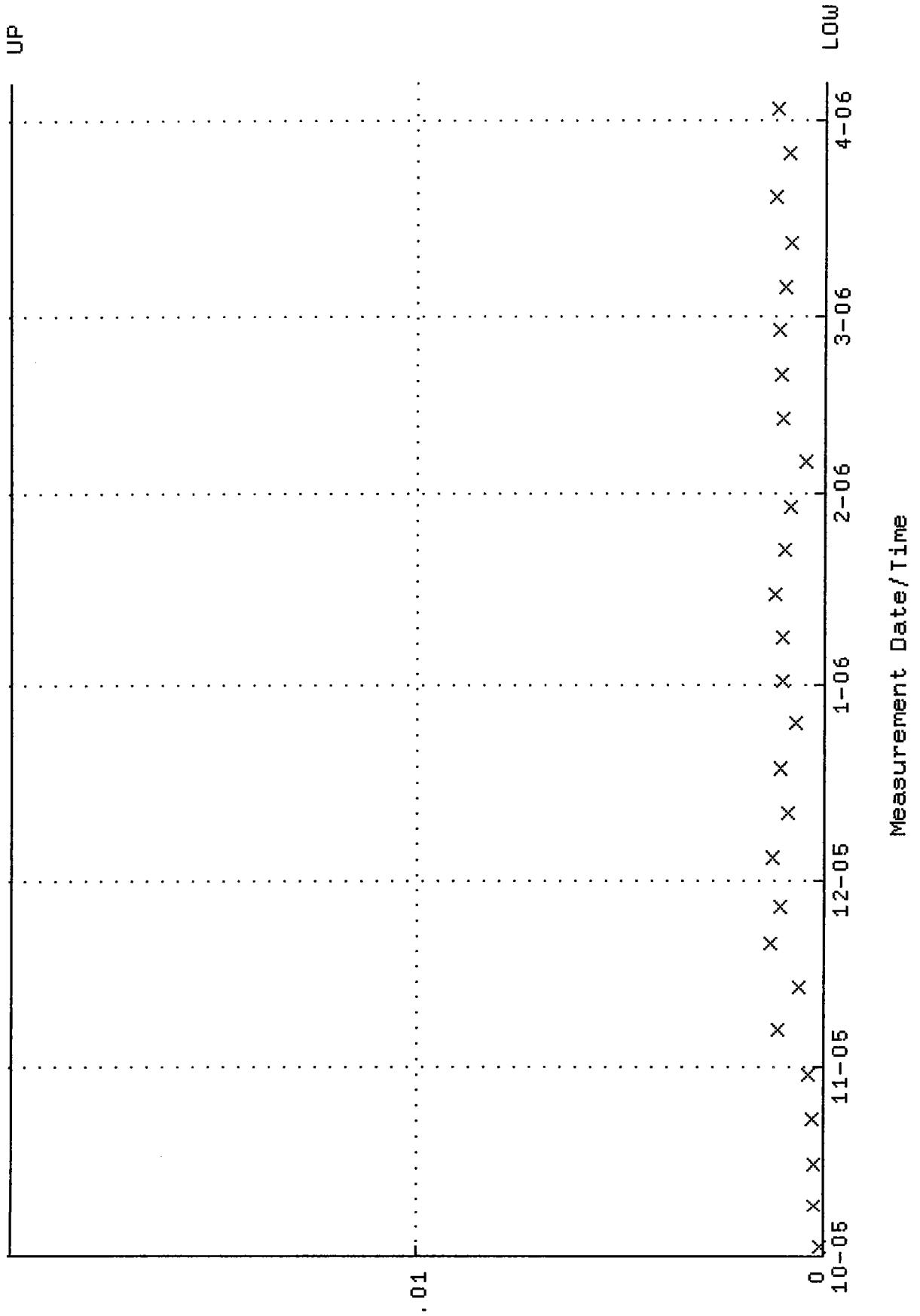
QA filename : DKA100:[ENV\_ALPHA.QA.W]W085.QAF;6  
 Parameter Name : AVREFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.280000 through 0.330000



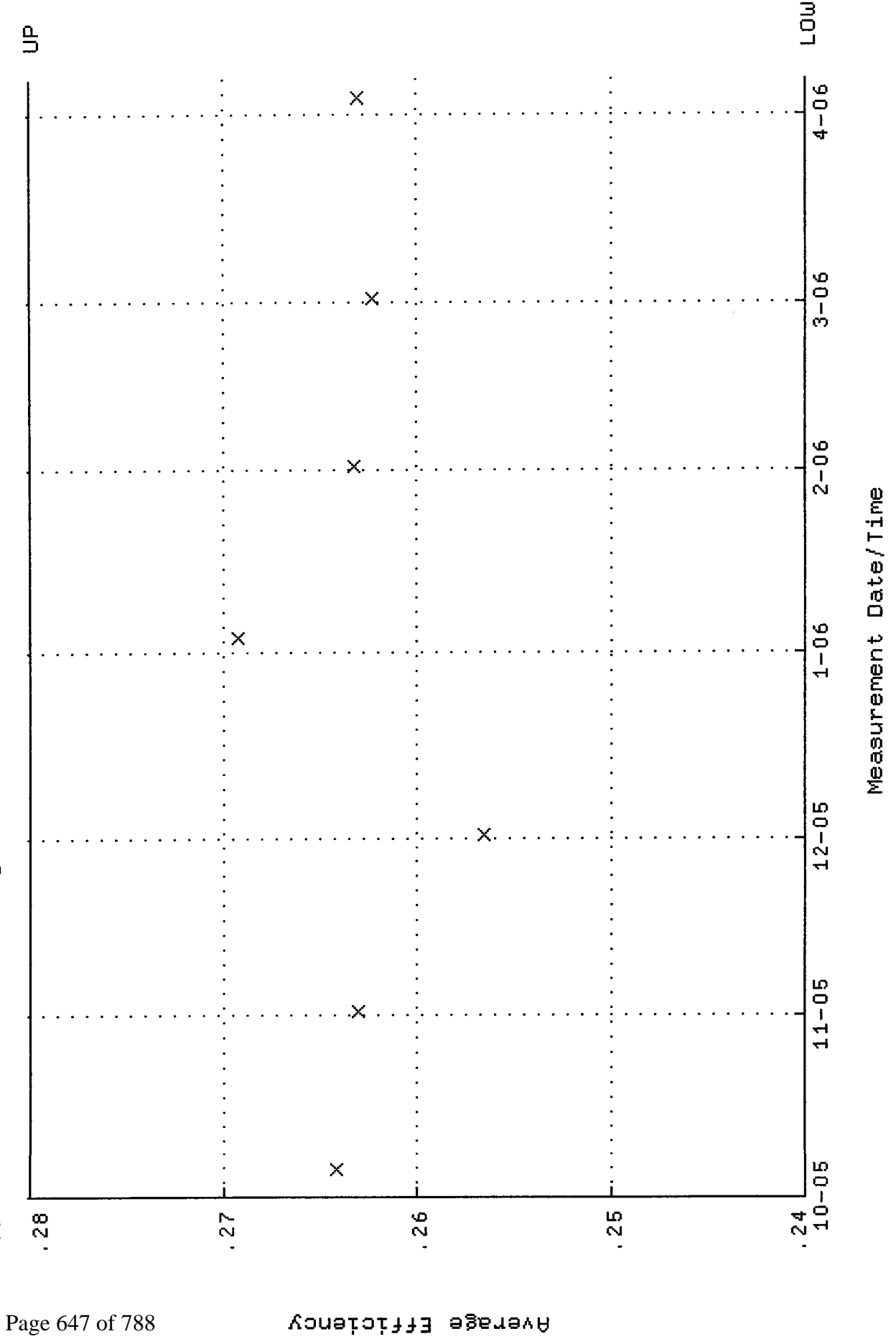
QA filename : DKA100:[ENV\_ALPHA.QA.W]W085.QAF;6  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.000



QA filename : DKA100:[ENV\_ALPHA.QA.B]B085.QAF;2  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:19 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02

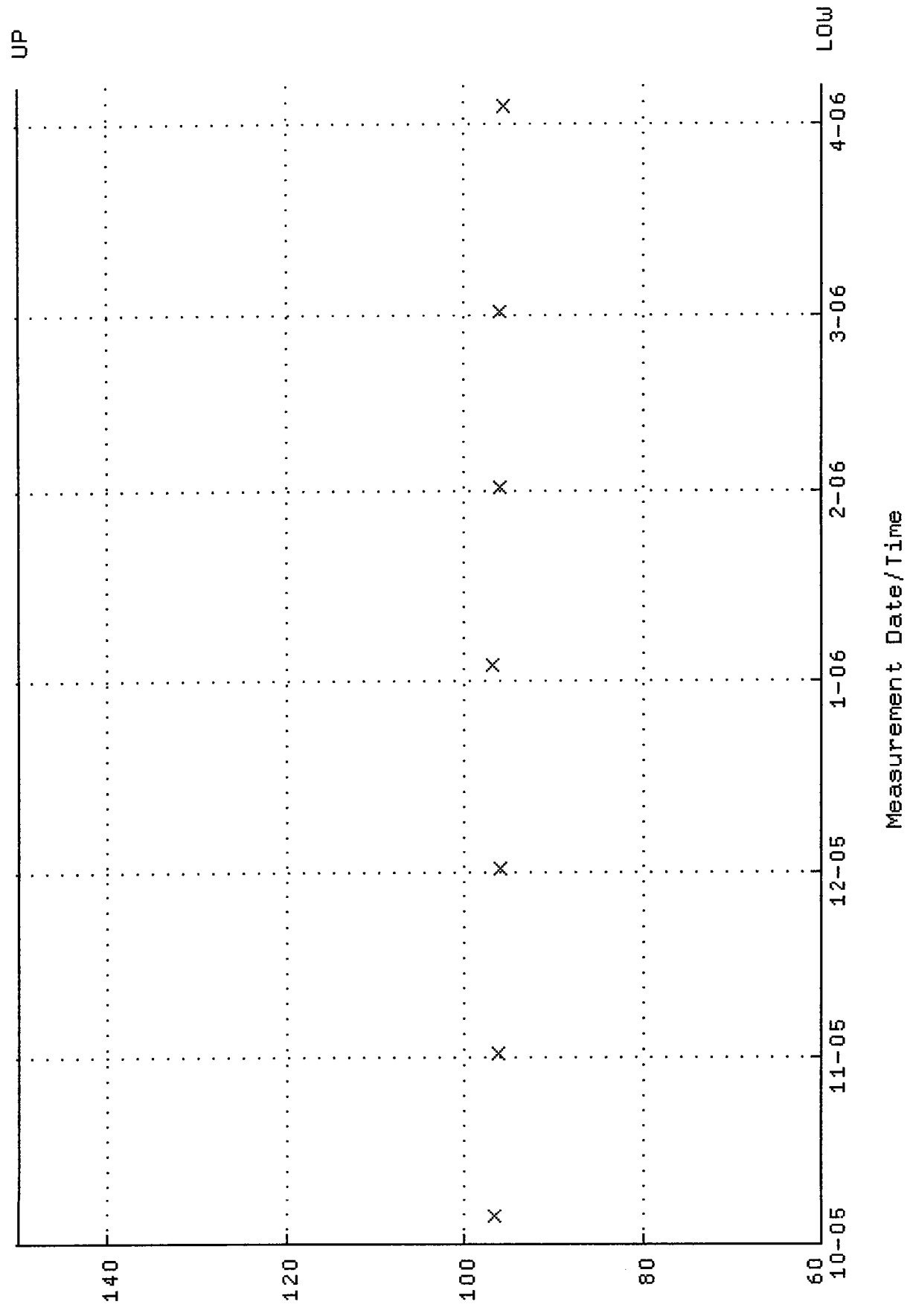


QA filename : DKA100:[ENVY\_ALPHA.QA.W]W086.QAF;4  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.240000 through 0.280000

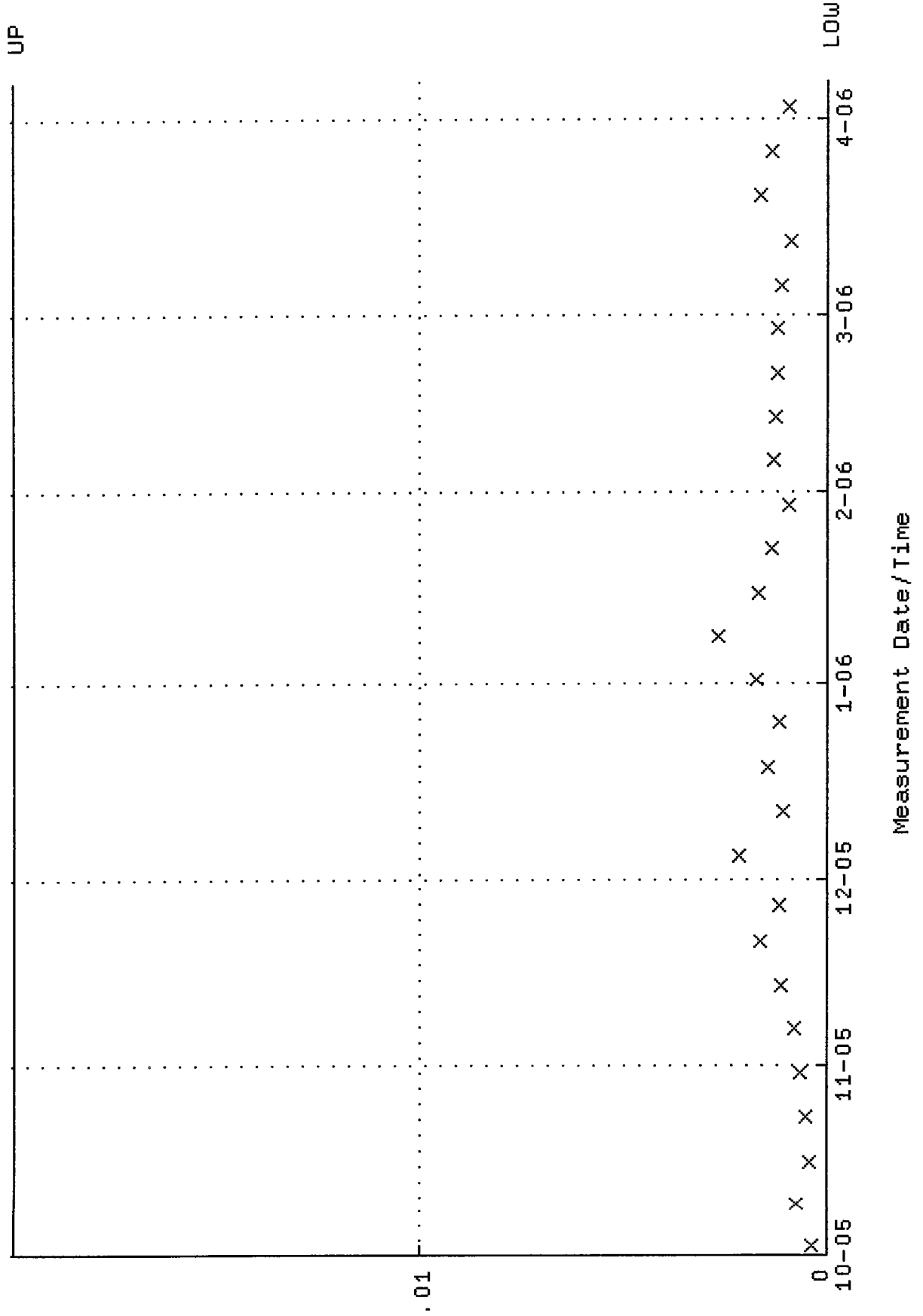




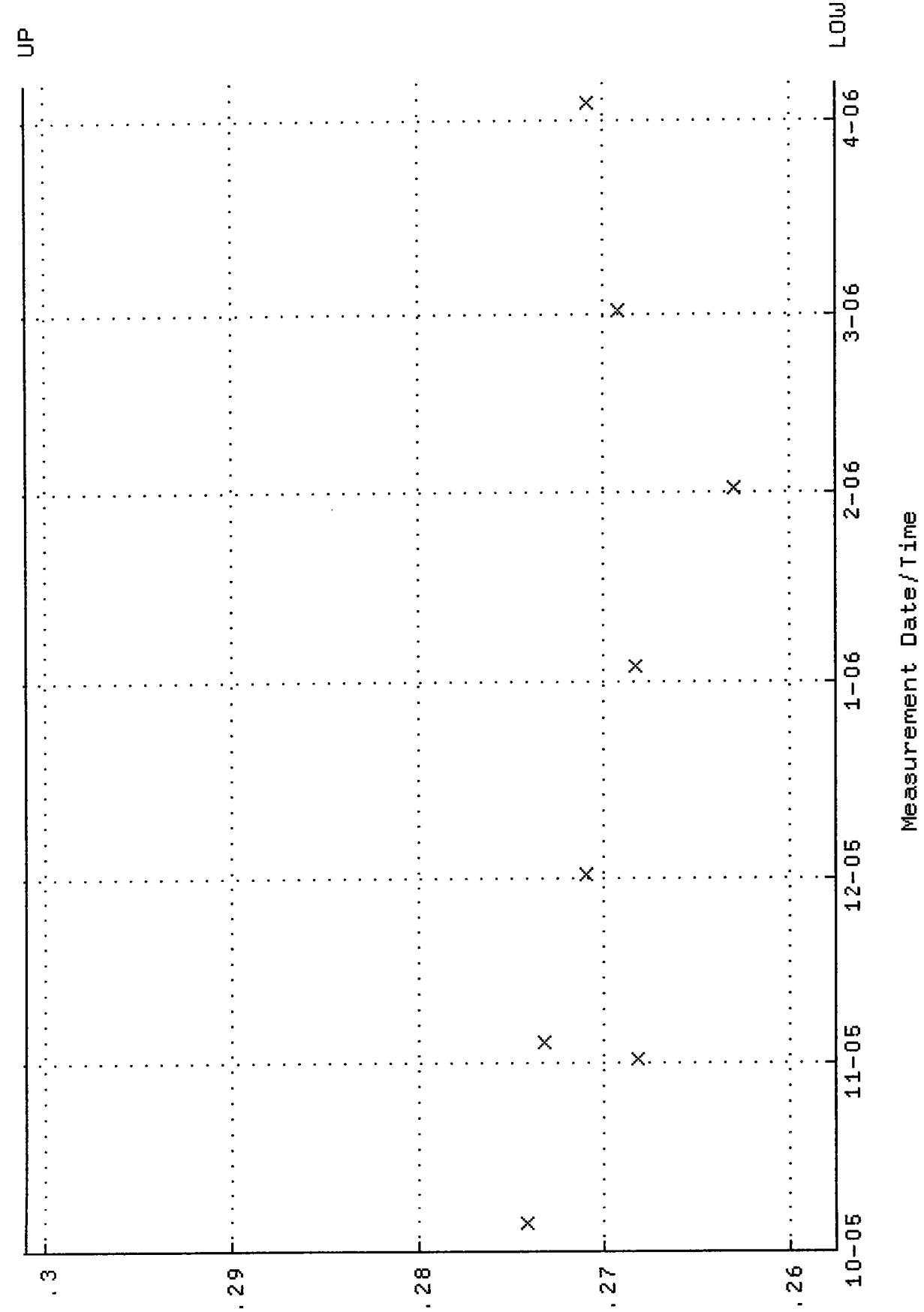
QA filename : DKA100:[ENV\_ALPHA.QA.W]W086.QAF;4  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



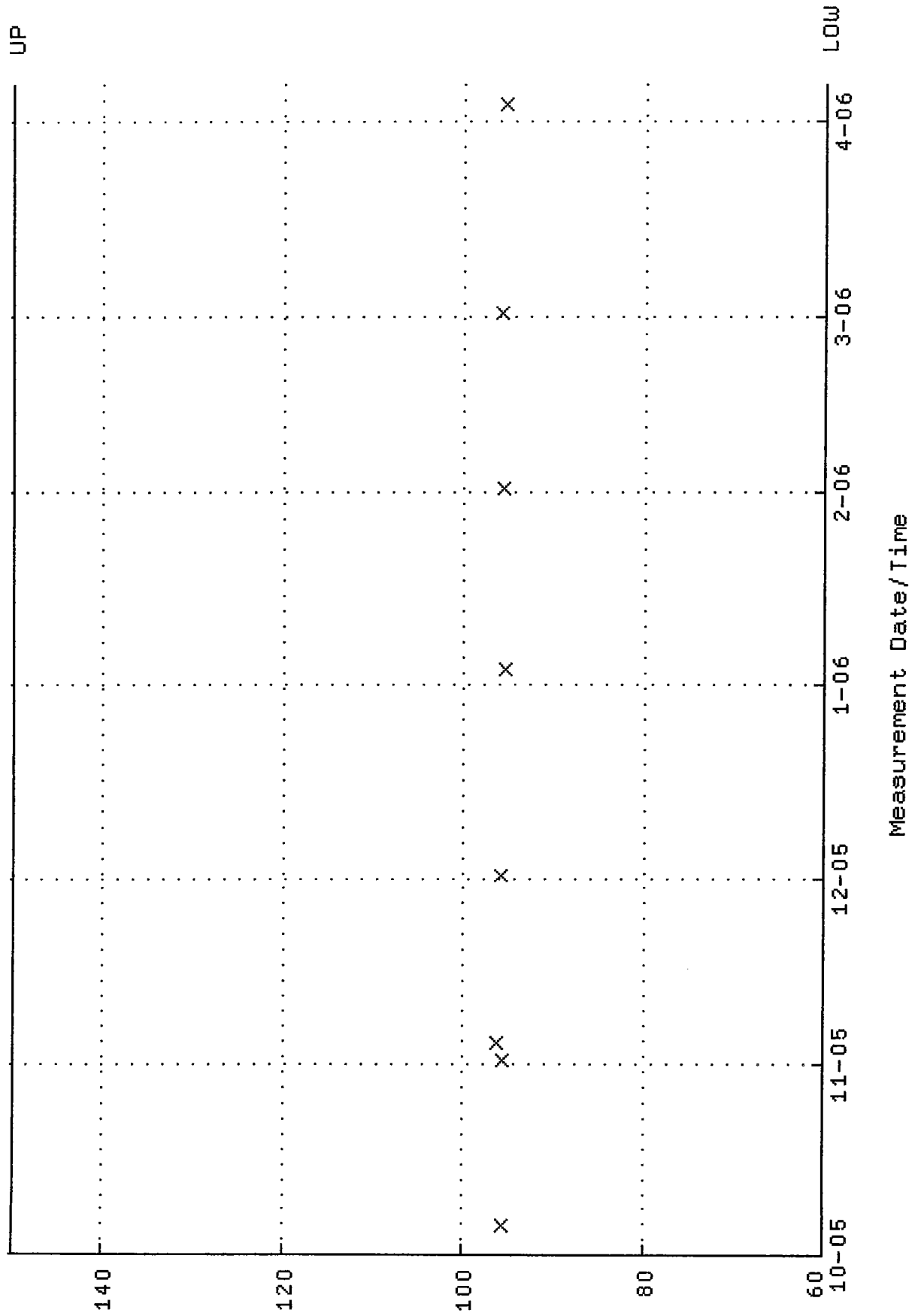
QA filename : DKA100:[ENV\_ALPHA.QA.B]B086.QAF;1  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:19 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



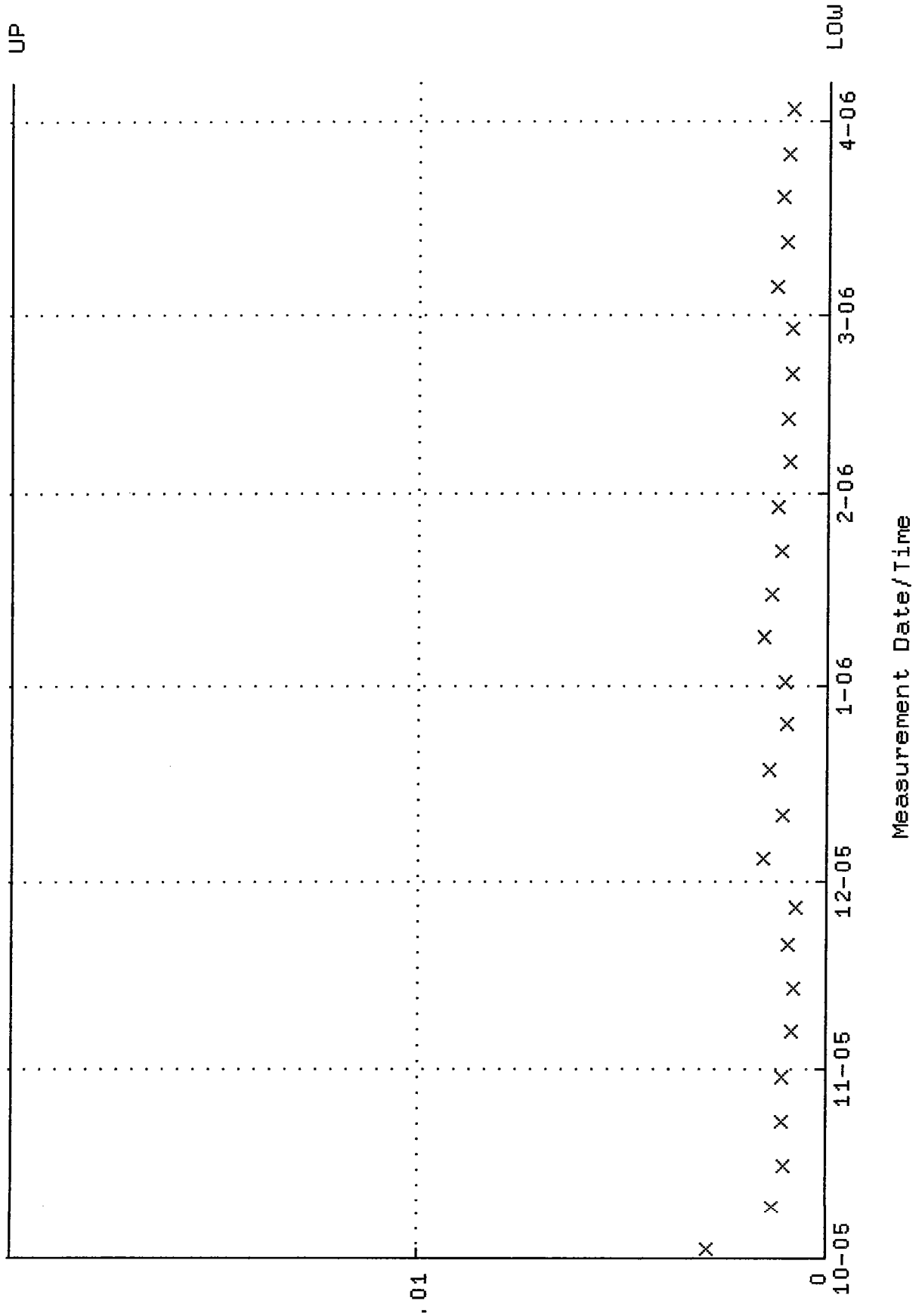
QA filename : DKA100:[ENV\_ALPHA.QA.W]W088.QAF;4  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.257580 through 0.301020



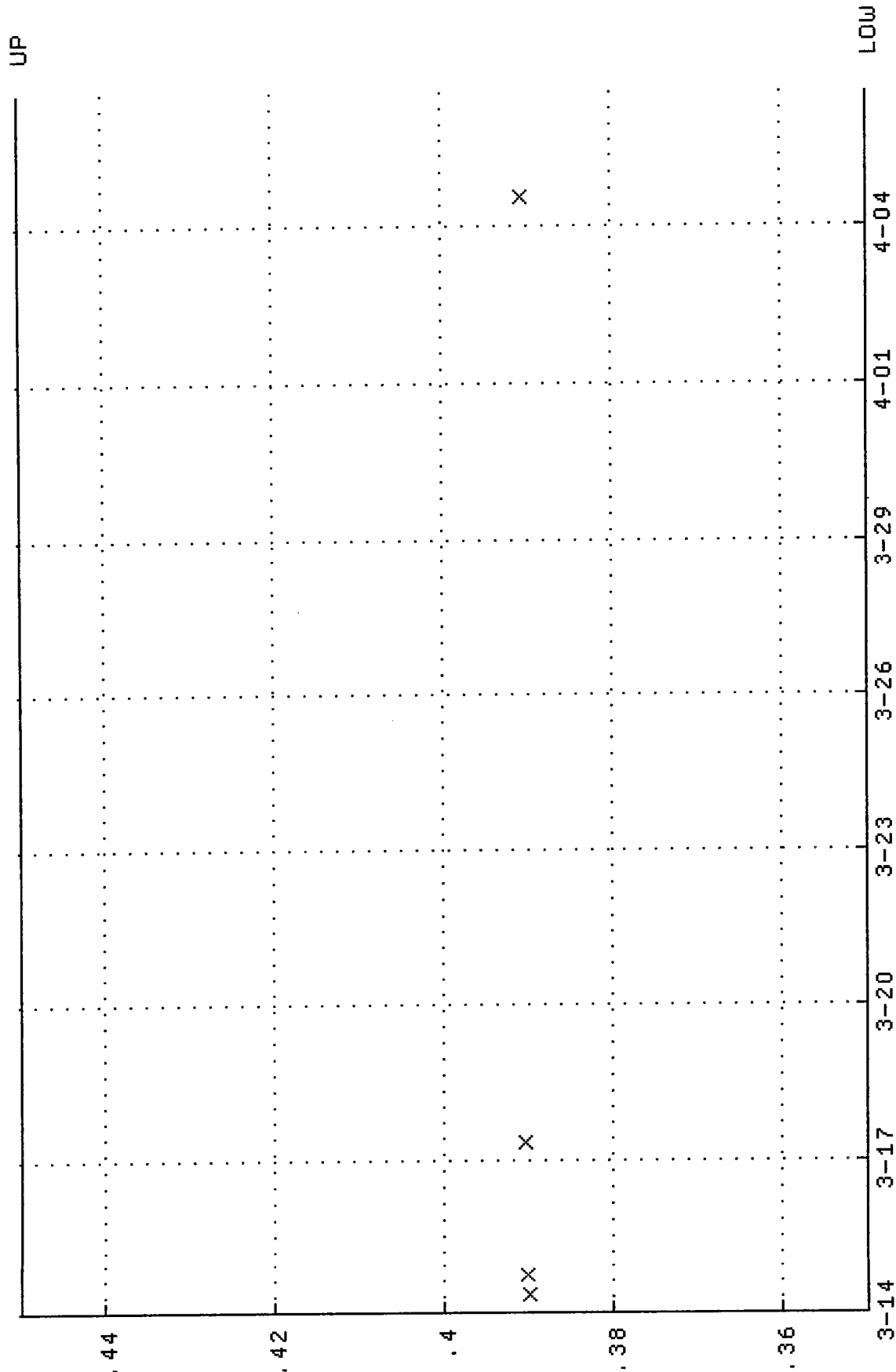
QA filename : DKA100:[ENV\_ALPHA,QA,W]W088.QAF;4  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 5-OCT-2005 12:08:55 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 60.0000 through 150.0000



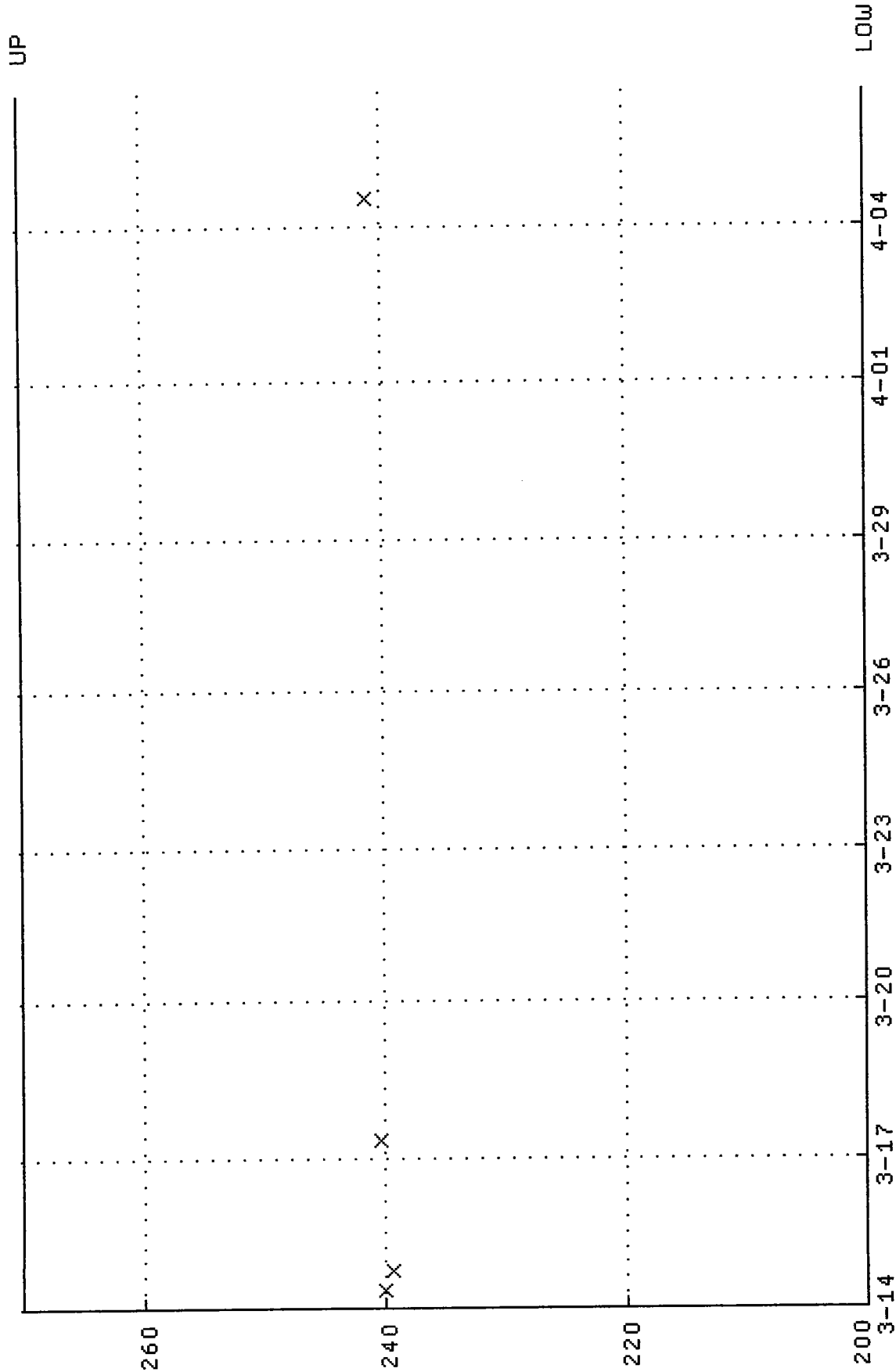
QA filename : DKA100:[ENV\_ALPHA.QA.B]B088.QAF;1  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 2-OCT-2005 13:57:19 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



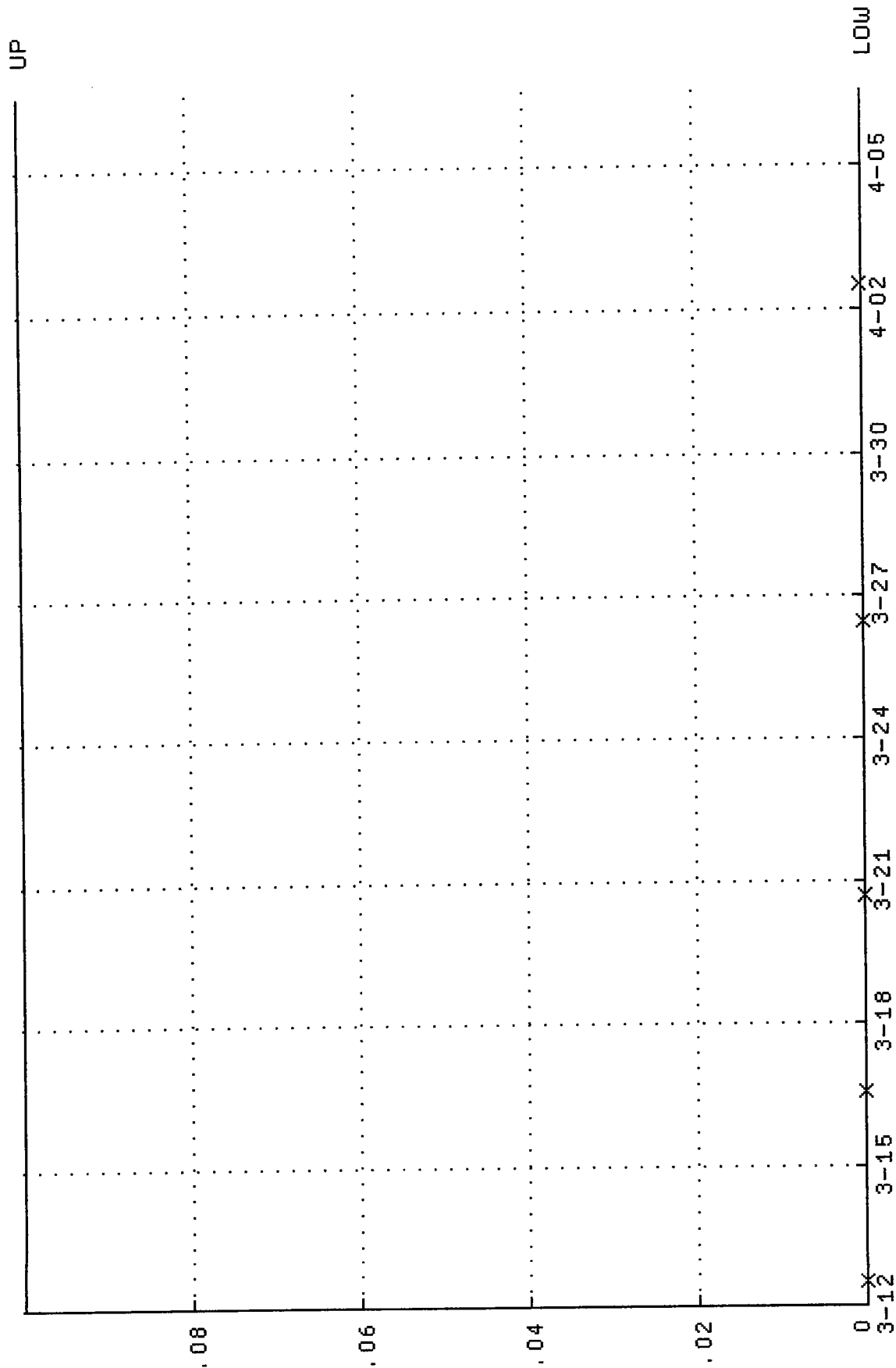
QA filename : DKA100:[ENV\_ALPHA.QA.W]W116.QAF;1  
 Parameter Name : AVRGEFF (Average Efficiency)  
 Start/End Dates : 14-MAR-2006 08:48:31 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.350000 through 0.450000



QA filename : DKA100:[ENV\_ALPHA.QA.W]W116.QAF;1  
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)  
 Start/End Dates : 14-MAR-2006 08:48:31 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 200.000 through 270.000

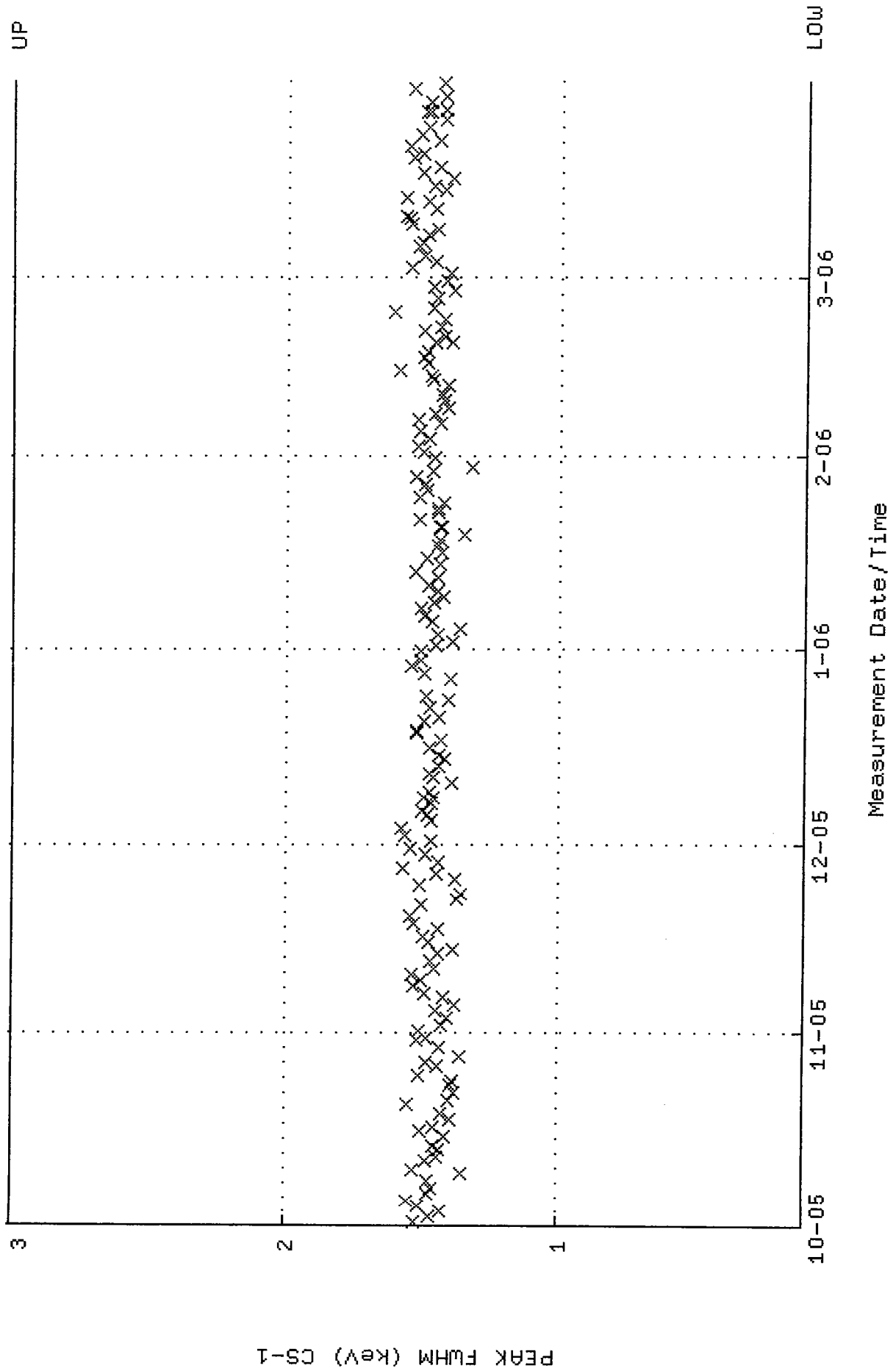


QA filename : DKA100:[ENV\_ALPHA.QA.B]B116.QAF;1  
 Parameter Name : BACKRATE (Background Rate)  
 Start/End Dates : 12-MAR-2006 12:14:13 through 6-APR-2006 12:00:00  
 Lower/Upper Lmts: 0.000000E+00 through 0.100000

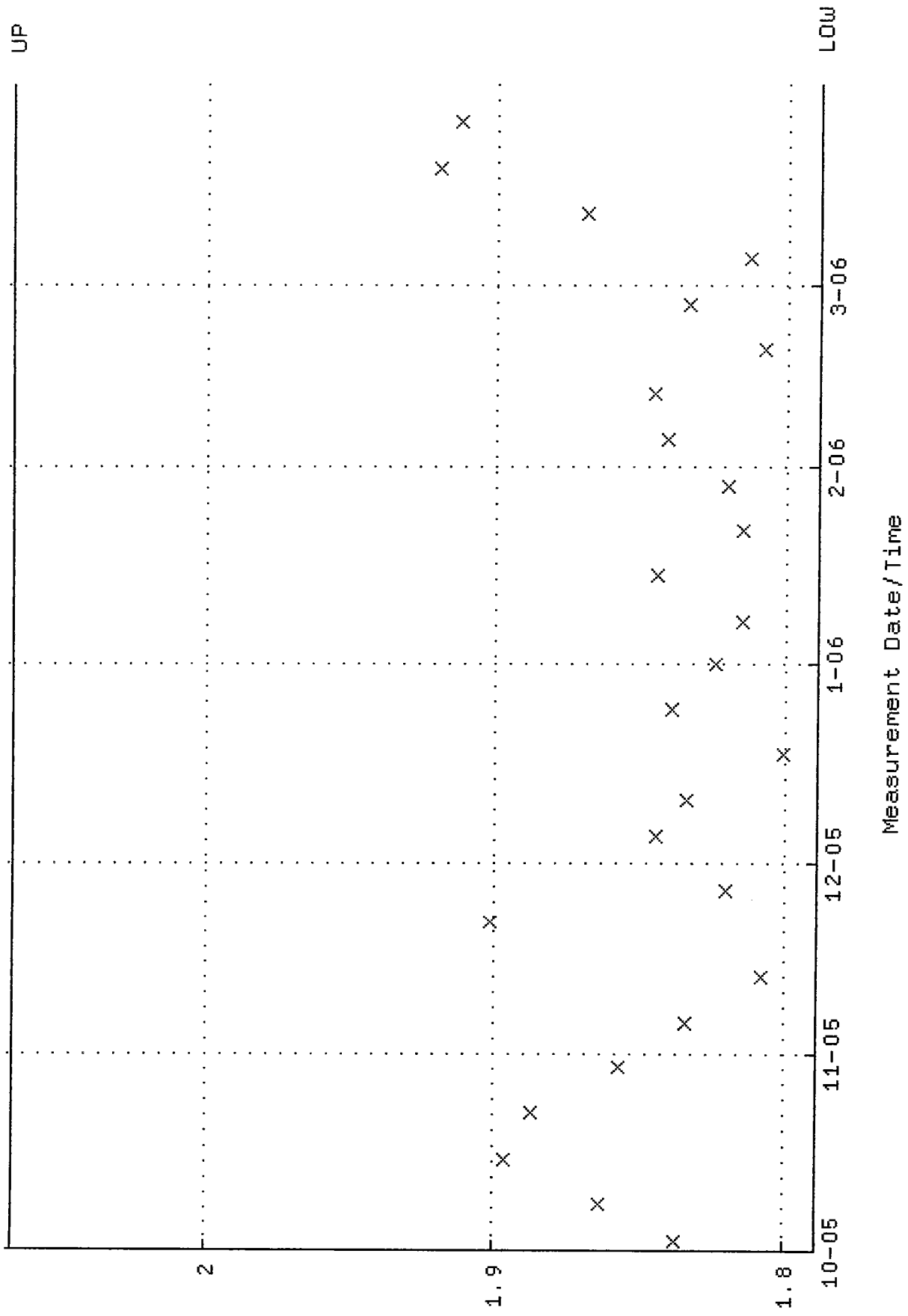




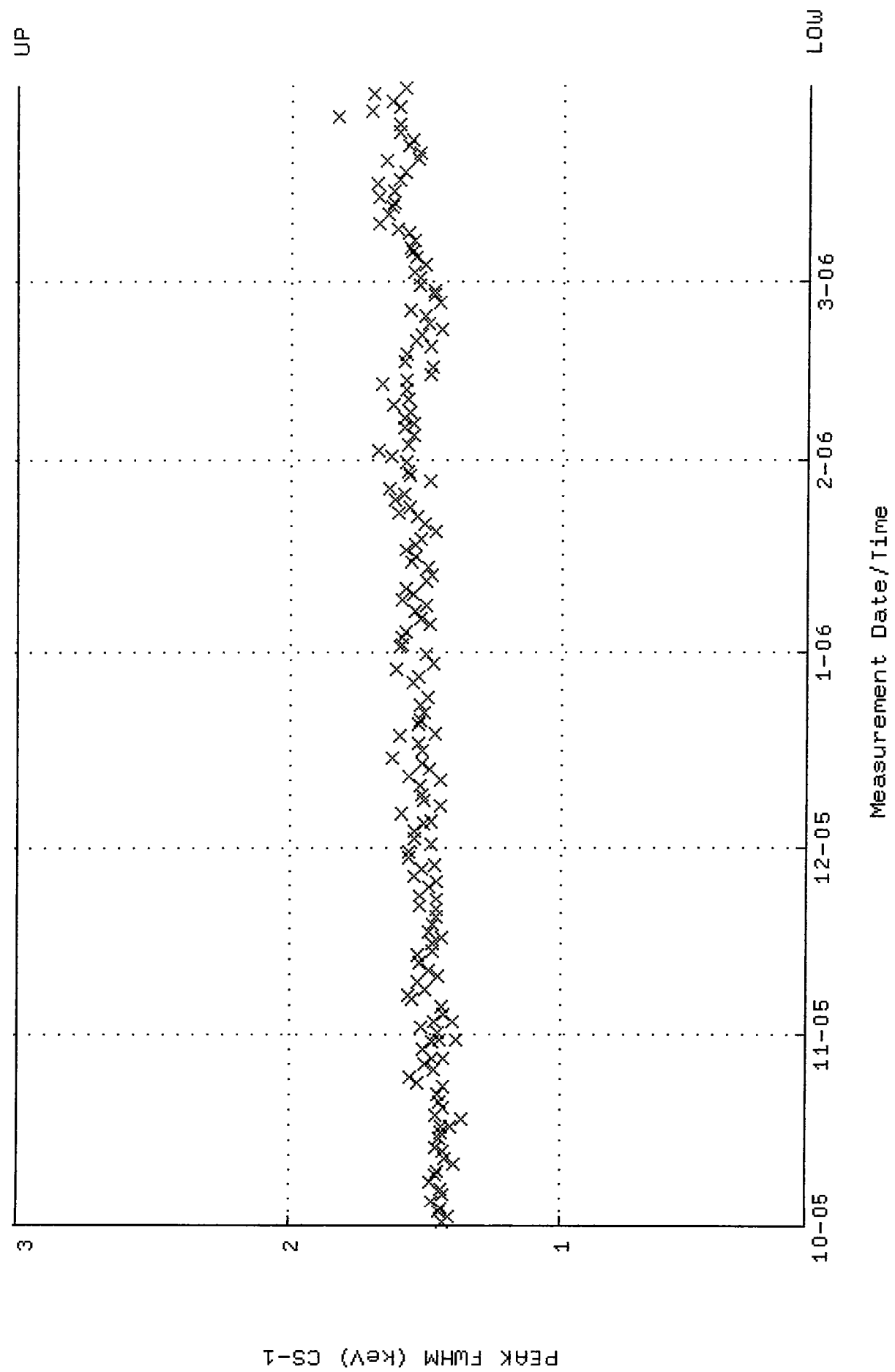
QA filename : DKA100:[ENV\_ALPHA]QC\_GAMMA6.QAF;5  
Parameter Name : PSFUHM-661 (PEAK FWHM (keV) CS-137)  
Start/End Dates : 1-OCT-2005 17:40:28 through 31-MAR-2006 12:00:00  
Lower/Upper Lmts: 0.100000 through 3.000000



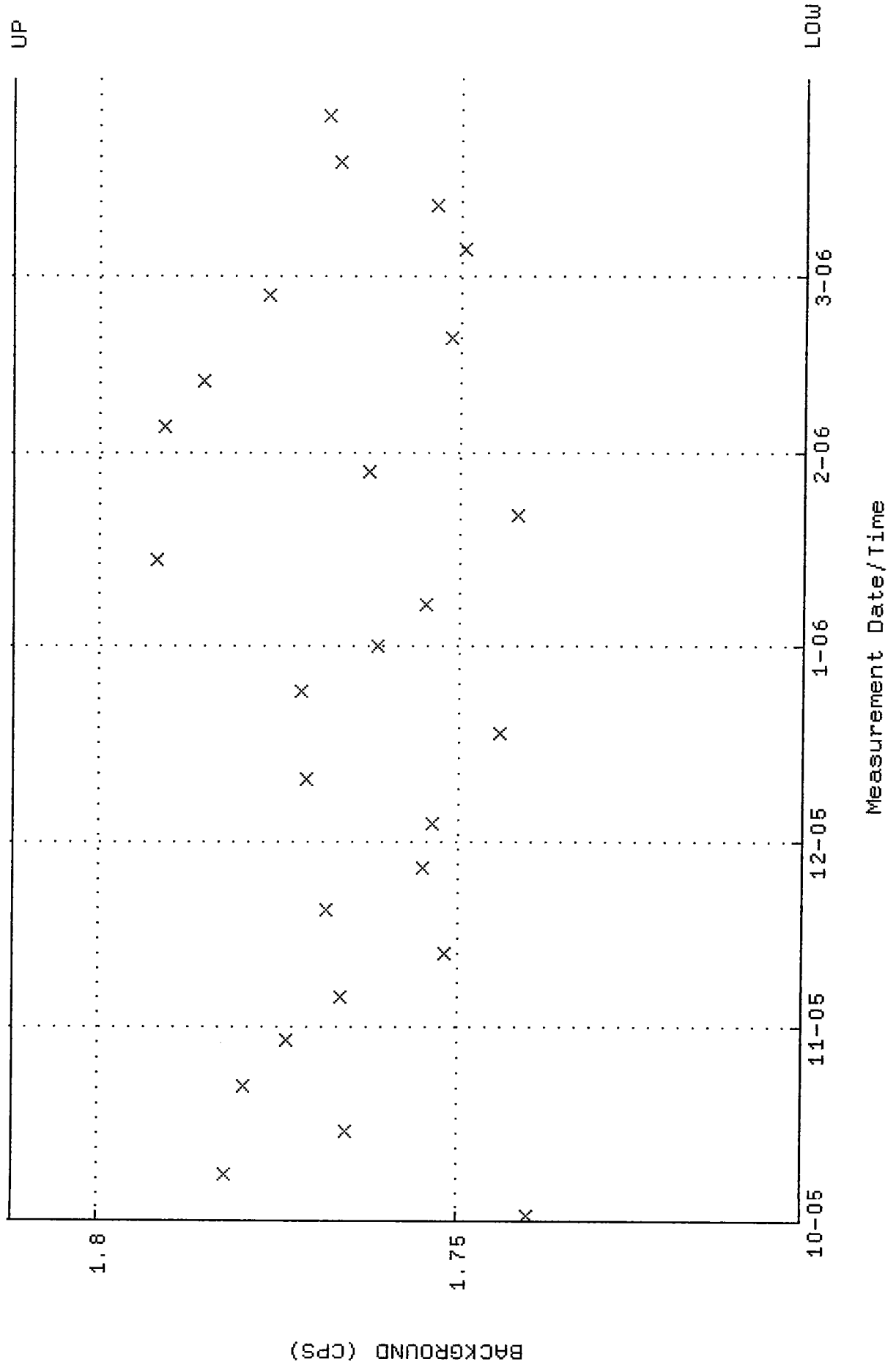
QA filename : DKA100:[ENV\_ALPHA]QC\_BKG\_GAMMA6.QAF;2  
 Parameter Name : BACKRATE (BACKGROUND (CPS))  
 Start/End Dates : 2-OCT-2005 11:51:15 through 31-MAR-2006 12:00:00  
 Lower/Upper Lmts: 1.78850 through 2.06800

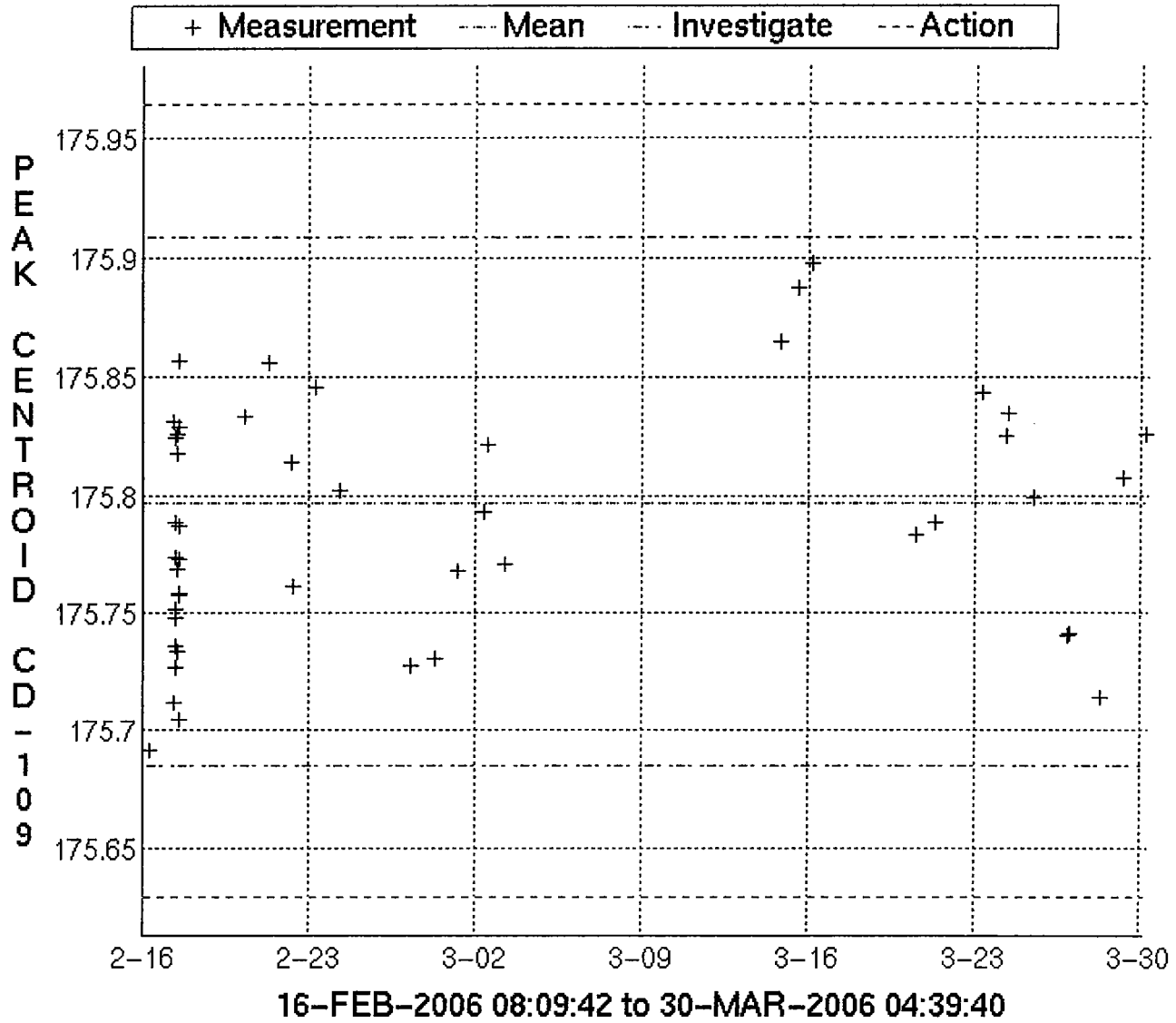


QA filename : DKA100:[ENV\_ALPHA]QC\_GAMMA17.QAF;3  
Parameter Name : PSFUHM-661 (PEAK FUHM (keV) CS-137)  
Start/End Dates : 1-OCT-2005 12:08:13 through 31-MAR-2006 12:00:00  
Lower/Upper Lmts: 0.100000 through 3.000000

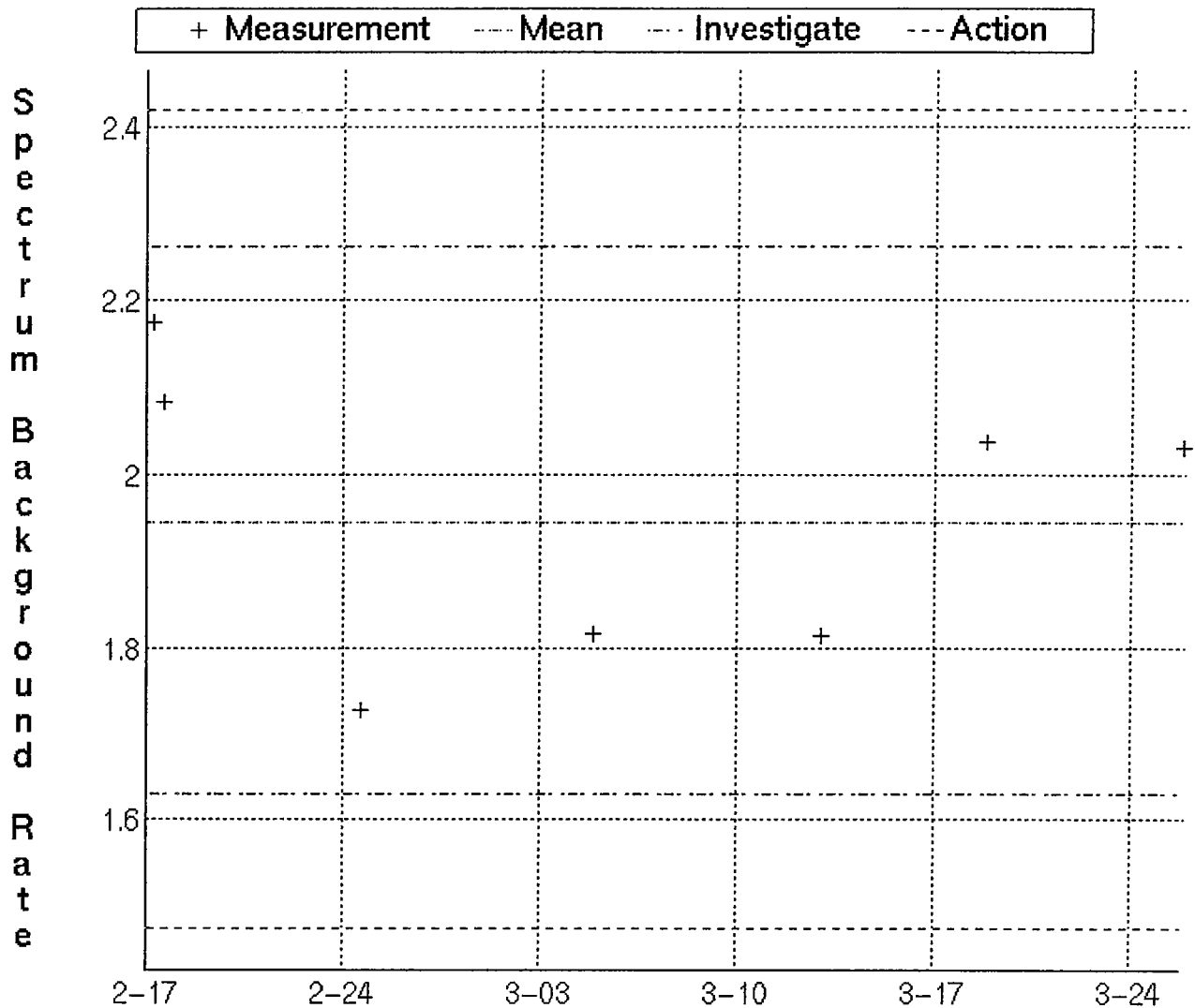


QA filename : DKA100:[ENV\_ALPHA]QC\_BKG\_GAMMA17.QAF;2  
 Parameter Name : BACKRATE (BACKGROUND (CPS))  
 Start/End Dates : 1-OCT-2005 21:09:41 through 31-MAR-2006 12:00:00  
 Lower/Upper Lmts: 1.70200 through 1.81200





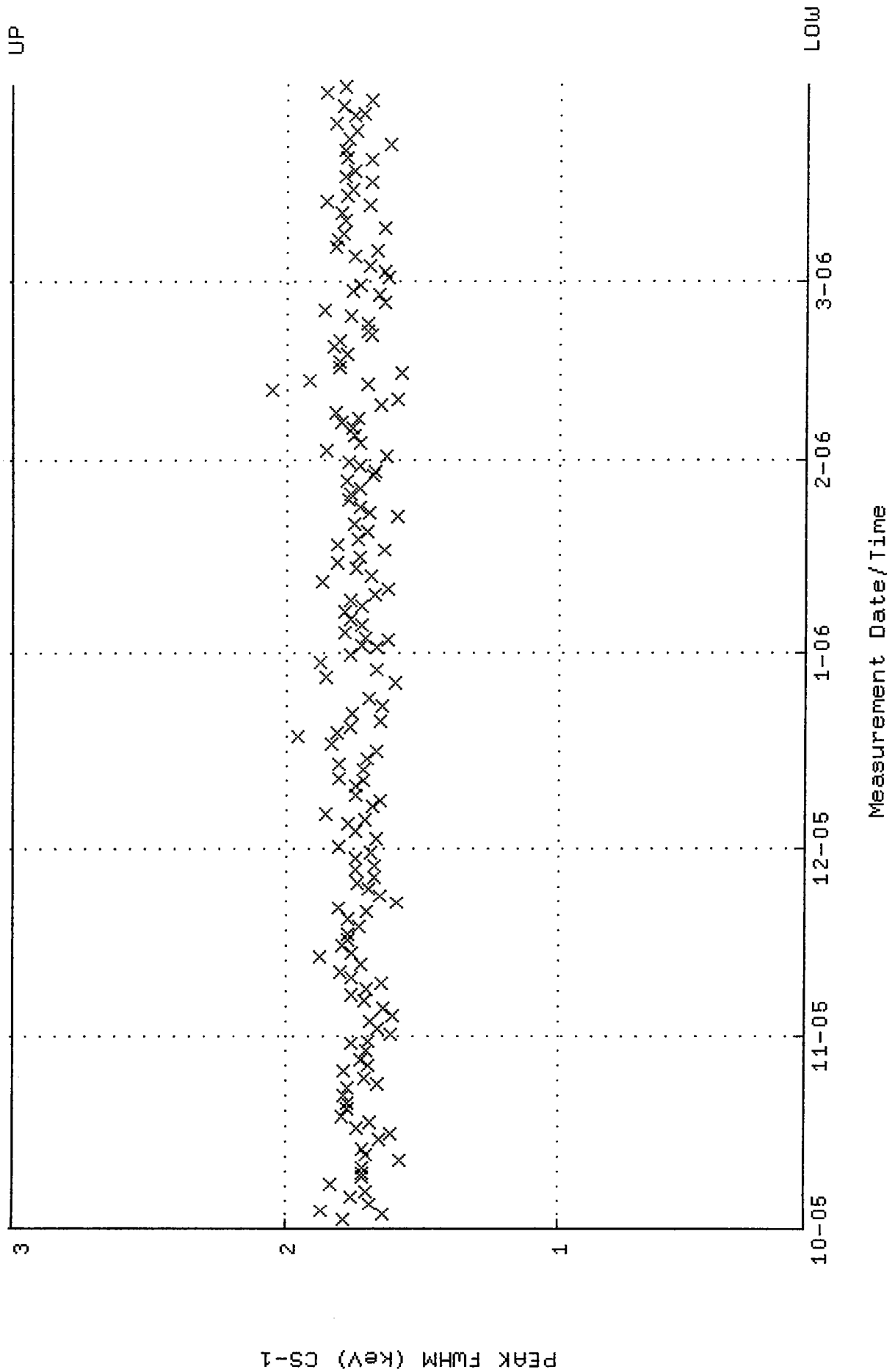
**QA Filename:** DKA0:[CANBERRA.GAMMA.SCUSR.QA]QCC\_GAM19\_CAN  
**Parameter Name:** PSCENTRD-88 (PEAK CENTROID CD-109)  
**Statistics Start/End Dates:** First data point through Last data point  
**Mean +/- Std Dev:** 175.797 ± 0.0558654 (0.03 %)



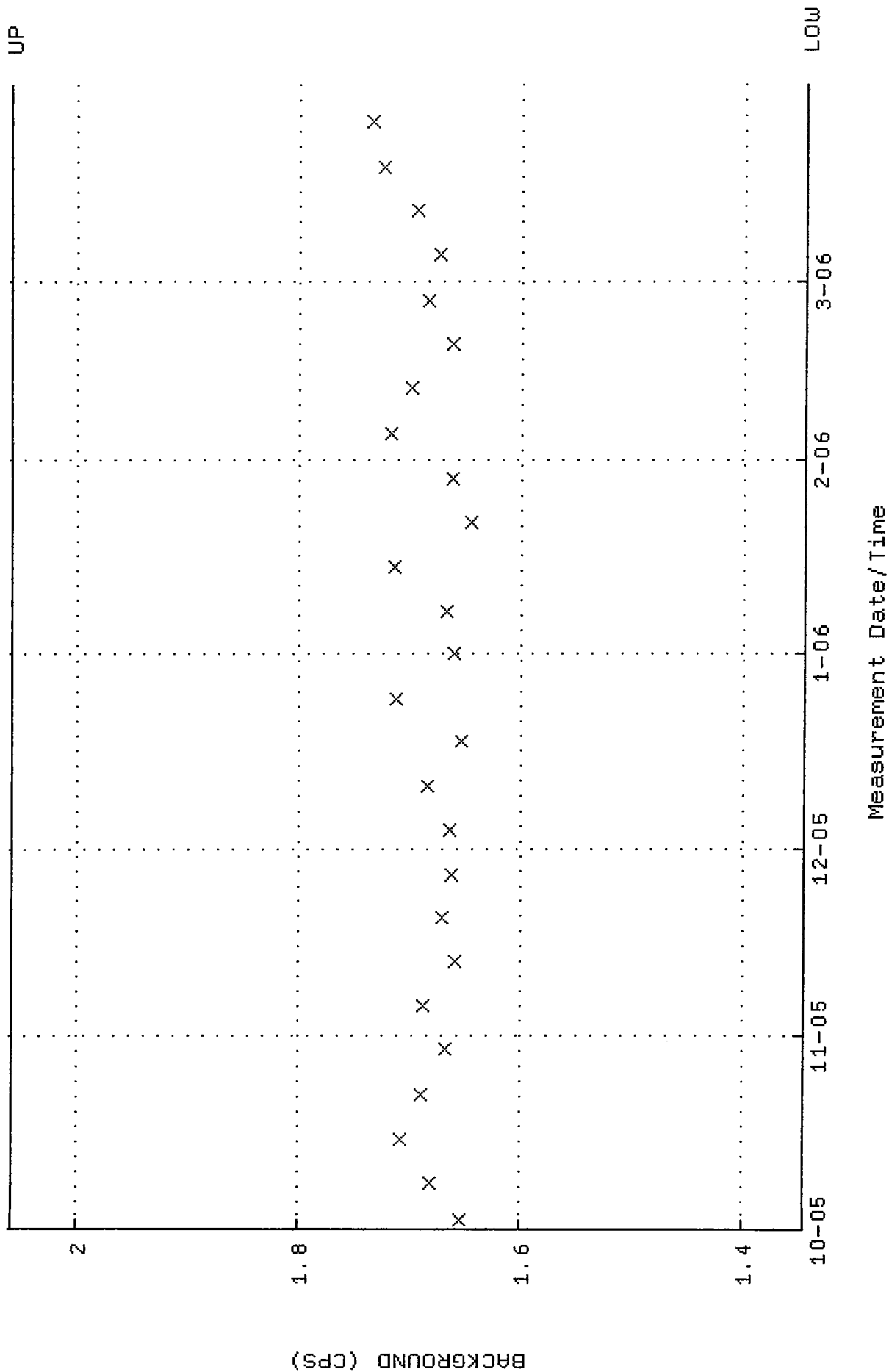
17-FEB-2006 07:20:41 to 25-MAR-2006 19:32:16

QA Filename: DKA0:[CANBERRA.GAMMA.SCUSR.QA]LBC\_GAM19.QAF;1  
 Parameter Name: BACKRATE (Spectrum Background Rate)  
 Statistics Start/End Dates: First data point through Last data point  
 Mean +/- Std Dev: 1.9459 ± 0.157399 (8.09 %)

QA filename : DKA100:[ENV\_ALPHA]QC\_WELL.QAF;4  
Parameter Name : PSFWHM-661 (PEAK FWHM (keV) CS-137)  
Start/End Dates : 2-OCT-2005 11:34:54 through 31-MAR-2006 12:00:00  
Lower/Upper Lmts: 0.100000 through 3.000000



QA filename : DKA100:[ENV\_ALPHA]QC\_BKG\_WELL.QAF;2  
 Parameter Name : BACKRATE (BACKGROUND (CPS))  
 Start/End Dates : 2-OCT-2005 11:46:24 through 31-MAR-2006 12:00:00  
 Lower/Upper Lmts: 1.34470 through 2.05930

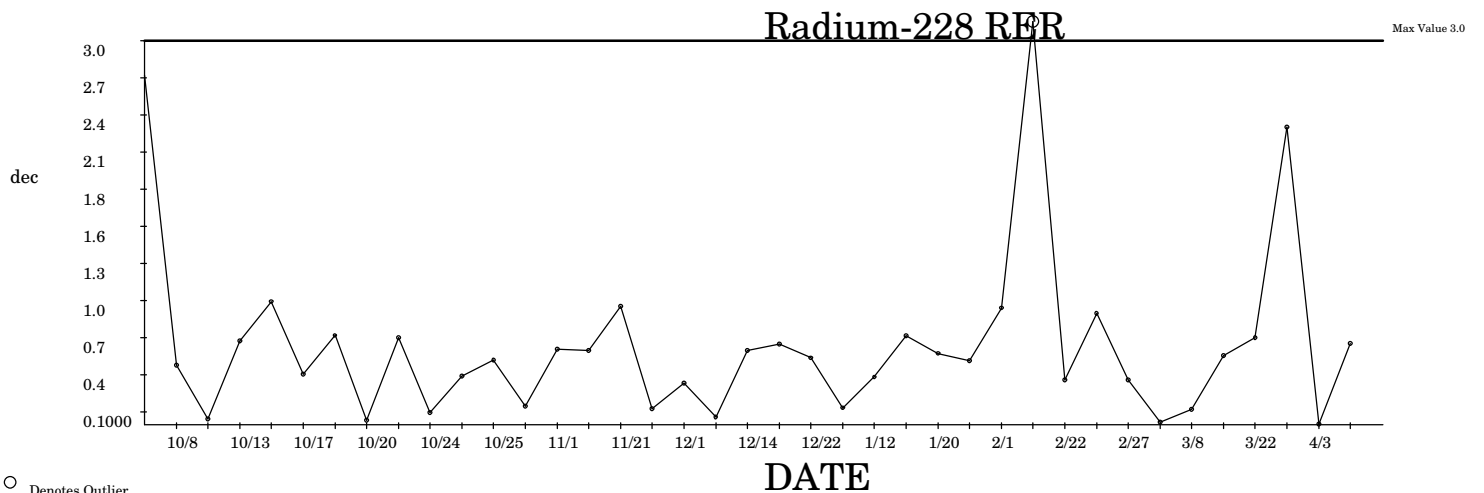
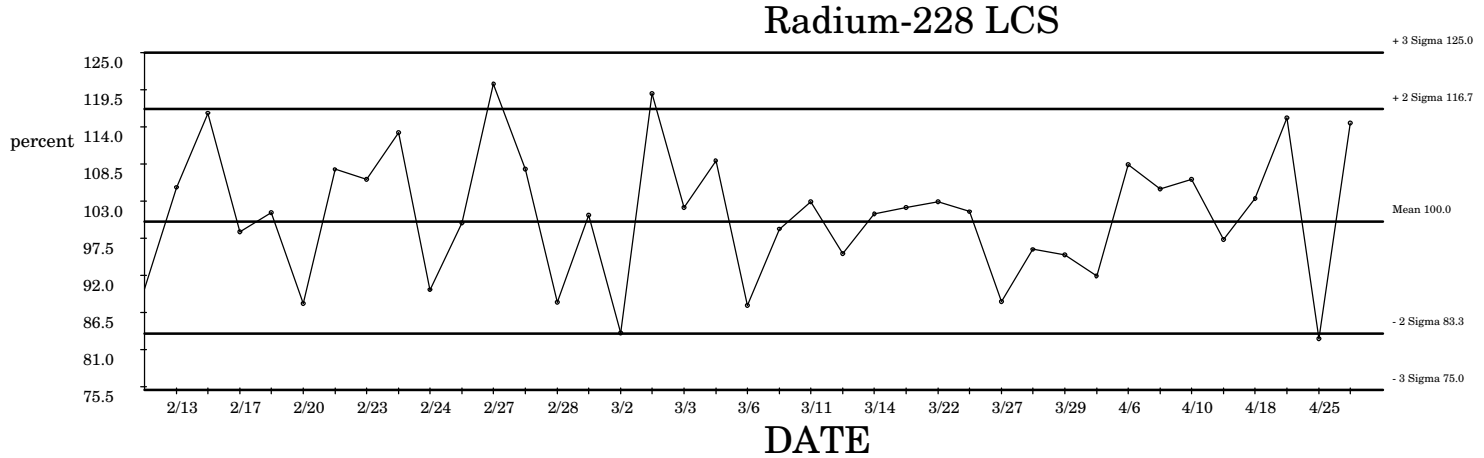
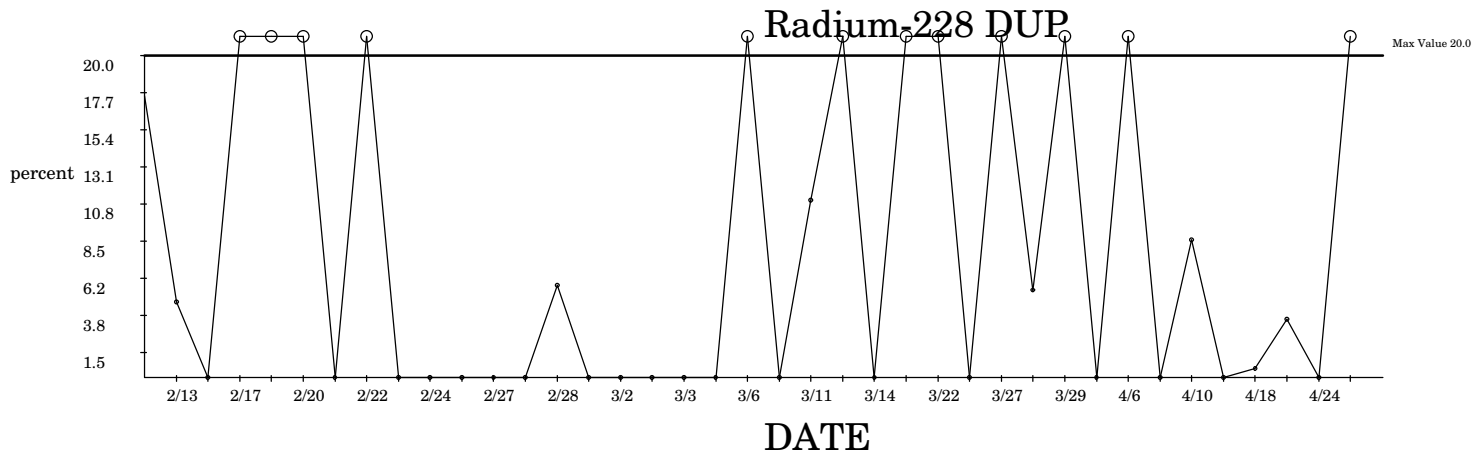
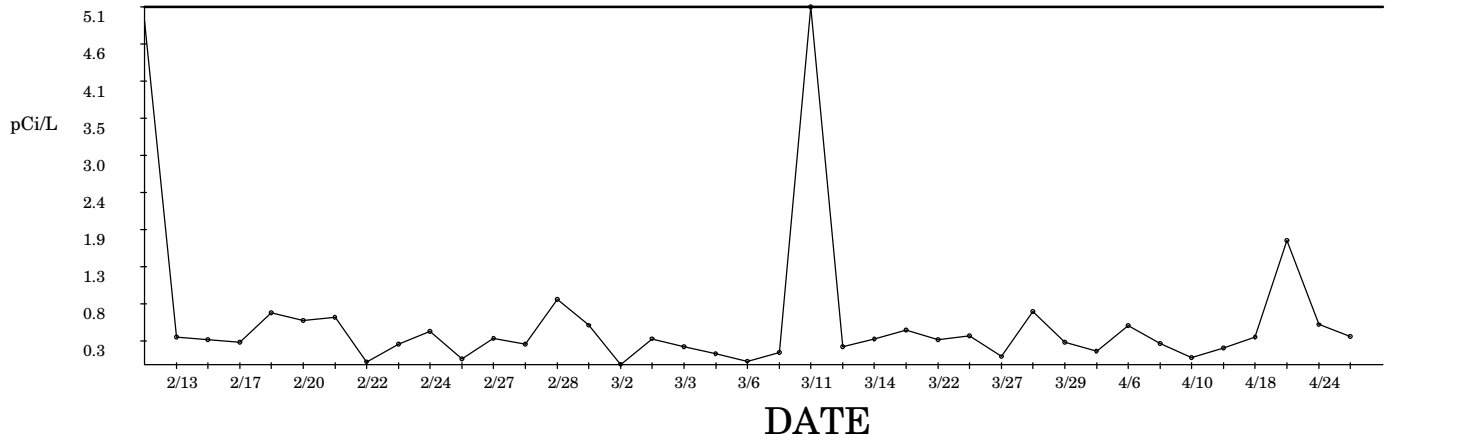




# QUALITY CONTROL CHARTS

# SPC Graph for Gas Flow Radium 228 in Liquids 4/25/2006

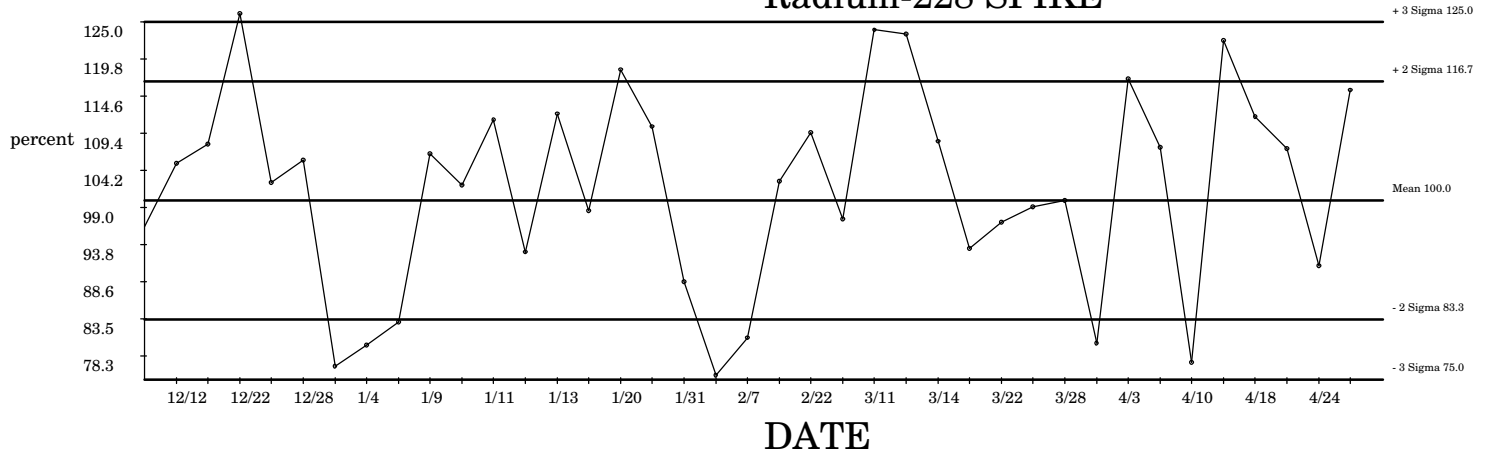
## Radium-228 BLANK



○ Denotes Outlier

# SPC Graph for Gas Flow Radium 228 in Liquids 4/25/2006

## Radium-228 SPIKE



○ Denotes Outlier

# Data used for Gas Flow Radium 228 in Liquids 26-APR-2006

Radium-228 BLANK: Limits LCL = -2.1 UCL = 2.9

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
500104	1201024129	13-FEB-2006 14:44	DONE	0	-0.38	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500102	1201024122	13-FEB-2006 22:54	DONE	0	-0.15	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500103	1201024126	14-FEB-2006 12:33	DONE	0	-0.2	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500107	1201024135	17-FEB-2006 19:06	DONE	0	-0.24	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500106	1201024132	18-FEB-2006 20:37	DONE	1	0.28	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500108	1201024138	20-FEB-2006 13:18	DONE	1	0.14	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500109	1201024141	21-FEB-2006 21:51	DONE	1	0.19	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
503553	1201031967	22-FEB-2006 23:15	DONE	0	-0.58	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500111	1201024147	24-FEB-2006 13:04	DONE	0	-0.27	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
504736	1201034726	24-FEB-2006 19:27	DONE	0	-0.05	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
505206	1201035921	24-FEB-2006 23:05	DONE	0	-0.53	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
502697	1201030163	27-FEB-2006 20:34	DONE	0	-0.17	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
505945	1201037656	27-FEB-2006 21:44	DONE	0	-0.27	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
500110	1201024144	28-FEB-2006 11:44	DONE	1	0.51	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
505426	1201036460	01-MAR-2006 23:28	DONE	0	0.06	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
505422	1201036449	02-MAR-2006 20:45	DONE	0	-0.63	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507266	1201040783	03-MAR-2006 12:51	DONE	0	-0.18	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507261	1201040773	03-MAR-2006 19:46	DONE	0	-0.32	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507469	1201041345	04-MAR-2006 14:23	DONE	0	-0.44	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507481	1201041382	06-MAR-2006 15:43	DONE	0	-0.57	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507501	1201041440	08-MAR-2006 11:56	DONE	0	-0.42	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
507516	1201041476	11-MAR-2006 15:32	DONE	5	5.6	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
508232	1201043146	13-MAR-2006 12:33	DONE	0	-0.32	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
510236	1201047754	14-MAR-2006 13:30	DONE	0	-0.19	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
510245	1201047773	16-MAR-2006 14:08	DONE	0	-0.03	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
513331	1201054714	22-MAR-2006 15:10	DONE	0	-0.2	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
510589	1201048485	24-MAR-2006 11:47	DONE	0	-0.13	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
508234	1201043153	27-MAR-2006 12:04	DONE	0	-0.49	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
510590	1201048488	28-MAR-2006 12:34	DONE	1	0.3	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
513290	1201054636	29-MAR-2006 15:21	DONE	0	-0.24	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
513295	1201054648	03-APR-2006 23:15	DONE	0	-0.4	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
517809	1201064414	06-APR-2006 22:35	DONE	0	0.05	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
515247	1201058669	07-APR-2006 21:32	DONE	0	-0.26	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
513299	1201054652	10-APR-2006 13:30	DONE	0	-0.51	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
515325	1201058924	10-APR-2006 18:53	DONE	0	-0.34	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
513308	1201054680	18-APR-2006 17:10	DONE	0	-0.15	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
518844	1201066724	19-APR-2006 12:20	DONE	2	1.5	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
521944	1201074036	24-APR-2006 12:19	DONE	0	0.07	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83
515983	1201060416	26-APR-2006 13:29	DONE	0	-0.14	pCi/L	0.44	-2.1	-1.2	2.11	2.94	0.83

Radium-228 DUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
500104	1201024130	13-FEB-2006 12:41	DONE	3	-0.54	percent	19	0	-41	79.3	20.0	30.2
500102	1201024123	13-FEB-2006 22:54	DONE	5	-0.47	percent	19	0	-41	79.3	20.0	30.2
500103	1201024127	14-FEB-2006 12:34	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
500107	1201024136	17-FEB-2006 19:06	DONE	23	0.14	percent	19	0	-41	79.3	20.0	30.2

500106	1201024133	18-FEB-2006 19:01	DONE	83	2.1	percent	19	0	-41	79.3	20.0	30.2
500108	1201024139	20-FEB-2006 12:19	DONE	27	0.25	percent	19	0	-41	79.3	20.0	30.2
500109	1201024142	21-FEB-2006 21:51	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
503553	1201031968	22-FEB-2006 23:14	DONE	64	1.5	percent	19	0	-41	79.3	20.0	30.2
500111	1201024148	24-FEB-2006 13:04	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
504736	1201034727	24-FEB-2006 19:27	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
505206	1201035922	24-FEB-2006 21:57	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
502697	1201030164	27-FEB-2006 20:34	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
505945	1201037657	27-FEB-2006 21:45	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
500110	1201024145	28-FEB-2006 11:44	DONE	6	-0.44	percent	19	0	-41	79.3	20.0	30.2
505426	1201036461	02-MAR-2006 00:22	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
505422	1201036450	02-MAR-2006 20:45	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
507266	1201040784	03-MAR-2006 12:51	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
507261	1201040774	03-MAR-2006 19:46	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
507469	1201041346	04-MAR-2006 13:18	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
507481	1201041383	06-MAR-2006 15:43	DONE	58	1.3	percent	19	0	-41	79.3	20.0	30.2
507501	1201041441	08-MAR-2006 13:57	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
507516	1201041477	11-MAR-2006 15:32	DONE	11	-0.26	percent	19	0	-41	79.3	20.0	30.2
508232	1201043147	13-MAR-2006 12:33	DONE	29	0.34	percent	19	0	-41	79.3	20.0	30.2
510236	1201047755	14-MAR-2006 12:29	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
510245	1201047774	16-MAR-2006 14:08	DONE	69	1.7	percent	19	0	-41	79.3	20.0	30.2
513331	1201054715	22-MAR-2006 15:10	DONE	68	1.6	percent	19	0	-41	79.3	20.0	30.2
510589	1201048486	24-MAR-2006 11:47	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
508234	1201043154	27-MAR-2006 12:04	DONE	42	0.76	percent	19	0	-41	79.3	20.0	30.2
510590	1201048489	28-MAR-2006 12:34	DONE	5	-0.45	percent	19	0	-41	79.3	20.0	30.2
513290	1201054637	29-MAR-2006 15:21	DONE	116	3.2	percent	19	0	-41	79.3	20.0	30.2
513295	1201054649	03-APR-2006 23:15	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
517809	1201064415	06-APR-2006 22:35	DONE	47	0.92	percent	19	0	-41	79.3	20.0	30.2
515247	1201058670	07-APR-2006 21:32	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
513299	1201054653	10-APR-2006 13:28	DONE	9	-0.34	percent	19	0	-41	79.3	20.0	30.2
515325	1201058925	10-APR-2006 18:53	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
513308	1201054681	18-APR-2006 17:10	DONE	1	-0.61	percent	19	0	-41	79.3	20.0	30.2
518844	1201066725	19-APR-2006 12:20	DONE	4	-0.51	percent	19	0	-41	79.3	20.0	30.2
521944	1201074037	24-APR-2006 14:55	DONE	0	-0.63	percent	19	0	-41	79.3	20.0	30.2
515983	1201060417	26-APR-2006 13:29	DONE	73	1.8	percent	19	0	-41	79.3	20.0	30.2

**Radium-228 LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
500104	1201024131	13-FEB-2006 15:47	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
500102	1201024125	13-FEB-2006 22:54	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
500103	1201024128	14-FEB-2006 14:36	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
500107	1201024137	17-FEB-2006 17:26	DONE	98	-0.19	percent	100	75.0	83.3	117	125	8.33
500106	1201024134	18-FEB-2006 17:56	DONE	101	0.16	percent	100	75.0	83.3	117	125	8.33
500108	1201024140	20-FEB-2006 13:22	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
500109	1201024143	21-FEB-2006 22:53	DONE	108	0.92	percent	100	75.0	83.3	117	125	8.33
503553	1201031970	23-FEB-2006 11:45	DONE	106	0.75	percent	100	75.0	83.3	117	125	8.33
500111	1201024149	24-FEB-2006 13:04	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
504736	1201034728	24-FEB-2006 19:27	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
505206	1201035923	24-FEB-2006 23:05	DONE	100	-0.03	percent	100	75.0	83.3	117	125	8.33
502697	1201030165	27-FEB-2006 20:34	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33

505945	1201037659	27-FEB-2006 22:08	DONE	108	0.93	percent	100	75.0	83.3	117	125	8.33
500110	1201024146	28-FEB-2006 16:07	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
505426	1201036462	02-MAR-2006 00:22	DONE	101	0.11	percent	100	75.0	83.3	117	125	8.33
505422	1201036451	02-MAR-2006 22:34	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
507266	1201040785	03-MAR-2006 13:59	DONE	119	2.3	percent	100	75.0	83.3	117	125	8.33
507261	1201040775	03-MAR-2006 19:46	DONE	102	0.25	percent	100	75.0	83.3	117	125	8.33
507469	1201041347	04-MAR-2006 13:19	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
507481	1201041384	06-MAR-2006 15:43	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
507501	1201041442	08-MAR-2006 13:57	DONE	99	-0.14	percent	100	75.0	83.3	117	125	8.33
507516	1201041479	11-MAR-2006 15:32	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
508232	1201043149	13-MAR-2006 12:33	DONE	95	-0.58	percent	100	75.0	83.3	117	125	8.33
510236	1201047757	14-MAR-2006 13:30	DONE	101	0.13	percent	100	75.0	83.3	117	125	8.33
510245	1201047776	16-MAR-2006 14:09	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
513331	1201054717	22-MAR-2006 15:10	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
510589	1201048487	24-MAR-2006 11:47	DONE	101	0.17	percent	100	75.0	83.3	117	125	8.33
508234	1201043156	27-MAR-2006 18:15	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
510590	1201048491	28-MAR-2006 12:34	DONE	96	-0.5	percent	100	75.0	83.3	117	125	8.33
513290	1201054639	29-MAR-2006 15:22	DONE	95	-0.59	percent	100	75.0	83.3	117	125	8.33
513295	1201054651	03-APR-2006 21:58	DONE	92	-0.98	percent	100	75.0	83.3	117	125	8.33
517809	1201064417	06-APR-2006 22:35	DONE	108	1	percent	100	75.0	83.3	117	125	8.33
515247	1201058671	07-APR-2006 21:32	DONE	105	0.57	percent	100	75.0	83.3	117	125	8.33
513299	1201054655	10-APR-2006 13:28	DONE	106	0.75	percent	100	75.0	83.3	117	125	8.33
515325	1201058927	10-APR-2006 18:53	DONE	97	-0.32	percent	100	75.0	83.3	117	125	8.33
513308	1201054683	18-APR-2006 17:09	DONE	103	0.41	percent	100	75.0	83.3	117	125	8.33
518844	1201066727	19-APR-2006 13:32	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
521944	1201074039	25-APR-2006 11:06	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
515983	1201060419	26-APR-2006 14:35	DONE	115	1.7	percent	100	75.0	83.3	117	125	8.33

**Radium-228 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
465675	1200943225	08-OCT-2005 10:52	DONE	0.27	-0.41	dec	0.61	0	-1	2.23	3.00	0.81
467327	1200947063	08-OCT-2005 11:05	DONE	0.47	-0.17	dec	0.61	0	-1	2.23	3.00	0.81
469671	1200952476	11-OCT-2005 15:48	DONE	0.05	-0.69	dec	0.61	0	-1	2.23	3.00	0.81
467329	1200947073	13-OCT-2005 12:07	DONE	0.66	0.06	dec	0.61	0	-1	2.23	3.00	0.81
470537	1200954570	14-OCT-2005 11:01	DONE	0.96	0.44	dec	0.61	0	-1	2.23	3.00	0.81
467333	1200947087	17-OCT-2005 12:10	DONE	0.39	-0.26	dec	0.61	0	-1	2.23	3.00	0.81
472059	1200958291	19-OCT-2005 13:47	DONE	0.7	0.11	dec	0.61	0	-1	2.23	3.00	0.81
472636	1200959672	20-OCT-2005 11:10	DONE	0.03	-0.7	dec	0.61	0	-1	2.23	3.00	0.81
473145	1200960959	24-OCT-2005 16:07	DUSE	0.68	0.09	dec	0.61	0	-1	2.23	3.00	0.81
474248	1200963592	24-OCT-2005 17:21	DONE	0.1	-0.63	dec	0.61	0	-1	2.23	3.00	0.81
471617	1200961158	25-OCT-2005 12:00	DONE	0.38	-0.28	dec	0.61	0	-1	2.23	3.00	0.81
473716	1200962428	25-OCT-2005 17:59	DONE	0.5	-0.12	dec	0.61	0	-1	2.23	3.00	0.81
473230	1200961166	01-NOV-2005 11:28	DONE	0.15	-0.56	dec	0.61	0	-1	2.23	3.00	0.81
476181	1200968154	01-NOV-2005 15:51	DONE	0.59	-0.02	dec	0.61	0	-1	2.23	3.00	0.81
480012	1200977648	14-NOV-2005 20:22	DONE	0.58	-0.03	dec	0.61	0	-1	2.23	3.00	0.81
479062	1200975199	21-NOV-2005 12:41	DONE	0.92	0.39	dec	0.61	0	-1	2.23	3.00	0.81
481985	1200982102	30-NOV-2005 23:53	DONE	0.13	-0.59	dec	0.61	0	-1	2.23	3.00	0.81
483514	1200985776	01-DEC-2005 12:05	DONE	0.33	-0.34	dec	0.61	0	-1	2.23	3.00	0.81
484248	1200987654	12-DEC-2005 12:09	DONE	0.06	-0.67	dec	0.61	0	-1	2.23	3.00	0.81
486611	1200993396	14-DEC-2005 22:44	DONE	0.58	-0.03	dec	0.61	0	-1	2.23	3.00	0.81

487788	1200996153	19-DEC-2005 14:38	DONE	0.63	0.03	dec	0.61	0	-1	2.23	3.00	0.81
488990	1200998922	22-DEC-2005 13:45	DONE	0.52	-0.1	dec	0.61	0	-1	2.23	3.00	0.81
490300	1201001796	06-JAN-2006 11:10	DONE	0.13	-0.58	dec	0.61	0	-1	2.23	3.00	0.81
491608	1201004824	12-JAN-2006 16:38	DONE	0.37	-0.29	dec	0.61	0	-1	2.23	3.00	0.81
493731	1201009556	17-JAN-2006 17:54	DONE	0.69	0.11	dec	0.61	0	-1	2.23	3.00	0.81
494613	1201011524	20-JAN-2006 21:32	DONE	0.56	-0.06	dec	0.61	0	-1	2.23	3.00	0.81
498305	1201019873	31-JAN-2006 18:16	DONE	0.5	-0.13	dec	0.61	0	-1	2.23	3.00	0.81
496468	1201015687	01-FEB-2006 14:45	DONE	0.91	0.38	dec	0.61	0	-1	2.23	3.00	0.81
500108	1201024139	20-FEB-2006 12:19	DONE	4.89	5.3	dec	0.61	0	-1	2.23	3.00	0.81
503553	1201031968	22-FEB-2006 23:14	DONE	0.35	-0.31	dec	0.61	0	-1	2.23	3.00	0.81
504736	1201034727	24-FEB-2006 19:27	DONE	0.87	0.32	dec	0.61	0	-1	2.23	3.00	0.81
505945	1201037657	27-FEB-2006 21:45	DONE	0.35	-0.31	dec	0.61	0	-1	2.23	3.00	0.81
505422	1201036450	02-MAR-2006 20:45	DONE	0.02	-0.72	dec	0.61	0	-1	2.23	3.00	0.81
507501	1201041441	08-MAR-2006 13:57	DONE	0.12	-0.6	dec	0.61	0	-1	2.23	3.00	0.81
510245	1201047774	16-MAR-2006 14:08	DONE	0.54	-0.08	dec	0.61	0	-1	2.23	3.00	0.81
513331	1201054715	22-MAR-2006 15:10	DONE	0.68	0.09	dec	0.61	0	-1	2.23	3.00	0.81
513290	1201054637	29-MAR-2006 15:21	DONE	2.32	2.1	dec	0.61	0	-1	2.23	3.00	0.81
513295	1201054649	03-APR-2006 23:15	DONE	00	-0.74	dec	0.61	0	-1	2.23	3.00	0.81
521944	1201074037	24-APR-2006 14:55	DONE	0.64	0.04	dec	0.61	0	-1	2.23	3.00	0.81

**Radium-228 SPIKE: Limits LCL = 75 UCL = 125**

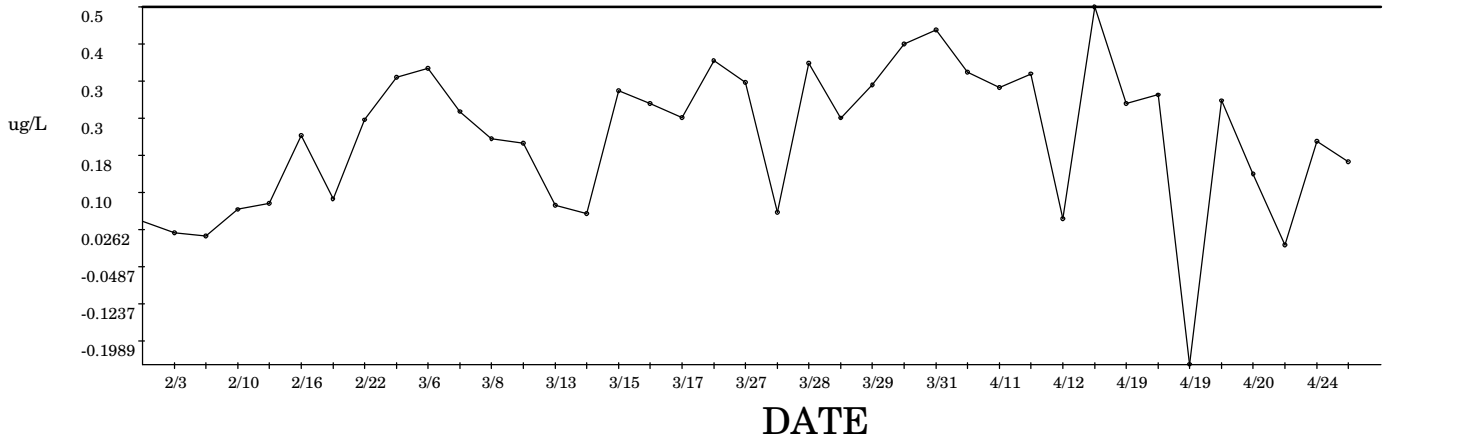
Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
484226	1200987599	05-DEC-2005 12:48	DONE	104	0.43	percent	100	75.0	83.3	117	125	8.33
484248	1200987655	12-DEC-2005 12:10	DONE	105	0.62	percent	100	75.0	83.3	117	125	8.33
486633	1200993447	16-DEC-2005 13:32	DONE	108	0.95	percent	100	75.0	83.3	117	125	8.33
488990	1200998923	22-DEC-2005 13:45	DONE	126	3.1	percent	100	75.0	83.3	117	125	8.33
485415	1200990577	22-DEC-2005 18:38	DONE	103	0.31	percent	100	75.0	83.3	117	125	8.33
487960	1200996652	28-DEC-2005 22:36	DONE	106	0.68	percent	100	75.0	83.3	117	125	8.33
486030	1200992037	29-DEC-2005 20:57	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
490306	1201001825	04-JAN-2006 23:08	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
488686	1200998269	06-JAN-2006 15:12	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
487814	1200996255	09-JAN-2006 13:54	DONE	107	0.79	percent	100	75.0	83.3	117	125	8.33
491352	1201004143	10-JAN-2006 13:01	DONE	102	0.26	percent	100	75.0	83.3	117	125	8.33
486289	1200992718	11-JAN-2006 17:36	DONE	111	1.4	percent	100	75.0	83.3	117	125	8.33
491608	1201004825	12-JAN-2006 16:38	DONE	93	-0.86	percent	100	75.0	83.3	117	125	8.33
492834	1201007534	13-JAN-2006 12:48	DONE	112	1.5	percent	100	75.0	83.3	117	125	8.33
493731	1201009557	17-JAN-2006 17:54	DONE	99	-0.17	percent	100	75.0	83.3	117	125	8.33
494613	1201011525	20-JAN-2006 21:33	DONE	118	2.2	percent	100	75.0	83.3	117	125	8.33
496446	1201015668	24-JAN-2006 23:12	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
495884	1201014389	31-JAN-2006 14:37	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
498305	1201019874	31-JAN-2006 18:16	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
492836	1201007542	07-FEB-2006 10:39	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33
500102	1201024124	13-FEB-2006 22:54	DONE	103	0.32	percent	100	75.0	83.3	117	125	8.33
503553	1201031969	22-FEB-2006 23:15	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
505945	1201037658	27-FEB-2006 22:09	DONE	97	-0.31	percent	100	75.0	83.3	117	125	8.33
507516	1201041478	11-MAR-2006 15:32	DONE	124	2.9	percent	100	75.0	83.3	117	125	8.33
508232	1201043148	13-MAR-2006 12:33	DONE	123	2.8	percent	100	75.0	83.3	117	125	8.33
510236	1201047756	14-MAR-2006 13:30	DONE	108	01	percent	100	75.0	83.3	117	125	8.33
510245	1201047775	16-MAR-2006 14:09	DONE	93	-0.81	percent	100	75.0	83.3	117	125	8.33
513331	1201054716	22-MAR-2006 15:10	DONE	97	-0.36	percent	100	75.0	83.3	117	125	8.33

508234	1201043155	27-MAR-2006 18:14	DONE	99	-0.11	percent	100	75.0	83.3	117	125	8.33
510590	1201048490	28-MAR-2006 12:34	DONE	100	00	percent	100	75.0	83.3	117	125	8.33
513290	1201054638	29-MAR-2006 15:22	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
513295	1201054650	03-APR-2006 21:58	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
517809	1201064416	06-APR-2006 22:35	DONE	107	0.9	percent	100	75.0	83.3	117	125	8.33
513299	1201054654	10-APR-2006 14:51	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
515325	1201058926	10-APR-2006 18:53	DONE	122	2.7	percent	100	75.0	83.3	117	125	8.33
513308	1201054682	18-APR-2006 17:09	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
518844	1201066726	19-APR-2006 12:21	DONE	107	0.87	percent	100	75.0	83.3	117	125	8.33
521944	1201074038	24-APR-2006 14:55	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
515983	1201060418	26-APR-2006 13:44	DONE	115	1.9	percent	100	75.0	83.3	117	125	8.33



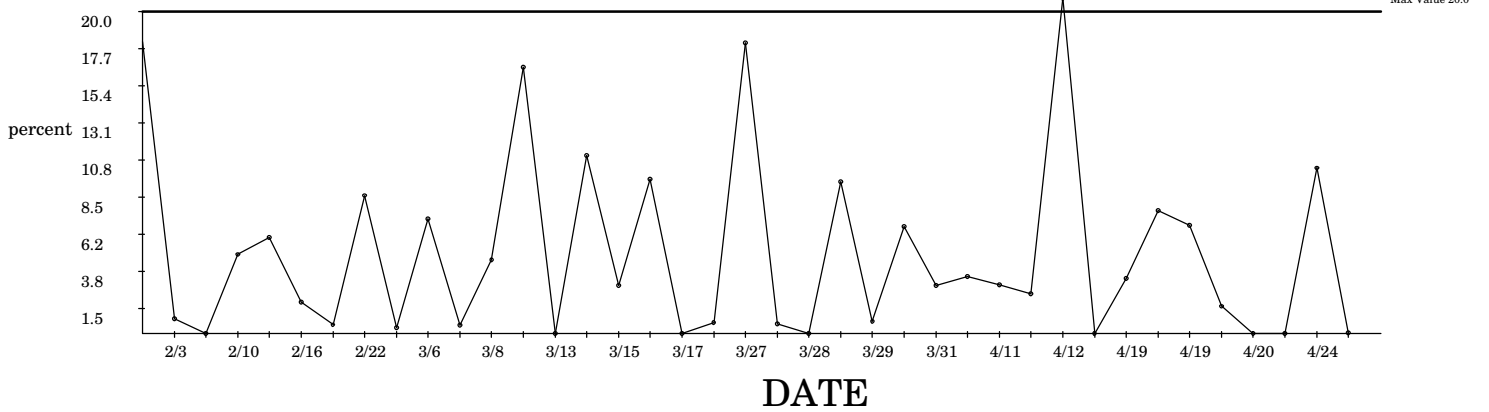
# SPC Graph for Total Uranium KPA in Liquids 4/25/2006

## Total Uranium BLANK



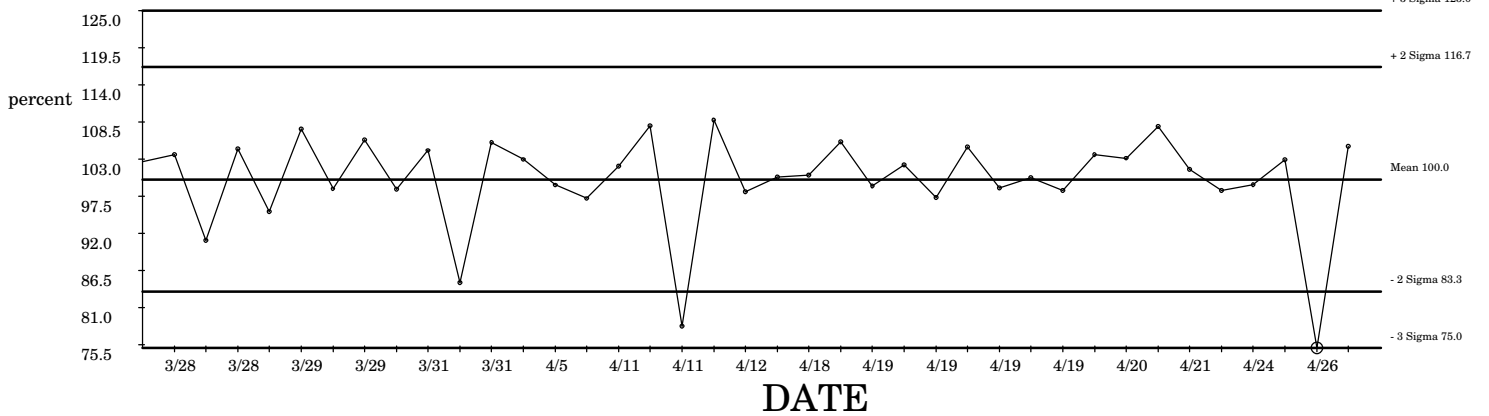
DATE

## Total Uranium DUP



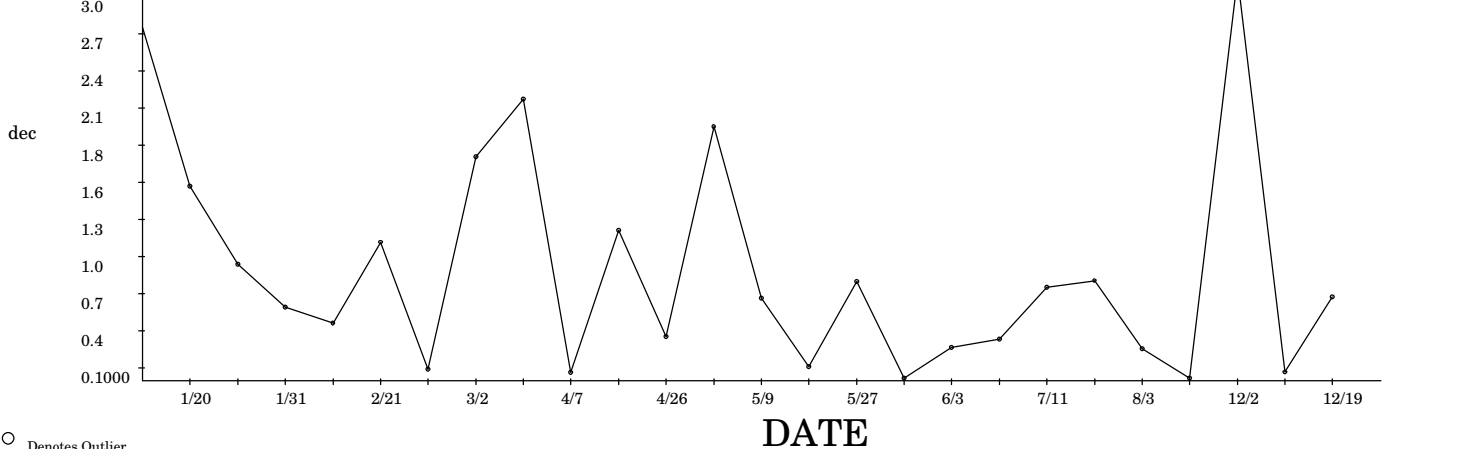
DATE

## Total Uranium LCS



DATE

## Total Uranium RER

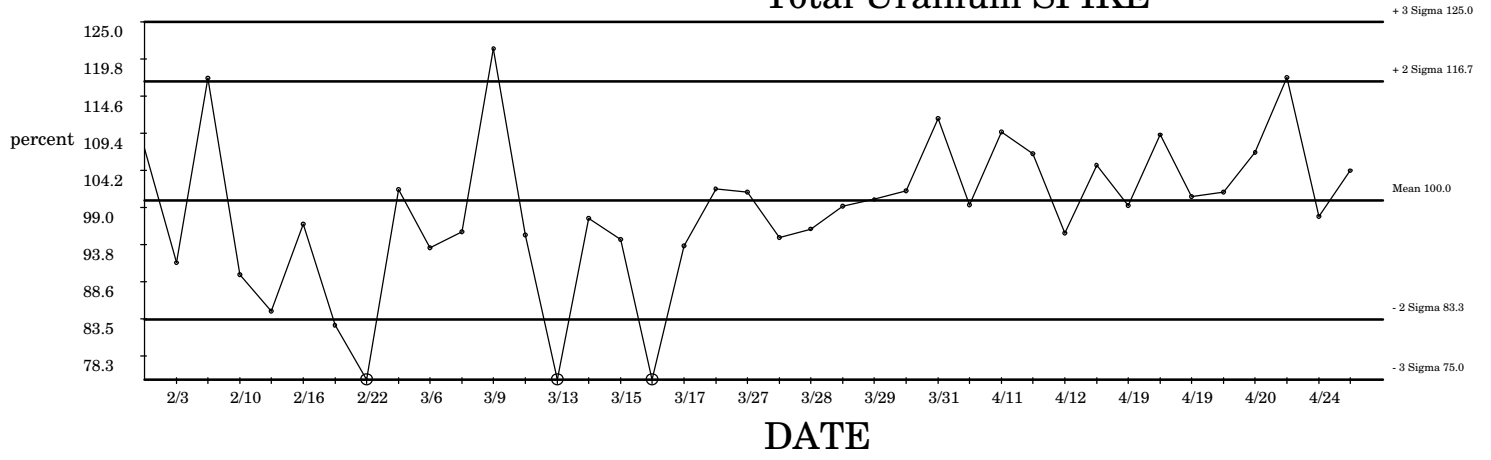


DATE

○ Denotes Outlier

# SPC Graph for Total Uranium KPA in Liquids 4/25/2006

## Total Uranium SPIKE



○ Denotes Outlier

## Data used for Total Uranium KPA in Liquids 26-APR-2006

Total UraniumBLANK: Limits LCL = -.2 UCL = .7

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
499318	1201022161	01-FEB-2006 10:19	DONE	0.19	-0.19	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
499606	1201022799	03-FEB-2006 15:14	DONE	0.02	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
495499	1201013559	09-FEB-2006 11:32	DONE	0.01	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
499607	1201022804	10-FEB-2006 14:09	DONE	0.07	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
502226	1201029167	14-FEB-2006 13:21	DONE	0.08	-0.93	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
502227	1201029172	16-FEB-2006 15:06	DONE	0.22	0.01	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
503735	1201032418	17-FEB-2006 14:35	DONE	0.09	-0.87	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
505123	1201035708	22-FEB-2006 14:58	DONE	0.25	0.22	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
505124	1201035713	23-FEB-2006 16:00	DONE	0.33	0.8	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
507732	1201041932	06-MAR-2006 14:19	DONE	0.35	0.92	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
509089	1201045163	08-MAR-2006 11:11	DONE	0.27	0.33	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
509091	1201045172	08-MAR-2006 13:41	DONE	0.21	-0.04	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
509093	1201045181	10-MAR-2006 10:26	DONE	0.2	-0.11	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
510519	1201048339	13-MAR-2006 13:18	DONE	0.08	-0.95	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
510315	1201048003	13-MAR-2006 15:02	DONE	0.06	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
510361	1201048009	15-MAR-2006 10:13	DONE	0.31	0.62	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
512099	1201051952	17-MAR-2006 09:23	DONE	0.28	0.44	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
511794	1201051265	17-MAR-2006 10:39	DONE	0.25	0.25	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
513427	1201054892	23-MAR-2006 09:42	DONE	0.37	1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
514308	1201056608	27-MAR-2006 10:53	DONE	0.32	0.73	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
514304	1201056593	28-MAR-2006 11:58	DONE	0.06	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
514306	1201056599	28-MAR-2006 15:01	DONE	0.36	0.99	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
514311	1201056621	29-MAR-2006 10:40	DONE	0.25	0.24	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
514314	1201056626	29-MAR-2006 11:19	DONE	0.32	0.7	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
515691	1201059799	31-MAR-2006 09:48	DONE	0.4	1.3	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
515693	1201059808	31-MAR-2006 10:42	DONE	0.43	1.4	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
515695	1201059813	05-APR-2006 10:15	DONE	0.35	0.87	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
518894	1201066876	11-APR-2006 10:02	DONE	0.31	0.66	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
518888	1201066855	11-APR-2006 11:40	DONE	0.34	0.85	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
518891	1201066864	12-APR-2006 10:57	DUSE	0.05	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519925	1201069158	18-APR-2006 11:22	DONE	0.48	1.8	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519934	1201069195	19-APR-2006 10:39	DONE	0.28	0.44	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519938	1201069200	19-APR-2006 12:45	DONE	0.3	0.56	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519939	1201069206	19-APR-2006 13:28	DONE	-0.246	-3	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519940	1201069211	19-APR-2006 15:31	DONE	0.29	0.48	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519941	1201069216	20-APR-2006 11:50	DONE	0.14	-0.52	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
519942	1201069226	21-APR-2006 11:45	DUSE	-0.005	-1	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
522696	1201075707	24-APR-2006 10:06	DONE	0.21	-0.07	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15
523680	1201077880	26-APR-2006 10:15	DONE	0.16	-0.35	ug/L	0.22	-0.227	-0.08	0.51	0.66	0.15

Total UraniumDUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
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496182	1201015021	31-JAN-2006 10:06	DONE	1.86	-0.5	percent	4.52	0	-6.1	15.1	20.0	5.31
499606	1201022800	03-FEB-2006 15:19	DONE	0.9	-0.68	percent	4.52	0	-6.1	15.1	20.0	5.31
495499	1201013560	09-FEB-2006 11:34	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
499607	1201022805	10-FEB-2006 14:12	DONE	4.91	0.07	percent	4.52	0	-6.1	15.1	20.0	5.31
502226	1201029168	14-FEB-2006 13:25	DONE	5.97	0.27	percent	4.52	0	-6.1	15.1	20.0	5.31
502227	1201029173	16-FEB-2006 15:09	DONE	1.96	-0.48	percent	4.52	0	-6.1	15.1	20.0	5.31
503735	1201032419	17-FEB-2006 14:40	DONE	0.53	-0.75	percent	4.52	0	-6.1	15.1	20.0	5.31
505123	1201035709	22-FEB-2006 15:03	DONE	8.57	0.76	percent	4.52	0	-6.1	15.1	20.0	5.31
505124	1201035714	23-FEB-2006 16:03	DONE	0.35	-0.78	percent	4.52	0	-6.1	15.1	20.0	5.31
507732	1201041933	06-MAR-2006 14:22	DONE	7.12	0.49	percent	4.52	0	-6.1	15.1	20.0	5.31
509089	1201045164	08-MAR-2006 11:14	DONE	0.5	-0.76	percent	4.52	0	-6.1	15.1	20.0	5.31
509091	1201045173	08-MAR-2006 13:47	DONE	4.55	0.01	percent	4.52	0	-6.1	15.1	20.0	5.31
509093	1201045182	10-MAR-2006 10:29	DONE	16.5	2.3	percent	4.52	0	-6.1	15.1	20.0	5.31
510519	1201048340	13-MAR-2006 13:21	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
510315	1201048004	13-MAR-2006 15:05	DONE	11.1	1.2	percent	4.52	0	-6.1	15.1	20.0	5.31
510361	1201048010	15-MAR-2006 10:16	DONE	2.98	-0.29	percent	4.52	0	-6.1	15.1	20.0	5.31
512099	1201051953	17-MAR-2006 09:27	DONE	9.59	0.96	percent	4.52	0	-6.1	15.1	20.0	5.31
511794	1201051266	17-MAR-2006 10:43	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
513427	1201054893	23-MAR-2006 09:47	DONE	0.68	-0.72	percent	4.52	0	-6.1	15.1	20.0	5.31
514308	1201056609	27-MAR-2006 10:56	DONE	18.1	2.6	percent	4.52	0	-6.1	15.1	20.0	5.31
514304	1201056594	28-MAR-2006 12:03	DONE	0.57	-0.74	percent	4.52	0	-6.1	15.1	20.0	5.31
514306	1201056600	28-MAR-2006 15:04	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
514311	1201056622	29-MAR-2006 10:01	DONE	9.44	0.93	percent	4.52	0	-6.1	15.1	20.0	5.31
514314	1201056627	29-MAR-2006 11:22	DONE	0.74	-0.71	percent	4.52	0	-6.1	15.1	20.0	5.31
515691	1201059800	31-MAR-2006 09:51	DONE	6.63	0.4	percent	4.52	0	-6.1	15.1	20.0	5.31
515693	1201059809	31-MAR-2006 10:47	DONE	2.97	-0.29	percent	4.52	0	-6.1	15.1	20.0	5.31
515695	1201059814	05-APR-2006 10:18	DONE	3.53	-0.19	percent	4.52	0	-6.1	15.1	20.0	5.31
518894	1201066877	11-APR-2006 10:07	DONE	3.01	-0.28	percent	4.52	0	-6.1	15.1	20.0	5.31
518888	1201066856	11-APR-2006 11:45	DONE	2.47	-0.39	percent	4.52	0	-6.1	15.1	20.0	5.31
518891	1201066865	12-APR-2006 13:12	DUSE	20.9	3.1	percent	4.52	0	-6.1	15.1	20.0	5.31
519925	1201069159	18-APR-2006 11:24	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
519934	1201069196	19-APR-2006 10:41	DONE	3.42	-0.21	percent	4.52	0	-6.1	15.1	20.0	5.31
519938	1201069201	19-APR-2006 12:49	DONE	7.64	0.59	percent	4.52	0	-6.1	15.1	20.0	5.31
519939	1201069207	19-APR-2006 13:30	DONE	6.73	0.42	percent	4.52	0	-6.1	15.1	20.0	5.31
519940	1201069212	19-APR-2006 15:34	DONE	1.68	-0.53	percent	4.52	0	-6.1	15.1	20.0	5.31
519941	1201069217	20-APR-2006 11:53	DONE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
519942	1201069227	21-APR-2006 11:48	DUSE	0	-0.85	percent	4.52	0	-6.1	15.1	20.0	5.31
522696	1201075708	24-APR-2006 10:09	DONE	10.3	1.1	percent	4.52	0	-6.1	15.1	20.0	5.31
523680	1201077881	26-APR-2006 10:18	DONE	0.04	-0.84	percent	4.52	0	-6.1	15.1	20.0	5.31

**Total UraniumLCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
514308	1201056612	27-MAR-2006 11:06	DONE	97.4	-0.31	percent	100	75.0	83.3	117	125	8.33
514304	1201056597	28-MAR-2006 12:08	DONE	104	0.44	percent	100	75.0	83.3	117	125	8.33
514304	1201056596	28-MAR-2006 12:13	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
514306	1201056602	28-MAR-2006 15:10	DONE	105	0.55	percent	100	75.0	83.3	117	125	8.33

514306	1201056603	28-MAR-2006 15:15	DONE	95.2	-0.57	percent	100	75.0	83.3	117	125	8.33
514311	1201056625	29-MAR-2006 10:07	DONE	107	0.89	percent	100	75.0	83.3	117	125	8.33
514311	1201056624	29-MAR-2006 10:11	DONE	98.6	-0.17	percent	100	75.0	83.3	117	125	8.33
514314	1201056630	29-MAR-2006 11:28	DONE	106	0.71	percent	100	75.0	83.3	117	125	8.33
514314	1201056629	29-MAR-2006 11:32	DONE	98.5	-0.18	percent	100	75.0	83.3	117	125	8.33
515691	1201059803	31-MAR-2006 09:57	DONE	104	0.51	percent	100	75.0	83.3	117	125	8.33
515691	1201059802	31-MAR-2006 10:02	DONE	84.7	-2	percent	100	75.0	83.3	117	125	8.33
515693	1201059812	31-MAR-2006 10:52	DONE	105	0.65	percent	100	75.0	83.3	117	125	8.33
515693	1201059811	31-MAR-2006 10:56	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
515695	1201059817	05-APR-2006 10:24	DONE	99.2	-0.1	percent	100	75.0	83.3	117	125	8.33
515695	1201059816	05-APR-2006 10:28	DONE	97.2	-0.34	percent	100	75.0	83.3	117	125	8.33
518894	1201066879	11-APR-2006 10:14	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
518894	1201066880	11-APR-2006 10:16	DONE	108	0.95	percent	100	75.0	83.3	117	125	8.33
518888	1201066858	11-APR-2006 11:52	DONE	78.2	-3	percent	100	75.0	83.3	117	125	8.33
518888	1201066859	11-APR-2006 11:54	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
518891	1201066867	12-APR-2006 11:08	DUSE	98.2	-0.22	percent	100	75.0	83.3	117	125	8.33
518891	1201066868	12-APR-2006 11:09	DUSE	100	0.04	percent	100	75.0	83.3	117	125	8.33
519925	1201069161	18-APR-2006 11:33	DONE	101	0.08	percent	100	75.0	83.3	117	125	8.33
519925	1201069162	18-APR-2006 11:34	DONE	106	0.67	percent	100	75.0	83.3	117	125	8.33
519934	1201069198	19-APR-2006 10:50	DONE	99	-0.12	percent	100	75.0	83.3	117	125	8.33
519934	1201069199	19-APR-2006 10:51	DONE	102	0.25	percent	100	75.0	83.3	117	125	8.33
519938	1201069203	19-APR-2006 12:54	DONE	97.3	-0.32	percent	100	75.0	83.3	117	125	8.33
519938	1201069204	19-APR-2006 12:57	DONE	105	0.58	percent	100	75.0	83.3	117	125	8.33
519939	1201069209	19-APR-2006 13:36	DONE	98.8	-0.15	percent	100	75.0	83.3	117	125	8.33
519939	1201069210	19-APR-2006 13:38	DONE	100	0.03	percent	100	75.0	83.3	117	125	8.33
519940	1201069214	19-APR-2006 15:42	DONE	98.3	-0.2	percent	100	75.0	83.3	117	125	8.33
519940	1201069215	19-APR-2006 15:43	DONE	104	0.44	percent	100	75.0	83.3	117	125	8.33
519941	1201069219	20-APR-2006 11:59	DONE	103	0.38	percent	100	75.0	83.3	117	125	8.33
519941	1201069220	20-APR-2006 12:02	DONE	108	0.94	percent	100	75.0	83.3	117	125	8.33
519942	1201069229	21-APR-2006 11:56	DUSE	101	0.17	percent	100	75.0	83.3	117	125	8.33
519942	1201069230	21-APR-2006 11:58	DUSE	98.4	-0.2	percent	100	75.0	83.3	117	125	8.33
522696	1201075710	24-APR-2006 10:15	DONE	99.2	-0.1	percent	100	75.0	83.3	117	125	8.33
522696	1201075711	24-APR-2006 10:18	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
523680	1201077883	26-APR-2006 10:26	DONE	75	-3	percent	100	75.0	83.3	117	125	8.33
523680	1201077884	26-APR-2006 10:27	DONE	105	0.59	percent	100	75.0	83.3	117	125	8.33

**Total UraniumRER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
392624	1200767846	10-JAN-2005 18:44	DONE	0.24	-0.55	dec	0.87	0	-1.4	3.2	3.00	1.16
395311	1200774051	20-JAN-2005 21:49	DONE	1.52	0.56	dec	0.87	0	-1.4	3.2	3.00	1.16
395311	1200774052	20-JAN-2005 21:52	DONE	0.91	0.03	dec	0.87	0	-1.4	3.2	3.00	1.16
397297	1200778619	31-JAN-2005 22:54	DONE	0.57	-0.26	dec	0.87	0	-1.4	3.2	3.00	1.16
399308	1200783560	10-FEB-2005 16:19	DONE	0.45	-0.37	dec	0.87	0	-1.4	3.2	3.00	1.16
403160	1200792687	21-FEB-2005 21:08	DONE	1.08	0.18	dec	0.87	0	-1.4	3.2	3.00	1.16
403533	1200793661	23-FEB-2005 14:20	DONE	0.09	-0.67	dec	0.87	0	-1.4	3.2	3.00	1.16
405087	1200797348	02-MAR-2005 18:20	DONE	1.75	0.75	dec	0.87	0	-1.4	3.2	3.00	1.16

410228	1200809516	25-MAR-2005 16:27	DONE	2.2	1.1	dec	0.87	0	-1.4	3.2	3.00	1.16
412929	1200815959	07-APR-2005 17:04	DONE	0.07	-0.7	dec	0.87	0	-1.4	3.2	3.00	1.16
413613	1200817441	11-APR-2005 16:50	DONE	1.18	0.26	dec	0.87	0	-1.4	3.2	3.00	1.16
419672	1200832042	26-APR-2005 16:51	DONE	0.35	-0.45	dec	0.87	0	-1.4	3.2	3.00	1.16
421104	1200835563	06-MAY-2005 16:48	DONE	1.98	0.96	dec	0.87	0	-1.4	3.2	3.00	1.16
423658	1200842019	09-MAY-2005 13:16	DONE	0.64	-0.2	dec	0.87	0	-1.4	3.2	3.00	1.16
425652	1200846824	21-MAY-2005 01:38	DONE	0.11	-0.66	dec	0.87	0	-1.4	3.2	3.00	1.16
429170	1200855475	27-MAY-2005 21:41	DONE	0.78	-0.08	dec	0.87	0	-1.4	3.2	3.00	1.16
428525	1200853979	28-MAY-2005 02:24	DONE	0.02	-0.74	dec	0.87	0	-1.4	3.2	3.00	1.16
430767	1200859375	03-JUN-2005 14:38	DONE	0.26	-0.53	dec	0.87	0	-1.4	3.2	3.00	1.16
439503	1200880211	05-JUL-2005 22:09	DONE	0.33	-0.47	dec	0.87	0	-1.4	3.2	3.00	1.16
437544	1200875750	11-JUL-2005 11:14	DONE	0.73	-0.12	dec	0.87	0	-1.4	3.2	3.00	1.16
439502	1200880206	11-JUL-2005 17:17	DONE	0.78	-0.08	dec	0.87	0	-1.4	3.2	3.00	1.16
447932	1200900828	03-AUG-2005 16:59	DONE	0.25	-0.54	dec	0.87	0	-1.4	3.2	3.00	1.16
473187	1200961069	25-OCT-2005 08:47	DONE	0.02	-0.73	dec	0.87	0	-1.4	3.2	3.00	1.16
483935	1200986716	02-DEC-2005 16:03	DONE	5.7	4.2	dec	0.87	0	-1.4	3.2	3.00	1.16
486185	1200992391	12-DEC-2005 11:32	DONE	0.07	-0.69	dec	0.87	0	-1.4	3.2	3.00	1.16
486203	1200992443	19-DEC-2005 11:48	DONE	0.65	-0.19	dec	0.87	0	-1.4	3.2	3.00	1.16

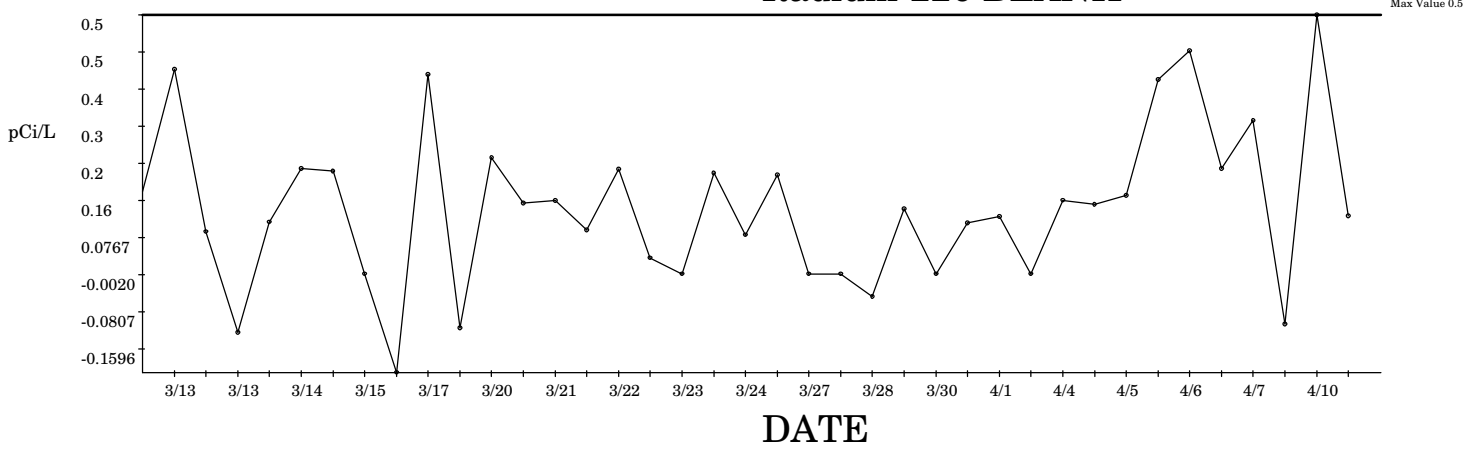
**Total UraniumSPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
499318	1201022163	01-FEB-2006 10:27	DONE	92.7	-0.87	percent	100	75.0	83.3	117	125	8.33
499606	1201022801	03-FEB-2006 15:22	DONE	91.3	-1	percent	100	75.0	83.3	117	125	8.33
495499	1201013561	09-FEB-2006 11:38	DONE	117	2.1	percent	100	75.0	83.3	117	125	8.33
499607	1201022806	10-FEB-2006 14:16	DONE	89.6	-1	percent	100	75.0	83.3	117	125	8.33
502226	1201029169	14-FEB-2006 13:29	DONE	84.5	-2	percent	100	75.0	83.3	117	125	8.33
502227	1201029174	16-FEB-2006 15:13	DONE	96.7	-0.4	percent	100	75.0	83.3	117	125	8.33
503735	1201032420	17-FEB-2006 14:43	DONE	82.6	-2	percent	100	75.0	83.3	117	125	8.33
505123	1201035710	22-FEB-2006 15:06	DONE	74.7	-3	percent	100	75.0	83.3	117	125	8.33
505124	1201035715	23-FEB-2006 16:07	DONE	102	0.18	percent	100	75.0	83.3	117	125	8.33
507732	1201041934	06-MAR-2006 14:26	DONE	93.4	-0.8	percent	100	75.0	83.3	117	125	8.33
509089	1201045165	08-MAR-2006 11:18	DONE	95.6	-0.53	percent	100	75.0	83.3	117	125	8.33
509091	1201045174	09-MAR-2006 11:10	DONE	121	2.5	percent	100	75.0	83.3	117	125	8.33
509093	1201045183	10-MAR-2006 10:33	DONE	95.2	-0.58	percent	100	75.0	83.3	117	125	8.33
510519	1201048341	13-MAR-2006 13:25	DONE	70.8	-4	percent	100	75.0	83.3	117	125	8.33
510315	1201048005	13-MAR-2006 15:09	DONE	97.5	-0.3	percent	100	75.0	83.3	117	125	8.33
510361	1201048011	15-MAR-2006 10:21	DONE	94.6	-0.65	percent	100	75.0	83.3	117	125	8.33
512099	1201051954	17-MAR-2006 09:31	DONE	62.5	-4	percent	100	75.0	83.3	117	125	8.33
511794	1201051267	17-MAR-2006 10:47	DONE	93.7	-0.76	percent	100	75.0	83.3	117	125	8.33
513427	1201054894	23-MAR-2006 09:50	DONE	102	0.19	percent	100	75.0	83.3	117	125	8.33
514308	1201056610	27-MAR-2006 11:00	DONE	101	0.15	percent	100	75.0	83.3	117	125	8.33
514304	1201056595	28-MAR-2006 12:06	DONE	94.8	-0.62	percent	100	75.0	83.3	117	125	8.33
514306	1201056601	28-MAR-2006 15:08	DONE	96	-0.48	percent	100	75.0	83.3	117	125	8.33
514311	1201056623	29-MAR-2006 10:05	DONE	99.2	-0.1	percent	100	75.0	83.3	117	125	8.33
514314	1201056628	29-MAR-2006 11:26	DONE	100	0.02	percent	100	75.0	83.3	117	125	8.33
515691	1201059801	31-MAR-2006 09:55	DONE	101	0.17	percent	100	75.0	83.3	117	125	8.33

515693	1201059810	31-MAR-2006 10:50	DONE	111	1.4	percent	100	75.0	83.3	117	125	8.33
515695	1201059815	05-APR-2006 10:22	DONE	99.4	-0.07	percent	100	75.0	83.3	117	125	8.33
518894	1201066878	11-APR-2006 10:11	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
518888	1201066857	11-APR-2006 11:49	DONE	107	0.78	percent	100	75.0	83.3	117	125	8.33
518891	1201066866	12-APR-2006 11:04	DUSE	95.5	-0.54	percent	100	75.0	83.3	117	125	8.33
519925	1201069160	18-APR-2006 11:29	DONE	105	0.59	percent	100	75.0	83.3	117	125	8.33
519934	1201069197	19-APR-2006 10:46	DONE	99.3	-0.08	percent	100	75.0	83.3	117	125	8.33
519938	1201069202	19-APR-2006 12:51	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
519939	1201069208	19-APR-2006 13:35	DONE	101	0.07	percent	100	75.0	83.3	117	125	8.33
519940	1201069213	19-APR-2006 15:39	DONE	101	0.14	percent	100	75.0	83.3	117	125	8.33
519941	1201069218	20-APR-2006 11:56	DONE	107	0.81	percent	100	75.0	83.3	117	125	8.33
519942	1201069228	21-APR-2006 11:53	DUSE	117	2.1	percent	100	75.0	83.3	117	125	8.33
522696	1201075709	24-APR-2006 10:12	DONE	97.7	-0.27	percent	100	75.0	83.3	117	125	8.33
523680	1201077882	26-APR-2006 10:22	DONE	104	0.5	percent	100	75.0	83.3	117	125	8.33

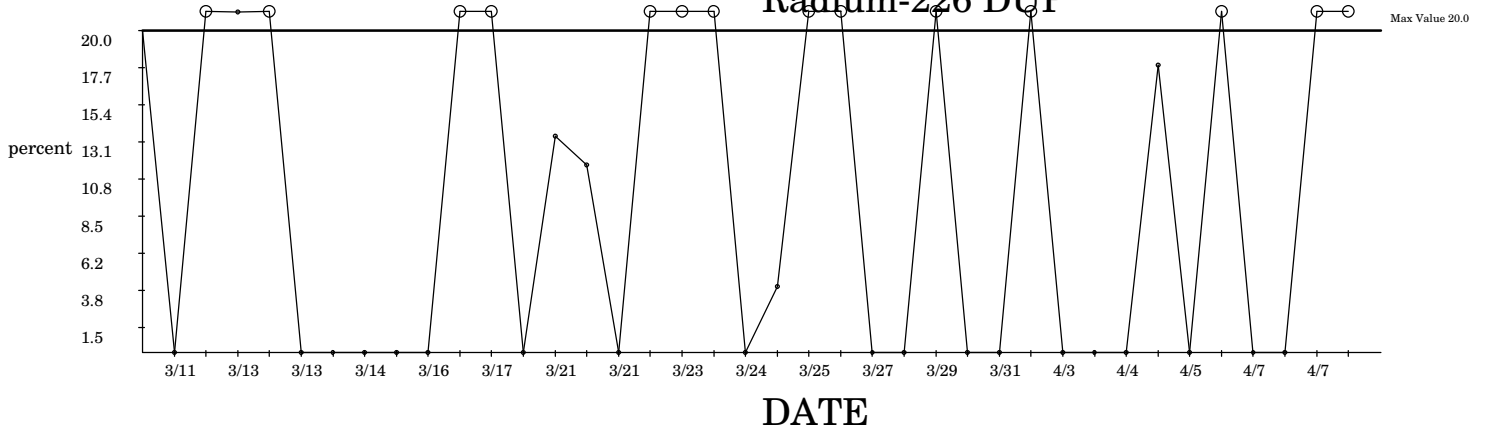
# SPC Graph for Lucas Cell Radium 226 in Liquids 4/11/2006

## Radium-226 BLANK



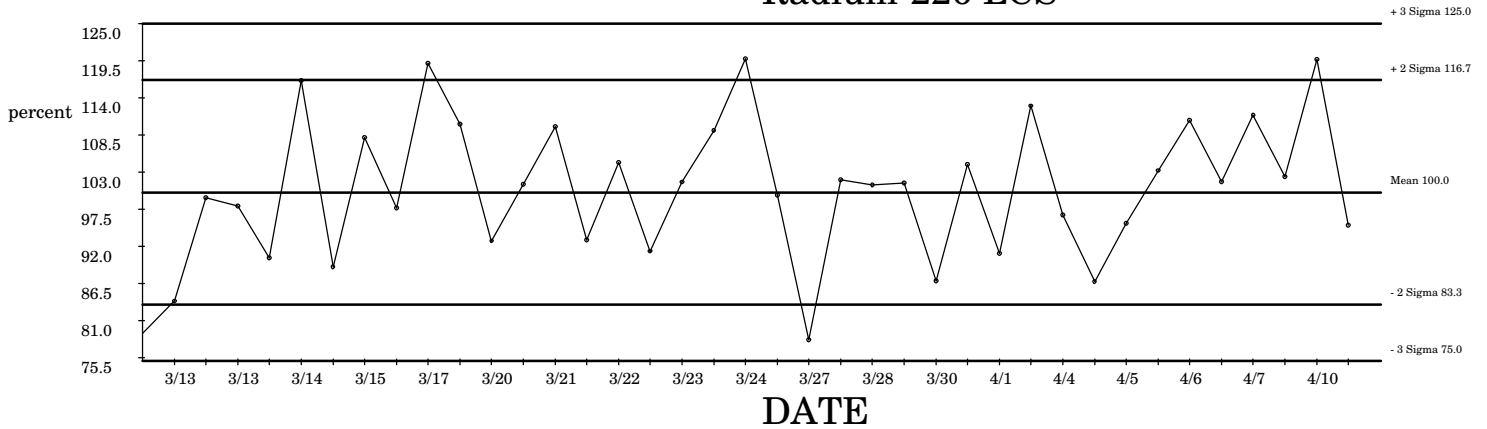
DATE

## Radium-226 DUP



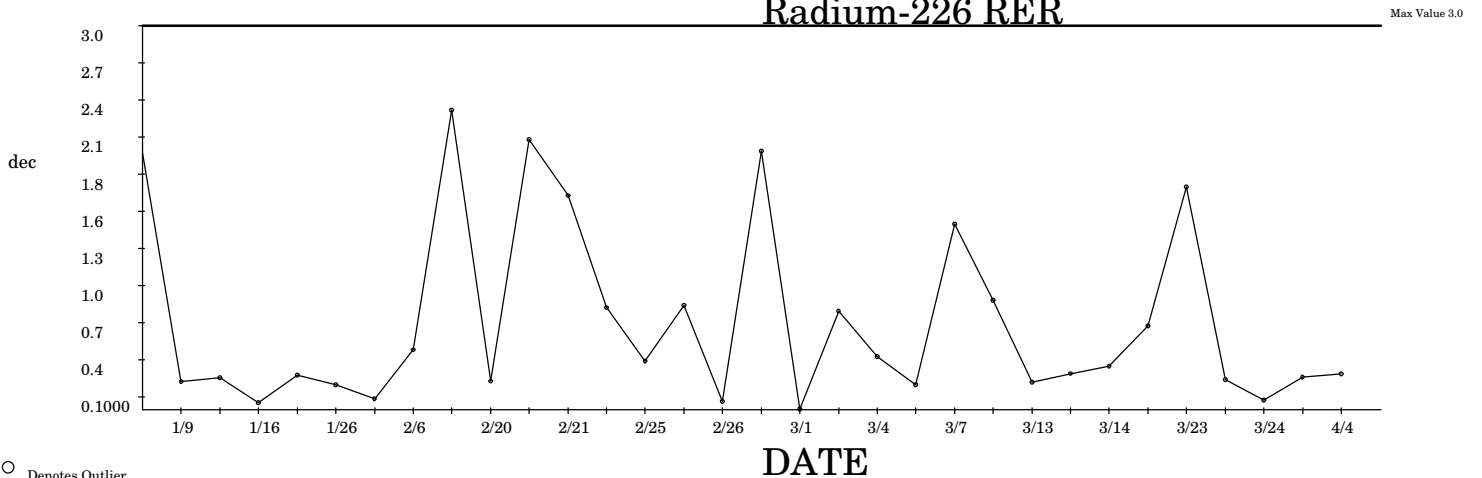
DATE

## Radium-226 LCS



DATE

## Radium-226 RER



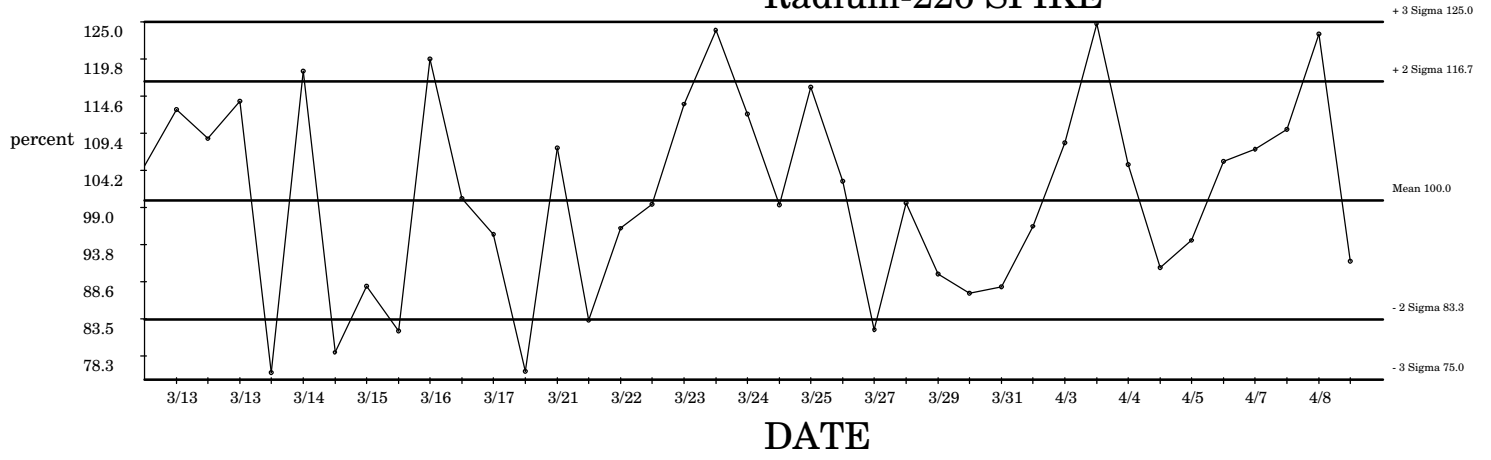
DATE

○ Denotes Outlier



# SPC Graph for Lucas Cell Radium 226 in Liquids 4/11/2006

## Radium-226 SPIKE



○ Denotes Outlier

# Data used for Lucas Cell Radium 226 in Liquids 12-APR-2006

Radium-226 BLANK: Limits LCL = -.4 UCL = .6

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
508193	1201043049	11-MAR-2006 18:30	DONE	0	0.16	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510096	1201047336	13-MAR-2006 07:55	DONE	0	1.7	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508847	1201044642	13-MAR-2006 09:00	DONE	0	-0.29	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
507422	1201041266	13-MAR-2006 23:05	DONE	0	-2	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510100	1201047353	13-MAR-2006 23:05	DONE	0	-0.17	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508848	1201044646	14-MAR-2006 10:35	DONE	0	0.5	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508845	1201044630	14-MAR-2006 14:00	DONE	0	0.47	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510098	1201047344	15-MAR-2006 21:20	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508846	1201044634	16-MAR-2006 15:05	DONE	0	-2	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510099	1201047349	17-MAR-2006 09:45	DONE	0	1.7	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510646	1201048626	17-MAR-2006 17:40	DONE	0	-1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510094	1201047328	20-MAR-2006 20:50	DONE	0	0.64	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508851	1201044655	21-MAR-2006 09:30	DONE	0	0.07	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
511412	1201050383	21-MAR-2006 13:45	DONE	0	0.1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510095	1201047332	21-MAR-2006 15:30	DONE	0	-0.27	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510101	1201047357	22-MAR-2006 09:20	DONE	0	0.49	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
511384	1201050305	23-MAR-2006 11:50	DONE	0	-0.62	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
511905	1201051483	23-MAR-2006 20:10	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
513423	1201054876	24-MAR-2006 07:50	DONE	0	0.44	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
512638	1201053208	24-MAR-2006 08:30	DONE	0	-0.33	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
510097	1201047340	27-MAR-2006 12:05	DONE	0	0.42	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
508195	1201043053	27-MAR-2006 15:00	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
512753	1201053461	27-MAR-2006 20:00	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
513367	1201054753	28-MAR-2006 22:50	DONE	0	-1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
512637	1201053204	29-MAR-2006 21:50	DONE	0	-0.01	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
514680	1201057530	30-MAR-2006 20:04	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
514682	1201057534	31-MAR-2006 23:18	DONE	0	-0.18	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
512635	1201053196	01-APR-2006 13:00	DONE	0	-0.1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
512634	1201053192	03-APR-2006 12:50	DONE	0	-0.82	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
516190	1201060833	04-APR-2006 05:15	DONE	0	0.1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
511410	1201050375	04-APR-2006 10:50	DONE	0	0.05	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
511411	1201050379	05-APR-2006 11:40	DONE	0	0.16	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
514686	1201057554	05-APR-2006 12:40	DONE	0	1.6	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
514684	1201057546	06-APR-2006 11:30	DONE	0	2	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
516172	1201060797	07-APR-2006 09:15	DONE	0	0.5	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
516170	1201060793	07-APR-2006 09:55	DONE	0	1.1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
516189	1201060829	07-APR-2006 23:50	DONE	0	-1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
518058	1201064983	10-APR-2006 08:55	DONE	1	2.4	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17
515528	1201059359	10-APR-2006 23:50	DONE	0	-0.1	pCi/L	0.14	-0.371	-0.201	0.48	0.65	0.17

Radium-226 DUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
507423	1201041271	10-MAR-2006 21:52	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
508193	1201043050	11-MAR-2006 18:30	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
510096	1201047337	13-MAR-2006 07:55	DONE	43	1	percent	17.8	0	-31	67	20.0	24.6
508847	1201044643	13-MAR-2006 09:00	DONE	21	0.14	percent	17.8	0	-31	67	20.0	24.6

510100	1201047354	13-MAR-2006 10:40	DONE	44	1.1	percent	17.8	0	-31	67	20.0	24.6
507422	1201041267	13-MAR-2006 23:05	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
508848	1201044647	14-MAR-2006 10:35	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
508845	1201044631	14-MAR-2006 14:00	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
510098	1201047345	15-MAR-2006 10:30	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
508846	1201044635	16-MAR-2006 13:15	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
510099	1201047350	17-MAR-2006 09:45	DONE	22	0.19	percent	17.8	0	-31	67	20.0	24.6
510646	1201048627	17-MAR-2006 17:40	DONE	40	0.9	percent	17.8	0	-31	67	20.0	24.6
510094	1201047329	20-MAR-2006 21:24	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
508851	1201044656	21-MAR-2006 11:30	DONE	13	-0.18	percent	17.8	0	-31	67	20.0	24.6
511412	1201050384	21-MAR-2006 13:45	DONE	12	-0.25	percent	17.8	0	-31	67	20.0	24.6
510095	1201047333	21-MAR-2006 16:10	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
510101	1201047358	22-MAR-2006 10:00	DONE	29	0.47	percent	17.8	0	-31	67	20.0	24.6
511384	1201050306	23-MAR-2006 11:50	DONE	50	1.3	percent	17.8	0	-31	67	20.0	24.6
511905	1201051484	23-MAR-2006 20:10	DONE	100	3.4	percent	17.8	0	-31	67	20.0	24.6
513423	1201054877	24-MAR-2006 07:50	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
512638	1201053209	24-MAR-2006 08:30	DONE	4	-0.56	percent	17.8	0	-31	67	20.0	24.6
508195	1201043054	25-MAR-2006 14:20	DONE	43	1	percent	17.8	0	-31	67	20.0	24.6
510097	1201047341	27-MAR-2006 12:05	DONE	36	0.75	percent	17.8	0	-31	67	20.0	24.6
512753	1201053462	27-MAR-2006 20:00	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
513367	1201054754	28-MAR-2006 22:50	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
512637	1201053205	29-MAR-2006 22:25	DONE	29	0.44	percent	17.8	0	-31	67	20.0	24.6
514680	1201057531	30-MAR-2006 20:04	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
514682	1201057535	31-MAR-2006 23:58	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
512635	1201053197	01-APR-2006 13:00	DONE	23	0.23	percent	17.8	0	-31	67	20.0	24.6
512634	1201053193	03-APR-2006 12:50	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
516190	1201060834	04-APR-2006 05:15	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
511410	1201050376	04-APR-2006 10:50	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
511411	1201050380	05-APR-2006 11:40	DONE	18	00	percent	17.8	0	-31	67	20.0	24.6
514686	1201057555	05-APR-2006 14:55	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
514684	1201057547	06-APR-2006 12:05	DONE	48	1.2	percent	17.8	0	-31	67	20.0	24.6
516172	1201060798	07-APR-2006 09:15	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
516170	1201060794	07-APR-2006 09:55	DONE	0	-0.72	percent	17.8	0	-31	67	20.0	24.6
516189	1201060830	07-APR-2006 23:19	DONE	83	2.6	percent	17.8	0	-31	67	20.0	24.6
518058	1201064984	10-APR-2006 09:30	DONE	35	0.72	percent	17.8	0	-31	67	20.0	24.6

**Radium-226 LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
508193	1201043052	13-MAR-2006 08:30	DONE	121	2.5	percent	100	75.0	83.3	117	125	8.33
510096	1201047339	13-MAR-2006 08:30	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
508847	1201044645	13-MAR-2006 09:00	DONE	99	-0.1	percent	100	75.0	83.3	117	125	8.33
510100	1201047356	13-MAR-2006 11:45	DONE	98	-0.25	percent	100	75.0	83.3	117	125	8.33
507422	1201041269	13-MAR-2006 23:40	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
508848	1201044649	14-MAR-2006 10:35	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
508845	1201044633	14-MAR-2006 14:40	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
510098	1201047348	15-MAR-2006 10:30	DONE	108	0.97	percent	100	75.0	83.3	117	125	8.33
510099	1201047352	17-MAR-2006 10:20	DONE	98	-0.28	percent	100	75.0	83.3	117	125	8.33
508846	1201044637	17-MAR-2006 11:30	DONE	119	2.3	percent	100	75.0	83.3	117	125	8.33
510646	1201048629	17-MAR-2006 18:12	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
510094	1201047331	20-MAR-2006 20:50	DONE	93	-0.86	percent	100	75.0	83.3	117	125	8.33

508851	1201044658	21-MAR-2006 11:30	DONE	101	0.15	percent	100	75.0	83.3	117	125	8.33
511412	1201050386	21-MAR-2006 14:15	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
510095	1201047335	21-MAR-2006 16:50	DONE	93	-0.85	percent	100	75.0	83.3	117	125	8.33
510101	1201047360	22-MAR-2006 10:00	DONE	104	0.53	percent	100	75.0	83.3	117	125	8.33
511384	1201050308	23-MAR-2006 12:35	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
511905	1201051486	23-MAR-2006 20:10	DONE	102	0.18	percent	100	75.0	83.3	117	125	8.33
512638	1201053211	24-MAR-2006 08:30	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
513423	1201054879	24-MAR-2006 09:05	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
508195	1201043056	25-MAR-2006 14:20	DONE	100	-0.05	percent	100	75.0	83.3	117	125	8.33
510097	1201047343	27-MAR-2006 12:45	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
512753	1201053464	27-MAR-2006 20:00	DONE	102	0.22	percent	100	75.0	83.3	117	125	8.33
513367	1201054756	28-MAR-2006 23:30	DONE	101	0.14	percent	100	75.0	83.3	117	125	8.33
512637	1201053207	29-MAR-2006 12:20	DONE	101	0.16	percent	100	75.0	83.3	117	125	8.33
514680	1201057533	30-MAR-2006 20:04	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
514682	1201057537	31-MAR-2006 23:58	DONE	104	0.49	percent	100	75.0	83.3	117	125	8.33
512635	1201053199	01-APR-2006 13:35	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
512634	1201053195	03-APR-2006 13:20	DONE	113	1.5	percent	100	75.0	83.3	117	125	8.33
516190	1201060836	04-APR-2006 05:45	DONE	97	-0.4	percent	100	75.0	83.3	117	125	8.33
511410	1201050378	04-APR-2006 11:25	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
511411	1201050382	05-APR-2006 11:40	DONE	95	-0.55	percent	100	75.0	83.3	117	125	8.33
514686	1201057557	05-APR-2006 14:55	DONE	103	0.39	percent	100	75.0	83.3	117	125	8.33
514684	1201057549	06-APR-2006 12:05	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
516172	1201060800	07-APR-2006 09:15	DONE	102	0.19	percent	100	75.0	83.3	117	125	8.33
516170	1201060796	07-APR-2006 09:55	DONE	111	1.4	percent	100	75.0	83.3	117	125	8.33
516189	1201060832	07-APR-2006 23:19	DONE	102	0.28	percent	100	75.0	83.3	117	125	8.33
518058	1201064986	10-APR-2006 09:30	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
515528	1201059362	10-APR-2006 23:50	DONE	95	-0.58	percent	100	75.0	83.3	117	125	8.33

**Radium-226 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
491123	1201003602	06-JAN-2006 08:30	DONE	01	0.52	dec	0.65	0	-0.689	1.99	3.00	0.67
492281	1201006340	09-JAN-2006 14:10	DONE	0.22	-0.64	dec	0.65	0	-0.689	1.99	3.00	0.67
493744	1201009613	16-JAN-2006 12:35	DONE	0.25	-0.59	dec	0.65	0	-0.689	1.99	3.00	0.67
491603	1201004809	16-JAN-2006 17:40	DONE	0.05	-0.89	dec	0.65	0	-0.689	1.99	3.00	0.67
496175	1201015002	24-JAN-2006 12:30	DONE	0.27	-0.56	dec	0.65	0	-0.689	1.99	3.00	0.67
494116	1201010400	26-JAN-2006 11:30	DONE	0.19	-0.68	dec	0.65	0	-0.689	1.99	3.00	0.67
498307	1201019879	31-JAN-2006 11:50	DONE	0.09	-0.84	dec	0.65	0	-0.689	1.99	3.00	0.67
494113	1201010392	06-FEB-2006 12:23	DONE	0.47	-0.27	dec	0.65	0	-0.689	1.99	3.00	0.67
498877	1201021133	09-FEB-2006 14:10	DONE	2.34	2.5	dec	0.65	0	-0.689	1.99	3.00	0.67
502800	1201030385	20-FEB-2006 12:05	DONE	0.22	-0.64	dec	0.65	0	-0.689	1.99	3.00	0.67
502788	1201030379	20-FEB-2006 21:00	DONE	2.11	2.2	dec	0.65	0	-0.689	1.99	3.00	0.67
501470	1201027422	21-FEB-2006 12:05	DONE	1.67	1.5	dec	0.65	0	-0.689	1.99	3.00	0.67
504420	1201034005	22-FEB-2006 10:35	DONE	0.8	0.22	dec	0.65	0	-0.689	1.99	3.00	0.67
505540	1201036745	25-FEB-2006 12:15	DONE	0.38	-0.4	dec	0.65	0	-0.689	1.99	3.00	0.67
504418	1201033997	25-FEB-2006 13:50	DONE	0.81	0.25	dec	0.65	0	-0.689	1.99	3.00	0.67
505537	1201036733	26-FEB-2006 12:30	DONE	0.07	-0.87	dec	0.65	0	-0.689	1.99	3.00	0.67
504916	1201035200	28-FEB-2006 11:20	DONE	2.02	2.1	dec	0.65	0	-0.689	1.99	3.00	0.67
505541	1201036749	01-MAR-2006 11:00	DONE	00	-0.96	dec	0.65	0	-0.689	1.99	3.00	0.67
506091	1201038002	03-MAR-2006 11:15	DONE	0.77	0.18	dec	0.65	0	-0.689	1.99	3.00	0.67
506887	1201039889	04-MAR-2006 20:29	DONE	0.42	-0.35	dec	0.65	0	-0.689	1.99	3.00	0.67

506889	1201039897	06-MAR-2006 09:00	DONE	0.19	-0.68	dec	0.65	0	-0.689	1.99	3.00	0.67
506097	1201038018	07-MAR-2006 09:30	DONE	1.45	1.2	dec	0.65	0	-0.689	1.99	3.00	0.67
506099	1201038022	08-MAR-2006 09:55	DONE	0.85	0.31	dec	0.65	0	-0.689	1.99	3.00	0.67
508847	1201044643	13-MAR-2006 09:00	DONE	0.21	-0.65	dec	0.65	0	-0.689	1.99	3.00	0.67
510100	1201047354	13-MAR-2006 10:40	DONE	0.28	-0.55	dec	0.65	0	-0.689	1.99	3.00	0.67
508848	1201044647	14-MAR-2006 10:35	DONE	0.34	-0.46	dec	0.65	0	-0.689	1.99	3.00	0.67
510098	1201047345	15-MAR-2006 10:30	DONE	0.66	0.01	dec	0.65	0	-0.689	1.99	3.00	0.67
511905	1201051484	23-MAR-2006 20:10	DONE	1.74	1.6	dec	0.65	0	-0.689	1.99	3.00	0.67
513423	1201054877	24-MAR-2006 07:50	DONE	0.23	-0.62	dec	0.65	0	-0.689	1.99	3.00	0.67
512638	1201053209	24-MAR-2006 08:30	DONE	0.08	-0.85	dec	0.65	0	-0.689	1.99	3.00	0.67
510097	1201047341	27-MAR-2006 12:05	DONE	0.25	-0.59	dec	0.65	0	-0.689	1.99	3.00	0.67
511410	1201050376	04-APR-2006 10:50	DONE	0.28	-0.55	dec	0.65	0	-0.689	1.99	3.00	0.67

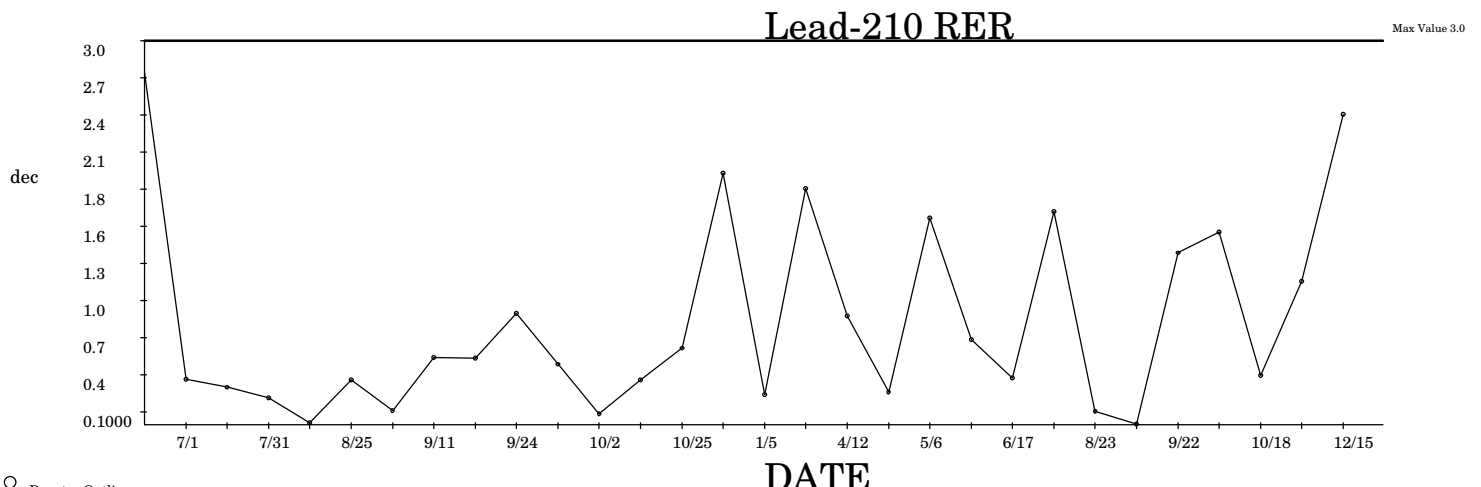
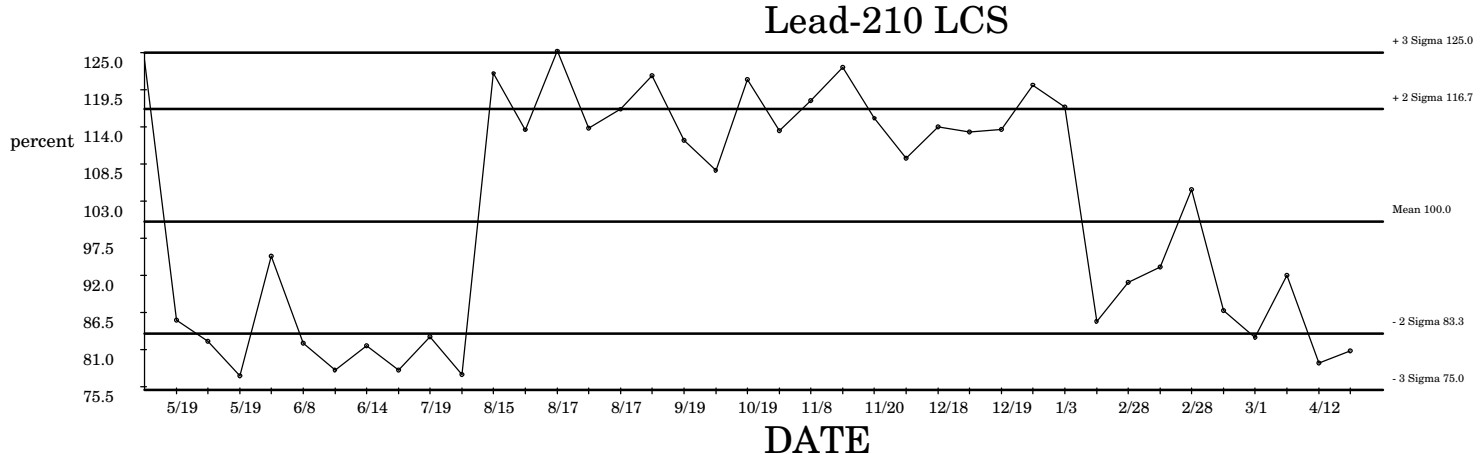
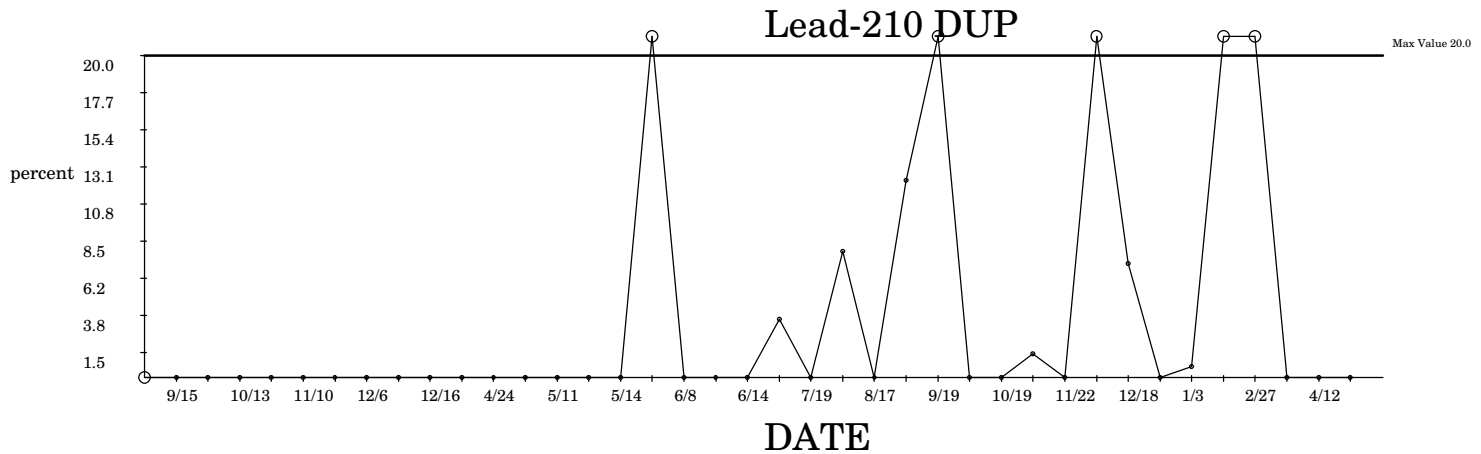
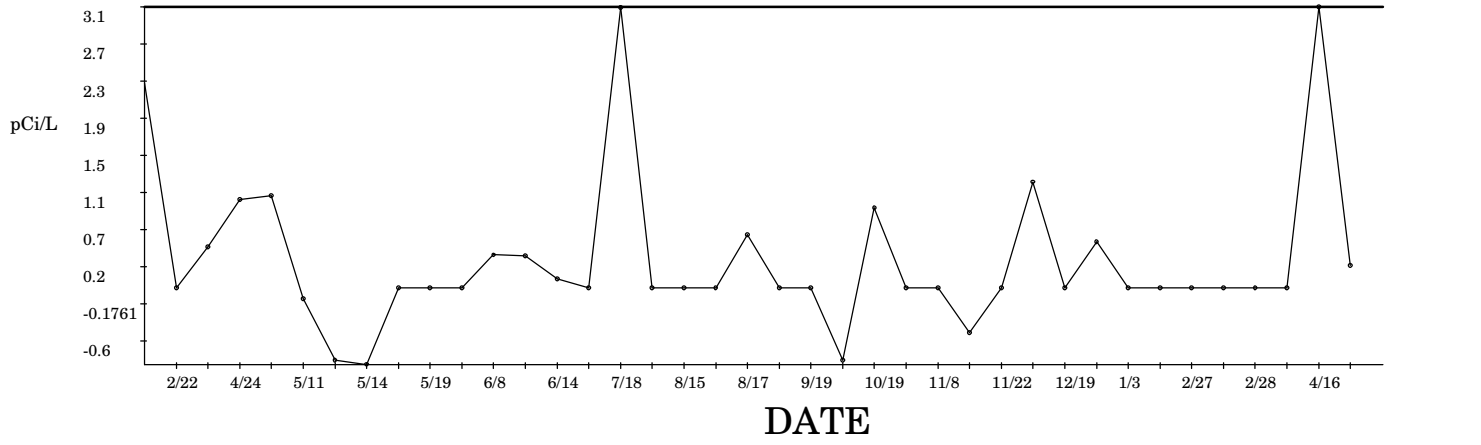
**Radium-226 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
508193	1201043051	11-MAR-2006 19:02	DONE	95	-0.58	percent	100	75.0	83.3	117	125	8.33
510096	1201047338	13-MAR-2006 07:55	DONE	113	1.5	percent	100	75.0	83.3	117	125	8.33
508847	1201044644	13-MAR-2006 09:00	DONE	109	1	percent	100	75.0	83.3	117	125	8.33
510100	1201047355	13-MAR-2006 11:45	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
507422	1201041268	14-MAR-2006 07:25	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
508848	1201044648	14-MAR-2006 10:35	DONE	118	2.2	percent	100	75.0	83.3	117	125	8.33
508845	1201044632	14-MAR-2006 16:00	DONE	79	-3	percent	100	75.0	83.3	117	125	8.33
510098	1201047346	15-MAR-2006 10:30	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
510098	1201047347	15-MAR-2006 10:30	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
508846	1201044636	16-MAR-2006 13:15	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
510099	1201047351	17-MAR-2006 09:45	DONE	100	0.04	percent	100	75.0	83.3	117	125	8.33
510646	1201048628	17-MAR-2006 18:12	DONE	95	-0.57	percent	100	75.0	83.3	117	125	8.33
510094	1201047330	21-MAR-2006 11:10	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
508851	1201044657	21-MAR-2006 11:30	DONE	107	0.88	percent	100	75.0	83.3	117	125	8.33
511412	1201050385	21-MAR-2006 14:15	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
510101	1201047359	22-MAR-2006 10:00	DONE	96	-0.46	percent	100	75.0	83.3	117	125	8.33
510095	1201047334	22-MAR-2006 11:05	DONE	99	-0.06	percent	100	75.0	83.3	117	125	8.33
511384	1201050307	23-MAR-2006 12:35	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
511905	1201051485	23-MAR-2006 20:10	DONE	124	2.9	percent	100	75.0	83.3	117	125	8.33
513423	1201054878	24-MAR-2006 07:50	DONE	112	1.5	percent	100	75.0	83.3	117	125	8.33
512638	1201053210	24-MAR-2006 08:30	DONE	99	-0.07	percent	100	75.0	83.3	117	125	8.33
508195	1201043055	25-MAR-2006 14:20	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
510097	1201047342	27-MAR-2006 12:05	DONE	103	0.33	percent	100	75.0	83.3	117	125	8.33
512753	1201053463	27-MAR-2006 20:30	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
513367	1201054755	28-MAR-2006 22:50	DONE	100	-0.04	percent	100	75.0	83.3	117	125	8.33
512637	1201053206	29-MAR-2006 12:20	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
514680	1201057532	30-MAR-2006 20:04	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
514682	1201057536	31-MAR-2006 23:18	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
512635	1201053198	01-APR-2006 13:00	DONE	96	-0.43	percent	100	75.0	83.3	117	125	8.33
512634	1201053194	03-APR-2006 12:50	DONE	108	0.97	percent	100	75.0	83.3	117	125	8.33
516190	1201060835	04-APR-2006 05:45	DONE	125	3	percent	100	75.0	83.3	117	125	8.33
511410	1201050377	04-APR-2006 11:25	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
511411	1201050381	05-APR-2006 11:40	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
514686	1201057556	05-APR-2006 14:55	DONE	94	-0.67	percent	100	75.0	83.3	117	125	8.33
514684	1201057548	06-APR-2006 12:05	DONE	105	0.65	percent	100	75.0	83.3	117	125	8.33

516172	1201060799	07-APR-2006 09:15	DONE	107	0.86	percent	100	75.0	83.3	117	125	8.33
516170	1201060795	07-APR-2006 09:55	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
516189	1201060831	08-APR-2006 15:20	DONE	123	2.8	percent	100	75.0	83.3	117	125	8.33
518058	1201064985	10-APR-2006 09:30	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33

# SPC Graph for Gas Flow Lead-210 in Liquids 4/25/2006

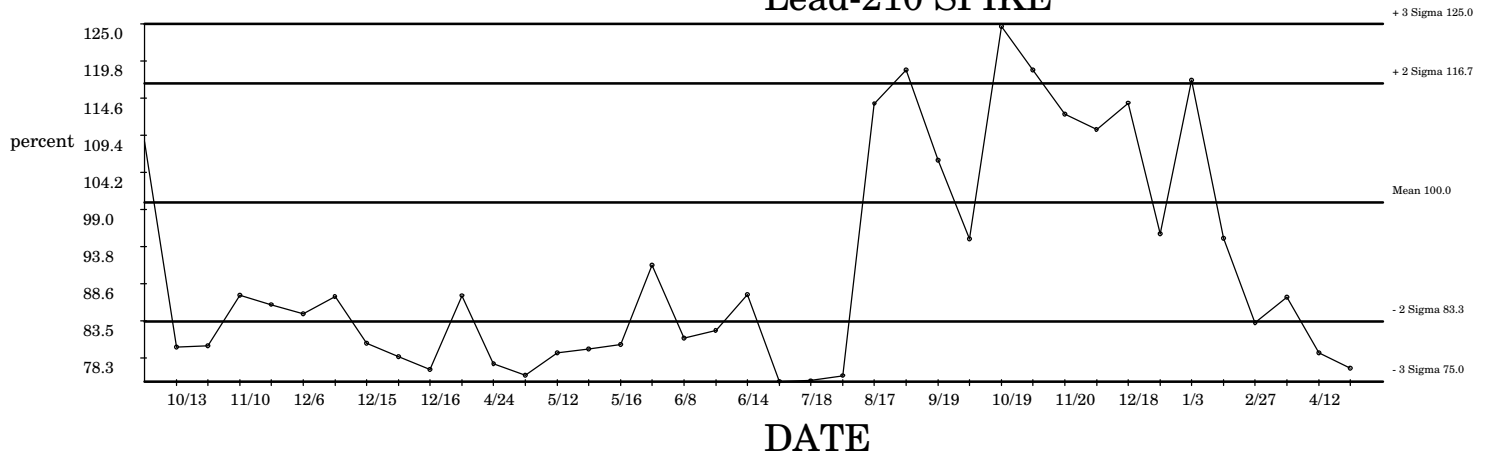
## Lead-210 BLANK



○ Denotes Outlier

# SPC Graph for Gas Flow Lead-210 in Liquids 4/25/2006

## Lead-210 SPIKE





# Data used for Gas Flow Lead-210 in Liquids 26-APR-2006

Lead-210 BLANK: Limits LCL = -2.2 UCL = 2.7

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
400110	1200785595	21-FEB-2005 16:38	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
400109	1200785591	22-FEB-2005 07:24	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
415571	1200822191	18-APR-2005 00:50	DONE	0	0.25	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
417543	1200827004	24-APR-2005 19:55	DONE	1	0.91	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
419557	1200831804	30-APR-2005 15:21	DONE	1	0.96	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
422332	1200838732	11-MAY-2005 07:18	DONE	0	-0.46	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
419558	1200831808	14-MAY-2005 20:57	DONE	-1	-1	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
422819	1200839939	14-MAY-2005 21:00	DONE	-1	-1	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
419559	1200831812	19-MAY-2005 08:43	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
419560	1200831815	19-MAY-2005 10:21	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
421692	1200836959	25-MAY-2005 08:55	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
430106	1200857690	08-JUN-2005 09:03	DONE	0	0.14	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
430764	1200859365	13-JUN-2005 11:29	DONE	0	0.13	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
431616	1200861663	14-JUN-2005 06:26	DONE	0	-0.19	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
430541	1200858801	26-JUN-2005 18:15	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
441104	1200884260	18-JUL-2005 19:15	DONE	3	3.6	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
437246	1200875105	21-JUL-2005 22:20	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
450347	1200906423	15-AUG-2005 21:26	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
450351	1200906426	17-AUG-2005 11:33	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
450354	1200906438	17-AUG-2005 14:19	DONE	1	0.42	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
450352	1200906430	18-AUG-2005 14:14	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
461613	1200933183	19-SEP-2005 13:53	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
461895	1200933942	22-SEP-2005 10:16	DONE	-1	-1	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
471295	1200956478	19-OCT-2005 10:39	DONE	1	0.79	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
470692	1200954937	19-OCT-2005 16:56	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
475222	1200965926	08-NOV-2005 10:52	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
481294	1200980553	22-NOV-2005 09:21	DONE	0	-0.93	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
479208	1200975628	22-NOV-2005 14:07	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
486637	1200993457	18-DEC-2005 21:40	DONE	1	1.1	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
485399	1200990514	19-DEC-2005 12:14	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
489016	1200998991	25-DEC-2005 19:10	DONE	1	0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
487146	1200994636	03-JAN-2006 10:19	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
495993	1201014597	05-FEB-2006 14:34	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
504804	1201034958	27-FEB-2006 11:25	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
503558	1201031984	28-FEB-2006 10:50	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
503559	1201031987	28-FEB-2006 23:10	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
512214	1201052258	21-MAR-2006 11:45	DONE	0	-0.32	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
517808	1201064410	16-APR-2006 23:19	DONE	3	3.6	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81
520607	1201070733	25-APR-2006 14:15	DONE	0	-0	pCi/L	0.25	-2.2	-1.4	1.87	2.68	0.81

Lead-210 DUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
356233	1200680261	17-AUG-2004 11:19	DONE	28	1.4	percent	6.62	0	-25	38.6	20.0	16
364294	1200699138	15-SEP-2004 09:13	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
364295	1200699143	15-SEP-2004 10:11	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
371366	1200716015	13-OCT-2004 08:24	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16

371367	1200716019	18-OCT-2004 07:44	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
378642	1200734036	10-NOV-2004 09:46	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
378641	1200734032	15-NOV-2004 09:35	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
383936	1200746759	06-DEC-2004 09:02	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
383918	1200746688	06-DEC-2004 10:34	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
385729	1200751075	16-DEC-2004 04:06	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
415571	1200822192	18-APR-2005 00:50	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
417543	1200827005	24-APR-2005 19:55	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
419557	1200831805	30-APR-2005 15:21	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
422332	1200838733	11-MAY-2005 07:18	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
419558	1200831809	14-MAY-2005 20:57	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
422819	1200839940	14-MAY-2005 21:01	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
421692	1200836960	25-MAY-2005 10:35	DONE	22	0.93	percent	6.62	0	-25	38.6	20.0	16
430106	1200857691	08-JUN-2005 09:03	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
430764	1200859366	13-JUN-2005 11:29	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
431616	1200861664	14-JUN-2005 06:26	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
430541	1200858802	26-JUN-2005 18:15	DONE	4	-0.19	percent	6.62	0	-25	38.6	20.0	16
441104	1200884261	19-JUL-2005 15:04	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
437246	1200875106	21-JUL-2005 22:20	DONE	8	0.08	percent	6.62	0	-25	38.6	20.0	16
450354	1200906439	17-AUG-2005 14:19	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
450352	1200906431	18-AUG-2005 14:14	DONE	12	0.35	percent	6.62	0	-25	38.6	20.0	16
461613	1200933184	19-SEP-2005 13:52	DONE	28	1.3	percent	6.62	0	-25	38.6	20.0	16
461895	1200933943	22-SEP-2005 10:16	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
471295	1200956479	19-OCT-2005 11:41	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
470692	1200954938	19-OCT-2005 16:56	DONE	1	-0.32	percent	6.62	0	-25	38.6	20.0	16
481294	1200980554	22-NOV-2005 09:21	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
479208	1200975629	22-NOV-2005 14:07	DONE	34	1.7	percent	6.62	0	-25	38.6	20.0	16
486637	1200993458	18-DEC-2005 21:39	DONE	7	0.03	percent	6.62	0	-25	38.6	20.0	16
489016	1200998992	25-DEC-2005 19:10	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
487146	1200994637	03-JAN-2006 10:19	DONE	1	-0.37	percent	6.62	0	-25	38.6	20.0	16
495993	1201014598	05-FEB-2006 14:34	DONE	84	4.8	percent	6.62	0	-25	38.6	20.0	16
504804	1201034959	27-FEB-2006 11:25	DONE	30	1.4	percent	6.62	0	-25	38.6	20.0	16
512214	1201052259	21-MAR-2006 11:45	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
517808	1201064411	12-APR-2006 10:37	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16
520607	1201070734	25-APR-2006 14:15	DONE	0	-0.41	percent	6.62	0	-25	38.6	20.0	16

Lead-210 LCS: Limits LCL = 75 UCL = 125

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
419559	1200831813	19-MAY-2005 08:42	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
419559	1200831814	19-MAY-2005 08:42	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
419560	1200831817	19-MAY-2005 10:20	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
419560	1200831816	19-MAY-2005 10:21	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
421692	1200836962	25-MAY-2005 10:35	DONE	95	-0.62	percent	100	75.0	83.3	117	125	8.33
430106	1200857693	08-JUN-2005 09:03	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
430764	1200859368	13-JUN-2005 11:29	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
431616	1200861666	14-JUN-2005 06:26	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
430541	1200858804	27-JUN-2005 11:34	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
441104	1200884263	19-JUL-2005 15:04	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
437246	1200875108	21-JUL-2005 13:20	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
450347	1200906424	15-AUG-2005 21:26	DONE	122	2.6	percent	100	75.0	83.3	117	125	8.33

450347	1200906425	15-AUG-2005 22:29	DONE	114	1.6	percent	100	75.0	83.3	117	125	8.33
450351	1200906427	17-AUG-2005 11:33	DONE	125	3	percent	100	75.0	83.3	117	125	8.33
450351	1200906428	17-AUG-2005 11:33	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
450354	1200906441	17-AUG-2005 14:19	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
450352	1200906433	18-AUG-2005 14:14	DONE	122	2.6	percent	100	75.0	83.3	117	125	8.33
461613	1200933186	19-SEP-2005 14:56	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
461895	1200933945	22-SEP-2005 10:16	DONE	108	0.9	percent	100	75.0	83.3	117	125	8.33
471295	1200956481	19-OCT-2005 10:40	DONE	121	2.5	percent	100	75.0	83.3	117	125	8.33
470692	1200954940	19-OCT-2005 17:59	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
475222	1200965928	08-NOV-2005 10:52	DONE	118	2.1	percent	100	75.0	83.3	117	125	8.33
475222	1200965927	08-NOV-2005 10:52	DONE	123	2.7	percent	100	75.0	83.3	117	125	8.33
479208	1200975631	20-NOV-2005 23:00	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
481294	1200980556	22-NOV-2005 09:21	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
486637	1200993460	18-DEC-2005 21:40	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
485399	1200990515	19-DEC-2005 12:14	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
485399	1200990516	19-DEC-2005 12:14	DONE	114	1.6	percent	100	75.0	83.3	117	125	8.33
489016	1200998994	25-DEC-2005 19:10	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
487146	1200994639	03-JAN-2006 10:19	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
495993	1201014600	04-FEB-2006 17:44	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
503558	1201031985	28-FEB-2006 15:18	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
503558	1201031986	28-FEB-2006 15:19	DONE	93	-0.82	percent	100	75.0	83.3	117	125	8.33
503559	1201031988	28-FEB-2006 23:10	DONE	105	0.57	percent	100	75.0	83.3	117	125	8.33
503559	1201031989	28-FEB-2006 23:10	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
504804	1201034961	01-MAR-2006 21:40	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
512214	1201052261	21-MAR-2006 11:45	DONE	92	-0.96	percent	100	75.0	83.3	117	125	8.33
517808	1201064413	12-APR-2006 10:37	DONE	79	-3	percent	100	75.0	83.3	117	125	8.33
520607	1201070736	25-APR-2006 14:15	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33

Lead-210 RER: Limits LCL = 0 UCL = 3

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
259157	1200444733	01-JUL-2003 03:49	DONE	0.25	-0.69	dec	0.71	0	-0.612	2.04	3.00	0.66
259156	1200444730	01-JUL-2003 13:35	DONE	0.35	-0.54	dec	0.71	0	-0.612	2.04	3.00	0.66
260891	1200449200	08-JUL-2003 03:35	DONE	0.29	-0.63	dec	0.71	0	-0.612	2.04	3.00	0.66
263853	1200456689	31-JUL-2003 12:42	DONE	0.21	-0.76	dec	0.71	0	-0.612	2.04	3.00	0.66
268208	1200467300	05-AUG-2003 20:11	DONE	0.02	-1	dec	0.71	0	-0.612	2.04	3.00	0.66
270119	1200472396	25-AUG-2003 17:29	DONE	0.35	-0.55	dec	0.71	0	-0.612	2.04	3.00	0.66
273714	1200481578	09-SEP-2003 12:10	DONE	0.11	-0.91	dec	0.71	0	-0.612	2.04	3.00	0.66
274534	1200483528	11-SEP-2003 03:42	DONE	0.52	-0.28	dec	0.71	0	-0.612	2.04	3.00	0.66
276187	1200487560	18-SEP-2003 16:35	DONE	0.52	-0.29	dec	0.71	0	-0.612	2.04	3.00	0.66
277706	1200491283	24-SEP-2003 14:13	DONE	0.87	0.24	dec	0.71	0	-0.612	2.04	3.00	0.66
277704	1200491269	29-SEP-2003 09:58	DONE	0.47	-0.36	dec	0.71	0	-0.612	2.04	3.00	0.66
278927	1200494421	02-OCT-2003 05:44	DONE	0.09	-0.95	dec	0.71	0	-0.612	2.04	3.00	0.66
280680	1200498873	13-OCT-2003 19:59	DONE	0.35	-0.55	dec	0.71	0	-0.612	2.04	3.00	0.66
284404	1200508164	25-OCT-2003 10:17	DONE	0.6	-0.17	dec	0.71	0	-0.612	2.04	3.00	0.66
290245	1200523078	17-NOV-2003 18:45	DONE	1.96	1.9	dec	0.71	0	-0.612	2.04	3.00	0.66
299278	1200545020	05-JAN-2004 20:33	DONE	0.23	-0.72	dec	0.71	0	-0.612	2.04	3.00	0.66
301230	1200549730	13-JAN-2004 05:57	DONE	1.84	1.7	dec	0.71	0	-0.612	2.04	3.00	0.66
322627	1200600723	12-APR-2004 12:50	DONE	0.85	0.21	dec	0.71	0	-0.612	2.04	3.00	0.66
323105	1200601878	14-APR-2004 14:15	DONE	0.25	-0.69	dec	0.71	0	-0.612	2.04	3.00	0.66
328142	1200613508	06-MAY-2004 19:34	DONE	1.62	1.4	dec	0.71	0	-0.612	2.04	3.00	0.66

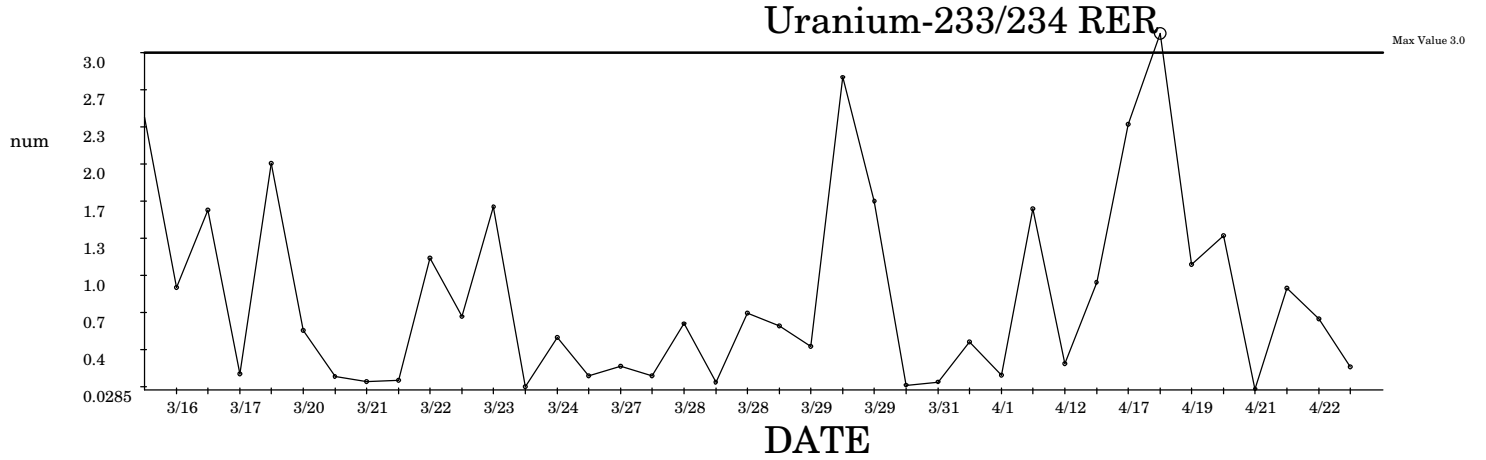
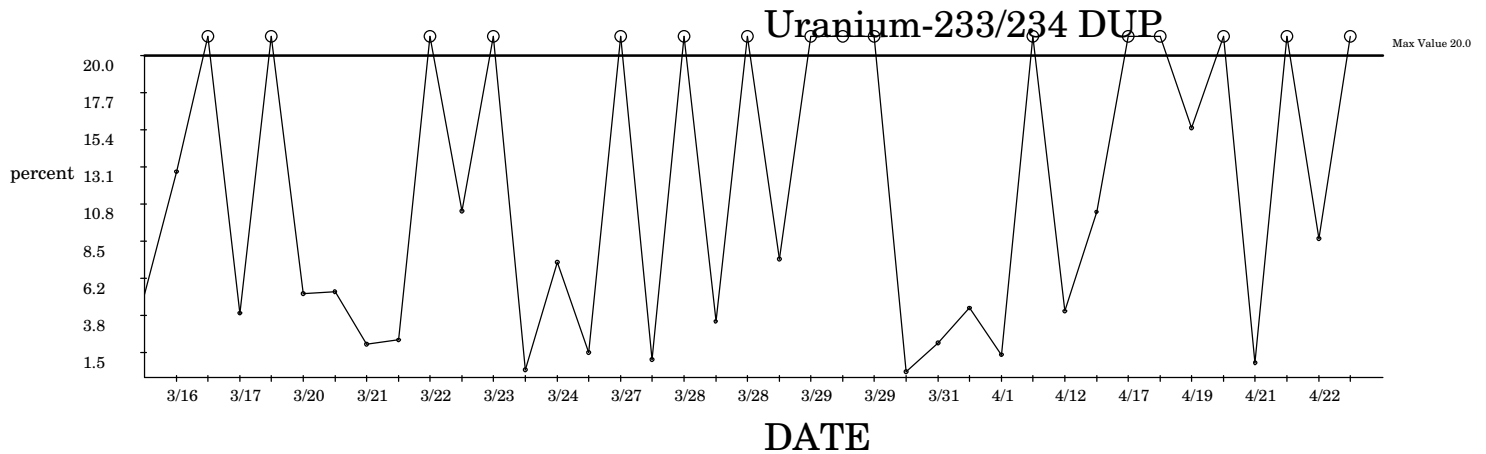
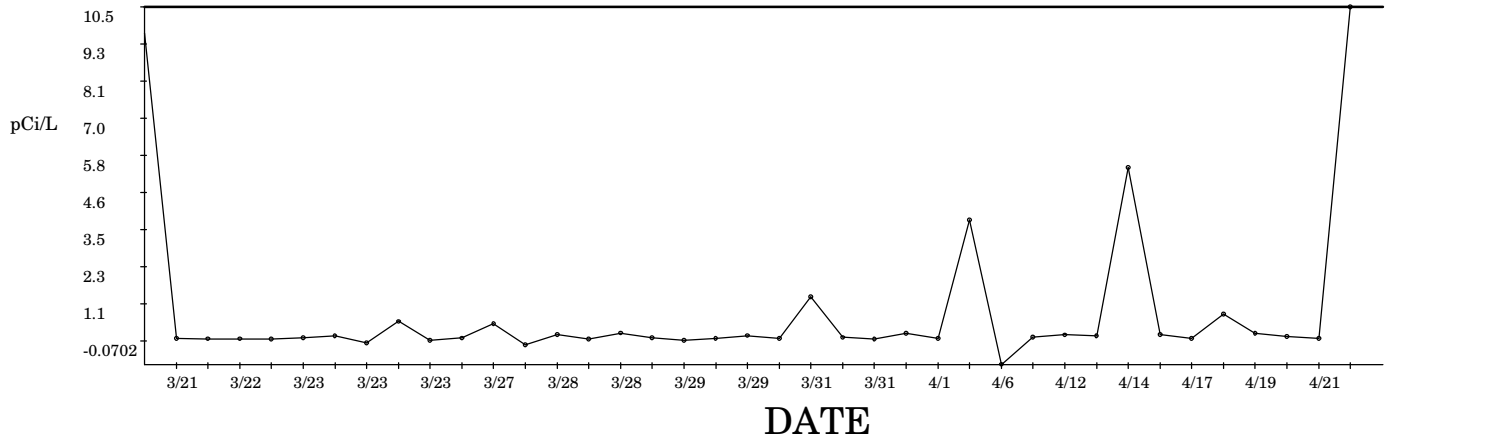
332226	1200623069	18-MAY-2004 21:56	DONE	0.67	-0.07	dec	0.71	0	-0.612	2.04	3.00	0.66
339666	1200640332	17-JUN-2004 20:36	DONE	0.36	-0.53	dec	0.71	0	-0.612	2.04	3.00	0.66
344859	1200653027	14-JUL-2004 01:14	DONE	1.67	1.4	dec	0.71	0	-0.612	2.04	3.00	0.66
355308	1200678102	23-AUG-2004 04:40	DONE	0.11	-0.91	dec	0.71	0	-0.612	2.04	3.00	0.66
356146	1200680029	25-AUG-2004 15:24	DONE	00	-1	dec	0.71	0	-0.612	2.04	3.00	0.66
365746	1200702829	22-SEP-2004 05:21	DONE	1.34	0.95	dec	0.71	0	-0.612	2.04	3.00	0.66
365744	1200702821	22-SEP-2004 06:27	DONE	1.51	1.2	dec	0.71	0	-0.612	2.04	3.00	0.66
372794	1200719620	18-OCT-2004 14:02	DONE	0.39	-0.49	dec	0.71	0	-0.612	2.04	3.00	0.66
385730	1200751079	15-DEC-2004 06:46	DONE	1.12	0.62	dec	0.71	0	-0.612	2.04	3.00	0.66
382363	1200742867	15-DEC-2004 13:22	DONE	2.42	2.6	dec	0.71	0	-0.612	2.04	3.00	0.66

Lead-210 SPIKE: Limits LCL = 75 UCL = 125

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
365744	1200702822	22-SEP-2004 06:27	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
371366	1200716016	13-OCT-2004 08:24	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
371367	1200716020	18-OCT-2004 07:44	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
378642	1200734037	10-NOV-2004 08:46	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
378641	1200734033	16-NOV-2004 18:49	DONE	86	-2	percent	100	75.0	83.3	117	125	8.33
383918	1200746689	06-DEC-2004 18:46	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
383936	1200746760	06-DEC-2004 19:50	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
385730	1200751080	15-DEC-2004 07:21	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
382363	1200742868	15-DEC-2004 13:22	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
385729	1200751076	16-DEC-2004 04:06	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
415571	1200822193	17-APR-2005 23:35	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
417543	1200827006	24-APR-2005 19:56	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33
419557	1200831806	30-APR-2005 15:21	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
422332	1200838734	12-MAY-2005 10:27	DONE	79	-3	percent	100	75.0	83.3	117	125	8.33
422819	1200839941	14-MAY-2005 21:00	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
419558	1200831810	16-MAY-2005 13:46	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
421692	1200836961	25-MAY-2005 10:35	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
430106	1200857692	08-JUN-2005 09:03	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33
430764	1200859367	13-JUN-2005 20:45	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
431616	1200861665	14-JUN-2005 06:26	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
430541	1200858803	27-JUN-2005 11:34	DONE	75	-3	percent	100	75.0	83.3	117	125	8.33
441104	1200884262	18-JUL-2005 19:44	DONE	75	-3	percent	100	75.0	83.3	117	125	8.33
437246	1200875107	21-JUL-2005 13:20	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
450354	1200906440	17-AUG-2005 14:19	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
450352	1200906432	18-AUG-2005 14:14	DONE	119	2.2	percent	100	75.0	83.3	117	125	8.33
461613	1200933185	19-SEP-2005 13:52	DONE	106	0.71	percent	100	75.0	83.3	117	125	8.33
461895	1200933944	22-SEP-2005 10:16	DONE	95	-0.61	percent	100	75.0	83.3	117	125	8.33
471295	1200956480	19-OCT-2005 10:39	DONE	125	3	percent	100	75.0	83.3	117	125	8.33
470692	1200954939	19-OCT-2005 16:56	DONE	119	2.2	percent	100	75.0	83.3	117	125	8.33
479208	1200975630	20-NOV-2005 23:00	DONE	112	1.5	percent	100	75.0	83.3	117	125	8.33
481294	1200980555	22-NOV-2005 09:21	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
486637	1200993459	18-DEC-2005 21:39	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
489016	1200998993	25-DEC-2005 19:10	DONE	96	-0.52	percent	100	75.0	83.3	117	125	8.33
487146	1200994638	03-JAN-2006 10:19	DONE	117	2.1	percent	100	75.0	83.3	117	125	8.33
495993	1201014599	04-FEB-2006 17:44	DONE	95	-0.6	percent	100	75.0	83.3	117	125	8.33
504804	1201034960	27-FEB-2006 11:26	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
512214	1201052260	21-MAR-2006 11:45	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33

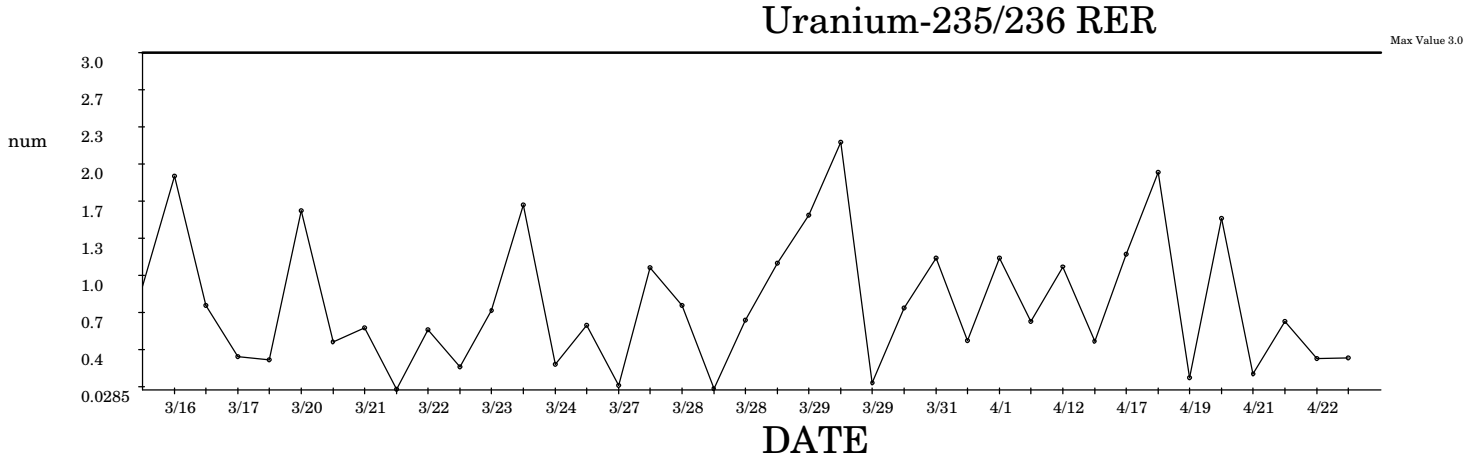
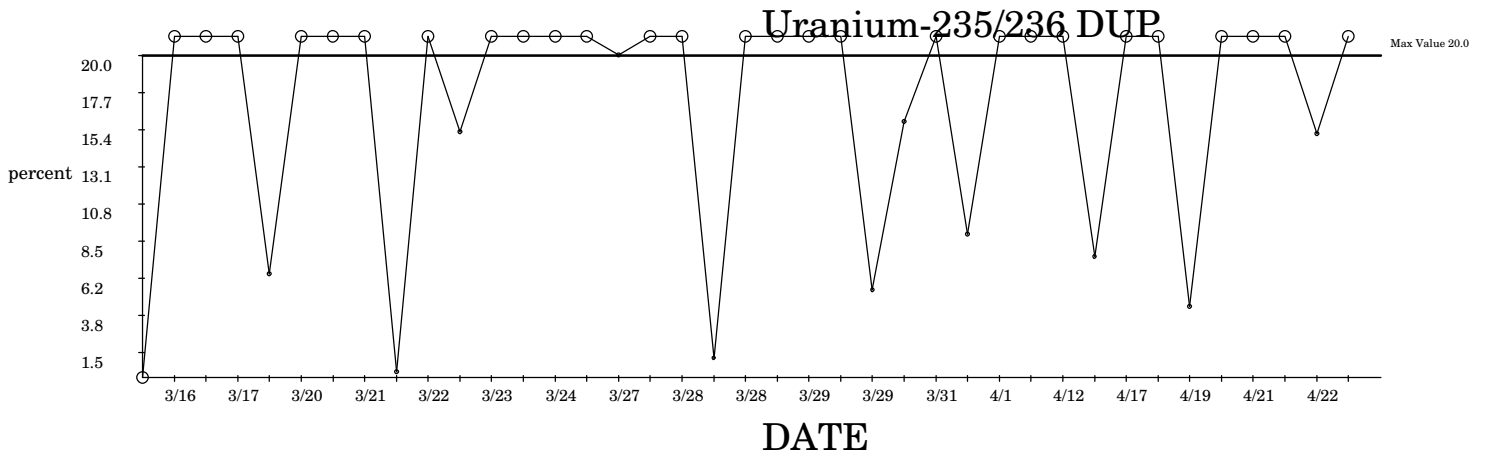
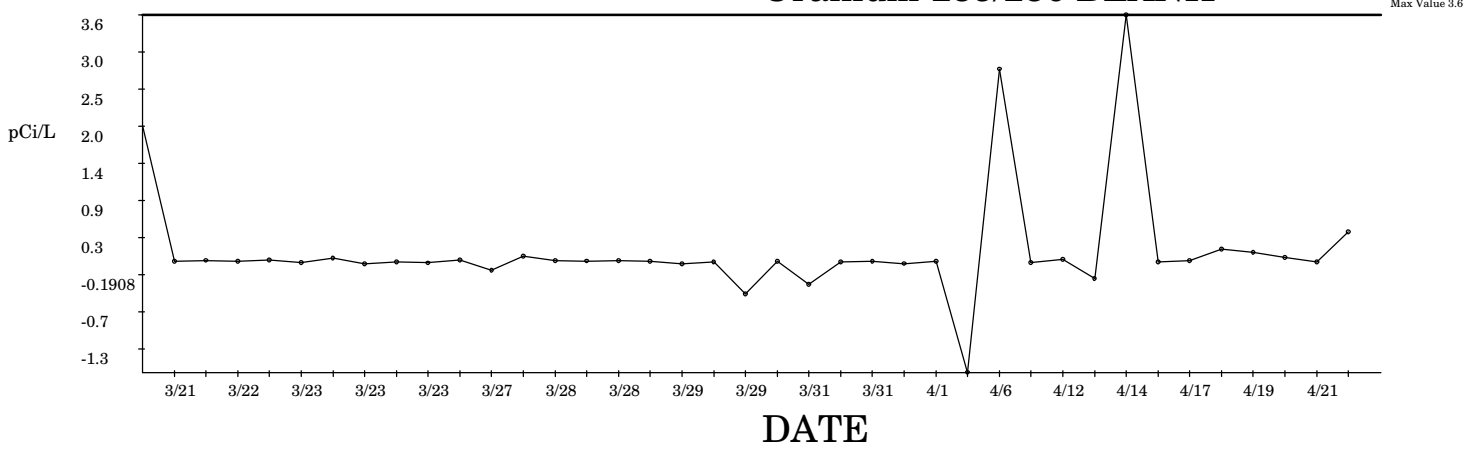
517808	1201064412	12-APR-2006 10:37	DONE	79	-3	percent	100	75.0	83.3	117	125	8.33
520607	1201070735	25-APR-2006 14:15	DONE	77	-3	percent	100	75.0	83.3	117	125	8.33

# SPC Graph for Alpha SpecUranium in Liquids 4/24/2006 Uranium-233/234 BLANK



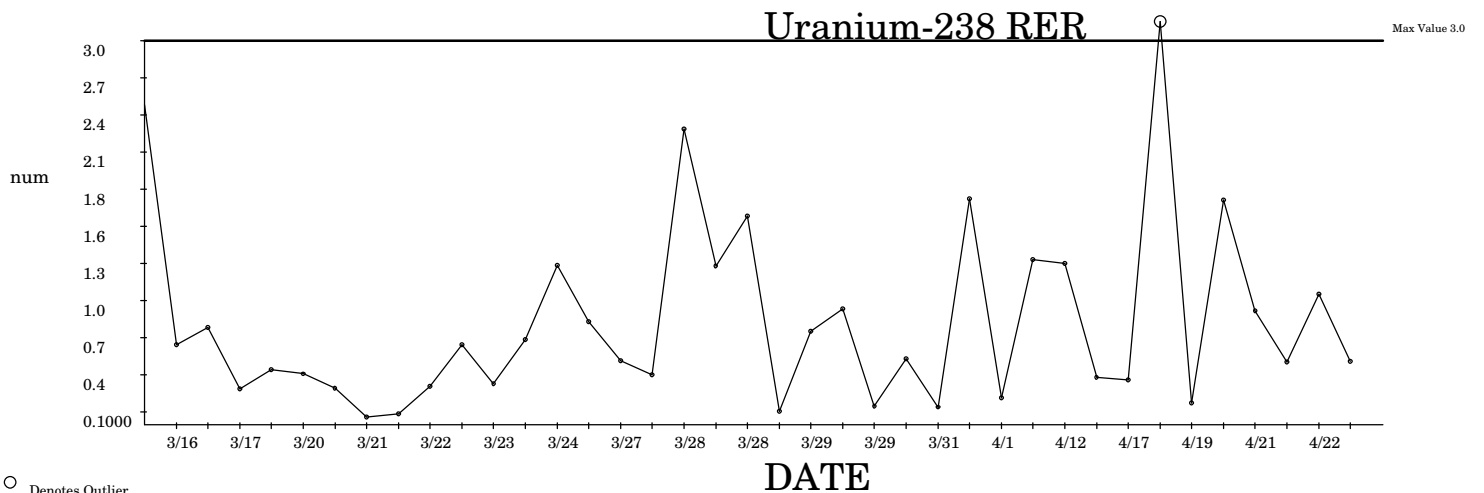
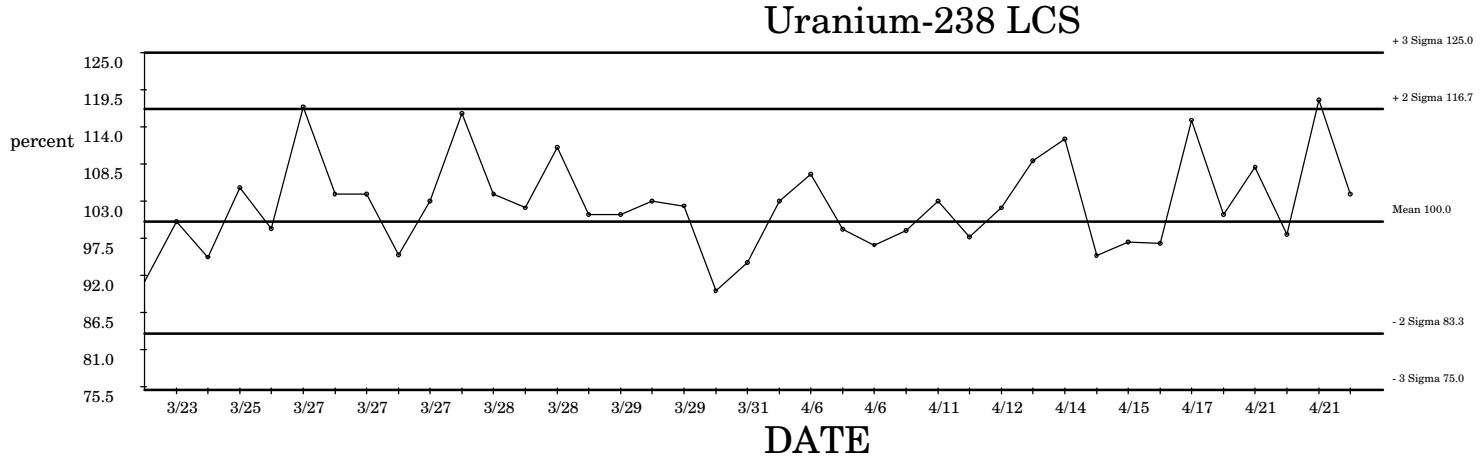
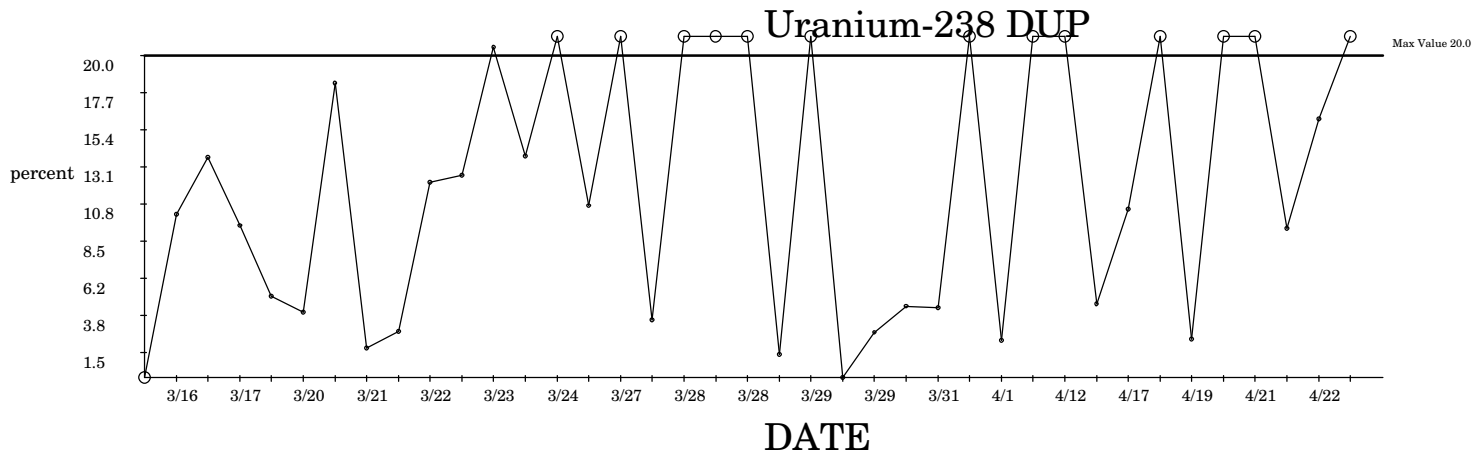
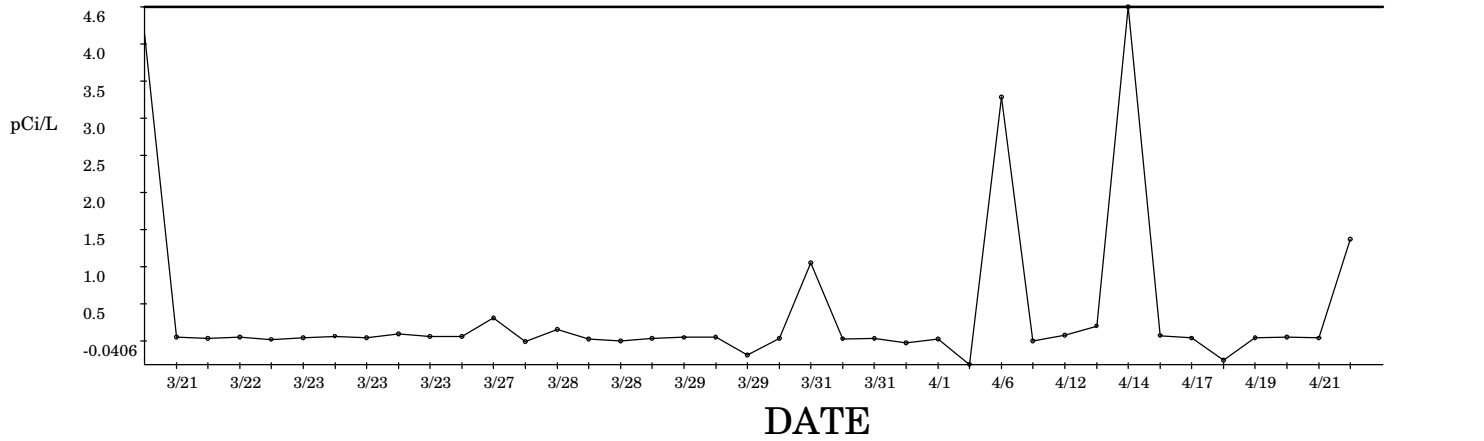
○ Denotes Outlier

# SPC Graph for Alpha SpecUranium in Liquids 4/24/2006 Uranium-235/236 BLANK



# SPC Graph for Alpha SpecUranium in Liquids 4/24/2006

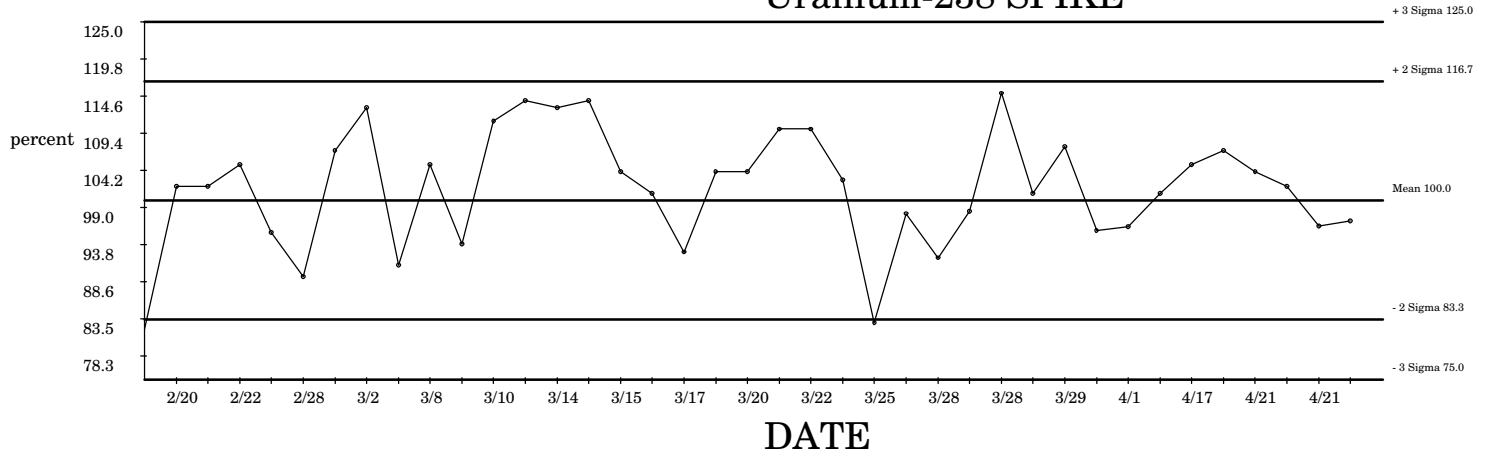
## Uranium-238 BLANK



○ Denotes Outlier



# SPC Graph for Alpha SpecUranium in Liquids 4/24/2006 Uranium-238 SPIKE



○ Denotes Outlier

## Data used for Alpha SpecUranium in Liquids 26-APR-2006

Uranium-233/234BLANK: Limits LCL = -5.2 UCL = 6.4

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510723	1201048836	20-MAR-2006 16:57	DONE	0.02	-0.29	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
510734	1201048867	21-MAR-2006 16:38	DONE	0.01	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511648	1201050949	21-MAR-2006 16:38	DONE	00	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511653	1201050964	22-MAR-2006 12:29	DONE	00	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
512077	1201051899	22-MAR-2006 14:23	DONE	-0.004	-0.31	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511616	1201050865	23-MAR-2006 08:32	DONE	0.03	-0.29	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511988	1201051682	23-MAR-2006 13:27	DONE	0.09	-0.26	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
510728	1201048852	23-MAR-2006 13:27	DONE	-0.138	-0.38	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511552	1201050721	23-MAR-2006 16:14	DONE	0.55	-0.02	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511560	1201050747	23-MAR-2006 18:20	DONE	-0.046	-0.33	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511709	1201051079	25-MAR-2006 15:09	DONE	0.02	-0.29	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511201	1201049856	27-MAR-2006 08:14	DONE	0.48	-0.06	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514936	1201057981	27-MAR-2006 14:43	DONE	-0.183	-0.4	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
512777	1201053518	28-MAR-2006 07:34	DONE	0.13	-0.24	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
512076	1201051895	28-MAR-2006 07:39	DONE	-0.013	-0.31	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
515153	1201058496	28-MAR-2006 12:29	DONE	0.18	-0.21	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514141	1201056267	28-MAR-2006 16:43	DONE	0.03	-0.29	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514267	1201056533	29-MAR-2006 07:59	DONE	-0.05	-0.33	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511652	1201050960	29-MAR-2006 16:04	DONE	0.02	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
511564	1201050754	29-MAR-2006 19:53	DONE	0.1	-0.25	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514277	1201056551	29-MAR-2006 22:27	DONE	00	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514320	1201056638	31-MAR-2006 08:29	DONE	1.32	0.37	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
512070	1201051881	31-MAR-2006 15:55	DONE	0.04	-0.28	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
515540	1201059382	31-MAR-2006 19:27	DONE	-0.016	-0.31	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
514261	1201056520	01-APR-2006 09:22	DONE	0.18	-0.21	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
516131	1201060706	01-APR-2006 16:30	DONE	0.02	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
516497	1201061514	06-APR-2006 08:42	DONE	3.76	1.6	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
516532	1201061530	06-APR-2006 13:23	DONE	-0.808	-0.72	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
518879	1201066818	11-APR-2006 16:43	DONE	0.05	-0.28	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
518911	1201066929	12-APR-2006 14:20	DONE	0.12	-0.24	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
517717	1201064212	12-APR-2006 17:24	DONE	0.09	-0.26	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
519218	1201067494	14-APR-2006 09:06	DONE	5.41	2.5	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
520706	1201070943	15-APR-2006 09:12	DONE	0.14	-0.23	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
518916	1201066938	17-APR-2006 07:52	DUSE	0.01	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
519428	1201067985	17-APR-2006 16:05	DONE	0.78	0.1	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
521040	1201071729	19-APR-2006 14:49	DONE	0.17	-0.22	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
520799	1201071144	21-APR-2006 07:38	DONE	0.07	-0.27	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
521962	1201074073	21-APR-2006 10:18	DONE	0.01	-0.3	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95
520373	1201070134	21-APR-2006 19:20	DUSE	10.5	5.1	pCi/L	0.59	-5.2	-3.3	4.48	6.43	1.95

Uranium-233/234DUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
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510661	1201048686	15-MAR-2006 10:56	DONE	14.8	-0.32	percent	41.6	0	-120	207	20.0	82.5
511878	1201051444	16-MAR-2006 12:58	DONE	12.8	-0.35	percent	41.6	0	-120	207	20.0	82.5
510654	1201048653	17-MAR-2006 13:41	DONE	26.6	-0.18	percent	41.6	0	-120	207	20.0	82.5
510724	1201048841	17-MAR-2006 13:41	DONE	3.99	-0.46	percent	41.6	0	-120	207	20.0	82.5
510738	1201048878	20-MAR-2006 07:42	DONE	23.4	-0.22	percent	41.6	0	-120	207	20.0	82.5
510723	1201048837	20-MAR-2006 16:57	DONE	5.2	-0.44	percent	41.6	0	-120	207	20.0	82.5
510734	1201048868	21-MAR-2006 16:38	DONE	5.33	-0.44	percent	41.6	0	-120	207	20.0	82.5
511648	1201050950	21-MAR-2006 16:38	DONE	2.05	-0.48	percent	41.6	0	-120	207	20.0	82.5
511653	1201050965	22-MAR-2006 12:29	DONE	2.33	-0.48	percent	41.6	0	-120	207	20.0	82.5
512077	1201051900	22-MAR-2006 14:23	DONE	40.0	-0.02	percent	41.6	0	-120	207	20.0	82.5
511988	1201051683	23-MAR-2006 13:27	DONE	10.3	-0.38	percent	41.6	0	-120	207	20.0	82.5
511552	1201050722	23-MAR-2006 16:14	DONE	73.8	0.39	percent	41.6	0	-120	207	20.0	82.5
511560	1201050748	23-MAR-2006 18:20	DONE	0.48	-0.5	percent	41.6	0	-120	207	20.0	82.5
511616	1201050866	24-MAR-2006 14:52	DONE	7.14	-0.42	percent	41.6	0	-120	207	20.0	82.5
511709	1201051080	25-MAR-2006 15:09	DONE	1.55	-0.49	percent	41.6	0	-120	207	20.0	82.5
514141	1201056268	27-MAR-2006 16:25	DONE	83.9	0.51	percent	41.6	0	-120	207	20.0	82.5
511652	1201050961	27-MAR-2006 16:59	DONE	1.11	-0.49	percent	41.6	0	-120	207	20.0	82.5
512777	1201053519	28-MAR-2006 07:34	DONE	35.3	-0.08	percent	41.6	0	-120	207	20.0	82.5
514320	1201056639	28-MAR-2006 07:34	DONE	3.48	-0.46	percent	41.6	0	-120	207	20.0	82.5
512076	1201051896	28-MAR-2006 07:39	DONE	32.8	-0.11	percent	41.6	0	-120	207	20.0	82.5
515153	1201058497	28-MAR-2006 12:29	DONE	7.34	-0.42	percent	41.6	0	-120	207	20.0	82.5
514267	1201056534	29-MAR-2006 07:59	DONE	90.3	0.59	percent	41.6	0	-120	207	20.0	82.5
514261	1201056521	29-MAR-2006 07:59	DONE	363	3.9	percent	41.6	0	-120	207	20.0	82.5
511564	1201050755	29-MAR-2006 19:53	DONE	34.7	-0.08	percent	41.6	0	-120	207	20.0	82.5
514277	1201056552	29-MAR-2006 22:27	DONE	0.36	-0.5	percent	41.6	0	-120	207	20.0	82.5
512070	1201051882	31-MAR-2006 15:55	DONE	2.14	-0.48	percent	41.6	0	-120	207	20.0	82.5
515540	1201059383	31-MAR-2006 19:27	DONE	4.31	-0.45	percent	41.6	0	-120	207	20.0	82.5
516131	1201060707	01-APR-2006 16:30	DONE	1.4	-0.49	percent	41.6	0	-120	207	20.0	82.5
518879	1201066819	11-APR-2006 16:43	DONE	74.1	0.39	percent	41.6	0	-120	207	20.0	82.5
518911	1201066930	12-APR-2006 14:20	DONE	4.11	-0.45	percent	41.6	0	-120	207	20.0	82.5
520706	1201070944	15-APR-2006 09:12	DONE	10.3	-0.38	percent	41.6	0	-120	207	20.0	82.5
519428	1201067986	17-APR-2006 07:52	DONE	67	0.31	percent	41.6	0	-120	207	20.0	82.5
518916	1201066939	18-APR-2006 14:03	DUSE	103	0.74	percent	41.6	0	-120	207	20.0	82.5
521040	1201071730	19-APR-2006 14:49	DONE	15.5	-0.32	percent	41.6	0	-120	207	20.0	82.5
521962	1201074074	21-APR-2006 10:18	DONE	378	4.1	percent	41.6	0	-120	207	20.0	82.5
521962	1201074159	21-APR-2006 10:18	DONE	0.9	-0.49	percent	41.6	0	-120	207	20.0	82.5
520373	1201070135	21-APR-2006 19:20	DUSE	28.9	-0.15	percent	41.6	0	-120	207	20.0	82.5
520799	1201071145	22-APR-2006 07:38	DONE	8.63	-0.4	percent	41.6	0	-120	207	20.0	82.5
521962	1201074160	22-APR-2006 09:26	DONE	42.5	0.01	percent	41.6	0	-120	207	20.0	82.5

**Uranium-233/234RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510661	1201048686	15-MAR-2006 10:56	DONE	0.58	-0.25	num	0.89	0	-1.6	3.41	3.00	1.26
511878	1201051444	16-MAR-2006 12:58	DONE	0.91	0.02	num	0.89	0	-1.6	3.41	3.00	1.26
510654	1201048653	17-MAR-2006 13:41	DONE	1.6	0.56	num	0.89	0	-1.6	3.41	3.00	1.26
510724	1201048841	17-MAR-2006 13:41	DONE	0.14	-0.59	num	0.89	0	-1.6	3.41	3.00	1.26

510738	1201048878	20-MAR-2006 07:42	DONE	2.02	0.9	num	0.89	0	-1.6	3.41	3.00	1.26
510723	1201048837	20-MAR-2006 16:57	DONE	0.53	-0.28	num	0.89	0	-1.6	3.41	3.00	1.26
510734	1201048868	21-MAR-2006 16:38	DONE	0.12	-0.61	num	0.89	0	-1.6	3.41	3.00	1.26
511648	1201050950	21-MAR-2006 16:38	DONE	0.07	-0.64	num	0.89	0	-1.6	3.41	3.00	1.26
511653	1201050965	22-MAR-2006 12:29	DONE	0.08	-0.64	num	0.89	0	-1.6	3.41	3.00	1.26
512077	1201051900	22-MAR-2006 14:23	DONE	1.17	0.23	num	0.89	0	-1.6	3.41	3.00	1.26
511988	1201051683	23-MAR-2006 13:27	DONE	0.65	-0.18	num	0.89	0	-1.6	3.41	3.00	1.26
511552	1201050722	23-MAR-2006 16:14	DONE	1.63	0.59	num	0.89	0	-1.6	3.41	3.00	1.26
511560	1201050748	23-MAR-2006 18:20	DONE	0.03	-0.68	num	0.89	0	-1.6	3.41	3.00	1.26
511616	1201050866	24-MAR-2006 14:52	DONE	0.47	-0.33	num	0.89	0	-1.6	3.41	3.00	1.26
511709	1201051080	25-MAR-2006 15:09	DONE	0.12	-0.6	num	0.89	0	-1.6	3.41	3.00	1.26
514141	1201056268	27-MAR-2006 16:25	DONE	0.21	-0.53	num	0.89	0	-1.6	3.41	3.00	1.26
511652	1201050961	27-MAR-2006 16:59	DONE	0.12	-0.6	num	0.89	0	-1.6	3.41	3.00	1.26
512777	1201053519	28-MAR-2006 07:34	DONE	0.59	-0.24	num	0.89	0	-1.6	3.41	3.00	1.26
514320	1201056639	28-MAR-2006 07:34	DONE	0.07	-0.65	num	0.89	0	-1.6	3.41	3.00	1.26
512076	1201051896	28-MAR-2006 07:39	DONE	0.68	-0.16	num	0.89	0	-1.6	3.41	3.00	1.26
515153	1201058497	28-MAR-2006 12:29	DONE	0.57	-0.25	num	0.89	0	-1.6	3.41	3.00	1.26
514267	1201056534	29-MAR-2006 07:59	DONE	0.39	-0.4	num	0.89	0	-1.6	3.41	3.00	1.26
514261	1201056521	29-MAR-2006 07:59	DONE	2.78	1.5	num	0.89	0	-1.6	3.41	3.00	1.26
511564	1201050755	29-MAR-2006 19:53	DONE	1.68	0.63	num	0.89	0	-1.6	3.41	3.00	1.26
514277	1201056552	29-MAR-2006 22:27	DONE	0.04	-0.67	num	0.89	0	-1.6	3.41	3.00	1.26
512070	1201051882	31-MAR-2006 15:55	DONE	0.07	-0.65	num	0.89	0	-1.6	3.41	3.00	1.26
515540	1201059383	31-MAR-2006 19:27	DONE	0.43	-0.36	num	0.89	0	-1.6	3.41	3.00	1.26
516131	1201060707	01-APR-2006 16:30	DONE	0.13	-0.6	num	0.89	0	-1.6	3.41	3.00	1.26
518879	1201066819	11-APR-2006 16:43	DONE	1.61	0.58	num	0.89	0	-1.6	3.41	3.00	1.26
518911	1201066930	12-APR-2006 14:20	DONE	0.23	-0.52	num	0.89	0	-1.6	3.41	3.00	1.26
520706	1201070944	15-APR-2006 09:12	DONE	0.96	0.06	num	0.89	0	-1.6	3.41	3.00	1.26
519428	1201067986	17-APR-2006 07:52	DONE	2.36	1.2	num	0.89	0	-1.6	3.41	3.00	1.26
518916	1201066939	18-APR-2006 14:03	DUSE	7.25	5	num	0.89	0	-1.6	3.41	3.00	1.26
521040	1201071730	19-APR-2006 14:49	DONE	1.12	0.18	num	0.89	0	-1.6	3.41	3.00	1.26
521962	1201074074	21-APR-2006 10:18	DONE	1.37	0.39	num	0.89	0	-1.6	3.41	3.00	1.26
521962	1201074159	21-APR-2006 10:18	DONE	0.01	-0.7	num	0.89	0	-1.6	3.41	3.00	1.26
520373	1201070135	21-APR-2006 19:20	DUSE	0.91	0.02	num	0.89	0	-1.6	3.41	3.00	1.26
520799	1201071145	22-APR-2006 07:38	DONE	0.63	-0.2	num	0.89	0	-1.6	3.41	3.00	1.26
521962	1201074160	22-APR-2006 09:26	DONE	0.2	-0.54	num	0.89	0	-1.6	3.41	3.00	1.26

**Uranium-235/236BLANK: Limits LCL = -2.2 UCL = 2.5**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510723	1201048836	20-MAR-2006 16:57	DONE	00	-0.14	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
510734	1201048867	21-MAR-2006 16:38	DONE	00	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511648	1201050949	21-MAR-2006 16:38	DONE	0.02	-0.12	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511653	1201050964	22-MAR-2006 12:29	DONE	0.01	-0.14	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
512077	1201051899	22-MAR-2006 14:23	DONE	0.02	-0.12	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511616	1201050865	23-MAR-2006 08:32	DONE	-0.013	-0.17	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511988	1201051682	23-MAR-2006 13:27	DONE	0.05	-0.08	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
510728	1201048852	23-MAR-2006 13:27	DONE	-0.03	-0.19	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79

511552	1201050721	23-MAR-2006 16:14	DONE	0	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511560	1201050747	23-MAR-2006 18:20	DONE	-0.018	-0.17	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511709	1201051079	25-MAR-2006 15:09	DONE	0.03	-0.12	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511201	1201049856	27-MAR-2006 08:14	DONE	-0.122	-0.3	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514936	1201057981	27-MAR-2006 14:43	DONE	0.08	-0.05	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
512777	1201053518	28-MAR-2006 07:34	DONE	0.02	-0.13	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
512076	1201051895	28-MAR-2006 07:39	DONE	0.01	-0.14	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
515153	1201058496	28-MAR-2006 12:29	DONE	0.01	-0.14	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514141	1201056267	28-MAR-2006 16:43	DONE	00	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514267	1201056533	29-MAR-2006 07:59	DONE	-0.031	-0.19	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511652	1201050960	29-MAR-2006 16:04	DONE	-0.005	-0.16	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
511564	1201050754	29-MAR-2006 19:53	DONE	-0.47	-0.75	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514277	1201056551	29-MAR-2006 22:27	DONE	00	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514320	1201056638	31-MAR-2006 08:29	DONE	-0.331	-0.57	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
512070	1201051881	31-MAR-2006 15:55	DONE	-0.007	-0.16	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
515540	1201059382	31-MAR-2006 19:27	DONE	00	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
514261	1201056520	01-APR-2006 09:22	DONE	-0.028	-0.18	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
516131	1201060706	01-APR-2006 16:30	DONE	00	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
516497	1201061514	06-APR-2006 08:42	DONE	-1.6	-2	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
516532	1201061530	06-APR-2006 13:23	DONE	2.8	3.4	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
518879	1201066818	11-APR-2006 16:43	DONE	-0.012	-0.16	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
518911	1201066929	12-APR-2006 14:20	DONE	0.03	-0.11	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
517717	1201064212	12-APR-2006 17:24	DONE	-0.249	-0.47	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
519218	1201067494	14-APR-2006 09:06	DONE	3.59	4.4	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
520706	1201070943	15-APR-2006 09:12	DONE	0	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
518916	1201066938	17-APR-2006 07:52	DUSE	0.01	-0.14	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
519428	1201067985	17-APR-2006 16:05	DONE	0.18	0.09	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
521040	1201071729	19-APR-2006 14:49	DONE	0.14	0.02	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
520799	1201071144	21-APR-2006 07:38	DONE	0.06	-0.08	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
521962	1201074073	21-APR-2006 10:18	DONE	0	-0.15	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79
520373	1201070134	21-APR-2006 19:20	DUSE	0.44	0.41	pCi/L	0.12	-2.2	-1.5	1.69	2.47	0.79

**Uranium-235/236DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510661	1201048686	15-MAR-2006 10:56	DONE	1230	3.4	percent	150	0	-490	790	20.0	320
511878	1201051444	16-MAR-2006 12:58	DONE	87.7	-0.19	percent	150	0	-490	790	20.0	320
510654	1201048653	17-MAR-2006 13:41	DONE	56.5	-0.29	percent	150	0	-490	790	20.0	320
510724	1201048841	17-MAR-2006 13:41	DONE	23	-0.4	percent	150	0	-490	790	20.0	320
510738	1201048878	20-MAR-2006 07:42	DONE	6.44	-0.45	percent	150	0	-490	790	20.0	320
510723	1201048837	20-MAR-2006 16:57	DONE	44.1	-0.33	percent	150	0	-490	790	20.0	320
510734	1201048868	21-MAR-2006 16:38	DONE	142	-0.02	percent	150	0	-490	790	20.0	320
511648	1201050950	21-MAR-2006 16:38	DONE	56.3	-0.29	percent	150	0	-490	790	20.0	320
511653	1201050965	22-MAR-2006 12:29	DONE	0.37	-0.47	percent	150	0	-490	790	20.0	320
512077	1201051900	22-MAR-2006 14:23	DONE	56.5	-0.29	percent	150	0	-490	790	20.0	320
511988	1201051683	23-MAR-2006 13:27	DONE	15.3	-0.42	percent	150	0	-490	790	20.0	320
511552	1201050722	23-MAR-2006 16:14	DONE	47.7	-0.32	percent	150	0	-490	790	20.0	320

511560	1201050748	23-MAR-2006 18:20	DONE	125	-0.08	percent	150	0	-490	790	20.0	320
511616	1201050866	24-MAR-2006 14:52	DONE	27.9	-0.38	percent	150	0	-490	790	20.0	320
511709	1201051080	25-MAR-2006 15:09	DONE	21.9	-0.4	percent	150	0	-490	790	20.0	320
514141	1201056268	27-MAR-2006 16:25	DONE	20.1	-0.41	percent	150	0	-490	790	20.0	320
511652	1201050961	27-MAR-2006 16:59	DONE	25.6	-0.39	percent	150	0	-490	790	20.0	320
512777	1201053519	28-MAR-2006 07:34	DONE	780	2	percent	150	0	-490	790	20.0	320
514320	1201056639	28-MAR-2006 07:34	DONE	1.2	-0.46	percent	150	0	-490	790	20.0	320
512076	1201051896	28-MAR-2006 07:39	DONE	190	0.13	percent	150	0	-490	790	20.0	320
515153	1201058497	28-MAR-2006 12:29	DONE	59.4	-0.28	percent	150	0	-490	790	20.0	320
514267	1201056534	29-MAR-2006 07:59	DONE	254	0.32	percent	150	0	-490	790	20.0	320
514261	1201056521	29-MAR-2006 07:59	DONE	1530	4.3	percent	150	0	-490	790	20.0	320
511564	1201050755	29-MAR-2006 19:53	DONE	5.44	-0.45	percent	150	0	-490	790	20.0	320
514277	1201056552	29-MAR-2006 22:27	DONE	15.9	-0.42	percent	150	0	-490	790	20.0	320
512070	1201051882	31-MAR-2006 15:55	DONE	44	-0.33	percent	150	0	-490	790	20.0	320
515540	1201059383	31-MAR-2006 19:27	DONE	8.9	-0.44	percent	150	0	-490	790	20.0	320
516131	1201060707	01-APR-2006 16:30	DONE	43.2	-0.33	percent	150	0	-490	790	20.0	320
518879	1201066819	11-APR-2006 16:43	DONE	200	0.16	percent	150	0	-490	790	20.0	320
518911	1201066930	12-APR-2006 14:20	DONE	108	-0.13	percent	150	0	-490	790	20.0	320
520706	1201070944	15-APR-2006 09:12	DONE	7.52	-0.44	percent	150	0	-490	790	20.0	320
519428	1201067986	17-APR-2006 07:52	DONE	68.2	-0.25	percent	150	0	-490	790	20.0	320
518916	1201066939	18-APR-2006 14:03	DUSE	76.8	-0.23	percent	150	0	-490	790	20.0	320
521040	1201071730	19-APR-2006 14:49	DONE	4.4	-0.45	percent	150	0	-490	790	20.0	320
521962	1201074074	21-APR-2006 10:18	DONE	301	0.47	percent	150	0	-490	790	20.0	320
521962	1201074159	21-APR-2006 10:18	DONE	29.4	-0.38	percent	150	0	-490	790	20.0	320
520373	1201070135	21-APR-2006 19:20	DUSE	55.6	-0.29	percent	150	0	-490	790	20.0	320
520799	1201071145	22-APR-2006 07:38	DONE	15.2	-0.42	percent	150	0	-490	790	20.0	320
521962	1201074160	22-APR-2006 09:26	DONE	63.1	-0.27	percent	150	0	-490	790	20.0	320

**Uranium-235/236RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510661	1201048686	15-MAR-2006 10:56	DONE	2.08	2	num	0.79	0	-0.463	2.05	3.00	0.63
511878	1201051444	16-MAR-2006 12:58	DONE	1.9	1.8	num	0.79	0	-0.463	2.05	3.00	0.63
510654	1201048653	17-MAR-2006 13:41	DONE	0.75	-0.07	num	0.79	0	-0.463	2.05	3.00	0.63
510724	1201048841	17-MAR-2006 13:41	DONE	0.29	-0.79	num	0.79	0	-0.463	2.05	3.00	0.63
510738	1201048878	20-MAR-2006 07:42	DONE	0.27	-0.84	num	0.79	0	-0.463	2.05	3.00	0.63
510723	1201048837	20-MAR-2006 16:57	DONE	1.59	1.3	num	0.79	0	-0.463	2.05	3.00	0.63
510734	1201048868	21-MAR-2006 16:38	DONE	0.43	-0.58	num	0.79	0	-0.463	2.05	3.00	0.63
511648	1201050950	21-MAR-2006 16:38	DONE	0.55	-0.38	num	0.79	0	-0.463	2.05	3.00	0.63
511653	1201050965	22-MAR-2006 12:29	DONE	00	-1	num	0.79	0	-0.463	2.05	3.00	0.63
512077	1201051900	22-MAR-2006 14:23	DONE	0.53	-0.41	num	0.79	0	-0.463	2.05	3.00	0.63
511988	1201051683	23-MAR-2006 13:27	DONE	0.21	-0.94	num	0.79	0	-0.463	2.05	3.00	0.63
511552	1201050722	23-MAR-2006 16:14	DONE	0.7	-0.14	num	0.79	0	-0.463	2.05	3.00	0.63
511560	1201050748	23-MAR-2006 18:20	DONE	1.64	1.4	num	0.79	0	-0.463	2.05	3.00	0.63
511616	1201050866	24-MAR-2006 14:52	DONE	0.23	-0.9	num	0.79	0	-0.463	2.05	3.00	0.63
511709	1201051080	25-MAR-2006 15:09	DONE	0.58	-0.35	num	0.79	0	-0.463	2.05	3.00	0.63
514141	1201056268	27-MAR-2006 16:25	DONE	0.04	-1	num	0.79	0	-0.463	2.05	3.00	0.63

511652	1201050961	27-MAR-2006 16:59	DONE	1.09	0.47	num	0.79	0	-0.463	2.05	3.00	0.63
512777	1201053519	28-MAR-2006 07:34	DONE	0.75	-0.07	num	0.79	0	-0.463	2.05	3.00	0.63
514320	1201056639	28-MAR-2006 07:34	DONE	0.01	-1	num	0.79	0	-0.463	2.05	3.00	0.63
512076	1201051896	28-MAR-2006 07:39	DONE	0.62	-0.27	num	0.79	0	-0.463	2.05	3.00	0.63
515153	1201058497	28-MAR-2006 12:29	DONE	1.13	0.53	num	0.79	0	-0.463	2.05	3.00	0.63
514267	1201056534	29-MAR-2006 07:59	DONE	1.55	1.2	num	0.79	0	-0.463	2.05	3.00	0.63
514261	1201056521	29-MAR-2006 07:59	DONE	2.2	2.2	num	0.79	0	-0.463	2.05	3.00	0.63
511564	1201050755	29-MAR-2006 19:53	DONE	0.06	-1	num	0.79	0	-0.463	2.05	3.00	0.63
514277	1201056552	29-MAR-2006 22:27	DONE	0.73	-0.11	num	0.79	0	-0.463	2.05	3.00	0.63
512070	1201051882	31-MAR-2006 15:55	DONE	1.17	0.6	num	0.79	0	-0.463	2.05	3.00	0.63
515540	1201059383	31-MAR-2006 19:27	DONE	0.44	-0.56	num	0.79	0	-0.463	2.05	3.00	0.63
516131	1201060707	01-APR-2006 16:30	DONE	1.17	0.6	num	0.79	0	-0.463	2.05	3.00	0.63
518879	1201066819	11-APR-2006 16:43	DONE	0.61	-0.29	num	0.79	0	-0.463	2.05	3.00	0.63
518911	1201066930	12-APR-2006 14:20	DONE	1.1	0.48	num	0.79	0	-0.463	2.05	3.00	0.63
520706	1201070944	15-APR-2006 09:12	DONE	0.43	-0.58	num	0.79	0	-0.463	2.05	3.00	0.63
519428	1201067986	17-APR-2006 07:52	DONE	1.21	0.65	num	0.79	0	-0.463	2.05	3.00	0.63
518916	1201066939	18-APR-2006 14:03	DUSE	1.94	1.8	num	0.79	0	-0.463	2.05	3.00	0.63
521040	1201071730	19-APR-2006 14:49	DONE	0.11	-1	num	0.79	0	-0.463	2.05	3.00	0.63
521962	1201074074	21-APR-2006 10:18	DONE	1.53	1.2	num	0.79	0	-0.463	2.05	3.00	0.63
521962	1201074159	21-APR-2006 10:18	DONE	0.14	-1	num	0.79	0	-0.463	2.05	3.00	0.63
520373	1201070135	21-APR-2006 19:20	DUSE	0.61	-0.29	num	0.79	0	-0.463	2.05	3.00	0.63
520799	1201071145	22-APR-2006 07:38	DONE	0.28	-0.82	num	0.79	0	-0.463	2.05	3.00	0.63
521962	1201074160	22-APR-2006 09:26	DONE	0.29	-0.81	num	0.79	0	-0.463	2.05	3.00	0.63

**Uranium-238BLANK: Limits LCL = -2.5 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510723	1201048836	20-MAR-2006 16:57	DONE	0.01	-0.26	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
510734	1201048867	21-MAR-2006 16:38	DONE	0.01	-0.26	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511648	1201050949	21-MAR-2006 16:38	DONE	-0.002	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511653	1201050964	22-MAR-2006 12:29	DONE	0.01	-0.26	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
512077	1201051899	22-MAR-2006 14:23	DONE	-0.018	-0.29	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511616	1201050865	23-MAR-2006 08:32	DONE	0.01	-0.27	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511988	1201051682	23-MAR-2006 13:27	DONE	0.03	-0.25	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
510728	1201048852	23-MAR-2006 13:27	DONE	00	-0.27	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511552	1201050721	23-MAR-2006 16:14	DONE	0.06	-0.22	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511560	1201050747	23-MAR-2006 18:20	DONE	0.02	-0.25	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511709	1201051079	25-MAR-2006 15:09	DONE	0.02	-0.25	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511201	1201049856	27-MAR-2006 08:14	DONE	0.28	0.02	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
514936	1201057981	27-MAR-2006 14:43	DONE	-0.046	-0.33	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
512777	1201053518	28-MAR-2006 07:34	DONE	0.12	-0.15	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
512076	1201051895	28-MAR-2006 07:39	DONE	-0.018	-0.29	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
515153	1201058496	28-MAR-2006 12:29	DONE	-0.036	-0.31	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
514141	1201056267	28-MAR-2006 16:43	DONE	-0.003	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
514267	1201056533	29-MAR-2006 07:59	DONE	0.01	-0.27	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511652	1201050960	29-MAR-2006 16:04	DONE	0.01	-0.26	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
511564	1201050754	29-MAR-2006 19:53	DONE	-0.231	-0.53	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92

514277	1201056551	29-MAR-2006 22:27	DONE	-0.002	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
514320	1201056638	31-MAR-2006 08:29	DONE	1.03	0.84	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
512070	1201051881	31-MAR-2006 15:55	DONE	-0.009	-0.29	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
515540	1201059382	31-MAR-2006 19:27	DONE	-0.007	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
514261	1201056520	01-APR-2006 09:22	DONE	-0.067	-0.35	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
516131	1201060706	01-APR-2006 16:30	DONE	-0.011	-0.29	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
516497	1201061514	06-APR-2006 08:42	DONE	-0.361	-0.67	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
516532	1201061530	06-APR-2006 13:23	DONE	3.31	3.3	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
518879	1201066818	11-APR-2006 16:43	DONE	-0.038	-0.32	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
518911	1201066929	12-APR-2006 14:20	DONE	0.04	-0.23	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
517717	1201064212	12-APR-2006 17:24	DONE	0.17	-0.09	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
519218	1201067494	14-APR-2006 09:06	DONE	4.55	4.6	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
520706	1201070943	15-APR-2006 09:12	DONE	0.04	-0.24	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
518916	1201066938	17-APR-2006 07:52	DUSE	0	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
519428	1201067985	17-APR-2006 16:05	DONE	-0.304	-0.6	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
521040	1201071729	19-APR-2006 14:49	DONE	00	-0.27	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
520799	1201071144	21-APR-2006 07:38	DONE	0.01	-0.26	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
521962	1201074073	21-APR-2006 10:18	DONE	-0	-0.28	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92
520373	1201070134	21-APR-2006 19:20	DUSE	1.36	1.2	pCi/L	0.25	-2.5	-1.6	2.1	3.03	0.92

**Uranium-238DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510661	1201048686	15-MAR-2006 10:56	DONE	22.7	-0.23	percent	82.3	0	-430	592	20.0	255
511878	1201051444	16-MAR-2006 12:58	DONE	10.1	-0.28	percent	82.3	0	-430	592	20.0	255
510654	1201048653	17-MAR-2006 13:41	DONE	13.7	-0.27	percent	82.3	0	-430	592	20.0	255
510724	1201048841	17-MAR-2006 13:41	DONE	9.44	-0.29	percent	82.3	0	-430	592	20.0	255
510738	1201048878	20-MAR-2006 07:42	DONE	5.04	-0.3	percent	82.3	0	-430	592	20.0	255
510723	1201048837	20-MAR-2006 16:57	DONE	4.04	-0.31	percent	82.3	0	-430	592	20.0	255
510734	1201048868	21-MAR-2006 16:38	DONE	18.3	-0.25	percent	82.3	0	-430	592	20.0	255
511648	1201050950	21-MAR-2006 16:38	DONE	1.83	-0.32	percent	82.3	0	-430	592	20.0	255
511653	1201050965	22-MAR-2006 12:29	DONE	2.87	-0.31	percent	82.3	0	-430	592	20.0	255
512077	1201051900	22-MAR-2006 14:23	DONE	12.1	-0.28	percent	82.3	0	-430	592	20.0	255
511988	1201051683	23-MAR-2006 13:27	DONE	12.6	-0.27	percent	82.3	0	-430	592	20.0	255
511552	1201050722	23-MAR-2006 16:14	DONE	20.5	-0.24	percent	82.3	0	-430	592	20.0	255
511560	1201050748	23-MAR-2006 18:20	DONE	13.7	-0.27	percent	82.3	0	-430	592	20.0	255
511616	1201050866	24-MAR-2006 14:52	DONE	23.9	-0.23	percent	82.3	0	-430	592	20.0	255
511709	1201051080	25-MAR-2006 15:09	DONE	10.7	-0.28	percent	82.3	0	-430	592	20.0	255
514141	1201056268	27-MAR-2006 16:25	DONE	124	0.16	percent	82.3	0	-430	592	20.0	255
511652	1201050961	27-MAR-2006 16:59	DONE	3.57	-0.31	percent	82.3	0	-430	592	20.0	255
512777	1201053519	28-MAR-2006 07:34	DONE	162	0.31	percent	82.3	0	-430	592	20.0	255
514320	1201056639	28-MAR-2006 07:34	DONE	126	0.17	percent	82.3	0	-430	592	20.0	255
512076	1201051896	28-MAR-2006 07:39	DONE	147	0.25	percent	82.3	0	-430	592	20.0	255
515153	1201058497	28-MAR-2006 12:29	DONE	1.43	-0.32	percent	82.3	0	-430	592	20.0	255
514267	1201056534	29-MAR-2006 07:59	DONE	1590	5.9	percent	82.3	0	-430	592	20.0	255
514261	1201056521	29-MAR-2006 07:59	DONE	0	-0.32	percent	82.3	0	-430	592	20.0	255
511564	1201050755	29-MAR-2006 19:53	DONE	2.79	-0.31	percent	82.3	0	-430	592	20.0	255



514277	1201056552	29-MAR-2006 22:27	DONE	4.42	-0.31	percent	82.3	0	-430	592	20.0	255
512070	1201051882	31-MAR-2006 15:55	DONE	4.32	-0.31	percent	82.3	0	-430	592	20.0	255
515540	1201059383	31-MAR-2006 19:27	DONE	81.7	-0	percent	82.3	0	-430	592	20.0	255
516131	1201060707	01-APR-2006 16:30	DONE	2.3	-0.31	percent	82.3	0	-430	592	20.0	255
518879	1201066819	11-APR-2006 16:43	DONE	101	0.07	percent	82.3	0	-430	592	20.0	255
518911	1201066930	12-APR-2006 14:20	DONE	45	-0.15	percent	82.3	0	-430	592	20.0	255
520706	1201070944	15-APR-2006 09:12	DONE	4.58	-0.3	percent	82.3	0	-430	592	20.0	255
519428	1201067986	17-APR-2006 07:52	DONE	10.5	-0.28	percent	82.3	0	-430	592	20.0	255
518916	1201066939	18-APR-2006 14:03	DUSE	140	0.23	percent	82.3	0	-430	592	20.0	255
521040	1201071730	19-APR-2006 14:49	DONE	2.37	-0.31	percent	82.3	0	-430	592	20.0	255
521962	1201074074	21-APR-2006 10:18	DONE	201	0.47	percent	82.3	0	-430	592	20.0	255
521962	1201074159	21-APR-2006 10:18	DONE	104	0.09	percent	82.3	0	-430	592	20.0	255
520373	1201070135	21-APR-2006 19:20	DUSE	9.26	-0.29	percent	82.3	0	-430	592	20.0	255
520799	1201071145	22-APR-2006 07:38	DONE	16.1	-0.26	percent	82.3	0	-430	592	20.0	255
521962	1201074160	22-APR-2006 09:26	DONE	140	0.23	percent	82.3	0	-430	592	20.0	255

**Uranium-238LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510728	1201048853	23-MAR-2006 13:27	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
510728	1201048854	23-MAR-2006 13:27	DONE	100	0	percent	100	75.0	83.3	117	125	8.33
511560	1201050749	23-MAR-2006 18:20	DONE	94.7	-0.64	percent	100	75.0	83.3	117	125	8.33
511709	1201051082	25-MAR-2006 15:09	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
514936	1201057982	27-MAR-2006 08:13	DONE	98.9	-0.13	percent	100	75.0	83.3	117	125	8.33
514936	1201057983	27-MAR-2006 08:13	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
511201	1201049857	27-MAR-2006 08:14	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
511201	1201049858	27-MAR-2006 08:14	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
514141	1201056269	27-MAR-2006 16:25	DONE	95.1	-0.59	percent	100	75.0	83.3	117	125	8.33
511652	1201050963	27-MAR-2006 16:59	DONE	103	0.37	percent	100	75.0	83.3	117	125	8.33
512777	1201053521	28-MAR-2006 07:34	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
514320	1201056641	28-MAR-2006 07:34	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
512076	1201051898	28-MAR-2006 07:44	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
515153	1201058498	28-MAR-2006 12:29	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
514267	1201056535	29-MAR-2006 07:59	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
514261	1201056522	29-MAR-2006 07:59	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
511564	1201050757	29-MAR-2006 19:53	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
514277	1201056554	29-MAR-2006 22:27	DONE	102	0.27	percent	100	75.0	83.3	117	125	8.33
512070	1201051883	31-MAR-2006 15:55	DONE	89.7	-1	percent	100	75.0	83.3	117	125	8.33
515540	1201059385	31-MAR-2006 19:27	DONE	93.9	-0.73	percent	100	75.0	83.3	117	125	8.33
516131	1201060709	01-APR-2006 16:30	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
516497	1201061515	06-APR-2006 08:42	DONE	107	0.84	percent	100	75.0	83.3	117	125	8.33
516497	1201061516	06-APR-2006 08:42	DONE	98.8	-0.14	percent	100	75.0	83.3	117	125	8.33
516532	1201061531	06-APR-2006 13:23	DONE	96.5	-0.42	percent	100	75.0	83.3	117	125	8.33
516532	1201061532	06-APR-2006 13:23	DONE	98.6	-0.17	percent	100	75.0	83.3	117	125	8.33
518879	1201066820	11-APR-2006 16:43	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
518911	1201066931	12-APR-2006 14:20	DONE	97.7	-0.28	percent	100	75.0	83.3	117	125	8.33
517717	1201064213	12-APR-2006 17:24	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33

517717	1201064214	12-APR-2006 17:24	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
519218	1201067495	14-APR-2006 09:06	DONE	112	1.5	percent	100	75.0	83.3	117	125	8.33
519218	1201067496	14-APR-2006 09:06	DONE	94.9	-0.61	percent	100	75.0	83.3	117	125	8.33
520706	1201070946	15-APR-2006 09:12	DONE	96.9	-0.37	percent	100	75.0	83.3	117	125	8.33
518916	1201066940	17-APR-2006 07:52	DUSE	96.7	-0.4	percent	100	75.0	83.3	117	125	8.33
519428	1201067988	17-APR-2006 07:52	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
521040	1201071732	19-APR-2006 14:49	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
520799	1201071147	21-APR-2006 07:38	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
521962	1201074076	21-APR-2006 10:18	DONE	98.1	-0.23	percent	100	75.0	83.3	117	125	8.33
520373	1201070136	21-APR-2006 19:20	DUSE	118	2.2	percent	100	75.0	83.3	117	125	8.33
522160	1201074581	22-APR-2006 12:03	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33

**Uranium-238RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510661	1201048686	15-MAR-2006 10:56	DONE	0.5	-0.28	num	0.9	0	-1.9	3.73	3.00	1.42
511878	1201051444	16-MAR-2006 12:58	DONE	0.63	-0.19	num	0.9	0	-1.9	3.73	3.00	1.42
510654	1201048653	17-MAR-2006 13:41	DONE	0.76	-0.1	num	0.9	0	-1.9	3.73	3.00	1.42
510724	1201048841	17-MAR-2006 13:41	DONE	0.28	-0.44	num	0.9	0	-1.9	3.73	3.00	1.42
510738	1201048878	20-MAR-2006 07:42	DONE	0.43	-0.33	num	0.9	0	-1.9	3.73	3.00	1.42
510723	1201048837	20-MAR-2006 16:57	DONE	0.4	-0.35	num	0.9	0	-1.9	3.73	3.00	1.42
510734	1201048868	21-MAR-2006 16:38	DONE	0.29	-0.43	num	0.9	0	-1.9	3.73	3.00	1.42
511648	1201050950	21-MAR-2006 16:38	DONE	0.06	-0.59	num	0.9	0	-1.9	3.73	3.00	1.42
511653	1201050965	22-MAR-2006 12:29	DONE	0.08	-0.57	num	0.9	0	-1.9	3.73	3.00	1.42
512077	1201051900	22-MAR-2006 14:23	DONE	0.3	-0.42	num	0.9	0	-1.9	3.73	3.00	1.42
511988	1201051683	23-MAR-2006 13:27	DONE	0.63	-0.19	num	0.9	0	-1.9	3.73	3.00	1.42
511552	1201050722	23-MAR-2006 16:14	DONE	0.32	-0.41	num	0.9	0	-1.9	3.73	3.00	1.42
511560	1201050748	23-MAR-2006 18:20	DONE	0.67	-0.16	num	0.9	0	-1.9	3.73	3.00	1.42
511616	1201050866	24-MAR-2006 14:52	DONE	1.25	0.25	num	0.9	0	-1.9	3.73	3.00	1.42
511709	1201051080	25-MAR-2006 15:09	DONE	0.8	-0.07	num	0.9	0	-1.9	3.73	3.00	1.42
514141	1201056268	27-MAR-2006 16:25	DONE	0.5	-0.28	num	0.9	0	-1.9	3.73	3.00	1.42
511652	1201050961	27-MAR-2006 16:59	DONE	0.39	-0.36	num	0.9	0	-1.9	3.73	3.00	1.42
512777	1201053519	28-MAR-2006 07:34	DONE	2.31	0.1	num	0.9	0	-1.9	3.73	3.00	1.42
514320	1201056639	28-MAR-2006 07:34	DONE	1.24	0.24	num	0.9	0	-1.9	3.73	3.00	1.42
512076	1201051896	28-MAR-2006 07:39	DONE	1.63	0.52	num	0.9	0	-1.9	3.73	3.00	1.42
515153	1201058497	28-MAR-2006 12:29	DONE	0.11	-0.56	num	0.9	0	-1.9	3.73	3.00	1.42
514267	1201056534	29-MAR-2006 07:59	DONE	0.73	-0.12	num	0.9	0	-1.9	3.73	3.00	1.42
514261	1201056521	29-MAR-2006 07:59	DONE	0.9	0.01	num	0.9	0	-1.9	3.73	3.00	1.42
511564	1201050755	29-MAR-2006 19:53	DONE	0.14	-0.53	num	0.9	0	-1.9	3.73	3.00	1.42
514277	1201056552	29-MAR-2006 22:27	DONE	0.52	-0.27	num	0.9	0	-1.9	3.73	3.00	1.42
512070	1201051882	31-MAR-2006 15:55	DONE	0.14	-0.54	num	0.9	0	-1.9	3.73	3.00	1.42
515540	1201059383	31-MAR-2006 19:27	DONE	1.77	0.62	num	0.9	0	-1.9	3.73	3.00	1.42
516131	1201060707	01-APR-2006 16:30	DONE	0.21	-0.49	num	0.9	0	-1.9	3.73	3.00	1.42
518879	1201066819	11-APR-2006 16:43	DONE	1.29	0.28	num	0.9	0	-1.9	3.73	3.00	1.42
518911	1201066930	12-APR-2006 14:20	DONE	1.26	0.26	num	0.9	0	-1.9	3.73	3.00	1.42
520706	1201070944	15-APR-2006 09:12	DONE	0.37	-0.37	num	0.9	0	-1.9	3.73	3.00	1.42
519428	1201067986	17-APR-2006 07:52	DONE	0.35	-0.39	num	0.9	0	-1.9	3.73	3.00	1.42

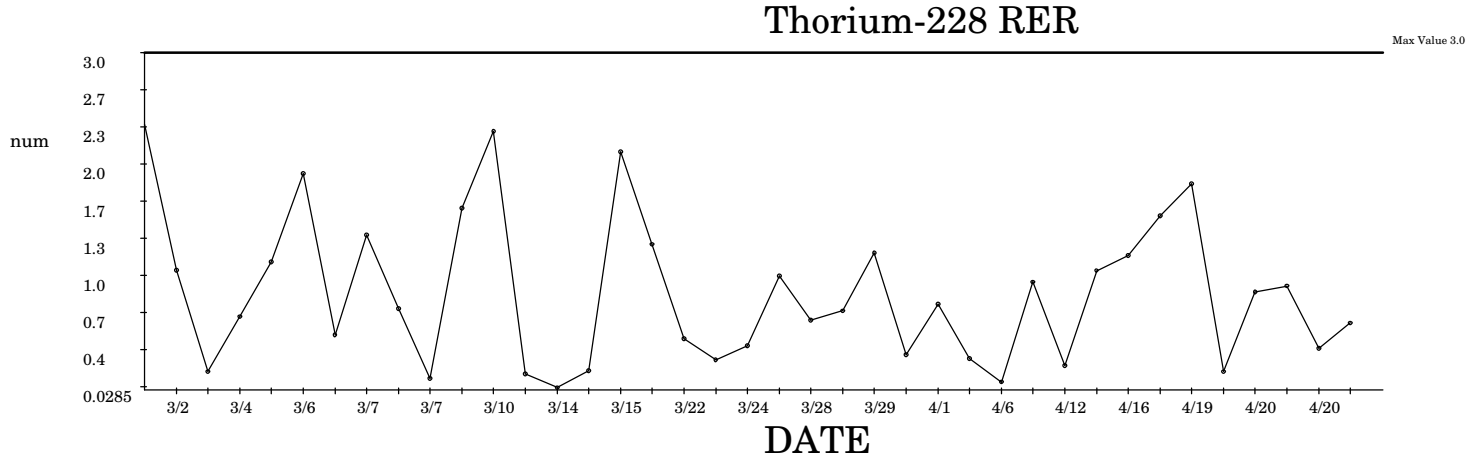
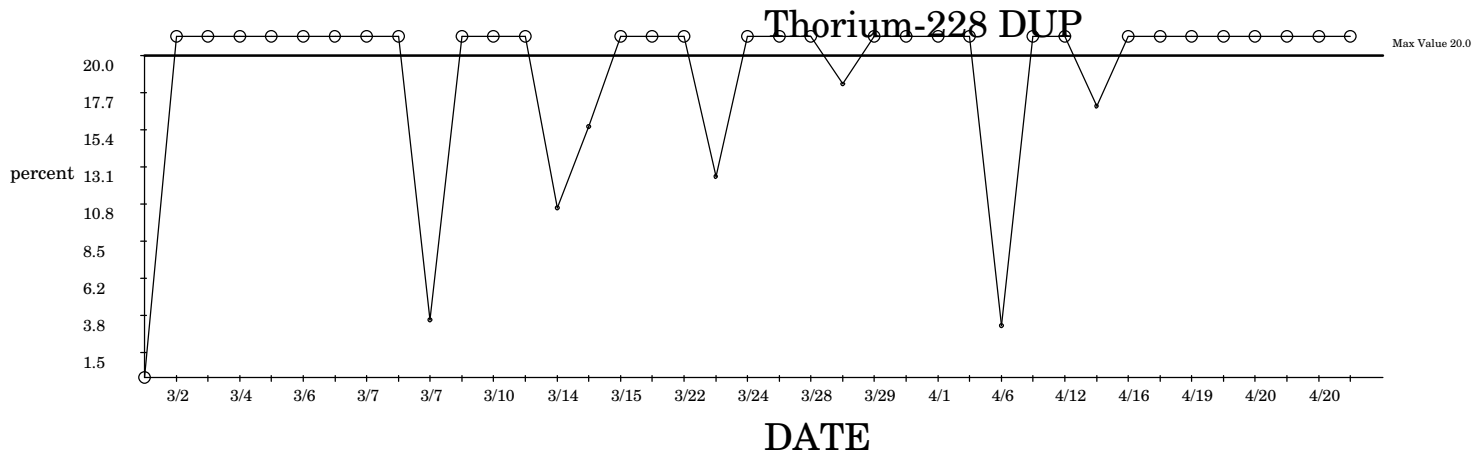
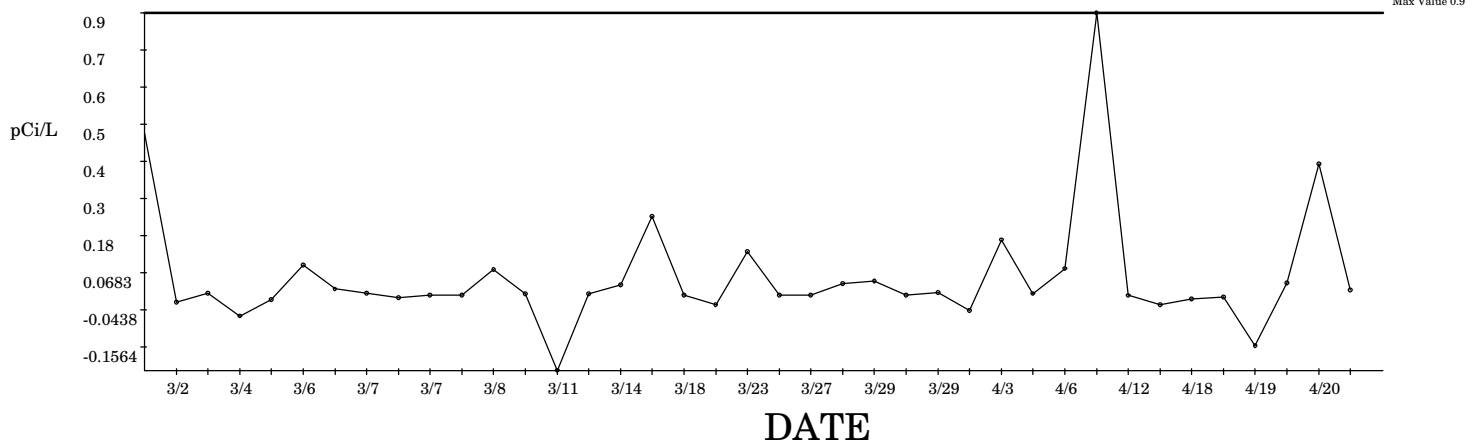
518916	1201066939	18-APR-2006 14:03	DUSE	8.87	5.6	num	0.9	0	-1.9	3.73	3.00	1.42
521040	1201071730	19-APR-2006 14:49	DONE	0.17	-0.51	num	0.9	0	-1.9	3.73	3.00	1.42
521962	1201074074	21-APR-2006 10:18	DONE	1.76	0.61	num	0.9	0	-1.9	3.73	3.00	1.42
521962	1201074159	21-APR-2006 10:18	DONE	0.89	-0	num	0.9	0	-1.9	3.73	3.00	1.42
520373	1201070135	21-APR-2006 19:20	DUSE	0.49	-0.29	num	0.9	0	-1.9	3.73	3.00	1.42
520799	1201071145	22-APR-2006 07:38	DONE	1.02	0.09	num	0.9	0	-1.9	3.73	3.00	1.42
521962	1201074160	22-APR-2006 09:26	DONE	0.5	-0.28	num	0.9	0	-1.9	3.73	3.00	1.42

## Uranium-238SPIKE: Limits LCL = 75 UCL = 125

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
502573	1201029916	20-FEB-2006 16:13	DONE	118	2.2	percent	100	75.0	83.3	117	125	8.33
504887	1201035136	20-FEB-2006 16:14	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
505235	1201036018	21-FEB-2006 23:51	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
504424	1201034014	22-FEB-2006 09:56	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
504435	1201034050	24-FEB-2006 20:19	DONE	95.5	-0.54	percent	100	75.0	83.3	117	125	8.33
504458	1201034119	28-FEB-2006 15:46	DONE	89.4	-1	percent	100	75.0	83.3	117	125	8.33
506041	1201037899	01-MAR-2006 20:40	DONE	107	0.84	percent	100	75.0	83.3	117	125	8.33
506022	1201037840	02-MAR-2006 16:44	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
507076	1201040302	07-MAR-2006 10:22	DONE	91.0	-1	percent	100	75.0	83.3	117	125	8.33
507403	1201041222	08-MAR-2006 06:44	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
509051	1201045064	09-MAR-2006 07:20	DONE	93.9	-0.73	percent	100	75.0	83.3	117	125	8.33
509092	1201045179	10-MAR-2006 15:56	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
509841	1201046806	10-MAR-2006 23:12	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
509802	1201046704	14-MAR-2006 11:55	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
509797	1201046682	14-MAR-2006 13:07	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
510658	1201048669	15-MAR-2006 09:16	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
511878	1201051445	16-MAR-2006 12:58	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
510654	1201048654	17-MAR-2006 13:41	DONE	92.8	-0.86	percent	100	75.0	83.3	117	125	8.33
510738	1201048879	20-MAR-2006 07:42	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
511552	1201050723	20-MAR-2006 07:42	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
510723	1201048838	20-MAR-2006 16:57	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
512077	1201051901	22-MAR-2006 14:23	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
511988	1201051684	23-MAR-2006 13:27	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
511709	1201051081	25-MAR-2006 15:09	DONE	82.9	-2	percent	100	75.0	83.3	117	125	8.33
511652	1201050962	27-MAR-2006 16:59	DONE	98.2	-0.22	percent	100	75.0	83.3	117	125	8.33
512777	1201053520	28-MAR-2006 07:34	DONE	92.0	-0.96	percent	100	75.0	83.3	117	125	8.33
514320	1201056640	28-MAR-2006 07:34	DONE	98.5	-0.18	percent	100	75.0	83.3	117	125	8.33
512076	1201051897	28-MAR-2006 07:44	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
511564	1201050756	29-MAR-2006 19:53	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
514277	1201056553	29-MAR-2006 22:27	DONE	108	0.91	percent	100	75.0	83.3	117	125	8.33
515540	1201059384	31-MAR-2006 19:27	DONE	95.8	-0.5	percent	100	75.0	83.3	117	125	8.33
516131	1201060708	01-APR-2006 16:30	DONE	96.3	-0.44	percent	100	75.0	83.3	117	125	8.33
520706	1201070945	15-APR-2006 09:12	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
519428	1201067987	17-APR-2006 07:52	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
521040	1201071731	19-APR-2006 14:49	DONE	107	0.84	percent	100	75.0	83.3	117	125	8.33
520799	1201071146	21-APR-2006 07:38	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33

521962	1201074075	21-APR-2006 10:18	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
521962	1201074161	21-APR-2006 10:18	DONE	96.4	-0.43	percent	100	75.0	83.3	117	125	8.33
521962	1201074162	21-APR-2006 10:18	DONE	97.1	-0.34	percent	100	75.0	83.3	117	125	8.33

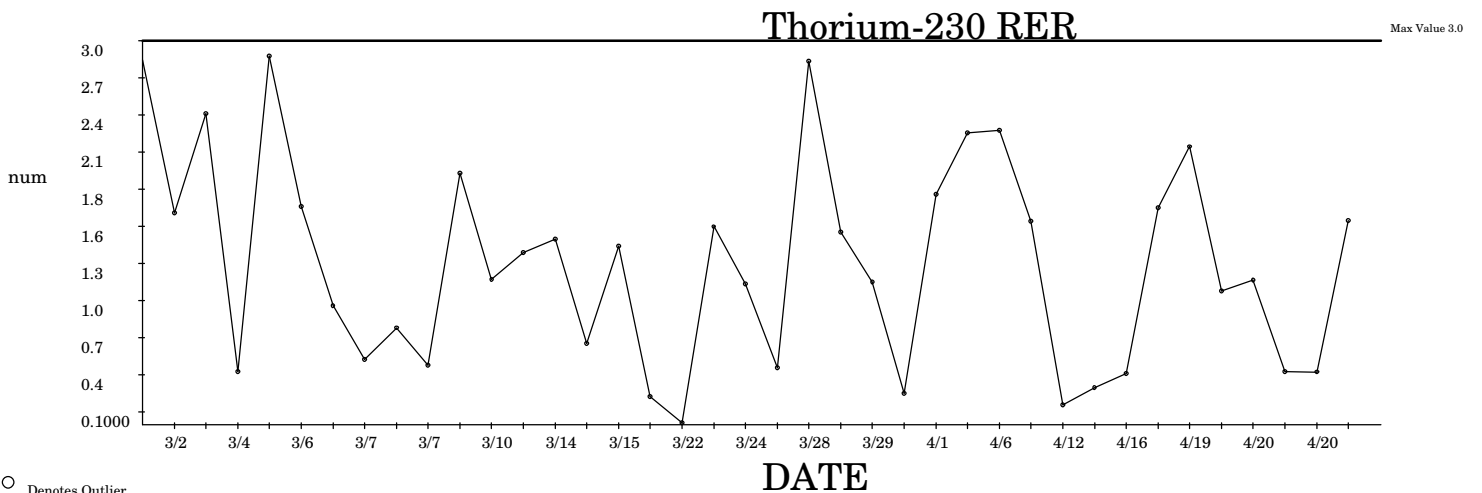
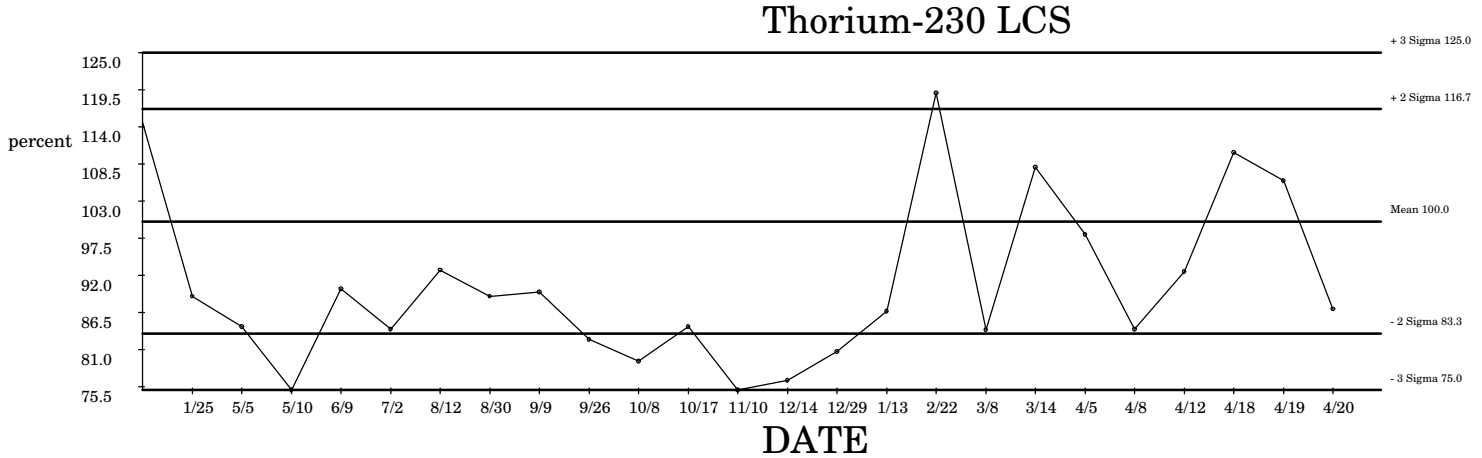
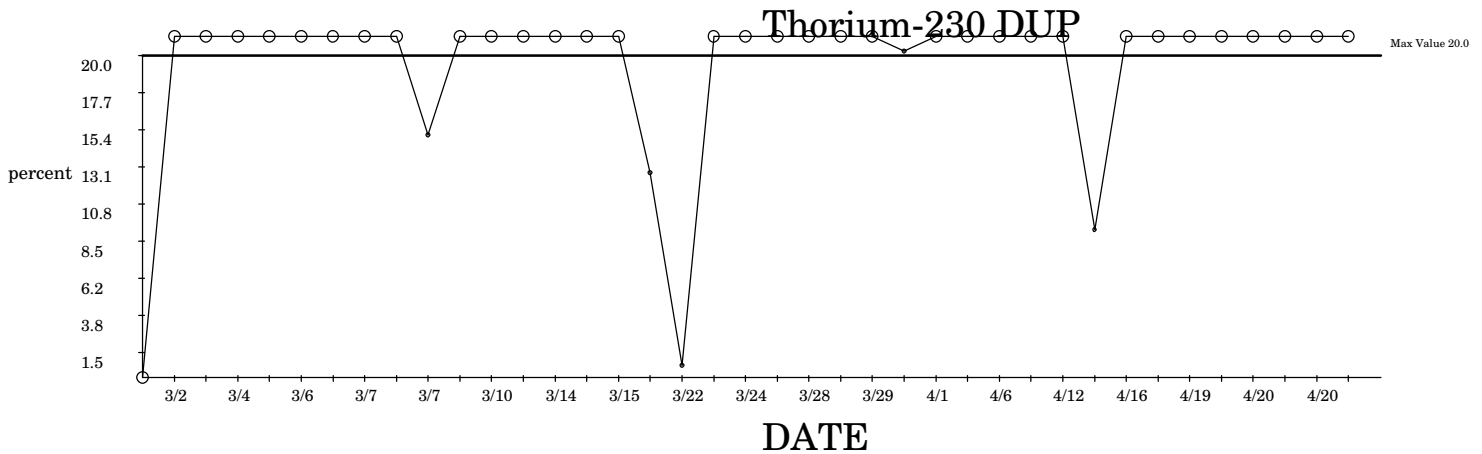
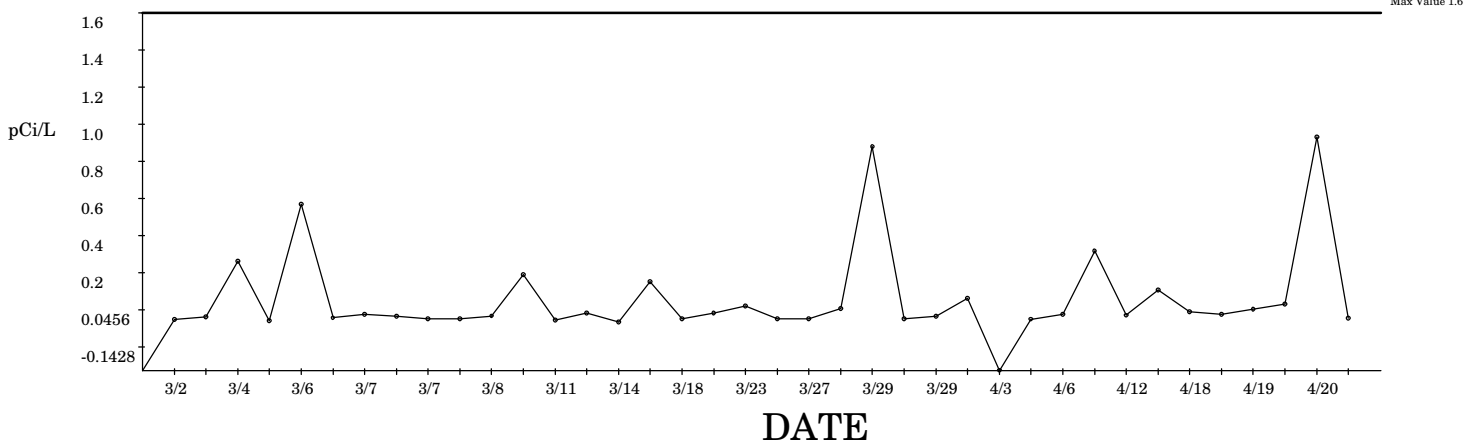
# SPC Graph for Alpha SpecThorium in Liquids 4/24/2006 Thorium-228 BLANK



○ Denotes Outlier

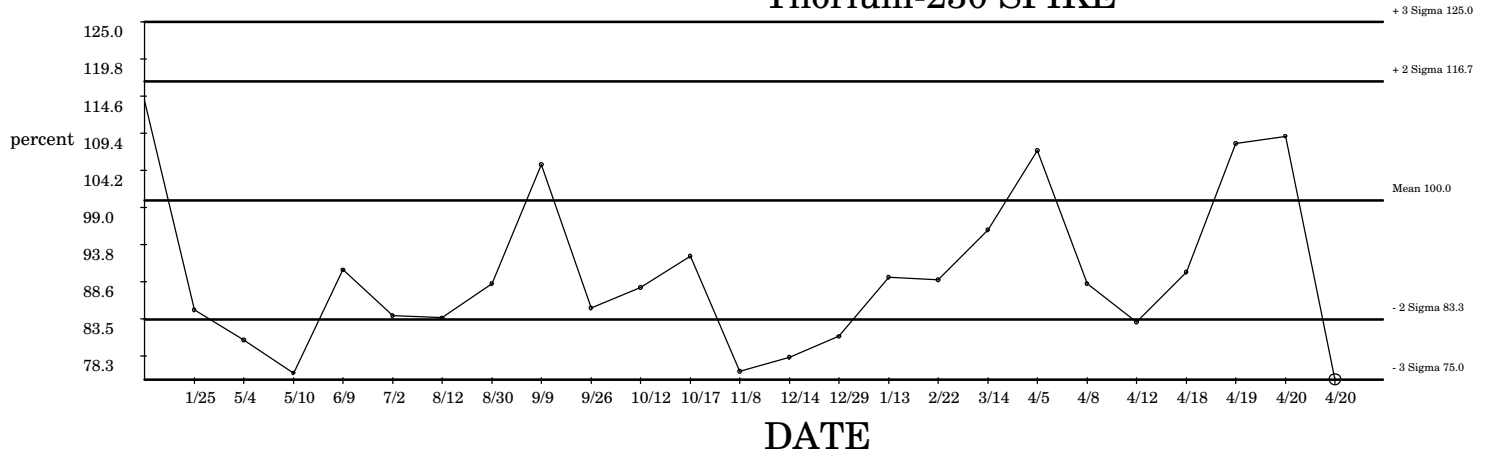
# SPC Graph for Alpha SpecThorium in Liquids 4/24/2006

## Thorium-230 BLANK



○ Denotes Outlier

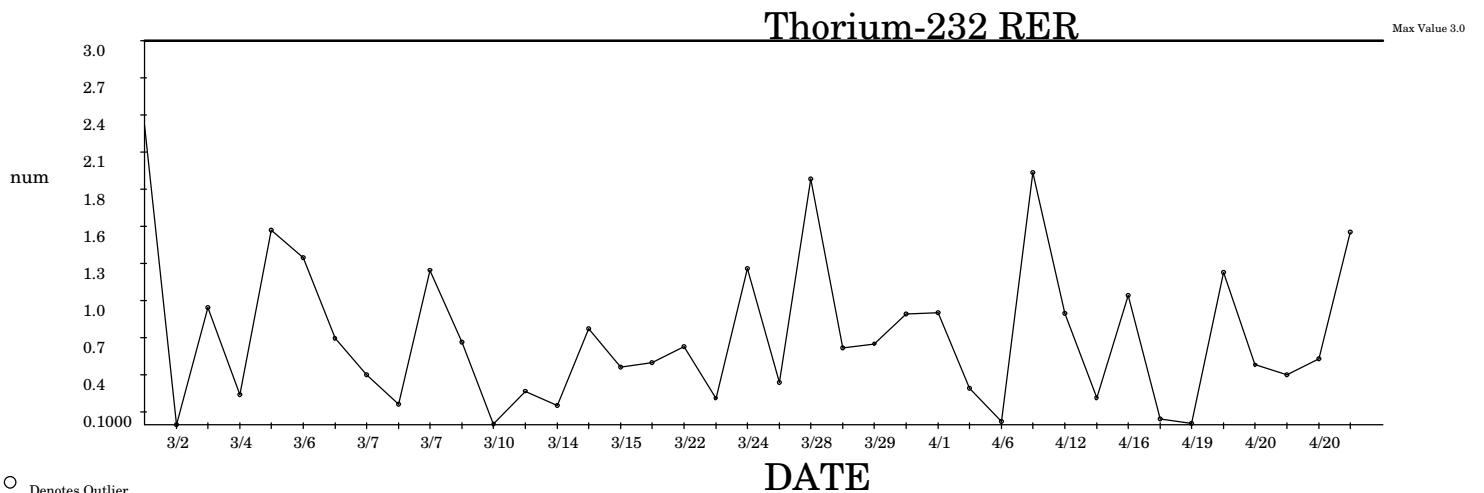
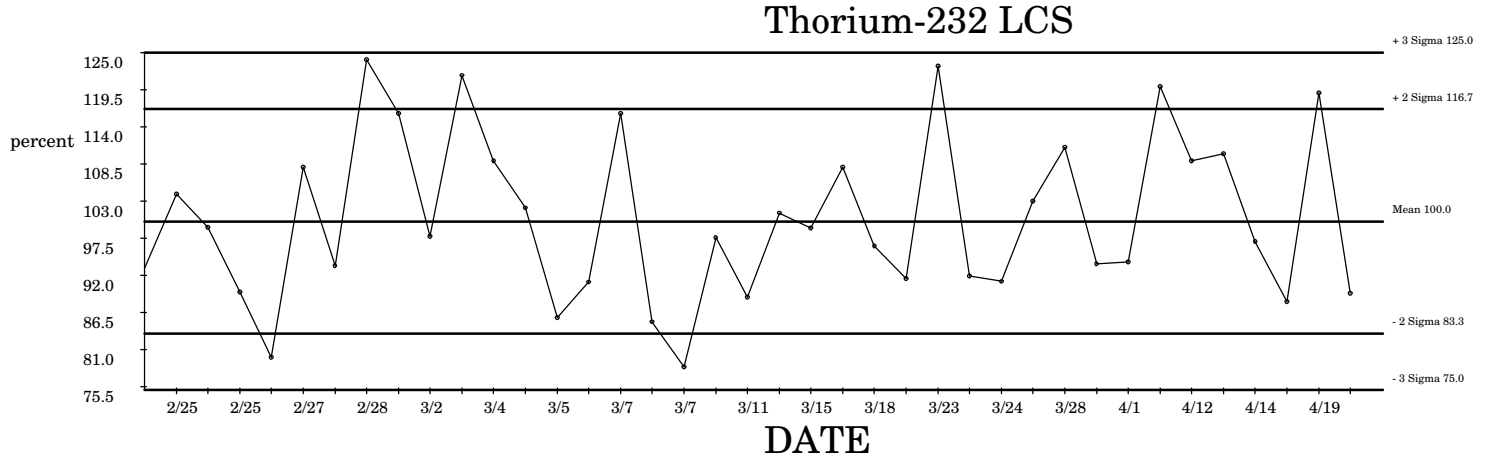
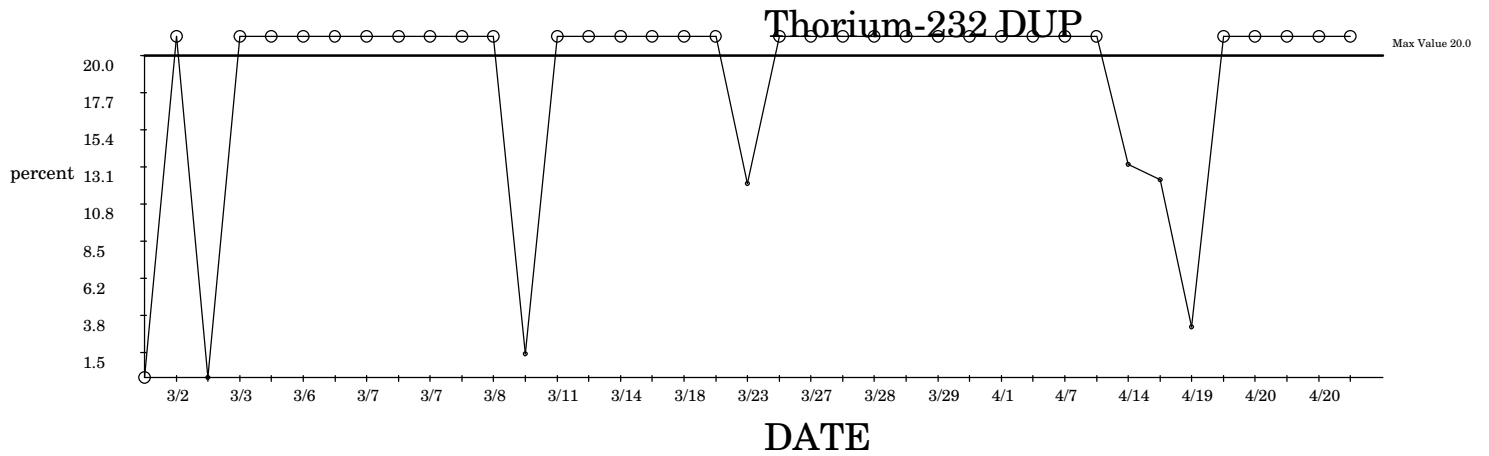
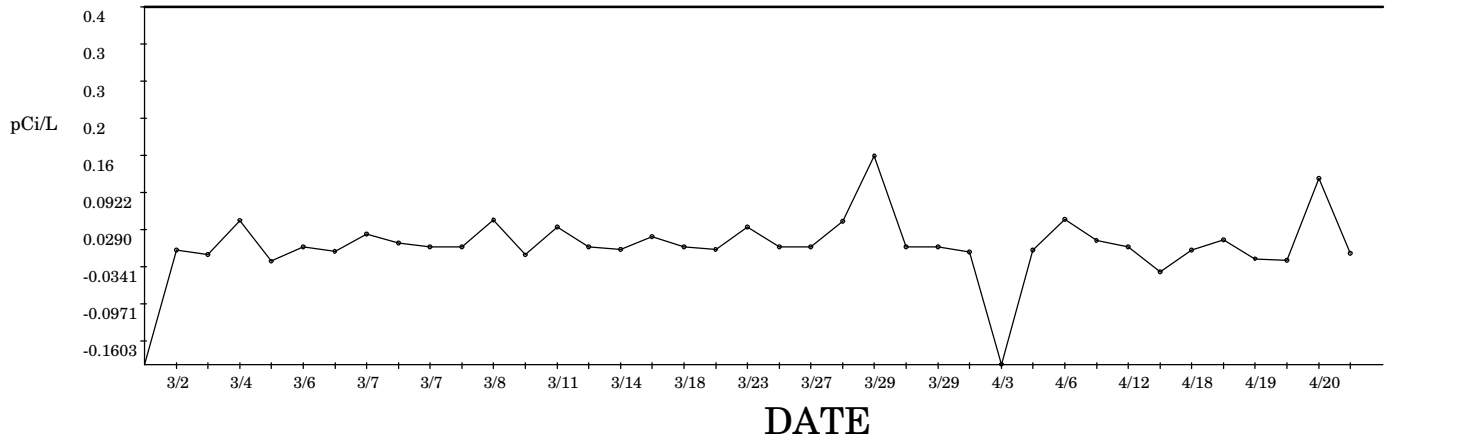
# SPC Graph for Alpha SpecThorium in Liquids 4/24/2006 Thorium-230 SPIKE



○ Denotes Outlier

# SPC Graph for Alpha SpecThorium in Liquids 4/24/2006

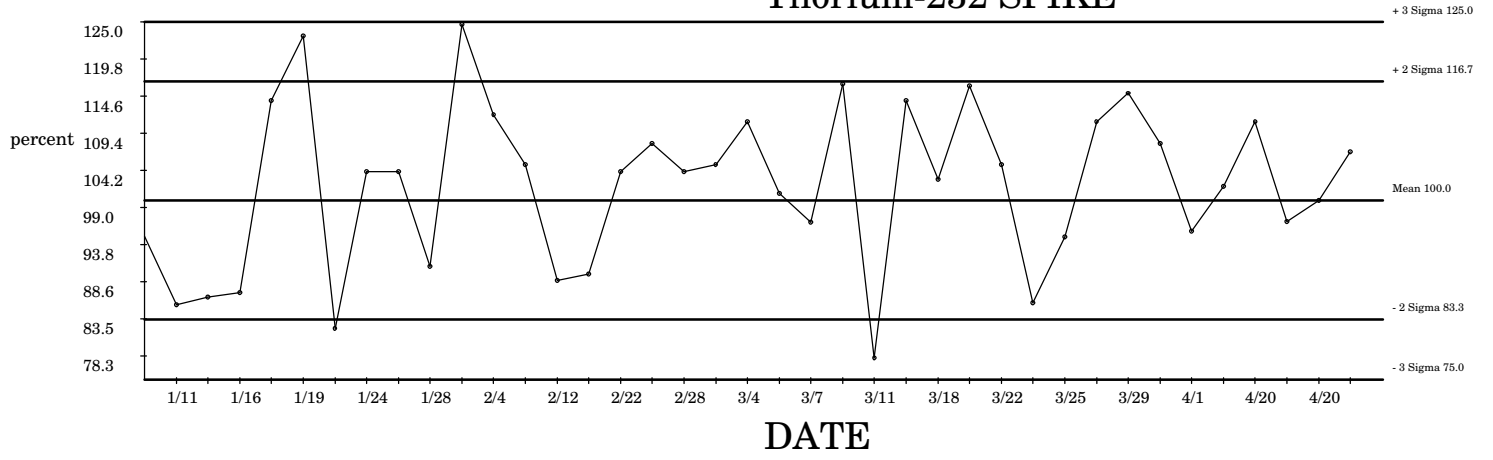
## Thorium-232 BLANK



○ Denotes Outlier



# SPC Graph for Alpha SpecThorium in Liquids 4/24/2006 Thorium-232 SPIKE



○ Denotes Outlier

# Data used for Alpha SpecThorium in Liquids 25-APR-2006

Thorium-228 BLANK: Limits LCL = -.4 UCL = .5

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
504484	1201034197	01-MAR-2006 16:22	DUSE	0	0.56	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
506015	1201037821	02-MAR-2006 07:38	DONE	0	-0.41	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
504514	1201034271	02-MAR-2006 12:09	DONE	0	-0.24	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
507079	1201040312	04-MAR-2006 21:34	DONE	0	-0.66	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
506064	1201037940	06-MAR-2006 08:00	DONE	0	-0.35	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
508121	1201042933	06-MAR-2006 16:33	DONE	0	0.27	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
507094	1201040358	07-MAR-2006 01:33	DONE	0	-0.16	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
506047	1201037914	07-MAR-2006 10:21	DONE	0	-0.24	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
507087	1201040340	07-MAR-2006 14:56	DONE	0	-0.33	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
507398	1201041204	07-MAR-2006 23:35	DONE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
507401	1201041212	07-MAR-2006 23:35	DONE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
509582	1201046244	08-MAR-2006 08:59	DONE	0	0.2	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
509840	1201046800	10-MAR-2006 11:48	DONE	0	-0.25	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
509118	1201045258	11-MAR-2006 09:34	DONE	0	-2	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
511062	1201049578	14-MAR-2006 17:18	DUSE	0	-0.26	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
509796	1201046675	14-MAR-2006 17:43	DONE	0	-0.09	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
510660	1201048675	15-MAR-2006 10:56	DONE	0	1.2	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
511207	1201049870	18-MAR-2006 12:05	DONE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
512010	1201051735	22-MAR-2006 20:59	DONE	0	-0.45	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
511986	1201051678	23-MAR-2006 08:32	DONE	0	0.53	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
512003	1201051718	25-MAR-2006 10:35	DONE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
512008	1201051727	27-MAR-2006 09:42	DUSE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
512781	1201053532	28-MAR-2006 07:34	DONE	0	-0.07	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
511549	1201050713	29-MAR-2006 08:24	DONE	0	-0.01	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
515678	1201059766	29-MAR-2006 10:23	DONE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
514263	1201056523	29-MAR-2006 22:27	DUSE	0	-0.23	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
515544	1201059406	01-APR-2006 09:22	DONE	0	-0.55	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
515266	1201058728	03-APR-2006 16:59	DONE	0	0.74	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
517136	1201062871	05-APR-2006 21:54	DUSE	0	-0.25	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
517718	1201064215	06-APR-2006 13:23	DONE	0	0.21	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
517716	1201064208	12-APR-2006 12:14	DUSE	1	4.9	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
518887	1201066848	12-APR-2006 19:27	DUSE	0	-0.28	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
518909	1201066925	16-APR-2006 08:06	DONE	0	-0.45	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
519439	1201068031	18-APR-2006 12:58	DUSE	0	-0.35	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
520797	1201071136	19-APR-2006 14:45	DUSE	0	-0.31	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
521038	1201071719	19-APR-2006 14:47	DONE	0	-1	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
520798	1201071140	20-APR-2006 07:49	DONE	0	-0.05	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
519427	1201067981	20-APR-2006 12:32	DONE	0	2.1	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17
521959	1201074063	20-APR-2006 21:36	DONE	0	-0.18	pCi/L	0.05	-0.45	-0.284	0.38	0.54	0.17

Thorium-228 DUP: Limits LCL = 0 UCL = 20

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506015	1201037822	02-MAR-2006 07:38	DONE	107	-0.27	percent	247	0	-790	1280	20.0	516
504514	1201034272	02-MAR-2006 12:09	DONE	183	-0.13	percent	247	0	-790	1280	20.0	516
507398	1201041205	03-MAR-2006 22:26	DONE	203	-0.09	percent	247	0	-790	1280	20.0	516
507079	1201040313	04-MAR-2006 21:34	DONE	62	-0.36	percent	247	0	-790	1280	20.0	516

506064	1201037941	06-MAR-2006 08:00	DONE	187	-0.12	percent	247	0	-790	1280	20.0	516
508121	1201042934	06-MAR-2006 16:33	DONE	418	0.33	percent	247	0	-790	1280	20.0	516
506047	1201037915	07-MAR-2006 01:33	DONE	168	-0.15	percent	247	0	-790	1280	20.0	516
507094	1201040359	07-MAR-2006 01:33	DONE	402	0.3	percent	247	0	-790	1280	20.0	516
507087	1201040341	07-MAR-2006 14:56	DONE	93	-0.3	percent	247	0	-790	1280	20.0	516
507401	1201041213	07-MAR-2006 23:35	DONE	4	-0.47	percent	247	0	-790	1280	20.0	516
509582	1201046245	08-MAR-2006 08:59	DONE	145	-0.2	percent	247	0	-790	1280	20.0	516
509840	1201046801	10-MAR-2006 11:48	DONE	589	0.66	percent	247	0	-790	1280	20.0	516
509118	1201045259	11-MAR-2006 09:34	DONE	23	-0.43	percent	247	0	-790	1280	20.0	516
511062	1201049579	14-MAR-2006 17:18	DUSE	11	-0.46	percent	247	0	-790	1280	20.0	516
509796	1201046676	14-MAR-2006 17:43	DONE	16	-0.45	percent	247	0	-790	1280	20.0	516
510660	1201048676	15-MAR-2006 10:56	DONE	209	-0.07	percent	247	0	-790	1280	20.0	516
511207	1201049871	18-MAR-2006 12:05	DONE	61	-0.36	percent	247	0	-790	1280	20.0	516
512010	1201051736	22-MAR-2006 20:59	DONE	26	-0.43	percent	247	0	-790	1280	20.0	516
511986	1201051679	23-MAR-2006 08:32	DONE	12	-0.45	percent	247	0	-790	1280	20.0	516
512003	1201051719	24-MAR-2006 08:00	DONE	293	0.09	percent	247	0	-790	1280	20.0	516
512008	1201051728	27-MAR-2006 18:58	DUSE	81	-0.32	percent	247	0	-790	1280	20.0	516
512781	1201053533	28-MAR-2006 07:34	DONE	394	0.29	percent	247	0	-790	1280	20.0	516
511549	1201050714	28-MAR-2006 11:48	DONE	18	-0.44	percent	247	0	-790	1280	20.0	516
515678	1201059767	29-MAR-2006 10:23	DONE	68	-0.35	percent	247	0	-790	1280	20.0	516
514263	1201056524	29-MAR-2006 22:27	DUSE	185	-0.12	percent	247	0	-790	1280	20.0	516
515544	1201059407	01-APR-2006 09:22	DONE	269	0.04	percent	247	0	-790	1280	20.0	516
515266	1201058729	01-APR-2006 11:30	DONE	39	-0.4	percent	247	0	-790	1280	20.0	516
517718	1201064216	06-APR-2006 13:23	DONE	3	-0.47	percent	247	0	-790	1280	20.0	516
517136	1201062872	07-APR-2006 07:28	DUSE	348	0.19	percent	247	0	-790	1280	20.0	516
518887	1201066849	12-APR-2006 19:27	DUSE	230	-0.03	percent	247	0	-790	1280	20.0	516
519427	1201067982	14-APR-2006 14:34	DONE	17	-0.45	percent	247	0	-790	1280	20.0	516
518909	1201066926	16-APR-2006 08:06	DONE	748	0.97	percent	247	0	-790	1280	20.0	516
519439	1201068032	18-APR-2006 12:58	DUSE	225	-0.04	percent	247	0	-790	1280	20.0	516
520797	1201071137	19-APR-2006 14:45	DUSE	247	-0	percent	247	0	-790	1280	20.0	516
521038	1201071720	19-APR-2006 14:47	DONE	45	-0.39	percent	247	0	-790	1280	20.0	516
520798	1201071141	20-APR-2006 07:49	DONE	56	-0.37	percent	247	0	-790	1280	20.0	516
521959	1201074064	20-APR-2006 21:36	DONE	3215	5.7	percent	247	0	-790	1280	20.0	516
521959	1201074155	20-APR-2006 21:36	DONE	30	-0.42	percent	247	0	-790	1280	20.0	516
521075	1201071845	20-APR-2006 21:36	DUSE	215	-0.06	percent	247	0	-790	1280	20.0	516

**Thorium-228 RER:** Limits LCL = 0 UCL = 3

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506015	1201037822	02-MAR-2006 07:38	DONE	0.64	-0.29	num	0.82	0	-0.395	2.03	3.00	0.61
504514	1201034272	02-MAR-2006 12:09	DONE	1.06	0.41	num	0.82	0	-0.395	2.03	3.00	0.61
507398	1201041205	03-MAR-2006 22:26	DONE	0.16	-1	num	0.82	0	-0.395	2.03	3.00	0.61
507079	1201040313	04-MAR-2006 21:34	DONE	0.65	-0.27	num	0.82	0	-0.395	2.03	3.00	0.61
506064	1201037941	06-MAR-2006 08:00	DONE	1.14	0.54	num	0.82	0	-0.395	2.03	3.00	0.61
508121	1201042934	06-MAR-2006 16:33	DONE	1.92	1.8	num	0.82	0	-0.395	2.03	3.00	0.61
506047	1201037915	07-MAR-2006 01:33	DONE	0.49	-0.54	num	0.82	0	-0.395	2.03	3.00	0.61
507094	1201040359	07-MAR-2006 01:33	DONE	1.38	0.93	num	0.82	0	-0.395	2.03	3.00	0.61
507087	1201040341	07-MAR-2006 14:56	DONE	0.72	-0.15	num	0.82	0	-0.395	2.03	3.00	0.61
507401	1201041213	07-MAR-2006 23:35	DONE	0.1	-1	num	0.82	0	-0.395	2.03	3.00	0.61
509582	1201046245	08-MAR-2006 08:59	DONE	1.62	1.3	num	0.82	0	-0.395	2.03	3.00	0.61
509840	1201046801	10-MAR-2006 11:48	DONE	2.3	2.5	num	0.82	0	-0.395	2.03	3.00	0.61

509118	1201045259	11-MAR-2006 09:34	DONE	0.15	-1	num	0.82	0	-0.395	2.03	3.00	0.61
511062	1201049579	14-MAR-2006 17:18	DUSE	0.02	-1	num	0.82	0	-0.395	2.03	3.00	0.61
509796	1201046676	14-MAR-2006 17:43	DONE	0.17	-1	num	0.82	0	-0.395	2.03	3.00	0.61
510660	1201048676	15-MAR-2006 10:56	DONE	2.12	2.2	num	0.82	0	-0.395	2.03	3.00	0.61
511207	1201049871	18-MAR-2006 12:05	DONE	1.3	0.79	num	0.82	0	-0.395	2.03	3.00	0.61
512010	1201051736	22-MAR-2006 20:59	DONE	0.46	-0.59	num	0.82	0	-0.395	2.03	3.00	0.61
511986	1201051679	23-MAR-2006 08:32	DONE	0.27	-0.91	num	0.82	0	-0.395	2.03	3.00	0.61
512003	1201051719	24-MAR-2006 08:00	DONE	0.39	-0.7	num	0.82	0	-0.395	2.03	3.00	0.61
512008	1201051728	27-MAR-2006 18:58	DUSE	1.02	0.33	num	0.82	0	-0.395	2.03	3.00	0.61
512781	1201053533	28-MAR-2006 07:34	DONE	0.62	-0.32	num	0.82	0	-0.395	2.03	3.00	0.61
511549	1201050714	28-MAR-2006 11:48	DONE	0.7	-0.18	num	0.82	0	-0.395	2.03	3.00	0.61
515678	1201059767	29-MAR-2006 10:23	DONE	1.22	0.67	num	0.82	0	-0.395	2.03	3.00	0.61
514263	1201056524	29-MAR-2006 22:27	DUSE	0.31	-0.83	num	0.82	0	-0.395	2.03	3.00	0.61
515544	1201059407	01-APR-2006 09:22	DONE	0.76	-0.09	num	0.82	0	-0.395	2.03	3.00	0.61
515266	1201058729	01-APR-2006 11:30	DONE	0.28	-0.89	num	0.82	0	-0.395	2.03	3.00	0.61
517718	1201064216	06-APR-2006 13:23	DONE	0.07	-1	num	0.82	0	-0.395	2.03	3.00	0.61
517136	1201062872	07-APR-2006 07:28	DUSE	0.96	0.24	num	0.82	0	-0.395	2.03	3.00	0.61
518887	1201066849	12-APR-2006 19:27	DUSE	0.22	-0.99	num	0.82	0	-0.395	2.03	3.00	0.61
519427	1201067982	14-APR-2006 14:34	DONE	1.06	0.41	num	0.82	0	-0.395	2.03	3.00	0.61
518909	1201066926	16-APR-2006 08:06	DONE	1.2	0.63	num	0.82	0	-0.395	2.03	3.00	0.61
519439	1201068032	18-APR-2006 12:58	DUSE	1.55	1.2	num	0.82	0	-0.395	2.03	3.00	0.61
520797	1201071137	19-APR-2006 14:45	DUSE	1.83	1.7	num	0.82	0	-0.395	2.03	3.00	0.61
521038	1201071720	19-APR-2006 14:47	DONE	0.16	-1	num	0.82	0	-0.395	2.03	3.00	0.61
520798	1201071141	20-APR-2006 07:49	DONE	0.87	0.09	num	0.82	0	-0.395	2.03	3.00	0.61
521959	1201074064	20-APR-2006 21:36	DONE	0.93	0.18	num	0.82	0	-0.395	2.03	3.00	0.61
521959	1201074155	20-APR-2006 21:36	DONE	0.37	-0.74	num	0.82	0	-0.395	2.03	3.00	0.61
521075	1201071845	20-APR-2006 21:36	DUSE	0.6	-0.36	num	0.82	0	-0.395	2.03	3.00	0.61

**Thorium-230 BLANK: Limits LCL = -8 UCL = 1.1**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
504484	1201034197	01-MAR-2006 16:22	DUSE	2	4.3	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
506015	1201037821	02-MAR-2006 07:38	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
504514	1201034271	02-MAR-2006 12:09	DONE	0	-0.4	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
507079	1201040312	04-MAR-2006 21:34	DONE	0	0.48	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
506064	1201037940	06-MAR-2006 08:00	DONE	0	-0.46	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
508121	1201042933	06-MAR-2006 16:33	DONE	1	1.4	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
507094	1201040358	07-MAR-2006 01:33	DONE	0	-0.41	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
506047	1201037914	07-MAR-2006 10:21	DONE	0	-0.35	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
507087	1201040340	07-MAR-2006 14:56	DONE	0	-0.39	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
507398	1201041204	07-MAR-2006 23:35	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
507401	1201041212	07-MAR-2006 23:35	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
509582	1201046244	08-MAR-2006 08:59	DONE	0	-0.38	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
509840	1201046800	10-MAR-2006 11:48	DONE	0	0.26	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
509118	1201045258	11-MAR-2006 09:34	DONE	0	-0.45	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
511062	1201049578	14-MAR-2006 17:18	DONE	0	-0.33	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
509796	1201046675	14-MAR-2006 17:43	DONE	0	-0.48	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
510660	1201048675	15-MAR-2006 10:56	DONE	0	0.16	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
511207	1201049870	18-MAR-2006 12:05	DUSE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
512010	1201051735	22-MAR-2006 20:59	DONE	0	-0.34	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
511986	1201051678	23-MAR-2006 08:32	DUSE	0	-0.23	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32

512003	1201051718	25-MAR-2006 10:35	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
512008	1201051727	27-MAR-2006 09:42	DUSE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
512781	1201053532	28-MAR-2006 07:34	DONE	0	-0.26	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
511549	1201050713	29-MAR-2006 08:24	DONE	1	2.3	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
515678	1201059766	29-MAR-2006 10:23	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
514263	1201056523	29-MAR-2006 22:27	DUSE	0	-0.39	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
515544	1201059406	01-APR-2006 09:22	DONE	0	-0.1	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
515266	1201058728	03-APR-2006 16:59	DUSE	0	-1	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
517136	1201062871	05-APR-2006 21:54	DONE	0	-0.43	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
517718	1201064215	06-APR-2006 13:23	DONE	0	-0.36	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
517716	1201064208	12-APR-2006 12:14	DUSE	0	0.63	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
518887	1201066848	12-APR-2006 19:27	DONE	0	-0.37	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
518909	1201066925	16-APR-2006 08:06	DONE	0	0.03	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
519439	1201068031	18-APR-2006 12:58	DONE	0	-0.31	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
520797	1201071136	19-APR-2006 14:45	DONE	0	-0.35	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
521038	1201071719	19-APR-2006 14:47	DONE	0	-0.27	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
520798	1201071140	20-APR-2006 07:49	DONE	0	-0.2	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
519427	1201067981	20-APR-2006 12:32	DONE	1	2.4	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32
521959	1201074063	20-APR-2006 21:36	DONE	0	-0.42	pCi/L	0.14	-0.836	-0.511	0.79	1.11	0.32

**Thorium-230 DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506015	1201037822	02-MAR-2006 07:38	DONE	24	-0.46	percent	241	0	-700	1180	20.0	470
504514	1201034272	02-MAR-2006 12:09	DONE	154	-0.18	percent	241	0	-700	1180	20.0	470
507398	1201041205	03-MAR-2006 22:26	DONE	365	0.26	percent	241	0	-700	1180	20.0	470
507079	1201040313	04-MAR-2006 21:34	DONE	28	-0.45	percent	241	0	-700	1180	20.0	470
506064	1201037941	06-MAR-2006 08:00	DONE	186	-0.12	percent	241	0	-700	1180	20.0	470
508121	1201042934	06-MAR-2006 16:33	DONE	455	0.45	percent	241	0	-700	1180	20.0	470
506047	1201037915	07-MAR-2006 01:33	DONE	51	-0.4	percent	241	0	-700	1180	20.0	470
507094	1201040359	07-MAR-2006 01:33	DONE	62	-0.38	percent	241	0	-700	1180	20.0	470
507087	1201040341	07-MAR-2006 14:56	DONE	66	-0.37	percent	241	0	-700	1180	20.0	470
507401	1201041213	07-MAR-2006 23:35	DONE	15	-0.48	percent	241	0	-700	1180	20.0	470
509582	1201046245	08-MAR-2006 08:59	DONE	2795	5.4	percent	241	0	-700	1180	20.0	470
509840	1201046801	10-MAR-2006 11:48	DONE	106	-0.29	percent	241	0	-700	1180	20.0	470
509118	1201045259	11-MAR-2006 09:34	DONE	574	0.71	percent	241	0	-700	1180	20.0	470
511062	1201049579	14-MAR-2006 17:18	DONE	494	0.54	percent	241	0	-700	1180	20.0	470
509796	1201046676	14-MAR-2006 17:43	DONE	76	-0.35	percent	241	0	-700	1180	20.0	470
510660	1201048676	15-MAR-2006 10:56	DONE	913	1.4	percent	241	0	-700	1180	20.0	470
511207	1201049871	18-MAR-2006 12:05	DUSE	13	-0.49	percent	241	0	-700	1180	20.0	470
512010	1201051736	22-MAR-2006 20:59	DONE	1	-0.51	percent	241	0	-700	1180	20.0	470
511986	1201051679	23-MAR-2006 08:32	DUSE	33	-0.44	percent	241	0	-700	1180	20.0	470
512003	1201051719	24-MAR-2006 08:00	DONE	714	1	percent	241	0	-700	1180	20.0	470
512008	1201051728	27-MAR-2006 18:58	DUSE	32	-0.44	percent	241	0	-700	1180	20.0	470
512781	1201053533	28-MAR-2006 07:34	DONE	180	-0.13	percent	241	0	-700	1180	20.0	470
511549	1201050714	28-MAR-2006 11:48	DONE	60	-0.38	percent	241	0	-700	1180	20.0	470
515678	1201059767	29-MAR-2006 10:23	DONE	509	0.57	percent	241	0	-700	1180	20.0	470
514263	1201056524	29-MAR-2006 22:27	DUSE	20	-0.47	percent	241	0	-700	1180	20.0	470
515544	1201059407	01-APR-2006 09:22	DONE	192	-0.1	percent	241	0	-700	1180	20.0	470
515266	1201058729	01-APR-2006 11:30	DUSE	82	-0.34	percent	241	0	-700	1180	20.0	470
517718	1201064216	06-APR-2006 13:23	DONE	158	-0.18	percent	241	0	-700	1180	20.0	470

517136	1201062872	07-APR-2006 07:28	DONE	82	-0.34	percent	241	0	-700	1180	20.0	470
518887	1201066849	12-APR-2006 19:27	DONE	30	-0.45	percent	241	0	-700	1180	20.0	470
519427	1201067982	14-APR-2006 14:34	DONE	9	-0.49	percent	241	0	-700	1180	20.0	470
518909	1201066926	16-APR-2006 08:06	DONE	32	-0.44	percent	241	0	-700	1180	20.0	470
519439	1201068032	18-APR-2006 12:58	DONE	114	-0.27	percent	241	0	-700	1180	20.0	470
520797	1201071137	19-APR-2006 14:45	DONE	271	0.06	percent	241	0	-700	1180	20.0	470
521038	1201071720	19-APR-2006 14:47	DONE	102	-0.3	percent	241	0	-700	1180	20.0	470
520798	1201071141	20-APR-2006 07:49	DONE	131	-0.23	percent	241	0	-700	1180	20.0	470
521959	1201074064	20-APR-2006 21:36	DONE	23	-0.46	percent	241	0	-700	1180	20.0	470
521959	1201074155	20-APR-2006 21:36	DONE	115	-0.27	percent	241	0	-700	1180	20.0	470
521075	1201071845	20-APR-2006 21:36	DONE	140	-0.22	percent	241	0	-700	1180	20.0	470

**Thorium-230 LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
394997	1200773390	19-JAN-2005 19:21	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
396381	1200776551	25-JAN-2005 17:25	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
421139	1200835683	05-MAY-2005 13:31	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
423378	1200841265	10-MAY-2005 17:51	DONE	75	-3.0	percent	100	75.0	83.3	117	125	8.33
430938	1200859789	09-JUN-2005 13:47	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
438579	1200878052	02-JUL-2005 21:23	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
450934	1200907752	12-AUG-2005 03:24	DONE	93	-0.86	percent	100	75.0	83.3	117	125	8.33
456441	1200920836	30-AUG-2005 17:32	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
457053	1200922083	09-SEP-2005 14:49	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
465256	1200942286	26-SEP-2005 15:33	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
468593	1200949998	08-OCT-2005 11:20	DONE	79	-2	percent	100	75.0	83.3	117	125	8.33
471081	1200955896	17-OCT-2005 21:18	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
478002	1200972583	10-NOV-2005 02:16	DONE	75	-3.0	percent	100	75.0	83.3	117	125	8.33
486414	1200993009	14-DEC-2005 08:11	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
490270	1201001730	29-DEC-2005 14:39	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33
492212	1201006211	13-JAN-2006 08:17	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
505245	1201036055	22-FEB-2006 23:48	DONE	119	2.3	percent	100	75.0	83.3	117	125	8.33
509582	1201046246	08-MAR-2006 08:59	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
511062	1201049581	14-MAR-2006 17:18	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
517136	1201062874	05-APR-2006 21:54	DONE	98	-0.23	percent	100	75.0	83.3	117	125	8.33
517718	1201064218	08-APR-2006 08:43	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
518887	1201066851	12-APR-2006 19:25	DONE	93	-0.89	percent	100	75.0	83.3	117	125	8.33
519439	1201068034	18-APR-2006 12:58	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
520797	1201071139	19-APR-2006 14:45	DONE	106	0.72	percent	100	75.0	83.3	117	125	8.33
520798	1201071143	20-APR-2006 07:49	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33

**Thorium-230 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506015	1201037822	02-MAR-2006 07:38	DONE	0.15	-1	num	1.18	0	-0.394	2.76	3.00	0.79
504514	1201034272	02-MAR-2006 12:09	DONE	1.65	0.6	num	1.18	0	-0.394	2.76	3.00	0.79
507398	1201041205	03-MAR-2006 22:26	DONE	2.43	1.6	num	1.18	0	-0.394	2.76	3.00	0.79
507079	1201040313	04-MAR-2006 21:34	DONE	0.42	-0.97	num	1.18	0	-0.394	2.76	3.00	0.79
506064	1201037941	06-MAR-2006 08:00	DONE	2.88	2.2	num	1.18	0	-0.394	2.76	3.00	0.79
508121	1201042934	06-MAR-2006 16:33	DONE	1.71	0.66	num	1.18	0	-0.394	2.76	3.00	0.79
506047	1201037915	07-MAR-2006 01:33	DONE	0.93	-0.32	num	1.18	0	-0.394	2.76	3.00	0.79
507094	1201040359	07-MAR-2006 01:33	DONE	0.51	-0.85	num	1.18	0	-0.394	2.76	3.00	0.79

507087	1201040341	07-MAR-2006 14:56	DONE	0.76	-0.54	num	1.18	0	-0.394	2.76	3.00	0.79
507401	1201041213	07-MAR-2006 23:35	DONE	0.47	-0.91	num	1.18	0	-0.394	2.76	3.00	0.79
509582	1201046245	08-MAR-2006 08:59	DONE	1.97	0.99	num	1.18	0	-0.394	2.76	3.00	0.79
509840	1201046801	10-MAR-2006 11:48	DONE	1.14	-0.06	num	1.18	0	-0.394	2.76	3.00	0.79
509118	1201045259	11-MAR-2006 09:34	DONE	1.35	0.21	num	1.18	0	-0.394	2.76	3.00	0.79
511062	1201049579	14-MAR-2006 17:18	DONE	1.45	0.34	num	1.18	0	-0.394	2.76	3.00	0.79
509796	1201046676	14-MAR-2006 17:43	DONE	0.64	-0.69	num	1.18	0	-0.394	2.76	3.00	0.79
510660	1201048676	15-MAR-2006 10:56	DONE	1.4	0.27	num	1.18	0	-0.394	2.76	3.00	0.79
511207	1201049871	18-MAR-2006 12:05	DUSE	0.22	-1	num	1.18	0	-0.394	2.76	3.00	0.79
512010	1201051736	22-MAR-2006 20:59	DONE	0.01	-1	num	1.18	0	-0.394	2.76	3.00	0.79
511986	1201051679	23-MAR-2006 08:32	DUSE	1.55	0.46	num	1.18	0	-0.394	2.76	3.00	0.79
512003	1201051719	24-MAR-2006 08:00	DONE	1.1	-0.1	num	1.18	0	-0.394	2.76	3.00	0.79
512008	1201051728	27-MAR-2006 18:58	DUSE	0.44	-0.94	num	1.18	0	-0.394	2.76	3.00	0.79
512781	1201053533	28-MAR-2006 07:34	DONE	2.84	2.1	num	1.18	0	-0.394	2.76	3.00	0.79
511549	1201050714	28-MAR-2006 11:48	DONE	1.5	0.41	num	1.18	0	-0.394	2.76	3.00	0.79
515678	1201059767	29-MAR-2006 10:23	DONE	1.12	-0.08	num	1.18	0	-0.394	2.76	3.00	0.79
514263	1201056524	29-MAR-2006 22:27	DUSE	0.24	-1	num	1.18	0	-0.394	2.76	3.00	0.79
515544	1201059407	01-APR-2006 09:22	DONE	1.8	0.78	num	1.18	0	-0.394	2.76	3.00	0.79
515266	1201058729	01-APR-2006 11:30	DUSE	2.28	1.4	num	1.18	0	-0.394	2.76	3.00	0.79
517718	1201064216	06-APR-2006 13:23	DONE	2.3	1.4	num	1.18	0	-0.394	2.76	3.00	0.79
517136	1201062872	07-APR-2006 07:28	DONE	1.59	0.52	num	1.18	0	-0.394	2.76	3.00	0.79
518887	1201066849	12-APR-2006 19:27	DONE	0.16	-1	num	1.18	0	-0.394	2.76	3.00	0.79
519427	1201067982	14-APR-2006 14:34	DONE	0.29	-1	num	1.18	0	-0.394	2.76	3.00	0.79
518909	1201066926	16-APR-2006 08:06	DONE	0.4	-0.99	num	1.18	0	-0.394	2.76	3.00	0.79
519439	1201068032	18-APR-2006 12:58	DONE	1.69	0.65	num	1.18	0	-0.394	2.76	3.00	0.79
520797	1201071137	19-APR-2006 14:45	DONE	2.17	1.3	num	1.18	0	-0.394	2.76	3.00	0.79
521038	1201071720	19-APR-2006 14:47	DONE	1.05	-0.17	num	1.18	0	-0.394	2.76	3.00	0.79
520798	1201071141	20-APR-2006 07:49	DONE	1.13	-0.07	num	1.18	0	-0.394	2.76	3.00	0.79
521959	1201074064	20-APR-2006 21:36	DONE	0.42	-0.97	num	1.18	0	-0.394	2.76	3.00	0.79
521959	1201074155	20-APR-2006 21:36	DONE	0.41	-0.98	num	1.18	0	-0.394	2.76	3.00	0.79
521075	1201071845	20-APR-2006 21:36	DONE	1.59	0.52	num	1.18	0	-0.394	2.76	3.00	0.79

**Thorium-230 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
394997	1200773389	19-JAN-2005 19:21	DONE	86	-2	percent	100	75.0	83.3	117	125	8.33
396381	1200776550	25-JAN-2005 22:09	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
421139	1200835681	04-MAY-2005 20:43	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33
423378	1200841264	10-MAY-2005 17:51	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
430938	1200859788	09-JUN-2005 13:47	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
438579	1200878051	02-JUL-2005 21:23	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
450934	1200907751	12-AUG-2005 03:24	DONE	84	-2	percent	100	75.0	83.3	117	125	8.33
456441	1200920835	30-AUG-2005 17:32	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
457053	1200922082	09-SEP-2005 14:49	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
465256	1200942285	26-SEP-2005 15:33	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
468593	1200949997	12-OCT-2005 08:29	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
471081	1200955895	17-OCT-2005 21:18	DONE	92	-0.94	percent	100	75.0	83.3	117	125	8.33
478002	1200972582	08-NOV-2005 08:03	DONE	76	-3	percent	100	75.0	83.3	117	125	8.33
486414	1200993008	14-DEC-2005 08:11	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
490270	1201001729	29-DEC-2005 14:39	DONE	81	-2	percent	100	75.0	83.3	117	125	8.33
492212	1201006210	13-JAN-2006 08:17	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33

505245	1201036054	22-FEB-2006 23:48	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
511062	1201049580	14-MAR-2006 17:18	DONE	96	-0.49	percent	100	75.0	83.3	117	125	8.33
517136	1201062873	05-APR-2006 21:54	DONE	107	0.84	percent	100	75.0	83.3	117	125	8.33
517718	1201064217	08-APR-2006 08:43	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
518887	1201066850	12-APR-2006 19:27	DONE	83	-2	percent	100	75.0	83.3	117	125	8.33
519439	1201068033	18-APR-2006 12:58	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
520797	1201071138	19-APR-2006 14:45	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
520798	1201071142	20-APR-2006 07:49	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
521075	1201071846	20-APR-2006 21:36	DONE	74	-3	percent	100	75.0	83.3	117	125	8.33

**Thorium-232 BLANK: Limits LCL = -.2 UCL = .3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
504484	1201034197	01-MAR-2006 16:22	DUSE	0	4.8	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
506015	1201037821	02-MAR-2006 07:38	DONE	0	-0.26	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
504514	1201034271	02-MAR-2006 12:09	DONE	0	-0.36	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
507079	1201040312	04-MAR-2006 21:34	DONE	0	0.36	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
506064	1201037940	06-MAR-2006 08:00	DONE	0	-0.49	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
508121	1201042933	06-MAR-2006 16:33	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
507094	1201040358	07-MAR-2006 01:33	DONE	0	-0.28	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
506047	1201037914	07-MAR-2006 10:21	DONE	0	0.08	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
507087	1201040340	07-MAR-2006 14:56	DONE	0	-0.11	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
507398	1201041204	07-MAR-2006 23:35	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
507401	1201041212	07-MAR-2006 23:35	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
509582	1201046244	08-MAR-2006 08:59	DONE	0	0.37	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
509840	1201046800	10-MAR-2006 11:48	DONE	0	-0.36	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
509118	1201045258	11-MAR-2006 09:34	DONE	0	0.22	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
511062	1201049578	14-MAR-2006 17:18	DUSE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
509796	1201046675	14-MAR-2006 17:43	DONE	0	-0.25	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
510660	1201048675	15-MAR-2006 10:56	DONE	0	0.02	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
511207	1201049870	18-MAR-2006 12:05	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
512010	1201051735	22-MAR-2006 20:59	DONE	0	-0.25	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
511986	1201051678	23-MAR-2006 08:32	DONE	0	0.22	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
512003	1201051718	25-MAR-2006 10:35	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
512008	1201051727	27-MAR-2006 09:42	DUSE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
512781	1201053532	28-MAR-2006 07:34	DONE	0	0.35	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
511549	1201050713	29-MAR-2006 08:24	DONE	0	1.7	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
515678	1201059766	29-MAR-2006 10:23	DONE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
514263	1201056523	29-MAR-2006 22:27	DUSE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
515544	1201059406	01-APR-2006 09:22	DONE	0	-0.3	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
515266	1201058728	03-APR-2006 16:59	DONE	0	-3	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
517136	1201062871	05-APR-2006 21:54	DUSE	0	-0.26	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
517718	1201064215	06-APR-2006 13:23	DONE	0	0.38	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
517716	1201064208	12-APR-2006 12:14	DONE	0	-0.06	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
518887	1201066848	12-APR-2006 19:27	DUSE	0	-0.19	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
518909	1201066925	16-APR-2006 08:06	DONE	0	-0.72	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
519439	1201068031	18-APR-2006 12:58	DUSE	0	-0.26	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
520797	1201071136	19-APR-2006 14:45	DUSE	0	-0.05	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
521038	1201071719	19-APR-2006 14:47	DONE	0	-0.44	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
520798	1201071140	20-APR-2006 07:49	DONE	0	-0.48	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
519427	1201067981	20-APR-2006 12:32	DONE	0	1.2	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08



521959	1201074063	20-APR-2006 21:36	DONE	0	-0.33	pCi/L	0.02	-0.228	-0.147	0.18	0.26	0.08
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**Thorium-232 DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
505915	1201037583	01-MAR-2006 13:35	DONE	71	-0.18	percent	2180	0	-22000	26300	20.0	12000
506015	1201037822	02-MAR-2006 07:38	DONE	126	-0.17	percent	2180	0	-22000	26300	20.0	12000
504514	1201034272	02-MAR-2006 12:09	DONE	0	-0.18	percent	2180	0	-22000	26300	20.0	12000
507398	1201041205	03-MAR-2006 22:26	DONE	200	-0.16	percent	2180	0	-22000	26300	20.0	12000
507079	1201040313	04-MAR-2006 21:34	DONE	24	-0.18	percent	2180	0	-22000	26300	20.0	12000
506064	1201037941	06-MAR-2006 08:00	DONE	153	-0.17	percent	2180	0	-22000	26300	20.0	12000
508121	1201042934	06-MAR-2006 16:33	DONE	484	-0.14	percent	2180	0	-22000	26300	20.0	12000
506047	1201037915	07-MAR-2006 01:33	DONE	156	-0.17	percent	2180	0	-22000	26300	20.0	12000
507094	1201040359	07-MAR-2006 01:33	DONE	58	-0.18	percent	2180	0	-22000	26300	20.0	12000
507087	1201040341	07-MAR-2006 14:56	DONE	200	-0.16	percent	2180	0	-22000	26300	20.0	12000
507401	1201041213	07-MAR-2006 23:35	DONE	44	-0.18	percent	2180	0	-22000	26300	20.0	12000
509582	1201046245	08-MAR-2006 08:59	DONE	91	-0.17	percent	2180	0	-22000	26300	20.0	12000
509840	1201046801	10-MAR-2006 11:48	DONE	1	-0.18	percent	2180	0	-22000	26300	20.0	12000
509118	1201045259	11-MAR-2006 09:34	DONE	37	-0.18	percent	2180	0	-22000	26300	20.0	12000
511062	1201049579	14-MAR-2006 17:18	DUSE	184	-0.17	percent	2180	0	-22000	26300	20.0	12000
509796	1201046676	14-MAR-2006 17:43	DONE	75	-0.17	percent	2180	0	-22000	26300	20.0	12000
510660	1201048676	15-MAR-2006 10:56	DONE	56	-0.18	percent	2180	0	-22000	26300	20.0	12000
511207	1201049871	18-MAR-2006 12:05	DONE	58	-0.18	percent	2180	0	-22000	26300	20.0	12000
512010	1201051736	22-MAR-2006 20:59	DONE	49	-0.18	percent	2180	0	-22000	26300	20.0	12000
511986	1201051679	23-MAR-2006 08:32	DONE	12	-0.18	percent	2180	0	-22000	26300	20.0	12000
512003	1201051719	24-MAR-2006 08:00	DONE	486	-0.14	percent	2180	0	-22000	26300	20.0	12000
512008	1201051728	27-MAR-2006 18:58	DUSE	22	-0.18	percent	2180	0	-22000	26300	20.0	12000
512781	1201053533	28-MAR-2006 07:34	DONE	282	-0.16	percent	2180	0	-22000	26300	20.0	12000
511549	1201050714	28-MAR-2006 11:48	DONE	70	-0.18	percent	2180	0	-22000	26300	20.0	12000
515678	1201059767	29-MAR-2006 10:23	DONE	72	-0.18	percent	2180	0	-22000	26300	20.0	12000
514263	1201056524	29-MAR-2006 22:27	DUSE	1828	-0.03	percent	2180	0	-22000	26300	20.0	12000
515544	1201059407	01-APR-2006 09:22	DONE	193	-0.17	percent	2180	0	-22000	26300	20.0	12000
515266	1201058729	01-APR-2006 11:30	DONE	41	-0.18	percent	2180	0	-22000	26300	20.0	12000
517718	1201064216	06-APR-2006 13:23	DONE	200	-0.16	percent	2180	0	-22000	26300	20.0	12000
517136	1201062872	07-APR-2006 07:28	DUSE	75400	6.1	percent	2180	0	-22000	26300	20.0	12000
518887	1201066849	12-APR-2006 19:27	DUSE	116	-0.17	percent	2180	0	-22000	26300	20.0	12000
519427	1201067982	14-APR-2006 14:34	DONE	13	-0.18	percent	2180	0	-22000	26300	20.0	12000
519439	1201068032	18-APR-2006 12:58	DUSE	12	-0.18	percent	2180	0	-22000	26300	20.0	12000
520797	1201071137	19-APR-2006 14:45	DUSE	3	-0.18	percent	2180	0	-22000	26300	20.0	12000
521038	1201071720	19-APR-2006 14:47	DONE	684	-0.12	percent	2180	0	-22000	26300	20.0	12000
520798	1201071141	20-APR-2006 07:49	DONE	64	-0.18	percent	2180	0	-22000	26300	20.0	12000
521959	1201074064	20-APR-2006 21:36	DONE	212	-0.16	percent	2180	0	-22000	26300	20.0	12000
521959	1201074155	20-APR-2006 21:36	DONE	112	-0.17	percent	2180	0	-22000	26300	20.0	12000
521075	1201071845	20-APR-2006 21:36	DUSE	3168	0.08	percent	2180	0	-22000	26300	20.0	12000

**Thorium-232 LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506508	1201038991	25-FEB-2006 18:04	DONE	107	0.84	percent	100	75.0	83.3	117	125	8.33
502229	1201029181	25-FEB-2006 18:05	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
505996	1201037774	25-FEB-2006 18:05	DONE	99	-0.11	percent	100	75.0	83.3	117	125	8.33
505996	1201037775	25-FEB-2006 18:05	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33

506001	1201037788	27-FEB-2006 08:26	DONE	80	-2	percent	100	75.0	83.3	117	125	8.33
506001	1201037789	27-FEB-2006 08:26	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
504486	1201034206	28-FEB-2006 15:46	DONE	93	-0.79	percent	100	75.0	83.3	117	125	8.33
504484	1201034200	28-FEB-2006 15:47	DUSE	124	2.9	percent	100	75.0	83.3	117	125	8.33
507036	1201040184	01-MAR-2006 20:40	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
506015	1201037823	02-MAR-2006 07:38	DONE	98	-0.26	percent	100	75.0	83.3	117	125	8.33
504514	1201034273	02-MAR-2006 12:09	DONE	122	2.6	percent	100	75.0	83.3	117	125	8.33
507398	1201041207	04-MAR-2006 12:45	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
508121	1201042936	04-MAR-2006 13:40	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
507079	1201040315	05-MAR-2006 08:42	DONE	86	-2	percent	100	75.0	83.3	117	125	8.33
506064	1201037942	06-MAR-2006 08:00	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
506047	1201037916	07-MAR-2006 01:33	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
507094	1201040360	07-MAR-2006 01:33	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
507087	1201040342	07-MAR-2006 14:56	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
507401	1201041215	07-MAR-2006 23:35	DONE	98	-0.29	percent	100	75.0	83.3	117	125	8.33
509118	1201045261	11-MAR-2006 09:34	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
509840	1201046803	11-MAR-2006 14:29	DONE	101	0.15	percent	100	75.0	83.3	117	125	8.33
509796	1201046678	15-MAR-2006 12:44	DONE	99	-0.12	percent	100	75.0	83.3	117	125	8.33
510660	1201048677	16-MAR-2006 10:10	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
511207	1201049873	18-MAR-2006 12:05	DONE	96	-0.43	percent	100	75.0	83.3	117	125	8.33
511549	1201050716	20-MAR-2006 07:43	DONE	92	-1	percent	100	75.0	83.3	117	125	8.33
511986	1201051681	23-MAR-2006 08:32	DONE	123	2.8	percent	100	75.0	83.3	117	125	8.33
512003	1201051721	24-MAR-2006 07:55	DONE	92	-0.97	percent	100	75.0	83.3	117	125	8.33
512010	1201051738	24-MAR-2006 08:00	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
512008	1201051730	27-MAR-2006 09:42	DUSE	103	0.36	percent	100	75.0	83.3	117	125	8.33
512781	1201053535	28-MAR-2006 07:34	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
515678	1201059769	29-MAR-2006 10:23	DONE	94	-0.76	percent	100	75.0	83.3	117	125	8.33
515266	1201058731	01-APR-2006 11:31	DONE	94	-0.72	percent	100	75.0	83.3	117	125	8.33
515544	1201059409	01-APR-2006 11:47	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
517716	1201064210	12-APR-2006 12:14	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
517716	1201064211	12-APR-2006 12:14	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
519427	1201067984	14-APR-2006 14:35	DONE	97	-0.36	percent	100	75.0	83.3	117	125	8.33
518909	1201066927	16-APR-2006 08:06	DONE	88	-1	percent	100	75.0	83.3	117	125	8.33
521038	1201071722	19-APR-2006 14:47	DONE	119	2.3	percent	100	75.0	83.3	117	125	8.33
521959	1201074066	20-APR-2006 21:36	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33

**Thorium-232 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
506015	1201037822	02-MAR-2006 07:38	DONE	0.66	00	num	0.66	0	-0.383	1.69	3.00	0.52
504514	1201034272	02-MAR-2006 12:09	DONE	0	-1	num	0.66	0	-0.383	1.69	3.00	0.52
507398	1201041205	03-MAR-2006 22:26	DONE	0.92	0.5	num	0.66	0	-0.383	1.69	3.00	0.52
507079	1201040313	04-MAR-2006 21:34	DONE	0.24	-0.81	num	0.66	0	-0.383	1.69	3.00	0.52
506064	1201037941	06-MAR-2006 08:00	DONE	1.52	1.7	num	0.66	0	-0.383	1.69	3.00	0.52
508121	1201042934	06-MAR-2006 16:33	DONE	1.3	1.2	num	0.66	0	-0.383	1.69	3.00	0.52
506047	1201037915	07-MAR-2006 01:33	DONE	0.68	0.04	num	0.66	0	-0.383	1.69	3.00	0.52
507094	1201040359	07-MAR-2006 01:33	DONE	0.39	-0.51	num	0.66	0	-0.383	1.69	3.00	0.52
507087	1201040341	07-MAR-2006 14:56	DONE	0.16	-0.96	num	0.66	0	-0.383	1.69	3.00	0.52
507401	1201041213	07-MAR-2006 23:35	DONE	1.21	1.1	num	0.66	0	-0.383	1.69	3.00	0.52
509582	1201046245	08-MAR-2006 08:59	DONE	0.64	-0.02	num	0.66	0	-0.383	1.69	3.00	0.52
509840	1201046801	10-MAR-2006 11:48	DONE	00	-1	num	0.66	0	-0.383	1.69	3.00	0.52

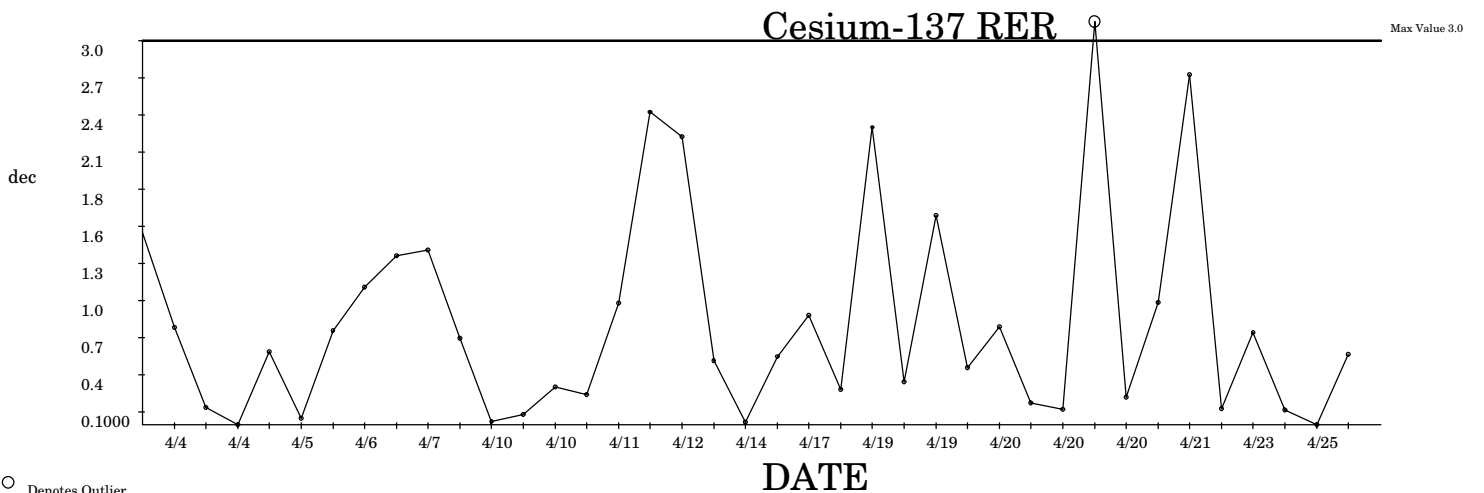
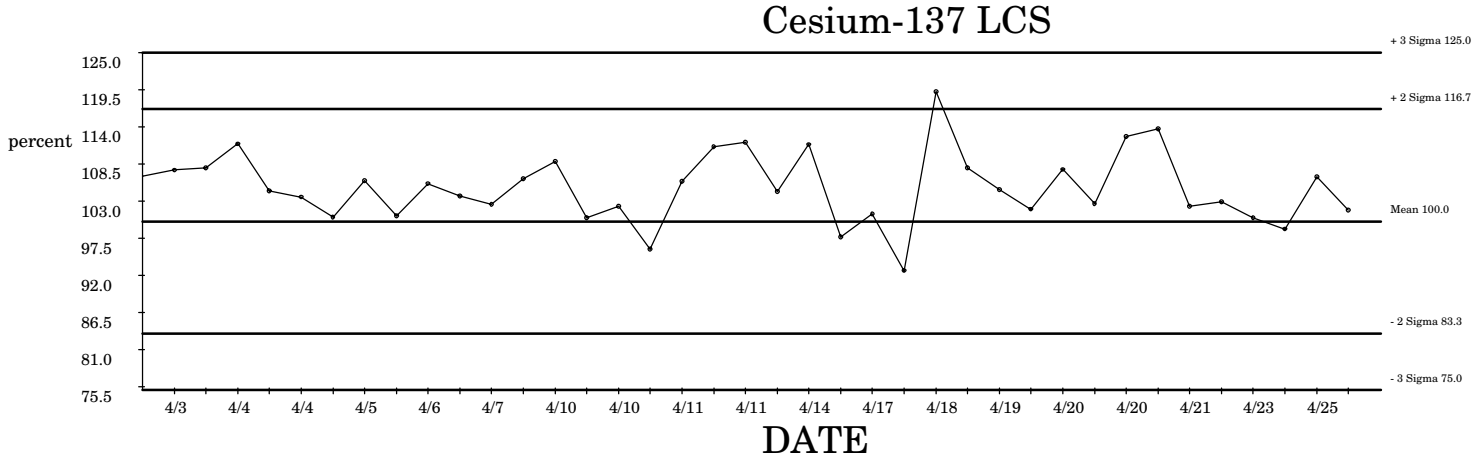
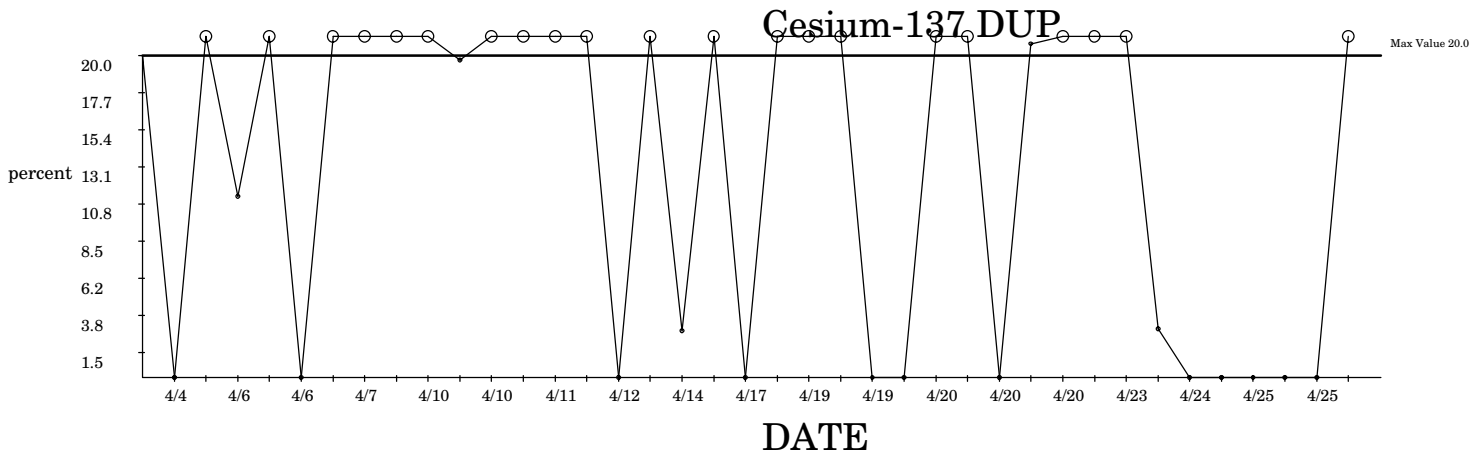
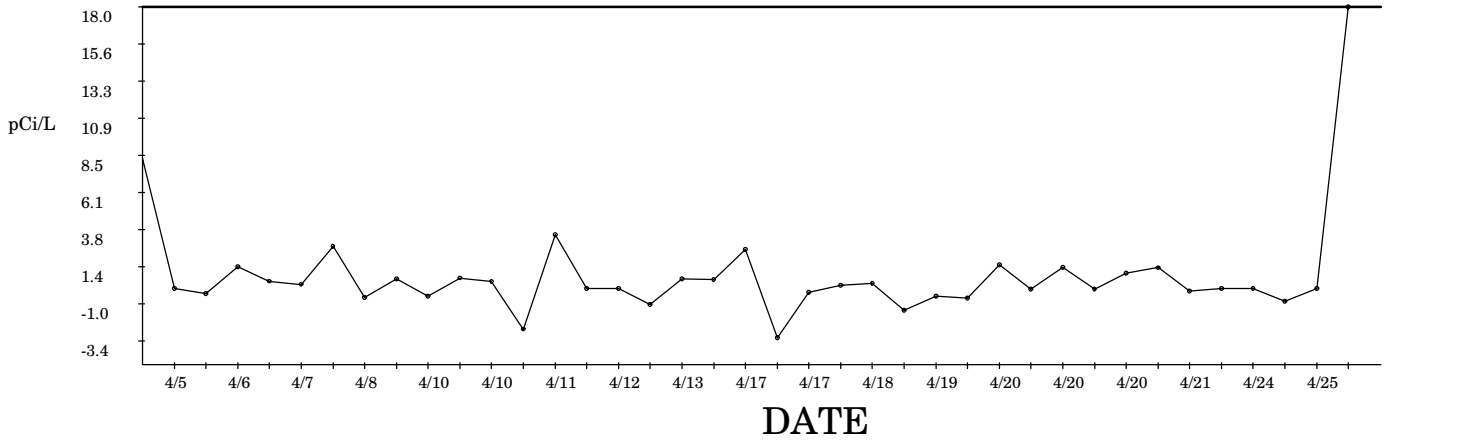
509118	1201045259	11-MAR-2006 09:34	DONE	0.26	-0.76	num	0.66	0	-0.383	1.69	3.00	0.52
511062	1201049579	14-MAR-2006 17:18	DUSE	0.15	-0.97	num	0.66	0	-0.383	1.69	3.00	0.52
509796	1201046676	14-MAR-2006 17:43	DONE	0.75	0.18	num	0.66	0	-0.383	1.69	3.00	0.52
510660	1201048676	15-MAR-2006 10:56	DONE	0.45	-0.39	num	0.66	0	-0.383	1.69	3.00	0.52
511207	1201049871	18-MAR-2006 12:05	DONE	0.49	-0.33	num	0.66	0	-0.383	1.69	3.00	0.52
512010	1201051736	22-MAR-2006 20:59	DONE	0.61	-0.09	num	0.66	0	-0.383	1.69	3.00	0.52
511986	1201051679	23-MAR-2006 08:32	DONE	0.21	-0.86	num	0.66	0	-0.383	1.69	3.00	0.52
512003	1201051719	24-MAR-2006 08:00	DONE	1.22	1.1	num	0.66	0	-0.383	1.69	3.00	0.52
512008	1201051728	27-MAR-2006 18:58	DUSE	0.33	-0.63	num	0.66	0	-0.383	1.69	3.00	0.52
512781	1201053533	28-MAR-2006 07:34	DONE	1.92	2.4	num	0.66	0	-0.383	1.69	3.00	0.52
511549	1201050714	28-MAR-2006 11:48	DONE	0.6	-0.11	num	0.66	0	-0.383	1.69	3.00	0.52
515678	1201059767	29-MAR-2006 10:23	DONE	0.63	-0.05	num	0.66	0	-0.383	1.69	3.00	0.52
514263	1201056524	29-MAR-2006 22:27	DUSE	0.87	0.41	num	0.66	0	-0.383	1.69	3.00	0.52
515544	1201059407	01-APR-2006 09:22	DONE	0.87	0.42	num	0.66	0	-0.383	1.69	3.00	0.52
515266	1201058729	01-APR-2006 11:30	DONE	0.28	-0.71	num	0.66	0	-0.383	1.69	3.00	0.52
517718	1201064216	06-APR-2006 13:23	DONE	0.02	-1	num	0.66	0	-0.383	1.69	3.00	0.52
517136	1201062872	07-APR-2006 07:28	DUSE	1.97	2.5	num	0.66	0	-0.383	1.69	3.00	0.52
518887	1201066849	12-APR-2006 19:27	DUSE	0.87	0.42	num	0.66	0	-0.383	1.69	3.00	0.52
519427	1201067982	14-APR-2006 14:34	DONE	0.21	-0.86	num	0.66	0	-0.383	1.69	3.00	0.52
518909	1201066926	16-APR-2006 08:06	DONE	1.01	0.68	num	0.66	0	-0.383	1.69	3.00	0.52
519439	1201068032	18-APR-2006 12:58	DUSE	0.05	-1	num	0.66	0	-0.383	1.69	3.00	0.52
520797	1201071137	19-APR-2006 14:45	DUSE	0.01	-1	num	0.66	0	-0.383	1.69	3.00	0.52
521038	1201071720	19-APR-2006 14:47	DONE	1.19	1	num	0.66	0	-0.383	1.69	3.00	0.52
520798	1201071141	20-APR-2006 07:49	DONE	0.47	-0.36	num	0.66	0	-0.383	1.69	3.00	0.52
521959	1201074064	20-APR-2006 21:36	DONE	0.39	-0.51	num	0.66	0	-0.383	1.69	3.00	0.52
521959	1201074155	20-APR-2006 21:36	DONE	0.52	-0.27	num	0.66	0	-0.383	1.69	3.00	0.52
521075	1201071845	20-APR-2006 21:36	DUSE	1.51	1.6	num	0.66	0	-0.383	1.69	3.00	0.52

**Thorium-232 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
491004	1201003363	09-JAN-2006 18:55	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
491923	1201005543	11-JAN-2006 12:43	DONE	85	-2	percent	100	75.0	83.3	117	125	8.33
491189	1201003738	12-JAN-2006 18:04	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
494226	1201010637	16-JAN-2006 16:49	DONE	87	-2	percent	100	75.0	83.3	117	125	8.33
494966	1201012326	19-JAN-2006 12:40	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
494595	1201011443	19-JAN-2006 12:40	DONE	123	2.8	percent	100	75.0	83.3	117	125	8.33
495880	1201014377	21-JAN-2006 10:02	DONE	82	-2	percent	100	75.0	83.3	117	125	8.33
496372	1201015511	24-JAN-2006 08:37	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
494599	1201011459	26-JAN-2006 14:49	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
497833	1201018880	28-JAN-2006 13:16	DONE	91	-1	percent	100	75.0	83.3	117	125	8.33
498151	1201019511	04-FEB-2006 07:58	DONE	125	3	percent	100	75.0	83.3	117	125	8.33
497915	1201019037	04-FEB-2006 12:32	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
500802	1201025782	10-FEB-2006 17:25	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
500664	1201025410	12-FEB-2006 08:45	DONE	89	-1	percent	100	75.0	83.3	117	125	8.33
504422	1201034010	22-FEB-2006 09:56	DONE	90	-1	percent	100	75.0	83.3	117	125	8.33
502229	1201029180	22-FEB-2006 23:48	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
505915	1201037584	25-FEB-2006 18:04	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
504484	1201034199	28-FEB-2006 15:47	DUSE	104	0.48	percent	100	75.0	83.3	117	125	8.33
507398	1201041206	03-MAR-2006 22:26	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
508121	1201042935	04-MAR-2006 13:40	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33

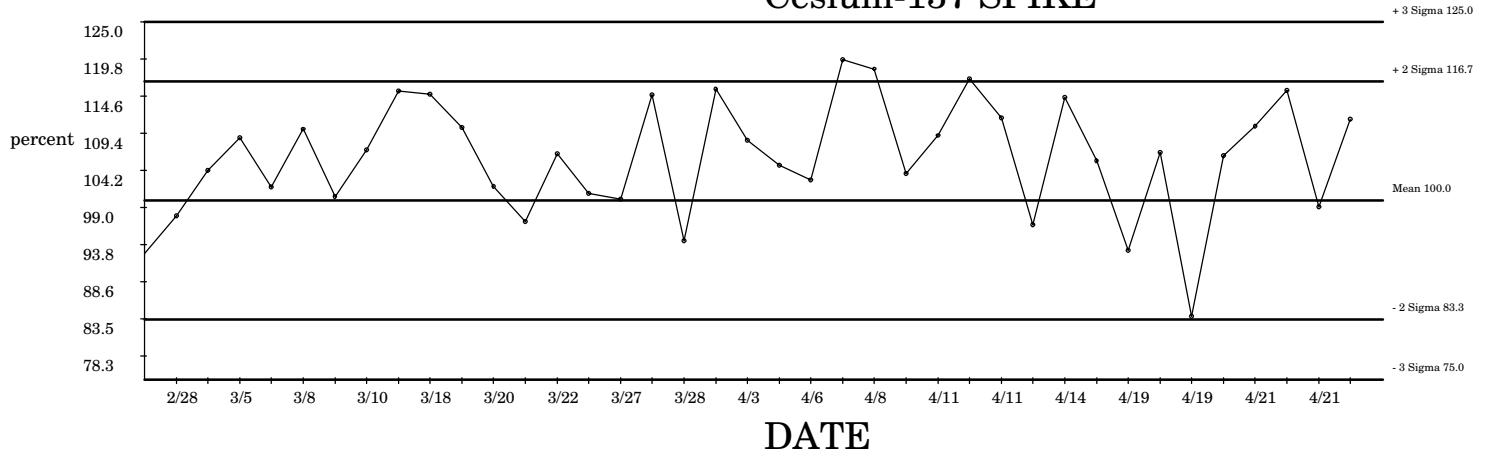
507079	1201040314	04-MAR-2006 21:34	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
507401	1201041214	07-MAR-2006 23:35	DONE	97	-0.36	percent	100	75.0	83.3	117	125	8.33
509840	1201046802	10-MAR-2006 11:48	DONE	116	2	percent	100	75.0	83.3	117	125	8.33
509118	1201045260	11-MAR-2006 09:34	DONE	78	-3	percent	100	75.0	83.3	117	125	8.33
509796	1201046677	14-MAR-2006 17:43	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
511207	1201049872	18-MAR-2006 12:05	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
511549	1201050715	20-MAR-2006 07:43	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
512010	1201051737	22-MAR-2006 20:59	DONE	105	0.6	percent	100	75.0	83.3	117	125	8.33
511986	1201051680	23-MAR-2006 08:32	DONE	86	-2	percent	100	75.0	83.3	117	125	8.33
512003	1201051720	25-MAR-2006 10:35	DONE	95	-0.61	percent	100	75.0	83.3	117	125	8.33
512781	1201053534	28-MAR-2006 07:34	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
515678	1201059768	29-MAR-2006 10:23	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
515544	1201059408	01-APR-2006 09:22	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
515266	1201058730	01-APR-2006 11:31	DONE	96	-0.52	percent	100	75.0	83.3	117	125	8.33
519427	1201067983	14-APR-2006 14:35	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
521038	1201071721	20-APR-2006 12:32	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
521959	1201074065	20-APR-2006 21:36	DONE	97	-0.35	percent	100	75.0	83.3	117	125	8.33
521959	1201074158	20-APR-2006 21:36	DONE	100	00	percent	100	75.0	83.3	117	125	8.33
521959	1201074157	20-APR-2006 21:36	DONE	107	0.82	percent	100	75.0	83.3	117	125	8.33

# SPC Graph for Gamma Spec inLiquid 4/25/2006 Cesium-137 BLANK



○ Denotes Outlier

# SPC Graph for Gamma Spec inLiquid 4/25/2006 Cesium-137 SPIKE



# Data used for Gamma Spec inLiquid 26-APR-2006

Americium-241 LCS: Limits LCL = 75 UCL = 125

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511298	1201050112	03-APR-2006 22:07	DONE	90.7	-1	percent	100	75.0	83.3	117	125	8.33
512870	1201053698	03-APR-2006 23:54	DUSE	104	0.47	percent	100	75.0	83.3	117	125	8.33
511297	1201050109	04-APR-2006 06:47	DONE	108	0.94	percent	100	75.0	83.3	117	125	8.33
516974	1201062509	04-APR-2006 07:59	DONE	94.4	-0.67	percent	100	75.0	83.3	117	125	8.33
516284	1201061022	04-APR-2006 10:09	DUSE	90.8	-1	percent	100	75.0	83.3	117	125	8.33
516477	1201061403	04-APR-2006 11:44	DONE	95.9	-0.49	percent	100	75.0	83.3	117	125	8.33
516727	1201061913	04-APR-2006 21:44	DONE	91.8	-0.98	percent	100	75.0	83.3	117	125	8.33
511296	1201050106	05-APR-2006 19:38	DONE	104	0.52	percent	100	75.0	83.3	117	125	8.33
515679	1201059782	06-APR-2006 21:11	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
516333	1201061132	06-APR-2006 22:33	DONE	103	0.31	percent	100	75.0	83.3	117	125	8.33
516981	1201062535	07-APR-2006 13:55	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
516331	1201061128	07-APR-2006 16:56	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
517019	1201062620	08-APR-2006 17:13	DONE	106	0.71	percent	100	75.0	83.3	117	125	8.33
516976	1201062516	10-APR-2006 08:10	DONE	106	0.76	percent	100	75.0	83.3	117	125	8.33
517034	1201062660	10-APR-2006 20:35	DONE	98.7	-0.16	percent	100	75.0	83.3	117	125	8.33
516982	1201062538	10-APR-2006 21:32	DONE	88.8	-1	percent	100	75.0	83.3	117	125	8.33
517023	1201062632	10-APR-2006 22:38	DONE	93.4	-0.79	percent	100	75.0	83.3	117	125	8.33
517024	1201062641	11-APR-2006 06:58	DONE	106	0.68	percent	100	75.0	83.3	117	125	8.33
519523	1201068262	11-APR-2006 10:58	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
519011	1201067124	11-APR-2006 22:38	DUSE	107	0.83	percent	100	75.0	83.3	117	125	8.33
516978	1201062524	14-APR-2006 06:31	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
516977	1201062520	14-APR-2006 10:17	DONE	96.4	-0.43	percent	100	75.0	83.3	117	125	8.33
520998	1201071625	17-APR-2006 19:03	DONE	101	0.13	percent	100	75.0	83.3	117	125	8.33
517253	1201063139	17-APR-2006 22:49	DONE	93.9	-0.73	percent	100	75.0	83.3	117	125	8.33
520996	1201071617	18-APR-2006 05:54	DONE	91.9	-0.97	percent	100	75.0	83.3	117	125	8.33
520754	1201071041	18-APR-2006 19:10	DUSE	113	1.6	percent	100	75.0	83.3	117	125	8.33
516979	1201062528	19-APR-2006 13:02	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
516657	1201061779	19-APR-2006 18:10	DUSE	110	1.1	percent	100	75.0	83.3	117	125	8.33
516980	1201062532	19-APR-2006 22:50	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
521937	1201074024	20-APR-2006 06:04	DUSE	110	1.2	percent	100	75.0	83.3	117	125	8.33
519545	1201068320	20-APR-2006 09:41	DONE	88.3	-1	percent	100	75.0	83.3	117	125	8.33
517257	1201063155	20-APR-2006 12:11	DONE	98.4	-0.19	percent	100	75.0	83.3	117	125	8.33
519535	1201068291	21-APR-2006 06:15	DONE	92.2	-0.93	percent	100	75.0	83.3	117	125	8.33
517255	1201063147	21-APR-2006 07:39	DONE	108	0.9	percent	100	75.0	83.3	117	125	8.33
519516	1201068251	21-APR-2006 09:58	DONE	97.3	-0.32	percent	100	75.0	83.3	117	125	8.33
522386	1201075056	23-APR-2006 21:45	DONE	96.4	-0.44	percent	100	75.0	83.3	117	125	8.33
523018	1201076449	24-APR-2006 05:38	DONE	92.7	-0.88	percent	100	75.0	83.3	117	125	8.33

523017	1201076445	25-APR-2006 06:13	DONE	118	2.1	percent	100	75.0	83.3	117	125	8.33
519510	1201068238	26-APR-2006 05:24	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33

**Americium-241 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511295	1201050102	03-APR-2006 05:16	DONE	0.59	-0.31	dec	1.37	0	-3.7	6.45	3.00	2.54
515677	1201059771	03-APR-2006 10:09	DUSE	1.06	-0.12	dec	1.37	0	-3.7	6.45	3.00	2.54
511297	1201050108	04-APR-2006 05:50	DONE	1.15	-0.09	dec	1.37	0	-3.7	6.45	3.00	2.54
516974	1201062507	04-APR-2006 11:01	DONE	1.03	-0.13	dec	1.37	0	-3.7	6.45	3.00	2.54
512870	1201053697	04-APR-2006 12:02	DUSE	0.49	-0.35	dec	1.37	0	-3.7	6.45	3.00	2.54
516477	1201061402	04-APR-2006 12:18	DONE	0.97	-0.16	dec	1.37	0	-3.7	6.45	3.00	2.54
516284	1201061021	04-APR-2006 17:27	DUSE	0.07	-0.51	dec	1.37	0	-3.7	6.45	3.00	2.54
511296	1201050105	05-APR-2006 18:16	DUSE	0.6	-0.3	dec	1.37	0	-3.7	6.45	3.00	2.54
515679	1201059780	06-APR-2006 11:54	DONE	0.08	-0.51	dec	1.37	0	-3.7	6.45	3.00	2.54
516981	1201062534	06-APR-2006 23:55	DONE	0.18	-0.47	dec	1.37	0	-3.7	6.45	3.00	2.54
516976	1201062514	07-APR-2006 11:18	DONE	0.8	-0.22	dec	1.37	0	-3.7	6.45	3.00	2.54
516333	1201061130	07-APR-2006 16:54	DONE	1.47	0.04	dec	1.37	0	-3.7	6.45	3.00	2.54
517034	1201062659	10-APR-2006 18:58	DONE	11.8	4.1	dec	1.37	0	-3.7	6.45	3.00	2.54
517023	1201062631	10-APR-2006 19:02	DONE	1.24	-0.05	dec	1.37	0	-3.7	6.45	3.00	2.54
517019	1201062618	10-APR-2006 19:13	DUSE	0.34	-0.41	dec	1.37	0	-3.7	6.45	3.00	2.54
516982	1201062537	10-APR-2006 21:49	DONE	0.81	-0.22	dec	1.37	0	-3.7	6.45	3.00	2.54
517024	1201062639	11-APR-2006 10:13	DONE	0.46	-0.36	dec	1.37	0	-3.7	6.45	3.00	2.54
519523	1201068260	11-APR-2006 10:15	DONE	0.89	-0.19	dec	1.37	0	-3.7	6.45	3.00	2.54
516331	1201061126	12-APR-2006 13:16	DONE	0.02	-0.53	dec	1.37	0	-3.7	6.45	3.00	2.54
516977	1201062518	13-APR-2006 21:04	DONE	2.14	0.31	dec	1.37	0	-3.7	6.45	3.00	2.54
516978	1201062522	14-APR-2006 06:30	DONE	0.92	-0.18	dec	1.37	0	-3.7	6.45	3.00	2.54
517253	1201063138	17-APR-2006 11:51	DONE	0.96	-0.16	dec	1.37	0	-3.7	6.45	3.00	2.54
520754	1201071040	17-APR-2006 23:56	DUSE	0.03	-0.52	dec	1.37	0	-3.7	6.45	3.00	2.54
520996	1201071615	18-APR-2006 05:53	DONE	1.28	-0.03	dec	1.37	0	-3.7	6.45	3.00	2.54
520998	1201071623	19-APR-2006 06:01	DONE	12	4.2	dec	1.37	0	-3.7	6.45	3.00	2.54
516979	1201062526	19-APR-2006 07:25	DONE	0.76	-0.24	dec	1.37	0	-3.7	6.45	3.00	2.54
516657	1201061778	19-APR-2006 17:52	DUSE	2.12	0.3	dec	1.37	0	-3.7	6.45	3.00	2.54
516980	1201062530	19-APR-2006 23:19	DONE	0.33	-0.41	dec	1.37	0	-3.7	6.45	3.00	2.54
521937	1201074023	20-APR-2006 06:04	DUSE	0.38	-0.39	dec	1.37	0	-3.7	6.45	3.00	2.54
517257	1201063153	20-APR-2006 10:21	DONE	0.21	-0.45	dec	1.37	0	-3.7	6.45	3.00	2.54
519545	1201068318	20-APR-2006 15:32	DONE	0.49	-0.35	dec	1.37	0	-3.7	6.45	3.00	2.54
519011	1201067123	20-APR-2006 23:49	DUSE	0.39	-0.39	dec	1.37	0	-3.7	6.45	3.00	2.54
517255	1201063145	20-APR-2006 23:50	DONE	0.13	-0.49	dec	1.37	0	-3.7	6.45	3.00	2.54
519535	1201068296	20-APR-2006 23:55	DUSE	1.46	0.04	dec	1.37	0	-3.7	6.45	3.00	2.54
519516	1201068249	21-APR-2006 09:09	DONE	1.37	-0	dec	1.37	0	-3.7	6.45	3.00	2.54
522386	1201075055	23-APR-2006 23:51	DUSE	1.09	-0.11	dec	1.37	0	-3.7	6.45	3.00	2.54
523018	1201076447	23-APR-2006 23:56	DONE	1.06	-0.12	dec	1.37	0	-3.7	6.45	3.00	2.54



523017	1201076444	25-APR-2006 06:13	DUSE	1.94	0.23	dec	1.37	0	-3.7	6.45	3.00	2.54
519510	1201068237	26-APR-2006 05:28	DUSE	0.22	-0.45	dec	1.37	0	-3.7	6.45	3.00	2.54

**Americium-241 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
503740	1201032437	27-FEB-2006 06:22	DONE	101	0.08	percent	100	75.0	83.3	117	125	8.33
506274	1201038473	28-FEB-2006 09:00	DONE	95.9	-0.49	percent	100	75.0	83.3	117	125	8.33
506282	1201038480	03-MAR-2006 11:15	DONE	100	0.05	percent	100	75.0	83.3	117	125	8.33
507258	1201040767	05-MAR-2006 19:50	DONE	93.9	-0.74	percent	100	75.0	83.3	117	125	8.33
507638	1201041726	07-MAR-2006 10:55	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
508355	1201043465	08-MAR-2006 11:21	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
507632	1201041716	10-MAR-2006 10:00	DONE	106	0.71	percent	100	75.0	83.3	117	125	8.33
510364	1201048016	10-MAR-2006 17:46	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
507647	1201041742	11-MAR-2006 15:34	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
507649	1201041746	18-MAR-2006 13:45	DONE	102	0.28	percent	100	75.0	83.3	117	125	8.33
507650	1201041750	18-MAR-2006 13:46	DONE	104	0.53	percent	100	75.0	83.3	117	125	8.33
507640	1201041730	20-MAR-2006 18:44	DONE	113	1.6	percent	100	75.0	83.3	117	125	8.33
512038	1201051800	21-MAR-2006 11:50	DONE	99.3	-0.08	percent	100	75.0	83.3	117	125	8.33
508908	1201044773	22-MAR-2006 17:05	DONE	118	2.2	percent	100	75.0	83.3	117	125	8.33
507641	1201041734	23-MAR-2006 09:11	DONE	95.2	-0.58	percent	100	75.0	83.3	117	125	8.33
510369	1201048027	27-MAR-2006 06:50	DONE	102	0.18	percent	100	75.0	83.3	117	125	8.33
508910	1201044781	27-MAR-2006 19:42	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
511246	1201049992	28-MAR-2006 11:43	DONE	106	0.76	percent	100	75.0	83.3	117	125	8.33
508909	1201044777	29-MAR-2006 08:15	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
507644	1201041738	03-APR-2006 12:47	DONE	107	0.81	percent	100	75.0	83.3	117	125	8.33
516974	1201062508	04-APR-2006 09:02	DONE	98.4	-0.19	percent	100	75.0	83.3	117	125	8.33
515679	1201059781	06-APR-2006 21:11	DONE	104	0.52	percent	100	75.0	83.3	117	125	8.33
516333	1201061131	06-APR-2006 22:34	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
517019	1201062619	08-APR-2006 18:42	DONE	105	0.56	percent	100	75.0	83.3	117	125	8.33
516976	1201062515	10-APR-2006 06:39	DONE	99.1	-0.11	percent	100	75.0	83.3	117	125	8.33
517024	1201062640	11-APR-2006 05:39	DONE	89.0	-1	percent	100	75.0	83.3	117	125	8.33
519523	1201068261	11-APR-2006 08:15	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
516331	1201061127	11-APR-2006 12:05	DONE	118	2.1	percent	100	75.0	83.3	117	125	8.33
516977	1201062519	13-APR-2006 21:04	DONE	107	0.82	percent	100	75.0	83.3	117	125	8.33
516978	1201062523	14-APR-2006 06:30	DONE	108	0.98	percent	100	75.0	83.3	117	125	8.33
520996	1201071616	18-APR-2006 05:54	DONE	105	0.61	percent	100	75.0	83.3	117	125	8.33
520998	1201071624	19-APR-2006 06:01	DONE	468	44	percent	100	75.0	83.3	117	125	8.33
516979	1201062527	19-APR-2006 07:26	DONE	121	2.5	percent	100	75.0	83.3	117	125	8.33
516980	1201062531	19-APR-2006 11:25	DONE	103	0.36	percent	100	75.0	83.3	117	125	8.33
517255	1201063146	21-APR-2006 06:23	DONE	103	0.37	percent	100	75.0	83.3	117	125	8.33
519516	1201068250	21-APR-2006 09:10	DONE	103	0.3	percent	100	75.0	83.3	117	125	8.33

517257	1201063154	21-APR-2006 12:55	DONE	99.1	-0.11	percent	100	75.0	83.3	117	125	8.33
519535	1201068297	21-APR-2006 13:59	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
523018	1201076448	21-APR-2006 20:25	DONE	96.7	-0.39	percent	100	75.0	83.3	117	125	8.33

**Cesium-137 BLANK: Limits LCL = -9.2 UCL = 10.2**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
516727	1201061912	04-APR-2006 21:43	DUSE	-4.9	-2	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
508904	1201044759	05-APR-2006 10:31	DUSE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
511296	1201050104	05-APR-2006 18:15	DONE	-0.309	-0.26	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516981	1201062533	06-APR-2006 16:41	DONE	1.39	0.27	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
515679	1201059779	06-APR-2006 20:00	DONE	0.47	-0.02	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516333	1201061129	07-APR-2006 16:54	DONE	0.27	-0.08	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516331	1201061125	07-APR-2006 16:55	DONE	2.7	0.67	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517023	1201062630	08-APR-2006 01:11	DONE	-0.56	-0.34	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517019	1201062617	08-APR-2006 17:58	DONE	0.62	0.03	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517034	1201062658	10-APR-2006 14:44	DONE	-0.471	-0.31	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516976	1201062513	10-APR-2006 15:40	DONE	0.67	0.04	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516982	1201062536	10-APR-2006 19:45	DONE	0.45	-0.02	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517024	1201062638	10-APR-2006 23:56	DONE	-2.6	-0.97	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519523	1201068259	11-APR-2006 06:19	DONE	3.46	0.91	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
512920	1201053810	11-APR-2006 17:05	DUSE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
513067	1201054116	12-APR-2006 12:55	DUSE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516977	1201062517	13-APR-2006 12:23	DONE	-1	-0.48	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516978	1201062521	13-APR-2006 23:22	DONE	0.6	0.02	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
520998	1201071622	16-APR-2006 20:07	DONE	0.58	0.01	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517253	1201063137	17-APR-2006 19:16	DONE	2.52	0.61	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
520996	1201071614	17-APR-2006 23:10	DONE	-3.2	-1	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
520754	1201071039	17-APR-2006 23:45	DONE	-0.253	-0.24	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519011	1201067122	18-APR-2006 19:02	DONE	0.19	-0.1	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516657	1201061777	18-APR-2006 19:37	DONE	0.32	-0.06	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516979	1201062525	19-APR-2006 11:15	DONE	-1.4	-0.6	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516980	1201062529	19-APR-2006 22:49	DONE	-0.499	-0.32	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
521937	1201074022	20-APR-2006 06:03	DONE	-0.61	-0.35	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517257	1201063152	20-APR-2006 10:17	DONE	1.53	0.31	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519545	1201068317	20-APR-2006 12:30	DONE	-0.03	-0.17	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517255	1201063144	20-APR-2006 17:02	DONE	1.35	0.25	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519535	1201068288	20-APR-2006 21:41	DONE	-0.02	-0.17	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519516	1201068248	20-APR-2006 23:48	DONE	0.98	0.14	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
523018	1201076446	21-APR-2006 17:26	DONE	1.33	0.25	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
522386	1201075054	21-APR-2006 23:16	DONE	-0.16	-0.21	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
515884	1201060218	23-APR-2006 17:45	DUSE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
516457	1201061353	24-APR-2006 17:09	DUSE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23

523017	1201076443	24-APR-2006 23:31	DUSE	-0.822	-0.42	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
517021	1201062624	25-APR-2006 09:46	DONE	0	-0.16	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23
519510	1201068236	25-APR-2006 18:43	DUSE	18	5.4	pCi/L	0.53	-9.2	-5.9	6.99	10.2	3.23

**Cesium-137 DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
510984	1201049365	04-APR-2006 17:17	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
516284	1201061021	04-APR-2006 17:27	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
511296	1201050105	05-APR-2006 18:16	DONE	36	-0.36	percent	166	0	-560	889	20.0	362
515679	1201059780	06-APR-2006 11:54	DONE	11.3	-0.43	percent	166	0	-560	889	20.0	362
516981	1201062534	06-APR-2006 23:55	DONE	786	1.7	percent	166	0	-560	889	20.0	362
508904	1201044760	06-APR-2006 23:56	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362
516976	1201062514	07-APR-2006 11:18	DONE	162	-0.01	percent	166	0	-560	889	20.0	362
516333	1201061130	07-APR-2006 16:54	DONE	126	-0.11	percent	166	0	-560	889	20.0	362
517034	1201062659	10-APR-2006 18:58	DONE	64.3	-0.28	percent	166	0	-560	889	20.0	362
517023	1201062631	10-APR-2006 19:02	DONE	24	-0.39	percent	166	0	-560	889	20.0	362
517019	1201062618	10-APR-2006 19:13	DONE	19.7	-0.4	percent	166	0	-560	889	20.0	362
516982	1201062537	10-APR-2006 21:49	DONE	135	-0.09	percent	166	0	-560	889	20.0	362
517024	1201062639	11-APR-2006 10:13	DONE	24.7	-0.39	percent	166	0	-560	889	20.0	362
519523	1201068260	11-APR-2006 10:15	DONE	110	-0.15	percent	166	0	-560	889	20.0	362
516331	1201061126	12-APR-2006 13:16	DONE	120	-0.13	percent	166	0	-560	889	20.0	362
513067	1201054117	12-APR-2006 16:58	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362
516977	1201062518	13-APR-2006 21:04	DONE	59.9	-0.29	percent	166	0	-560	889	20.0	362
516978	1201062522	14-APR-2006 06:30	DONE	2.89	-0.45	percent	166	0	-560	889	20.0	362
517253	1201063138	17-APR-2006 11:51	DONE	1580	3.9	percent	166	0	-560	889	20.0	362
520754	1201071040	17-APR-2006 23:56	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
520996	1201071615	18-APR-2006 05:53	DONE	65.6	-0.28	percent	166	0	-560	889	20.0	362
520998	1201071623	19-APR-2006 06:01	DONE	1520	3.8	percent	166	0	-560	889	20.0	362
516979	1201062526	19-APR-2006 07:25	DONE	48.4	-0.32	percent	166	0	-560	889	20.0	362
516657	1201061778	19-APR-2006 17:52	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
521937	1201074023	20-APR-2006 06:04	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
517257	1201063153	20-APR-2006 10:21	DONE	82	-0.23	percent	166	0	-560	889	20.0	362
519545	1201068318	20-APR-2006 15:32	DONE	180	0.04	percent	166	0	-560	889	20.0	362
519011	1201067123	20-APR-2006 23:49	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
517255	1201063145	20-APR-2006 23:50	DONE	20.7	-0.4	percent	166	0	-560	889	20.0	362
519535	1201068296	20-APR-2006 23:55	DONE	279	0.31	percent	166	0	-560	889	20.0	362
519516	1201068249	21-APR-2006 09:09	DONE	425	0.72	percent	166	0	-560	889	20.0	362
522386	1201075055	23-APR-2006 23:51	DONE	114	-0.14	percent	166	0	-560	889	20.0	362
523018	1201076447	23-APR-2006 23:56	DONE	3	-0.45	percent	166	0	-560	889	20.0	362
515884	1201060219	24-APR-2006 05:36	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362
516457	1201061354	24-APR-2006 19:50	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362

516457	1201061354	25-APR-2006 09:11	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362
517021	1201062625	25-APR-2006 09:46	DONE	0	-0.46	percent	166	0	-560	889	20.0	362
516457	1201061354	25-APR-2006 16:01	DUSE	0	-0.46	percent	166	0	-560	889	20.0	362
519510	1201068237	26-APR-2006 05:28	DUSE	459	0.81	percent	166	0	-560	889	20.0	362

**Cesium-137 LCS: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511298	1201050112	03-APR-2006 22:07	DONE	93.3	-0.8	percent	100	75.0	83.3	117	125	8.33
512870	1201053698	03-APR-2006 23:54	DONE	108	0.91	percent	100	75.0	83.3	117	125	8.33
511297	1201050109	04-APR-2006 06:47	DONE	108	0.95	percent	100	75.0	83.3	117	125	8.33
516974	1201062509	04-APR-2006 07:59	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
516284	1201061022	04-APR-2006 10:09	DONE	105	0.54	percent	100	75.0	83.3	117	125	8.33
516477	1201061403	04-APR-2006 11:44	DONE	104	0.43	percent	100	75.0	83.3	117	125	8.33
516727	1201061913	04-APR-2006 21:44	DONE	101	0.07	percent	100	75.0	83.3	117	125	8.33
511296	1201050106	05-APR-2006 19:38	DONE	106	0.72	percent	100	75.0	83.3	117	125	8.33
515679	1201059782	06-APR-2006 21:11	DONE	101	0.1	percent	100	75.0	83.3	117	125	8.33
516333	1201061132	06-APR-2006 22:33	DONE	106	0.67	percent	100	75.0	83.3	117	125	8.33
516981	1201062535	07-APR-2006 13:55	DONE	104	0.45	percent	100	75.0	83.3	117	125	8.33
516331	1201061128	07-APR-2006 16:56	DONE	103	0.3	percent	100	75.0	83.3	117	125	8.33
517019	1201062620	08-APR-2006 17:13	DONE	106	0.76	percent	100	75.0	83.3	117	125	8.33
516976	1201062516	10-APR-2006 08:10	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
517034	1201062660	10-APR-2006 20:35	DONE	101	0.06	percent	100	75.0	83.3	117	125	8.33
516982	1201062538	10-APR-2006 21:32	DONE	102	0.27	percent	100	75.0	83.3	117	125	8.33
517023	1201062632	10-APR-2006 22:38	DONE	95.9	-0.49	percent	100	75.0	83.3	117	125	8.33
517024	1201062641	11-APR-2006 06:58	DONE	106	0.71	percent	100	75.0	83.3	117	125	8.33
519523	1201068262	11-APR-2006 10:58	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
519011	1201067124	11-APR-2006 22:38	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
516978	1201062524	14-APR-2006 06:31	DONE	104	0.53	percent	100	75.0	83.3	117	125	8.33
516977	1201062520	14-APR-2006 10:17	DONE	111	1.4	percent	100	75.0	83.3	117	125	8.33
520998	1201071625	17-APR-2006 19:03	DONE	97.7	-0.28	percent	100	75.0	83.3	117	125	8.33
517253	1201063139	17-APR-2006 22:49	DONE	101	0.13	percent	100	75.0	83.3	117	125	8.33
520996	1201071617	18-APR-2006 05:54	DONE	92.7	-0.88	percent	100	75.0	83.3	117	125	8.33
520754	1201071041	18-APR-2006 19:10	DONE	119	2.3	percent	100	75.0	83.3	117	125	8.33
516979	1201062528	19-APR-2006 13:02	DONE	108	0.95	percent	100	75.0	83.3	117	125	8.33
516657	1201061779	19-APR-2006 18:10	DONE	105	0.56	percent	100	75.0	83.3	117	125	8.33
516980	1201062532	19-APR-2006 22:50	DONE	102	0.22	percent	100	75.0	83.3	117	125	8.33
521937	1201074024	20-APR-2006 06:04	DONE	108	0.92	percent	100	75.0	83.3	117	125	8.33
519545	1201068320	20-APR-2006 09:41	DONE	103	0.31	percent	100	75.0	83.3	117	125	8.33
517257	1201063155	20-APR-2006 12:11	DONE	113	1.5	percent	100	75.0	83.3	117	125	8.33
519535	1201068291	21-APR-2006 06:15	DONE	114	1.6	percent	100	75.0	83.3	117	125	8.33
517255	1201063147	21-APR-2006 07:39	DONE	102	0.26	percent	100	75.0	83.3	117	125	8.33
519516	1201068251	21-APR-2006 09:58	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33

522386	1201075056	23-APR-2006 21:45	DONE	101	0.06	percent	100	75.0	83.3	117	125	8.33
523018	1201076449	24-APR-2006 05:38	DONE	98.9	-0.14	percent	100	75.0	83.3	117	125	8.33
523017	1201076445	25-APR-2006 06:13	DONE	107	0.79	percent	100	75.0	83.3	117	125	8.33
519510	1201068238	26-APR-2006 05:24	DONE	102	0.2	percent	100	75.0	83.3	117	125	8.33

**Cesium-137 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
516974	1201062507	04-APR-2006 11:01	DONE	1.5	0.47	dec	0.9	0	-1.6	3.45	3.00	1.27
512870	1201053697	04-APR-2006 12:02	DONE	0.76	-0.11	dec	0.9	0	-1.6	3.45	3.00	1.27
516477	1201061402	04-APR-2006 12:18	DONE	0.14	-0.6	dec	0.9	0	-1.6	3.45	3.00	1.27
510984	1201049365	04-APR-2006 17:17	DONE	0	-0.71	dec	0.9	0	-1.6	3.45	3.00	1.27
516284	1201061021	04-APR-2006 17:27	DONE	0.57	-0.26	dec	0.9	0	-1.6	3.45	3.00	1.27
511296	1201050105	05-APR-2006 18:16	DONE	0.05	-0.67	dec	0.9	0	-1.6	3.45	3.00	1.27
515679	1201059780	06-APR-2006 11:54	DONE	0.74	-0.13	dec	0.9	0	-1.6	3.45	3.00	1.27
516981	1201062534	06-APR-2006 23:55	DONE	1.08	0.14	dec	0.9	0	-1.6	3.45	3.00	1.27
516976	1201062514	07-APR-2006 11:18	DONE	1.32	0.33	dec	0.9	0	-1.6	3.45	3.00	1.27
516333	1201061130	07-APR-2006 16:54	DONE	1.37	0.37	dec	0.9	0	-1.6	3.45	3.00	1.27
517034	1201062659	10-APR-2006 18:58	DONE	0.67	-0.18	dec	0.9	0	-1.6	3.45	3.00	1.27
517023	1201062631	10-APR-2006 19:02	DONE	0.03	-0.68	dec	0.9	0	-1.6	3.45	3.00	1.27
517019	1201062618	10-APR-2006 19:13	DONE	0.08	-0.65	dec	0.9	0	-1.6	3.45	3.00	1.27
516982	1201062537	10-APR-2006 21:49	DONE	0.29	-0.48	dec	0.9	0	-1.6	3.45	3.00	1.27
517024	1201062639	11-APR-2006 10:13	DONE	0.23	-0.52	dec	0.9	0	-1.6	3.45	3.00	1.27
519523	1201068260	11-APR-2006 10:15	DONE	0.95	0.04	dec	0.9	0	-1.6	3.45	3.00	1.27
512920	1201053811	11-APR-2006 19:17	DUSE	2.44	1.2	dec	0.9	0	-1.6	3.45	3.00	1.27
516331	1201061126	12-APR-2006 13:16	DONE	2.25	1.1	dec	0.9	0	-1.6	3.45	3.00	1.27
516977	1201062518	13-APR-2006 21:04	DONE	0.5	-0.31	dec	0.9	0	-1.6	3.45	3.00	1.27
516978	1201062522	14-APR-2006 06:30	DONE	0.02	-0.69	dec	0.9	0	-1.6	3.45	3.00	1.27
517253	1201063138	17-APR-2006 11:51	DONE	0.53	-0.29	dec	0.9	0	-1.6	3.45	3.00	1.27
520754	1201071040	17-APR-2006 23:56	DONE	0.85	-0.04	dec	0.9	0	-1.6	3.45	3.00	1.27
520996	1201071615	18-APR-2006 05:53	DONE	0.28	-0.49	dec	0.9	0	-1.6	3.45	3.00	1.27
520998	1201071623	19-APR-2006 06:01	DONE	2.32	1.1	dec	0.9	0	-1.6	3.45	3.00	1.27
516979	1201062526	19-APR-2006 07:25	DONE	0.34	-0.44	dec	0.9	0	-1.6	3.45	3.00	1.27
516657	1201061778	19-APR-2006 17:52	DONE	1.63	0.58	dec	0.9	0	-1.6	3.45	3.00	1.27
516980	1201062530	19-APR-2006 23:19	DONE	0.44	-0.36	dec	0.9	0	-1.6	3.45	3.00	1.27
521937	1201074023	20-APR-2006 06:04	DONE	0.77	-0.11	dec	0.9	0	-1.6	3.45	3.00	1.27
517257	1201063153	20-APR-2006 10:21	DONE	0.17	-0.57	dec	0.9	0	-1.6	3.45	3.00	1.27
519545	1201068318	20-APR-2006 15:32	DONE	0.12	-0.61	dec	0.9	0	-1.6	3.45	3.00	1.27
519011	1201067123	20-APR-2006 23:49	DONE	7.26	5	dec	0.9	0	-1.6	3.45	3.00	1.27
517255	1201063145	20-APR-2006 23:50	DONE	0.21	-0.54	dec	0.9	0	-1.6	3.45	3.00	1.27
519535	1201068296	20-APR-2006 23:55	DONE	0.95	0.04	dec	0.9	0	-1.6	3.45	3.00	1.27
519516	1201068249	21-APR-2006 09:09	DONE	2.73	1.4	dec	0.9	0	-1.6	3.45	3.00	1.27

522386	1201075055	23-APR-2006 23:51	DONE	0.13	-0.61	dec	0.9	0	-1.6	3.45	3.00	1.27
523018	1201076447	23-APR-2006 23:56	DONE	0.72	-0.14	dec	0.9	0	-1.6	3.45	3.00	1.27
523017	1201076444	25-APR-2006 06:13	DUSE	0.11	-0.62	dec	0.9	0	-1.6	3.45	3.00	1.27
517021	1201062625	25-APR-2006 09:46	DONE	0	-0.71	dec	0.9	0	-1.6	3.45	3.00	1.27
519510	1201068237	26-APR-2006 05:28	DUSE	0.55	-0.27	dec	0.9	0	-1.6	3.45	3.00	1.27

**Cesium-137 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
503740	1201032437	27-FEB-2006 06:22	DONE	107	0.89	percent	100	75.0	83.3	117	125	8.33
506274	1201038473	28-FEB-2006 09:00	DONE	97.9	-0.25	percent	100	75.0	83.3	117	125	8.33
506282	1201038480	03-MAR-2006 11:15	DONE	104	0.5	percent	100	75.0	83.3	117	125	8.33
507258	1201040767	05-MAR-2006 19:50	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
507638	1201041726	07-MAR-2006 10:55	DONE	102	0.23	percent	100	75.0	83.3	117	125	8.33
508355	1201043465	08-MAR-2006 11:21	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
507632	1201041716	10-MAR-2006 10:00	DONE	101	0.07	percent	100	75.0	83.3	117	125	8.33
510364	1201048016	10-MAR-2006 17:46	DONE	107	0.85	percent	100	75.0	83.3	117	125	8.33
507647	1201041742	11-MAR-2006 15:34	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
507649	1201041746	18-MAR-2006 13:45	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
507650	1201041750	18-MAR-2006 13:46	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
507640	1201041730	20-MAR-2006 18:44	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
512038	1201051800	21-MAR-2006 11:50	DONE	97	-0.36	percent	100	75.0	83.3	117	125	8.33
508908	1201044773	22-MAR-2006 17:05	DONE	107	0.79	percent	100	75.0	83.3	117	125	8.33
507641	1201041734	23-MAR-2006 09:11	DONE	101	0.12	percent	100	75.0	83.3	117	125	8.33
510369	1201048027	27-MAR-2006 06:50	DONE	100	0.02	percent	100	75.0	83.3	117	125	8.33
508910	1201044781	27-MAR-2006 19:42	DONE	115	1.8	percent	100	75.0	83.3	117	125	8.33
511246	1201049992	28-MAR-2006 11:43	DONE	94.4	-0.67	percent	100	75.0	83.3	117	125	8.33
508909	1201044777	29-MAR-2006 08:15	DONE	116	1.9	percent	100	75.0	83.3	117	125	8.33
507644	1201041738	03-APR-2006 12:47	DONE	108	1	percent	100	75.0	83.3	117	125	8.33
516974	1201062508	04-APR-2006 09:02	DONE	105	0.59	percent	100	75.0	83.3	117	125	8.33
515679	1201059781	06-APR-2006 21:11	DONE	103	0.35	percent	100	75.0	83.3	117	125	8.33
516333	1201061131	06-APR-2006 22:34	DONE	120	2.4	percent	100	75.0	83.3	117	125	8.33
517019	1201062619	08-APR-2006 18:42	DONE	118	2.2	percent	100	75.0	83.3	117	125	8.33
516976	1201062515	10-APR-2006 06:39	DONE	104	0.46	percent	100	75.0	83.3	117	125	8.33
517024	1201062640	11-APR-2006 05:39	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
519523	1201068261	11-APR-2006 08:15	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
516331	1201061127	11-APR-2006 12:05	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
516977	1201062519	13-APR-2006 21:04	DONE	96.6	-0.41	percent	100	75.0	83.3	117	125	8.33
516978	1201062523	14-APR-2006 06:30	DONE	114	1.7	percent	100	75.0	83.3	117	125	8.33
520996	1201071616	18-APR-2006 05:54	DONE	106	0.67	percent	100	75.0	83.3	117	125	8.33
520998	1201071624	19-APR-2006 06:01	DONE	93.0	-0.84	percent	100	75.0	83.3	117	125	8.33
516979	1201062527	19-APR-2006 07:26	DONE	107	0.8	percent	100	75.0	83.3	117	125	8.33
516980	1201062531	19-APR-2006 11:25	DONE	83.8	-2	percent	100	75.0	83.3	117	125	8.33

519535	1201068297	21-APR-2006 13:59	DONE	99.1	-0.1	percent	100	75.0	83.3	117	125	8.33
523018	1201076448	21-APR-2006 20:25	DONE	111	1.4	percent	100	75.0	83.3	117	125	8.33

**Cobalt-60 BLANK: Limits LCL = -4 UCL = 5.4**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511298	1201050110	02-APR-2006 22:50	DONE	0.15	-0.38	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
512870	1201053696	02-APR-2006 23:54	DONE	1.6	0.54	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
512910	1201053787	03-APR-2006 16:51	DUSE	3.83	2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516974	1201062506	04-APR-2006 06:44	DONE	0.2	-0.35	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516284	1201061020	04-APR-2006 10:08	DONE	-1.7	-2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516477	1201061401	04-APR-2006 10:18	DONE	6.83	3.9	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516727	1201061912	04-APR-2006 21:43	DUSE	-0.858	-1	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
511296	1201050104	05-APR-2006 18:15	DONE	1.32	0.37	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516981	1201062533	06-APR-2006 16:41	DONE	1.36	0.4	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
515679	1201059779	06-APR-2006 20:00	DONE	2.14	0.89	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516333	1201061129	07-APR-2006 16:54	DONE	-0.153	-0.57	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516331	1201061125	07-APR-2006 16:55	DONE	-0.15	-0.57	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517023	1201062630	08-APR-2006 01:11	DONE	1.56	0.52	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517019	1201062617	08-APR-2006 17:58	DUSE	-0.436	-0.75	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517034	1201062658	10-APR-2006 14:44	DONE	0.67	-0.05	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516976	1201062513	10-APR-2006 15:40	DONE	0.01	-0.47	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516982	1201062536	10-APR-2006 19:45	DONE	1.45	0.45	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517024	1201062638	10-APR-2006 23:56	DONE	1.64	0.57	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
519523	1201068259	11-APR-2006 06:19	DONE	0.58	-0.1	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516977	1201062517	13-APR-2006 12:23	DONE	-2.2	-2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516978	1201062521	13-APR-2006 23:22	DONE	1.76	0.65	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
520998	1201071622	16-APR-2006 20:07	DONE	0.61	-0.09	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517253	1201063137	17-APR-2006 19:16	DONE	0.44	-0.2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
520996	1201071614	17-APR-2006 23:10	DONE	-1	-1	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
520754	1201071039	17-APR-2006 23:45	DONE	0.48	-0.17	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
519011	1201067122	18-APR-2006 19:02	DONE	0.29	-0.29	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516657	1201061777	18-APR-2006 19:37	DONE	1.16	0.26	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516979	1201062525	19-APR-2006 11:15	DONE	0.47	-0.18	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
516980	1201062529	19-APR-2006 22:49	DONE	-0.125	-0.55	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
521937	1201074022	20-APR-2006 06:03	DUSE	0.05	-0.44	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517257	1201063152	20-APR-2006 10:17	DONE	-0.245	-0.63	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
519545	1201068317	20-APR-2006 12:30	DONE	1.06	0.2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
517255	1201063144	20-APR-2006 17:02	DONE	0.43	-0.2	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57

519535	1201068288	20-APR-2006 21:41	DONE	1.97	0.78	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
519516	1201068248	20-APR-2006 23:48	DONE	0.35	-0.25	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
523018	1201076446	21-APR-2006 17:26	DONE	-0.582	-0.85	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
522386	1201075054	21-APR-2006 23:16	DONE	2.89	1.4	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
523017	1201076443	24-APR-2006 23:31	DUSE	-0.982	-1	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57
519510	1201068236	25-APR-2006 18:43	DUSE	2.14	0.89	pCi/L	0.74	-4	-2.4	3.88	5.44	1.57

**Cobalt-60 DUP: Limits LCL = 0 UCL = 20**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
514861	1201057810	01-APR-2006 20:22	DONE	184	-0.22	percent	282	0	-610	1170	20.0	445
511298	1201050111	02-APR-2006 22:51	DONE	78.7	-0.46	percent	282	0	-610	1170	20.0	445
511295	1201050102	03-APR-2006 05:16	DONE	73	-0.47	percent	282	0	-610	1170	20.0	445
515677	1201059771	03-APR-2006 10:09	DONE	711	0.96	percent	282	0	-610	1170	20.0	445
511297	1201050108	04-APR-2006 05:50	DONE	1210	2.1	percent	282	0	-610	1170	20.0	445
516974	1201062507	04-APR-2006 11:01	DONE	211	-0.16	percent	282	0	-610	1170	20.0	445
512870	1201053697	04-APR-2006 12:02	DONE	0	-0.63	percent	282	0	-610	1170	20.0	445
516477	1201061402	04-APR-2006 12:18	DONE	133	-0.33	percent	282	0	-610	1170	20.0	445
516284	1201061021	04-APR-2006 17:27	DONE	0	-0.63	percent	282	0	-610	1170	20.0	445
511296	1201050105	05-APR-2006 18:16	DONE	274	-0.02	percent	282	0	-610	1170	20.0	445
515679	1201059780	06-APR-2006 11:54	DONE	36.6	-0.55	percent	282	0	-610	1170	20.0	445
516981	1201062534	06-APR-2006 23:55	DONE	11.5	-0.61	percent	282	0	-610	1170	20.0	445
516976	1201062514	07-APR-2006 11:18	DONE	87	-0.44	percent	282	0	-610	1170	20.0	445
516333	1201061130	07-APR-2006 16:54	DONE	67.7	-0.48	percent	282	0	-610	1170	20.0	445
517034	1201062659	10-APR-2006 18:58	DONE	42.7	-0.54	percent	282	0	-610	1170	20.0	445
517023	1201062631	10-APR-2006 19:02	DONE	36.6	-0.55	percent	282	0	-610	1170	20.0	445
517019	1201062618	10-APR-2006 19:13	DUSE	214	-0.15	percent	282	0	-610	1170	20.0	445
516982	1201062537	10-APR-2006 21:49	DONE	259	-0.05	percent	282	0	-610	1170	20.0	445
517024	1201062639	11-APR-2006 10:13	DONE	301	0.04	percent	282	0	-610	1170	20.0	445
519523	1201068260	11-APR-2006 10:15	DONE	152	-0.29	percent	282	0	-610	1170	20.0	445
516331	1201061126	12-APR-2006 13:16	DONE	1660	3.1	percent	282	0	-610	1170	20.0	445
516977	1201062518	13-APR-2006 21:04	DONE	650	0.83	percent	282	0	-610	1170	20.0	445
516978	1201062522	14-APR-2006 06:30	DONE	65.3	-0.49	percent	282	0	-610	1170	20.0	445
517253	1201063138	17-APR-2006 11:51	DONE	1480	2.7	percent	282	0	-610	1170	20.0	445
520754	1201071040	17-APR-2006 23:56	DONE	0	-0.63	percent	282	0	-610	1170	20.0	445
520996	1201071615	18-APR-2006 05:53	DONE	102	-0.4	percent	282	0	-610	1170	20.0	445
520998	1201071623	19-APR-2006 06:01	DONE	688	0.91	percent	282	0	-610	1170	20.0	445
516979	1201062526	19-APR-2006 07:25	DONE	308	0.06	percent	282	0	-610	1170	20.0	445
516657	1201061778	19-APR-2006 17:52	DONE	0	-0.63	percent	282	0	-610	1170	20.0	445
521937	1201074023	20-APR-2006 06:04	DUSE	0	-0.63	percent	282	0	-610	1170	20.0	445
517257	1201063153	20-APR-2006 10:21	DONE	107	-0.39	percent	282	0	-610	1170	20.0	445
519545	1201068318	20-APR-2006 15:32	DONE	36	-0.55	percent	282	0	-610	1170	20.0	445
519011	1201067123	20-APR-2006 23:40	DONE	0	-0.63	percent	282	0	-610	1170	20.0	445



519011	1201067125	20-APR-2006 23:47	DONE	51.8	-0.52	percent	282	0	-610	1170	20.0	445
517255	1201063145	20-APR-2006 23:50	DONE	51.8	-0.52	percent	282	0	-610	1170	20.0	445
519535	1201068296	20-APR-2006 23:55	DONE	1510	2.7	percent	282	0	-610	1170	20.0	445
519516	1201068249	21-APR-2006 09:09	DONE	75.8	-0.46	percent	282	0	-610	1170	20.0	445
522386	1201075055	23-APR-2006 23:51	DONE	155	-0.28	percent	282	0	-610	1170	20.0	445
523018	1201076447	23-APR-2006 23:56	DONE	17.1	-0.6	percent	282	0	-610	1170	20.0	445
519510	1201068237	26-APR-2006 05:28	DUSE	28.5	-0.57	percent	282	0	-610	1170	20.0	445

## Cobalt-60 LCS: Limits LCL = 75 UCL = 125

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511298	1201050112	03-APR-2006 22:07	DONE	94.3	-0.69	percent	100	75.0	83.3	117	125	8.33
512870	1201053698	03-APR-2006 23:54	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
511297	1201050109	04-APR-2006 06:47	DONE	107	0.8	percent	100	75.0	83.3	117	125	8.33
516974	1201062509	04-APR-2006 07:59	DONE	97.7	-0.28	percent	100	75.0	83.3	117	125	8.33
516284	1201061022	04-APR-2006 10:09	DONE	94.2	-0.7	percent	100	75.0	83.3	117	125	8.33
516477	1201061403	04-APR-2006 11:44	DONE	97.7	-0.28	percent	100	75.0	83.3	117	125	8.33
516727	1201061913	04-APR-2006 21:44	DONE	96.2	-0.46	percent	100	75.0	83.3	117	125	8.33
511296	1201050106	05-APR-2006 19:38	DONE	99.8	-0.03	percent	100	75.0	83.3	117	125	8.33
515679	1201059782	06-APR-2006 21:11	DONE	108	0.98	percent	100	75.0	83.3	117	125	8.33
516333	1201061132	06-APR-2006 22:33	DONE	102	0.28	percent	100	75.0	83.3	117	125	8.33
516981	1201062535	07-APR-2006 13:55	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33
516331	1201061128	07-APR-2006 16:56	DONE	98.8	-0.14	percent	100	75.0	83.3	117	125	8.33
517019	1201062620	08-APR-2006 17:13	DUSE	106	0.71	percent	100	75.0	83.3	117	125	8.33
516976	1201062516	10-APR-2006 08:10	DONE	108	0.95	percent	100	75.0	83.3	117	125	8.33
517034	1201062660	10-APR-2006 20:35	DONE	107	0.8	percent	100	75.0	83.3	117	125	8.33
516982	1201062538	10-APR-2006 21:32	DONE	96.7	-0.4	percent	100	75.0	83.3	117	125	8.33
517023	1201062632	10-APR-2006 22:38	DONE	96.1	-0.47	percent	100	75.0	83.3	117	125	8.33
517024	1201062641	11-APR-2006 06:58	DONE	106	0.72	percent	100	75.0	83.3	117	125	8.33
519523	1201068262	11-APR-2006 10:58	DONE	105	0.62	percent	100	75.0	83.3	117	125	8.33
519011	1201067124	11-APR-2006 22:38	DONE	97.4	-0.31	percent	100	75.0	83.3	117	125	8.33
516978	1201062524	14-APR-2006 06:31	DONE	103	0.3	percent	100	75.0	83.3	117	125	8.33
516977	1201062520	14-APR-2006 10:17	DONE	117	2	percent	100	75.0	83.3	117	125	8.33
520998	1201071625	17-APR-2006 19:03	DONE	93.8	-0.74	percent	100	75.0	83.3	117	125	8.33
517253	1201063139	17-APR-2006 22:49	DONE	95.4	-0.55	percent	100	75.0	83.3	117	125	8.33
520996	1201071617	18-APR-2006 05:54	DONE	97.2	-0.34	percent	100	75.0	83.3	117	125	8.33
520754	1201071041	18-APR-2006 19:10	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33
516979	1201062528	19-APR-2006 13:02	DONE	105	0.56	percent	100	75.0	83.3	117	125	8.33
516657	1201061779	19-APR-2006 18:10	DONE	105	0.56	percent	100	75.0	83.3	117	125	8.33
516980	1201062532	19-APR-2006 22:50	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
521937	1201074024	20-APR-2006 06:04	DUSE	101	0.16	percent	100	75.0	83.3	117	125	8.33
519545	1201068320	20-APR-2006 09:41	DONE	92.5	-0.9	percent	100	75.0	83.3	117	125	8.33
517257	1201063155	20-APR-2006 12:11	DONE	102	0.18	percent	100	75.0	83.3	117	125	8.33

519535	1201068291	21-APR-2006 06:15	DONE	103	0.37	percent	100	75.0	83.3	117	125	8.33
517255	1201063147	21-APR-2006 07:39	DONE	104	0.5	percent	100	75.0	83.3	117	125	8.33
519516	1201068251	21-APR-2006 09:58	DONE	97.5	-0.3	percent	100	75.0	83.3	117	125	8.33
522386	1201075056	23-APR-2006 21:45	DONE	97.2	-0.34	percent	100	75.0	83.3	117	125	8.33
523018	1201076449	24-APR-2006 05:38	DONE	90.9	-1	percent	100	75.0	83.3	117	125	8.33
523017	1201076445	25-APR-2006 06:13	DONE	99.1	-0.11	percent	100	75.0	83.3	117	125	8.33
519510	1201068238	26-APR-2006 05:24	DONE	98.0	-0.24	percent	100	75.0	83.3	117	125	8.33

**Cobalt-60 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511295	1201050102	03-APR-2006 05:16	DONE	0.13	-0.98	dec	0.76	0	-0.518	2.03	3.00	0.64
515677	1201059771	03-APR-2006 10:09	DONE	0.5	-0.4	dec	0.76	0	-0.518	2.03	3.00	0.64
511297	1201050108	04-APR-2006 05:50	DONE	2.13	2.2	dec	0.76	0	-0.518	2.03	3.00	0.64
516974	1201062507	04-APR-2006 11:01	DONE	1.99	1.9	dec	0.76	0	-0.518	2.03	3.00	0.64
512870	1201053697	04-APR-2006 12:02	DONE	0.84	0.14	dec	0.76	0	-0.518	2.03	3.00	0.64
516477	1201061402	04-APR-2006 12:18	DONE	0.39	-0.57	dec	0.76	0	-0.518	2.03	3.00	0.64
516284	1201061021	04-APR-2006 17:27	DONE	0.85	0.14	dec	0.76	0	-0.518	2.03	3.00	0.64
511296	1201050105	05-APR-2006 18:16	DONE	0.4	-0.56	dec	0.76	0	-0.518	2.03	3.00	0.64
515679	1201059780	06-APR-2006 11:54	DONE	0.9	0.22	dec	0.76	0	-0.518	2.03	3.00	0.64
516981	1201062534	06-APR-2006 23:55	DONE	0.11	-1	dec	0.76	0	-0.518	2.03	3.00	0.64
516976	1201062514	07-APR-2006 11:18	DONE	0.88	0.2	dec	0.76	0	-0.518	2.03	3.00	0.64
516333	1201061130	07-APR-2006 16:54	DONE	0.46	-0.46	dec	0.76	0	-0.518	2.03	3.00	0.64
517034	1201062659	10-APR-2006 18:58	DONE	0.22	-0.84	dec	0.76	0	-0.518	2.03	3.00	0.64
517023	1201062631	10-APR-2006 19:02	DONE	0.09	-1	dec	0.76	0	-0.518	2.03	3.00	0.64
517019	1201062618	10-APR-2006 19:13	DUSE	0.89	0.2	dec	0.76	0	-0.518	2.03	3.00	0.64
516982	1201062537	10-APR-2006 21:49	DONE	1.57	1.3	dec	0.76	0	-0.518	2.03	3.00	0.64
517024	1201062639	11-APR-2006 10:13	DONE	2.34	2.5	dec	0.76	0	-0.518	2.03	3.00	0.64
519523	1201068260	11-APR-2006 10:15	DONE	1.95	1.9	dec	0.76	0	-0.518	2.03	3.00	0.64
516331	1201061126	12-APR-2006 13:16	DONE	0.63	-0.2	dec	0.76	0	-0.518	2.03	3.00	0.64
516977	1201062518	13-APR-2006 21:04	DONE	0.38	-0.59	dec	0.76	0	-0.518	2.03	3.00	0.64
516978	1201062522	14-APR-2006 06:30	DONE	0.37	-0.61	dec	0.76	0	-0.518	2.03	3.00	0.64
517253	1201063138	17-APR-2006 11:51	DONE	0.29	-0.73	dec	0.76	0	-0.518	2.03	3.00	0.64
520754	1201071040	17-APR-2006 23:56	DONE	0.02	-1	dec	0.76	0	-0.518	2.03	3.00	0.64
520996	1201071615	18-APR-2006 05:53	DONE	1.12	0.58	dec	0.76	0	-0.518	2.03	3.00	0.64
520998	1201071623	19-APR-2006 06:01	DONE	1.52	1.2	dec	0.76	0	-0.518	2.03	3.00	0.64
516979	1201062526	19-APR-2006 07:25	DONE	1.2	0.7	dec	0.76	0	-0.518	2.03	3.00	0.64
516657	1201061778	19-APR-2006 17:52	DONE	0.11	-1	dec	0.76	0	-0.518	2.03	3.00	0.64
516980	1201062530	19-APR-2006 23:19	DONE	0.08	-1	dec	0.76	0	-0.518	2.03	3.00	0.64
521937	1201074023	20-APR-2006 06:04	DUSE	0.61	-0.22	dec	0.76	0	-0.518	2.03	3.00	0.64
517257	1201063153	20-APR-2006 10:21	DONE	0.84	0.13	dec	0.76	0	-0.518	2.03	3.00	0.64
519545	1201068318	20-APR-2006 15:32	DONE	0.15	-0.95	dec	0.76	0	-0.518	2.03	3.00	0.64
519011	1201067132	20-APR-2006 22:40	DONE	0.75	0.01	dec	0.76	0	-0.518	2.03	3.00	0.64

519011	1201067125	20-APR-2006 23:47	DONE	0.75	-0.01	dec	0.76	0	-0.518	2.03	3.00	0.64
517255	1201063145	20-APR-2006 23:50	DONE	0.43	-0.51	dec	0.76	0	-0.518	2.03	3.00	0.64
519535	1201068296	20-APR-2006 23:55	DONE	1.94	1.9	dec	0.76	0	-0.518	2.03	3.00	0.64
519516	1201068249	21-APR-2006 09:09	DONE	0.46	-0.46	dec	0.76	0	-0.518	2.03	3.00	0.64
522386	1201075055	23-APR-2006 23:51	DONE	0.53	-0.36	dec	0.76	0	-0.518	2.03	3.00	0.64
523018	1201076447	23-APR-2006 23:56	DONE	0.55	-0.32	dec	0.76	0	-0.518	2.03	3.00	0.64
523017	1201076444	25-APR-2006 06:13	DUSE	0.8	0.07	dec	0.76	0	-0.518	2.03	3.00	0.64
519510	1201068237	26-APR-2006 05:28	DUSE	0.08	-1	dec	0.76	0	-0.518	2.03	3.00	0.64

**Cobalt-60 SPIKE: Limits LCL = 75 UCL = 125**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
503740	1201032437	27-FEB-2006 06:22	DONE	96.9	-0.37	percent	100	75.0	83.3	117	125	8.33
506274	1201038473	28-FEB-2006 09:00	DONE	93.0	-0.84	percent	100	75.0	83.3	117	125	8.33
506282	1201038480	03-MAR-2006 11:15	DONE	103	0.38	percent	100	75.0	83.3	117	125	8.33
507258	1201040767	05-MAR-2006 19:50	DONE	107	0.82	percent	100	75.0	83.3	117	125	8.33
507638	1201041726	07-MAR-2006 10:55	DONE	90.5	-1	percent	100	75.0	83.3	117	125	8.33
508355	1201043465	08-MAR-2006 11:21	DONE	102	0.23	percent	100	75.0	83.3	117	125	8.33
507632	1201041716	10-MAR-2006 10:00	DONE	104	0.49	percent	100	75.0	83.3	117	125	8.33
510364	1201048016	10-MAR-2006 17:46	DONE	108	0.96	percent	100	75.0	83.3	117	125	8.33
507647	1201041742	11-MAR-2006 15:34	DONE	86.8	-2	percent	100	75.0	83.3	117	125	8.33
507649	1201041746	18-MAR-2006 13:45	DONE	108	0.94	percent	100	75.0	83.3	117	125	8.33
507650	1201041750	18-MAR-2006 13:46	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
507640	1201041730	20-MAR-2006 18:44	DONE	99.4	-0.07	percent	100	75.0	83.3	117	125	8.33
512038	1201051800	21-MAR-2006 11:50	DONE	103	0.41	percent	100	75.0	83.3	117	125	8.33
508908	1201044773	22-MAR-2006 17:05	DONE	105	0.63	percent	100	75.0	83.3	117	125	8.33
507641	1201041734	23-MAR-2006 09:11	DONE	102	0.28	percent	100	75.0	83.3	117	125	8.33
510369	1201048027	27-MAR-2006 06:50	DONE	88.6	-1	percent	100	75.0	83.3	117	125	8.33
508910	1201044781	27-MAR-2006 19:42	DONE	94.2	-0.7	percent	100	75.0	83.3	117	125	8.33
511246	1201049992	28-MAR-2006 11:43	DONE	105	0.54	percent	100	75.0	83.3	117	125	8.33
508909	1201044777	29-MAR-2006 08:15	DONE	102	0.2	percent	100	75.0	83.3	117	125	8.33
507644	1201041738	03-APR-2006 12:47	DONE	109	1.1	percent	100	75.0	83.3	117	125	8.33
516974	1201062508	04-APR-2006 09:02	DONE	104	0.52	percent	100	75.0	83.3	117	125	8.33
515679	1201059781	06-APR-2006 21:11	DONE	103	0.31	percent	100	75.0	83.3	117	125	8.33
516333	1201061131	06-APR-2006 22:34	DONE	100	-0	percent	100	75.0	83.3	117	125	8.33
517019	1201062619	08-APR-2006 18:42	DUSE	106	0.73	percent	100	75.0	83.3	117	125	8.33
516976	1201062515	10-APR-2006 06:39	DONE	102	0.28	percent	100	75.0	83.3	117	125	8.33
517024	1201062640	11-APR-2006 05:39	DONE	97.6	-0.29	percent	100	75.0	83.3	117	125	8.33
519523	1201068261	11-APR-2006 08:15	DONE	91.7	-01	percent	100	75.0	83.3	117	125	8.33
516331	1201061127	11-APR-2006 12:05	DONE	96.6	-0.41	percent	100	75.0	83.3	117	125	8.33
516977	1201062519	13-APR-2006 21:04	DONE	102	0.26	percent	100	75.0	83.3	117	125	8.33
516978	1201062523	14-APR-2006 06:30	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
520996	1201071616	18-APR-2006 05:54	DONE	110	1.2	percent	100	75.0	83.3	117	125	8.33

520998	1201071624	19-APR-2006 06:01	DONE	104	0.48	percent	100	75.0	83.3	117	125	8.33
516979	1201062527	19-APR-2006 07:26	DONE	99.4	-0.08	percent	100	75.0	83.3	117	125	8.33
516980	1201062531	19-APR-2006 11:25	DONE	98.6	-0.17	percent	100	75.0	83.3	117	125	8.33
517255	1201063146	21-APR-2006 06:23	DONE	106	0.76	percent	100	75.0	83.3	117	125	8.33
519516	1201068250	21-APR-2006 09:10	DONE	111	1.3	percent	100	75.0	83.3	117	125	8.33
517257	1201063154	21-APR-2006 12:55	DONE	102	0.24	percent	100	75.0	83.3	117	125	8.33
519535	1201068297	21-APR-2006 13:59	DONE	105	0.58	percent	100	75.0	83.3	117	125	8.33
523018	1201076448	21-APR-2006 20:25	DONE	112	1.4	percent	100	75.0	83.3	117	125	8.33

**Lead-212 RER: Limits LCL = 0 UCL = 3**

Batch ID	Samp ID	Run Date	Status	Value	Deviation	Units	Mean	LCL	LWL	UWL	UCL	Stdev
511295	1201050102	03-APR-2006 05:16	DUSE	0.22	-0.82	dec	0.59	0	-0.313	1.49	3.00	0.45
515677	1201059771	03-APR-2006 10:09	DUSE	0.36	-0.5	dec	0.59	0	-0.313	1.49	3.00	0.45
511297	1201050108	04-APR-2006 05:50	DONE	2.15	3.5	dec	0.59	0	-0.313	1.49	3.00	0.45
516974	1201062507	04-APR-2006 11:01	DUSE	0.07	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
512870	1201053697	04-APR-2006 12:02	DUSE	0.58	-0.01	dec	0.59	0	-0.313	1.49	3.00	0.45
516477	1201061402	04-APR-2006 12:18	DUSE	0.47	-0.27	dec	0.59	0	-0.313	1.49	3.00	0.45
516284	1201061021	04-APR-2006 17:27	DUSE	0.65	0.14	dec	0.59	0	-0.313	1.49	3.00	0.45
511296	1201050105	05-APR-2006 18:16	DUSE	0.33	-0.58	dec	0.59	0	-0.313	1.49	3.00	0.45
515679	1201059780	06-APR-2006 11:54	DONE	0.58	-0.03	dec	0.59	0	-0.313	1.49	3.00	0.45
516981	1201062534	06-APR-2006 23:55	DUSE	0.59	0.01	dec	0.59	0	-0.313	1.49	3.00	0.45
516976	1201062514	07-APR-2006 11:18	DUSE	0.33	-0.58	dec	0.59	0	-0.313	1.49	3.00	0.45
516333	1201061130	07-APR-2006 16:54	DONE	0.28	-0.69	dec	0.59	0	-0.313	1.49	3.00	0.45
517034	1201062659	10-APR-2006 18:58	DONE	1	0.91	dec	0.59	0	-0.313	1.49	3.00	0.45
517023	1201062631	10-APR-2006 19:02	DUSE	0.12	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
517019	1201062618	10-APR-2006 19:13	DONE	0.87	0.62	dec	0.59	0	-0.313	1.49	3.00	0.45
516982	1201062537	10-APR-2006 21:49	DUSE	0.39	-0.45	dec	0.59	0	-0.313	1.49	3.00	0.45
517024	1201062639	11-APR-2006 10:13	DONE	0.15	-0.98	dec	0.59	0	-0.313	1.49	3.00	0.45
519523	1201068260	11-APR-2006 10:15	DONE	0.82	0.51	dec	0.59	0	-0.313	1.49	3.00	0.45
516331	1201061126	12-APR-2006 13:16	DONE	0.41	-0.39	dec	0.59	0	-0.313	1.49	3.00	0.45
516977	1201062518	13-APR-2006 21:04	DUSE	0.65	0.13	dec	0.59	0	-0.313	1.49	3.00	0.45
516978	1201062522	14-APR-2006 06:30	DUSE	1.35	1.7	dec	0.59	0	-0.313	1.49	3.00	0.45
517253	1201063138	17-APR-2006 11:51	DONE	0.64	0.11	dec	0.59	0	-0.313	1.49	3.00	0.45
520754	1201071040	17-APR-2006 23:56	DUSE	1.26	1.5	dec	0.59	0	-0.313	1.49	3.00	0.45
520996	1201071615	18-APR-2006 05:53	DONE	0.84	0.55	dec	0.59	0	-0.313	1.49	3.00	0.45
520998	1201071623	19-APR-2006 06:01	DONE	0.07	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
516979	1201062526	19-APR-2006 07:25	DUSE	1.28	1.5	dec	0.59	0	-0.313	1.49	3.00	0.45
516657	1201061778	19-APR-2006 17:52	DUSE	0.3	-0.64	dec	0.59	0	-0.313	1.49	3.00	0.45
516980	1201062530	19-APR-2006 23:19	DUSE	0.33	-0.58	dec	0.59	0	-0.313	1.49	3.00	0.45
521937	1201074023	20-APR-2006 06:04	DUSE	0.65	0.14	dec	0.59	0	-0.313	1.49	3.00	0.45
517257	1201063153	20-APR-2006 10:21	DONE	1.11	1.1	dec	0.59	0	-0.313	1.49	3.00	0.45
519545	1201068218	20-APR-2006 15:22	DONE	0.22	-1	dec	0.59	0	-0.313	1.49	3.00	0.45

519545	1201068318	20-APR-2006 15:32	DONE	0.03	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
519011	1201067123	20-APR-2006 23:49	DUSE	0.07	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
517255	1201063145	20-APR-2006 23:50	DONE	0.29	-0.66	dec	0.59	0	-0.313	1.49	3.00	0.45
519535	1201068296	20-APR-2006 23:55	DUSE	0.3	-0.65	dec	0.59	0	-0.313	1.49	3.00	0.45
519516	1201068249	21-APR-2006 09:09	DONE	1.04	1	dec	0.59	0	-0.313	1.49	3.00	0.45
522386	1201075055	23-APR-2006 23:51	DUSE	0.64	0.12	dec	0.59	0	-0.313	1.49	3.00	0.45
523018	1201076447	23-APR-2006 23:56	DUSE	0.01	-1	dec	0.59	0	-0.313	1.49	3.00	0.45
523017	1201076444	25-APR-2006 06:13	DONE	0.73	0.3	dec	0.59	0	-0.313	1.49	3.00	0.45
519510	1201068237	26-APR-2006 05:28	DONE	1.03	0.97	dec	0.59	0	-0.313	1.49	3.00	0.45

# STANDARDS DATA

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

61762-278

Ac-227 5 mL Liquid in Flame Sealed Vial

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

Radionuclide purity and calibration were checked by alpha spectroscopy. The nuclear decay rate and assay date for this source are given below.

Analytics maintains traceability to the National Institute of Standards and Technology through participation in a Measurements Assurance Program as described in USNRC Reg. Guide 4.15, Revision 1, February 1979.

ISOTOPE:	Ac-227
ACTIVITY (dps):	2.085 E5
HALF-LIFE:	21.77 years
CALIBRATION DATE:	June 8, 2001 12:00 EST
TOTAL UNCERTAINTY*:	5.0%
SYSTEMATIC:	2.0%
RANDOM:	3.0%

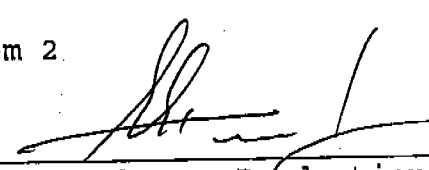
\*99% Confidence Level

Impurities:  $\gamma$ -impurities (other than decay products) <0.1%  
 $\alpha$ -impurities <0.3%

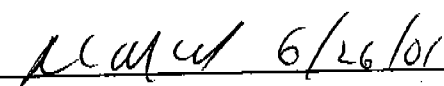
5.3136 grams 2M HNO<sub>3</sub> solution, carrier free.

P O NUMBER 2533RD, Item 2

SOURCE PREPARED BY:

  
E. A. Taskaev, Production Manager

Q A APPROVED:

  
6/26/01



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0387	Isotope:	Actinium-227
Prepared By:	Angela Johnson	Prepared By:	Angela Johnson
Carrier Conc:	2 M HNO3	Prep Date:	07/17/2001
Reference Date:	06/08/2001	Verification Date:	07/01/2002
Ampoule Mass (g):	5.3136 g	Expiration Date:	07/01/2003
Uncertainty:	+/- 5 %	Primary Code:	0387-A
LogBook No:	RC S 034	Dilution(mL):	100 mL
		Mass of Parent(g):	4.7794 g
		Density(g/mL):	1.0370

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$$

$$(4.7794 \text{ g}) * (208500 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.3136 \text{ g} * 100 \text{ mL}) = 112335.5983 \text{ dpm/mL}$$

$$(4.7794 \text{ g}) * (208500 \text{ dps}) * (59.9 \text{ dpm/dps}) / (1.0370 \text{ g/mL}) / (5.3136 \text{ g} * 100 \text{ mL}) = 108330.3019 \text{ dpm/g}$$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/17/2001	Lonnie Morris	.4684	1000	0387-B-102	50.8266 dpm/mL	07/11/2005	07/11/2006
07/17/2001	Lonnie Morris	.4684	1000	0387-B-202	50.827 dpm/mL	07/11/2004	07/11/2005

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000



## Verification for Ac-227 Standard 0387-B

A. Fehr 7/13/2005	Isotope	Value	Uncertainty
	0387-B #1	193.600	38.1000
	0387-B #2	181.200	36.2000
	0387-B #3	192.900	52.4000

Mean Value (Counting) = 189.233    0.9416936  
 Stdev = 6.965869173

Target = 200.95  
 Lower Limit = 175.301595  
 Upper Limit = 203.1650717  
 Rule 1 Pass/Fail    **Pass**    **Pass**    **Pass**  
 Two sigma = 13.93173835  
 10 % of Mean = 18.92333333  
 Rule 2 (Pass/Fail)    **Pass**

The analyst prepared three standard verification sources for standard 0387-B using 0.1 mL for each source. Each standard was combined with 0.1 mL of Th-230 standard 0159-K and 50 micrograms of cerium carrier in a disposable centrifuge tube. Each standard was diluted to 20 mL with 0.1 M HCl. Three mL of 48% HF was added to precipitate cerium (and Thorium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for Ac-227 were calculated by comparison to Th-230 certified values.

*Amanda L. Fehr*  
 7/13/05

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

0159

Radionuclide: Th-230  
Half Life:  $(7.54 \pm 0.03) \times 10^4$  years  
Catalog No.: 7230  
Source No.: 678-28-1  
Customer: GENERAL ENGINEERING LABS  
P.O.No.: 2507 RD  
Reference Date: 1 Sep 99 12:00 PST.  
Contained Radioactivity: Th-230: 9.740  $\mu$ Ci (360.4 kBq)

### Description of Solution

- a. Mass of solution: 4.89252 grams in 5 mL flame sealed ampoule
- b. Chemical form: Thorium nitrate in 0.1M nitric acid
- c. Carrier content: 10  $\mu$ g Th/mL of solution
- d. Density: 1.0016

gram/ml @ 20°C.

### Radioimpurities

Am-241: See Technical Data Sheet

### Radioactive Daughters

Ra-226: See Technical Data Sheet

### Radionuclide Concentration

Th-230: 1.991  $\mu$ Ci/gram of solution (73.67 kBq/gram of solution)

### Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

### Uncertainty of Measurement

- a. Systematic uncertainty in instrument calibration:  $\pm 2.0\%$
- b. Random uncertainty in assay:  $\pm 0.8\%$
- c. Random uncertainty in weighing(s):  $\pm 0.0\%$
- d. Total uncertainty at the 99% confidence level:  $\pm 2.2\%$

### NIST Traceability

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

### Leak Test(s)

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

### Notes

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

Daniel James Van Dalsen  
QUALITY CONTROL

26-Aug-99  
Date Signed



ISOTOPE PRODUCTS LABORATORIES

1800 N. KEYSTONE STREET  
BURBANK, CALIFORNIA 91504

818-843-7000 FAX 818-843-6168

0159



### Th-230 TECHNICAL DATA

The Th-230 used to prepare your order was taken from Isotope Products Laboratories Lot #6481 and had the following composition as of December 15, 1994.

<u>NUCLIDE</u>	<u>ATOM%</u>	<u>ACTIVITY%</u>
Th-229	<0.001	<1.23 x 10 <sup>-2</sup>
Th-230	83.71	99.79
Th-232	16.29	1.08 x 10 <sup>-4</sup>
Ra-226 (daughter Th-230)	----	0.15
Am-241	----	0.05

Isotopic composition provided by Oak Ridge National Laboratory.

No other alpha emitting nuclides were detected.

If you have any questions, please contact Technical Service.

Corporate and  
Sales Offices  
1800 N. Keystone Street  
Folsom, California  
91504  
818-843-7000  
888-843-6168



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0159	Isotope:	Thorium-230
Prepared By:	Joe Davis	Prepared By:	Joe Davis
Carrier Conc:	0.1M HNO3	Prep Date:	09/21/1999
Reference Date:	09/01/1999	Verification Date:	06/19/2004
Ampoule Mass (g):	4.89252 g	Expiration Date:	06/19/2005
Uncertainty:	+/- 2.2 %	Primary Code:	0159-A
LogBook No:	RC S 023 102	Dilution(mL):	100 mL
		Mass of Parent(g):	4.7484 g
		Density(g/mL):	0.9992

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (uCi/g)}) * (\text{conversion dpm to uCi}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (uCi/g)}) * (\text{conversion dpm to uCi}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.7484 \text{ g}) * (1.991 \text{ uCi/g}) * (2220000 \text{ dpm/uCi}) / (100 \text{ mL}) = 209880.2297 \text{ dpm/mL}$
$(4.7484 \text{ g}) * (1.991 \text{ uCi/g}) * (2220000 \text{ dpm/uCi}) / (0.9992 \text{ g/mL}) / (100 \text{ mL}) = 210051.8397 \text{ dpm/g}$

## Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
01/29/2001	Angela Albee	.0992	100	0159-H	208.37 dpm/mL	01/29/2001	01/29/2002
02/28/2001	Angela Albee	1.0451	1000	0159-I-102	219.525 dpm/mL	03/06/2002	03/06/2003
02/28/2001	Angela Albee	1.0451	1000	0159-I-202	219.525 dpm/mL	03/12/2002	03/12/2003
09/21/1999	Joe Davis	.1172	100	0159-B	246.18 dpm/mL	09/21/1999	09/21/2000
09/23/1999	Joe Davis	.1016	100	0159-C	213.41 dpm/mL	09/23/1999	09/23/2000
01/10/2000	Joe Davis	.1008	100	0159-D	211.56 dpm/mL	01/10/2000	01/10/2001
02/16/2000	Richard Kinney	.2422	500	0159-E	101.75 dpm/mL	02/16/2000	02/16/2001
03/20/2000	Joe Davis	.0998	100	0159-F	209.63 dpm/mL	03/20/2000	03/20/2001
07/28/2000	Robert Timm	1.0046	1000	0159-G	211.02 dpm/mL	07/28/2000	07/28/2001
05/10/2001	Angela Albee	.0987	1000	0159-J	210.1569 dpm/mL	05/10/2001	05/10/2002
08/31/2001	Lonnie Morris	.0416	100	0159-K	87.31 dpm/mL	09/23/2002	09/23/2003
06/07/2002	Angela Albee	1.0002	1000	0159-L	207.278 dpm/mL	06/07/2002	06/07/2003
01/16/2003	Angela Albee	4.5144	1000	0159-M	947.483 dpm/mL	01/16/2003	01/16/2004
02/27/2003	Angela Albee	1.1079	1000	0159-N	232.526 dpm/mL	02/27/2004	02/27/2005
06/23/2004	Amanda Fehr	1.14	1000	0159-O	239.459 dpm/mL	07/03/2005	07/03/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

## Verification for Th-230 Standard 0159-O

A. Fehr  
7/3/2005

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard Amt Used (mL)	Source DPM/mL
0159-N N1	258.0000	23.3000	234.7000	0.9696	1.0000	242.0585809
0159-N N2	259.3000	23.3000	236.0000	0.9696	1.0000	243.3993399
0159-N N3	255.4000	23.3000	232.1000	0.9696	1.0000	239.3770627

Mean Value (Counting) = 241.6116612 dpm/mL 100.903182 % of known  
 Stdev = 2.048043318 dpm/mL 0.00847659

Certificate Value = 239.449 dpm/mL  
 Lower Limit = 237.5155745 dpm/mL  
 Upper Limit = 245.7077478 dpm/mL  
 Rule 1 Pass/Fail Pass Pass  
 Two sigma = 4.096086636  
 10 % of Mean = 24.16116612  
 Rule 2 (Pass/Fail) Pass

### Verification Rules

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

The analyst prepared three standard verification sources for Th-230 source 0159-O by transferring 1.0 mL portions of the standard to glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 26 for alpha source standard verification. The alpha efficiency calibration which was used for verification calculations was performed using NIST source 0556-A (Th-230). Calibration data is recorded in this logbook under Th-230 0556-A. Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

Amanda L. Fehr 7/3/05

Angela A. Johnson  
7/5/05

### STANDARDIZATION OF LEAD CARRIER

DATE: 1/30/2006  
 LOT NUMBER: 1006864

	LEAD PRECIPITATES				Average	Std. Dev.	
	1	2	3	4			
Weight of carrier added	1.00	1.01	1.00	1.01	13.88	± 0.05	0.003604
Aliquot (1.00 mL)	1	1	1	1	13.81	± 0.12	0.008355
filter + ppt	0.0975	0.0970	0.0979	0.0978			
filter	0.0836	0.0832	0.0840	0.0839			
Wt. of ppt., g	0.0139	0.0138	0.0139	0.0139	<b>13.88</b>	<b>mg Pb/mL</b>	
					<b>13.81</b>	<b>mg Pb/g</b>	
mg Ca/mL	13.90	13.80	13.90	13.90			
mg Ca/g	13.90	13.66	13.90	13.76			

0.5% of Mean Value = 0.069 Pass

A satisfactory standardization is obtained when results give a standard deviation of less than 0.5% of the mean value.

# DEUTSCHER KALIBRIERDIENST (DKD)

Kalibrierlaboratorium für Meßgrößen der Radioaktivität  
*Calibration laboratory for measurements of radioactivity*

AKKREDITIERT DURCH DIE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)



**Amersham Buchler GmbH & Co KG**  
Postfach 11 49 Gieselweg 1  
D-38001 Braunschweig D-38110 Braunschweig

Telefon (05307) 930-0  
Telefax (05307) 930-293  
Telefax-Zentrale 930-237

## Kalibrierschein *Calibration Certificate*

Kalibrierzeichen  
*Calibration mark*

02628
DKD-K- 06501
95-10

Gegenstand <i>Object</i>	Radioactive Reference Solution
Hersteller <i>Manufacturer</i>	Amersham Buchler GmbH & Co KG Postfach 11 49 Gieselweg 1 D-38001 Braunschweig D-38110 Braunschweig
Typ <i>Type</i>	RBZB44
Strahler-Nr. <i>Source number</i>	ET 491
Auftraggeber <i>Customer</i>	Amersham Corporation 2636 S. Clearbrook Drive Arlington Heights, IL 60005 USA-Arlington Heights, IL
Auftragsnummer <i>Work order number</i>	112116
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	2
Referenzdatum <i>Reference date</i>	1 January 1995

Der Deutsche Kalibrierdienst ist Unterzeichner des multilateralen Übereinkommens der Western European Calibration Cooperation (WECC) zur gegenseitigen Anerkennung der Kalibrierscheine. Die Kalibrierung erfolgt auf der Grundlage des zwischen der Physikalisch-Technischen Bundesanstalt und dem Träger abgeschlossenen Vertrages. Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

*The Deutscher Kalibrierdienst is signatory to the multilateral agreement of the Western European Calibration Cooperation (WECC) for the mutual recognition of calibration certificates. The calibration is performed according to the stipulations of the contract between the Physikalisch-Technische Bundesanstalt and the holder of the calibration laboratory. This calibration certificate documents the traceability to national standards, which realize the physical units of measurement according to the International System of Units (SI). The user is obliged to have the object recalibrated at appropriate intervals.*

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Physikalisch-Technischen Bundesanstalt als auch des ausstellenden Kalibrierlaboratoriums.  
Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.  
*This calibration certificate may not be reproduced other than in full except with the permission of both the Physikalisch-Technische Bundesanstalt and the issuing laboratory. Calibration certificates without signature and seal are not valid.*

Stempel Seal	Datum Date	Leiter des Kalibrierlaboratoriums Head of the calibration laboratory	Stellvertreter Deputy	Bearbeiter Person responsible
	18 October 1995	Dr. Dornhöfer	 Dr. Thieme	 E. Schuber 20-5-013-4



02628
DKD-K-06501
95-10

## Radioactive Reference Solution

Solution No.: ET 491

Drawing No.: VZ-2058

Nuclide: Lead-210

Radioactive concentration: 38.1 kBq/g

Reference date: 1 January 1995 at 12.00 GMT

Mass of solution: (5.182 ± 0.001) g

Volume of solution: approx. 5 ml

Chemical composition: Solution in 1.2 M HNO<sub>3</sub>  
Carrier: Pb (NO<sub>3</sub>)<sub>2</sub>, Bi (NO<sub>3</sub>)<sub>3</sub>; each 20 mg/l of the corresponding element.

Measuring method: The activity was determined by comparison with a reference solution by measurement with a Ge-detector with MCA.

Traceability: Additional to the direct traceability to the PTB through the DKD this product satisfies the quality assurance requirements of USNRC Regulatory Guide 4.15 Revision 1, February 1979, for achieving NIST traceability through Amersham's participation in the NEI-NIST Measurements Assurance Program of the Nuclear Power Industry.

Uncertainty: The relative uncertainty of the activity is ± 3 %.

The declared uncertainty U is an expanded uncertainty  $U = k * u_c$  with a coverage factor of  $k = 3$ . The combined uncertainty  $u_c$  is the sum of all uncertainties which can be evaluated by statistical means (uncertainty type A,  $u_A$ ) and all other uncertainties (uncertainty type B,  $u_B$ ) whereby  $u_c^2 = u_A^2 + u_B^2$ .  
(Ref.: NIST Technical Note 1297 / WECC-Doc. 19-1990)

Radioactive impurities: Related to Pb-210 (equal 100 %) the following radioactive impurities were detected:  
Ra-226: 0.003 %



LC-5-013-47

## TRACEABILITY TO NIST

Amersham Corporation  
2636 S. Clearbrook Drive  
Arlington Heights, IL 60005  
tel (708) 593-6300  
fax (708) 593-8091



Traceability is the ability to relate the accuracy of measurement of radionuclides to the National Institute of Standards and Technology (NIST). Traceability is achieved by participation in a Measurements Assurance Program linked to NIST and production of certified materials in accordance with a quality assurance program.

Amersham participates in measurement assurance programs conducted by NIST in cooperation with the Nuclear Energy Institute (NEI, formerly USCEA). Additionally, our production facilities and measurement laboratories operate under routinely audited quality assurance programs.

Therefore, Amersham certified standardized products meet or exceed, the NRC requirements for measurements traceable to NIST.

278004C



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	ET491	Isotope:	Lead-210
Prepared By:	Garret Ray	Prepared By:	Garret Ray
Carrier Conc:	1.2M HNO3	Prep Date:	03/01/1996
Reference Date:	01/01/1995	Verification Date:	07/12/2005
Ampoule Mass (g):	5.182 g	Expiration Date:	07/12/2006
Uncertainty:	+/- 3 %	Primary Code:	ET491-A
LogBook No:	RC S 014 004	Dilution(mL):	100 mL
		Mass of Parent(g):	5.0547 g
		Density(g/mL):	1.0000

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(5.0547 \text{ g}) * (38.1 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 115550.4420 \text{ dpm/mL}$
$(5.0547 \text{ g}) * (38.1 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0000 \text{ g/mL}) / (100 \text{ mL}) = 115550.4420 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
10/20/1997	Richard Kinney	.467	100	ET491-B	524.45 dpm/ml	03/01/1997	03/01/1998
10/29/1997	Richard Kinney	3.0992	500	ET491-C	696.09 dpm/mL	10/29/1998	10/29/1999
04/03/2001	Angela Johnson	.5184	100	ET491-D	582.17 dpm/mL	04/16/2003	04/16/2004
09/15/2003	Angela Johnson	.5132	100	ET491-E	576.33 dpm/mL	11/11/2005	11/11/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Pb-210 Standard ET491-E

A. Fehr  
11/11/2005

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Source DPM/mL
ET491-E N1	1098.1000	21.6000	1098.1000	1.0000	416.9502415
ET491-E N2	1124.3000	21.6000	1124.3000	1.0000	426.8984214
ET491-E N3	1105.2000	21.6000	1105.2000	1.0000	419.6461223
Average =					421.1649284

Mean Value (Counting) = 421.1649284 % of known  
 Stdev = 5.145060708 102.491173  
 0.01221626

Certificate Value = 410.9  
 Lower Limit = 410.874807  
 Upper Limit = 431.4550498  
 Rule 1 Pass/Fail Pass Pass  
 Two sigma = 10.29012142  
 10 % of Mean = 42.11649284  
 Rule 2 (Pass/Fail) Pass

## Verification Rules

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

The analyst prepared three calibration sources for source ET491-E by transferring 1.0 mL portions of the standard to glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The calibration vials and background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 31 for Pb-210 standard verification. The efficiency calibration which was used for verification calculations was performed on 4/19/04 using source 0356-A (Pb-210). Each verification source calculation was performed as follows:

$$\text{Source dpm/g} = (A - B)/(C)(D)$$

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amanda L. Fehr 11/11/05*

0112



UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

**Methods of measurement** The measurement techniques listed below are currently in use at Nycomed Amersham for the absolute standardisation of radioactive solutions. The methods used for this standardisation are indicated on page 2 of the certificate.

Using a gas flow proportional counter

- A 4 pi beta counting
- B 4 pi alpha counting
- C 4 pi internal conversion electron counting
- D 4 pi coincidence counting
- E 4 pi anticoincidence counting
- F 4 pi coincidence and anticoincidence counting

Using a liquid scintillation counter

- G 4 pi coincidence counting
- H 4 pi anticoincidence counting
- J 4 pi coincidence and anticoincidence counting
- K 4 pi efficiency tracing

**SI unit of radioactivity** The S.I. unit of radioactivity is the becquerel

- 1 becquerel (Bq) = 1 nuclear transformation per second, therefore
- 1 curie (Ci) =  $3.7 \times 10^{10}$  becquerels exactly

Useful conversion factors are:

- 1 microcurie ( $\mu$ Ci) =  $3.7 \times 10^4$  Bq = 37 kilobecquerels (kBq)
- 1 millicurie (mCi) =  $3.7 \times 10^7$  Bq = 37 megabecquerels (MBq)
- 1 kilobecquerel (kBq) = 27.027 nanocuries (nCi)
- 1 megabecquerel (MBq) = 27.027 microcuries ( $\mu$ Ci)

RC-5-024-038B



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0112	Isotope:	Barium-133
Prepared By:	Richard Kinney	Prepared By:	Richard Kinney
Carrier Conc:	0.1M HCL	Prep Date:	04/09/1999
Reference Date:	06/20/1997	Verification Date:	01/21/2004
Ampoule Mass (g):	5.129 g	Expiration Date:	01/21/2005
Uncertainty:	+/- 1.8 %	Primary Code:	0112-A
LogBook No:	RC S 023 038A	Dilution(mL):	100 mL
		Mass of Parent(g):	5.0881 g
		Density(g/mL):	0.9935

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(5.0881 \text{ g}) * (474 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 1447055.6400 \text{ dpm/mL}$
$(5.0881 \text{ g}) * (474 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (0.9935 \text{ g/mL}) / (100 \text{ mL}) = 1456575.8226 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
04/09/1999	Joe Davis	.5846	100	0112-B	8514.6 dpm/ml	04/09/1999	04/09/2000
07/09/1999	Joe Davis	.5027	100	0112-C	7321.7 dpm/mL	07/09/1999	07/09/2000
11/11/1999	Joe Davis	.4993	100	0112-D	7272.22 dpm/mL	11/11/1999	11/11/2000
01/28/2000	Aadli Abdul-Kareem	5.2157	1000	0112-E	7596.58 dpm/mL	02/17/2001	02/17/2002
06/08/2001	Angela Johnson	10.6972	1000	0112-F-102	15580.3 dpm/mL	06/11/2002	06/11/2003
06/08/2001	Angela Johnson	10.6972	1000	0112-F-202	15580.3 dpm/mL	06/11/2002	06/11/2003
10/31/2002	Angela Johnson	10.11	1000	0112-G	14725.049 dpm/mL	10/31/2003	10/31/2004
01/19/2005	Amanda Fehr	10.431	1000	0112-H	15193.542 dpm/mL	01/18/2006	01/18/2007

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ba-133 Standard 0112-H

A. Fehr	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Vol. Used (mL)	Source DPM/mL
1/18/2006	0112-H N1	707.9000	39.2000	668.7000	0.7442	0.1000	8985.12049
	0112-H N2	685.8000	39.2000	646.6000	0.7442	0.1000	8688.169447
	0112-H N3	693.1000	39.2000	653.9000	0.7442	0.1000	8786.257348
						Average =	8819.849095

Mean Value (Counting) = 8819.849095      **102.144245**      **Pass**  
 Stdev = 151.2986605      0.01715434      **Rule 3 (Pass/Fail)**

Certificate Value = 8634.7  
 Lower Limit = 8517.251774  
 Upper Limit = 9122.446416  
 Rule 1 Pass/Fail      **Pass**  
 Two sigma = 302.597321  
 10 % of Mean = 881.9849095  
 Rule 2 (Pass/Fail)      **Pass**

### Verification Rules

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

The analyst prepared three standard verification sources for Ba-133 source 0112-H by transferring 0.1 mL portions of the standard into glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 24 for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 1/18/06 using source 0487-A (Ba-133). Calibration data is recorded in this logbook under Ba-133 0487. Each verification source calculation was performed as follows:

Source dpm/g = (A - B)/(C)(D)

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

RAD SOP M-001

*Amanda L. Fehr* 2/2/06  
 Amanda L. Fehr 1/19/06

**CERTIFICATE OF CALIBRATION**  
Standard Radionuclide Source

64673-278

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

ISOTOPE:	Ra-228
ACTIVITY (dps):	1.939 E4
HALF-LIFE:	5.75 years
CALIBRATION DATE:	October 1, 2002 12:00 EST
TOTAL UNCERTAINTY*:	3.6%
SYSTEMATIC:	3.4%
RANDOM:	1.1%

\*99% Confidence Level

Impurities:  $\gamma$ -impurities <0.1%5.02617 grams 0.1M HCl solution with 110  $\mu\text{g/g}$  Ba carrier.

P O NUMBER 3208RD, Item 2

SOURCE PREPARED BY:

M. Taskaeva  
M. Taskaeva, Radiochemist

Q A APPROVED:

M. M. 10-2-02





# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0503	Isotope:	Radium-228
Prepared By:	Angela Albee	Prepared By:	Angela Albee
Carrier Conc:	0.1 M HCL	Prep Date:	02/20/2003
Reference Date:	10/01/2002	Verification Date:	04/09/2004
Ampoule Mass (g):	5.02617 g	Expiration Date:	04/09/2005
Uncertainty:	+/- 3.6 %	Primary Code:	0503-A
LogBook No:	RC S 035 018	Dilution(mL):	100 mL
		Mass of Parent(g):	4.4737 g
		Density(g/mL):	0.9992

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10337.9473 \text{ dpm/mL}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (59.9 \text{ dpm/dps}) / (0.9992 \text{ g/mL}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10345.8102 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
04/02/2003	Lonnie Morris	39.71	1000	0503-B	411.518 dpm/mL	09/09/2005	09/09/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Verification for Ra-228 Standard 0503-B

A. Fehr 9/9/2005	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source DPM/mL
	0503-B N1	252.8000	14.4000	238.4000	0.8260783	1.0000 288.5924962
	0503-B N2	267.0000	14.4000	252.6000	0.8260783	1.0000 305.7821499
	0503-B N3	266.0000	14.4000	251.6000	0.8260783	1.0000 304.5716109
						Average = 299.6487523

Mean Value (Counting) = 299.6487523 dpm/mL 103.79387 % of known  
 Stdev = 9.594110231 dpm/mL 0.03201785

Certificate Value = 288.7 dpm/mL  
 Lower Limit = 280.4605319 dpm/mL  
 Upper Limit = 318.8369728 dpm/mL  
 Rule 1 Pass/Fail Pass  
 Two sigma = 19.18822046  
 10 % of Mean = 29.96487523  
 Rule 2 (Pass/Fail) Pass

### Verification Rules

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

The analyst prepared three standard verification sources for Ra-228 source 0503-B by transferring portions of the standard into glass liquid scintillation vials. Ten mL of Ready Gel liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 1 mL of DI water and 10 mL of Ready Gel cocktail. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Yellow (Wallac) using Protocol 23 for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 2/20/03 using Analytic's source 0503(Ra-228). Calibration data is recorded in this logbook under Ra-228 0503. Each verification source calculation was performed as follows:

Source dpm/g = (A - B)/(C)(D)

where:

- A = Ver. source cpm,
- B = BKG cpm,
- C = System efficiency, (cpm/dpm), and
- D = mass used for standard verification.

Reference RAD SOP M-001

*Amenda D. Fehr 9/9/05*  
*Heather B. Urow 9/9/05*

0638

**CERTIFICATE OF CALIBRATION**  
**Standard Radionuclide Source**

67519-278

Ra-226 5 mL Liquid in Flame Sealed Vial

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

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

Analytics maintains traceability to the National Institute of Standards and Technology through participation in a Measurements Assurance Program as described in USNRC Reg. Guide 4.15, Revision 1, February 1979.

ISOTOPE:	Ra-226
ACTIVITY (dps):	2.353 E4
HALF-LIFE:	1.600 E3 years
CALIBRATION DATE:	January 23, 2004 12:00 EST
RELATIVE EXPANDED UNCERTAINTY (k=2):	3.3%

Impurities:  $\gamma$ -impurities (other than decay products) <0.1%

5.01065 grams 0.1M HCl solution with 50  $\mu\text{g/g}$  Ba carrier.

P O NUMBER 3231RD, Item 5

SOURCE PREPARED BY:

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

Q A APPROVED:

ACUW 1/26/04



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0638	Isotope:	Radium-226
Prepared By:	Amanda Fehr	Prepared By:	Amanda Fehr
Carrier Conc:	0.1M HCl	Prep Date:	01/16/2006
Reference Date:	01/23/2004	Verification Date:	01/16/2006
Ampoule Mass (g):	5.01065 g	Expiration Date:	01/16/2007
Uncertainty:	+/- 3.3 %	Primary Code:	0638-A
LogBook No:	RC-S-037-037	Dilution(mL):	100 mL
		Mass of Parent(g):	4.8398 g
		Density(g/mL):	1.0266

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13613.8856 \text{ dpm/mL}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (59.9 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13260.8293 \text{ dpm/g}$$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
01/17/2006	Amanda Fehr	2.1041	100	0638-B	279.0211 dpm/mL	01/17/2006	01/17/2007

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

# Certificate of Analysis

0903

Catalog No: 060092-16

Lot No: 1006930

Storage: Ambient

Matrix: 1M HNO<sub>3</sub>

Container: 250 ml Narrow Mouth, HDPE

Description: Uranium 250 µg/L ± 0.5% in 1M HNO<sub>3</sub>

Quality System  
Audited & Registered  
by NSF-ISR to ISO 9001:2000

Received: 2/7/06

Issue Date: 3/1/2007

Element	Symbol	CAS No	Source Lot No	Purity %	Concentration ug/L
Uranium Total	U	7440-61-1	7075.42.5	100	250



Mark Filla

This standard was prepared gravimetrically using balances calibrated with NIST traceable weights (NIST Test Number 1000). Only calibrated Class A volumetric glassware was used to prepare this standard. Sub-boiled distilled acid and deionized water were used to stabilize the product. All raw materials were checked for stoichiometry and purity. This standard has been spectrometrically certified by an independent source, which is directly traceable to NIST.

**CERTIFICATE OF CALIBRATION**  
Standard Radionuclide Source

68509-278

U-232 5 mL Liquid 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 23236.

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

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

ISOTOPE:	U-232
ACTIVITY (dps):	3.779 E3
CALIBRATION DATE:	June 18, 2004 12:00 EST
HALF-LIFE:	68.9 years
RELATIVE EXPANDED: UNCERTAINTY (k=2):	3.3%

Impurities: Am-241 <0.15%  
U-233 <0.3%

5.20343 grams 1M HNO<sub>3</sub> solution.

P O NUMBER 3243 RD, Item 1

SOURCE PREPARED BY:

M. Dimitrova  
M. Dimitrova, Radiochemist

Q A APPROVED:

ACU/6/23/04

RECEIVED  
11/26/04



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0688	Isotope:	Uranium-232
Prepared By:	Amanda Fehr	Prepared By:	Amanda Fehr
Carrier Conc:	1M HNO3	Prep Date:	06/25/2004
Reference Date:	06/18/2004	Verification Date:	01/12/2006
Ampoule Mass (g):	5.20343 g	Expiration Date:	01/12/2007
Uncertainty:	+/- 3.3 %	Primary Code:	0688-A
LogBook No:	RC-S-037-087	Dilution(mL):	100 mL
		Mass of Parent(g):	4.9894 g
		Density(g/mL):	1.0276

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$$

$$(4.9894 \text{ g}) * (3779 \text{ dps}) * (59.9 \text{ dpm/dps}) / (5.20343 \text{ g} * 100 \text{ mL}) = 2170.5126 \text{ dpm/mL}$$

$$(4.9894 \text{ g}) * (3779 \text{ dps}) * (59.9 \text{ dpm/dps}) / (1.0276 \text{ g/mL}) / (5.20343 \text{ g} * 100 \text{ mL}) = 2112.2178 \text{ dpm/g}$$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
06/18/2004	Brenda Burke	2.203	250	0688-B	18.6439 g/mL	06/28/2005	06/28/2006
07/06/2004	Tim Chandler	2.2243	250	0688-C	18.8242 dpm/mL	08/14/2004	08/14/2005
07/06/2004	Amanda Fehr	26.03	1000	0688-D	55.0728 dpm/mL	07/06/2004	07/06/2005
04/19/2005	Amanda Fehr	26.01	1000	0688-E	55.0305 dpm/mL	05/04/2005	05/04/2006
05/27/2005	Brenda Burke	.612	250	0688-F	5.17934 dpm/mL	05/31/2005	05/31/2006
06/23/2005	Brenda Burke	2.227	250	0688-G	18.847 dpm/mL	06/28/2005	06/28/2006
01/06/2006	Mary Avins	26.01	1000	0688-H	55.0305 dpm/mL	01/12/2006	01/12/2007

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

## Verification for Uranium-232 Standard 0688-H

Analyst: M Avins	Isotope	Value	Uncertainty	
Date: 1/12/06	0688-H N1	2.46	pCi/L	0.292 pCi/L
	0688-H N2	2.49	pCi/L	0.383 pCi/L
	0688-H N3	2.48	pCi/L	0.315 pCi/L
<b>Mean Value (Counting) =</b>	2.477	pCi/L	<b>0.9992767</b>	<b>% of known</b>
<b>Stdev =</b>	0.015275252	pCi/L		
<b>Target =</b>	2.48	pCi/L		
<b>Lower Limit =</b>	2.446116162	pCi/L		
<b>Upper Limit =</b>	2.507217171	pCi/L		
<b>Rule 1 Pass/Fail</b>	<b>Pass</b>	<b>Pass</b>		<b>Pass</b>
<b>Two sigma =</b>	0.030550505			
<b>10 % of Mean =</b>	0.247666667			
<b>Rule 2 (Pass/Fail)</b>	<b>Pass</b>			

The analyst prepared three standard verification sources for standard **0688-H** using 0.1 mL for each source. Each standard was combined with 0.1 mL of **U-238** standard **0858-B** and 50 micrograms of Nd carrier in a disposable centrifuge tube. Each standard was diluted to 4 mL with 2 M HCl, and 2 mL of DI water. One mL of TiCl<sub>3</sub> was added. Two mL of 48% HF was added to precipitate Nd (and **Uranium**) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for **U-232** were calculated by comparison to **U-238** certified values.

Reference SOP RAD M-001

*Mary L. Avins*  
1/12/06

*Amanda L. Loh*  
1/24/06





# National Institute of Standards & Technology

## Certificate

### Standard Reference Material 4321C Natural Uranium Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive natural uranium 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-238, uranium-235, and uranium-234 with a total activity of approximately 2600 Bq. Uranium decays by alpha-particle emission. The progeny of uranium-238, uranium-235, and uranium-234 have a total activity of approximately 2600 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 11 keV to 2.0 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 ( $\text{HNO}_3$ ) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

#### Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least August 2007.

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  
November 1997

Thomas E. Gills, Chief  
Standard Reference Materials Program

### Recommended Procedure for Opening the SRM Ampoule

- 1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.
- 2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.
- 3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.
- 4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.
- 5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.
- 6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.
- 7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.
- 8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. **NEVER PIPETTE BY MOUTH.**
- 9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]\*.

**PROPERTIES OF SRM 4321C**  
(Certified values are shown in bold type)

Source identification number	NIST SRM 4321C		
<b>Physical Properties:</b>			
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	(1.053 ± 0.001) g·mL <sup>-1</sup> at 21.4 °C [b]*		
Solution mass	(5.258 ± 0.002) g [b]		
<b>Chemical Properties:</b>			
Solution composition	Chemical Formula	Concentration (mol·L <sup>-1</sup> )	Mass Fraction (g·g <sup>-1</sup> )
	H <sub>2</sub> O	53	0.91
	HNO <sub>3</sub>	1.0	0.06
	UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub>	0.09	0.03
<b>Radiological Properties:</b>			
Radionuclide	Natural Uranium (Mixture of U-238, U-235, and U-234)		
Reference time	1200 EST, 1 August 1997		
Massic activity of the solution [c]	U-238: 242.0 Bq·g <sup>-1</sup> U-235: 11.14 Bq·g <sup>-1</sup> U-234: 233.1 Bq·g <sup>-1</sup>		
Relative expanded uncertainty (k=2)	U-238: 0.60% [d] [e] U-235: 0.62% [d] [e] U-234: 0.98% [d] [e]		
Mass fraction of uranium	(0.01960 ± 0.00010) g·g <sup>-1</sup> [b]		
Photon-emitting impurities	None detected [f]		
Half lives used	Uranium-238: (4.468 ± 0.003) × 10 <sup>9</sup> a [g] Uranium-235: (7.038 ± 0.005) × 10 <sup>8</sup> a [g] Uranium-234: (2.455 ± 0.006) × 10 <sup>5</sup> a [g]		
Measuring instruments	Mass spectrometer, silicon surface-barrier detector, and 4π(α+β) liquid-scintillation counting systems.		

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]\*

Input Quantity $x_i$ , the source of uncertainty  (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$ , the standard uncertainty of $x_i$ (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$ , (%) [h]	Relative Sensitivity Factor, $ \partial y/\partial x_i  \cdot$ $(x_i/y)$ [i]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$ , (%) [j]
Isotopic uranium atom fraction in SRM 960	Standard deviation of the mean for repeated mass-spectrometric measurements (A)	U-238: 0.001	1.0	0.001
		U-235: 0.07	1.0	0.07
		U-234: 0.31	1.0	0.31
Half life	Standard uncertainty of the half life (A)	U-238: 0.07	1.0	0.07
		U-235: 0.07	1.0	0.07
		U-234: 0.25	1.0	0.25
Uranium mass fraction in SRM 960	Certificate value (B)	0.003	1.0	0.003
Quantitative dissolution	Estimated (B)	0.25	1.0	0.25
Gravimetric measurements	Estimated (B)	0.10	1.0	0.10
Photon-emitting impurities	Limit of detection (B) [k]	100.	0.001	0.10
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$ , (%)			U-238:	0.30
			U-235:	0.31
			U-234:	0.49
Coverage Factor, $k$				<u>x 2</u>
Relative Expanded Uncertainty of the Output Quantity, $U/y$ , (%)			U-238:	0.60
			U-235:	0.62
			U-234:	0.98

## NOTES

- [a] The Sievert is the SI unit for dose equivalent. See reference [1]. One  $\mu\text{Sv}$  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 divided by the total mass of the sample. See reference [1].
- [d] The reported value,  $y$ , of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as  $y = f(x_1, x_2, x_3, \dots, x_n)$ , where  $f$  is a mathematical function derived from the assumed model of the measurement process.  
 The value,  $x_i$ , used for each input quantity  $i$  has a **standard uncertainty**,  $u(x_i)$ , that generates a corresponding uncertainty in  $y$ ,  $u_i(y) \equiv |\partial y / \partial x_i| \cdot u(x_i)$ , 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] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic count rate is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval  $U/2$  to  $2U$  (i.e., within a factor of 2 of the estimated value).
- [f] Estimated limits of detection for photon-emitting impurities are:  
 $1.4 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 8 and 59 keV,  
 $1.1 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 67 and 88 keV,  
 $0.5 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 102 and 197 keV,  
 $0.3 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 205 and 762 keV,  
 $0.2 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 770 and 996 keV, and  
 $0.1 \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$  for energies between 1006 and 1900 keV,  
 provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of uranium-238, uranium-235, uranium-234, or their progeny.
- [g] The stated uncertainty is the standard uncertainty. See reference [5].

- [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  $y$ , rounded to two significant figures or less. The relative component of combined standard uncertainty of  $y$  is given by  $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$ . 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] 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.  $u(x_i)/x_i = 100\%$ .  $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of U-238})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of U-238})\}$ . 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, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.
- [5] Evaluated Nuclear Structure Data File (ENSDF), August 1997.



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0858	Isotope:	Uranium-238
Prepared By:	Mary Avins	Prepared By:	Mary Avins
Carrier Conc:	HNO3	Prep Date:	11/21/2005
Reference Date:	08/01/1997	Verification Date:	11/21/2005
Ampoule Mass (g):	5.258 g	Expiration Date:	11/21/2006
Uncertainty:	+/- .6 %	Primary Code:	0858-A
LogBook No:	RC-S-041-034	Dilution(mL):	100 mL
		Mass of Parent(g):	4.972 g
		Density(g/mL):	1.0155

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (Bq/g)}) * (\text{conversion dpm to Bq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (Bq/g)}) * (\text{conversion dpm to Bq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.972 \text{ g}) * (242 \text{ Bq/g}) * (60 \text{ dpm/Bq}) / (100 \text{ mL}) = 721.9344 \text{ dpm/mL}$
$(4.972 \text{ g}) * (242 \text{ Bq/g}) * (60 \text{ dpm/Bq}) / (1.0155 \text{ g/mL}) / (100 \text{ mL}) = 710.9460 \text{ dpm/g}$

### Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
11/21/2005	Mary Avins	8.2104	100	0858-B	58.3715 dpm/mL	11/21/2005	11/21/2006

General Engineering Laboratories, LLC  
Version 1.0 9/18/2000

**CERTIFICATE OF CALIBRATION**  
Standard Radionuclide Source

70361-278

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: April 1, 2005 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432 Y	3372	4.5
Cd-109	88	462.6 d	4698	3.3
Co-57	122	271.79 d	2450	3.0
Ce-139	166	137.6 d	3496	2.8
Hg-203	279	46.61 d	7565	2.7
Sn-113	392	115.1 d	4711	2.6
Cs-137	662	30.07 Y	3109	3.0
Y-88	898	106.6 d	12320	2.6
Co-60	1173	5.2714 Y	5769	2.7
Co-60	1332	5.2714 Y	5830	2.6
Y-88	1836	106.6 d	12860	2.6

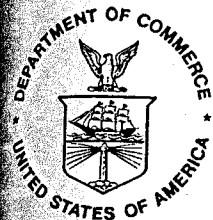
5.32720 grams 4M HCl solution.  
P O NUMBER 2704RD, Item 1

SOURCE PREPARED BY: M. Taskaeva  
M. Taskaeva, Radiochemist

Q A APPROVED: [Signature] 04-11-2005

This standard will expire one year after the calibration date.





U.S. DEPARTMENT OF COMMERCE  
National Institute of Standards & Technology  
Gaithersburg, MD 20899

## Certificate of Participation

*Analytics, Incorporated*  
*Atlanta, Georgia*

is a participant for the period January 1, 2005, through December 31, 2005, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with the Nuclear Energy Institute. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.\*

For the Director,

A handwritten signature in black ink, appearing to read "Michael P. Unterweger".

Michael P. Unterweger, Acting Leader  
Radioactivity Group  
Physics Laboratory

\* As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

# ANALYTICS

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## ANALYSIS OF UNCERTAINTY FOR MIXED GAMMA STANDARDS

### BATCH 120

CALIBRATION DATE: April 1, 2005 12:00 EST

Isotope	Energy (keV)	Calibration Method <sup>1</sup>	Statistics <sup>2</sup>	Calibration <sup>2</sup>	Peak Fitting <sup>2</sup>	Geometry <sup>2</sup>	Impurities <sup>2</sup>	Weighing <sup>2</sup>	Combined Standard Uncertainty <sup>2</sup>	Relative Expanded Uncertainty <sup>2</sup> (k=2)
Cd-109	88	HPGe	0.16	1.1	0.88	0.8	0	0.2	1.64	3.3
Co-57	122	HPGe	0.23	1.1	0.71	0.7	0	0.2	1.52	3.0
Ce-139	166	HPGe	0.17	1.0	0.58	0.7	0	0.2	1.38	2.8
Hg-203	279	HPGe	0.11	1.1	0.34	0.7	0	0.2	1.37	2.7
Sn-113	392	HPGe	0.21	1.0	0.35	0.7	0	0.2	1.30	2.6
Cs-137	662	HPGe	0.36	1.1	0.60	0.7	0	0.2	1.49	3.0
Y-88	898	HPGe	0.19	1.0	0.33	0.7	0	0.2	1.29	2.6
Co-60	1173	HPGe	0.31	.97	0.45	0.7	0	0.2	1.33	2.7
Co-60	1332	HPGe	0.33	.93	0.48	0.7	0	0.2	1.32	2.6
Y-88	1836	HPGe	0.24	1.0	0.35	0.7	0	0.2	1.31	2.6

#### Optional Additional Isotopes

Pb-210	46.5	4π LS	0.33	1.1	0	0.9	0.30	0.2	1.50	3.0
Am-241	59.5	4π LS	0.33	1.1	0	0.9	0.30	0.2	1.50	3.0
Sr-85	514	IC	0.30	1.1	0	0.7	0.17	0.2	1.36	2.7
Cs-134	605	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Cs-134	796	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Mn-54	835	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Zn-65	1116	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7

#### Calibration Methods:

- 4π LS (4 pi Liquid Scintillation Counting)
- HPGe (High Purity Germanium Gamma Ray Spectrometer)
- IC (Gamma Ray Ionization Chamber)

<sup>2</sup>As Percent (%) from counting data

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.



# Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0781	Isotope:	Mixed Gamma
Prepared By:	Amanda Fehr	Prepared By:	Amanda Fehr
Carrier Conc:	4M HCL	Prep Date:	04/26/2005
Reference Date:	04/01/2005	Verification Date:	04/27/2005
Ampoule Mass (g):	5.3272 g	Expiration Date:	04/27/2006
Uncertainty:	+/- 3 %	Primary Code:	0781-A
LogBook No:	RC-S-039-065	Dilution(mL):	100 mL
		Mass of Parent(g):	5.1233 g
		Density(g/mL):	5.4962

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dpm)}) * (\text{conversion dpm to dpm}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dpm)}) * (\text{conversion dpm to dpm}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$$

$$(5.1233 \text{ g}) * (219149.436 \text{ dpm}) * (1 \text{ dpm/dpm}) / (5.3272 \text{ g} * 100 \text{ mL}) = 2107.6143 \text{ dpm/mL}$$

$$(5.1233 \text{ g}) * (219149.436 \text{ dpm}) * (1 \text{ dpm/dpm}) / (5.4962 \text{ g/mL}) / (5.3272 \text{ g} * 100 \text{ mL}) = 383.4709 \text{ dpm/g}$$

## Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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General Engineering Laboratories, LLC

Version 1.0 9/18/2000

## Verification for Mixed Gamma Standard 0781-A (AM-241 & Cs-137)

A. Fehr  
4/29/2005

Am-241			Cs-137		
	Isotope	Result		Isotope	Result
	Mixed Gamma N1	9796		Mixed Gamma N1	3753
	Mixed Gamma N2	9930		Mixed Gamma N2	4015
	Mixed Gamma N3	10290		Mixed Gamma N3	3878
<b>Mean Value (Counting) =</b>	10005.33	<b>102.47</b>	<b>Pass</b>	3882.00	<b>102.39</b>
<b>Stdev =</b>	255.471	<b>Rule 3 (Pass/Fail)</b>		131.046	<b>Pass</b>
<b>Certificate Value =</b>	9764.6			3791.3	
<b>Lower Limit =</b>	9494.391719			3619.908413	
<b>Upper Limit =</b>	10516.27495			4144.091587	
<b>Rule 1 (Pass/Fail)</b>	<b>Pass</b>			<b>Pass</b>	
<b>Two sigma =</b>	510.9416144			262.091587	
<b>10 % of Mean =</b>	1000.53333333			388.20000000	
<b>Rule 2 (Pass/Fail)</b>	<b>Pass</b>			<b>Pass</b>	

### Verification Rules

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

Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule 3 = The determined mean value shall be within 10% of the certificate value.

*Amanda L. Fehr 4/29/05*

*Angela L. Johnson 5/6/05*

## Verification for Mixed Gamma Standard 0781-A (Co-60)

A. Fehr 4/29/2005	Isotope	Result pCi/L	
	Mixed Gamma N1	6132	
	Mixed Gamma N2	6073	
	Mixed Gamma N3	6240	
<b>Mean Value (Counting) =</b>	6148.33	pCi/L	<b>102.365 Pass</b>
<b>Stdev =</b>	84.690	pCi/L	<b>Rule 3 (Pass/Fail)</b>
<b>Certificate Value =</b>	6006.3	pCi/L	
<b>Lower Limit =</b>	5978.954074	pCi/L	
<b>Upper Limit =</b>	6317.712592	pCi/L	
<b>Rule 1 Pass/Fail</b>	<b>Pass</b>		
<b>Two sigma =</b>	169.3792589		
<b>10 % of Mean =</b>	614.8333333		
<b>Rule 2 (Pass/Fail)</b>	<b>Pass</b>		

### Verification Rules

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

**Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.**

**Rule 3 = The determined mean value shall be within 10% of the certificate value.**

*Amanda L. Fehr 4/29/05*

*Angela L. Johnson  
5/6/05*

# RUNLOGS



# Instrument Run Log

ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
158272001	SAMPLE	BJB1	1026		20-APR-2006 07:49	520798	DONE		
158275001	SAMPLE	BJB1	1027		20-APR-2006 07:49	520798	DONE		
158276001	SAMPLE	BJB1	1029		20-APR-2006 07:49	520798	DONE		
158277001	SAMPLE	BJB1	1030		20-APR-2006 07:49	520798	DONE		
158436001	SAMPLE	BJB1	1065		20-APR-2006 07:49	520798	DONE		
158971001	SAMPLE	BJB1	1069		20-APR-2006 07:49	520798	DONE		
158971002	SAMPLE	BJB1	1070		20-APR-2006 07:49	520798	DONE		
158971004	SAMPLE	BJB1	1073		20-APR-2006 07:49	520798	DONE		
159242001	SAMPLE	BJB1	1075		20-APR-2006 07:49	520798	DONE		
159242002	SAMPLE	BJB1	1077		20-APR-2006 07:49	520798	DONE		
159242003	SAMPLE	BJB1	1078		20-APR-2006 07:49	520798	DONE		
159243001	SAMPLE	BJB1	1079		20-APR-2006 07:49	520798	DONE		
159244001	SAMPLE	BJB1	1080		20-APR-2006 07:49	520798	DONE		
1201071140	MB	BJB1	1083		20-APR-2006 07:49	520798	DONE		
1201071141	DUP	BJB1	1085		20-APR-2006 07:49	520798	DONE		
1201071142	MS	BJB1	1086		20-APR-2006 07:49	520798	DONE		
1201071143	LCS	BJB1	1088		20-APR-2006 07:49	520798	DONE		
158971003	SAMPLE	BJB1	1010		21-APR-2006 11:47	520798	DONE		
159247001	SAMPLE	BJB1	1011		21-APR-2006 11:47	520798	DONE		

Version 1.1 9/5/05

General Engineering Laboratories, LLC



# Instrument Run Log

ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
158272001	SAMPLE	BJB1	1019		20-APR-2006 17:29	520799	DONE		
158275001	SAMPLE	BJB1	1020		20-APR-2006 17:29	520799	DONE		
158276001	SAMPLE	BJB1	1021		20-APR-2006 17:29	520799	DONE		
158277001	SAMPLE	BJB1	1023		20-APR-2006 17:29	520799	DONE		
158436001	SAMPLE	BJB1	1001		21-APR-2006 07:38	520799	DONE		
158971001	SAMPLE	BJB1	1003		21-APR-2006 07:38	520799	DONE		
158971002	SAMPLE	BJB1	1004		21-APR-2006 07:38	520799	DONE		
158971003	SAMPLE	BJB1	1005		21-APR-2006 07:38	520799	DONE		
158971004	SAMPLE	BJB1	1007		21-APR-2006 07:38	520799	DONE		
159242001	SAMPLE	BJB1	1009		21-APR-2006 07:38	520799	DONE		
159242002	SAMPLE	BJB1	1010		21-APR-2006 07:38	520799	DONE		
159242003	SAMPLE	BJB1	1011		21-APR-2006 07:38	520799	DONE		
159243001	SAMPLE	BJB1	1013		21-APR-2006 07:38	520799	DONE		
159244001	SAMPLE	BJB1	1016		21-APR-2006 07:38	520799	DONE		
159247001	SAMPLE	BJB1	1017		21-APR-2006 07:38	520799	DONE		
1201071144	MB	BJB1	1018		21-APR-2006 07:38	520799	DONE		
1201071146	MS	BJB1	1020		21-APR-2006 07:38	520799	DONE		
1201071147	LCS	BJB1	1021		21-APR-2006 07:38	520799	DONE		
1201071145	DUP	BJB1	1116		22-APR-2006 07:38	520799	DONE		

Version 1.1 9/5/05

General Engineering Laboratories, LLC





# Instrument Run Log

ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
158272001	SAMPLE	MJH1	GAMMA1		25-APR-2006 18:37	519510	DONE	2L_MB	13-FEB-2006
158275001	SAMPLE	MJH1	GAMMA3		25-APR-2006 18:37	519510	DONE	2L_MB	24-MAR-2006
158276001	SAMPLE	MJH1	GAMMA4		25-APR-2006 18:37	519510	DONE	2L_MB	23-FEB-2006
158277001	SAMPLE	MJH1	GAMMA6		25-APR-2006 18:38	519510	DONE	2L_MB	04-JAN-2006
158436001	SAMPLE	MJH1	GAMMA7		25-APR-2006 18:38	519510	DONE	2L_MB	03-JAN-2006
158971001	SAMPLE	MJH1	GAMMA8		25-APR-2006 18:38	519510	DONE	2L_MB	23-SEP-2005
158971002	SAMPLE	MJH1	GAMMA9		25-APR-2006 18:39	519510	DONE	2L_MB	08-JUL-2005
158971003	SAMPLE	MJH1	GAMMA10		25-APR-2006 18:39	519510	DONE	2L_MB	15-FEB-2006
158971004	SAMPLE	MJH1	GAMMA11		25-APR-2006 18:39	519510	DONE	2L_MB	25-MAR-2006
159242001	SAMPLE	MJH1	GAMMA12		25-APR-2006 18:40	519510	DONE	2L_MB	10-JAN-2006
159242003	SAMPLE	MJH1	GAMMA15		25-APR-2006 18:42	519510	DONE	2L_MB	09-JUL-2005
159244001	SAMPLE	MJH1	GAMMA17		25-APR-2006 18:42	519510	DONE	2L_MB	06-JAN-2006
159242002	SAMPLE	MJH1	GAM14		25-APR-2006 18:43	519510	DONE	2LMB	22-FEB-2006
1201068236	MB	MJH1	WELL		25-APR-2006 18:43	519510	DONE	2L_MB	29-DEC-2005
159247001	SAMPLE	MJH1	GAM19		25-APR-2006 18:46	519510	DONE	2LMB	22-FEB-2006
1201068238	LCS	MJH1	GAMMA6		26-APR-2006 05:24	519510	DONE	2L_MB	04-JAN-2006
159243001	SAMPLE	MJH1	GAM14		26-APR-2006 05:26	519510	DONE	2LMB	22-FEB-2006
1201068237	DUP	MJH1	GAM19		26-APR-2006 05:28	519510	DONE	2LMB	22-FEB-2006

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ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
1201060416	MB	KSD1	PIC4C		26-APR-2006 13:29	515983	DONE	CeF on 25mm Filter	22-APR-2005
1201060417	DUP	KSD1	PIC4D		26-APR-2006 13:29	515983	DONE	CeF on 25mm Filter	22-APR-2005
158783003	SAMPLE	KSD1	PIC1A		26-APR-2006 13:29	515983	DONE	CeF on 25mm Filter	22-APR-2005
158783004	SAMPLE	KSD1	PIC1B		26-APR-2006 13:29	515983	DONE	CeF on 25mm Filter	22-APR-2005
158783005	SAMPLE	KSD1	PIC1C		26-APR-2006 13:29	515983	DONE	CeF on 25mm Filter	22-APR-2005
158971001	SAMPLE	KSD1	PIC1D		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
158971002	SAMPLE	KSD1	PIC2A		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
158971003	SAMPLE	KSD1	PIC2B		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
158971004	SAMPLE	KSD1	PIC2C		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159242001	SAMPLE	KSD1	PIC2D		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159242002	SAMPLE	KSD1	PIC3A		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159242003	SAMPLE	KSD1	PIC3B		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159243001	SAMPLE	KSD1	PIC3C		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159244001	SAMPLE	KSD1	PIC4A		26-APR-2006 13:30	515983	DONE	CeF on 25mm Filter	22-APR-2005
159247001	SAMPLE	KSD1	PIC4B		26-APR-2006 13:32	515983	DONE	CeF on 25mm Filter	22-APR-2005
1201060418	MS	KSD1	PIC3D		26-APR-2006 13:44	515983	DONE	CeF on 25mm Filter	22-APR-2005
1201060419	LCS	KSD1	PIC3B		26-APR-2006 14:35	515983	DONE	CeF on 25mm Filter	22-APR-2005

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ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
158272001	SAMPLE	BXF1	PIC1B		25-APR-2006 11:02	520607	DONE	Tuffryn Filter	29-JUL-2005
158275001	SAMPLE	BXF1	PIC1C		25-APR-2006 11:02	520607	DONE	Tuffryn Filter	29-JUL-2005
158276001	SAMPLE	BXF1	PIC1D		25-APR-2006 11:02	520607	DONE	Tuffryn Filter	29-JUL-2005
158277001	SAMPLE	BXF1	PIC2A		25-APR-2006 11:02	520607	DONE	Tuffryn Filter	29-JUL-2005
158436001	SAMPLE	BXF1	PIC2B		25-APR-2006 11:02	520607	DONE	Tuffryn Filter	29-JUL-2005
158971001	SAMPLE	BXF1	PIC2C		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
158971003	SAMPLE	BXF1	PIC3A		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
158971004	SAMPLE	BXF1	PIC3B		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159242001	SAMPLE	BXF1	PIC3C		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159242002	SAMPLE	BXF1	PIC3D		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159242003	SAMPLE	BXF1	PIC4A		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159243001	SAMPLE	BXF1	PIC4B		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159244001	SAMPLE	BXF1	PIC4C		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
159247001	SAMPLE	BXF1	PIC4D		25-APR-2006 11:03	520607	DONE	Tuffryn Filter	29-JUL-2005
158971002	SAMPLE	BXF1	PIC2D		25-APR-2006 12:32	520607	DONE	Tuffryn Filter	29-JUL-2005
1201070733	MB	BXF1	PIC3A		25-APR-2006 14:15	520607	DONE	Tuffryn Filter	29-JUL-2005
1201070735	MS	BXF1	PIC3C		25-APR-2006 14:15	520607	DONE	Tuffryn Filter	29-JUL-2005
1201070734	DUP	BXF1	PIC3B		25-APR-2006 14:15	520607	DONE	Tuffryn Filter	29-JUL-2005
1201070736	LCS	BXF1	PIC3D		25-APR-2006 14:15	520607	DONE	Tuffryn Filter	29-JUL-2005

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ID	Sample Type	Analyst	Instrument	Dil	Run Date	Batch Id	Status	Geometry	Cal Date
1201077880	MB	DRS1	KPA11AUTO2		26-APR-2006 10:15	523680	DONE		
1201077881	DUP	DRS1	KPA11AUTO2		26-APR-2006 10:18	523680	DONE		
1201077882	MS	DRS1	KPA11AUTO2		26-APR-2006 10:22	523680	DONE		
1201077883	LCS	DRS1	KPA11AUTO2		26-APR-2006 10:26	523680	DONE		
1201077884	LCSD	DRS1	KPA11AUTO2		26-APR-2006 10:27	523680	DONE		
158272001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:30	523680	DONE		
158275001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:32	523680	DONE		
158276001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:34	523680	DONE		
158277001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:36	523680	DONE		
158436001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:38	523680	DONE		
158971001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:40	523680	DONE		
158971002	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:43	523680	DONE		
158971003	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:45	523680	DONE		
158971004	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:47	523680	DONE		
159242001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:49	523680	DONE		
159242002	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:51	523680	DONE		
159242003	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:53	523680	DONE		
159243001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:55	523680	DONE		
159244001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 10:57	523680	DONE		
159247001	SAMPLE	DRS1	KPA11AUTO2		26-APR-2006 11:01	523680	DONE		

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<b>ID</b>	<b>Sample Type</b>	<b>Analyst</b>	<b>Instrument</b>	<b>Dil</b>	<b>Run Date</b>	<b>Batch Id</b>	<b>Status</b>	<b>Geometry</b>	<b>Cal Date</b>
158272001	SAMPLE	SG	LUCAS6		10-APR-2006 08:20	518058	DONE	Lucas Cell	29-DEC-2005
159242001	SAMPLE	SG	LUCAS1		10-APR-2006 08:55	518058	DONE	Lucas Cell	27-MAR-2006
159242002	SAMPLE	SG	LUCAS2		10-APR-2006 08:55	518058	DONE	Lucas Cell	09-MAY-2005
159243001	SAMPLE	SG	LUCAS3		10-APR-2006 08:55	518058	DONE	Lucas Cell	23-NOV-2005
159244001	SAMPLE	SG	LUCAS4		10-APR-2006 08:55	518058	DONE	Lucas Cell	04-NOV-2005
159247001	SAMPLE	SG	LUCAS5		10-APR-2006 08:55	518058	DONE	Lucas Cell	09-DEC-2005
1201064983	MB	SG	LUCAS6		10-APR-2006 08:55	518058	DONE	Lucas Cell	29-DEC-2005
1201064984	DUP	SG	LUCAS1		10-APR-2006 09:30	518058	DONE	Lucas Cell	27-MAR-2006
1201064985	MS	SG	LUCAS2		10-APR-2006 09:30	518058	DONE	Lucas Cell	09-MAY-2005
1201064986	LCS	SG	LUCAS3		10-APR-2006 09:30	518058	DONE	Lucas Cell	23-NOV-2005

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