



October 12, 2009

Mr. Frank Hagar
Northgate Environmental Management, Inc.
1100 Quail St., Suite 102
Newport Beach, California 92660

Re: Tronox Henderson
Work Order: 237118

Dear Mr. Hagar:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 14, 2009 and September 15, 2009. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Sincerely,

Edith Kent
Project Manager

Chain of Custody: 2027.001.00723, 2027.001.00751, 2027.001.00753, 2027.001.00755, 2027.001.00763,
2027.001.00765 and 2027.001.00775
Enclosures

Tronox LLC
Tronox Henderson
SDG:237118

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Case Narrative

CASE NARRATIVE
for
Tronox LLC
Tronox Henderson
SDG:237118

October 12, 2009

Laboratory Identification:

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

Summary

Sample receipt

The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on September 14, 2009 and September 15, 2009 for analysis. Shipping container temperatures were checked, documented, and within specifications. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There was no time of collection on the sample container for sample RSAO8-43B. The client was notified. Please refer to the attached e-mail for further details.

Items of Note

All samples under this SDG were logged as an open SDG until a sufficient amount of samples were received by the lab. The client was notified that the SDG was closed on September 15, 2009 and the turnaround time would start from then.

QC Issues

The following samples did not meet the Tronox QA program sample result uncertainty limit of <30% for Ra-226 with the results between 2 and 5 times the MDA and were counted for the maximum time: 237118001, 237118003, 237118006, 237118009, 237118012 and 237118014. The following samples did not meet the Tronox QA program sample result uncertainty limit of <30% for Alpha Spec Uranium with the results between 2 and 5 times the MDA and were counted for the maximum time: 237118002, 237118004, 237118005, 237118006, 237118017 and 237118019. The following samples did not meet the Tronox QA program sample result uncertainty limit of <30% for Alpha Spec Uranium with the results greater than 5 times the MDA and were counted for the maximum time: 237118007, 237118010, 237118013 and 237118014. The following samples did not meet the Tronox QA program required detection limits for Alpha Spec Uranium due to limited sample volume and were counted for the maximum time: and 237118011.. Sample 237118011 did not meet the Tronox QA program sample result uncertainty limit of <30% for Ra-226 with the results greater than 5 times the MDA and was counted for the maximum time. The lab DUP did not meet the Tronox QA program sample result uncertainty limit of <30% for Ra-226 with the results between 2 and 5 times the MDA and was counted for the maximum time. The lab DUP did not meet the Tronox QA program sample result uncertainty limit of <30% for Alpha Spec Uranium with the results between 2 and 5 times the MDA and was counted for the maximum time. Please refer to the attached e-mail for further details on QA issues.

Sample Identification

The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
237118001	SA40-10B
237118002	SA40-25B
237118003	SA41-12B

237118004	SA41-25B
237118005	SA41-38B
237118006	SA114-10B
237118007	SA114-30B
237118008	RSAO8-11.5B
237118009	RSAO8-21.5B
237118010	RSAO8-43B
237118011	RSAR6-0.5B
237118012	RSAR6-9B
237118013	RSAR6-25B
237118014	RSAR6-37B
237118015	SA43-10B
237118016	SA43-25B
237118017	SA43-43B
237118018	SA44-10B
237118019	SA44-25B
237118020	SA44-42B

Case Narrative

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

Data Package

The enclosed data package contains the following sections: 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



1100 Quail Street, Suite 102, Newport Beach, CA 92660
(949) 261-9293

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

COC No. 2027.001.00723

Page: 1 of 1

Cooler # 1 of 1

Collection Area: II

Required Ship to Lab:		Required Project Information:		Required Invoice Information:		TAT: Standard 30 day		Rush		Mark One				
Lab Name: GEL Laboratories, LLC		Site ID #: TRONOX LLC, HENDERSON		Send Invoice to: Susan Crowley Trenox LLC		If Rush, Date due								
Address: 2040 Savage Road		Project #: 2027.001		Address: PO Box 55										
Charleston, SC 29407		Site Address: 560 W. Lake Mead Drive		City/State: Henderson, NV 89009		Phone #: (949) 260-9293		Special		EPA Stage				
Lab PM: Edith M. Kent		City: Henderson		State: NV		Reimbursement project? <input checked="" type="checkbox"/>		Non-reimbursement project? <input type="checkbox"/>		Mark one				
Phone/Fax: (843) 556-8171		Site PM Name: Derrick Willis		Send EDD to: Frank Hagar Northgate Environmental Management, Inc frank.hagar@ngem.com		Send EDD to: Frank Hagar Northgate Environmental Management, Inc frank.hagar@ngem.com		NJ Reduced Deliverable Package?		Mark One				
Lab PM email: emk@gel.com		Phone/Fax: (949) 375-7004		CC Hardcopy report to: derrick.willis@ngem.com		CC Hardcopy report to: PDF Electronic Version Only		MA MCP Cert?		CT RCP Cert?				
Applicable Lab Quote #:		Site PM Email: derrick.willis@ngem.com		Valid Matrix Codes		see additional comments below		Lab Project ID (lab use)						
#	ITEM	SAMPLE ID	One Character per box. (A-Z, 0-9 / -)	SAMPLE TYPE	G=GRAB C=COMP	MATRIX CODE	SAMPLE DATE	SAMPLE TIME	#OF CONTAINERS	FIELD FILTERED? (Y/N)	Preservatives	Requested	Analyses	Comments/Lab Sample I.D.
1	SA41-12B			G		SO	9/11/2009	8:46	1	N	Unpreserved H2SO4 HNO3 HCl NaOH Na2S2O3 Methanol			8 oz. glass jar
2	SA41-25B			G		SO	9/11/2009	9:39	1	N				8 oz. glass jar
3	SA41-38B			G		SO	9/11/2009	10:48	1	N				8 oz. glass jar
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Additional Comments/Special Instructions:
FULL DIGESTION SPECIFICATION
Radionuclides* includes Thorium (isotopic) and Uranium (isotopic)
by EML HASL 300 modified(alpha spectroscopy)

All PDF reports and EDDs will be uploaded to:
Northgate Environmental Management, Inc.
FTP site address provided to labs
Notifications provided to:
cindy.arnold@ngem.com & frank.hagar@ngem.com

RELINQUISHED BY / AFFILIATION: *Patrick Ferring*
DATE: 9-11-09
TIME: 17:00
ACCEPTED BY / AFFILIATION: *Patrick Ferring*
DATE: 9-11-09
TIME: 08:35

DATE	TIME	TEMP IN OC	SAMPLES ON	SAMPLE INTACT?	TRIP BLANK?
9-11-09	08:35	25°	Y/N	Y/N	Y/N
			Y/N	Y/N	Y/N
			Y/N	Y/N	Y/N
			Y/N	Y/N	Y/N

SHIPPING METHOD: (mark as appropriate)
UPS COURIER *Patrick Ferring*
US MAIL

SAMPLER NAME AND SIGNATURE: *Patrick Ferring*
DATE SIGNED: 9-11
TIME: 14:56



1100 Quail Street, Suite 102, Newport Beach, CA 92660
(949) 260-9293

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

COC No. 2027.001.00753

Page: 1 of 1

Cooler # 1 of 1

Collection Area: II

Required Ship to Lab:		Required Project Information:		Required Invoice Information:		TAT: Standard 30 day		Rush		Mark One		
Lab Name: GEL Laboratories, LLC		Site ID #: TRONOX LLC, HENDERSON		Send Invoice to: Susan Crowley Tronox LLC		If Rush, Date due		X				
Address: 2040 Savage Road		Project #: 2027.001		Address: PO Box 55								
Charleston, SC 29407		Site Address: 560 W. Lake Mead Drive		City/State: Henderson, NV 89009		Phone #: (949) 260-9293		QC level Required: Standard		Special EPA Stage Mark one		
Lab PM: Edith M. Kent		City: Henderson		State: NV		Reimbursement project? <input checked="" type="checkbox"/>		Non-reimbursement project? <input type="checkbox"/>		Mark one		
Phone/Fax: (843) 556-8171		Site PM Name: Derrick Willis		Send EDD to: Frank Hagar Northgate Environmental Management, Inc frank.hagar@ngem.com		Send EDD to: Frank Hagar Northgate Environmental Management, Inc frank.hagar@ngem.com		NJ Reduced Deliverable Package?		EPA Stage 4		
Lab PM email: emk@gel.com		Phone/Fax: (949) 375-7004		CC Hardcopy report to: derrick.willis@ngem.com		CC Hardcopy report to: see additional comments below		MA MCP Cert?		CT RCP Cert?		
Applicable Lab Quote #:		Site PM Email: derrick.willis@ngem.com		PDF Electronic Version Only				Lab Project ID (lab use)		Mark One		
#	ITEM	SAMPLE ID	MATRIX CODE	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	#OF CONTAINERS	FIELD FILTERED? (Y/N)	Preservatives	Requested	Analyses	Comments/Lab Sample I.D.
1	SA114-10B	PF 9-11-09	SO	G	9/11/2009	6:54	1	N	Unpreserved	X X X	EPA04 Radium-226	8 oz. glass jar
2	SA114-30B		SO	G	9/11/2009	7:40	1	N	H2SO4	X X X	EPA04 Radium-226	8 oz. glass jar
3									HNO3			
4									HCl			
5									NaOH			
6									MnSO4			
7									Unpreserved			
8									Other			
9									Methanol			
10									MnSO4			
11									HNO3			
12									HCl			
13									NaOH			
									MnSO4			
									Unpreserved			
									Other			

Additional Comments/Special Instructions:
FULL DIGESTION SPECIFICATION
Radionuclides* Includes Thorium (isotopic) and Uranium (isotopic)
 by EML HASL 300 modified(alpha spectroscopy)

All PDF reports and EDDs will be uploaded to:
 Northgate Environmental Management, Inc.
 FTP site address provided to labs
 Notifications provided to:
 cindy.arnold@ngem.com & frank.hagar@ngem.com

RELINQUISHED BY / AFFILIATION: Peter P...
 DATE: 9-11-09
 TIME: 17:00
 ACCEPTED BY / AFFILIATION: Mike...
 DATE: 9-11-09
 TIME: 08:35

SHIPPING METHOD: (mark as appropriate)
 UPS COURIER (FEDEX)
 SIGNATURE OF SAMPLER: Patrick Ferring
 DATE SIGNED: 9-11
 TIME: 14:56

Temp in OC: Samples on
 Sample Intact? Y/N
 Trip Blank? Y/N



SAMPLE RECEIPT & REVIEW FORM

Client: <u>Kerr/Northeast</u>		SDG/ARCOC/Work Order: <u>2371187</u>	
Received By: <u>mk</u>		Date Received: <u>9-14-09</u>	
Suspected Hazard Information	Yes	No	*If Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group of further investigation.
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	Maximum Counts Observed*: <u>40-20</u>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within 0 ≤ 6 deg. C?			<input checked="" type="checkbox"/>	Preservation Method: ice bags blue ice dry ice <u>none</u> other (describe) <u>25°C</u>
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?			<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7	Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	<input checked="" type="checkbox"/>			Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments:

FX 7979 2669 5404

PM (or PMA) review: Initials EM Date 9/14/09



1100 Quail Street, Suite 102, Newport Beach, CA 92660
(949) 266-9293

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

COC No. 2027.001.00775
Page: 1 of 1
Cooler # 1 of 1
Collection Area: II

Required Ship to Lab:		Required Project Information:		Required Invoice Information:		TAT: Standard 30 day		Rush		Mark One	
Lab Name: GEL Laboratories, LLC		Site ID #: TRONOX LLC, HENDERSON		Send Invoice to: Susan Crowley Tronox LLC		Address: PO Box 65					
Address: 2040 Savage Road		Project #: 2027.001		City/State: Henderson, NV 89009		Phone #: (949) 260-9293		Special		EPA Stage 4 Mark one	
Lab PM: Edith M. Kent		City: Henderson		State: NV		Reimbursement project? <input checked="" type="checkbox"/>		Mark one		EPA Reduced Deliverable Package?	
Phone/Fax: (949) 596-6771		Site PM Name: Derrick Willis		Site PM Email: derrick.willis@ngem.com		Send EDD to: Frank Hagar Northgate Environmental Management, Inc. frank.hagar@ngem.com		MA MCP Cert? <input type="checkbox"/>		CT RCP Cert? <input type="checkbox"/>	
Applicable Lab Quota #:		Site PM Email: derrick.willis@ngem.com		CC Hardcopy report to: PDF Electronic Version Only		CC Hardcopy report to: see additional comments below		Lab Project ID (lab use)		Mark One	
ITEM #	SAMPLE ID	Character per box. (A-Z, 0-9 / -)	SAMPLE TYPE	MATRIX CODE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	FIELD FILTERED? (Y/N)	Preservatives	Requested	Comments/Lab Sample I.D.
1	RSAR6-0.5B		G	SO	9/14/2009	11:52	1	N	X	X	8 oz Glass jar
2	RSAR6-9B		G	SO	9/14/2009	12:04	1	N	X	X	8 oz Glass jar
3	RSAR6-25B		G	SO	9/14/2009	12:27	1	N	X	X	8 oz Glass jar
4	RSAR6-37B		G	SO	9/14/2009	12:49	1	N	X	X	8 oz Glass jar
5	RSAR6-37BMS		G	SO	9/14/2009	12:49	1	N	X	X	8 oz Glass jar
6	RSAR6-37BMSD		G	SO	9/14/2009	12:49	1	N	X	X	8 oz Glass jar
7											
8											
9											
10											
11											
12											
13											

Additional Comments/Special Instructions:	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
FULL DIGESTION SPECIFICATION Radiocesium includes Thorium (isotopic) and Uranium (isotopic) by EML HASL 300 modified(alpha spectroscopy)	9-14-09	13:30	9-14-09	16:00	9-14-09	13:30	9-14-09	13:30	9-14-09	13:30	9-14-09	13:30
Additional Comments/Special Instructions: All PDF reports and EDDs will be uploaded to: Northgate Environmental Management, Inc. FTP site address provided to labs Notifications provided to: cindy.arnold@ngem.com & frank.hagar@ngem.com												

Shipping Method	Signature of Sampler	Date Signed	Time
UPS COURIER	Dana R. Brown	9/14/2009	13:30
US MAIL	Dana R. Brown	9/14/2009	13:30



SAMPLE RECEIPT & REVIEW FORM

Client: <u>Kerr / Northgate</u>		SDG/ARCO/Work Order: <u>2371181</u>	
Received By: <u>mk</u>		Date Received: <u>9-15-09</u>	
Suspected Hazard Information	Yes	No	*If Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group of further investigation.
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	Maximum Counts Observed*: <u>cpm 20</u>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within 0 ≤ 6 deg. C?		<input checked="" type="checkbox"/>		Preservation Method: ice bags blue ice dry ice <u>none</u> other (describe) <u>21c</u>
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		<input checked="" type="checkbox"/>		Sample ID's and containers affected:
7	Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	<input checked="" type="checkbox"/>			Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?			<input checked="" type="checkbox"/>	Sample ID's affected: <u>NO TIME ON SAMPLE RSA08-43B</u>
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments:

FX 7979 3107 0035

PM (or PMA) review: Initials RS Date 9-15-09



SAMPLE RECEIPT & REVIEW FORM

Client: <u>KEPP/NORTHGATE</u>		SDG/ARCOC/Work Order: <u>231181</u>	
Received By: <u>ML</u>		Date Received: <u>9-15-09</u>	
Suspected Hazard Information		Yes	No
COC/Samples marked as radioactive?			<input checked="" type="checkbox"/>
Classified Radioactive II or III by RSO?			<input checked="" type="checkbox"/>
COC/Samples marked containing PCBs?			<input checked="" type="checkbox"/>
Shipped as a DOT Hazardous?			<input checked="" type="checkbox"/>
Samples identified as Foreign Soil?			<input checked="" type="checkbox"/>

*If Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group of further investigation.
 Maximum Counts Observed*: cpm 20
 Hazard Class Shipped: _____ UN#: _____

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within 0 ≤ 6 deg. C?		<input checked="" type="checkbox"/>		Preservation Method: ice bags blue ice dry ice <u>none</u> other (describe) <u>add</u>
3	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		<input checked="" type="checkbox"/>		Sample ID's and containers affected:
7	Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	<input checked="" type="checkbox"/>			Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments:

FX 7969 4347 2595

PM (or PMA) review: Initials (N) Date 9-15-09

Subject: COC 2027.001.00751, Condition upon receipt

From: Heather Shaffer <Heather.Shaffer@gel.com>

Date: Tue, 15 Sep 2009 12:48:01 -0400

To: Cindy Arnold <Cindy.Arnold@ngem.com>, Vivian Willis <vivian.willis@verdant-solutions.com>, Derrick Willis <Derrick.Willis@ngem.com>, Frank Hagar <Frank.Hagar@ngem.com>

CC: Edie Kent <emk@gel.com>

The sample container for ID RSAO8-43B had no time of collection listed on the container. GEL will use the time of collection listed on the chain of custody to log the sample in.

Thank you,
Heather

--

Heather Shaffer
Project Manager Assistant
GEL Laboratories, LLC
2040 Savage Road
Charleston, SC (USA) 29407
Main: 843.556.8171 x 4505
Fax: 843.766.1178
E-mail: heather.shaffer@gel.com
Web: www.gel.com

Subject: GEL Closed SDGs 237118

From: Heather Shaffer <Heather.Shaffer@gel.com>

Date: Tue, 15 Sep 2009 13:05:48 -0400

To: Cindy Arnold <Cindy.Arnold@ngem.com>, Frank Hagar <Frank.Hagar@ngem.com>, Edie Kent <emk@gel.com>, Derrick Willis <Derrick.Willis@ngem.com>

CC: Heather Shaffer <hea01394@gel.com>

With today's receipts, we closed soil SDG 237118. Attached is a list of the samples in the SDG. As soon as we have completed the login review, you will receive the full receipt package for these SDG.

Thank you,
Heather

--

Heather Shaffer
Project Manager Assistant
GEL Laboratories, LLC
2040 Savage Road
Charleston, SC (USA) 29407
Main: 843.556.8171 x 4505
Fax: 843.766.1178
E-mail: heather.shaffer@gel.com
Web: www.gel.com

237118.xls	Content-Type: application/msexcel Content-Encoding: base64
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Subject: SDG 237118 QC Issues - Alpha Spec U, Ra-226

From: Edie Kent <emk@gel.com>

Date: Mon, 12 Oct 2009 14:37:45 -0400

To: Cindy Arnold <Cindy.Arnold@ngem.com>, Frank Hagar <Frank.Hagar@ngem.com>, Derrick Willis <Derrick.Willis@ngem.com>, Team Kent <Team.Kent@gel.com>

CC: Martha Harrison <Martha.Harrison@gel.com>

The following are the QC issues regarding this SDG for Alpha Spec U and Ra 226:

Soil Ra 226 Issues:

The following samples did not meet the Tronox QA program sample result uncertainty limit of <30% with activity between 2 and 5 times the MDA and were counted the maximum possible count time: 237118001, 237118003, 237118006, 237118009, 237118012, 237118014, and the lab DUP.

Sample 237118011 did not meet the Tronox QA program sample result uncertainty limit of <30% with activity greater than 5 times the MDA and was counted the maximum possible count time.

Soil Uranium Issues:

Sample 237118011 did not meet the Tronox QA program required detection limit for U235/236 due to limited aliquot size: 237010005, 237010015, 237010016, 237010017, 237010018. The sample size is restricted in the attempt to assure achieved yield recoveries meet the program yield requirements and to reduce the chance of tailing from U-233/234 activity into the U-235/236 region of interest. The samples met the program yield requirements and were counted the maximum possible count time in order to achieve the lowest possible MDA.

The following samples did not meet the Tronox QA program sample result uncertainty limit of <30% for U-235/236 with activity greater than 5 times the MDA and were counted the maximum possible count time: 237118007, 237118010, 237118013, 237118014.

The following samples do not meet the Tronox QA program sample result uncertainty limit of <30% for U-235/236 with activity between 2 and 5 times the MDA and were counted the maximum possible count time: 237118002, 237118004, 237118005, 237118006, 237118017, 237118019, and the lab DUP.

This will be noted in the case narrative.

Edie

--

Edith M. Kent
Project Manager
GEL Laboratories, LLC
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Laboratory Certifications

List of current GEL Certifications as of 12 October 2009

State	Certification
Arizona	AZ0668
Arkansas	88-0651
CLIA	42D0904046
California – NELAP	01151CA
Colorado	GEL
Connecticut	PH-0169
Dept. of Navy	NFESC 413
EPA Region 5	WG-15J
Florida – NELAP	E87156
Georgia	E87156 (FL/NELAP)
Georgia DW	967
Hawaii	N/A
ISO 17025	2567.01
Idaho	SC00012
Illinois – NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046
Maryland	270
Massachusetts	M-SC012
Nevada	SC00012
New Jersey – NELAP	SC002
New Mexico	FL NELAP E87156
New York – NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania – NELAP	68-00485
South Carolina	10120001/10120002
Tennessee	TN 02934
Texas – NELAP	T104704235-07B-TX
U.S. Dept. of Agriculture	S-52597
Utah – NELAP	GEL
Vermont	VT87156
Virginia	00151
Washington	C1641

RADIOLOGICAL ANALYSIS

**Radiochemistry Case Narrative
Tronox LLC (KERR)
SDG 237118**

Method/Analysis Information

Product: Alphaspec Th, Solid
Analytical Method: DOE EML HASL-300, Th-01-RC Modified
Prep Method: Dry Soil Prep
Analytical Batch Number: 906768
Prep Batch Number: 903060

Sample ID	Client ID
237118001	SA40-10B
237118002	SA40-25B
237118003	SA41-12B
237118004	SA41-25B
237118005	SA41-38B
237118006	SA114-10B
237118007	SA114-30B
237118008	RSAO8-11.5B
237118009	RSAO8-21.5B
237118010	RSAO8-43B
237118011	RSAR6-0.5B
237118012	RSAR6-9B
237118013	RSAR6-25B
237118014	RSAR6-37B
237118015	SA43-10B
237118016	SA43-25B
237118017	SA43-43B
237118018	SA44-10B
237118019	SA44-25B
237118020	SA44-42B
1201933858	Method Blank (MB)
1201933859	237118014(RSAR6-37B) Sample Duplicate (DUP)
1201933860	237118014(RSAR6-37B) Matrix Spike (MS)
1201933861	Laboratory Control Sample (LCS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-038 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: 237118014 (RSAR6-37B).

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.

Sample Re-prep/Re-analysis

Sample 237118006 (SA114-10B) 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

The blank did not meet the detection limits for Th-228 and Th-230 due to keeping the blank volume consistent with the other sample aliquots. All other samples met the detection limits.

Qualifier information

Manual qualifiers were not required.

Method/Analysis Information

Product: Alphaspec U, Solid
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Prep Method: Dry Soil Prep
Analytical Batch Number: 906769
Prep Batch Number: 903060

Sample ID	Client ID
237118001	SA40-10B
237118002	SA40-25B
237118003	SA41-12B
237118004	SA41-25B
237118005	SA41-38B
237118006	SA114-10B
237118007	SA114-30B
237118008	RSAO8-11.5B
237118009	RSAO8-21.5B
237118010	RSAO8-43B
237118011	RSAR6-0.5B
237118012	RSAR6-9B
237118013	RSAR6-25B
237118014	RSAR6-37B
237118015	SA43-10B
237118016	SA43-25B
237118017	SA43-43B
237118018	SA44-10B
237118019	SA44-25B
237118020	SA44-42B
1201933862	Method Blank (MB)
1201933863	237118014(RSAR6-37B) Sample Duplicate (DUP)
1201933864	237118014(RSAR6-37B) Matrix Spike (MS)
1201933865	Laboratory Control Sample (LCS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories

LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 17.

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: 237118014 (RSAR6-37B).

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.

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. The following NCR was generated for this SDG: NCR 744314 was generated due to RDL less than MDA. 1. Samples 237118007, 237118010, 237118013 and 237118014 have Uranium-235/236 activity greater than five times the MDA and uncertainty greater than 30% of that activity. Samples 237118002, 237118004, 237118005, 237118006, 237118017, 237118019 and 1201933863 have Uranium-235/236 activity between two and five times the MDA and uncertainty greater than 30% of that respective activity. 2. Sample 237118011 does not meet the U-235/236 detection limit as a result of the size of aliquot used. 1. Samples were all counted the maximum count time of 1000 minutes to achieve the best possible uncertainties. PM notified, reporting results. 2. A larger aliquot was not used to maintain the quality of the data, attempting to meet the client's yield recovery criteria and preventing tailing from the U-233/234 region of interest. The sample was counted 1000 minutes to achieve the lowest possible MDA. The sample meets both the client's yield recovery criteria and uncertainty requirements. PM notified, reporting results.

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:	Gas Flow Radium 228
Analytical Method:	EPA 904.0/SW846 9320 Modified
Prep Method:	Dry Soil Prep
Analytical Batch Number:	906726
Prep Batch Number:	903060

Sample ID	Client ID
237118001	SA40-10B
237118002	SA40-25B
237118003	SA41-12B
237118004	SA41-25B
237118005	SA41-38B
237118006	SA114-10B
237118007	SA114-30B
237118008	RSAO8-11.5B
237118009	RSAO8-21.5B
237118010	RSAO8-43B
237118011	RSAR6-0.5B
237118012	RSAR6-9B
237118013	RSAR6-25B
237118014	RSAR6-37B
237118015	SA43-10B
237118016	SA43-25B
237118017	SA43-43B
237118018	SA44-10B
237118019	SA44-25B
237118020	SA44-42B
1201933688	Method Blank (MB)
1201933689	237118014(RSAR6-37B) Sample Duplicate (DUP)
1201933690	237118014(RSAR6-37B) Matrix Spike (MS)
1201933691	Laboratory Control Sample (LCS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 15.

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: 237118014 (RSAR6-37B).

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.

Sample Re-prep/Re-analysis

Samples 237118017 (SA43-43B), 237118019 (SA44-25B) and 237118020 (SA44-42B) were recounted due to client uncertainty requirements. Samples counted 390 minutes. Samples 237118012 (RSAR6-9B) were re-eluted due to client uncertainty requirements.

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, solid
Analytical Method: EPA 903.1 Modified
Prep Method: Dry Soil Prep
Analytical Batch Number: 905696
Prep Batch Number: 903060

Sample ID	Client ID
237118001	SA40-10B
237118002	SA40-25B
237118003	SA41-12B
237118004	SA41-25B
237118005	SA41-38B
237118006	SA114-10B
237118007	SA114-30B
237118008	RSAO8-11.5B
237118009	RSAO8-21.5B
237118010	RSAO8-43B
237118011	RSAR6-0.5B
237118012	RSAR6-9B
237118013	RSAR6-25B
237118014	RSAR6-37B
237118015	SA43-10B
237118016	SA43-25B
237118017	SA43-43B
237118018	SA44-10B
237118019	SA44-25B
237118020	SA44-42B
1201931175	Method Blank (MB)
1201931176	237118014(RSAR6-37B) Sample Duplicate (DUP)
1201931177	237118014(RSAR6-37B) Matrix Spike (MS)
1201931178	Laboratory Control Sample (LCS)

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 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: 237118014 (RSAR6-37B).

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.

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. The following NCR was generated for this SDG: NCR 744123 was generated due to Other. 1. Samples, 237118001, 237118003, 237118006, 237118009, 237118012, 237118014, and 1201931176, have activity between 2 and 5 times the MDA and uncertainty is greater than 30 percent. Samples counted the maximum count time. 2. Sample, 237118011, has activity greater than 5 times the MDA and uncertainty is greater than 30 percent. Samples counted the maximum count time. 1. Reporting results 2. Reporting results

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:  10/12/09 _____

COMPANY - WIDE NONCONFORMANCE REPORT

Mo.Day Yr. 09-OCT-09	Division: Radiochemistry	Quality Criteria: Specifications	Type: Process
Instrument Type: LUCAS CELL DETECTOR	Test / Method: EPA 903.1 Modified	Matrix Type: Solid	Client Code: KERR
Batch ID: 905696	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 237118			
Application Issues: Other			
Specification and Requirements Nonconformance Description:		NRG Disposition:	
<p>1. Samples, 237118001, 237118003, 237118006, 237118009, 237118012, 237118014, and 1201931176, have activity between 2 and 5 times the MDA and uncertainty is greater than 30 percent. Samples counted the maximum count time.</p> <p>2. Sample, 237118011, has activity greater than 5 times the MDA and uncertainty is greater than 30 percent. Samples counted the maximum count time.</p>		<p>1. Reporting results</p> <p>2. Reporting results</p>	

Originator's Name:
Takesha Mungo 09-OCT-09

Data Validator/Group Leader:
Lesley Anderson 09-OCT-09

COMPANY - WIDE NONCONFORMANCE REPORT

Mo.Day Yr. 09-OCT-09	Division: Radiochemistry	Quality Criteria: Specifications	Type: Process
Instrument Type: ALPHA SPECTROMETER	Test / Method: DOE EML HASL-300, U-02-RC Modified	Matrix Type: Solid	Client Code: KERR
Batch ID: 906769	Sample Numbers: See Below		

Potentially affected work order(s)(SDG): 237118

Application Issues:

RDL less than MDA

**Specification and Requirements
Nonconformance Description:**

1. Samples 237118007, 237118010, 237118013 and 237118014 have Uranium-235/236 activity greater than five times the MDA and uncertainty greater than 30% of that activity. Samples 237118002, 237118004, 237118005, 237118006, 237118017, 237118019 and 1201933863 have Uranium-235/236 activity between two and five times the MDA and uncertainty greater than 30% of that respective activity.
2. Sample 237118011 does not meet the U-235/236 detection limit as a result of the size of aliquot used.

NRG Disposition:

1. Samples were all counted the maximum count time of 1000 minutes to achieve the best possible uncertainties. PM notified, reporting results.
2. A larger aliquot was not used to maintain the quality of the data, attempting to meet the client's yield recovery criteria and preventing tailing from the U-233/234 region of interest. The sample was counted 1000 minutes to achieve the lowest possible MDA. The sample meets both the client's yield recovery criteria and uncertainty requirements. PM notified, reporting results.

Originator's Name:

Eric Brimstin 09-OCT-09

Data Validator/Group Leader:

Scott Moreland 12-OCT-09

SAMPLE DATA SUMMARY

GEL LABORATORIES LLC

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

Certificate of Analysis Report for

KERR003 Tronox LLC

Client SDG: 237118 GEL Work Order: 237118


The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

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.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

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

 10/12/09

Reviewed by

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA40-10B
Sample ID: 237118001
Matrix: SO
Collect Date: 11-SEP-09 11:36
Receive Date: 14-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.65	+/-0.213	0.125	0.050	pCi/g		KXM	10/06/09	2147	906768	1
							4					
Thorium-230		0.993	+/-0.156	0.0191	0.050	pCi/g						
Thorium-232		1.39	+/-0.185	0.0487	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.10	+/-0.131	0.0592	0.040	pCi/g		KXM	10/07/09	2132	906769	2
							4					
Uranium-235/236		0.0622	+/-0.0363	0.0366	0.040	pCi/g						
Uranium-238		1.11	+/-0.129	0.0116	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		2.06	+/-0.433	0.392	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.582	+/-0.237	0.277	0.500	pCi/g		KSD1	10/08/09	1445	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			109	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			92.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			93.0	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA40-25B
Sample ID: 237118002
Matrix: SO
Collect Date: 11-SEP-09 12:23
Receive Date: 14-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.06	+/-0.170	0.105	0.050	pCi/g		KXM	10/06/09	2147	906768	1
											4	
Thorium-230		1.76	+/-0.208	0.0484	0.050	pCi/g						
Thorium-232		0.986	+/-0.155	0.019	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.86	+/-0.182	0.0603	0.040	pCi/g		KXM	10/07/09	2132	906769	2
											4	
Uranium-235/236		0.111	+/-0.0511	0.0425	0.040	pCi/g						
Uranium-238		1.83	+/-0.178	0.0344	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228	U	0.283	+/-0.262	0.423	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.24	+/-0.329	0.287	0.500	pCi/g		KSD1	10/08/09	1445	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			111	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			79.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			90.0	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	SA41-12B	Project:	KERRHenderson
Sample ID:	237118003	Client ID:	KERR003
Matrix:	SO		
Collect Date:	11-SEP-09 08:46		
Receive Date:	14-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.35	+/-0.188	0.114	0.050	pCi/g		KXM	10/06/09	2147	906768	1
											4	
Thorium-230		0.948	+/-0.150	0.0578	0.050	pCi/g						
Thorium-232		1.36	+/-0.179	0.0578	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.63	+/-0.157	0.0118	0.040	pCi/g		KXM	10/07/09	2132	906769	2
											4	
Uranium-235/236		0.0633	+/-0.0394	0.0467	0.040	pCi/g						
Uranium-238		1.28	+/-0.139	0.0118	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.670	+/-0.295	0.375	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.700	+/-0.253	0.276	0.500	pCi/g		KSD1	10/08/09	1445	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			112	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			92.5	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			92.2	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA41-25B
Sample ID: 237118004
Matrix: SO
Collect Date: 11-SEP-09 09:39
Receive Date: 14-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.10	+/-0.181	0.133	0.050	pCi/g		KXM	10/06/09	2147	906768	1
											4	
Thorium-230		1.56	+/-0.199	0.0625	0.050	pCi/g						
Thorium-232		0.940	+/-0.156	0.0625	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.94	+/-0.166	0.0449	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0947	+/-0.0442	0.0432	0.040	pCi/g						
Uranium-238		1.88	+/-0.162	0.0109	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.17	+/-0.475	0.676	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.15	+/-0.309	0.281	0.500	pCi/g		KSD1	10/08/09	1445	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			105	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			99.3	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			87.6	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA41-38B
Sample ID: 237118005
Matrix: SO
Collect Date: 11-SEP-09 10:49
Receive Date: 14-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.41	+/-0.174	0.0852	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		2.60	+/-0.226	0.0154	0.050	pCi/g						
Thorium-232		1.41	+/-0.168	0.0492	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		2.74	+/-0.207	0.039	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.101	+/-0.0462	0.0385	0.040	pCi/g						
Uranium-238		2.56	+/-0.201	0.045	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.41	+/-0.516	0.715	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		2.19	+/-0.417	0.295	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			112	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			87.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			87.9	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	SA114-10B	Project:	KERRHenderson
Sample ID:	237118006	Client ID:	KERR003
Matrix:	SO		
Collect Date:	11-SEP-09 06:54		
Receive Date:	14-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		2.06	+/-0.264	0.0953	0.050	pCi/g		KXM	10/09/09	1749	906768	1
											4	
Thorium-230		1.01	+/-0.182	0.0641	0.050	pCi/g						
Thorium-232		1.06	+/-0.185	0.0251	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.08	+/-0.144	0.068	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0525	+/-0.0343	0.0175	0.040	pCi/g						
Uranium-238		0.939	+/-0.132	0.0452	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.11	+/-0.416	0.573	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.556	+/-0.213	0.219	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			85.4	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			73.6	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			97.2	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA114-30B	Project: KERRHenderson
Sample ID: 237118007	Client ID: KERR003
Matrix: SO	
Collect Date: 11-SEP-09 07:40	
Receive Date: 14-SEP-09	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.25	+/-0.166	0.0537	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.99	+/-0.204	0.0164	0.050	pCi/g						
Thorium-232		1.06	+/-0.150	0.0418	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		2.18	+/-0.170	0.0379	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.157	+/-0.0505	0.0127	0.040	pCi/g						
Uranium-238		2.02	+/-0.164	0.0379	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.22	+/-0.496	0.725	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.08	+/-0.299	0.277	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			109	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			98.6	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			96.7	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	RSAO8-11.5B	Project:	KERRHenderson
Sample ID:	237118008	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 07:52		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.67	+/-0.205	0.155	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		0.874	+/-0.136	0.0589	0.050	pCi/g						
Thorium-232		1.42	+/-0.173	0.0656	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.14	+/-0.132	0.0609	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0653	+/-0.0388	0.0447	0.040	pCi/g						
Uranium-238		1.18	+/-0.131	0.0361	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.08	+/-0.440	0.628	0.500	pCi/g		JXC5	10/07/09	1609	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.52	+/-0.344	0.228	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			105	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			96.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			96.0	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	RSAO8-21.5B	Project:	KERRHenderson
Sample ID:	237118009	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 08:19		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.58	+/-0.181	0.118	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		0.910	+/-0.129	0.0447	0.050	pCi/g						
Thorium-232		1.27	+/-0.153	0.0516	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.54	+/-0.142	0.0559	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0652	+/-0.0375	0.0451	0.040	pCi/g						
Uranium-238		1.39	+/-0.135	0.0475	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.679	+/-0.283	0.370	0.500	pCi/g		JXC5	10/07/09	1610	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.809	+/-0.274	0.281	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			118	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			106	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			106	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	RSAO8-43B	Project:	KERRHenderson
Sample ID:	237118010	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 09:00		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.60	+/-0.192	0.0874	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.62	+/-0.188	0.0617	0.050	pCi/g						
Thorium-232		1.37	+/-0.175	0.0748	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.96	+/-0.178	0.0459	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0975	+/-0.0439	0.0154	0.040	pCi/g						
Uranium-238		1.81	+/-0.170	0.0318	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.00	+/-0.392	0.541	0.500	pCi/g		JXC5	10/07/09	1610	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.36	+/-0.304	0.161	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			102	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			84.8	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			98.2	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental Management, Inc.
 Address : 1100 Quail St., Suite 102
 Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
 Project: **Tronox Henderson**

Client Sample ID:	RSAR6-0.5B	Project:	KERRHenderson
Sample ID:	237118011	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 11:52		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.56	+/-0.188	0.119	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		0.810	+/-0.132	0.0785	0.050	pCi/g						
Thorium-232		1.24	+/-0.157	0.0392	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.10	+/-0.134	0.0701	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236	U	0.0245	+/-0.0318	0.0541	0.040	pCi/g						
Uranium-238		1.12	+/-0.132	0.0438	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.607	+/-0.344	0.519	0.500	pCi/g		JXC5	10/07/09	1610	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.612	+/-0.200	0.051	0.500	pCi/g		KSD1	10/08/09	1555	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			115	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			90.0	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			94.4	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: RSAR6-9B
Sample ID: 237118012
Matrix: SO
Collect Date: 14-SEP-09 12:04
Receive Date: 15-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.51	+/-0.168	0.0671	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		0.879	+/-0.126	0.0504	0.050	pCi/g						
Thorium-232		1.21	+/-0.146	0.0349	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.27	+/-0.158	0.0665	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0797	+/-0.0496	0.0587	0.040	pCi/g						
Uranium-238		1.09	+/-0.147	0.061	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.413	+/-0.227	0.369	0.500	pCi/g		JXC5	10/09/09	1646	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.902	+/-0.282	0.265	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			117	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			73.3	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			105	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: RSAR6-25B	Project: KERRHenderson
Sample ID: 237118013	Client ID: KERR003
Matrix: SO	
Collect Date: 14-SEP-09 12:27	
Receive Date: 15-SEP-09	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.23	+/-0.154	0.102	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		3.29	+/-0.236	0.0761	0.050	pCi/g						
Thorium-232		0.928	+/-0.127	0.0576	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		3.25	+/-0.184	0.0258	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.110	+/-0.0374	0.00997	0.040	pCi/g						
Uranium-238		2.77	+/-0.169	0.0258	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.697	+/-0.411	0.635	0.500	pCi/g		JXC5	10/07/09	1610	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		2.75	+/-0.459	0.291	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			117	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			104	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			98.3	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	RSAR6-37B	Project:	KERRHenderson
Sample ID:	237118014	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 12:49		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.34	+/-0.163	0.109	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.54	+/-0.164	0.0549	0.050	pCi/g						
Thorium-232		1.31	+/-0.151	0.0494	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		2.24	+/-0.157	0.0315	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.134	+/-0.0426	0.0106	0.040	pCi/g						
Uranium-238		2.23	+/-0.158	0.0461	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.775	+/-0.401	0.597	0.500	pCi/g		JXC5	10/07/09	1611	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.934	+/-0.297	0.292	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			115	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			91.0	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			95.3	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	SA43-10B	Project:	KERRHenderson
Sample ID:	237118015	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 10:27		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.83	+/-0.187	0.116	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.14	+/-0.140	0.0533	0.050	pCi/g						
Thorium-232		1.48	+/-0.158	0.0479	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.07	+/-0.114	0.0296	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0497	+/-0.0327	0.0423	0.040	pCi/g						
Uranium-238		0.958	+/-0.108	0.038	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.18	+/-0.341	0.361	0.500	pCi/g		JXC5	10/07/09	1611	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.09	+/-0.307	0.288	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			115	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			93.9	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			95.5	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	SA43-25B	Project:	KERRHenderson
Sample ID:	237118016	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 10:58		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.42	+/-0.172	0.0893	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.16	+/-0.150	0.0545	0.050	pCi/g						
Thorium-232		1.41	+/-0.164	0.0472	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.48	+/-0.130	0.0326	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0655	+/-0.0335	0.0349	0.040	pCi/g						
Uranium-238		1.31	+/-0.124	0.0499	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.498	+/-0.258	0.358	0.500	pCi/g		JXC5	10/07/09	1611	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.35	+/-0.344	0.205	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			114	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			100	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			93.5	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA43-43B
Sample ID: 237118017
Matrix: SO
Collect Date: 14-SEP-09 11:39
Receive Date: 15-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.58	+/-0.183	0.0916	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		2.71	+/-0.230	0.0387	0.050	pCi/g						
Thorium-232		1.36	+/-0.163	0.0387	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		2.79	+/-0.184	0.0347	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.132	+/-0.0481	0.0429	0.040	pCi/g						
Uranium-238		2.85	+/-0.186	0.024	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		2.02	+/-0.364	0.525	0.500	pCi/g		JXC5	10/07/09	1801	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.57	+/-0.325	0.246	0.500	pCi/g		KSD1	10/08/09	1625	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			106	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			95.4	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			93.3	(25%-125%)

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID:	SA44-10B	Project:	KERRHenderson
Sample ID:	237118018	Client ID:	KERR003
Matrix:	SO		
Collect Date:	14-SEP-09 12:31		
Receive Date:	15-SEP-09		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.72	+/-0.191	0.101	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		1.17	+/-0.153	0.0671	0.050	pCi/g						
Thorium-232		1.33	+/-0.162	0.0554	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.25	+/-0.119	0.0321	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.0502	+/-0.0281	0.0274	0.040	pCi/g						
Uranium-238		1.01	+/-0.108	0.0418	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.13	+/-0.323	0.343	0.500	pCi/g		JXC5	10/07/09	1611	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.819	+/-0.225	0.0482	0.500	pCi/g		KSD1	10/08/09	1700	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			107	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			90.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			104	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA44-25B
Sample ID: 237118019
Matrix: SO
Collect Date: 14-SEP-09 13:01
Receive Date: 15-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.88	+/-0.216	0.0899	0.050	pCi/g		KXM	10/06/09	0855	906768	1
							4					
Thorium-230		1.19	+/-0.169	0.0584	0.050	pCi/g						
Thorium-232		1.43	+/-0.185	0.0584	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		1.37	+/-0.130	0.035	0.040	pCi/g		KXM	10/07/09	2133	906769	2
							4					
Uranium-235/236		0.0938	+/-0.0391	0.0299	0.040	pCi/g						
Uranium-238		1.16	+/-0.120	0.0389	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		0.906	+/-0.386	0.618	0.500	pCi/g		JXC5	10/07/09	1801	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		0.830	+/-0.244	0.235	0.500	pCi/g		KSD1	10/08/09	1700	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			85.7	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			88.9	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			79.1	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Northgate Environmental
Management, Inc.
Address : 1100 Quail St., Suite 102
Newport Beach, California 92660

Report Date: October 12, 2009

Contact: Mr. Frank Hagar
Project: **Tronox Henderson**

Client Sample ID: SA44-42B
Sample ID: 237118020
Matrix: SO
Collect Date: 14-SEP-09 13:42
Receive Date: 15-SEP-09
Collector: Client

Project: KERRHenderson
Client ID: KERR003

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis												
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>												
Thorium-228		1.49	+/-0.182	0.0694	0.050	pCi/g		KXM	10/06/09	0855	906768	1
											4	
Thorium-230		3.33	+/-0.268	0.0738	0.050	pCi/g						
Thorium-232		1.29	+/-0.168	0.0678	0.100	pCi/g						
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>												
Uranium-233/234		2.96	+/-0.182	0.0277	0.040	pCi/g		KXM	10/07/09	2133	906769	2
											4	
Uranium-235/236		0.168	+/-0.0481	0.0107	0.040	pCi/g						
Uranium-238		2.83	+/-0.178	0.032	0.040	pCi/g						
Rad Gas Flow Proportional Counting												
<i>Gas Flow Radium 228 "Dry Weight Corrected"</i>												
Radium-228		1.89	+/-0.521	0.802	0.500	pCi/g		JXC5	10/07/09	1930	906726	3
Rad Radium-226												
<i>Lucas Cell, Ra226, solid "Dry Weight Corrected"</i>												
Radium-226		1.63	+/-0.363	0.289	0.500	pCi/g		KSD1	10/08/09	1700	905696	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/15/09	1459	903060

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 904.0/SW846 9320 Modified	
4	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Actinium-227 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"			92.0	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"			94.2	(15%-125%)
Barium-133 Tracer	Gas Flow Radium 228 "Dry Weight Corrected"			89.0	(25%-125%)

QUALITY CONTROL DATA

GEL LABORATORIES LLC

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

QC Summary

Report Date: October 12, 2009

Page 1 of 3

Northgate Environmental Management, Inc.

1100 Quail St., Suite 102
Newport Beach, California

Contact: Mr. Frank Hagar

Workorder: 237118

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	906768										
QC1201933859	237118014	DUP									
Thorium-228		1.34		1.17	pCi/g	13.0		(0% - 20%)	KXM4	10/06/09	08:55
		+/-0.163		+/-0.152							
Thorium-230		1.54		1.64	pCi/g	6.24		(0% - 20%)			
		+/-0.164		+/-0.172							
Thorium-232		1.31		1.23	pCi/g	6.38		(0% - 20%)			
		+/-0.151		+/-0.152							
QC1201933861	LCS										
Thorium-228			U	0.102	pCi/g					10/06/09	08:55
				+/-0.0763							
Thorium-230	8.26			8.05	pCi/g		97.5	(75%-125%)			
				+/-0.406							
Thorium-232			U	-0.0159	pCi/g			(75%-125%)			
				+/-0.0312							
QC1201933858	MB										
Thorium-228			U	0.0772	pCi/g					10/06/09	08:55
				+/-0.0558							
Thorium-230			U	-0.0412	pCi/g						
				+/-0.0383							
Thorium-232			U	0.00589	pCi/g						
				+/-0.0258							
QC1201933860	237118014	MS									
Thorium-228		1.34		1.43	pCi/g					10/06/09	08:55
		+/-0.163		+/-0.162							
Thorium-230	8.46	1.54		8.87	pCi/g		86.6	(75%-125%)			
		+/-0.164		+/-0.393							
Thorium-232		1.31		1.21	pCi/g			(75%-125%)			
		+/-0.151		+/-0.146							
Batch	906769										
QC1201933863	237118014	DUP									
Uranium-233/234		2.24		2.35	pCi/g	4.78		(0% - 20%)	KXM4	10/07/09	21:33
		+/-0.157		+/-0.161							
Uranium-235/236		0.134		0.152	pCi/g	12.4		(0% - 20%)			
		+/-0.0426		+/-0.0474							
Uranium-238		2.23		2.26	pCi/g	1.33		(0% - 20%)			
		+/-0.158		+/-0.157							
QC1201933865	LCS										
Uranium-233/234				4.72	pCi/g					10/07/09	21:33
				+/-0.225							
Uranium-235/236				0.234	pCi/g						
				+/-0.0581							
Uranium-238	4.85			5.06	pCi/g		104	(75%-125%)			

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QC Summary

Workorder: 237118

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	906769										
QC1201933862	MB			+/-0.233							
Uranium-233/234			U	0.000484	pCi/g				KXM4	10/07/09	21:33
				+/-0.0124							
Uranium-235/236			U	-0.00628	pCi/g						
				+/-0.0107							
Uranium-238			U	-0.00508	pCi/g						
				+/-0.00862							
QC1201933864	237118014	MS									
Uranium-233/234				2.24	pCi/g					10/07/09	21:33
				+/-0.157							
Uranium-235/236				0.134	pCi/g						
				+/-0.0426							
Uranium-238	4.98			2.23	pCi/g		102	(75%-125%)			
				+/-0.158							
Rad Gas Flow											
Batch	906726										
QC1201933689	237118014	DUP									
Radium-228				0.775	pCi/g	32.6		(0% - 100%)	JXC5	10/07/09	16:08
				+/-0.401							
QC1201933691	LCS										
Radium-228	7.46			7.19	pCi/g		96.4	(75%-125%)		10/07/09	16:09
				+/-0.758							
QC1201933688	MB										
Radium-228			U	0.286	pCi/g					10/07/09	16:08
				+/-0.267							
QC1201933690	237118014	MS									
Radium-228	70.3			0.775	pCi/g		101	(75%-125%)		10/07/09	16:08
				+/-0.401							
				+/-7.16							
Rad Ra-226											
Batch	905696										
QC1201931176	237118014	DUP									
Radium-226				0.934	pCi/g	16.5		(0% - 100%)	KSD1	10/08/09	17:35
				+/-0.297							
QC1201931178	LCS										
Radium-226	11.0			9.87	pCi/g		89.6	(75%-125%)		10/08/09	18:05
				+/-0.760							
QC1201931175	MB										
Radium-226			U	0.263	pCi/g					10/08/09	17:00
				+/-0.182							
QC1201931177	237118014	MS									
Radium-226	12.0			0.934	pCi/g		108	(75%-125%)		10/08/09	17:35
				+/-0.297							
				+/-1.00							

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

GEL LABORATORIES LLC

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QC Summary

Workorder: 237118

Page 3 of 3

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
**	Analyte is a surrogate compound									
<	Result is less than value reported									
>	Result is greater than value reported									
A	The TIC is a suspected aldol-condensation product									
B	For General Chemistry and Organic analysis the target analyte was detected in the associated blank.									
BD	Results are either below the MDC or tracer recovery is low									
C	Analyte has been confirmed by GC/MS analysis									
D	Results are reported from a diluted aliquot of the sample									
F	Estimated Value									
H	Analytical holding time was exceeded									
J	Value is estimated									
M	M if above MDC and less than LLD									
M	Matrix Related Failure									
N/A	RPD or %Recovery limits do not apply.									
ND	Analyte concentration is not detected above the detection limit									
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
R	Sample results are rejected									
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.									
UI	Gamma Spectroscopy--Uncertain identification									
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
Y	QC Samples were not spiked with this compound									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
h	Preparation or preservation holding time was exceeded									

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

^ 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.

* Indicates that a Quality Control parameter was not within specifications.

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

THORIUM

Radiochemistry Batch Checklist, Rev 9

Batch# 906768 Product: JN Date: 10/12/09

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

GEL Laboratories, LLC

revised 8/1/08

Primary Review Performed By:

[Signature] 10/12/09

Secondary Review Performed By:

[Signature] 10/12/09

10/12-10/13
ICARD

Thorium (Ac-227 Tracer) Que Sheet

28-SEP-09

Batch #: 906768 Analyst: KXM4 First Client Due Date: 13-OCT-09 Internal Due Date: 2-OCT-09
 Tracer Isotope: Ac-227 Tracer Code: 0387-B-102 Expiration Date: 7-23-10 Vol: 0.1ml Ac-227 Separation Date/Time: 10/2/09 @ 900
 LCS Isotope: Th-230 LCS Code: A2796-3 Expiration Date: 4-13-10 Vol: 0.1ml
 Spike Isotope: Th-230 Spike Code: A2796-3 Expiration Date: 4-13-10 Vol: 0.1ml
 Prep Date: 9-30-09 Initials: KM Pipet ID: 297/D58 Balance ID: 50416272 Witness: MPA 9/30/09

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collection Date	Pos.	Label #	Wet/Dry Aliquot (g) (l/f)	Th Det #
237118001-1	SA40-10B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	1	1	0.253	181
237118002-1	SA40-25B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	2	2	0.252	182
237118003-1	SA41-12B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	3	3	0.256	183
237118004-1	SA41-25B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	4	4	0.255 * 25	184
237118005-1	SA41-38B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	5	5	0.252	26
237118006-1	SA114-10B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	6	6	0.251	27 208
237118007-1	SA114-30B	SAMPLE		.05 pCi/g	SOIL	KERR003	11-SEP-09	7	7	0.253	28 208
237118008-1	RSAR6-11.5B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	8	8	0.256	29 208
237118009-1	RSAR6-21.5B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	9	9	0.252	30
237118010-1	RSAR6-43B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	10	10	0.252	33
237118011-1	RSAR6-5B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	11	11	0.251	35
237118012-1	RSAR6-9B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	12	12	0.259	36
237118013-1	RSAR6-25B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	13	13	0.251	37
237118014-1	RSAR6-37B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	14	14	0.255	38
237118015-1	SA43-10B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	15	15	0.256	39
237118016-1	SA43-25B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	16	16	0.252	40
237118017-1	SA43-43B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	17	17	0.256	41
237118018-1	SA44-10B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	18	18	0.252	42
237118019-1	SA44-25B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	19	19	0.252	43
237118020-1	SA44-42B	SAMPLE		.05 pCi/g	SOIL	KERR003	14-SEP-09	20	20	0.254	44
1201933858-1	MB for batch 906768	MB		.05 pCi/g	SOIL	QC ACCOUNT		21	21	0.259	45
1201933859-1	RSAR6-37B(237118014DUP)	DUP		.05 pCi/g	SOIL	QC ACCOUNT	14-SEP-09	22	22	0.256	46
1201933860-1	RSAR6-37B(237118014MS)	MS		.05 pCi/g	SOIL	QC ACCOUNT	14-SEP-09	23	23	0.253	47
1201933861-1	LCS for batch 906768	LCS		.05 pCi/g	SOIL	QC ACCOUNT		24	24	0.259	48

Choose SOP Used: GL-RAD-A-038 Solid Sample Dissolution by: LEACH or DIGESTION Data Reviewed By: Julia 10/18/09

GL-RAD-A-045
 GL-RAD-A-043
 GL-RAD-A-032

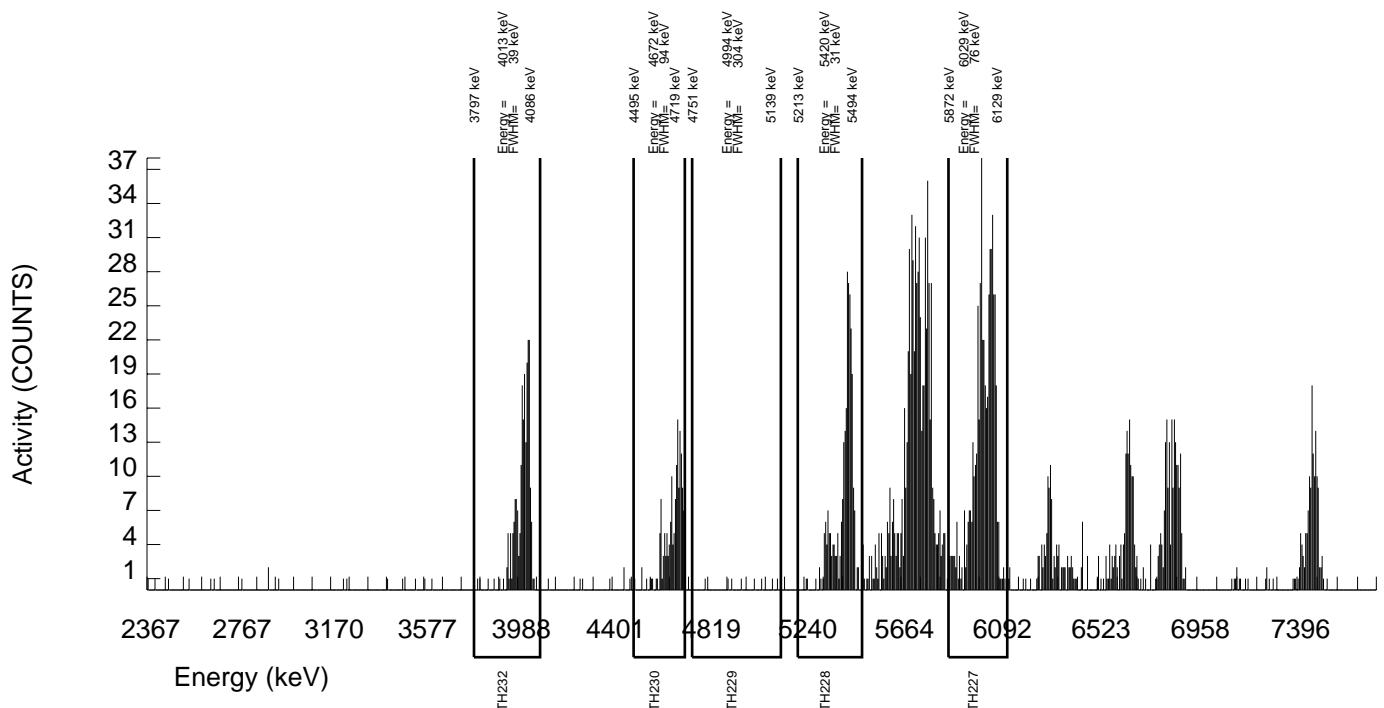
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118001_TH SAMPLE QTY: 0.253 G	
DETECTOR NUMBER :74439 AVERAGE %EFFICIENCY :25.6899 % YIELD : 108.871		COUNT DATE: 6-OCT-2009 21:47:24 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.24608 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B181.CNF;132 BKG DATE : 4-OCT-2009 EFF FILE : W181.CNF;41 CAL DATE : 21-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	525.000	523.000	2.000	1.4142	57.44000	6.94E+00	7.26E-01	1.27E-01	4.37E-02	5.97E-01
TH-228	5363.000	265.000	253.000	12.000	3.4641	99.94000	1.65E+00	2.35E-01	1.25E-01	5.27E-02	2.13E-01
TH229	4900.000	8.000	6.000	2.000	1.4142	99.52000	3.84E-02	3.97E-02	6.13E-02	2.10E-02	3.96E-02
TH-230	4625.000	156.000	156.000	0.000	0.0000	100.0000	9.93E-01	1.67E-01	1.91E-02	0.00E+00	1.56E-01
TH-232	3972.000	219.000	218.000	1.000	1.0000	100.0000	1.39E+00	2.03E-01	4.87E-02	1.48E-02	1.85E-01

NOTE: Ac-227 results decay corrected to separation date/time.



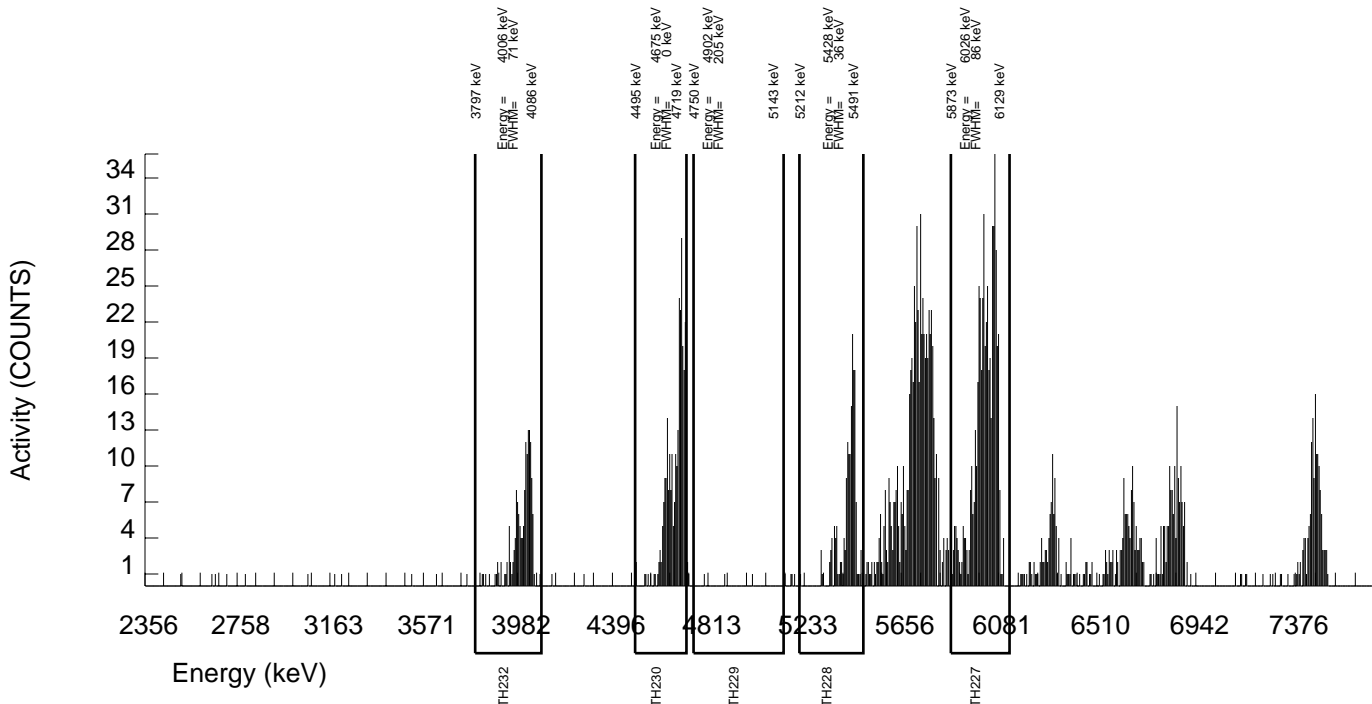
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118002_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :74440 AVERAGE %EFFICIENCY :25.5522 % YIELD : 110.714		COUNT DATE: 6-OCT-2009 21:47:27 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.31796 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B182.CNF;132 BKG DATE : 4-OCT-2009 EFF FILE : W182.CNF;41 CAL DATE : 21-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	540.000	529.000	11.000	3.3166	57.44000	6.97E+00	7.35E-01	2.43E-01	1.02E-01	6.06E-01
TH-228	5363.000	171.000	163.000	8.000	2.8284	99.94000	1.06E+00	1.81E-01	1.05E-01	4.27E-02	1.70E-01
TH229	4900.000	3.000	0.000	3.000	1.7321	99.52000	0.00E+00	3.05E-02	7.02E-02	2.56E-02	3.05E-02
TH-230	4625.000	280.000	279.000	1.000	1.0000	100.0000	1.76E+00	2.33E-01	4.84E-02	1.47E-02	2.08E-01
TH-232	3972.000	156.000	156.000	0.000	0.0000	100.0000	9.86E-01	1.65E-01	1.90E-02	0.00E+00	1.55E-01

NOTE: Ac-227 results decay corrected to separation date/time.



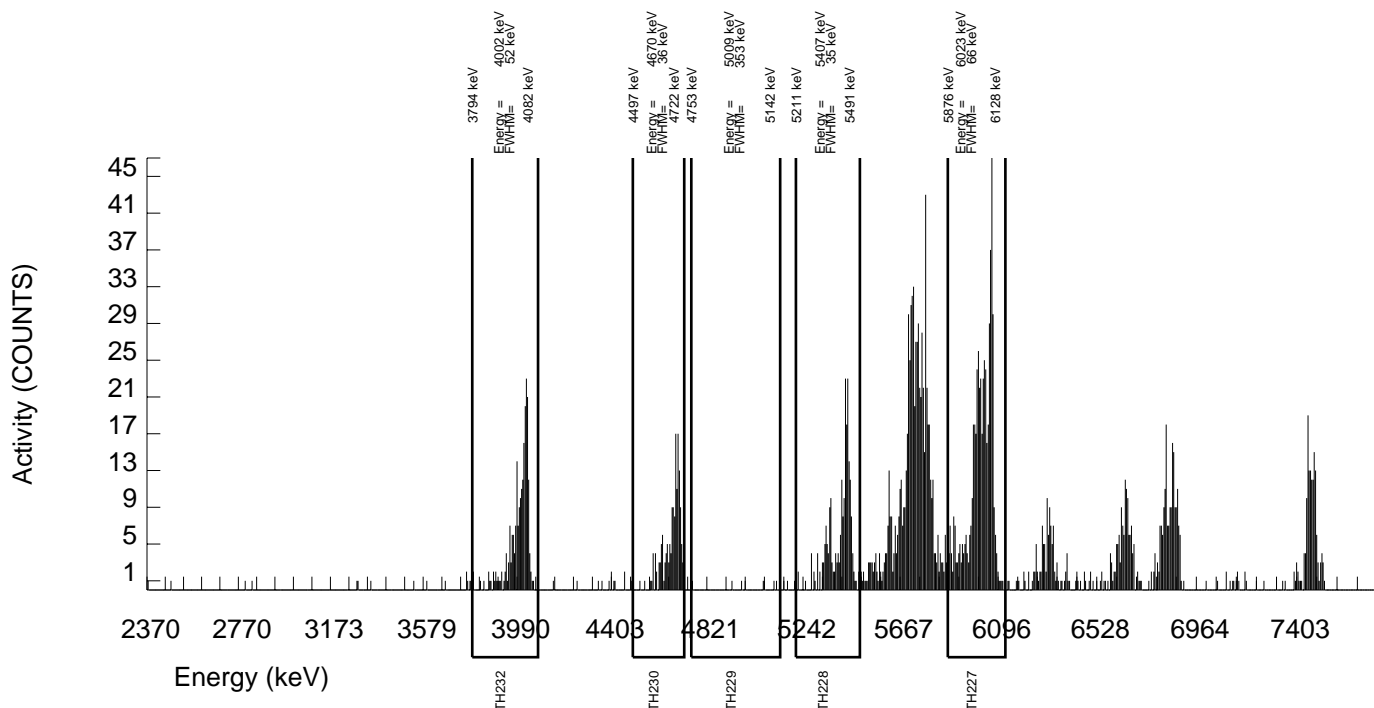
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118003_TH SAMPLE QTY: 0.256 G	
DETECTOR NUMBER :74441 AVERAGE %EFFICIENCY :26.1199 % YIELD : 111.583		COUNT DATE: 6-OCT-2009 21:47:29 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.35187 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B183.CNF;132 BKG DATE : 4-OCT-2009 EFF FILE : W183.CNF;41 CAL DATE : 21-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	547.000	545.000	2.000	1.4142	57.44000	6.86E+00	7.07E-01	1.21E-01	4.14E-02	5.78E-01
TH-228	5363.000	228.000	217.000	11.000	3.3166	99.94000	1.35E+00	2.04E-01	1.14E-01	4.78E-02	1.88E-01
TH229	4900.000	8.000	2.000	6.000	2.4495	99.52000	1.21E-02	4.45E-02	8.73E-02	3.46E-02	4.45E-02
TH-230	4625.000	159.000	157.000	2.000	1.4142	100.0000	9.48E-01	1.60E-01	5.78E-02	1.99E-02	1.50E-01
TH-232	3972.000	227.000	225.000	2.000	1.4142	100.0000	1.36E+00	1.96E-01	5.78E-02	1.99E-02	1.79E-01

NOTE: Ac-227 results decay corrected to separation date/time.



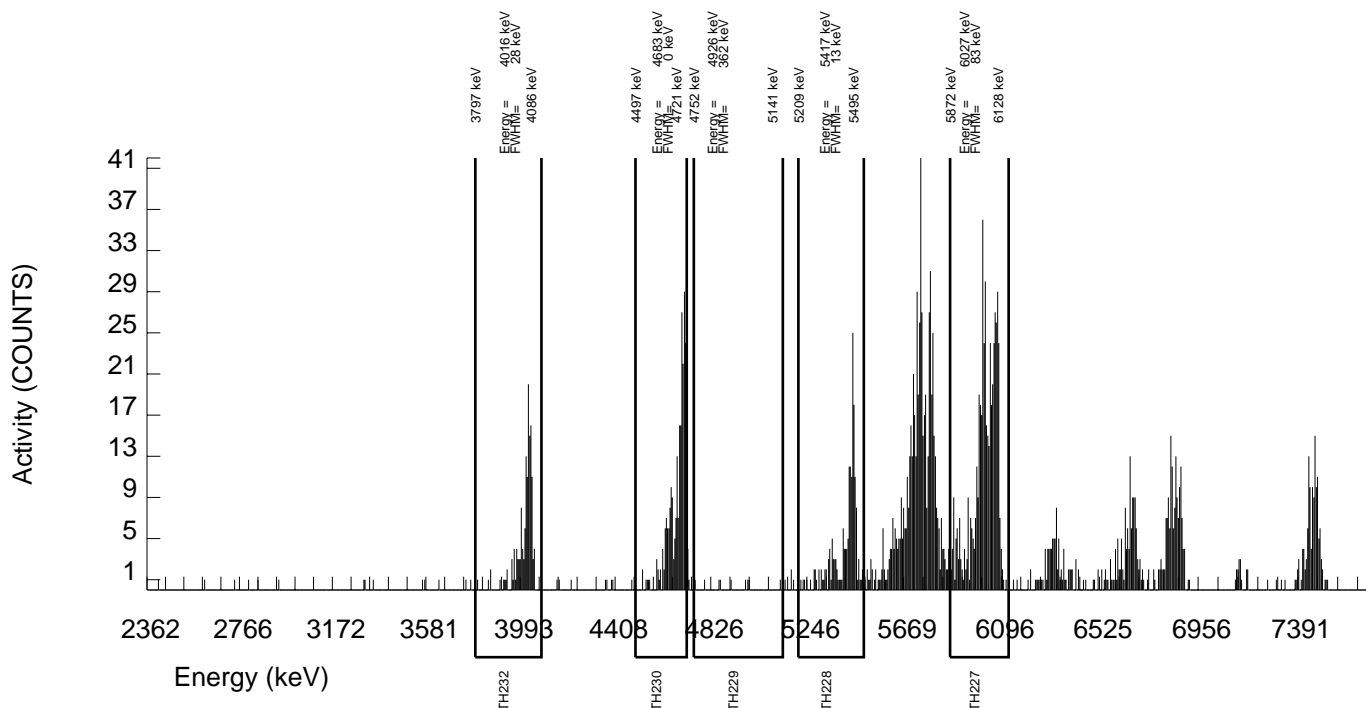
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118004_TH SAMPLE QTY: 0.255 G	
DETECTOR NUMBER :74442 AVERAGE %EFFICIENCY :25.8458 % YIELD : 104.697		COUNT DATE: 6-OCT-2009 21:47:31 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.393E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.393E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.08329 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B184.CNF;134 BKG DATE : 4-OCT-2009 EFF FILE : W184.CNF;41 CAL DATE : 21-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	512.000	506.000	6.000	2.4495	57.44000	6.89E+00	7.32E-01	1.96E-01	7.76E-02	6.07E-01
TH-228	5363.000	177.000	164.000	13.000	3.6056	99.94000	1.10E+00	1.93E-01	1.33E-01	5.62E-02	1.81E-01
TH229	4900.000	9.000	3.000	6.000	2.4495	99.52000	1.97E-02	4.98E-02	9.44E-02	3.74E-02	4.98E-02
TH-230	4625.000	241.000	239.000	2.000	1.4142	100.0000	1.56E+00	2.20E-01	6.25E-02	2.15E-02	1.99E-01
TH-232	3972.000	146.000	144.000	2.000	1.4142	100.0000	9.40E-01	1.65E-01	6.25E-02	2.15E-02	1.56E-01

NOTE: Ac-227 results decay corrected to separation date/time.



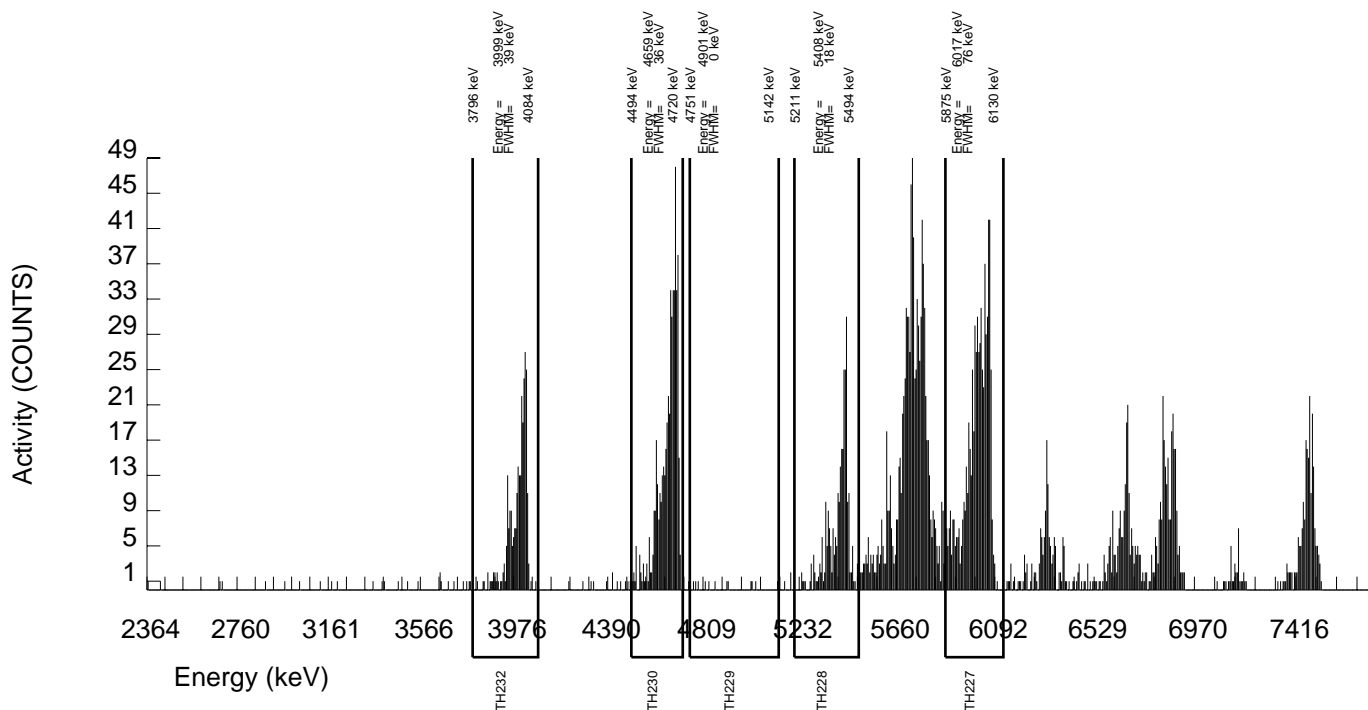
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118005_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :78204 AVERAGE %EFFICIENCY :31.1744 % YIELD : 111.667		COUNT DATE: 6-OCT-2009 08:55:45 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.35514 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B026.CNF;1071 BKG DATE : 4-OCT-2009 EFF FILE : W026.CNF;294 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	680.000	664.000	16.000	4.0000	57.44000	6.97E+00	6.97E-01	2.27E-01	9.77E-02	5.43E-01
TH-228	5363.000	276.000	268.000	8.000	2.8284	99.94000	1.41E+00	1.95E-01	8.52E-02	3.47E-02	1.74E-01
TH229	4900.000	13.000	2.000	11.000	3.3166	99.52000	1.03E-02	4.95E-02	9.51E-02	3.98E-02	4.95E-02
TH-230	4625.000	506.000	506.000	0.000	0.0000	100.0000	2.60E+00	2.79E-01	1.54E-02	0.00E+00	2.26E-01
TH-232	3972.000	276.000	274.000	2.000	1.4142	100.0000	1.41E+00	1.90E-01	4.92E-02	1.69E-02	1.68E-01

NOTE: Ac-227 results decay corrected to separation date/time.



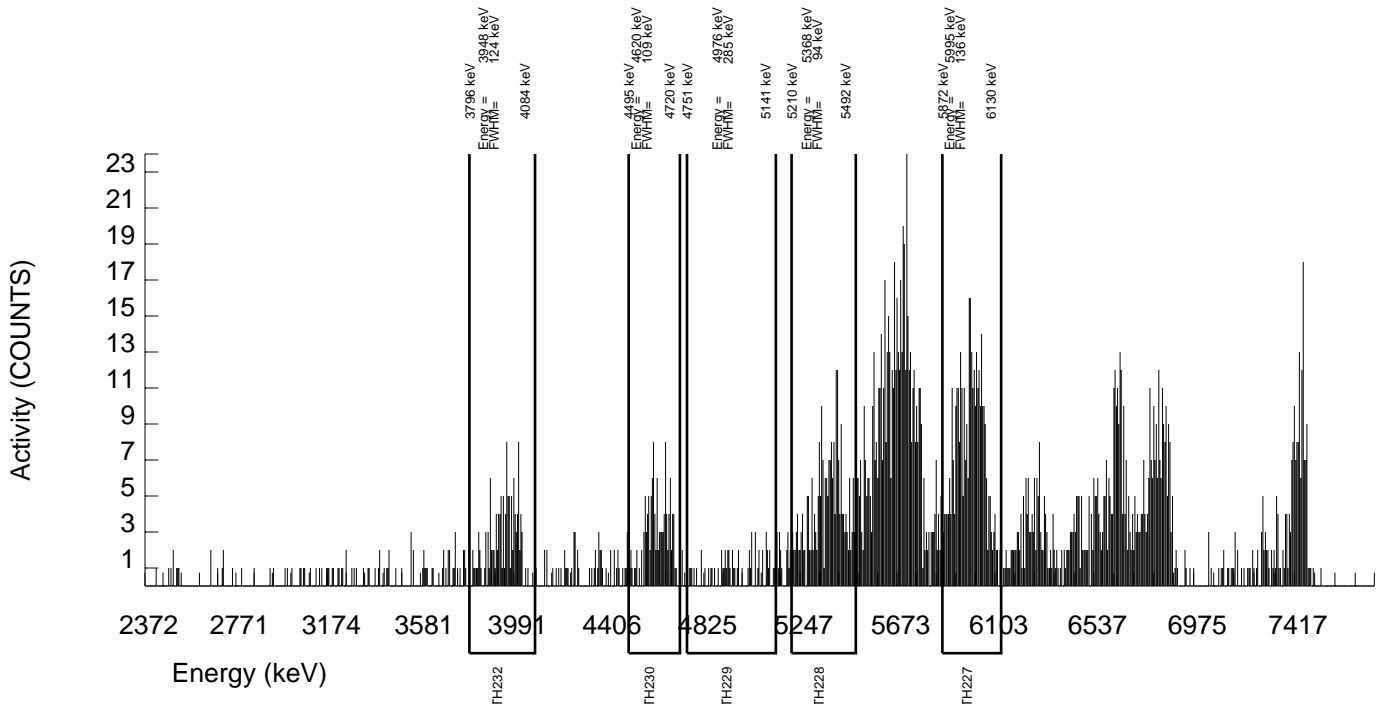
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118006_TH SAMPLE QTY: 0.251 G	
DETECTOR NUMBER :78911 AVERAGE %EFFICIENCY :25.1006 % YIELD : 85.424		COUNT DATE: 9-OCT-2009 17:49:33 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 3.33164 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B208.CNF;60 BKG DATE : 4-OCT-2009 EFF FILE : W208.CNF;38 CAL DATE : 21-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	365.000	361.000	4.000	2.0000	57.44000	7.00E+00	8.41E-01	2.39E-01	9.02E-02	7.30E-01
TH-228	5363.000	242.000	239.000	3.000	1.7321	99.94000	2.06E+00	2.92E-01	9.53E-02	3.47E-02	2.64E-01
TH229	4900.000	58.000	55.000	3.000	1.7321	99.52000	4.63E-01	1.32E-01	9.30E-02	3.39E-02	1.29E-01
TH-230	4625.000	122.000	121.000	1.000	1.0000	100.0000	1.01E+00	1.92E-01	6.41E-02	1.95E-02	1.82E-01
TH-232	3972.000	127.000	127.000	0.000	0.0000	100.0000	1.06E+00	1.95E-01	2.51E-02	0.00E+00	1.85E-01

NOTE: Ac-227 results decay corrected to separation date/time.



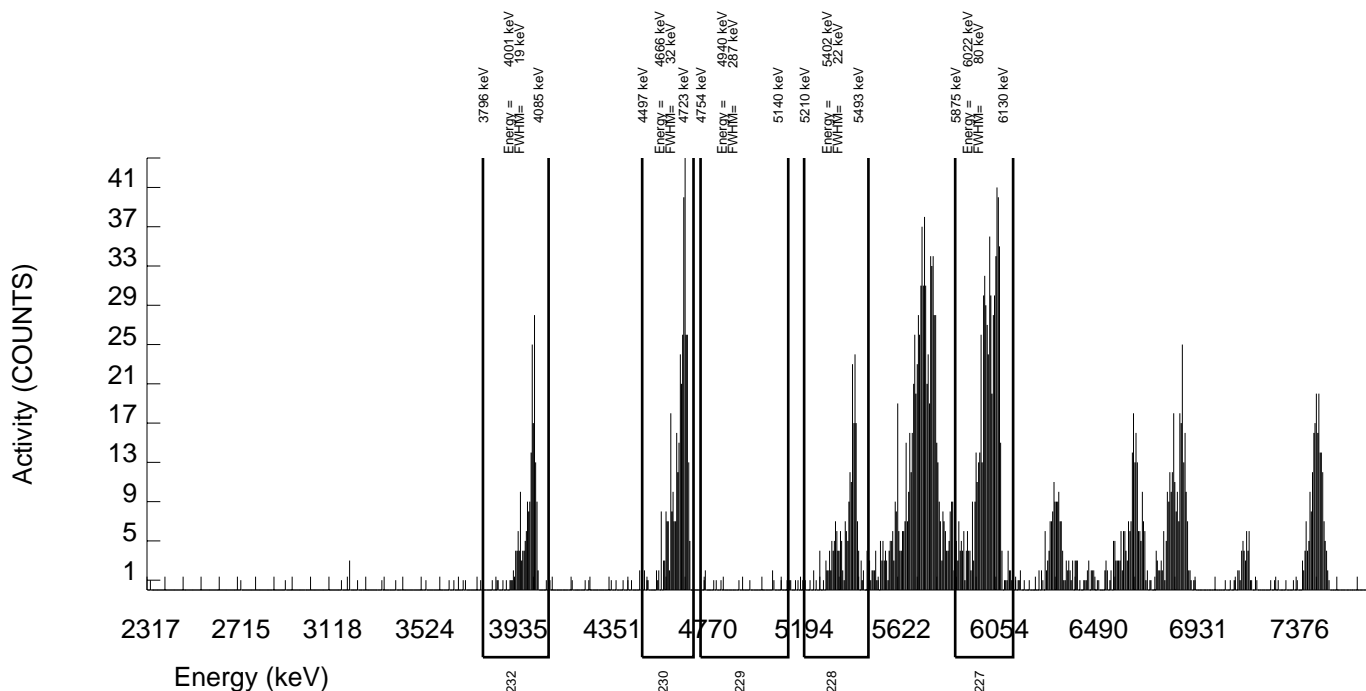
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 11-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118007_TH SAMPLE QTY: 0.253 G	
DETECTOR NUMBER :78792 AVERAGE %EFFICIENCY :29.9827 % YIELD : 108.762		COUNT DATE: 6-OCT-2009 08:55:45 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.24182 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B028.CNF;1081 BKG DATE : 4-OCT-2009 EFF FILE : W028.CNF;313 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	640.000	622.000	18.000	4.2426	57.44000	6.94E+00	7.11E-01	2.54E-01	1.10E-01	5.61E-01
TH-228	5363.000	225.000	223.000	2.000	1.4142	99.94000	1.25E+00	1.83E-01	5.37E-02	1.84E-02	1.65E-01
TH229	4900.000	13.000	10.000	3.000	1.7321	99.52000	5.49E-02	4.31E-02	6.07E-02	2.21E-02	4.30E-02
TH-230	4625.000	365.000	365.000	0.000	0.0000	100.0000	1.99E+00	2.40E-01	1.64E-02	0.00E+00	2.04E-01
TH-232	3972.000	196.000	195.000	1.000	1.0000	100.0000	1.06E+00	1.64E-01	4.18E-02	1.27E-02	1.50E-01

NOTE: Ac-227 results decay corrected to separation date/time.



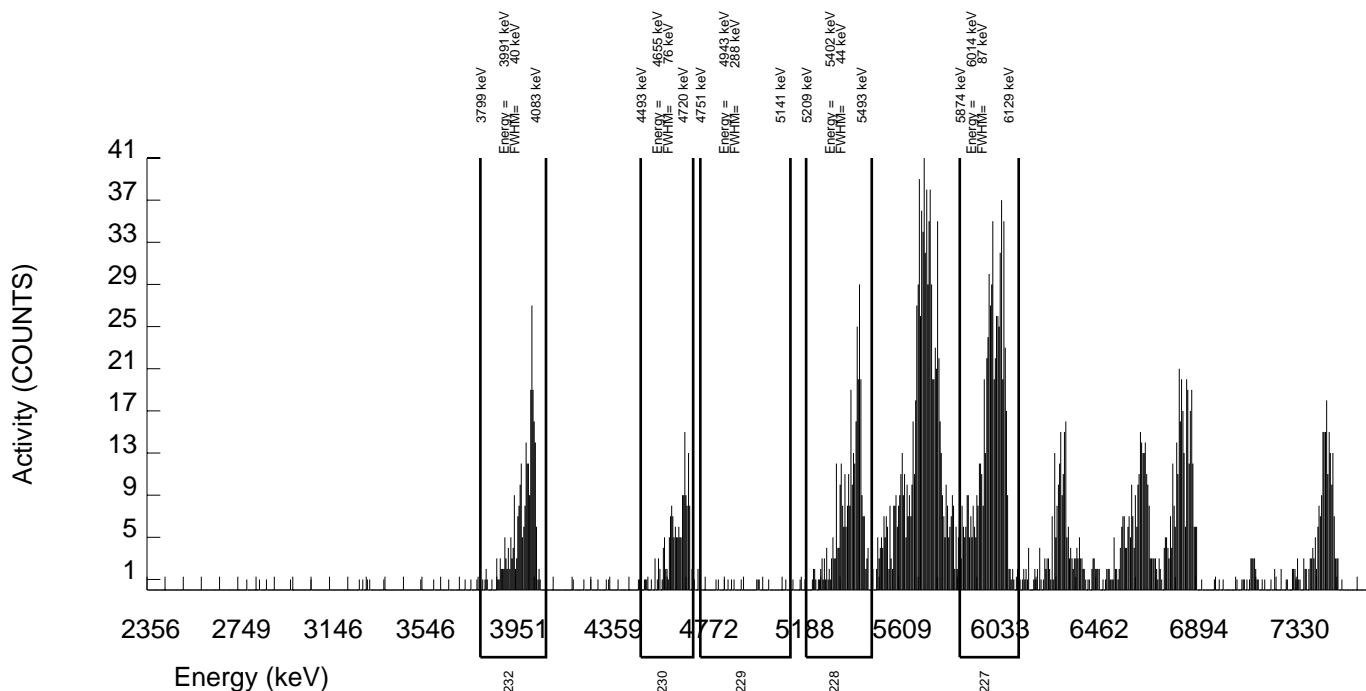
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118008_TH SAMPLE QTY: 0.256 G	
DETECTOR NUMBER :33454 AVERAGE %EFFICIENCY :31.4800 % YIELD : 104.921		COUNT DATE: 6-OCT-2009 08:55:45 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.09203 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B029.CNF;1072 BKG DATE : 4-OCT-2009 EFF FILE : W029.CNF;312 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	650.000	630.000	20.000	4.4721	57.44000	6.86E+00	7.00E-01	2.59E-01	1.13E-01	5.53E-01
TH-228	5363.000	337.000	307.000	30.000	5.4772	99.94000	1.67E+00	2.30E-01	1.55E-01	6.95E-02	2.05E-01
TH229	4900.000	12.000	6.000	6.000	2.4495	99.52000	3.21E-02	4.46E-02	7.71E-02	3.05E-02	4.45E-02
TH-230	4625.000	167.000	164.000	3.000	1.7321	100.0000	8.74E-01	1.47E-01	5.89E-02	2.15E-02	1.36E-01
TH-232	3972.000	270.000	266.000	4.000	2.0000	100.0000	1.42E+00	1.94E-01	6.56E-02	2.48E-02	1.73E-01

NOTE: Ac-227 results decay corrected to separation date/time.



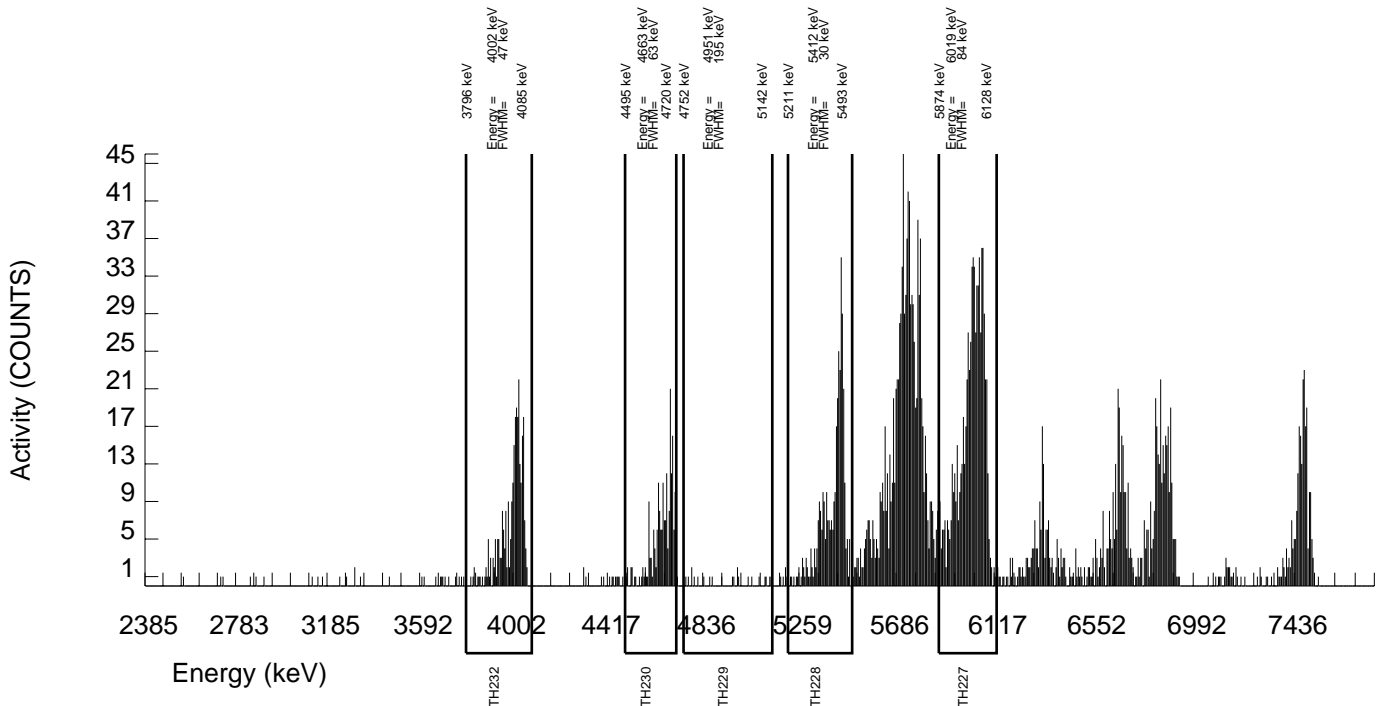
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118009_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :33447 AVERAGE %EFFICIENCY :32.5279 % YIELD : 117.820		COUNT DATE: 6-OCT-2009 08:55:45 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.59509 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B030.CNF;1069 BKG DATE : 4-OCT-2009 EFF FILE : W030.CNF;297 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	751.000	731.000	20.000	4.4721	57.44000	6.97E+00	6.79E-01	2.27E-01	9.92E-02	5.19E-01
TH-228	5363.000	352.000	330.000	22.000	4.6904	99.94000	1.58E+00	2.06E-01	1.18E-01	5.21E-02	1.81E-01
TH229	4900.000	22.000	8.000	14.000	3.7417	99.52000	3.75E-02	5.52E-02	9.57E-02	4.08E-02	5.51E-02
TH-230	4625.000	197.000	195.000	2.000	1.4142	100.0000	9.10E-01	1.41E-01	4.47E-02	1.53E-02	1.29E-01
TH-232	3972.000	276.000	273.000	3.000	1.7321	100.0000	1.27E+00	1.72E-01	5.16E-02	1.88E-02	1.53E-01

NOTE: Ac-227 results decay corrected to separation date/time.



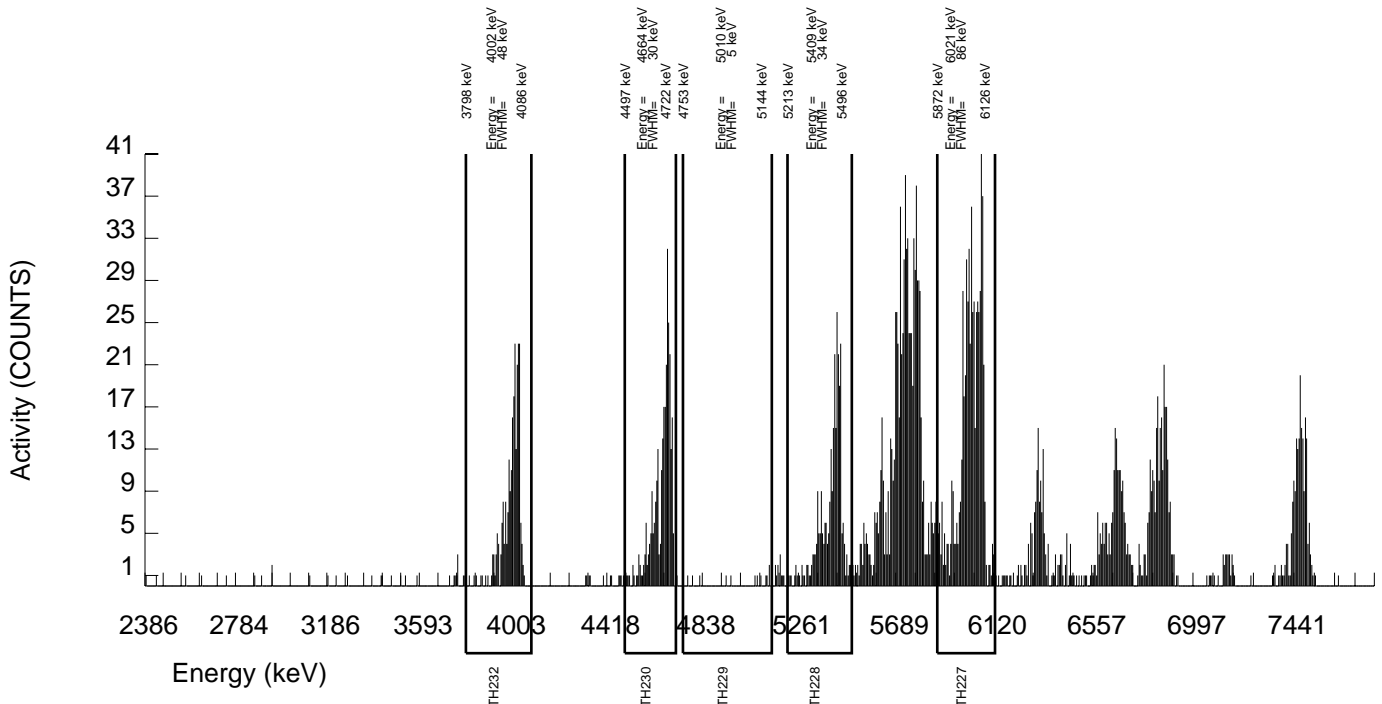
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118010_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :78785 AVERAGE %EFFICIENCY :31.2888 % YIELD : 102.378		COUNT DATE: 6-OCT-2009 08:55:46 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 3.99287 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B033.CNF;1066 BKG DATE : 4-OCT-2009 EFF FILE : W033.CNF;322 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	629.000	611.000	18.000	4.2426	57.44000	6.97E+00	7.05E-01	2.59E-01	1.13E-01	5.69E-01
TH-228	5363.000	287.000	280.000	7.000	2.6458	99.94000	1.60E+00	2.14E-01	8.74E-02	3.52E-02	1.92E-01
TH229	4900.000	12.000	5.000	7.000	2.6458	99.52000	2.80E-02	4.79E-02	8.58E-02	3.45E-02	4.79E-02
TH-230	4625.000	293.000	290.000	3.000	1.7321	100.0000	1.62E+00	2.12E-01	6.17E-02	2.25E-02	1.88E-01
TH-232	3972.000	250.000	245.000	5.000	2.2361	100.0000	1.37E+00	1.93E-01	7.48E-02	2.90E-02	1.75E-01

NOTE: Ac-227 results decay corrected to separation date/time.



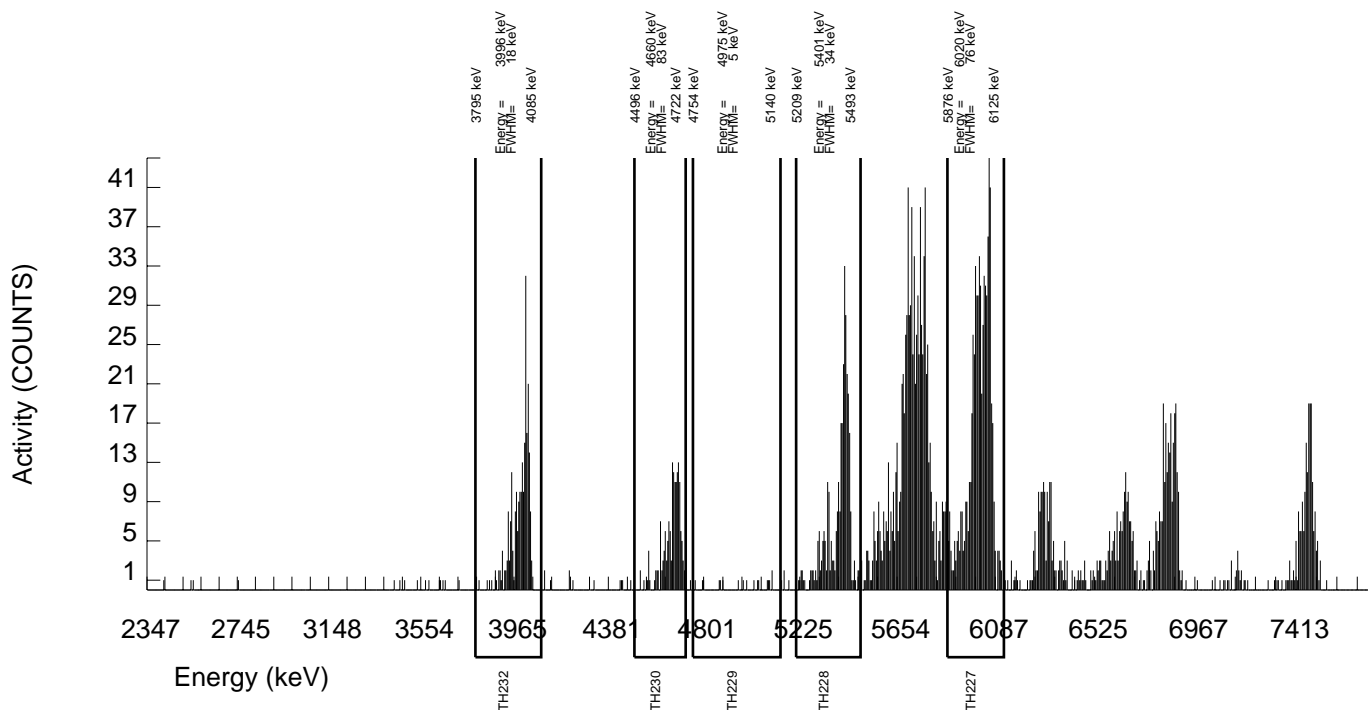
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118011_TH SAMPLE QTY: 0.251 G	
DETECTOR NUMBER :78202 AVERAGE %EFFICIENCY :30.4217 % YIELD : 115.119		COUNT DATE: 6-OCT-2009 08:55:46 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.48978 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B035.CNF;1064 BKG DATE : 4-OCT-2009 EFF FILE : W035.CNF;311 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	681.000	668.000	13.000	3.6056	57.44000	7.00E+00	6.84E-01	2.07E-01	8.79E-02	5.41E-01
TH-228	5363.000	316.000	298.000	18.000	4.2426	99.94000	1.56E+00	2.10E-01	1.19E-01	5.18E-02	1.88E-01
TH229	4900.000	17.000	-5.000	22.000	4.6904	99.52000	-2.57E-02	6.30E-02	1.28E-01	5.62E-02	6.30E-02
TH-230	4625.000	165.000	158.000	7.000	2.6458	100.0000	8.10E-01	1.40E-01	7.85E-02	3.15E-02	1.32E-01
TH-232	3972.000	243.000	242.000	1.000	1.0000	100.0000	1.24E+00	1.73E-01	3.92E-02	1.19E-02	1.57E-01

NOTE: Ac-227 results decay corrected to separation date/time.



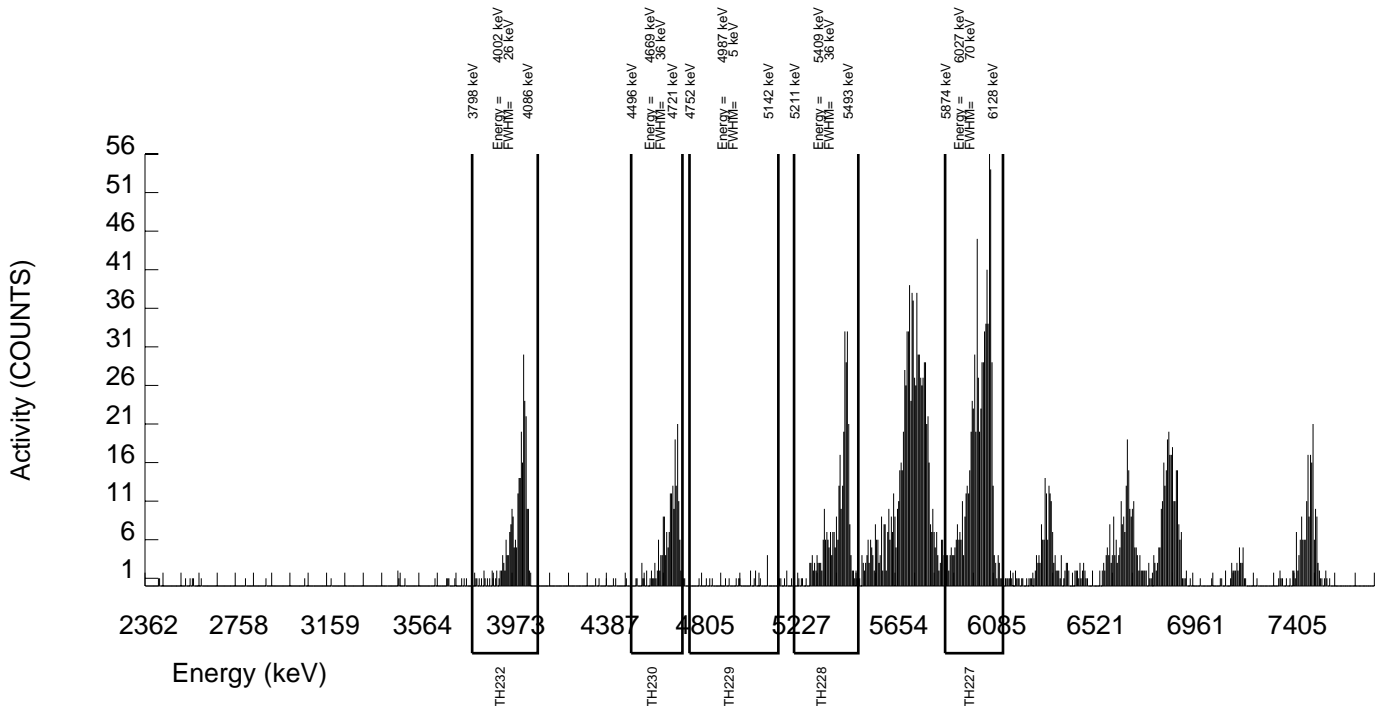
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118012_TH SAMPLE QTY: 0.259 G	
DETECTOR NUMBER :78203 AVERAGE %EFFICIENCY :32.5365 % YIELD : 117.305		COUNT DATE: 6-OCT-2009 08:55:46 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.57501 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B036.CNF;1062 BKG DATE : 4-OCT-2009 EFF FILE : W036.CNF;323 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	750.000	728.000	22.000	4.6904	57.44000	6.78E+00	6.48E-01	2.31E-01	1.02E-01	5.07E-01
TH-228	5363.000	330.000	324.000	6.000	2.4495	99.94000	1.51E+00	1.90E-01	6.71E-02	2.66E-02	1.68E-01
TH229	4900.000	19.000	7.000	12.000	3.4641	99.52000	3.21E-02	5.00E-02	8.75E-02	3.69E-02	5.00E-02
TH-230	4625.000	196.000	193.000	3.000	1.7321	100.0000	8.79E-01	1.36E-01	5.04E-02	1.84E-02	1.26E-01
TH-232	3972.000	267.000	266.000	1.000	1.0000	100.0000	1.21E+00	1.63E-01	3.49E-02	1.06E-02	1.46E-01

NOTE: Ac-227 results decay corrected to separation date/time.



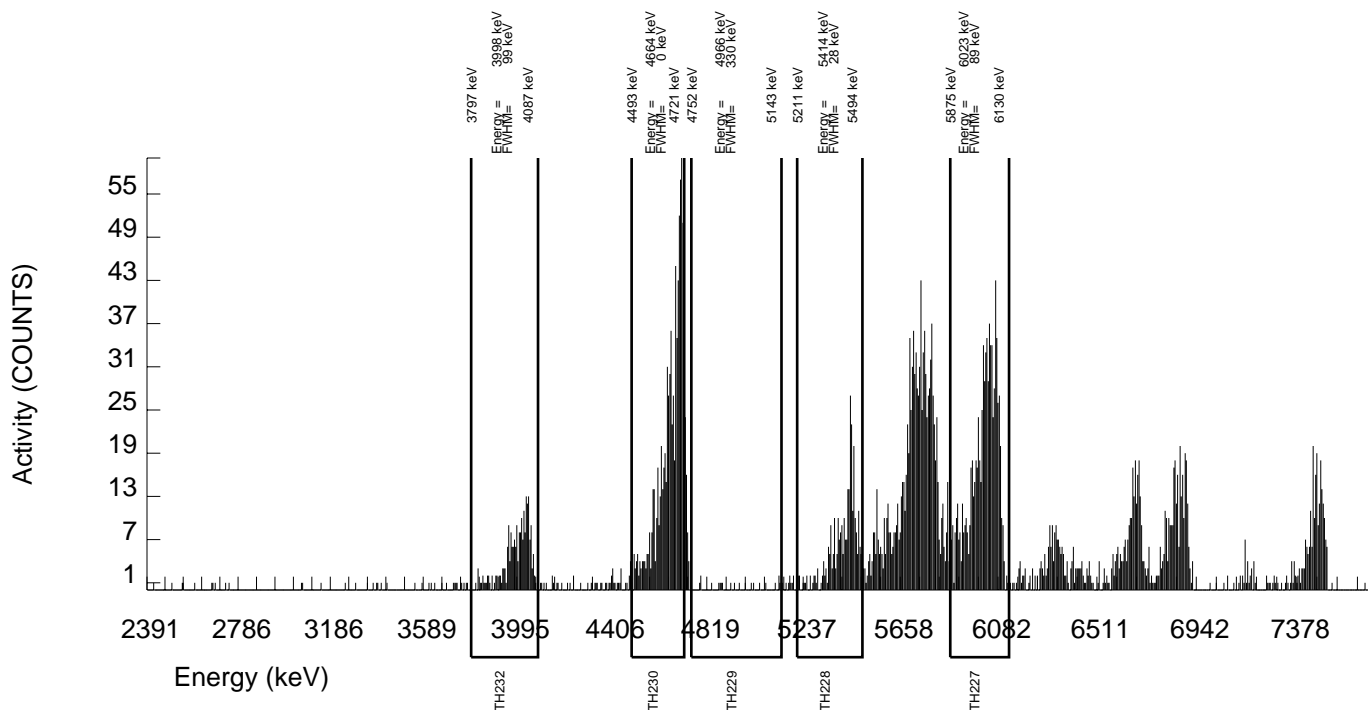
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118013_TH SAMPLE QTY: 0.251 G	
DETECTOR NUMBER :45-149BB5 AVERAGE %EFFICIENCY :35.6745 % YIELD : 117.127		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.527E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.56807 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B037.CNF;1074 BKG DATE : 4-OCT-2009 EFF FILE : W037.CNF;299 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	814.000	797.000	17.000	4.1231	57.44000	7.00E+00	6.48E-01	1.95E-01	8.42E-02	4.96E-01
TH-228	5363.000	299.000	280.000	19.000	4.3589	99.94000	1.23E+00	1.70E-01	1.02E-01	4.46E-02	1.54E-01
TH229	4900.000	20.000	8.000	12.000	3.4641	99.52000	3.45E-02	4.79E-02	8.25E-02	3.48E-02	4.78E-02
TH-230	4625.000	776.000	766.000	10.000	3.1623	100.0000	3.29E+00	3.07E-01	7.61E-02	3.16E-02	2.36E-01
TH-232	3972.000	221.000	216.000	5.000	2.2361	100.0000	9.28E-01	1.38E-01	5.76E-02	2.23E-02	1.27E-01

NOTE: Ac-227 results decay corrected to separation date/time.



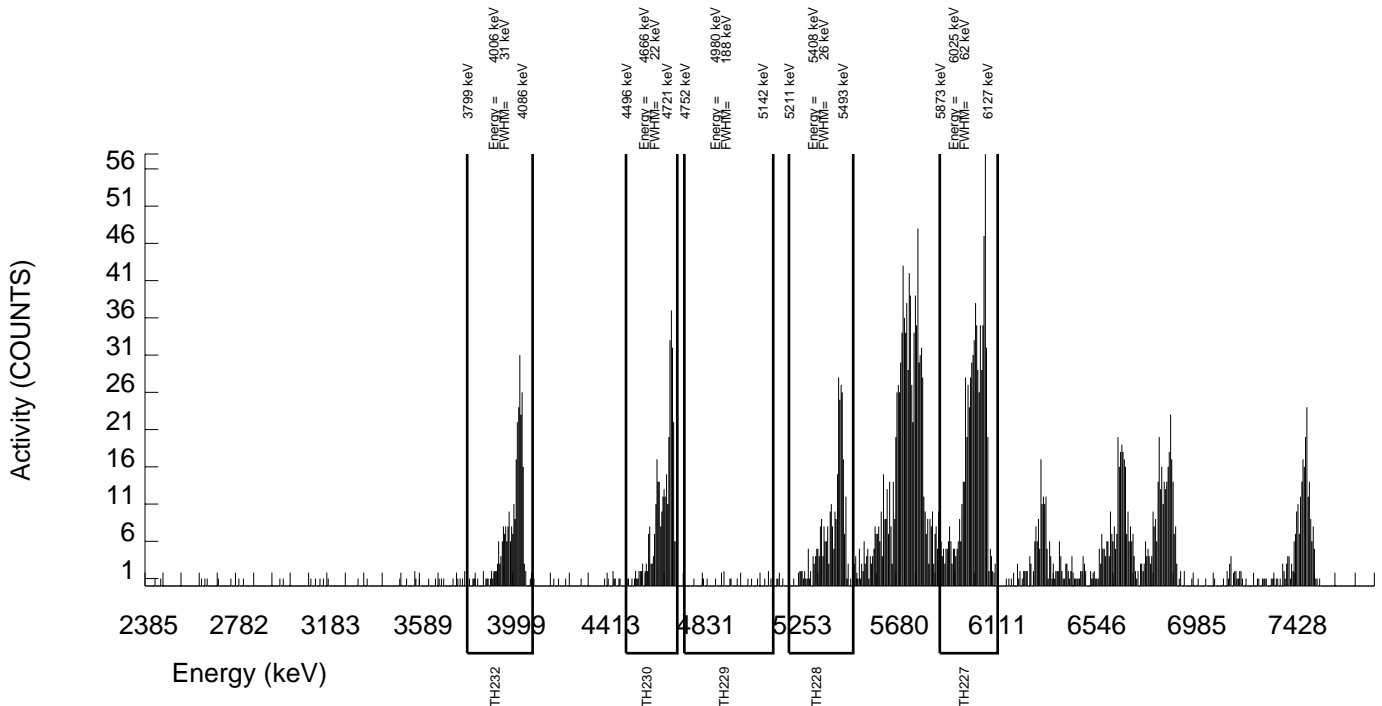
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118014_TH SAMPLE QTY: 0.255 G	
DETECTOR NUMBER :72532 AVERAGE %EFFICIENCY :34.4118 % YIELD : 115.026		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.393E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.393E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.48614 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B038.CNF;1071 BKG DATE : 4-OCT-2009 EFF FILE : W038.CNF;313 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	766.000	755.000	11.000	3.3166	57.44000	6.89E+00	6.45E-01	1.68E-01	7.04E-02	4.99E-01
TH-228	5363.000	313.000	293.000	20.000	4.4721	99.94000	1.34E+00	1.82E-01	1.09E-01	4.75E-02	1.63E-01
TH229	4900.000	17.000	7.000	10.000	3.1623	99.52000	3.14E-02	4.57E-02	7.94E-02	3.30E-02	4.57E-02
TH-230	4625.000	349.000	345.000	4.000	2.0000	100.0000	1.54E+00	1.88E-01	5.49E-02	2.08E-02	1.64E-01
TH-232	3972.000	296.000	293.000	3.000	1.7321	100.0000	1.31E+00	1.70E-01	4.94E-02	1.80E-02	1.51E-01

NOTE: Ac-227 results decay corrected to separation date/time.



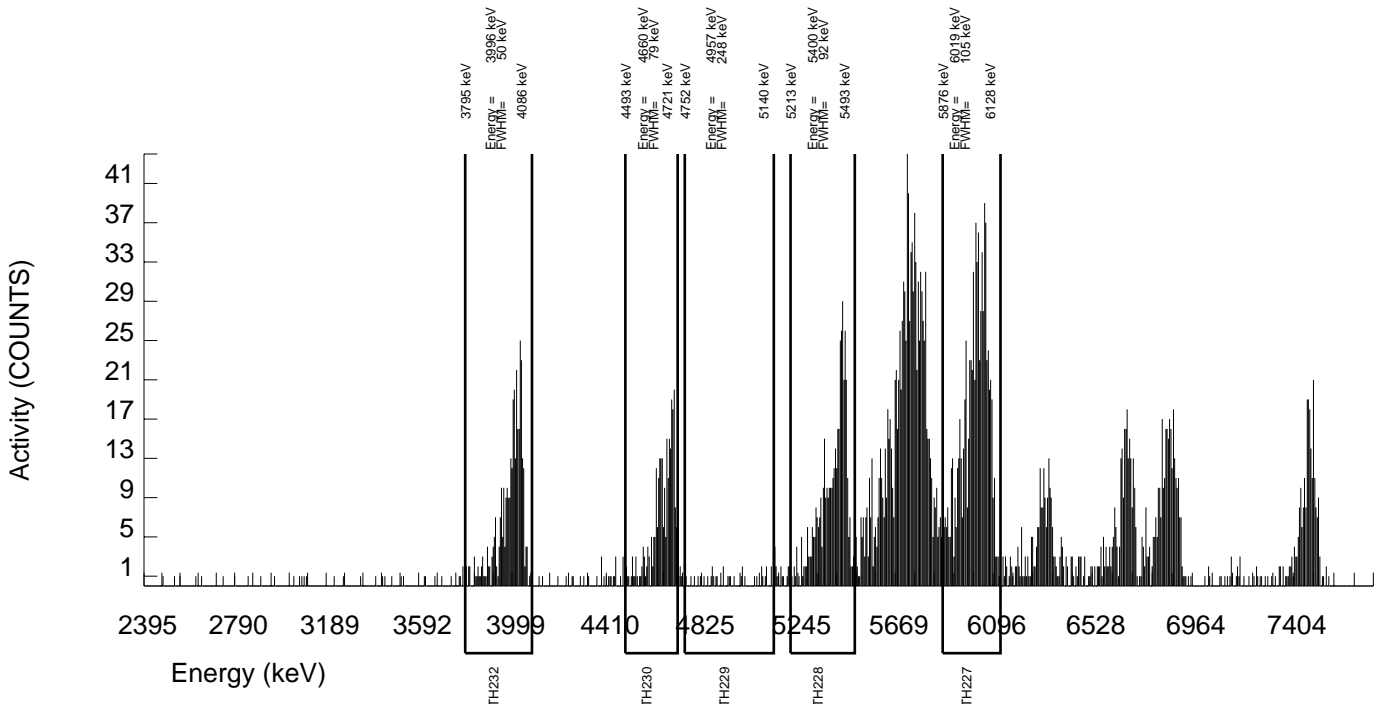
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118015_TH SAMPLE QTY: 0.256 G	
DETECTOR NUMBER :45-149BB2 AVERAGE %EFFICIENCY :35.4433 % YIELD : 114.637		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.47095 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B039.CNF;1071 BKG DATE : 4-OCT-2009 EFF FILE : W039.CNF;290 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	792.000	775.000	17.000	4.1231	57.44000	6.86E+00	6.40E-01	1.96E-01	8.49E-02	4.94E-01
TH-228	5363.000	439.000	414.000	25.000	5.0000	99.94000	1.83E+00	2.17E-01	1.16E-01	5.16E-02	1.87E-01
TH229	4900.000	34.000	27.000	7.000	2.6458	99.52000	1.17E-01	5.51E-02	6.66E-02	2.68E-02	5.46E-02
TH-230	4625.000	268.000	264.000	4.000	2.0000	100.0000	1.14E+00	1.56E-01	5.33E-02	2.01E-02	1.40E-01
TH-232	3972.000	345.000	342.000	3.000	1.7321	100.0000	1.48E+00	1.81E-01	4.79E-02	1.74E-02	1.58E-01

NOTE: Ac-227 results decay corrected to separation date/time.



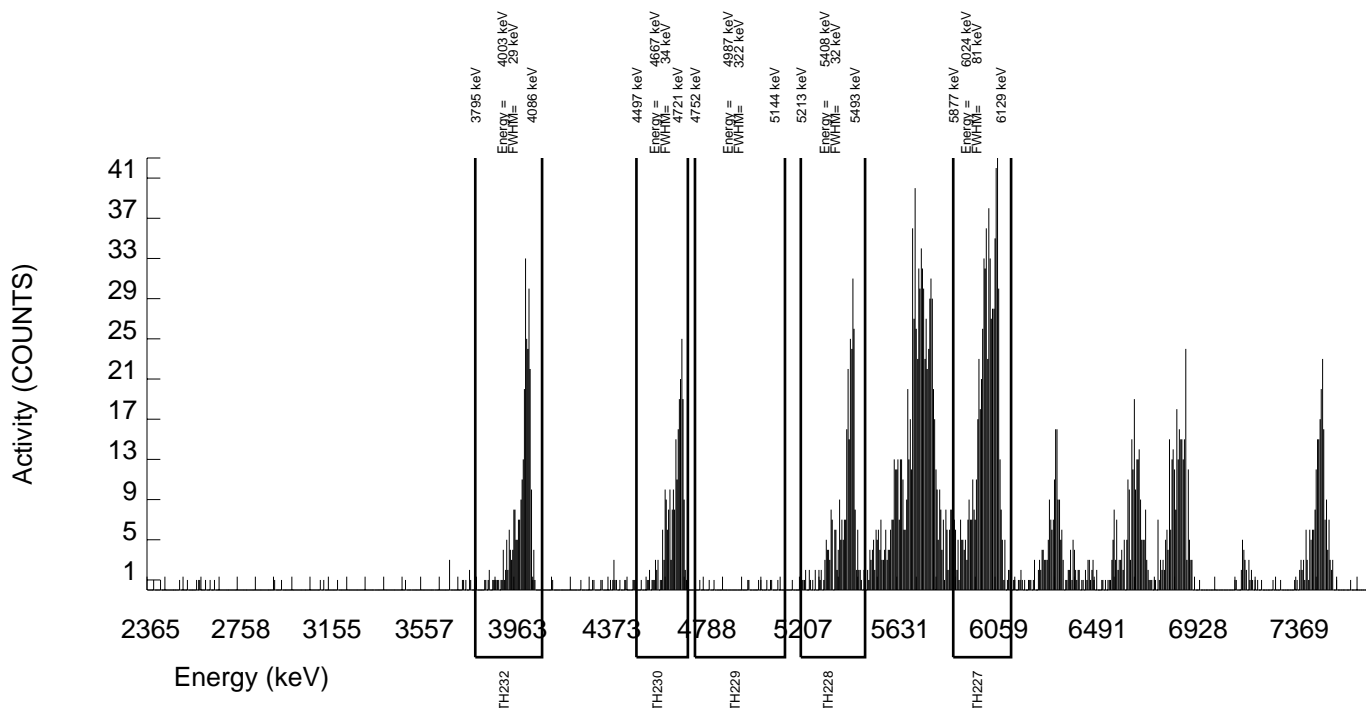
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118016_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :78773 AVERAGE %EFFICIENCY :31.9517 % YIELD : 113.545		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.42839 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B040.CNF;1074 BKG DATE : 4-OCT-2009 EFF FILE : W040.CNF;309 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	700.000	692.000	8.000	2.8284	57.44000	6.97E+00	6.70E-01	1.63E-01	6.63E-02	5.25E-01
TH-228	5363.000	292.000	282.000	10.000	3.1623	99.94000	1.42E+00	1.92E-01	8.93E-02	3.71E-02	1.72E-01
TH229	4900.000	11.000	1.000	10.000	3.1623	99.52000	4.95E-03	4.45E-02	8.77E-02	3.64E-02	4.45E-02
TH-230	4625.000	238.000	235.000	3.000	1.7321	100.0000	1.16E+00	1.65E-01	5.45E-02	1.99E-02	1.50E-01
TH-232	3972.000	288.000	286.000	2.000	1.4142	100.0000	1.41E+00	1.85E-01	4.72E-02	1.62E-02	1.64E-01

NOTE: Ac-227 results decay corrected to separation date/time.



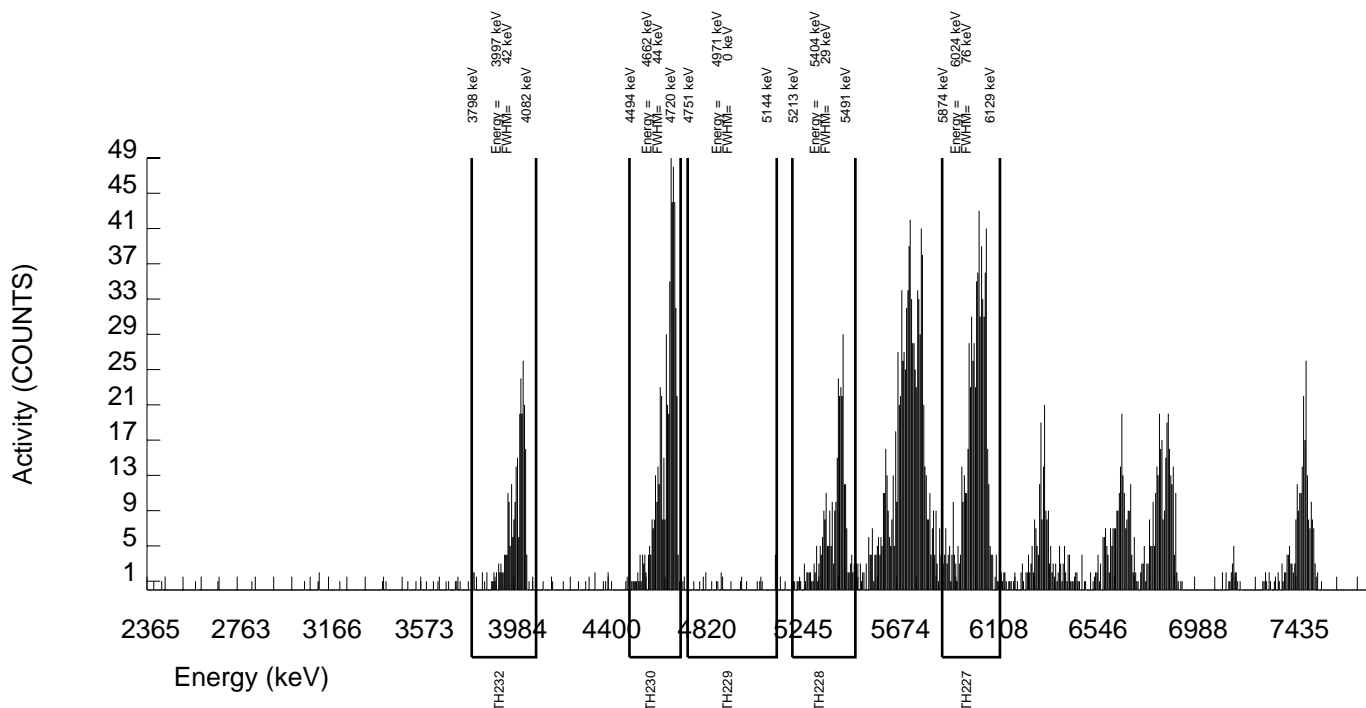
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118017_TH SAMPLE QTY: 0.256 G	
DETECTOR NUMBER :78205 AVERAGE %EFFICIENCY :32.8873 % YIELD : 105.851		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.12832 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B041.CNF;1067 BKG DATE : 4-OCT-2009 EFF FILE : W041.CNF;313 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	674.000	664.000	10.000	3.1623	57.44000	6.86E+00	6.69E-01	1.83E-01	7.60E-02	5.30E-01
TH-228	5363.000	315.000	305.000	10.000	3.1623	99.94000	1.58E+00	2.05E-01	9.16E-02	3.81E-02	1.83E-01
TH229	4900.000	19.000	11.000	8.000	2.8284	99.52000	5.59E-02	5.18E-02	8.21E-02	3.34E-02	5.17E-02
TH-230	4625.000	537.000	536.000	1.000	1.0000	100.0000	2.71E+00	2.81E-01	3.87E-02	1.18E-02	2.30E-01
TH-232	3972.000	270.000	269.000	1.000	1.0000	100.0000	1.36E+00	1.82E-01	3.87E-02	1.18E-02	1.63E-01

NOTE: Ac-227 results decay corrected to separation date/time.



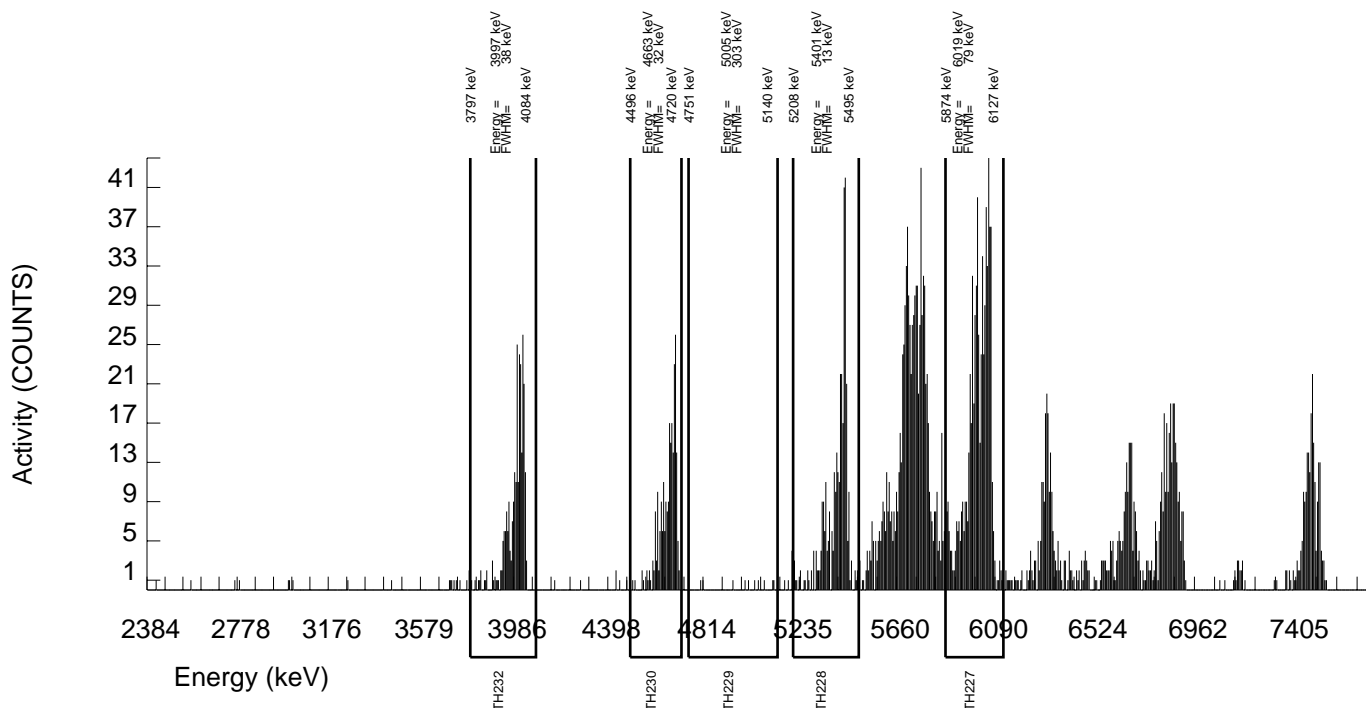
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118018_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :78793 AVERAGE %EFFICIENCY :33.3701 % YIELD : 106.991		COUNT DATE: 6-OCT-2009 08:55:47 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.17275 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B042.CNF;1066 BKG DATE : 4-OCT-2009 EFF FILE : W042.CNF;286 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	697.000	681.000	16.000	4.0000	57.44000	6.97E+00	6.78E-01	2.21E-01	9.53E-02	5.36E-01
TH-228	5363.000	348.000	335.000	13.000	3.6056	99.94000	1.72E+00	2.17E-01	1.01E-01	4.30E-02	1.91E-01
TH229	4900.000	10.000	0.000	10.000	3.1623	99.52000	0.00E+00	4.41E-02	8.91E-02	3.70E-02	4.41E-02
TH-230	4625.000	238.000	233.000	5.000	2.2361	100.0000	1.17E+00	1.68E-01	6.71E-02	2.60E-02	1.53E-01
TH-232	3972.000	268.000	265.000	3.000	1.7321	100.0000	1.33E+00	1.80E-01	5.54E-02	2.02E-02	1.62E-01

NOTE: Ac-227 results decay corrected to separation date/time.



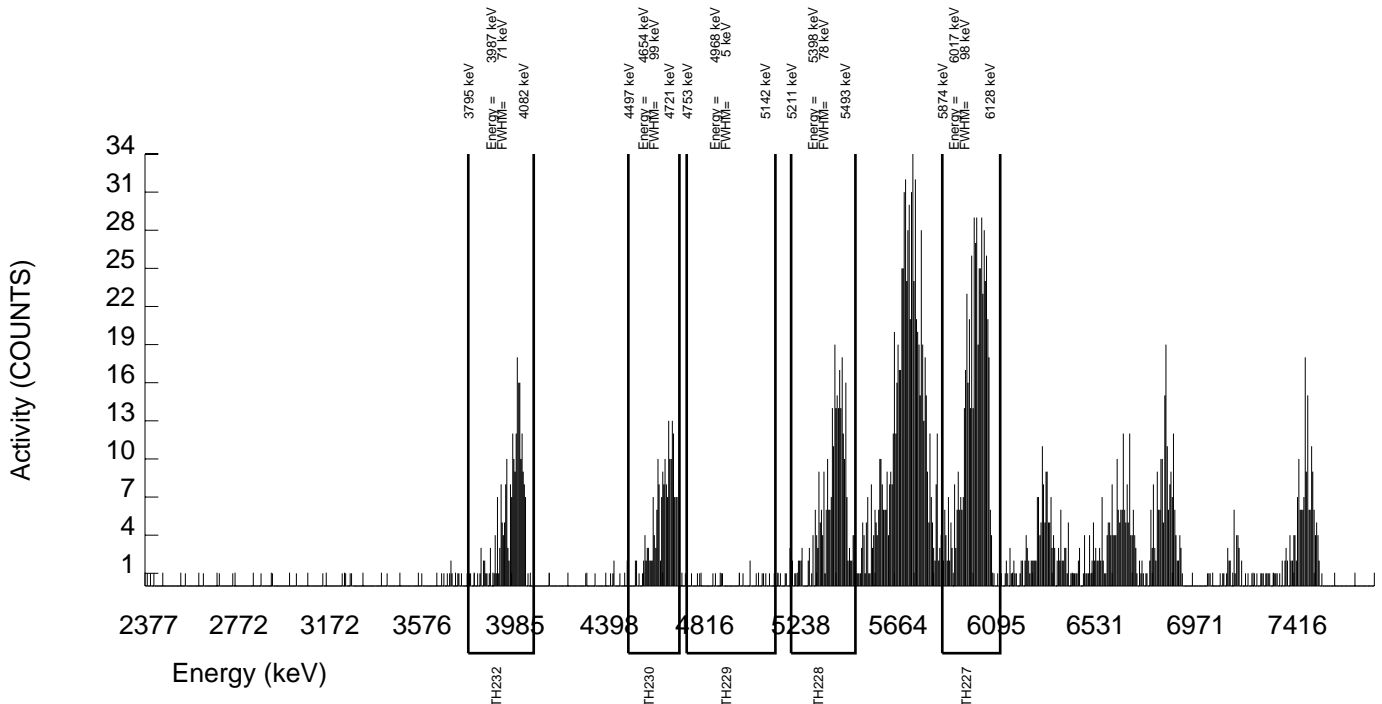
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118019_TH SAMPLE QTY: 0.252 G	
DETECTOR NUMBER :76543 AVERAGE %EFFICIENCY :34.1841 % YIELD : 85.732		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.493E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 3.34365 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B043.CNF;1062 BKG DATE : 4-OCT-2009 EFF FILE : W043.CNF;278 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	575.000	559.000	16.000	4.0000	57.44000	6.97E+00	7.25E-01	2.70E-01	1.16E-01	5.94E-01
TH-228	5363.000	307.000	301.000	6.000	2.4495	99.94000	1.88E+00	2.44E-01	8.99E-02	3.56E-02	2.16E-01
TH229	4900.000	18.000	12.000	6.000	2.4495	99.52000	7.35E-02	5.90E-02	8.82E-02	3.49E-02	5.88E-02
TH-230	4625.000	197.000	195.000	2.000	1.4142	100.0000	1.19E+00	1.83E-01	5.84E-02	2.01E-02	1.69E-01
TH-232	3972.000	237.000	235.000	2.000	1.4142	100.0000	1.43E+00	2.04E-01	5.84E-02	2.01E-02	1.85E-01

NOTE: Ac-227 results decay corrected to separation date/time.



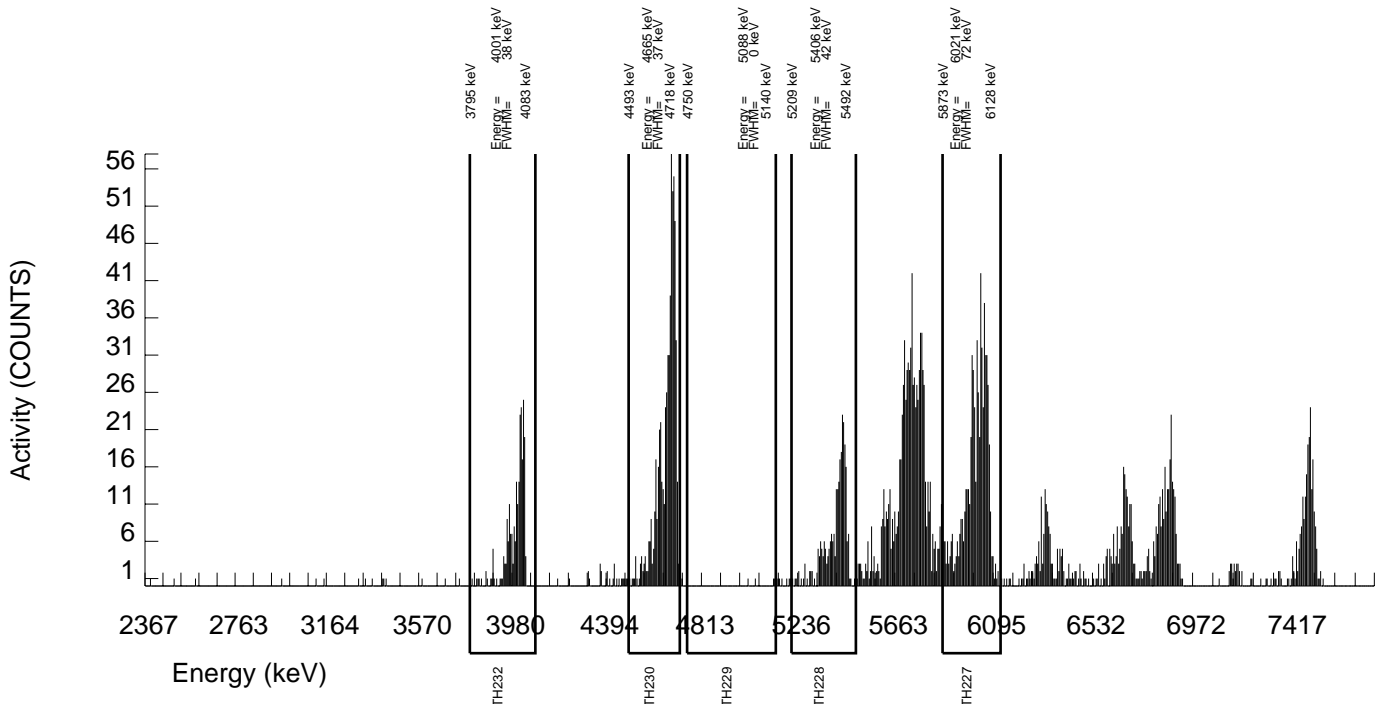
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S0237118020_TH SAMPLE QTY: 0.254 G	
DETECTOR NUMBER :79459 AVERAGE %EFFICIENCY :34.9728 % YIELD : 92.044		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.426E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.426E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 3.58981 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B044.CNF;1072 BKG DATE : 4-OCT-2009 EFF FILE : W044.CNF;299 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	632.000	614.000	18.000	4.2426	57.44000	6.92E+00	6.97E-01	2.56E-01	1.11E-01	5.63E-01
TH-228	5363.000	268.000	264.000	4.000	2.0000	99.94000	1.49E+00	2.03E-01	6.94E-02	2.62E-02	1.82E-01
TH229	4900.000	4.000	-5.000	9.000	3.0000	99.52000	-2.77E-02	3.91E-02	9.39E-02	3.86E-02	3.91E-02
TH-230	4625.000	609.000	604.000	5.000	2.2361	100.0000	3.33E+00	3.33E-01	7.38E-02	2.87E-02	2.68E-01
TH-232	3972.000	239.000	235.000	4.000	2.0000	100.0000	1.29E+00	1.85E-01	6.78E-02	2.56E-02	1.68E-01

NOTE: Ac-227 results decay corrected to separation date/time.



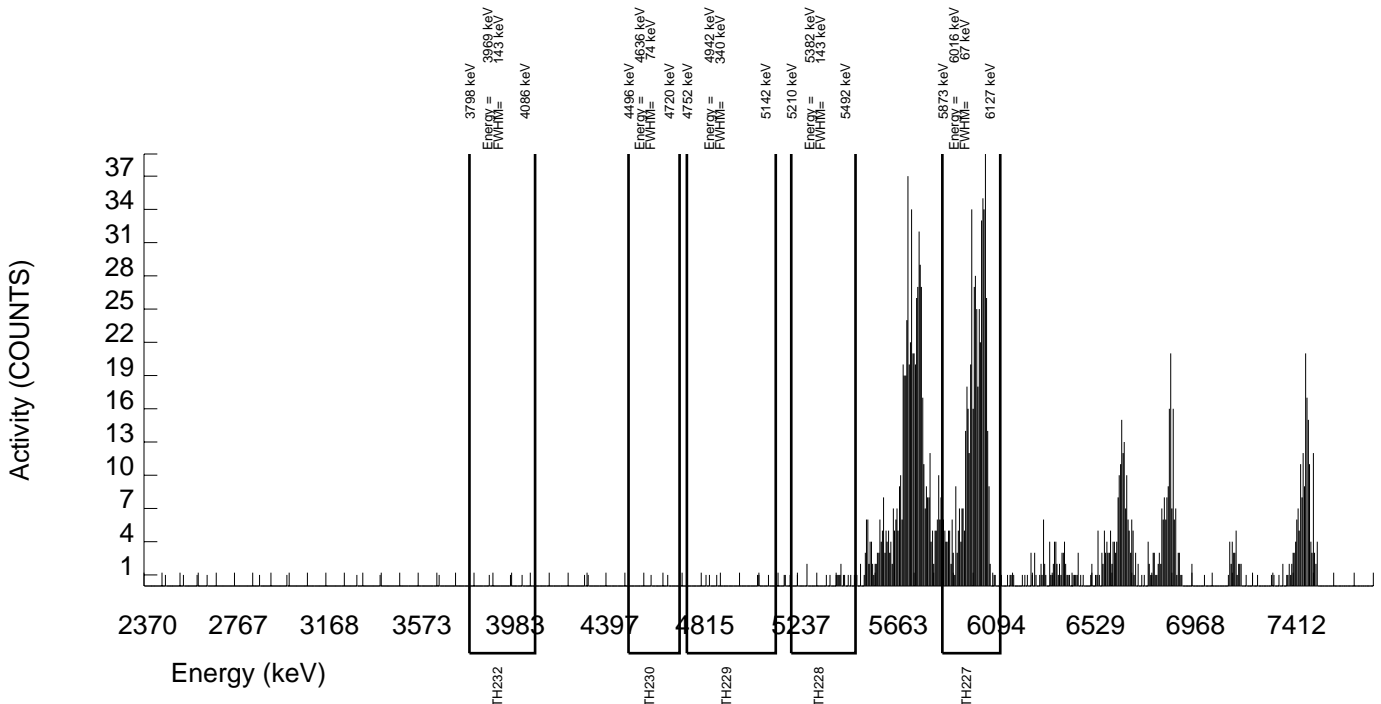
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 30-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S1201933858_TH SAMPLE QTY: 0.259 G	
DETECTOR NUMBER :78783 AVERAGE %EFFICIENCY :34.0523 % YIELD : 86.680		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 3.38060 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B045.CNF;1061 BKG DATE : 4-OCT-2009 EFF FILE : W045.CNF;290 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	571.000	563.000	8.000	2.8284	57.44000	6.78E+00	6.96E-01	1.95E-01	7.93E-02	5.68E-01
TH-228	5363.000	18.000	13.000	5.000	2.2361	99.94000	7.72E-02	5.60E-02	7.96E-02	3.09E-02	5.58E-02
TH229	4900.000	7.000	-2.000	9.000	3.0000	99.52000	-1.18E-02	4.64E-02	1.00E-01	4.13E-02	4.64E-02
TH-230	4625.000	2.000	-7.000	9.000	3.0000	100.0000	-4.12E-02	3.83E-02	9.99E-02	4.11E-02	3.83E-02
TH-232	3972.000	3.000	1.000	2.000	1.4142	100.0000	5.89E-03	2.58E-02	5.64E-02	1.94E-02	2.58E-02

NOTE: Ac-227 results decay corrected to separation date/time.



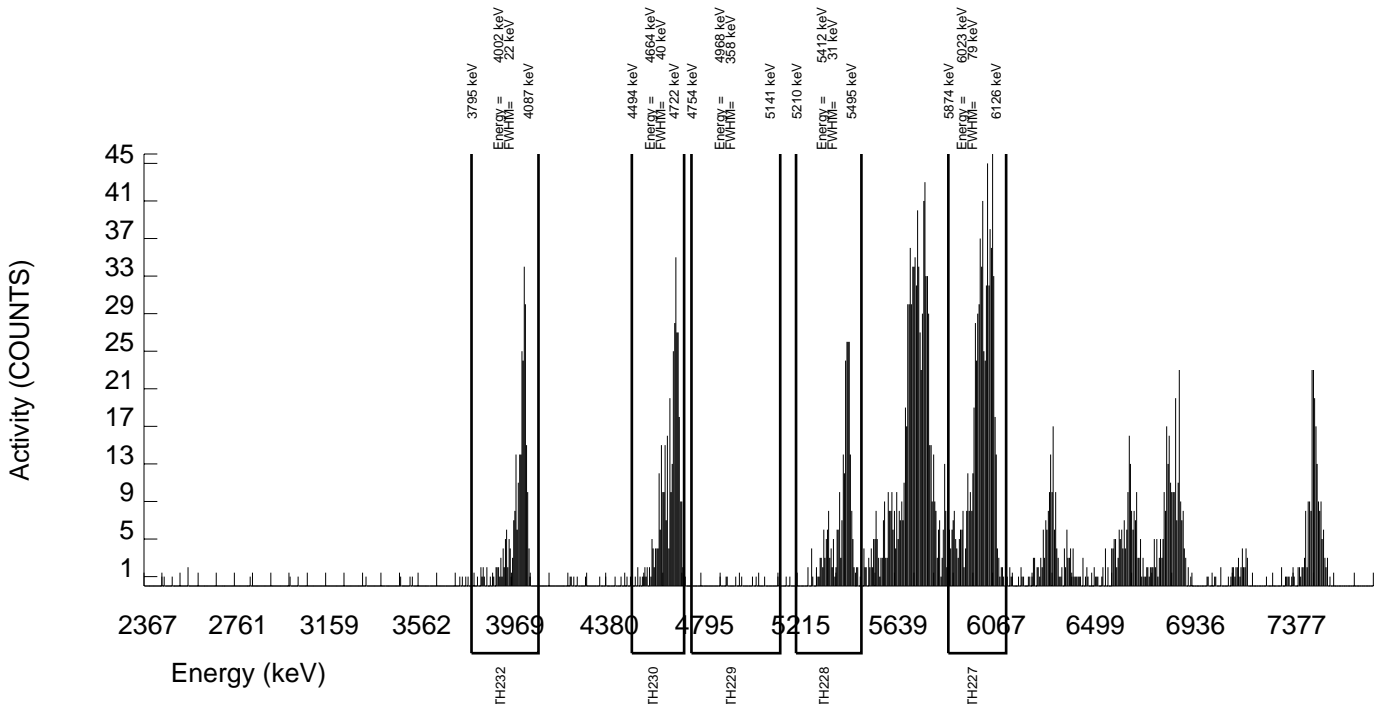
GEL Laboratories LLC
 ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S1201933859_TH SAMPLE QTY: 0.256 G	
DETECTOR NUMBER :76544 AVERAGE %EFFICIENCY :33.9607 % YIELD : 111.923		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.360E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.36511 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B046.CNF;1072 BKG DATE : 4-OCT-2009 EFF FILE : W046.CNF;281 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	734.000	725.000	9.000	3.0000	57.44000	6.86E+00	6.50E-01	1.61E-01	6.61E-02	5.06E-01
TH-228	5363.000	258.000	248.000	10.000	3.1623	99.94000	1.17E+00	1.67E-01	8.39E-02	3.49E-02	1.52E-01
TH229	4900.000	10.000	2.000	8.000	2.8284	99.52000	9.30E-03	3.87E-02	7.52E-02	3.06E-02	3.87E-02
TH-230	4625.000	357.000	354.000	3.000	1.7321	100.0000	1.64E+00	1.98E-01	5.12E-02	1.87E-02	1.72E-01
TH-232	3972.000	272.000	265.000	7.000	2.6458	100.0000	1.23E+00	1.68E-01	7.09E-02	2.85E-02	1.52E-01

NOTE: Ac-227 results decay corrected to separation date/time.



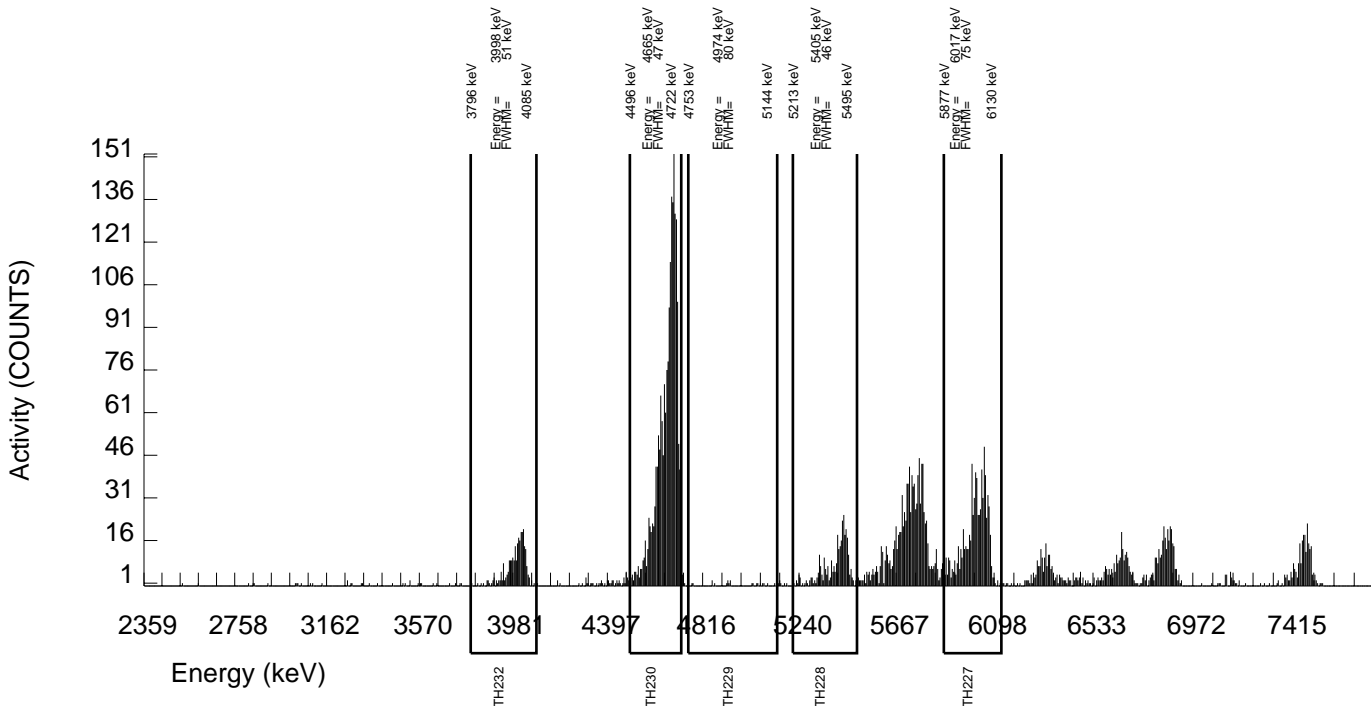
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 14-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S1201933860_TH SAMPLE QTY: 0.253 G	
DETECTOR NUMBER :46-089B1 AVERAGE %EFFICIENCY :34.2510 % YIELD : 115.260		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.459E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.49526 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B047.CNF;1067 BKG DATE : 4-OCT-2009 EFF FILE : W047.CNF;295 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	770.000	753.000	17.000	4.1231	57.44000	6.94E+00	6.54E-01	2.05E-01	8.85E-02	5.07E-01
TH-228	5363.000	316.000	310.000	6.000	2.4495	99.94000	1.43E+00	1.83E-01	6.64E-02	2.63E-02	1.62E-01
TH229	4900.000	20.000	12.000	8.000	2.8284	99.52000	5.44E-02	4.71E-02	7.32E-02	2.98E-02	4.70E-02
TH-230	4625.000	1971.000	1966.000	5.000	2.2361	100.0000	8.87E+00	6.58E-01	6.05E-02	2.35E-02	3.93E-01
TH-232	3972.000	270.000	268.000	2.000	1.4142	100.0000	1.21E+00	1.63E-01	4.32E-02	1.48E-02	1.46E-01

NOTE: Ac-227 results decay corrected to separation date/time.



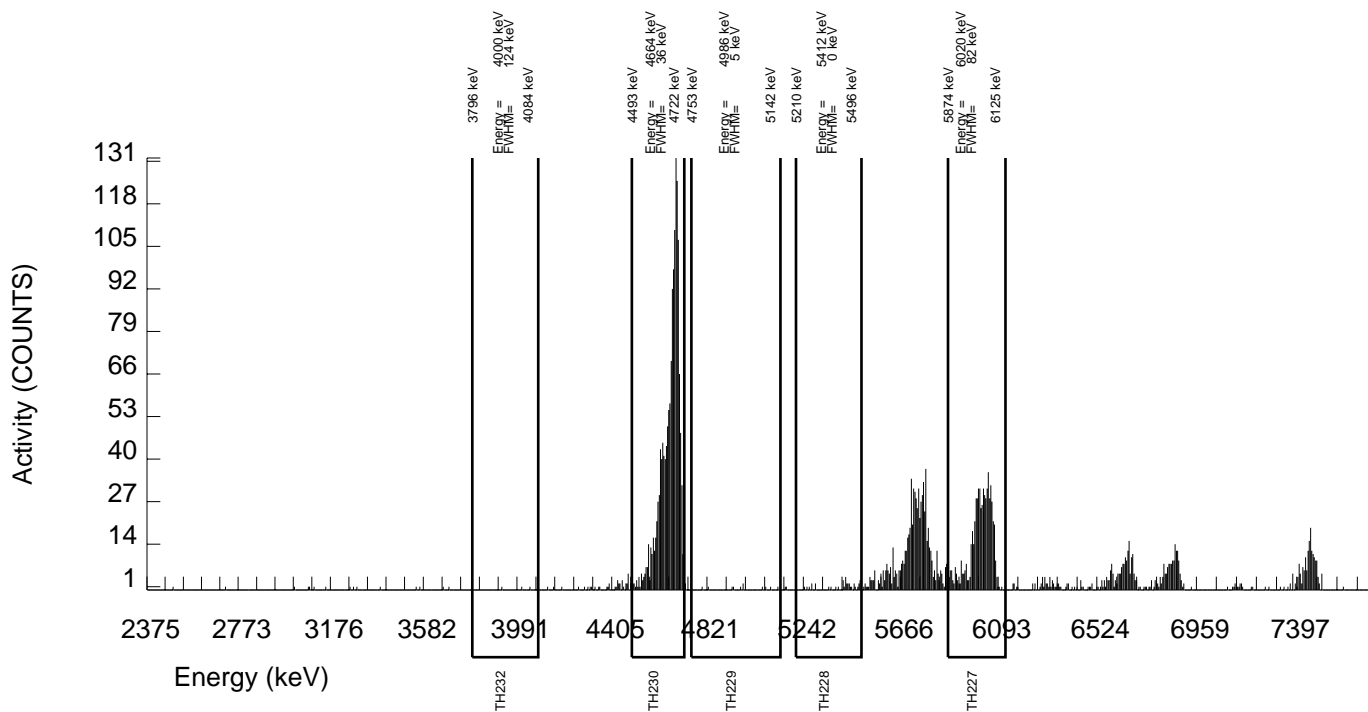
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906768 SAMPLE DATE : 30-SEP-2009 00:00:00 AC-227 SEPARATION : 2-OCT-2009 09:00:00.		SAMPLE ID : S1201933861_TH SAMPLE QTY: 0.259 G	
DETECTOR NUMBER :42483 AVERAGE %EFFICIENCY :31.6032 % YIELD : 103.683		COUNT DATE: 6-OCT-2009 08:55:48 ELAPSED LIVE TIME(SEC): 59999.99 ANALYST :KXM4	
MS/MSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	LCS/LCSD ID : A2796-J ISOTOPE : TH-230 PCI/G : 8.263E+00	TRACER ID : 0387-B-102 ISOTOPE : AC-227 NOMINAL : 3.90010 dpm RESULTS : 4.04373 dpm	LIB FILE : ENV_ALPHA_TH.N BKG FILE : B048.CNF;1068 BKG DATE : 4-OCT-2009 EFF FILE : W048.CNF;308 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
AC-227	5994.040	627.000	625.000	2.000	1.4142	57.44000	6.78E+00	6.69E-01	1.04E-01	3.57E-02	5.33E-01
TH-228	5363.000	36.000	19.000	17.000	4.1231	99.94000	1.02E-01	7.65E-02	1.19E-01	5.13E-02	7.63E-02
TH229	4900.000	11.000	-3.000	14.000	3.7417	99.52000	-1.60E-02	5.23E-02	1.09E-01	4.64E-02	5.23E-02
TH-230	4625.000	1518.000	1516.000	2.000	1.4142	100.0000	8.05E+00	6.27E-01	5.08E-02	1.75E-02	4.06E-01
TH-232	3972.000	3.000	-3.000	6.000	2.4495	100.0000	-1.59E-02	3.12E-02	7.64E-02	3.02E-02	3.12E-02

NOTE: Ac-227 results decay corrected to separation date/time.



URANIUM

Radiochemistry Batch Checklist, Rev 9

Batch# 906769 Product: u Date: 10/9/09

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			N/A
Samples have been blank corrected (if required)			N/A
If activity less 10* MDA/ MDC, error is 150% or less of sample activity. If greater 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.		✓	NCR# 744314
If duplicate activities are less 5* MDA/ MDC, then RPD is 100% or less. If greater 5* MDA/ MDC, then RPD 20% or less. If below the MDA/ MDC, the RPD is 0%.	✓		
Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%.	✓		
Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			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 line outs initialed and dated.	✓		
No transcription errors are apparent.	✓		
Aux data is correct.			N/A
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stasured.	✓		
QC data entered into QC database and batch is in REVW	✓		
Hit notification complete (if necessary)			N/A
Batch entered into Case Narrative.	✓		
Batch non-conformances completed, if applicable.	✓		NCR# 744314
Batch non-conformances second reviewed and disposition verified to be completed.	✓		NCR# 744314
Aliquot Correction completed if required.			N/A
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

GEL Laboratories, LLC

revised 8/1/08

Primary Review Performed By: [Signature] 10/9/09

Secondary Review Performed By: [Signature]

KELR

10/2 - 10/13

Uranium Que Sheet

28-SEP-09

Batch #: 906769 Analyst: KXM4 First Client Due Date: 13-OCT-09 Internal Due Date: 02-OCT-09
 Tracer Isotope: U-232 Tracer Code: 1283-E Expiration Date: 1-15-10 Vol: 0.1ml
 LCS Isotope: U-238 LCS Code: 1163-G Expiration Date: 4-16-10 Vol: 0.1ml
 Spike Isotope: U-238 Spike Code: 1163-G Expiration Date: 4-16-10 Vol: 0.1ml
 Prep Date: 9-30-09 Initials: VM Pipet ID: 2971058 Balance ID: 50410277
 Witness: NDA 9/30/09

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collection Date	Pos.	Label #	Wet/Dry Aliquot (g/l/f)	U Det #
237118001-1	SA40-10B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	1	1	0.517	149
237118002-1	SA40-25B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	2	2	0.506	150
237118003-1	SA41-12B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	3	3	0.505	151
237118004-1	SA41-25B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	4	4	0.504	152
237118005-1	SA41-38B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	5	5	0.502	153
237118006-1	SA114-10B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	6	6	0.505	154
237118007-1	SA114-30B	SAMPLE		.04 pCi/g	SOIL	KERR003	11-SEP-09	7	7	0.515	155
237118008-1	RSA08-11.5B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	8	8	0.505	156
237118009-1	RSA08-21.5B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	9	9	0.519	157
237118010-1	RSA08-43B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	10	10	0.513	158
237118011-1	RSAR6-0.5B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	11	11	0.504	159
237118012-1	RSAR6-9B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	12	12	0.507	160
237118013-1	RSAR6-25B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	13	13	0.504	8
237118014-1	RSAR6-37B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	14	14	0.511	9
237118015-1	SA43-10B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	15	15	0.501	10
237118016-1	SA43-25B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	16	16	0.519	11
237118017-1	SA43-43B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	17	17	0.502	12
237118018-1	SA44-10B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	18	18	0.506	13
237118019-1	SA44-25B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	19	19	0.508	14
237118020-1	SA44-42B	SAMPLE		.04 pCi/g	SOIL	KERR003	14-SEP-09	20	20	0.510	15
1201933862-1	MB for batch 906769	MB		.04 pCi/g	SOIL	QC ACCOUNT		21	21	0.519	16
1201933863-1	RSAR6-37B(237118014DUP)	DUP		.04 pCi/g	SOIL	QC ACCOUNT	14-SEP-09	22	22	0.519	17
1201933864-1	RSAR6-37B(237118014MS)	MS		.04 pCi/g	SOIL	QC ACCOUNT	14-SEP-09	23	23	0.506	18
1201933865-1	LCS for batch 906769	LCS		.04 pCi/g	SOIL	QC ACCOUNT		24	24	0.519	19

Data Reviewed By: [Signature] 10/9/09

Solid Sample Dissolution by: LEACH of DIGESTION
 Circle One

Choose SOP used: GL-RAD-A-011
 GL-RAD-A-036
 GL-RAD-A-045
 GL-RAD-A-043

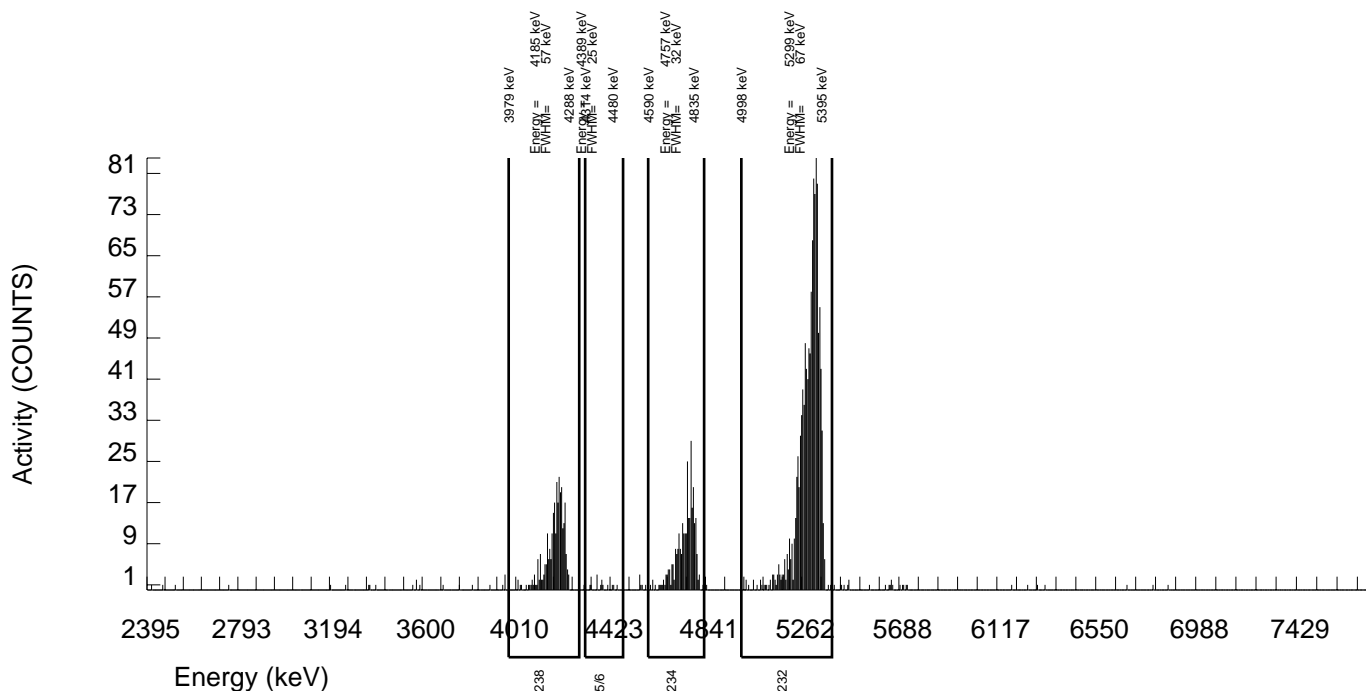
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118001_UU SAMPLE QTY: 0.517 G	
DETECTOR NUMBER :33449 AVERAGE %EFFICIENCY :24.4275 % YIELD : 92.169		COUNT DATE: 7-OCT-2009 21:32:54 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.872E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.872E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 4.84639 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B149.CNF;360 BKG DATE : 4-OCT-2009 EFF FILE : W149.CNF;104 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	292.000	283.807	7.000	2.6458	100.0000	1.10E+00	2.00E-01	5.92E-02	2.38E-02	1.31E-01
U232	5302.100	1191.000	1183.000	8.000	2.8284	100.0000	4.58E+00	6.83E-01	6.26E-02	2.55E-02	2.63E-01
U-235	4391.000	14.000	13.000	1.000	1.0000	80.90000	6.22E-02	3.73E-02	3.66E-02	1.11E-02	3.63E-02
U-238	4184.730	288.000	288.000	0.000	0.0000	100.0000	1.11E+00	2.00E-01	1.16E-02	0.00E+00	1.29E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



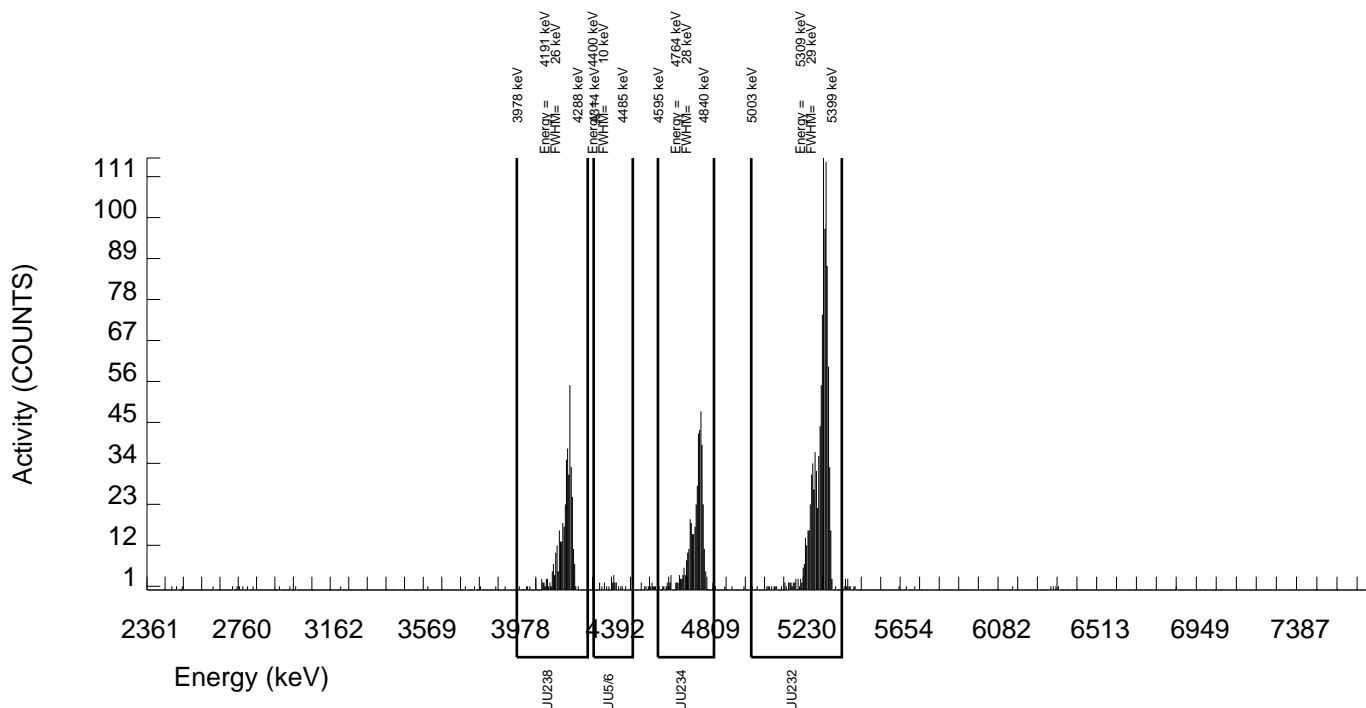
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118002_UU SAMPLE QTY: 0.506 G	
DETECTOR NUMBER :75552 AVERAGE %EFFICIENCY :24.9777 % YIELD : 79.242		COUNT DATE: 7-OCT-2009 21:32:56 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 4.16670 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B150.CNF;361 BKG DATE : 4-OCT-2009 EFF FILE : W150.CNF;112 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	420.000	413.952	5.000	2.2361	100.0000	1.86E+00	3.16E-01	6.03E-02	2.34E-02	1.82E-01
U232	5302.100	1050.000	1040.000	10.000	3.1623	100.0000	4.68E+00	7.12E-01	7.97E-02	3.31E-02	2.87E-01
U-235	4391.000	21.000	20.000	1.000	1.0000	80.90000	1.11E-01	5.34E-02	4.25E-02	1.29E-02	5.11E-02
U-238	4184.730	408.000	407.000	1.000	1.0000	100.0000	1.83E+00	3.11E-01	3.44E-02	1.05E-02	1.78E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



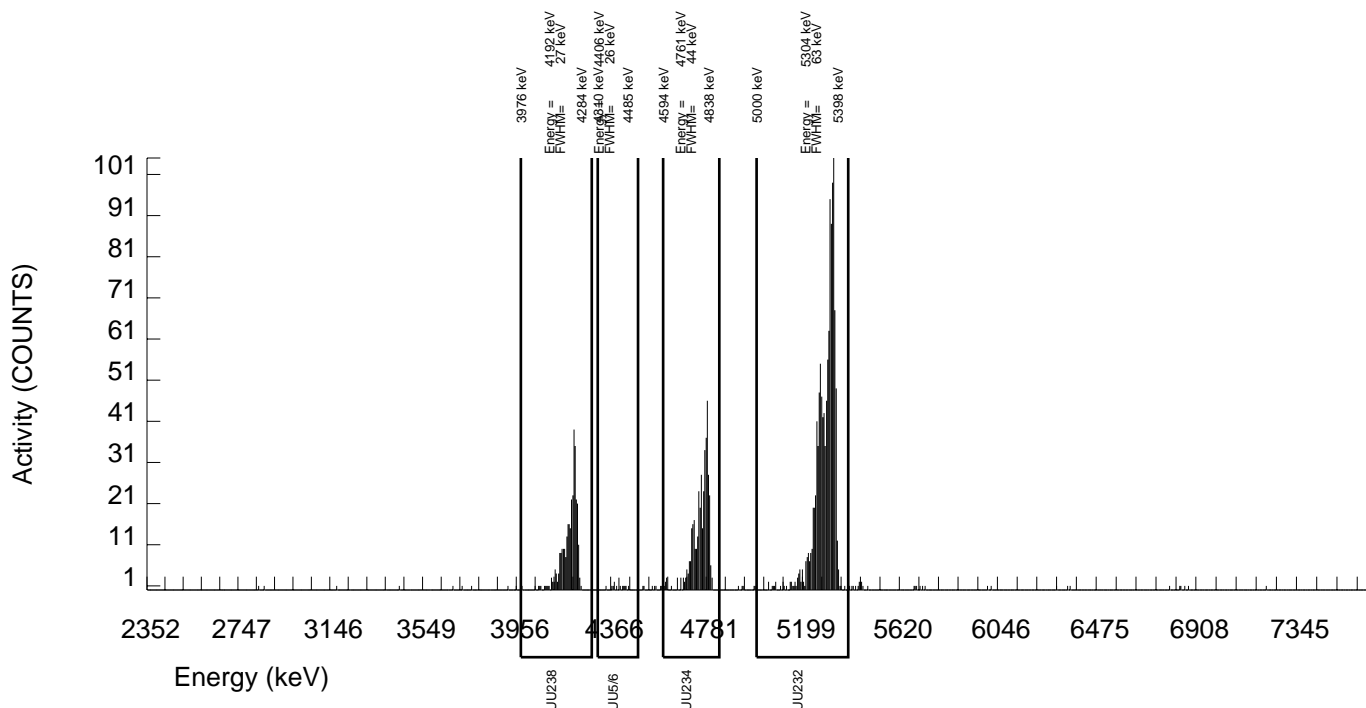
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118003_UU SAMPLE QTY: 0.505 G	
DETECTOR NUMBER :75556 AVERAGE %EFFICIENCY :24.4597 % YIELD : 92.514		COUNT DATE: 7-OCT-2009 21:32:58 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 4.86454 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B151.CNF;356 BKG DATE : 4-OCT-2009 EFF FILE : W151.CNF;110 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	414.000	412.801	0.000	0.0000	100.0000	1.63E+00	2.73E-01	1.18E-02	0.00E+00	1.57E-01
U232	5302.100	1193.000	1189.000	4.000	2.0000	100.0000	4.69E+00	6.98E-01	4.85E-02	1.84E-02	2.67E-01
U-235	4391.000	15.000	13.000	2.000	1.4142	80.90000	6.33E-02	4.03E-02	4.67E-02	1.60E-02	3.94E-02
U-238	4184.730	325.000	325.000	0.000	0.0000	100.0000	1.28E+00	2.24E-01	1.18E-02	0.00E+00	1.39E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



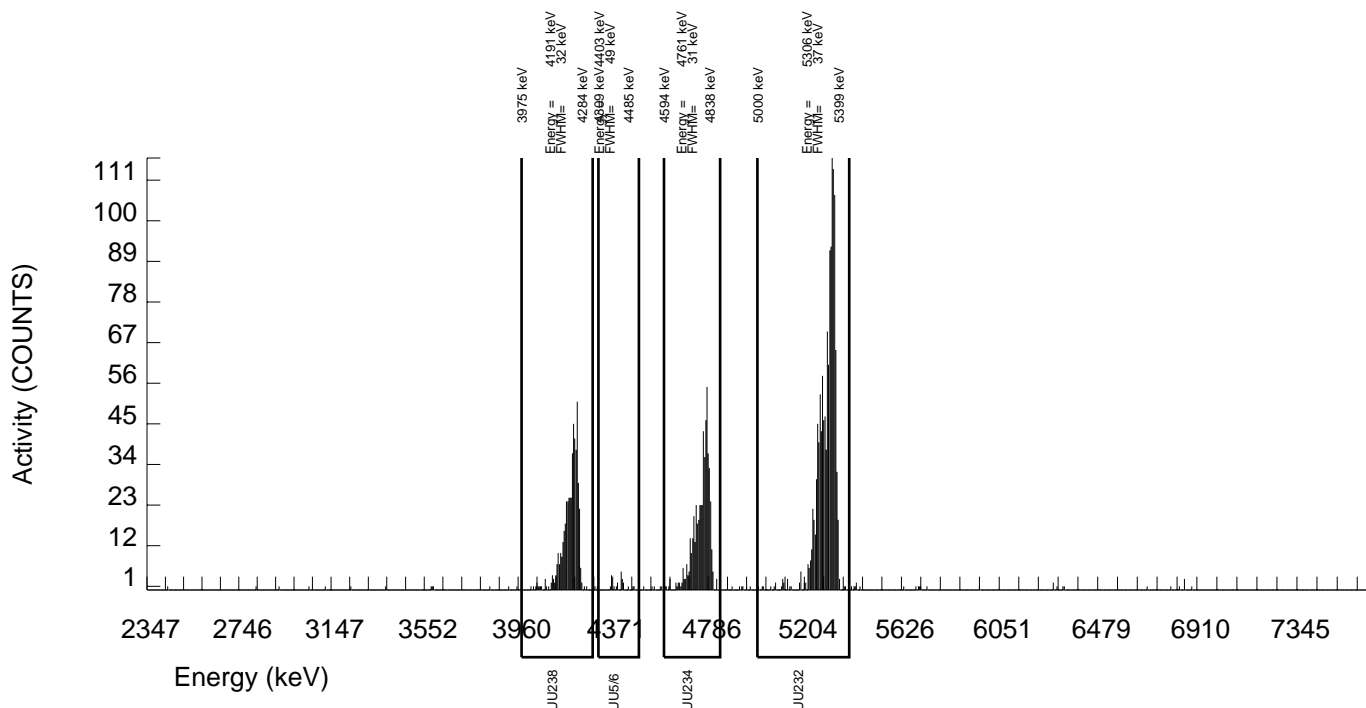
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118004_UU SAMPLE QTY: 0.504 G	
DETECTOR NUMBER :76222 AVERAGE %EFFICIENCY :24.6765 % YIELD : 99.259		COUNT DATE: 7-OCT-2009 21:33:01 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.998E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.998E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 5.21923 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B152.CNF;353 BKG DATE : 4-OCT-2009 EFF FILE : W152.CNF;97 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	537.000	531.703	4.000	2.0000	100.0000	1.94E+00	3.13E-01	4.49E-02	1.70E-02	1.66E-01
U232	5302.100	1292.000	1287.000	5.000	2.2361	100.0000	4.70E+00	6.91E-01	4.89E-02	1.90E-02	2.58E-01
U-235	4391.000	23.000	21.000	2.000	1.4142	80.90000	9.47E-02	4.61E-02	4.32E-02	1.48E-02	4.42E-02
U-238	4184.730	516.000	516.000	0.000	0.0000	100.0000	1.88E+00	3.04E-01	1.09E-02	0.00E+00	1.62E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



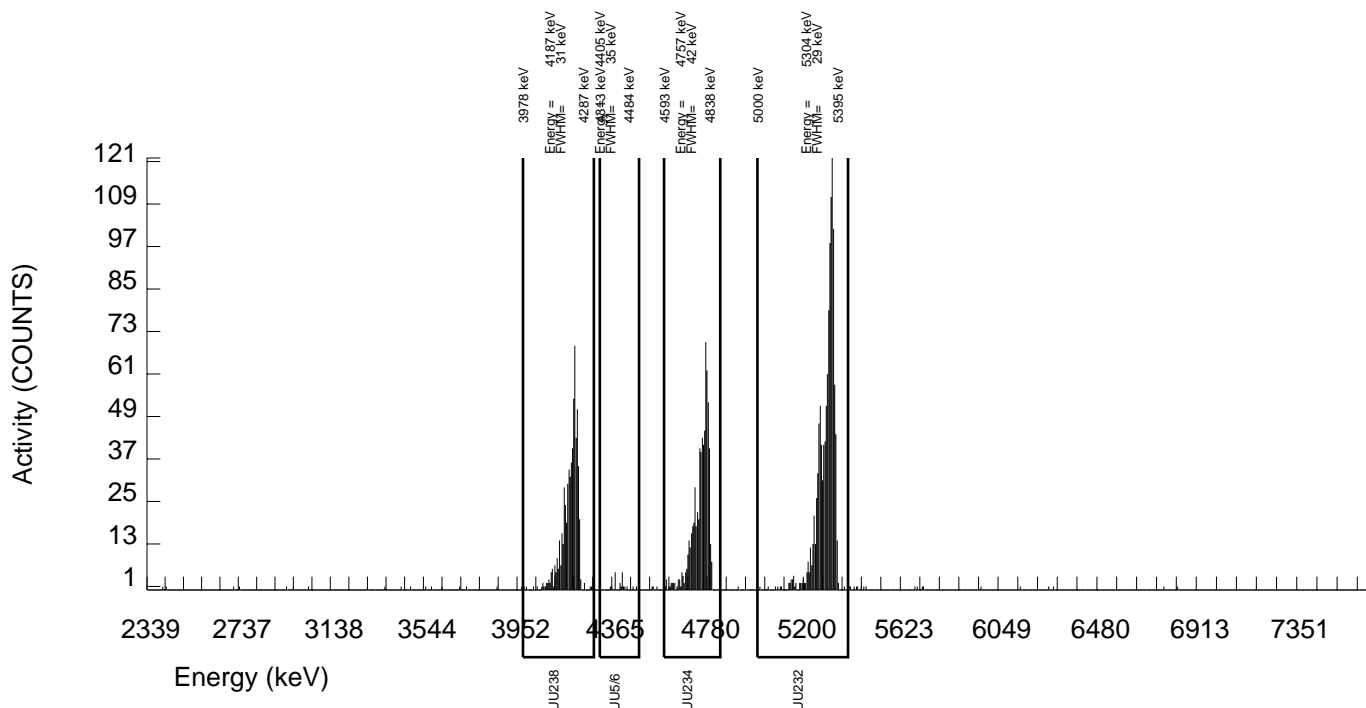
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118005_UU SAMPLE QTY: 0.502 G	
DETECTOR NUMBER :76223 AVERAGE %EFFICIENCY :25.3061 % YIELD : 87.163		COUNT DATE: 7-OCT-2009 21:33:03 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.018E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.018E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 4.58320 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B153.CNF;348 BKG DATE : 4-OCT-2009 EFF FILE : W153.CNF;100 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	676.000	672.832	2.000	1.4142	100.0000	2.74E+00	4.31E-01	3.90E-02	1.34E-02	2.07E-01
U232	5302.100	1178.000	1159.000	19.000	4.3589	100.0000	4.72E+00	7.07E-01	9.48E-02	4.13E-02	2.76E-01
U-235	4391.000	21.000	20.000	1.000	1.0000	80.90000	1.01E-01	4.83E-02	3.85E-02	1.17E-02	4.62E-02
U-238	4184.730	632.000	629.000	3.000	1.7321	100.0000	2.56E+00	4.06E-01	4.50E-02	1.64E-02	2.01E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



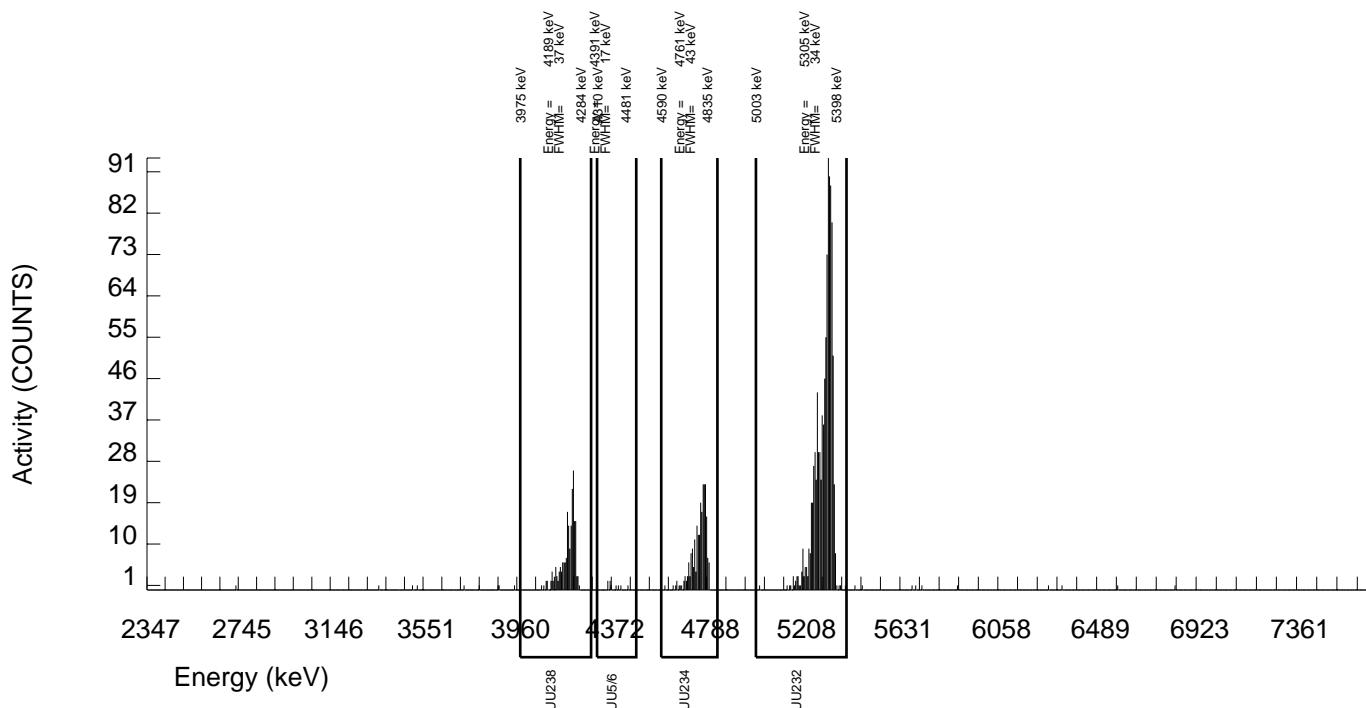
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118006_UU SAMPLE QTY: 0.505 G	
DETECTOR NUMBER :76224 AVERAGE %EFFICIENCY :25.6606 % YIELD : 73.648		COUNT DATE: 7-OCT-2009 21:33:06 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 3.87253 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B154.CNF;350 BKG DATE : 4-OCT-2009 EFF FILE : W154.CNF;98 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	236.000	228.999	6.000	2.4495	100.0000	1.08E+00	2.08E-01	6.80E-02	2.69E-02	1.44E-01
U232	5302.100	996.000	993.000	3.000	1.7321	100.0000	4.69E+00	7.18E-01	5.22E-02	1.90E-02	2.93E-01
U-235	4391.000	9.000	9.000	0.000	0.0000	80.90000	5.25E-02	3.51E-02	1.75E-02	0.00E+00	3.43E-02
U-238	4184.730	201.000	199.000	2.000	1.4142	100.0000	9.39E-01	1.86E-01	4.52E-02	1.55E-02	1.32E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



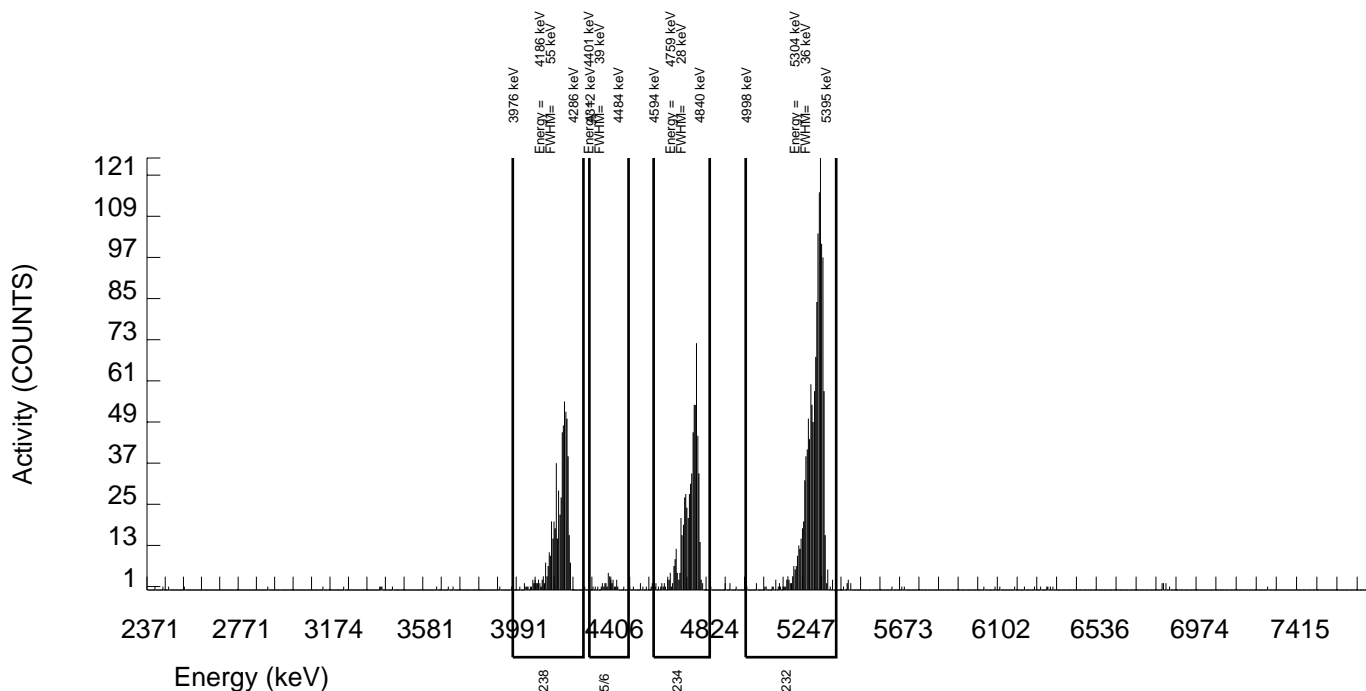
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 11-SEP-2009 00:00:00		SAMPLE ID : S0237118007_UU SAMPLE QTY: 0.515 G	
DETECTOR NUMBER :75553 AVERAGE %EFFICIENCY :25.8645 % YIELD : 98.600		COUNT DATE: 7-OCT-2009 21:33:08 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.891E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.891E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25817 dpm RESULTS : 5.18457 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B155.CNF;357 BKG DATE : 4-OCT-2009 EFF FILE : W155.CNF;107 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	641.000	636.649	3.000	1.7321	100.0000	2.18E+00	3.43E-01	3.79E-02	1.38E-02	1.70E-01
U232	5302.100	1353.000	1340.000	13.000	3.6056	100.0000	4.60E+00	6.74E-01	6.79E-02	2.88E-02	2.49E-01
U-235	4391.000	37.000	37.000	0.000	0.0000	80.90000	1.57E-01	5.49E-02	1.27E-02	0.00E+00	5.05E-02
U-238	4184.730	593.000	590.000	3.000	1.7321	100.0000	2.02E+00	3.21E-01	3.79E-02	1.38E-02	1.64E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



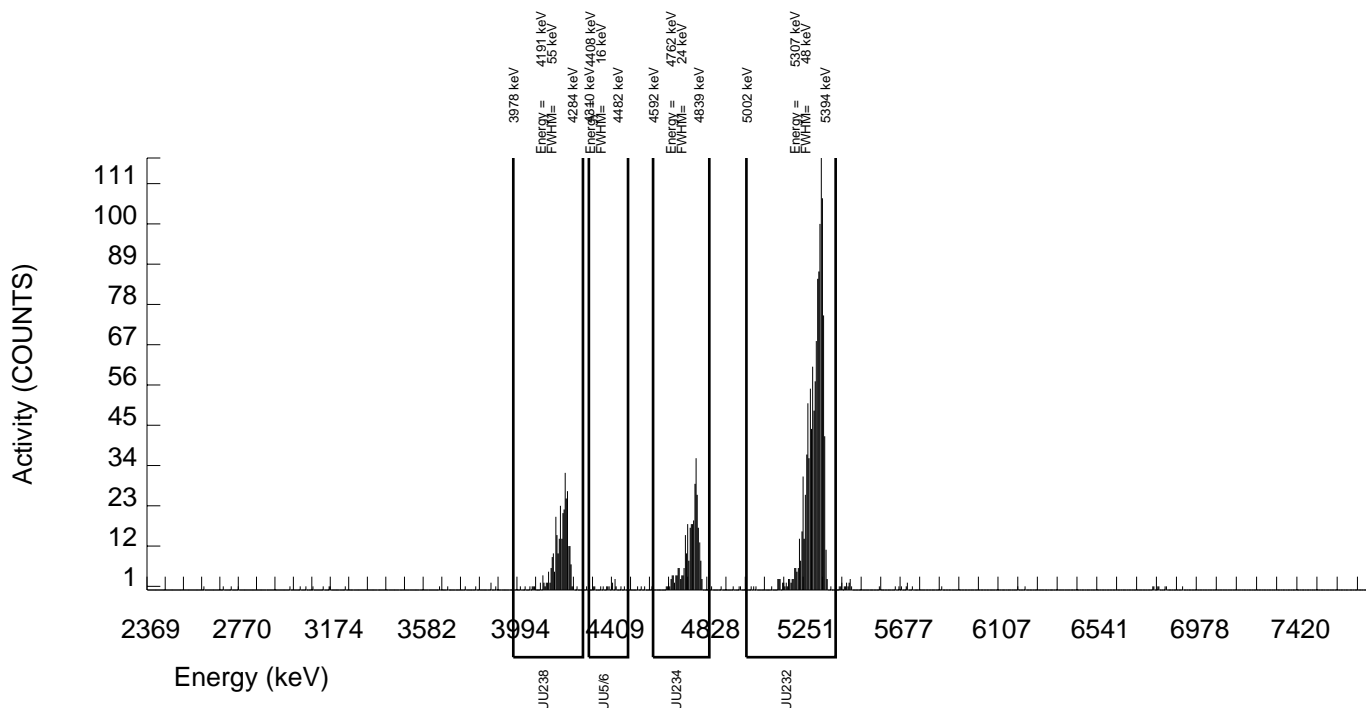
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118008_UU SAMPLE QTY: 0.505 G	
DETECTOR NUMBER :75554 AVERAGE %EFFICIENCY :24.5835 % YIELD : 96.229		COUNT DATE: 7-OCT-2009 21:33:11 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.988E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 5.05947 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B156.CNF;358 BKG DATE : 4-OCT-2009 EFF FILE : W156.CNF;111 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	311.000	301.747	8.000	2.8284	100.0000	1.14E+00	2.04E-01	6.09E-02	2.48E-02	1.32E-01
U232	5302.100	1254.000	1243.000	11.000	3.3166	100.0000	4.69E+00	6.94E-01	6.95E-02	2.91E-02	2.63E-01
U-235	4391.000	16.000	14.000	2.000	1.4142	80.90000	6.53E-02	3.98E-02	4.47E-02	1.53E-02	3.88E-02
U-238	4184.730	314.000	312.000	2.000	1.4142	100.0000	1.18E+00	2.08E-01	3.61E-02	1.24E-02	1.31E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



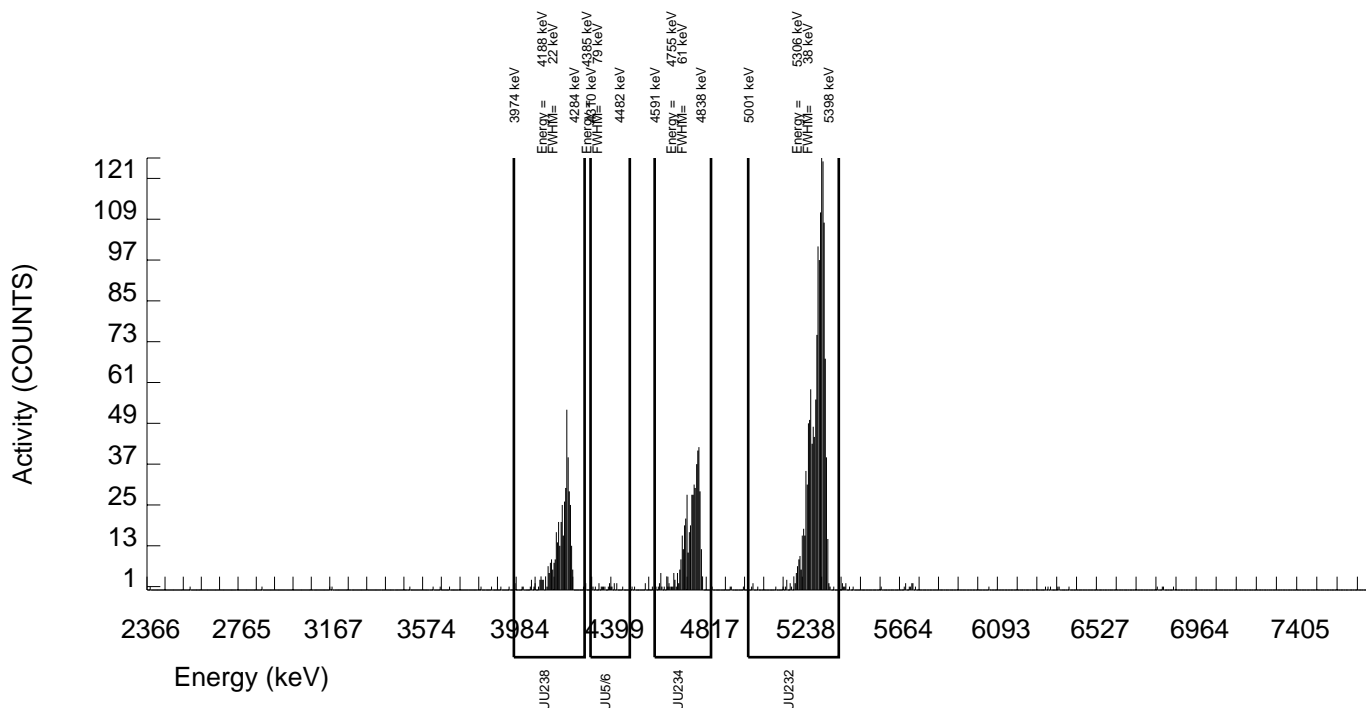
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118009_UU SAMPLE QTY: 0.519 G	
DETECTOR NUMBER :75555 AVERAGE %EFFICIENCY :24.7420 % YIELD : 106.381		COUNT DATE: 7-OCT-2009 21:33:13 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 5.59326 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B157.CNF;358 BKG DATE : 4-OCT-2009 EFF FILE : W157.CNF;101 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	477.000	466.606	9.000	3.0000	100.0000	1.54E+00	2.53E-01	5.59E-02	2.30E-02	1.42E-01
U232	5302.100	1393.000	1383.000	10.000	3.1623	100.0000	4.56E+00	6.65E-01	5.84E-02	2.43E-02	2.42E-01
U-235	4391.000	19.000	16.000	3.000	1.7321	80.90000	6.52E-02	3.85E-02	4.51E-02	1.64E-02	3.75E-02
U-238	4184.730	429.000	423.000	6.000	2.4495	100.0000	1.39E+00	2.32E-01	4.75E-02	1.88E-02	1.35E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



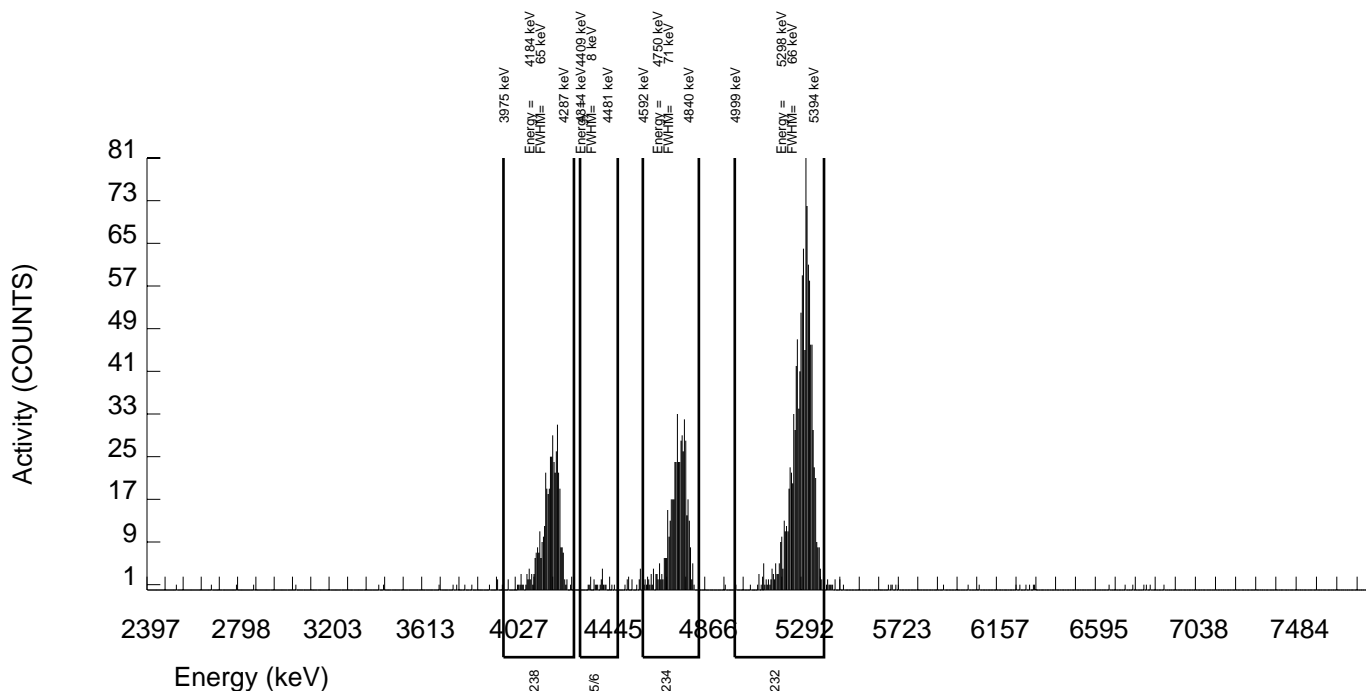
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118010_UU SAMPLE QTY: 0.513 G	
DETECTOR NUMBER :33451 AVERAGE %EFFICIENCY :24.9380 % YIELD : 84.787		COUNT DATE: 7-OCT-2009 21:33:16 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.910E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.910E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.45790 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B158.CNF;359 BKG DATE : 4-OCT-2009 EFF FILE : W158.CNF;104 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	475.000	470.880	3.000	1.7321	100.0000	1.96E+00	3.24E-01	4.59E-02	1.67E-02	1.78E-01
U232	5302.100	1118.000	1111.000	7.000	2.6458	100.0000	4.62E+00	6.94E-01	6.36E-02	2.56E-02	2.73E-01
U-235	4391.000	19.000	19.000	0.000	0.0000	80.90000	9.75E-02	4.59E-02	1.54E-02	0.00E+00	4.39E-02
U-238	4184.730	436.000	435.000	1.000	1.0000	100.0000	1.81E+00	3.02E-01	3.18E-02	9.66E-03	1.70E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



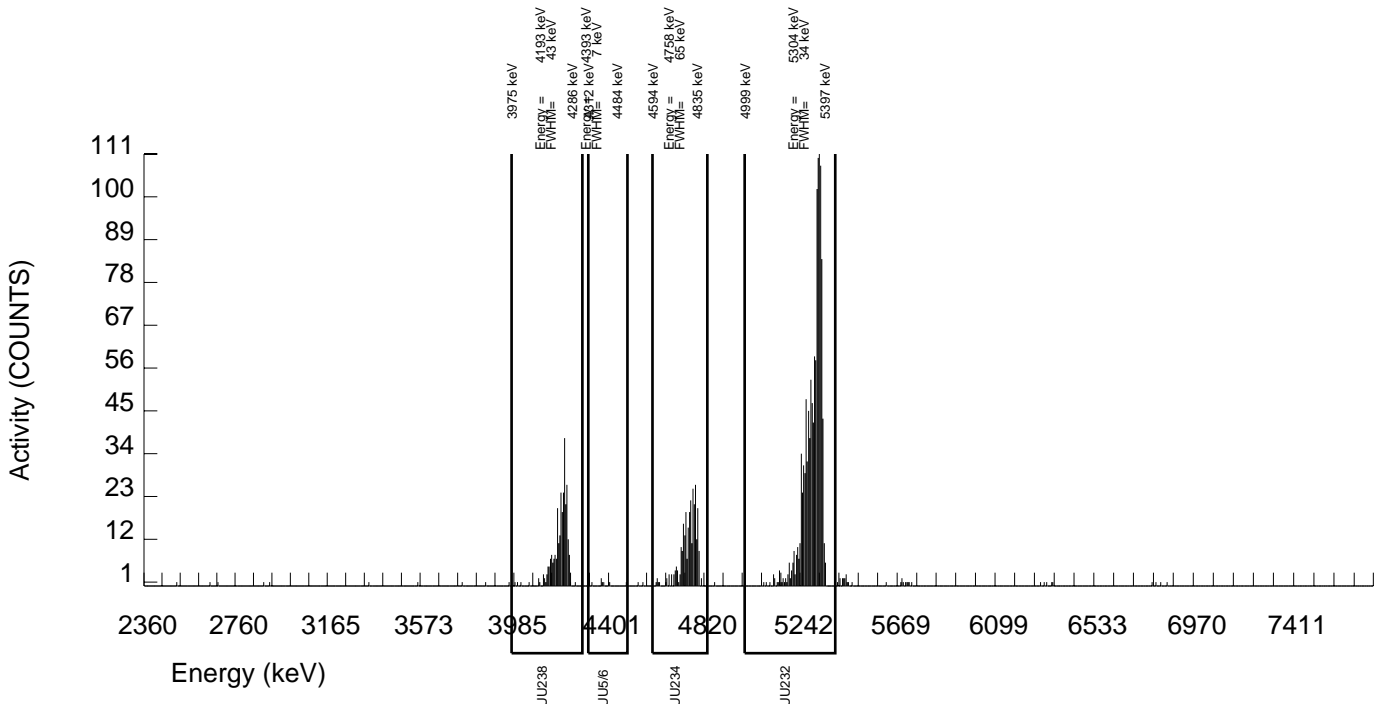
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118011_UU SAMPLE QTY: 0.504 G	
DETECTOR NUMBER :76225 AVERAGE %EFFICIENCY :25.0830 % YIELD : 89.987		COUNT DATE: 7-OCT-2009 21:33:18 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.998E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.998E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.73132 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B159.CNF;332 BKG DATE : 4-OCT-2009 EFF FILE : W159.CNF;96 CAL DATE : 15-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	290.000	278.804	10.000	3.1623	100.0000	1.10E+00	2.03E-01	7.01E-02	2.91E-02	1.34E-01
U232	5302.100	1207.000	1186.000	21.000	4.5826	100.0000	4.70E+00	7.02E-01	9.64E-02	4.22E-02	2.72E-01
U-235	4391.000	8.000	5.000	3.000	1.7321	80.90000	2.45E-02	3.20E-02	5.41E-02	1.97E-02	3.18E-02
U-238	4184.730	287.000	284.000	3.000	1.7321	100.0000	1.12E+00	2.04E-01	4.38E-02	1.60E-02	1.32E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



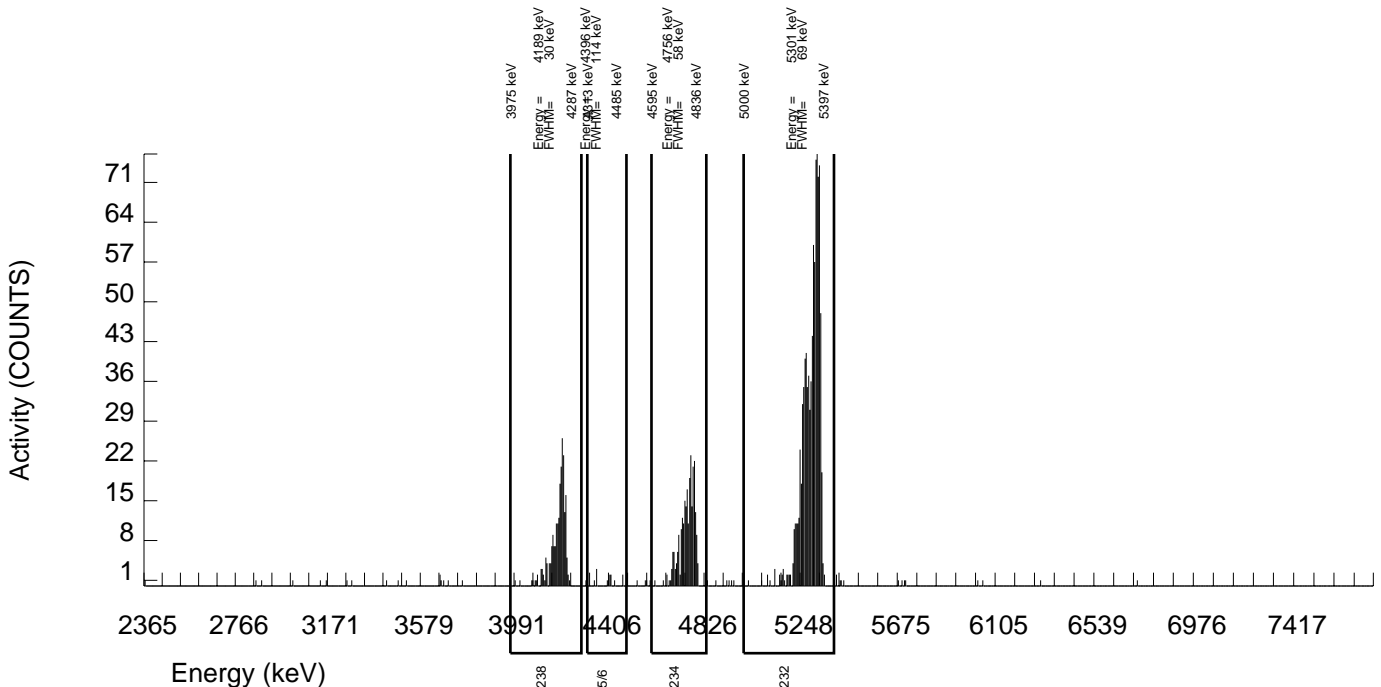
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118012_UU SAMPLE QTY: 0.507 G	
DETECTOR NUMBER :79994 AVERAGE %EFFICIENCY :24.4465 % YIELD : 73.257		COUNT DATE: 7-OCT-2009 21:33:20 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.968E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.968E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 3.85169 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B160.CNF;334 BKG DATE : 4-OCT-2009 EFF FILE : W160.CNF;108 CAL DATE : 29-SEP-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	261.000	255.051	5.000	2.2361	100.0000	1.27E+00	2.38E-01	6.65E-02	2.58E-02	1.58E-01
U232	5302.100	945.000	941.000	4.000	2.0000	100.0000	4.67E+00	7.22E-01	6.11E-02	2.31E-02	3.00E-01
U-235	4391.000	15.000	13.000	2.000	1.4142	80.90000	7.97E-02	5.08E-02	5.87E-02	2.02E-02	4.96E-02
U-238	4184.730	223.000	219.000	4.000	2.0000	100.0000	1.09E+00	2.12E-01	6.10E-02	2.31E-02	1.47E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769
SAMPLE DATE : 14-SEP-2009 00:00:00

SAMPLE ID : S0237118013_UU
SAMPLE QTY: 0.504 G

DETECTOR NUMBER :78788
AVERAGE %EFFICIENCY :32.1035
% YIELD : 103.507

COUNT DATE: 7-OCT-2009 21:33:31
ELAPSED LIVE TIME(SEC): 60000.00
ANALYST :KXM4

MS/MSD
ID : 1163-G
ISOTOPE : U-238
PCI/G : 4.998E+00

LCS/LCSD
ID : 1163-G
ISOTOPE : U-238
PCI/G : 4.998E+00

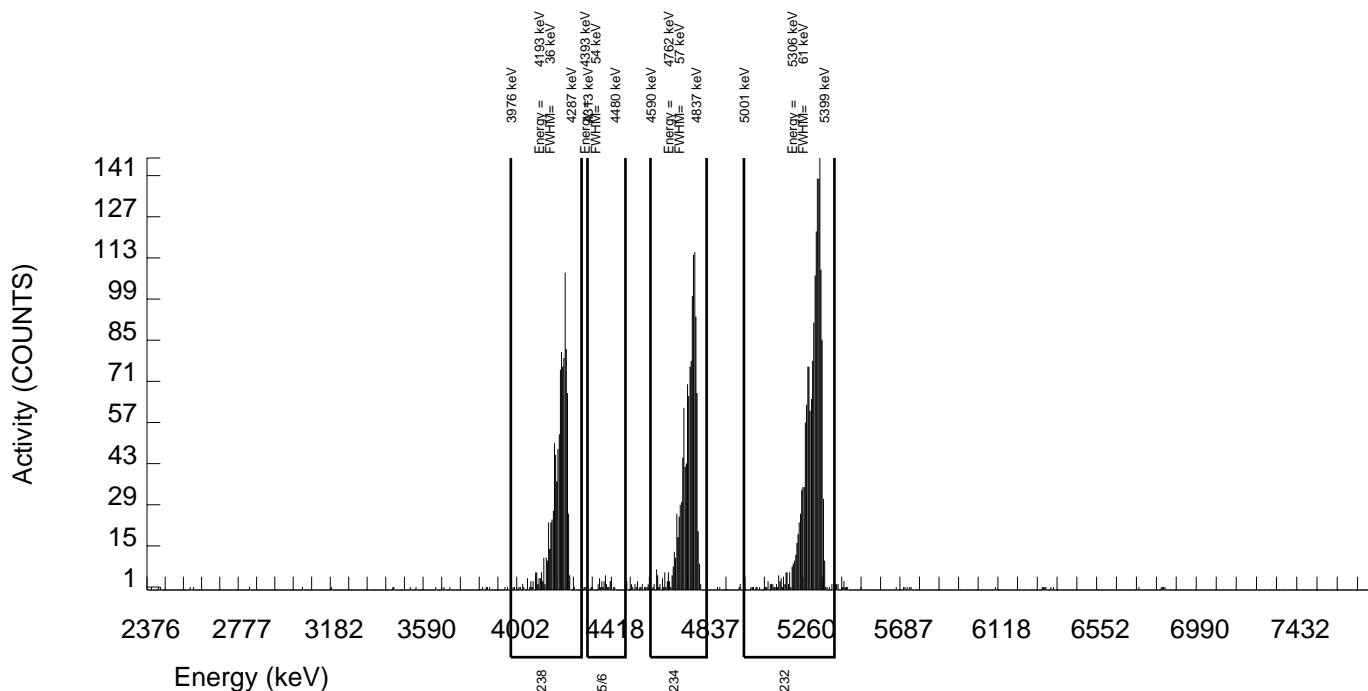
TRACER
ID : 1283-E
ISOTOPE : U232
NOMINAL : 5.25776 dpm
RESULTS : 5.44214 dpm

LIB FILE : ENV_ALPHA_UU.N
BKG FILE : B008.CNF;1071
BKG DATE : 4-OCT-2009
EFF FILE : W008.CNF;335
CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	1213.000	1209.240	2.000	1.4142	100.0000	3.25E+00	4.71E-01	2.58E-02	8.85E-03	1.84E-01
U232	5302.100	1751.000	1746.000	5.000	2.2361	100.0000	4.70E+00	6.65E-01	3.61E-02	1.40E-02	2.21E-01
U-235	4391.000	33.000	33.000	0.000	0.0000	80.90000	1.10E-01	4.02E-02	9.97E-03	0.00E+00	3.74E-02
U-238	4184.730	1031.000	1029.000	2.000	1.4142	100.0000	2.77E+00	4.06E-01	2.58E-02	8.85E-03	1.69E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



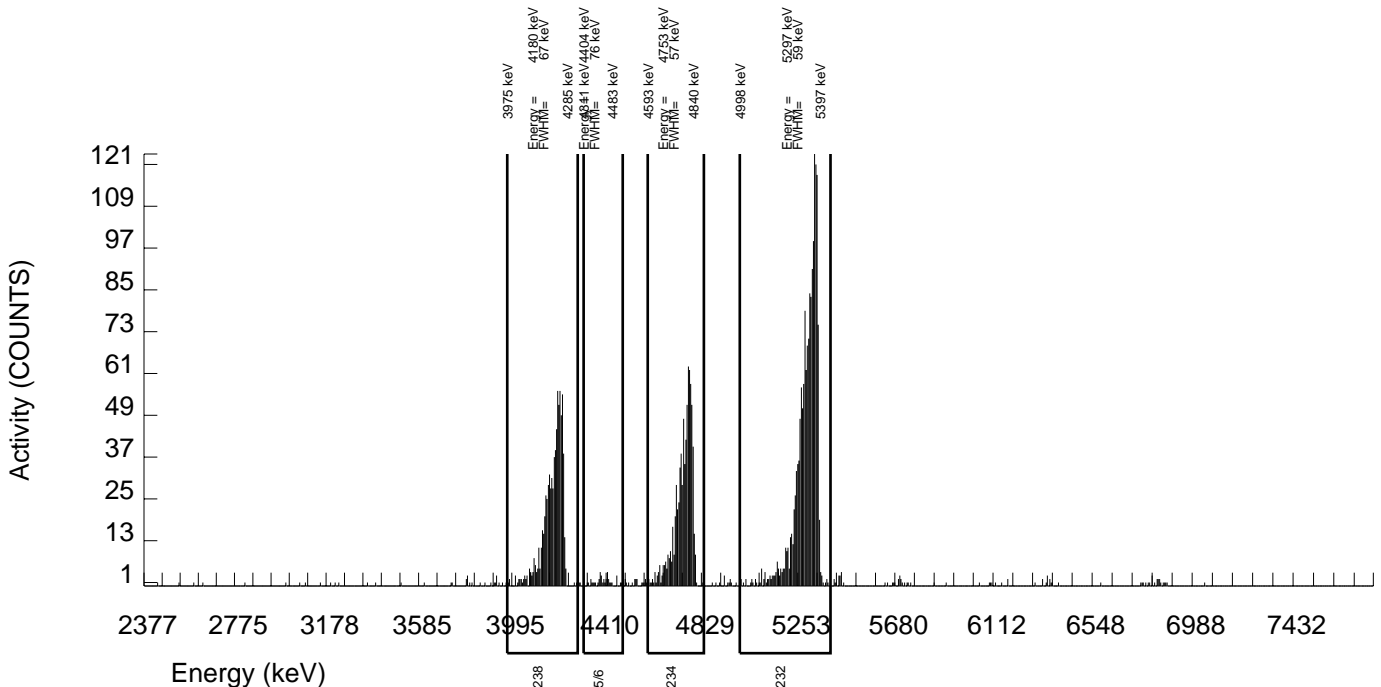
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118014_UU SAMPLE QTY: 0.511 G	
DETECTOR NUMBER :72528 AVERAGE %EFFICIENCY :33.9677 % YIELD : 91.047		COUNT DATE: 7-OCT-2009 21:33:31 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.929E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.929E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.78701 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B009.CNF;1062 BKG DATE : 4-OCT-2009 EFF FILE : W009.CNF;299 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	791.000	786.362	3.000	1.7321	100.0000	2.24E+00	3.39E-01	3.15E-02	1.15E-02	1.57E-01
U232	5302.100	1633.000	1625.000	8.000	2.8284	100.0000	4.63E+00	6.61E-01	4.61E-02	1.88E-02	2.26E-01
U-235	4391.000	38.000	38.000	0.000	0.0000	80.90000	1.34E-01	4.62E-02	1.06E-02	0.00E+00	4.26E-02
U-238	4184.730	789.000	781.000	8.000	2.8284	100.0000	2.23E+00	3.38E-01	4.61E-02	1.88E-02	1.58E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



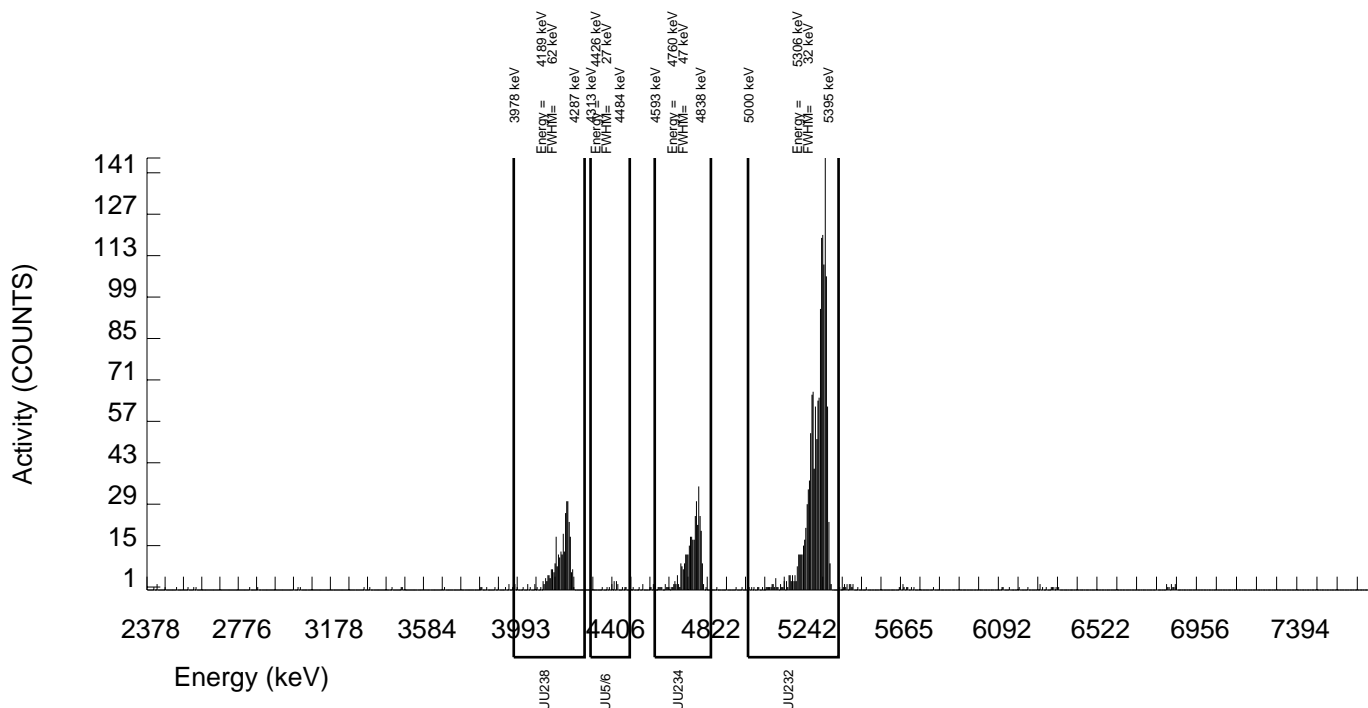
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118015_UU SAMPLE QTY: 0.501 G	
DETECTOR NUMBER :72529 AVERAGE %EFFICIENCY :30.9645 % YIELD : 93.915		COUNT DATE: 7-OCT-2009 21:33:31 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.028E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.028E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.93784 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B010.CNF;1080 BKG DATE : 4-OCT-2009 EFF FILE : W010.CNF;327 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	351.000	347.460	2.000	1.4142	100.0000	1.07E+00	1.84E-01	2.96E-02	1.02E-02	1.14E-01
U232	5302.100	1532.000	1528.000	4.000	2.0000	100.0000	4.73E+00	6.80E-01	3.81E-02	1.44E-02	2.38E-01
U-235	4391.000	16.000	13.000	3.000	1.7321	80.90000	4.97E-02	3.33E-02	4.23E-02	1.54E-02	3.27E-02
U-238	4184.730	314.000	310.000	4.000	2.0000	100.0000	9.58E-01	1.68E-01	3.80E-02	1.44E-02	1.08E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



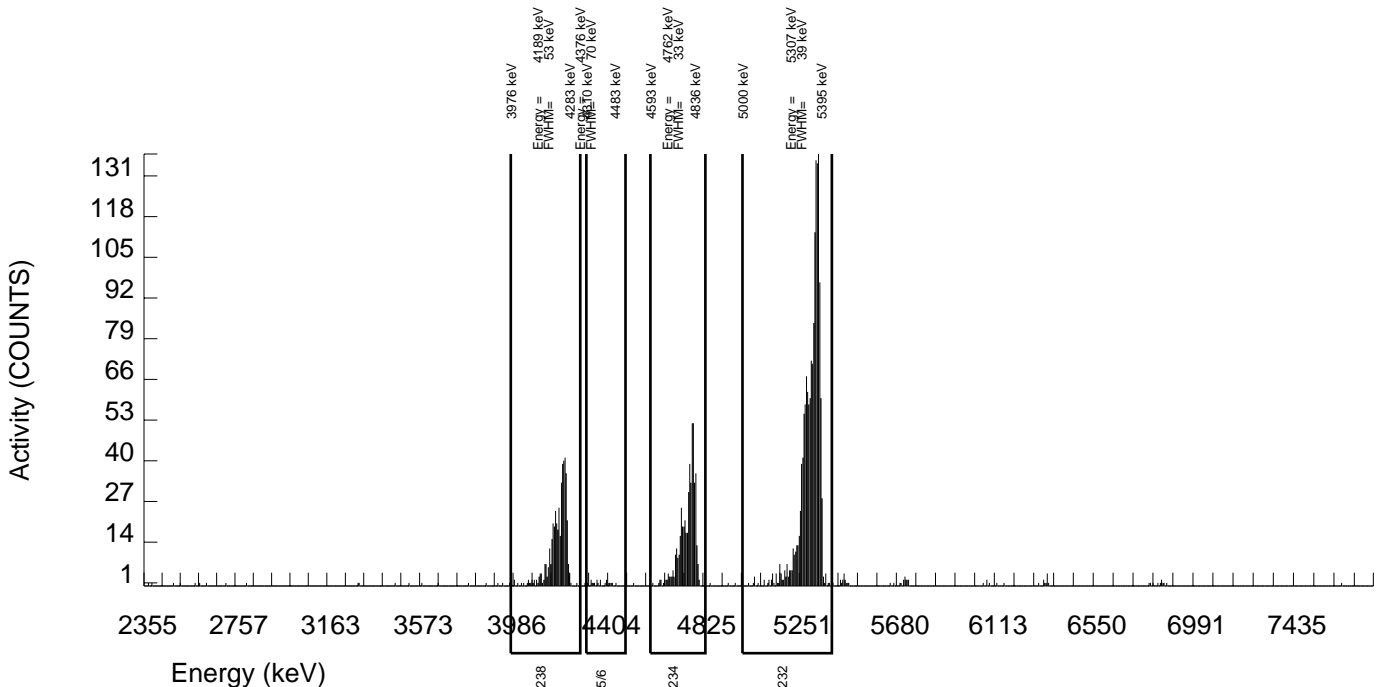
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118016_UU SAMPLE QTY: 0.519 G	
DETECTOR NUMBER :72531 AVERAGE %EFFICIENCY :29.4476 % YIELD : 100.110		COUNT DATE: 7-OCT-2009 21:33:31 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 5.26356 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B011.CNF;1072 BKG DATE : 4-OCT-2009 EFF FILE : W011.CNF;305 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	506.000	501.439	3.000	1.7321	100.0000	1.48E+00	2.37E-01	3.26E-02	1.19E-02	1.30E-01
U232	5302.100	1556.000	1549.000	7.000	2.6458	100.0000	4.56E+00	6.55E-01	4.51E-02	1.81E-02	2.28E-01
U-235	4391.000	20.000	18.000	2.000	1.4142	80.90000	6.55E-02	3.46E-02	3.49E-02	1.20E-02	3.35E-02
U-238	4184.730	455.000	446.000	9.000	3.0000	100.0000	1.31E+00	2.16E-01	4.99E-02	2.05E-02	1.24E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



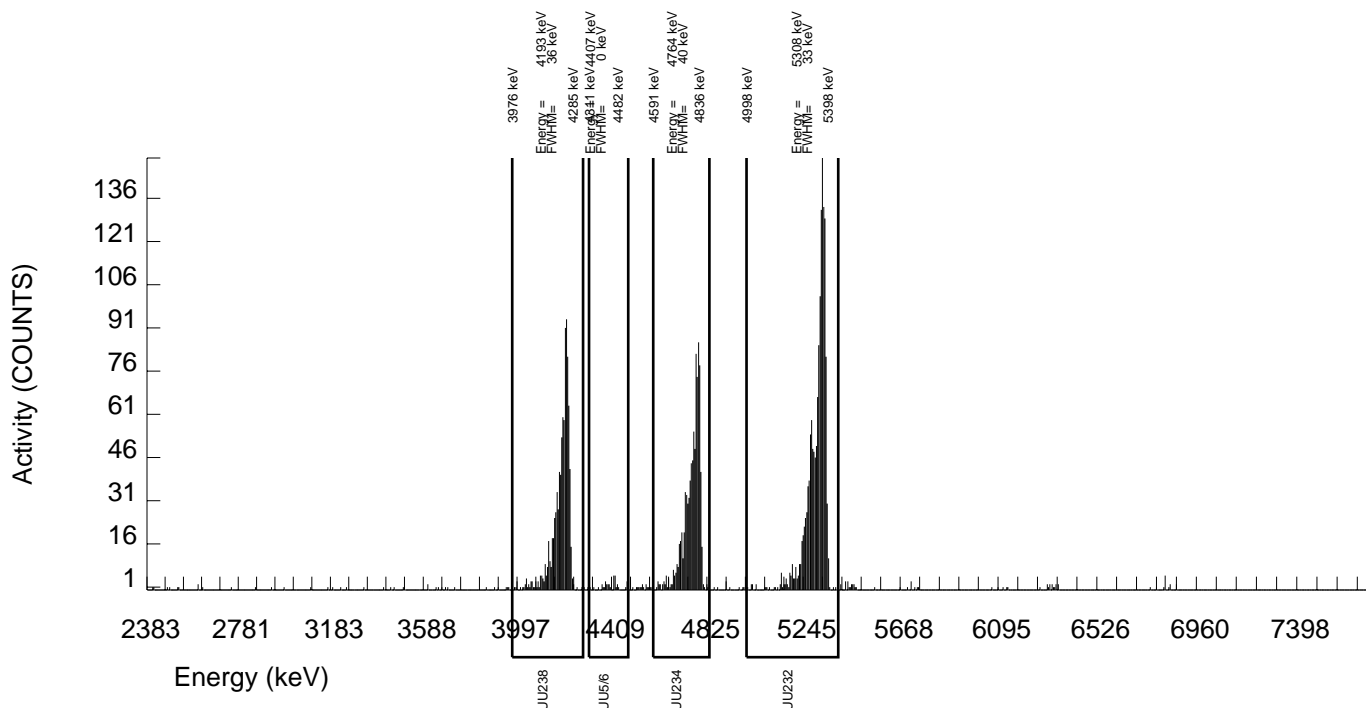
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118017_UU SAMPLE QTY: 0.502 G	
DETECTOR NUMBER :67594 AVERAGE %EFFICIENCY :29.9316 % YIELD : 95.439		COUNT DATE: 7-OCT-2009 21:33:31 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.018E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 5.018E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 5.01798 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B012.CNF;1074 BKG DATE : 4-OCT-2009 EFF FILE : W012.CNF;306 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	892.000	887.487	3.000	1.7321	100.0000	2.79E+00	4.19E-01	3.47E-02	1.27E-02	1.84E-01
U232	5302.100	1510.000	1501.000	9.000	3.0000	100.0000	4.72E+00	6.80E-01	5.33E-02	2.19E-02	2.40E-01
U-235	4391.000	37.000	34.000	3.000	1.7321	80.90000	1.32E-01	5.13E-02	4.29E-02	1.56E-02	4.81E-02
U-238	4184.730	907.000	906.000	1.000	1.0000	100.0000	2.85E+00	4.26E-01	2.40E-02	7.31E-03	1.86E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



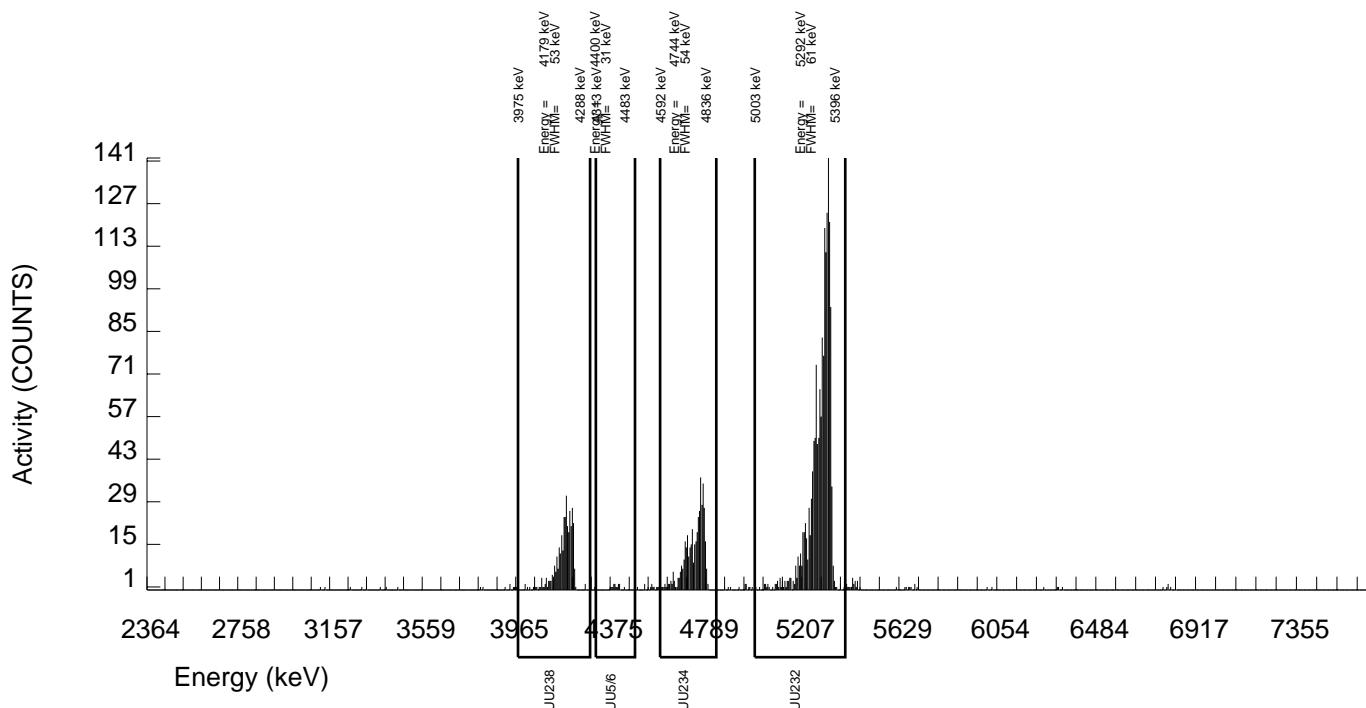
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118018_UU SAMPLE QTY: 0.506 G	
DETECTOR NUMBER :78790 AVERAGE %EFFICIENCY :34.0254 % YIELD : 90.165		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.74066 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B013.CNF;1051 BKG DATE : 4-OCT-2009 EFF FILE : W013.CNF;318 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	436.000	431.375	3.000	1.7321	100.0000	1.25E+00	2.06E-01	3.21E-02	1.17E-02	1.19E-01
U232	5302.100	1617.000	1612.000	5.000	2.2361	100.0000	4.68E+00	6.68E-01	3.89E-02	1.51E-02	2.29E-01
U-235	4391.000	15.000	14.000	1.000	1.0000	80.90000	5.02E-02	2.89E-02	2.74E-02	8.34E-03	2.81E-02
U-238	4184.730	353.000	347.000	6.000	2.4495	100.0000	1.01E+00	1.73E-01	4.18E-02	1.65E-02	1.08E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



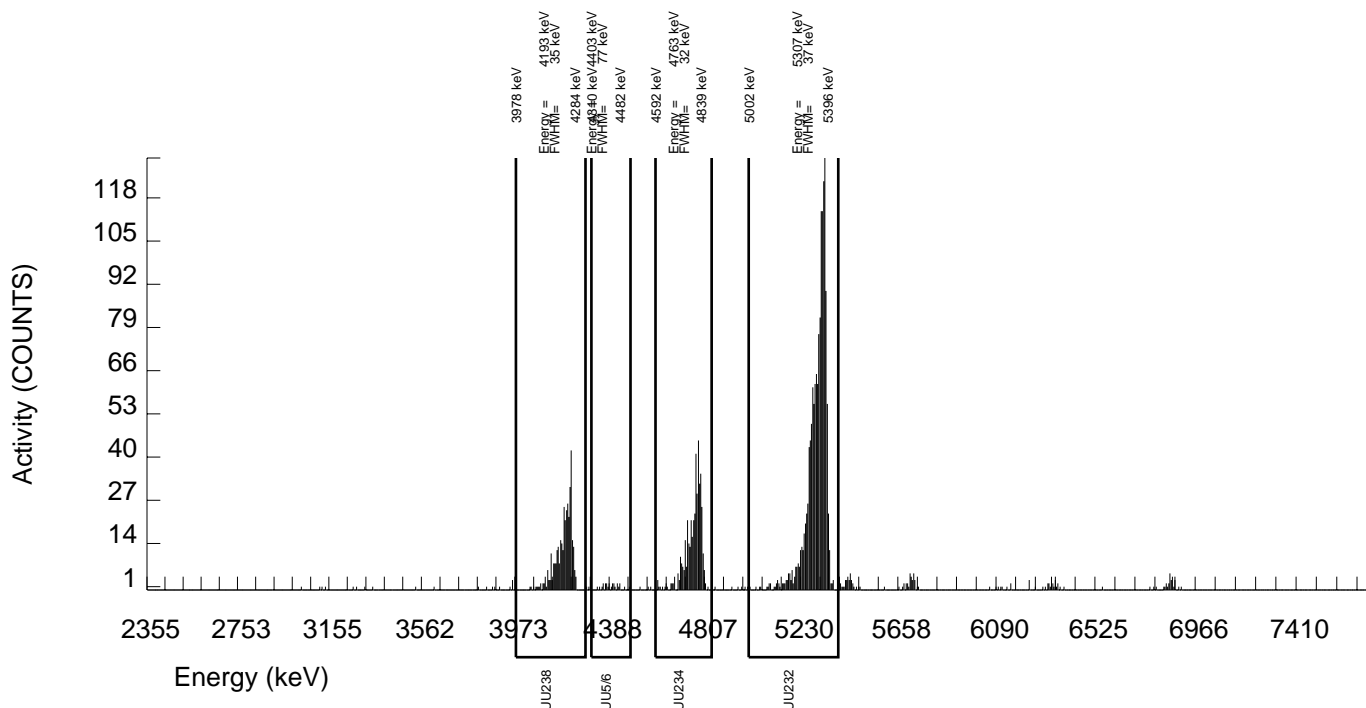
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118019_UU SAMPLE QTY: 0.508 G	
DETECTOR NUMBER :67616 AVERAGE %EFFICIENCY :31.5461 % YIELD : 88.865		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.958E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.958E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.67233 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B014.CNF;1052 BKG DATE : 4-OCT-2009 EFF FILE : W014.CNF;317 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	437.000	432.515	3.000	1.7321	100.0000	1.37E+00	2.26E-01	3.50E-02	1.27E-02	1.30E-01
U232	5302.100	1483.000	1473.000	10.000	3.1623	100.0000	4.66E+00	6.74E-01	5.61E-02	2.33E-02	2.40E-01
U-235	4391.000	25.000	24.000	1.000	1.0000	80.90000	9.38E-02	4.11E-02	2.99E-02	9.10E-03	3.91E-02
U-238	4184.730	371.000	367.000	4.000	2.0000	100.0000	1.16E+00	1.97E-01	3.89E-02	1.47E-02	1.20E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



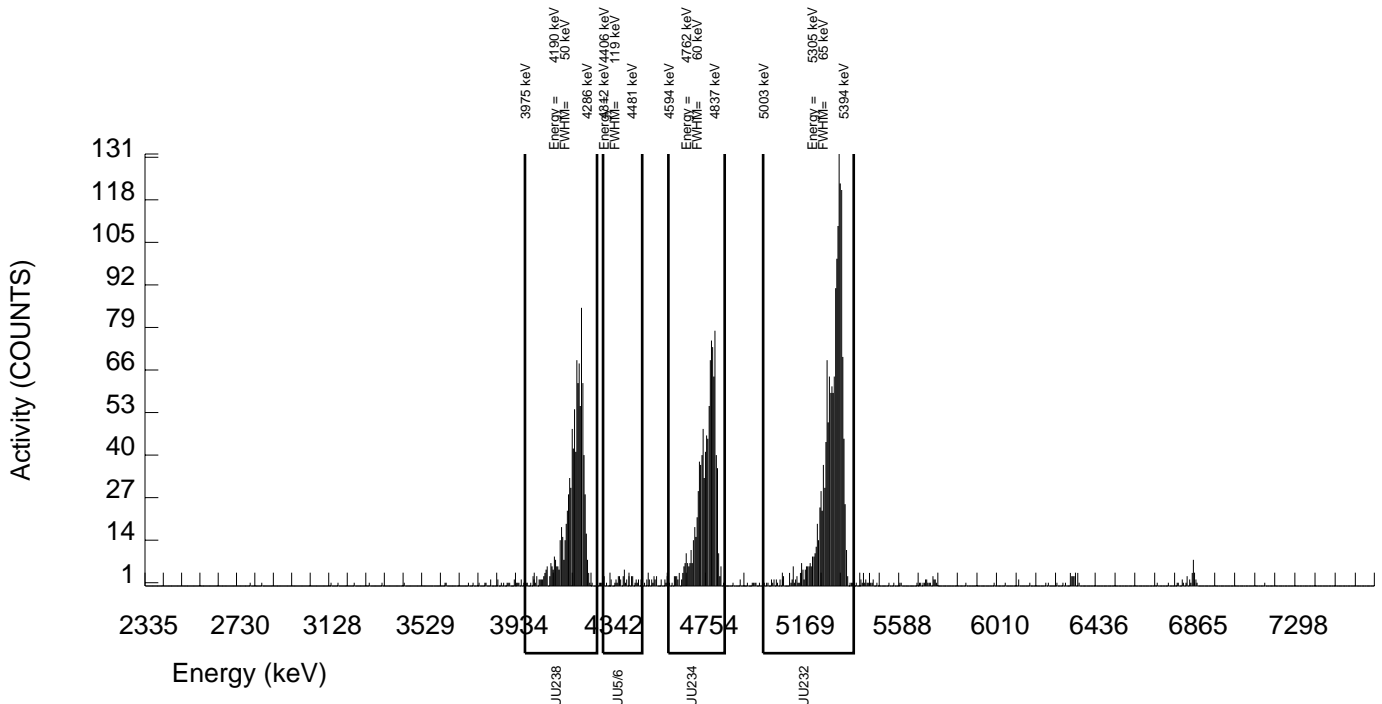
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S0237118020_UU SAMPLE QTY: 0.510 G	
DETECTOR NUMBER :61581 AVERAGE %EFFICIENCY :32.3931 % YIELD : 94.180		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.939E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.939E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.95175 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B015.CNF;1071 BKG DATE : 4-OCT-2009 EFF FILE : W015.CNF;321 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	1026.000	1022.384	2.000	1.4142	100.0000	2.96E+00	4.37E-01	2.77E-02	9.52E-03	1.82E-01
U232	5302.100	1613.000	1603.000	10.000	3.1623	100.0000	4.64E+00	6.64E-01	5.13E-02	2.13E-02	2.29E-01
U-235	4391.000	47.000	47.000	0.000	0.0000	80.90000	1.68E-01	5.31E-02	1.07E-02	0.00E+00	4.81E-02
U-238	4184.730	981.000	978.000	3.000	1.7321	100.0000	2.83E+00	4.20E-01	3.20E-02	1.17E-02	1.78E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



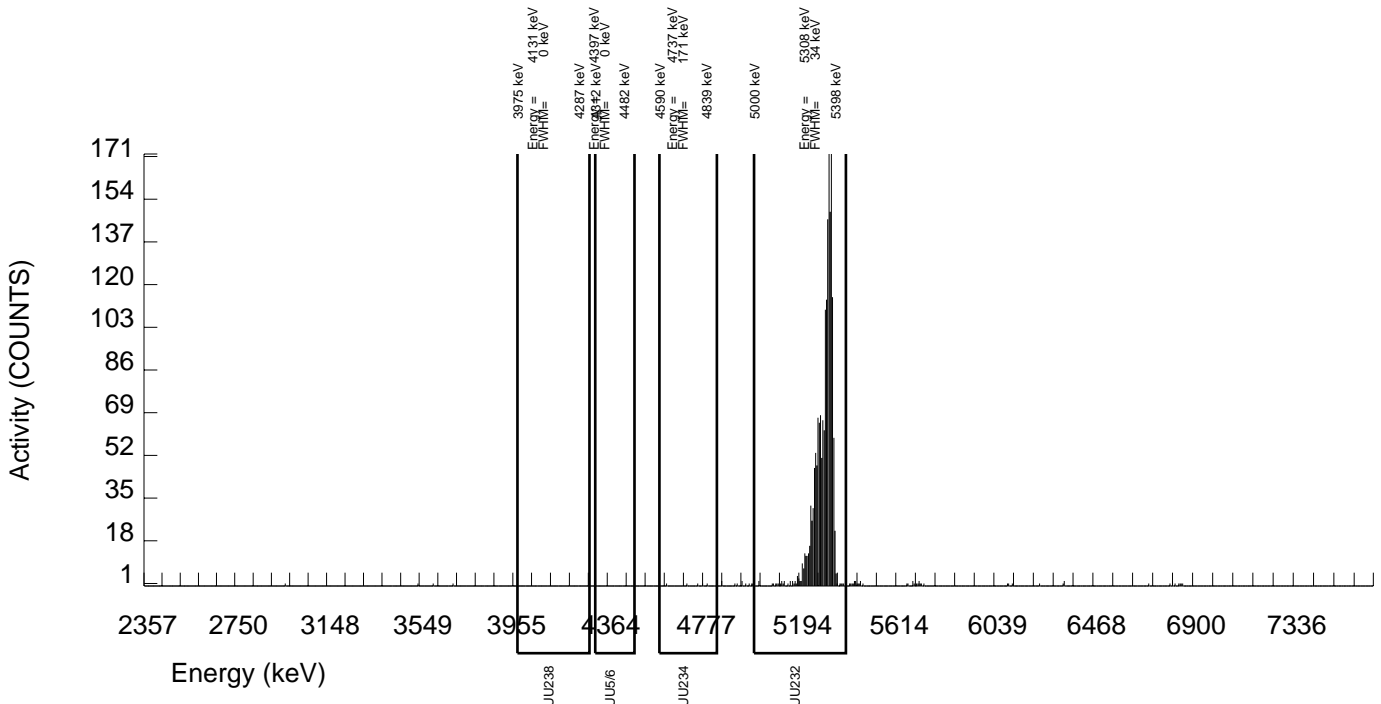
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 30-SEP-2009 00:00:00		SAMPLE ID : S1201933862_UU SAMPLE QTY: 0.519 G	
DETECTOR NUMBER :78774 AVERAGE %EFFICIENCY :33.4821 % YIELD : 102.030		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25554 dpm RESULTS : 5.36225 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B016.CNF;1047 BKG DATE : 4-OCT-2009 EFF FILE : W016.CNF;303 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	5.000	0.191	3.000	1.7321	100.0000	4.84E-04	1.24E-02	2.81E-02	1.02E-02	1.24E-02
U232	5302.100	1801.000	1795.000	6.000	2.4495	100.0000	4.56E+00	6.43E-01	3.66E-02	1.45E-02	2.12E-01
U-235	4391.000	0.000	-2.000	2.000	1.4142	80.90000	-6.28E-03	1.07E-02	3.01E-02	1.03E-02	1.07E-02
U-238	4184.730	0.000	-2.000	2.000	1.4142	100.0000	-5.08E-03	8.63E-03	2.43E-02	8.36E-03	8.62E-03

NOTE: Corrections made to U-3/4 net area due to tracer impurity



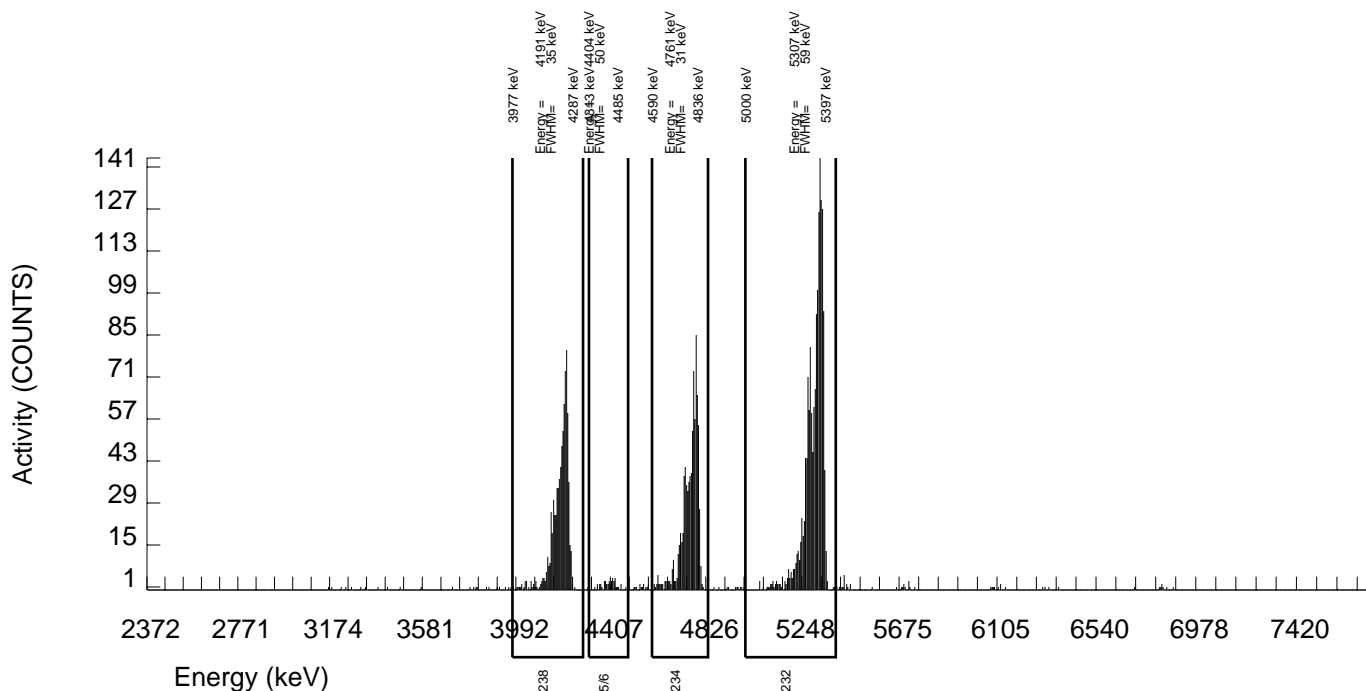
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S1201933863_UU SAMPLE QTY: 0.519 G	
DETECTOR NUMBER :78791 AVERAGE %EFFICIENCY :29.7459 % YIELD : 102.305		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 5.37897 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B017.CNF;1894 BKG DATE : 4-OCT-2009 EFF FILE : W017.CNF;1254 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	829.000	824.388	3.000	1.7321	100.0000	2.35E+00	3.54E-01	3.15E-02	1.15E-02	1.61E-01
U232	5302.100	1601.000	1599.000	2.000	1.4142	100.0000	4.56E+00	6.52E-01	2.73E-02	9.39E-03	2.24E-01
U-235	4391.000	45.000	43.000	2.000	1.4142	80.90000	1.52E-01	5.16E-02	3.38E-02	1.16E-02	4.74E-02
U-238	4184.730	791.000	791.000	0.000	0.0000	100.0000	2.26E+00	3.41E-01	8.56E-03	0.00E+00	1.57E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



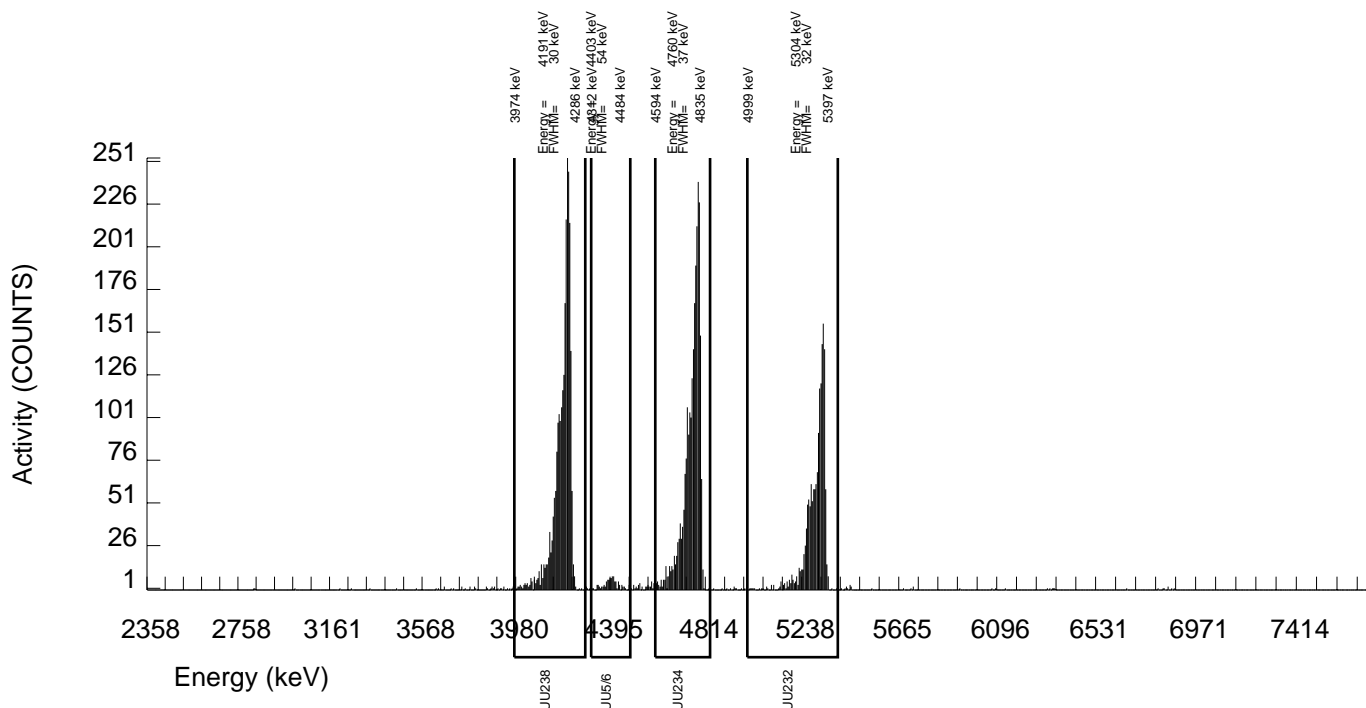
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 14-SEP-2009 00:00:00		SAMPLE ID : S1201933864_UU SAMPLE QTY: 0.506 G	
DETECTOR NUMBER :78782 AVERAGE %EFFICIENCY :32.3239 % YIELD : 93.086		COUNT DATE: 7-OCT-2009 21:33:32 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.978E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25776 dpm RESULTS : 4.89425 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B018.CNF;1046 BKG DATE : 4-OCT-2009 EFF FILE : W018.CNF;298 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	2459.000	2452.406	5.000	2.2361	100.0000	7.26E+00	1.02E+00	3.97E-02	1.54E-02	2.88E-01
U232	5302.100	1590.000	1581.000	9.000	3.0000	100.0000	4.68E+00	6.70E-01	5.02E-02	2.07E-02	2.32E-01
U-235	4391.000	99.000	97.000	2.000	1.4142	80.90000	3.55E-01	8.64E-02	3.50E-02	1.20E-02	7.20E-02
U-238	4184.730	2474.000	2469.000	5.000	2.2361	100.0000	7.30E+00	1.02E+00	3.97E-02	1.54E-02	2.89E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



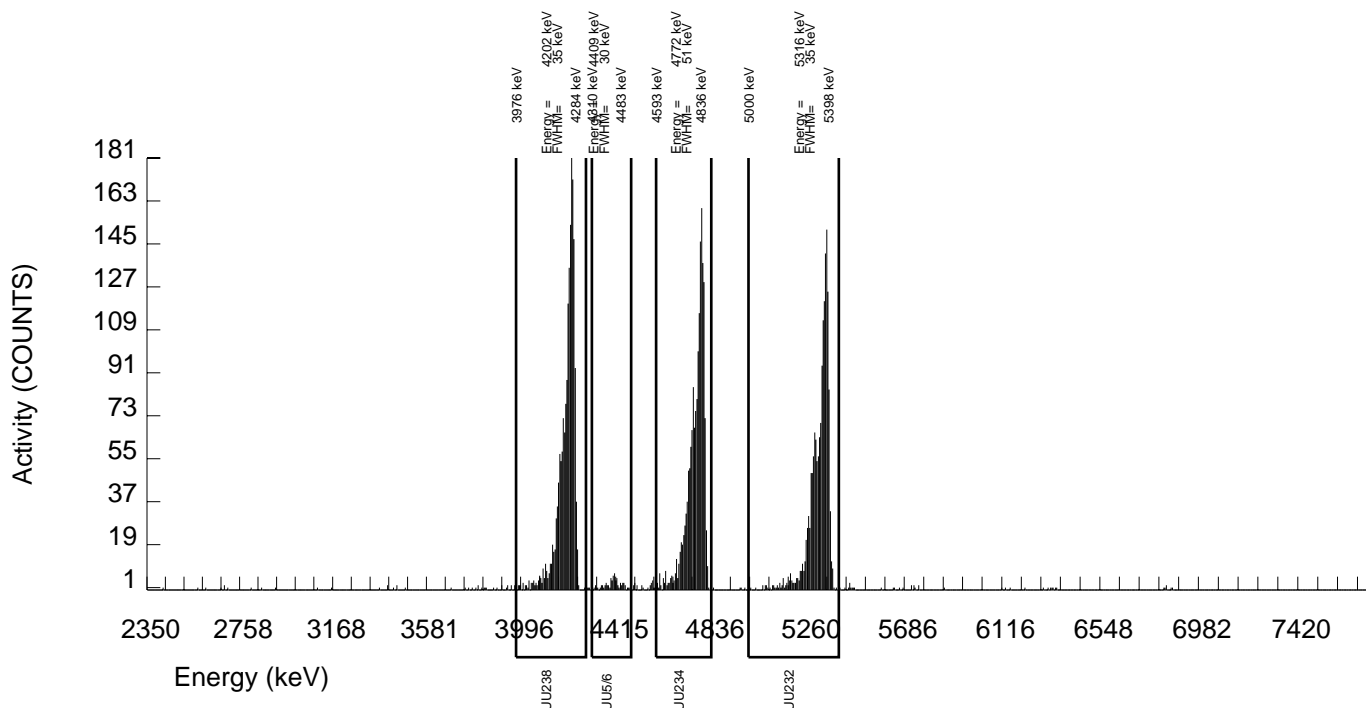
GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

BATCH NUMBER: 906769 SAMPLE DATE : 30-SEP-2009 00:00:00		SAMPLE ID : S1201933865_UU SAMPLE QTY: 0.519 G	
DETECTOR NUMBER :78786 AVERAGE %EFFICIENCY :29.1980 % YIELD : 106.702		COUNT DATE: 7-OCT-2009 21:33:33 ELAPSED LIVE TIME(SEC): 60000.00 ANALYST :KXM4	
MS/MSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	LCS/LCSD ID : 1163-G ISOTOPE : U-238 PCI/G : 4.853E+00	TRACER ID : 1283-E ISOTOPE : U232 NOMINAL : 5.25554 dpm RESULTS : 5.60776 dpm	LIB FILE : ENV_ALPHA_UU.N BKG FILE : B019.CNF;1060 BKG DATE : 4-OCT-2009 EFF FILE : W019.CNF;298 CAL DATE : 6-OCT-2009

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	GROSS AREA	NET AREA	BKG AREA	BKG Sg	%ABUN	ACTIVITY pCi/G	TPU 1.96-SIGMA	MDA pCi/G	Lc pCi/G	UNC pCi/G
U-3/4	4763.020	1700.000	1694.350	4.000	2.0000	100.0000	4.72E+00	6.71E-01	3.43E-02	1.30E-02	2.25E-01
U232	5302.100	1639.000	1637.000	2.000	1.4142	100.0000	4.56E+00	6.50E-01	2.67E-02	9.17E-03	2.21E-01
U-235	4391.000	71.000	68.000	3.000	1.7321	80.90000	2.34E-01	6.60E-02	3.81E-02	1.39E-02	5.81E-02
U-238	4184.730	1816.000	1815.000	1.000	1.0000	100.0000	5.06E+00	7.16E-01	2.13E-02	6.48E-03	2.33E-01

NOTE: Corrections made to U-3/4 net area due to tracer impurity



RADIUM 228

Radiochemistry Batch Checklist, Rev 9

Batch# 906726 Product: Radium 228 Date: 10/12/09

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			N/A
Samples have been blank corrected (if required)			N/A
If activity less 10* MDA/ MDC, error is 150% or less of sample activity. If greater 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.			N/A
Instrument source check is within limits. Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are less 5* MDA/ MDC, then RPD is 100% or less. If greater 5* MDA/ MDC, then RPD 20% or less. If below the MDA/ MDC, the RPD is 0%. Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. Or meets the client's contract acceptance criteria.	✓		
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.			N/A
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 line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			N/A
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stated.	✓		
QC data entered into QC database and batch is in REVW	✓		
Hit notification complete (if necessary)			N/A
Batch entered into Case Narrative.	✓		
Batch non-conformances completed, if applicable.			N/A
Batch non-conformances second reviewed and disposition verified to be completed.			N/A
Aliquot Correction completed if required.			N/A
Review sample historical results if available (If REMF, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

GEL Laboratories, LLC

revised 8/1/08

Primary Review Performed By: V. Calpepa 10/12/09

Secondary Review Performed By: [Signature]

KERTZ
10/13

Radium-228 Que Sheet

Batch #: 906726 Analyst: JXC5 First Client Due Date: 10/13/2009 Internal Due Date: 10/02/2009
 Spike Isotope: Radium-228 Spike Code: 0503-β Expiration Date: 9-11-10 Vol: 0.1 mL
 LCS Isotope: Radium-228 LCS Code: 0503-β Expiration Date: 9-11-10 Vol: 0.1 mL
 Tracer Isotope: Barium-133 Tracer Code: 0112-3 Expiration Date: 2-17-10 Vol: 0.1 mL
 Prep Date: 9-30-09 Initials: MS Pipet ID: 2164953 Balance ID: 1936028 Ac-228 Ingrow: 10-5-09 | 11610
 Ac-228 Separation Date/Time: 10-7-09 | 1305 Witness: MCB 9-30-09

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collect Date & Time	Pos. #	Vol (mL)	Det #	Ba Yield (%)	Gamma Det. #
237118001-1	SA40-10B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 11:36 AM	1	1.067	28108	93.02	
237118002-1	SA40-25B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 12:23 PM	2	1.009	22	90.01	
237118003-1	SA41-12B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 08:46 AM	3	1.005	20	92.20	
237118004-1	SA41-25B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 09:39 AM	4	1.029	32	87.58	
237118005-1	SA41-38B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 10:49 AM	5	1.001	30	87.91	
237118006-1	SA114-10B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 06:54 AM	6	1.030	4A	97.18	
237118007-1	SA114-30B	SAMPLE		.5 pCi/g	SOIL	KERR003	11-SEP-09 07:40 AM	7	1.035	4C	96.69	
237118008-1	RSA08-11.5B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 07:52 AM	8	1.068	4D	95.97	
237118009-1	RSA08-21.5B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 08:19 AM	9	1.028	5A	105.57	
237118010-1	RSA08-43B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 09:00 AM	10	1.021	5B	98.17	
237118011-1	RSAR6-0.5B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 11:52 AM	11	1.064	5C	94.36	
237118012-1	RSAR6-9B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 12:04 PM	12	1.014	5D	97.35/106.59	
237118013-1	RSAR6-25B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 12:27 PM	13	1.001	6A	98.26	
237118014-1	RSAR6-37B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 12:49 PM	14	1.006	6D	95.35	
237118015-1	SA43-10B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 10:27 AM	15	1.050	7A	95.48	
237118016-1	SA43-25B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 10:58 AM	16	1.099	7B	93.55	
237118017-1	SA43-43B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 11:39 AM	17	1.004	72A	93.35	
237118018-1	SA44-10B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 12:31 PM	18	1.018	7D	103.70	
237118019-1	SA44-25B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 01:01 PM	19	1.069	8AAZ	77.10	
237118020-1	SA44-42B	SAMPLE		.5 pCi/g	SOIL	KERR003	14-SEP-09 01:42 PM	20	1.045	8CA	88.96	
1201933688-1	MB for batch 906726	MB		.5 pCi/g	SOIL	QC ACCOUNT		21	1.069	9A	91.98	
1201933689-1	RSAR6-37B(237118014DUP)	DUP		.5 pCi/g	SOIL	QC ACCOUNT	14-SEP-09 12:49 PM	22	1.009	9B	97.02	
1201933690-1	RSAR6-37B(237118014MS)	MS		.5 pCi/g	SOIL	QC ACCOUNT	14-SEP-09 12:49 PM	23	0.114	9C	90.01	
1201933691-1	LCS for batch 906726	LCS		.5 pCi/g	SOIL	QC ACCOUNT		24	1.069	10A	84.27	

08/10/10

*ve 10/14/09

Data Reviewed By: V. Calappa 10/12/09

Comments:

Instrument Used: (Circle One) PIC S/N: 1075124

Radium-228 Solid

Filename : RA228.XLS
 File Type : Excel
 Version # : 1.2.5
 Batch : 906726
 Analyst : JXC5
 Prep Date : 9/30/2009

Spike S/N : 0503-B
 Spike Exp Date : 9/11/2010
 Spike Activity (dpm/ml): 177.02
 Spike Volume Added: 0.10

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 : 9/11/2010
 LCS Activity (dpm/ml): 177.02
 LCS Volume Added: 0.10

Ra-228 Abundance : 1
 Ra-228 Method Uncertainty : 0

Procedure Code : GFC28RAS
 Parname : Radium-228
 Required MDA : 0.5 pCi/G
 Half-life of Ra-228 : 5.75 years
 Half-life of Ac-228 : 6.13 hours

Tracer S/N : 0112-J
 Tracer Exp Date : 2/17/2010
 Tracer Volume Added: 0.10

Pos.	Sample Characteristics			Tracer Calculations				Tracer Samp.		
	Sample ID	Sample Aliquot G	Sample Aliquot StDev G	Tracer Concentration (Ba-133 Ref.) (cpm)	Tracer Ref. Count Uncertainty (cpm)	Tracer Concentration (Ba-133 Samp.) (cpm)	Tracer Count Uncertainty (cpm)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)	
1	237118001.1	1.0670	3.3303E-03	305.2	3.51%	283.9	3.66%	0.1	0.000701	
2	237118002.1	1.0090	3.3243E-03	305.2	3.51%	274.7	3.73%	0.1	0.000701	
3	237118003.1	1.0050	3.3239E-03	305.2	3.51%	281.4	3.68%	0.1	0.000701	
4	237118004.1	1.0290	3.3264E-03	305.2	3.51%	267.3	3.78%	0.1	0.000701	
5	237118005.1	1.0010	3.3234E-03	305.2	3.51%	268.3	3.78%	0.1	0.000701	
6	237118006.1	1.0300	3.3265E-03	305.2	3.51%	296.6	3.57%	0.1	0.000701	
7	237118007.1	1.0350	3.3270E-03	305.2	3.51%	295.1	3.58%	0.1	0.000701	
8	237118008.1	1.0680	3.3304E-03	305.2	3.51%	292.9	3.59%	0.1	0.000701	
9	237118009.1	1.0280	3.3263E-03	305.2	3.51%	322.2	3.41%	0.1	0.000701	
10	237118010.1	1.0210	3.3255E-03	305.2	3.51%	299.6	3.55%	0.1	0.000701	
11	237118011.1	1.0640	3.3300E-03	305.2	3.51%	288.0	3.63%	0.1	0.000701	
12	237118012.1	1.0140	3.3248E-03	305.2	3.51%	297.1	3.57%	0.1	0.000701	
13	237118013.1	1.0010	3.3234E-03	305.2	3.51%	299.9	3.55%	0.1	0.000701	
14	237118014.1	1.0060	3.3240E-03	305.2	3.51%	291.0	3.61%	0.1	0.000701	
15	237118015.1	1.0500	3.3285E-03	305.2	3.51%	291.4	3.60%	0.1	0.000701	
16	237118016.1	1.0990	3.3366E-03	305.2	3.51%	285.5	3.85%	0.1	0.000701	
17	237118017.1	1.0040	3.3238E-03	305.2	3.51%	284.9	3.85%	0.1	0.000701	
18	237118018.1	1.0180	3.3252E-03	305.2	3.51%	316.5	3.44%	0.1	0.000701	
19	237118019.1	1.0690	3.3305E-03	305.2	3.51%	241.4	4.01%	0.1	0.000701	
20	237118020.1	1.0450	3.3280E-03	305.2	3.51%	271.5	3.75%	0.1	0.000701	
21	1201933688.1	1.0690	3.3305E-03	305.2	3.51%	250.2	3.93%	0.1	0.000701	
22	1201933689.1	1.0090	3.3243E-03	305.2	3.51%	296.1	3.57%	0.1	0.000701	
23	1201933690.1	0.1140	3.2309E-03	305.2	3.51%	274.7	3.73%	0.1	0.000701	
24	1201933691.1	1.0690	3.3305E-03	305.2	3.51%	257.2	3.87%	0.1	0.000701	

Count raw Data		Counting										Calibration Data										Sample Recovery	
Pos.	Detector ID	Time (min.)	Gross Alpha	Gross Beta	Beta cpm	Count Start Date/Time	Separation Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Error (cpm/dpm)	Weekly Bkg Count	Time (min.)				
1	10B	60	3	138	2.300	10/7/2009 16:09	10/7/2009 13:05	0.991	0.707	1.058	93.02%	2.72%	PIC	7/2/2009	7/31/2010	0.6137	0.00816	0.450	500				
2	2C	60	13	38	0.833	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	90.01%	2.75%	PIC	7/2/2009	7/31/2010	0.5969	0.00575	0.408	500				
3	2D	60	6	54	0.900	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	92.20%	2.73%	PIC	7/2/2009	7/31/2010	0.6119	0.00479	0.342	500				
4	3C	60	8	132	2.200	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	87.58%	2.76%	PIC	7/2/2009	7/31/2010	0.6164	0.00535	1.248	500				
5	3D	60	10	141	2.350	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	87.91%	2.76%	PIC	7/2/2009	7/31/2010	0.5994	0.00464	1.256	500				
6	4A	60	17	127	2.117	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	97.18%	2.69%	PIC	7/2/2009	7/31/2010	0.6208	0.00744	1.108	500				
7	4C	60	10	170	2.833	10/7/2009 16:09	10/7/2009 13:05	0.991	0.706	1.058	96.89%	2.70%	PIC	7/2/2009	7/31/2010	0.6052	0.00426	1.752	500				
8	4D	60	26	133	2.217	10/7/2009 16:09	10/7/2009 13:05	0.992	0.706	1.058	95.97%	2.70%	PIC	7/2/2009	7/31/2010	0.5873	0.00816	1.264	500				
9	5A	60	6	71	1.183	10/7/2009 16:10	10/7/2009 13:05	0.992	0.706	1.058	105.57%	2.64%	PIC	7/2/2009	7/31/2010	0.6258	0.00816	0.506	500				
10	5B	60	13	116	1.933	10/7/2009 16:10	10/7/2009 13:05	0.992	0.706	1.058	98.17%	2.69%	PIC	7/2/2009	7/31/2010	0.6280	0.00816	1.006	500				
11	5C	60	14	91	1.517	10/7/2009 16:10	10/7/2009 13:05	0.992	0.705	1.058	94.36%	2.71%	PIC	7/2/2009	7/31/2010	0.6368	0.00816	0.946	500				
12	14D	370	82	553	1.495	10/9/2009 16:46	10/9/2009 13:00	0.992	0.652	1.389	104.59%	2.69%	PIC	7/2/2009	7/31/2010	0.6326	0.00816	1.208	500				
13	6A	60	15	118	1.967	10/7/2009 16:10	10/7/2009 13:05	0.992	0.705	1.058	98.26%	2.69%	PIC	7/2/2009	7/31/2010	0.6221	0.00816	1.340	500				
14	6D	60	6	104	1.733	10/7/2009 16:11	10/7/2009 13:05	0.992	0.704	1.058	95.35%	2.71%	PIC	7/2/2009	7/31/2010	0.6120	0.00816	1.066	500				
15	7A	60	13	87	1.450	10/7/2009 16:11	10/7/2009 13:05	0.992	0.704	1.058	95.48%	2.70%	PIC	7/2/2009	7/31/2010	0.6180	0.00816	0.382	500				
16	7B	60	11	53	0.883	10/7/2009 16:11	10/7/2009 13:05	0.992	0.704	1.058	93.55%	2.72%	PIC	7/2/2009	7/31/2010	0.6280	0.00816	0.412	500				
17	A1	390	57	879	2.254	10/7/2009 18:01	10/7/2009 13:05	0.992	0.572	1.412	93.35%	2.72%	LB4100	7/2/2009	7/31/2010	0.5861	0.01870	1.262	500				
18	7D	60	7	89	1.483	10/7/2009 16:11	10/7/2009 13:05	0.992	0.704	1.058	103.70%	2.65%	PIC	7/2/2009	7/31/2010	0.6257	0.00816	0.394	500				
19	A2	390	108	634	1.626	10/7/2009 18:01	10/7/2009 13:05	0.992	0.572	1.412	79.10%	2.84%	LB4100	7/2/2009	7/31/2010	0.5495	0.01949	1.250	500				
20	C1	390	21	763	1.956	10/7/2009 19:30	10/7/2009 13:05	0.992	0.484	1.412	88.96%	2.75%	LB4100	7/2/2009	7/31/2010	0.4698	0.01902	1.332	500				
21	9A	60	4	44	0.733	10/7/2009 16:08	10/7/2009 13:05	0.997	0.708	1.058	81.98%	2.81%	PIC	7/2/2009	7/31/2010	0.6496	0.00816	0.492	500				
22	9B	60	4	170	2.833	10/7/2009 16:08	10/7/2009 13:05	0.992	0.708	1.058	97.02%	2.69%	PIC	7/2/2009	7/31/2010	0.6356	0.00816	1.846	500				
23	9C	60	9	430	7.167	10/7/2009 16:08	10/7/2009 13:05	0.992	0.707	1.058	90.01%	2.75%	PIC	7/2/2009	7/31/2010	0.6273	0.00816	0.362	500				
24	10A	60	7	388	6.467	10/7/2009 16:09	10/7/2009 13:05	0.997	0.707	1.058	84.27%	2.79%	PIC	7/2/2009	7/31/2010	0.6389	0.00816	0.338	500				

- Notes:
 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Results Pos.	Decision Level pCi/G	Critical Level pCi/G	Required MDA pCi/G	MDA pCi/G	Sample Act. Conc. pCi/G	Sample Act. Error pCi/G	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/G	Recovery
									Counting Uncertainty pCi/G	Total Prop. Uncertainty pCi/G						
1	0.2384	0.1683	0.5	0.3924	2.0649	0.1108	1.8500	0.1981	0.4333	0.4485	SAMPLE					
2	0.2552	0.1801	0.5	0.4230	0.2828	0.4741	0.2253	0.1066	0.2623	0.2627	SAMPLE					
3	0.2234	0.1577	0.5	0.3755	0.6696	0.2262	0.5580	0.1252	0.2946	0.2968	SAMPLE					
4	0.4356	0.3076	0.5	0.6764	1.1661	0.2098	0.9520	0.1979	0.4751	0.4795	SAMPLE					
5	0.4604	0.3250	0.5	0.7145	1.4117	0.1887	1.0940	0.2042	0.5163	0.5222	SAMPLE					
6	0.3671	0.2592	0.5	0.5732	1.1051	0.1940	1.0087	0.1936	0.4158	0.4203	SAMPLE					
7	0.4737	0.3344	0.5	0.7251	1.2156	0.2101	1.0813	0.2252	0.4963	0.5006	SAMPLE					
8	0.4045	0.2856	0.5	0.6276	1.0767	0.2105	0.9527	0.1987	0.4401	0.4441	SAMPLE					
9	0.2269	0.1602	0.5	0.3704	0.6786	0.2144	0.6773	0.1440	0.2827	0.2852	SAMPLE					
10	0.3452	0.2437	0.5	0.5414	1.0025	0.2015	0.9273	0.1850	0.3920	0.3959	SAMPLE					
11	0.3295	0.2327	0.5	0.5185	0.6074	0.2902	0.5707	0.1648	0.3438	0.3455	SAMPLE					
12	0.2533	0.1788	0.5	0.3693	0.4133	0.2818	0.2866	0.0803	0.2271	0.2283	SAMPLE					
13	0.4101	0.2895	0.5	0.6346	0.6973	0.3018	0.6267	0.1883	0.4107	0.4125	SAMPLE					
14	0.3817	0.2695	0.5	0.5971	0.7750	0.2655	0.6673	0.1761	0.4009	0.4033	SAMPLE					
15	0.2166	0.1529	0.5	0.3609	1.1756	0.1505	1.0680	0.1579	0.3407	0.3469	SAMPLE					
16	0.2159	0.1524	0.5	0.3576	0.4980	0.2661	0.4713	0.1247	0.2582	0.2597	SAMPLE					
17	0.3607	0.2547	0.5	0.5250	2.0232	0.0977	0.9918	0.0911	0.3643	0.3873	SAMPLE					
18	0.2064	0.1457	0.5	0.3431	1.1252	0.1493	1.0893	0.1597	0.3234	0.3292	SAMPLE					
19	0.4244	0.2996	0.5	0.6178	0.9059	0.2201	0.3756	0.0817	0.3860	0.3908	SAMPLE					
20	0.5511	0.3891	0.5	0.8015	1.8943	0.1443	0.6244	0.0876	0.5211	0.5358	SAMPLE					
21	0.2647	0.1869	0.5	0.4330	0.2861	0.4771	0.2413	0.1149	0.2670	0.2675	SAMPLE					
22	0.4716	0.3330	0.5	0.7204	1.0766	0.2303	0.9873	0.2256	0.4822	0.4859	MB		32.6%	70.3046	100.9%	
23	2.0192	1.4256	0.5	3.3782	71.7361	0.0650	6.8047	0.3467	7.1628	9.1328	DUP	237118014.1		7.4592		
24	0.2172	0.1534	0.5	0.3655	7.1941	0.0612	6.1287	0.3293	0.7577	0.8628	MS	237118014.1			96.4%	
											LCS					

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	906726	Count Start Time	Count End Time	Machine
237118001	10B	60	3	138		10/7/2009 16:09	10/7/2009 17:09	PIC
237118002	2C	60	13	38		10/7/2009 16:09	10/7/2009 17:09	PIC
237118003	2D	60	6	54		10/7/2009 16:09	10/7/2009 17:09	PIC
237118004	3C	60	8	132		10/7/2009 16:09	10/7/2009 17:09	PIC
237118005	3D	60	10	141		10/7/2009 16:09	10/7/2009 17:09	PIC
237118006	4A	60	17	127		10/7/2009 16:09	10/7/2009 17:09	PIC
237118007	4C	60	10	170		10/7/2009 16:09	10/7/2009 17:09	PIC
237118008	4D	60	26	133		10/7/2009 16:09	10/7/2009 17:09	PIC
237118009	5A	60	6	71		10/7/2009 16:10	10/7/2009 17:10	PIC
237118010	5B	60	13	116		10/7/2009 16:10	10/7/2009 17:10	PIC
237118011	5C	60	14	91		10/7/2009 16:10	10/7/2009 17:10	PIC
237118012	14D	370	82	553		10/9/2009 16:46	10/9/2009 22:56	PIC
237118013	6A	60	15	118		10/7/2009 16:10	10/7/2009 17:10	PIC
237118014	6D	60	6	104		10/7/2009 16:11	10/7/2009 17:11	PIC
237118015	7A	60	13	87		10/7/2009 16:11	10/7/2009 17:11	PIC
237118016	7B	60	11	53		10/7/2009 16:11	10/7/2009 17:11	PIC
237118017	A1	390	57	879		10/7/2009 18:01	10/8/2009 0:31	LB4100
237118018	7D	60	7	89		10/7/2009 16:11	10/7/2009 17:11	PIC
237118019	A2	390	108	634		10/7/2009 18:01	10/8/2009 0:31	LB4100
237118020	C1	390	21	763		10/7/2009 19:30	10/8/2009 2:00	LB4100
1201933688	9A	60	4	44		10/7/2009 16:08	10/7/2009 17:08	PIC
1201933689	9B	60	4	170		10/7/2009 16:08	10/7/2009 17:08	PIC
1201933690	9C	60	9	430		10/7/2009 16:08	10/7/2009 17:08	PIC
1201933691	10A	60	7	388		10/7/2009 16:09	10/7/2009 17:09	PIC

ASSAY 5-Oct-09 17:29:15

Protocol id 9 228_REC2
Time limit 180
Count limit 50000
Isotope Ba-133
Protocol date 9-Apr-07 10:02:22
Run id. 91

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	72	1	180	1007	305.2	3.51		17:29:17
2	72	2	180	943	283.9	3.66	93.02	17:32:28
3	72	3	180	915	274.7	3.73	90.01	17:35:40
4	72	4	180	935	281.4	3.68	92.20	17:38:51
5	72	5	180	893	267.3	3.78	87.58	17:42:02
6	51	6	180	896	268.3	3.78	87.91	17:45:27
7	51	7	180	981	296.6	3.57	97.18	17:48:38
8	51	8	180	976	295.1	3.58	96.69	17:51:50
9	51	9	180	970	292.9	3.59	95.97	17:55:01
10	51	10	180	1058	322.2	3.41	105.57	17:58:12
11	75	11	180	990	299.6	3.55	98.17	18:01:37
12	75	12	180	955	288	3.63	94.36	18:04:49
13	75	13	180	982	297.1	3.57	97.35	18:08:00 <i>re 10/12/09</i>
14	75	14	180	991	299.9	3.55	98.26	18:11:11
15	75	15	180	964	291	3.61	95.35	18:14:23
16	60	16	180	965	291.4	3.6	95.48	18:17:47
17	60	17	180	948	285.5	3.65	93.55	18:20:59
18	60	18	180	946	284.9	3.65	93.35	18:24:10
19	60	19	180	1041	316.5	3.44	103.70	18:27:21
20	60	20	180	815	241.4	4.01	79.10	18:30:33
21	91	21	180	906	271.5	3.75	88.96	18:33:57
22	91	22	180	842	250.2	3.93	81.98	18:37:09
23	91	23	180	979	296.1	3.57	97.02	18:40:20
24	91	24	180	915	274.7	3.73	90.01	18:43:31
25	91	25	180	863	257.2	3.87	84.27	18:46:43

END OF ASSAY

ASSAY 8-Oct-09 20:39:17

Protocol id 9 228_REC2
Time limit 180
Count limit 50000
Isotope Ba-133
Protocol date 9-Apr-07 10:02:22
Run id. 12

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	87	1	180	914	274.3	3.73		20:39:19
2	87	2	180	952	286.9	3.64	104.59	20:42:31
3	87	3	180	715	208	4.37	75.83	20:45:43*
4	87	4	180	791	233.4	4.09	85.09	20:48:54*

END OF ASSAY

* MRB + LCS were re-eluted in order to verify
the accuracy of the procedure

RADIUM 226

Radiochemistry Batch Checklist, Rev 9

Batch# 905696 Product: Radium 226 Date: 10-09-09

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required)			NA
If activity less 10* MDA/ MDC, error is 150% or less of sample activity. If greater 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are less 5* MDA/ MDC, then RPD is 100% or less. If greater 5* MDA/ MDC, then RPD 20% or less. If below the MDA/ MDC, the RPD is 0%.	✓		
Or meets the client's required RER acceptance criteria.			
Tracer yield is 15-125% . Carrier yield 25-125%.			
Or meets the client's contract acceptance criteria.			NA
Method blank is less than the RDL/ LLD.	✓		
(If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.			NA
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% or meets the client's contract acceptance criteria.	✓		
No blank spaces on data forms.	✓		
All line outs initialed and dated.	✓		
No transcription errors are apparent.			
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stated.	✓		
QC data entered into QC database and batch is in REVW	✓		
Hit notification complete (if necessary)			NA
Batch entered into Case Narrative.	✓		
Batch non-conformances completed, if applicable.	✓		NCR 744123
Batch non-conformances second reviewed and disposition verified to be completed.	✓		NCR 744123
Allquot Correction completed if required.			NA
Review sample historical results if available (if REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

GEL Laboratories, LLC

revised 8/1/08

Primary Review Performed By: [Signature]

Secondary Review Performed By: [Signature] 10/9/09

KERR 10-13-09

Radium-226 Que Sheet

24-SEP-09

GEL Laboratories, Radiochemistry Division

Batch #: 905696

Analyst: KSD1

First Client Due Date: 10/13/2009

Internal Due Date: 10/02/2009

Spike Isotope: Radium-226 Spike Code: 00384

Expiration Date: 7/17/10

Vol: 0.1

End Initial/Degas Date/Time: 10/5/09 1700

LCS Isotope: Radium-226 LCS Code: 00384

Expiration Date: 7/17/10

Vol: 0.1

End LN De-em Date: 10/2/09

Bkg Count Time: 30 (Min)

Sample Count Time: 30 (Min)

Start Count Date: 10/8/09

Pipet ID: 144203

Balance ID: 50410272

Witness: M5 10-1-09

Initials: KD

Sample I	Client Description	Hazard Type	Code Matrix	Min CRDL	Client	Position (Label)	Aliquot (mL of g)	End LN De-em Time	Start Count Time	Cell #	Det #	Bkg counts	Total Counts
237118001-1	SA40-10B	SAMPLE	SOIL	.5 pCi/g	KERR003	1	1.023	1105	1445	402	4	8	42
237118002-1	SA40-25B	SAMPLE	SOIL	.5 pCi/g	KERR003	2	1.010	1105	1445	911	5	7	73
237118003-1	SA41-12B	SAMPLE	SOIL	.5 pCi/g	KERR003	3	1.011	1105	1445	005	0	8	49
237118004-1	SA41-25B	SAMPLE	SOIL	.5 pCi/g	KERR003	4	1.031	1105	1445	712	7	8	74
237118005-1	SA41-38B	SAMPLE	SOIL	.5 pCi/g	KERR003	5	1.004	1245	1555	107	1	8	128
237118006-1	SA114-10B	SAMPLE	SOIL	.5 pCi/g	KERR003	6	1.022	1245	1555	241	2	5	39
237118007-1	SA114-30B	SAMPLE	SOIL	.5 pCi/g	KERR003	7	1.001	1245	1555	311	3	8	71
237118008-1	RSA08-11.5B	SAMPLE	SOIL	.5 pCi/g	KERR003	8	1.016	1245	1555	404	4	4	86
237118009-1	RSA08-21.5B	SAMPLE	SOIL	.5 pCi/g	KERR003	9	1.052	1245	1555	502	5	7	51
237118010-1	RSA08-43B	SAMPLE	SOIL	.5 pCi/g	KERR003	10	1.011	1245	1555	604	6	2	83
237118011-1	RSAR6-0.5B	SAMPLE	SOIL	.5 pCi/g	KERR003	11	1.014	1245	1555	705	7	0	50
237118012-1	RSAR6-9B	SAMPLE	SOIL	.5 pCi/g	KERR003	12	1.003	1315	1625	101	1	6	55
237118013-1	RSAR6-25B	SAMPLE	SOIL	.5 pCi/g	KERR003	13	1.007	1315	1625	201	2	8	141
237118014-1	RSAR6-37B	SAMPLE	SOIL	.5 pCi/g	KERR003	14	1.009	1315	1625	304	3	7	56
237118015-1	SA43-10B	SAMPLE	SOIL	.5 pCi/g	KERR003	15	1.030	1315	1625	412	4	8	69
237118016-1	SA43-25B	SAMPLE	SOIL	.5 pCi/g	KERR003	16	1.052	1315	1625	503	5	2	65
237118017-1	SA43-43B	SAMPLE	SOIL	.5 pCi/g	KERR003	17	1.011	1315	1625	606	6	8	111
237118018-1	SA44-10B	SAMPLE	SOIL	.5 pCi/g	KERR003	18	1.011	1315	1700	704	7	0	51
237118019-1	SA44-25B	SAMPLE	SOIL	.5 pCi/g	KERR003	19	1.096	1355	1700	201	2	8	65
237118020-1	SA44-42B	SAMPLE	SOIL	.5 pCi/g	KERR003	20	1.034	1355	1700	306	3	8	99
1201931175-1	MB for batch 905696	MB	QC ACCOUNT	.5 pCi/g	QC ACCOUNT	21	1.011	1355	1700	506	5	8	24
1201931176-1	RSAR6-37B(237118014DUP)	DUP	QC ACCOUNT	.5 pCi/g	QC ACCOUNT	22	1.004	1355	1735	106	7	6	53
1201931177-1	RSAR6-37B(237118014MS)	MS	QC ACCOUNT	.5 pCi/g	QC ACCOUNT	23	1.003	1355	1735	512	5	8	769
1201931178-1	LCS for batch 905696	LCS	QC ACCOUNT	.5 pCi/g	QC ACCOUNT	24	1.011	1355	1805	703	7	8	672

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*11-10-09
dailies ✓

Data Reviewed By: JM 10-08-09
Page 1 of 1

Radium-226 Solid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.2.4

Spike S/N : 0638-H
 Spike Exp Date : 7/17/2010
 Spike Activity (dpm/ml): 268.22
 Spike Volume Added: 0.10

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

Batch : 905696

Analyst : KSD1

Prep Date : 10/1/2009

Ra-226 Abundance : 1

Ra-226 Method Uncertainty : 0.1153

Procedure Code : LUC26RAS

Parinname : Radium-226

Required MDA : 0.5 pCi/G

Halfife of Ra-226 : 1600 years

Halfife of Rn-222: 3.823 days

Batch counted on : LUCAS CELL DETECTOR

BKG Count time : 30 min

Sample Characteristics			Sample		Sample Date/Time		Count Raw Data			Weekly Background		
Pos.	Sample ID	Sample Aliquot G	Sample Aliquot SIDev. G	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Counts	CPM	Count Time (min.)	Detector Efficiency (cpm/dpm)
1	237118001.1	1.0230	3.3257E-03	9/11/2009 11:36	402	30	42	1.400	8	0.267	30	2.1180
2	237118002.1	1.0100	3.3244E-03	9/11/2009 12:23	511	30	73	2.433	7	0.233	30	1.9590
3	237118003.1	1.0110	3.3245E-03	9/11/2009 8:46	605	30	49	1.633	8	0.267	30	2.1490
4	237118004.1	1.0310	3.3266E-03	9/11/2009 9:39	712	30	74	2.467	8	0.267	30	2.0690
5	237118005.1	1.0040	3.3238E-03	9/11/2009 10:49	107	30	128	4.267	8	0.267	30	1.9810
6	237118006.1	1.0220	3.3256E-03	9/11/2009 6:54	211	30	39	1.300	5	0.167	30	2.1710
7	237118007.1	1.0010	3.3234E-03	9/11/2009 7:40	311	30	71	2.367	8	0.267	30	2.1140
8	237118008.1	1.0160	3.3250E-03	9/14/2009 7:52	404	30	86	2.867	4	0.133	30	1.9310
9	237118009.1	1.0520	3.3287E-03	9/14/2009 8:19	502	30	51	1.700	7	0.233	30	1.8780
10	237118010.1	1.0110	3.3245E-03	9/14/2009 9:00	604	30	83	2.767	2	0.067	30	2.1330
11	237118011.1	1.0140	3.3248E-03	9/14/2009 11:52	705	30	36	1.200	0	0.000	30	2.1070
12	237118012.1	1.0030	3.3237E-03	9/14/2009 12:04	101	30	55	1.833	6	0.200	30	1.9560
13	237118013.1	1.0070	3.3241E-03	9/14/2009 12:27	201	30	161	5.367	8	0.267	30	1.9930
14	237118014.1	1.0090	3.3243E-03	9/14/2009 12:49	309	30	56	1.867	7	0.233	30	1.8770
15	237118015.1	1.0300	3.3265E-03	9/14/2009 10:27	412	30	69	2.300	8	0.267	30	1.9670
16	237118016.1	1.0520	3.3287E-03	9/14/2009 10:58	503	30	65	2.167	2	0.067	30	1.6010
17	237118017.1	1.0110	3.3245E-03	9/14/2009 11:39	606	30	111	3.700	8	0.267	30	2.3480
18	237118018.1	1.0110	3.3245E-03	9/14/2009 12:31	704	30	51	1.700	0	0.000	30	2.2350
19	237118019.1	1.0960	3.3333E-03	9/14/2009 13:01	202	30	65	2.167	8	0.267	30	2.2610
20	237118020.1	1.0340	3.3269E-03	9/14/2009 13:42	308	30	99	3.300	8	0.267	30	1.9500
21	1201931175.1	1.0960	3.3333E-03	10/1/2009 0:00	506	30	24	0.800	8	0.267	30	2.0040
22	1201931176.1	1.0040	3.3238E-03	9/14/2009 12:49	706	30	53	1.767	6	0.200	30	2.1420
23	1201931177.1	1.0030	3.3237E-03	9/14/2009 12:49	512	30	769	25.633	8	0.267	30	1.9560
24	1201931178.1	1.0960	3.3333E-03	10/1/2009 0:00	703	30	672	22.400	8	0.267	30	2.2210

Detector Efficiency Error (cpm/dpm)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow		Count Start Date/Time	De-Gas to Ingrowth	Rn-222 Corrections		Ra-226 Decay
				End Date/Time	Count Date/Time			Ingrowth to Count	During Count	
0.12371	3/2/2009	3/2/2010	10/5/2009 12:00	10/8/2009 11:05	10/8/2009 14:45	0.416	0.973	1.002	1.000	
0.14377	3/25/2009	3/25/2010	10/5/2009 12:00	10/8/2009 11:05	10/8/2009 14:45	0.416	0.973	1.002	1.000	
0.06605	8/4/2009	8/4/2010	10/5/2009 12:00	10/8/2009 11:05	10/8/2009 14:45	0.416	0.973	1.002	1.000	
0.06519	9/30/2009	9/30/2010	10/5/2009 12:00	10/8/2009 11:05	10/8/2009 14:45	0.416	0.973	1.002	1.000	
0.05303	8/31/2009	8/31/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.07722	12/19/2008	12/19/2009	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.06082	2/4/2009	2/4/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.12371	3/2/2009	3/2/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.14377	3/25/2009	3/25/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.06605	8/4/2009	8/4/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.06519	9/30/2009	9/30/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 15:55	0.423	0.976	1.002	1.000	
0.05303	8/31/2009	8/31/2010	10/5/2009 12:00	10/8/2009 12:45	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.07722	12/19/2008	12/19/2009	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.06082	2/4/2009	2/4/2010	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.12371	3/2/2009	3/2/2010	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.14377	3/25/2009	3/25/2010	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.06605	8/4/2009	8/4/2010	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 16:25	0.425	0.976	1.002	1.000	
0.06519	9/30/2009	9/30/2010	10/5/2009 12:00	10/8/2009 13:15	10/8/2009 17:00	0.425	0.972	1.002	1.000	
0.07722	12/19/2008	12/19/2009	10/5/2009 12:00	10/8/2009 13:35	10/8/2009 17:00	0.426	0.975	1.002	1.000	
0.06082	2/4/2009	2/4/2010	10/5/2009 12:00	10/8/2009 13:35	10/8/2009 17:00	0.426	0.975	1.002	1.000	
0.14377	3/25/2009	3/25/2010	10/5/2009 12:00	10/8/2009 13:35	10/8/2009 17:00	0.426	0.975	1.002	1.000	
0.06519	9/30/2009	9/30/2010	10/5/2009 12:00	10/8/2009 13:35	10/8/2009 17:35	0.426	0.970	1.002	1.000	
0.14377	3/25/2009	3/25/2010	10/5/2009 12:00	10/8/2009 13:50	10/8/2009 17:35	0.428	0.972	1.002	1.000	
0.06519	9/30/2009	9/30/2010	10/5/2009 12:00	10/8/2009 13:50	10/8/2009 18:05	0.428	0.968	1.002	1.000	

- Notes:
 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Pos.	Decision Level pCi/G	Critical Level pCi/G	Required MDA pCi/G	MDA pCi/G	Sample Act. Conc. pCi/G	Sample Act. Error pCi/G	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/G	Recovery	
									Counting Uncertainty pCi/G	Total Prop. Uncertainty pCi/G							
1	0.1595	0.1126	0.5	0.2766	0.5819	0.2420	1.1333	0.2357	0.2372	0.3057		SAMPLE					
2	0.1634	0.1154	0.5	0.2869	1.2370	0.1976	2.2000	0.2981	0.3286	0.3547		SAMPLE					
3	0.1591	0.1123	0.5	0.2758	0.6998	0.1957	1.3667	0.2517	0.2526	0.3115		SAMPLE					
4	0.1620	0.1144	0.5	0.2809	1.1474	0.1519	2.2000	0.3018	0.3085	0.4289		SAMPLE					
5	0.1701	0.1201	0.5	0.2950	2.1904	0.1108	4.0000	0.3887	0.4172	0.6864		SAMPLE					
6	0.1206	0.0851	0.5	0.2193	0.5563	0.2098	1.1333	0.2211	0.2127	0.2611		SAMPLE					
7	0.1599	0.1129	0.5	0.2772	1.0808	0.1537	2.1000	0.2963	0.2989	0.4070		SAMPLE					
8	0.1219	0.0861	0.5	0.2277	1.5174	0.1694	2.7333	0.3162	0.3441	0.6094		SAMPLE					
9	0.1602	0.1131	0.5	0.2813	0.8085	0.2250	1.4667	0.2539	0.2743	0.4007		SAMPLE					
10	0.0785	0.0554	0.5	0.1613	1.3636	0.1316	2.7000	0.3073	0.3042	0.4677		SAMPLE					
11	0.000E+00	0.000E+00	0.5	0.0510	0.6117	0.1790	1.2000	0.2000	0.1998	0.2553		SAMPLE					
12	0.1486	0.1049	0.5	0.2650	0.9021	0.1680	1.6333	0.2603	0.2818	0.3603		SAMPLE					
13	0.1677	0.1184	0.5	0.2908	2.7535	0.1149	5.1000	0.4333	0.4586	0.8783		SAMPLE					
14	0.1663	0.1174	0.5	0.2920	0.9345	0.1731	1.6333	0.2646	0.2967	0.3809		SAMPLE					
15	0.1661	0.1173	0.5	0.2881	1.0875	0.1898	2.0333	0.2925	0.3066	0.4733		SAMPLE					
16	0.0999	0.0706	0.5	0.2054	1.3510	0.1938	2.1000	0.2728	0.3440	0.5971		SAMPLE					
17	0.1418	0.1001	0.5	0.2459	1.5672	0.1249	3.4333	0.3636	0.3253	0.5220		SAMPLE					
18	0.000E+00	0.000E+00	0.5	0.0482	0.8188	0.1545	1.7000	0.2380	0.2247	0.3094		SAMPLE					
19	0.1356	0.0958	0.5	0.2352	0.8295	0.1686	1.9000	0.2848	0.2437	0.3322		SAMPLE					
20	0.1667	0.1177	0.5	0.2890	1.6276	0.1290	3.0333	0.3448	0.3626	0.5519		SAMPLE					
21	0.1530	0.1080	0.5	0.2653	0.2627	0.3817	0.5333	0.1886	0.1820	0.2053		SAMPLE					
22	0.1359	0.0960	0.5	0.2425	0.7916	0.1760	1.5667	0.2560	0.2536	0.3264		SAMPLE					
23	0.1713	0.1210	0.5	0.2971	13.9887	0.1484	25.3667	0.9292	1.0043	5.1525	237118014.1	MB	16.5%		12.0462	108.4%	
24	0.1386	0.0979	0.5	0.2403	9.8742	0.0762	22.1333	0.8692	0.7601	2.6743	237118014.1	DUP			11.0238	89.6%	
												LCS					

METHOD CALIBRATION DATA

LUCAS CELL COUNTERS

General Engineering Laboratories

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

Lucas Cell Calibration Package

	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?	✓		
	✓		
	✓		
	✓		
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: Kelli S. Dume

Date: 8/31/09

Reviewed By: Angela G. H.

Date: 8/31/09

Effective Date: 8/31/09

Ra-226 Cell Constants

standard ID: 0299-H
 Volume added (mL): 0.1
 Standard Reference Activity (DPM/mL): 2483.21

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	Bkg Counts cpm	total counts	count time min	Known activity dpm	t1 (days)		t2 (days)		t3 (days)		Decay from Std Ref Date to count
										end-degas to flush	to flush	end-flush to count	to count	Std Ref Date to count		
101	1.846	cal 7	8/27/2009 16:35	8/27/2009 13:30	8/21/2009 11:30		4479	15	298.60	6.08333	0.12847	3544	0.9958			
101	1.960	cal 9	8/24/2009 14:20	8/24/2009 9:30	8/18/2009 13:40		4581	15	305.40	5.82639	0.20139	3541	0.9958			
101	2.060	cal 1	8/21/2009 15:00	8/21/2009 9:30	8/18/2009 13:40		2945	15	196.33	2.82639	0.22917	3538	0.9958			
102	1.862	cal 5	8/27/2009 15:50	8/27/2009 12:40	8/21/2009 10:50		4510	15	300.67	6.07639	0.13194	3544	0.9958			
102	1.850	cal 10	8/24/2009 14:45	8/24/2009 9:55	8/18/2009 13:40		4330	15	288.67	5.84375	0.20139	3541	0.9958			
102	1.853	cal 2	8/21/2009 15:20	8/21/2009 9:50	8/18/2009 13:40		2659	15	177.27	2.84028	0.22917	3538	0.9958			

104	2.073	Average	1.972	cal 1	8/27/2009 14:25	8/27/2009 9:35	8/24/2009 11:00		3070	15	204.67	2.94097	0.20139	3544	0.9958
104	1.855	Stdev	0.110	cal 11	8/24/2009 15:15	8/24/2009 10:15	8/18/2009 13:40		4343	15	289.53	5.85764	0.20833	3541	0.9958
104	1.987	cal 3		8/21/2009 15:50	8/21/2009 10:10	8/18/2009 13:40		2858	15	190.53	2.85417	0.23611	3538	0.9958	

106	1.985	Average	1.836	cal 2	8/27/2009 14:55	8/27/2009 10:00	8/24/2009 11:20		2940	15	196.00	2.94444	0.20466	3544	0.9958
106	1.738	Stdev	0.131	cal 12	8/24/2009 15:35	8/24/2009 10:40	8/18/2009 13:40		4078	15	271.87	5.87500	0.20466	3541	0.9958
106	1.786	cal 4		8/21/2009 16:30	8/21/2009 10:30	8/18/2009 13:40		2572	15	171.47	2.86806	0.25000	3538	0.9958	
107	2.025	Average	1.981	cal 8	8/27/2009 16:55	8/27/2009 13:50	8/21/2009 11:55		4910	15	327.33	6.07986	0.12847	3544	0.9958
107	2.054	Stdev	0.102	cal 1	8/24/2009 15:55	8/24/2009 11:00	8/21/2009 10:50		3090	15	206.00	3.00694	0.20466	3541	0.9958
107	1.864	cal 5		8/21/2009 16:45	8/21/2009 10:50	8/18/2009 13:40		2696	15	179.73	2.88194	0.24653	3538	0.9958	
108	1.906	Average	1.946	cal 6	8/27/2009 16:05	8/27/2009 13:05	8/21/2009 11:15		4623	15	308.20	6.07639	0.12500	3544	0.9958
108	1.975	Stdev	0.036	cal 2	8/24/2009 16:25	8/24/2009 11:20	8/21/2009 10:50		2978	15	198.53	3.02083	0.21181	3541	0.9958
108	1.957	cal 6		8/21/2009 17:00	8/21/2009 11:15	8/18/2009 13:40		2846	15	189.73	2.89931	0.23958	3538	0.9958	

111	2.162	Average	2.024	cal 3	8/27/2009 15:12	8/27/2009 10:20	8/24/2009 12:25		3177	15	211.80	2.91319	0.20278	3544	0.9958
111	2.051	Stdev	0.153	cal 3	8/24/2009 17:00	8/24/2009 12:25	8/21/2009 10:50		3139	15	209.27	3.06597	0.19097	3541	0.9958
111	1.859	cal 7		8/21/2009 17:15	8/21/2009 11:30	8/18/2009 13:40		2712	15	180.80	2.90972	0.23958	3538	0.9958	
112	1.962	Average	1.931	cal 4	8/27/2009 15:30	8/27/2009 10:50	8/24/2009 12:40		2895	15	193.00	2.92361	0.19444	3544	0.9958
112	1.967	Stdev	0.059	cal 4	8/24/2009 17:15	8/24/2009 12:40	8/21/2009 10:50		3019	15	201.27	3.07639	0.19097	3541	0.9958
112	1.863	cal 8		8/21/2009 17:35	8/21/2009 11:55	8/18/2009 13:40		2731	15	182.07	2.92708	0.23611	3538	0.9958	

EffErr 0.053028 <- Put in Machines.xls (Lucas Cell Tab)

8/13/09

VW 8/13/109

Ra-226 Calibration Sheet

Standard ID: 0119-H

Volume Added (mL): 0.1

Expiration Date: 8/1/10

$\frac{2945}{8/13/09} = 900$
 $\frac{2778}{8/13/09} = 900$
 $\frac{2659}{8/13/09} = 900$
 $\frac{2858}{8/13/09} = 900$

* count time 15 min

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 1	500	8/18/09 1340	8/21/09 0930	8/21/09 1500 8/21/09 1430	101	1	3142 4055
Cal 2	500	8/18/09 1340	8/21/09 0950	8/21/09 1500 8/21/09 1425	102	1	2778
Cal 3	500	8/18/09 1340	8/21/09 1010	8/21/09 1550 8/21/09 1445	104	1	2182 259
Cal 4	500	8/18/09 1340	8/21/09 1030	8/21/09 1630	106	1	2572
Cal 5	500	8/18/09 1340	8/21/09 1050	8/21/09 1645	107	1	2696
Cal 6	500	8/18/09 1340	8/21/09 1115	8/21/09 1700	108	1	2846
Cal 7	500	8/18/09 1340	8/21/09 1130	8/21/09 1715	111	1	2712
Cal 8	500	8/18/09 1340	8/21/09 1155	8/21/09 1735	112	1	2731
Cal 9							
Cal 10							
Cal 11							
Cal 12							

$\frac{2945}{8/13/09}$
 $\frac{2778}{8/13/09}$
 $\frac{2659}{8/13/09}$
 $\frac{2858}{8/13/09}$

WSP/BSM

8/13/09

8/21/09

General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-A-008 Isotope RA-226
 Date Standards Prepared 4/5/05 Cocktail Type Used NA
 Standard ID 0799-H Matrix of Vial/Planchett NA
 Amount Used (g or ml) 0.1 NA
 Standard Activity (DPM/g or ml) 2483.233 Type of Scintillation Vial NA
 Reference Date 12/15/99 Pipette ID Used 1429303
 Expiration Date 8/1/10 Balance ID Used 38080204
 Residue/Carrier Agent D-1MHC1 Quenching Agent NA

	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				
	100502105				

Prepared By: Kelli Dorego Date 8/31/09
 Reviewed By: Angela J Gh Date 8/31/09

Rev 1 RLM 9/10/97

eev

8-21-00

Nycomed Amersham plc
Amersham Laboratories

0299



CALIBRATION
No. 0140



ISSUED BY: 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

Description Principal radionuclide: Radium-226

Product code: RAY44
Solution number: R4/131/89

Measurement Reference time: 1200 GMT on 15 December 1999

Nuclear data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

Expression of uncertainties 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

Approved
Signature

Date of issue

17th December 1999

VO 8131105

Nycomed

GEL Standard Traceability Log Rad

Source Material Info	
Parent Code:	0299
Prepared By:	Angela Johnson
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 Johnson
Prep Date:	09/15/2000
Verification Date:	01/23/2008
Expiration Date:	01/23/2009
Primary Code:	0299-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.6634 g
Density(g/mL):	1.0012
Balance ID:	

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

$(\text{Mass of parent(g)}) * (\text{Parent Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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	01/26/2009	01/26/2010
08/07/2009	Mary Aders	5.0767	250	0299-H	2483.2133 dpm/mL	08/07/2009	08/07/2010

GEL Laboratories LLC
Version 1.0 9/18/2000

W. Spina

Voltage Curve Ludlum #1

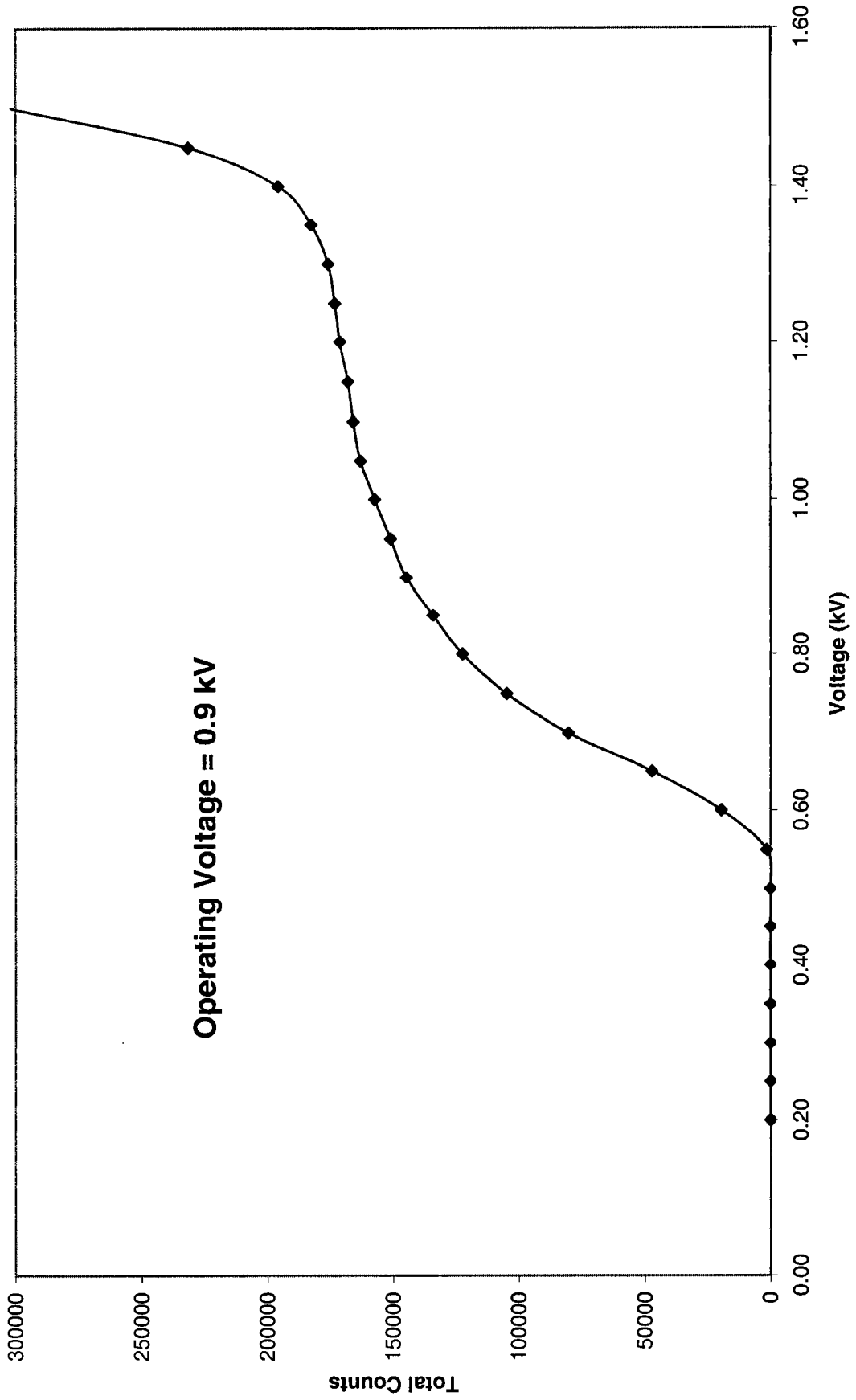
Voltage (kV)	Count Time (min)	Counts	Date/Time
0.20	1.00	0	8/21/09 13:20
0.25	1.00	0	8/21/09 13:21
0.30	1.00	0	8/21/09 13:22
0.35	1.00	0	8/21/09 13:23
0.40	1.00	0	8/21/09 13:24
0.45	1.00	0	8/21/09 13:25
0.50	1.00	0	8/21/09 13:26
0.55	1.00	1534	8/21/09 13:27
0.60	1.00	19637	8/21/09 13:28
0.65	1.00	47206	8/21/09 13:29
0.70	1.00	80410	8/21/09 13:30
0.75	1.00	104945	8/21/09 13:31
0.80	1.00	122514	8/21/09 13:32
0.85	1.00	134160	8/21/09 13:33
0.90	1.00	144753	8/21/09 13:34
0.95	1.00	151057	8/21/09 13:35
1.00	1.00	157429	8/21/09 13:36
1.05	1.00	163110	8/21/09 13:37
1.10	1.00	166034	8/21/09 13:38
1.15	1.00	168121	8/21/09 13:39
1.20	1.00	171347	8/21/09 13:40
1.25	1.00	173388	8/21/09 13:41
1.30	1.00	175958	8/21/09 13:42
1.35	1.00	182719	8/21/09 13:43
1.40	1.00	195871	8/21/09 13:44
1.45	1.00	231584	8/21/09 13:45
1.50	1.00	303021	8/21/09 13:46
1.55	1.00	387838	8/21/09 13:47

Detector set to operate at 0.90 kV

Handwritten: 19
8/31/09

Ludlum Detector Voltage Curve

—◆— Voltage Curve Ludlum #1



8/13/09

Control Limits for Lucas Cell Counter #1

Analyst: KSD1
Date: 8/31/2009

Count #	Detector #1
1	138383
2	138269
3	141307
4	140521
5	132825
6	135924
7	139231
8	138298
9	135342
10	138056
11	138123
12	139159
13	138410
14	138251
15	138438
16	138080
17	137814
18	137961
19	137248
20	137477

Average = 137955.9
Std. Dev. = 1775.5

+3 S. D. = 143282.4266
+2 S. D. = 141506.901
Mean = 137955.9
-2 S. D. = 134404.799
-3 S. D. = 132629.2734

Control Limits **8/31/2009** * Operating Voltage changed to 0.9 kV
Detector #1
Upper Limit **143282**
Lower Limit **132629**

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8/31/09

	Eff	Cal Date
101	1.956	8/31/2009
102	1.855	8/31/2009
104	1.972	8/31/2009
106	1.836	8/31/2009
107	1.981	8/31/2009
108	1.946	8/31/2009
111	2.024	8/31/2009
112	1.931	8/31/2009

Lucas	Ra-226	
Oldest Cal	01/23/2008	
Detector	Eff Error	Cal Date
1	0.0530	8/31/2009
2	0.0772	12/19/2008
3	0.0608	1/23/2008
4	0.1237	3/2/2009
5	0.1438	3/25/2009
6	0.0661	8/4/2009
7	0.0855	11/21/2008

Ra-226 WATER

Batch : LCSVER
Date : 8/20/2008
Analyst : KSD1
Procedure Code : LUC26RAL
Parname : 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	689	101	1.956	0.267	0.5907	25.3156	1.9236	8/31/2009 14:35
Ver 6	0.500	30	697	102	1.855	0.133	0.4721	27.1986	2.0367	8/31/2009 15:05
Ver 2	0.500	30	656	104	1.972	0.267	0.6303	25.7021	2.0032	8/28/2009 14:00
Ver 4	0.500	30	638	106	1.836	0.267	0.6304	24.9919	1.9762	8/31/2009 15:40
Ver 7	0.500	30	629	107	1.981	0.267	0.6257	24.4533	1.9479	8/28/2009 17:50
Ver 5	0.500	30	693	108	1.946	0.267	0.5959	25.6861	1.9459	8/31/2009 16:15
Ver 3	0.500	30	672	111	2.024	0.267	0.6129	25.6096	1.9713	8/28/2009 14:35
Ver 4	0.500	30	631	112	1.931	0.267	0.6411	25.1365	1.9990	8/28/2009 15:10

JLQ
8/31/09

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
Ver 2		1	8/31/2009 14:35	LCS	0638-H	24.17	pCi/L	105%
Ver 3		1	8/31/2009 15:05	LCS	0638-H	24.17	pCi/L	113%
Ver 2		1	8/28/2009 14:00	LCS	0638-H	24.17	pCi/L	106%
Ver 4		1	8/31/2009 15:40	LCS	0638-H	24.17	pCi/L	103%
Ver 7		1	8/28/2009 17:50	LCS	0638-H	24.17	pCi/L	101%
Ver 8		1	8/31/2009 16:15	LCS	0638-H	24.17	pCi/L	106%
Ver 3		1	8/28/2009 14:35	LCS	0638-H	24.17	pCi/L	106%
Ver 4		1	8/28/2009 15:10	LCS	0638-H	24.17	pCi/L	104%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
8/28/2009 10:20	8/31/2009 11:10	72.83	3.42	0.4230	0.9745	1.0019	22.7000	0.4130
8/28/2009 10:40	8/31/2009 11:30	72.83	3.58	0.4230	0.9733	1.0019	23.1000	0.4125
8/25/2009 16:00	8/28/2009 10:20	66.33	3.67	0.3940	0.9727	1.0019	21.6000	0.3839
8/28/2009 11:00	8/31/2009 11:55	72.92	3.75	0.4234	0.9721	1.0019	21.0000	0.4123
8/25/2009 16:00	8/28/2009 12:00	68.00	5.83	0.4015	0.9569	1.0019	20.7000	0.3850
8/28/2009 11:20	8/31/2009 12:15	72.92	4.00	0.4234	0.9703	1.0019	22.8333	0.4115
8/25/2009 16:00	8/28/2009 10:40	66.67	3.92	0.3955	0.9709	1.0019	22.1333	0.3847
8/25/2009 16:00	8/28/2009 11:00	67.00	4.17	0.3970	0.9690	1.0019	20.7667	0.3854

Handwritten signature and date: 8/31/09

062584 CAP: 11/11/10

Ra-226 Verification Sheet

* 1 .9 voltage

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
VEN 1	500	8/28/09 1600	8/28/09 0655	8/28/09 1310	101	1	8	525
VEN 2	500	8/28/09 1600	8/28/09 1020	8/28/09 1400	104	1	8	654
VEN 3	500	8/28/09 1600	8/28/09 1040	8/28/09 1435	111	1	8	672
VEN 4	500	8/28/09 1600	8/28/09 1100	8/28/09 1510	112	1	8	631
VEN 5	500	8/28/09 1600	8/28/09 1120	8/28/09 1510	106	1	8	678
VEN 6	500	8/28/09 1600	8/28/09 1140	8/28/09 1610	107	1	4	654
VEN 7	500	8/28/09 1600	8/28/09 1200	8/28/09 1750	107	1	8	629
VEN 8	500	8/28/09 1600	8/28/09 1305	8/28/09 1820	108	1	8	736
VEN 2	500	8/28/09 1020	8/28/09 1110	8/28/09 1435	101	1	8	689
VEN 3	500	8/28/09 1040	8/28/09 1130	8/28/09 1505	102	1	4	697
VEN 4	500	8/28/09 1050	8/28/09 1155	8/28/09 1540	106	1	8	638
VEN 5	500	8/28/09 1120	8/28/09 1215	8/28/09 1615	108	1	8	693

W 8/30/09
W 8/31/09

W 9/1/09

W 8/28/09

W 8/28/09
147

W 8/28/09

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

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

5.01065 grams 0.1M HCl solution with 50 μ g/g Ba carrier.

P O NUMBER 3231RD, Item 5

SOURCE PREPARED BY:

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

Q A APPROVED:

ACM 1/26/04

W 8731105

Standard Traceability Log Rad

WARNING! Training must be completed!!

Alphalims will be locked out if training is not completed within 1 week of assignment Contact Quality if additional time is needed to complete training

Source Material Info	
Parent Code:	0638
Prepared By:	Amanda Fehr
Carrier Conc:	0.1M HCl
Reference Date:	01/23/2004
Ampoule Mass (g):	5.01065 g
Uncertainty:	+/- 3.3 %
LogBook No:	RC-S-037-037

A Solution Material Info	
Isotope:	Radium-226
Prepared By:	Amanda Fehr
Prep Date:	01/16/2006
Verification Date:	04/09/2009
Expiration Date:	04/09/2010
Primary Code:	0638-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.8398 g
Density(g/mL):	1.0266
Balance ID:	38080204

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

$$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)}) * (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)}) * (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) * (5.01065 \text{ g} * 100 \text{ mL}) = 13636.6133 \text{ dpm/mL}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13282.9676 \text{ dpm/g}$$

W 8/28/09

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	01/17/2007	01/17/2008
07/17/2006	Mary Aders	2.1313	100	0638-C	282.6281 dpm/mL	07/26/2006	07/26/2007
03/28/2007	Daniel Roy	2.1025	100	0638-D	279.2744 dpm/ml	04/08/2007	04/08/2008
03/28/2007	Daniel Roy	45.468	250	0638-E	2415.7999 dpm/ml	04/09/2009	04/09/2010
12/18/2007	Daniel Roy	2.014	100	0638-F	267.519 dpm/ml	02/02/2009	02/02/2010
02/12/2008	Daniel Roy	.5004	100	0638-G	66.468 dpm/ml	03/02/2009	03/02/2010
07/23/2008	Daniel Roy	5.0607	250	0638-H	268.8845 dpm/ml	07/17/2009	07/17/2010

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Version 1.0 9/18/2000

W 8/31/09

Verification for Ra-226 Standard 0638-H

D. Roy 7/23/2008	Isotope	Value	Uncertainty
	0638-H	11.852	1.1079
	0638-H	12.092	1.1141
	0638-H	12.372	1.1216
Mean Value (Counting) =	12.106	100.13	Pass
Stdev =	0.260353631		Rule 3 (Pass/Fail)
Target =	12.09		
Lower Limit =	11.5848594		
Upper Limit =	12.62627393		
Rule 1 Pass/Fail	Pass		
Two sigma =	0.520707263		
10 % of Mean =	1.210556667		
Rule 2 (Pass/Fail)	Pass		

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-H by transferring portions of the degassed standard into tared glass liquid scintillation vials. 10 mL of DI Water and 10 mL of mineral oil were added to each vial and the vials were shaken. A Blank vial was prepared in a similar fashion using 10 mL of DI Water and 10 mL of mineral oil. The standard verification vials and Background source were dark adapted for two hours and counted on LSC RED using source standard verification. 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

David D. Roy 8/14/08
Ver. L. Jones 8/14/08

General Engineering Laboratories

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

Lucas Cell Calibration Package

	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: Kelli Donnell

Date: 12/19/08

Reviewed By: Mark G. Adams

Date: 12/19/08

Effective Date: 12/19/08

NU 12/19/08

Ra-226 Cell Constants

Standard Reference date: 12/15/1999
 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 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	2.021	Average	9/15/2008 15:45	9/15/2008 9:05	9/12/2008 13:20	0.267	5596	30	186.53	243.02	2.82292	0.27778	3198	0.9962
201	2.043	Stddev	9/18/2008 13:00	9/18/2008 8:10	9/15/2008 9:05	0.267	5949	30	198.30	243.02	2.96181	0.20139	3201	0.9962
201	1.915		9/25/2008 19:35	9/25/2008 9:15	9/22/2008 10:00	0.267	5361	30	178.70	243.02	2.96875	0.49056	3208	0.9962
202	2.436	Average	9/15/2008 16:20	9/15/2008 9:35	9/12/2008 13:20	0.267	6779	30	225.97	243.02	2.84375	0.28125	3198	0.9962
202	2.209	Stddev	9/18/2008 13:50	9/18/2008 8:45	9/15/2008 9:35	0.267	6425	30	214.17	243.02	2.96528	0.21181	3201	0.9962
202	2.137		10/21/2008 13:50	10/20/2008 13:45	10/13/2008 16:00	0.267	9248	30	308.27	243.02	6.90625	1.00347	3234	0.9962
203	2.255	Average	9/15/2008 16:50	9/15/2008 10:00	9/12/2008 13:20	0.267	6300	30	210.00	243.02	2.86111	0.28472	3198	0.9962
203	2.273	Stddev	9/18/2008 14:25	9/18/2008 9:15	9/15/2008 10:00	0.267	6613	30	220.43	243.02	2.96875	0.21528	3201	0.9962
203	2.234		9/25/2008 21:00	9/25/2008 10:15	9/22/2008 10:00	0.267	6298	30	209.93	243.02	3.01042	0.44782	3208	0.9962
204	2.184	Average	9/15/2008 17:25	9/15/2008 10:30	9/12/2008 13:20	0.267	6132	30	204.40	243.02	2.88194	0.28819	3198	0.9962
204	2.300	Stddev	9/18/2008 14:55	9/18/2008 9:35	9/15/2008 10:30	0.267	6671	30	222.37	243.02	2.96181	0.22222	3201	0.9962
204	2.096		9/30/2008 14:05	9/30/2008 9:10	9/28/2008 9:45	0.133	7535	30	251.17	243.02	3.97569	0.20486	3213	0.9962
205	1.677	Average	10/21/2008 8:30	10/20/2008 14:05	10/13/2008 16:00	0.267	7584	30	252.80	243.02	6.32014	0.76736	3233	0.9962
205	1.730	Stddev	9/18/2008 16:00	9/18/2008 10:05	9/15/2008 10:55	0.167	4989	30	166.63	243.02	2.96528	0.24653	3201	0.9962
205	1.990		9/30/2008 14:45	9/30/2008 9:40	9/28/2008 9:45	0.167	7170	30	239.00	243.02	3.89653	0.21181	3213	0.9962
206	2.240	Average	9/15/2008 21:10	9/15/2008 11:25	9/12/2008 13:20	0.233	6216	30	207.20	243.02	2.32014	0.40825	3198	0.9962
206	2.293	Stddev	9/18/2008 16:35	9/18/2008 10:25	9/15/2008 11:25	0.267	6604	30	220.13	243.02	2.95833	0.25694	3201	0.9962
206	2.245		9/30/2008 15:20	9/30/2008 10:15	9/28/2008 9:45	0.267	8125	30	270.83	243.02	4.02083	0.21181	3213	0.9962
207	2.187	Average	9/15/2008 21:40	9/15/2008 11:50	9/12/2008 13:20	0.267	6084	30	203.13	243.02	2.33750	0.40972	3198	0.9962
207	2.141	Stddev	9/18/2008 17:55	9/18/2008 10:40	9/15/2008 11:50	0.267	6105	30	203.50	243.02	2.95139	0.30208	3201	0.9962
207	2.110		9/30/2008 16:00	9/30/2008 10:45	9/28/2008 9:45	0.233	7856	30	255.20	243.02	4.04167	0.21875	3213	0.9962
208	2.239	Average	9/15/2008 22:15	9/15/2008 12:15	9/12/2008 13:20	0.267	6288	30	208.60	243.02	2.85486	0.41667	3198	0.9962
208	2.243	Stddev	9/18/2008 19:30	9/18/2008 11:00	9/15/2008 12:15	0.133	6374	30	212.47	243.02	2.94786	0.41290	3201	0.9962
208	2.148		9/30/2008 16:55	9/30/2008 11:10	9/28/2008 9:45	0.167	7691	30	236.03	243.02	4.04989	0.21875	3213	0.9962
209	2.471	Average	9/15/2008 22:45	9/15/2008 13:50	9/12/2008 13:20	0.033	7073	30	235.77	243.02	3.02083	0.37153	3198	0.9962
209	2.212	Stddev	9/18/2008 19:15	9/18/2008 11:15	9/15/2008 13:50	0.067	6170	30	205.67	243.02	2.89236	0.33333	3201	0.9962
209	2.420		9/30/2008 17:25	9/30/2008 11:40	9/28/2008 9:45	0.100	8795	30	293.17	243.02	4.07986	0.23958	3213	0.9962
210	2.320	Average	9/15/2008 23:15	9/15/2008 14:15	9/12/2008 13:20	0.033	6665	30	222.17	243.02	3.03819	0.37500	3198	0.9962
210	2.210	Stddev	9/18/2008 19:45	9/18/2008 11:30	9/15/2008 14:15	0.100	6142	30	204.73	243.02	2.88542	0.34375	3201	0.9962
210	2.230		9/30/2008 18:00	9/30/2008 12:05	9/28/2008 9:45	0.033	8116	30	270.53	243.02	4.09722	0.24653	3213	0.9962
211	2.140	Average	9/15/2008 23:50	9/15/2008 14:30	9/12/2008 13:20	0.033	6150	30	205.00	243.02	3.04661	0.36889	3198	0.9962
211	2.238	Stddev	9/18/2008 22:20	9/18/2008 12:35	9/15/2008 14:30	0.133	6207	30	206.90	243.02	2.92014	0.40625	3201	0.9962
211	2.136		9/30/2008 18:30	9/30/2008 13:35	9/28/2008 9:45	0.100	7917	30	263.90	243.02	4.15972	0.20486	3213	0.9962
212	2.405	Average	9/16/2008 0:20	9/15/2008 14:50	9/12/2008 13:20	0.033	6926	30	230.87	243.02	3.06250	0.39583	3198	0.9962
212	2.315	Stddev	9/18/2008 22:55	9/18/2008 12:50	9/15/2008 14:50	0.267	6405	30	213.50	243.02	2.91667	0.42014	3201	0.9962
212	2.244		9/30/2008 19:50	9/30/2008 14:00	9/28/2008 9:45	0.267	8287	30	276.23	243.02	4.17708	0.24306	3213	0.9962

NU 12/19/08

NU 12/19/08

NU 12/19/08

Verification for Ra-226 Standard 0299-G

4/2/2008	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Mass. Used (G)	Source DPM/G
D. Roy	0299-G N1	2536.9600	52.4000	2484.5600	1.917186	0.5057	2562.667649
	0299-G N2	2520.2500	52.4000	2467.8500	1.917186	0.5056	2545.935781
	0299-G N3	2532.5000	52.4000	2480.1000	1.917186	0.5042	2565.677715
						Average =	2558.093715

Mean Value (Counting) = 2558.093715
 Stdev = 10.63610098

Certificate Value = 2437.6 dpm/mL
 Lower Limit = 2536.821513 dpm/mL
 Upper Limit = 2579.365917 dpm/mL
 Rule 1 Pass/Fail = Fail *exception taken due to full recovery of standard
 Two sigma = 21.27220197 dpm/mL
 10 % of Mean = 255.8093715 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 Gold for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 4/02/08 using source 0024-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0024. 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.

BAD.SOP.M-001

Noted 12/19/08
 W 12/19/08
 Nancy E. Johnson 4/9/08
 Daniel Dwyer 4/10/08



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:	01/23/2008
Ampoule Mass (g):	5.0368 g	Expiration Date:	01/23/2009
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
		Balance ID:	

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
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	04/02/2008	04/02/2009

GEL Laboratories LLC
Version 1.0 9/18/2000

all ok re 12/19/08
len 12/19/08

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.

Handwritten notes:
12/19/99
12/19/98

Ra-226 WATER

Batch : LCSVER
Date : 10/31/2008
Analyst : KSD1

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 1	0.500	30	1014	201	1.993	0.267	0.3504	22.1841	1.3817	11/17/2008 15:10
VER 2	0.500	30	1056	202	2.261	0.267	0.3089	20.3702	1.2427	11/17/2008 15:45
VER 3	0.500	30	726	203	2.254	0.267	0.5419	24.4866	1.8110	10/30/2008 16:05
VER 4	0.500	30	737	204	2.193	0.267	0.5519	25.3188	1.8580	10/30/2008 18:20
VER 5	0.500	30	937	205	1.799	0.267	0.3882	22.6936	1.4718	11/17/2008 16:20
VER 6	0.500	30	780	206	2.259	0.267	0.5373	26.1045	1.8604	10/30/2008 20:20
VER 7	0.500	30	711	207	2.146	0.267	0.5705	25.2245	1.8858	10/30/2008 22:00
VER 3	0.500	30	593	208	2.283	0.267	0.5132	16.9552	1.4723	11/20/2008 16:40
VER 9	0.500	30	630	209	2.291	0.133	0.4042	21.0513	1.6596	10/30/2008 23:40
VER 10	0.500	30	691	210	2.253	0.033	0.2527	23.7356	1.7736	10/31/2008 1:15
VER 11	0.500	30	1067	211	2.171	0.267	0.3314	22.0840	1.3401	11/17/2008 21:55
VER 12	0.500	30	648	212	2.322	0.133	0.4223	22.6294	1.7586	10/31/2008 9:15

12/19/08
KSD

12/19/08
KSD

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
201		2	11/17/2008 10:20	LCS	0638-F	24.10	pCi/L	92%
202		2	11/17/2008 10:45	LCS	0638-F	24.10	pCi/L	85%
203		2	10/30/2008 11:05	LCS	0638-F	24.10	pCi/L	102%
204		2	10/30/2008 12:30	LCS	0638-F	24.10	pCi/L	105%
205		2	11/17/2008 11:10	LCS	0638-F	24.10	pCi/L	94%
206		2	10/30/2008 13:10	LCS	0638-F	24.10	pCi/L	108%
207		2	10/30/2008 13:25	LCS	0638-F	24.10	pCi/L	105%
208		2	11/20/2008 11:45	LCS	0638-F	24.10	pCi/L	70% <i>W</i>
209		2	10/30/2008 14:05	LCS	0638-F	24.10	pCi/L	87% <i>W</i>
210		2	10/30/2008 14:25	LCS	0638-F	24.10	pCi/L	98% <i>W</i>
211		2	11/17/2008 12:20	LCS	0638-F	24.10	pCi/L	92%
212		2	10/30/2008 14:55	LCS	0638-F	24.10	pCi/L	94%

W
12/18/08

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
11/10/2008 15:35	11/17/2008 10:20	162.75	4.83	0.7073	0.9642	1.0019	33.5333	0.6833
11/10/2008 15:35	11/17/2008 10:45	163.17	5.00	0.7083	0.9630	1.0019	34.9333	0.6833
10/27/2008 14:20	10/30/2008 11:05	68.75	5.00	0.4049	0.9630	1.0019	23.9333	0.3907
10/27/2008 14:20	10/30/2008 12:30	70.17	5.83	0.4113	0.9569	1.0019	24.3000	0.3943
11/10/2008 15:35	11/17/2008 11:10	163.58	5.17	0.7092	0.9617	1.0019	30.9667	0.6833
10/27/2008 14:20	10/30/2008 13:10	70.83	7.17	0.4142	0.9473	1.0019	25.7333	0.3931
10/27/2008 14:20	10/30/2008 13:25	71.08	8.58	0.4153	0.9373	1.0019	23.4330	0.3900
11/17/2008 11:10	11/20/2008 11:45	72.58	4.92	0.4219	0.9696	1.0019	17.5900	0.4073
10/27/2008 14:20	10/30/2008 14:05	71.75	9.58	0.4182	0.9302	1.0019	20.8670	0.3898
10/27/2008 14:20	10/30/2008 14:25	72.08	10.83	0.4197	0.9215	1.0019	23.0003	0.3875
11/10/2008 15:35	11/17/2008 12:20	164.75	9.58	0.7117	0.9302	1.0019	35.3000	0.6633
10/27/2008 14:20	10/30/2008 14:55	72.58	18.33	0.4219	0.8707	1.0019	21.4670	0.3681

W
12/18/08

W
12/19/08
W
12/18/08

Verification for Ra-226 Standard 0638-F

D Roy
12/27/2007

Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Source DPM/mL
0638-F N1	1239.9000	31.5000	1208.4000	4.624018	261.3311626
0638-F N2	1222.8000	31.5000	1191.3000	4.624018	257.6330801
0638-F N3	1219.4000	31.5000	1187.9000	4.624018	256.8977889
					Average =

Mean Value (Counting) = 258.6206772
 Stdev = 2.375965421

96.8384646 Pass
 0.00918707 Rule 3 (Pass/Fail)

Certificate Value = 267.1
 Lower Limit = 253.8687464
 Upper Limit = 263.3726081
 Rule 1 Pass/Fail Fail
 Two sigma = 4.751930843
 10 % of Mean = 25.86206772
 Rule 2 (Pass/Fail) Pass

*exception taken due to full recovery of standard

Verification Rules

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

The analyst prepared three standard verification sources for Ra-226 source 0638-F 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 YELLOW using source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/27/07 using source 0024-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 (0024-A). Each verification source calculation was performed as follows:

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

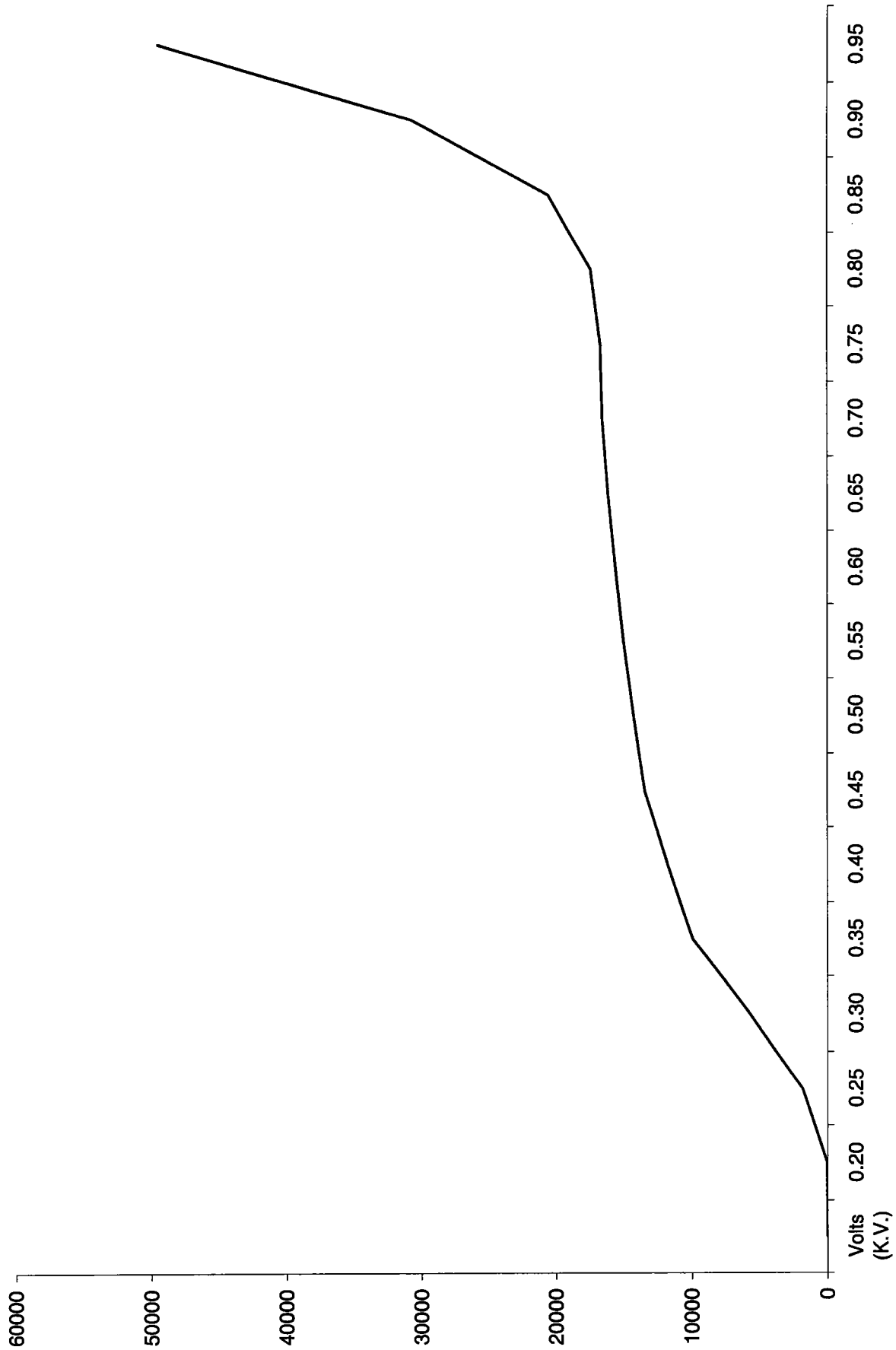
where:

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

Reference RAD SOP M-001

12/19/08

Handwritten signature and date:
 1/4/07
 Amanda L. Fehr 1/4/07



mut 12/19/08
VW 12/19/08

201	1.993	12/19/2008
202	2.261	12/19/2008
203	2.254	12/19/2008
204	2.193	12/19/2008
205	1.799	12/19/2008
206	2.259	12/19/2008
207	2.146	12/19/2008
209	2.291	12/19/2008
210	2.253	12/19/2008
211	2.171	12/19/2008
212	2.322	12/19/2008

*Next
12/19/08*

General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414

(843)556-8171

Lucas Cell Calibration Package

	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: Kellipanel

Date: 2/3/09

Reviewed By: M. G. Hens

Date: 2/4/09

Effective Date: 2/4/09

Ra-226 Cell Constants

Standard Reference date: 12/15/1999
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 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	1.867	Average	1/20/2009 11:05	1/19/2009 10:10	1/19/2009 15:45	0.267	9355	30	311.83	9.76736	1.03819	3324	0.9961
301	2.184	Stdev	1/29/2009 11:50	1/29/2009 8:50	1/28/2009 13:00	0.267	6239	30	207.97	2.82639	0.12500	3333	0.9961
301	2.011		1/26/2009 14:35	1/26/2009 9:25	1/22/2009 9:10	0.267	7282	30	242.73	4.01042	0.21528	3331	0.9961
302	2.082	Average	1/30/2009 11:30	1/30/2009 8:30	1/28/2009 13:00	0.267	7401	30	246.70	3.81250	0.12500	3334	0.9961
302	2.225	Stdev	1/29/2009 13:30	1/29/2009 9:20	1/28/2009 13:00	0.233	6335	30	211.17	2.84722	0.17361	3334	0.9961
302	2.086		1/26/2009 15:30	1/26/2009 9:55	1/22/2009 9:10	0.267	7555	30	251.83	4.03125	0.23264	3331	0.9961
303	1.958	Average	1/20/2009 13:40	1/19/2009 11:00	1/19/2009 15:45	0.267	9695	30	323.17	9.80208	1.11111	3325	0.9961
303	2.218	Stdev	1/22/2009 20:35	1/22/2009 10:05	1/19/2009 15:00	0.267	5938	30	197.93	2.79514	0.43750	3327	0.9961
303	2.231		1/26/2009 17:20	1/26/2009 10:25	1/22/2009 9:10	0.267	8028	30	267.60	4.05208	0.28819	3331	0.9961

305	1.897	Average	1/20/2009 14:50	1/19/2009 11:35	1/19/2009 15:45	0.200	9357	30	311.90	9.82639	1.13542	3325	0.9961
305	2.191	Stdev	1/22/2009 21:50	1/22/2009 11:05	1/19/2009 15:00	0.267	5921	30	197.37	2.83681	0.44792	3327	0.9961
305	2.083		1/26/2009 23:00	1/26/2009 11:20	1/22/2009 9:10	0.267	7280	30	242.67	4.09028	0.48611	3331	0.9961
306	1.730	Average	1/20/2009 15:20	1/19/2009 11:50	1/19/2009 15:45	0.167	8521	30	284.03	9.83681	1.14593	3325	0.9961
306	1.891	Stdev	1/29/2009 14:30	1/29/2009 10:20	1/28/2009 13:00	0.233	4869	30	162.30	2.88889	0.17361	3334	0.9961
306	1.821		1/26/2009 23:30	1/26/2009 11:50	1/22/2009 9:10	0.267	6387	30	212.90	4.11111	0.48611	3331	0.9961
307	1.818	Average	1/20/2009 15:50	1/19/2009 12:05	1/19/2009 15:45	0.267	8944	30	298.13	9.84722	1.15625	3325	0.9961
307	2.095	Stdev	1/30/2009 12:55	1/30/2009 9:10	1/28/2009 13:00	0.267	7442	30	248.07	3.84028	0.15625	3335	0.9961
307	1.881		1/27/2009 0:05	1/26/2009 12:10	1/22/2009 9:10	0.267	6598	30	219.93	4.12500	0.49653	3331	0.9961
308	2.129	Average	1/29/2009 15:50	1/29/2009 11:05	1/28/2009 13:00	0.133	6149	30	204.97	2.92014	0.19792	3334	0.9961
308	1.858	Stdev	1/23/2009 9:35	1/22/2009 13:45	1/19/2009 15:00	0.267	4829	30	160.97	2.94792	0.82639	3327	0.9961
308	1.862		1/27/2009 8:30	1/26/2009 13:15	1/22/2009 9:10	0.267	6226	30	207.53	4.17014	0.80208	3331	0.9961
309	1.857	Average	1/20/2009 17:20	1/19/2009 13:35	1/19/2009 15:45	0.033	9149	30	304.97	9.90972	1.15625	3325	0.9961
309	1.964	Stdev	1/23/2009 10:30	1/22/2009 14:05	1/19/2009 15:00	0.267	5100	30	170.00	2.96181	0.85069	3327	0.9961
309	1.810		1/27/2009 9:05	1/26/2009 13:30	1/22/2009 9:10	0.267	6046	30	201.53	4.18056	0.81597	3331	0.9961

311	2.140	Average	1/29/2009 16:40	1/29/2009 11:20	1/28/2009 13:00	0.267	6176	30	205.87	2.93056	0.22222	3334	0.9961
311	2.212	Stdev	1/23/2009 12:20	1/22/2009 14:25	1/19/2009 15:00	0.267	5698	30	189.93	2.97569	0.91319	3328	0.9961
311	1.988		1/27/2009 10:15	1/26/2009 13:45	1/22/2009 9:10	0.267	6607	30	220.23	4.19097	0.85417	3331	0.9961
312	1.871	Average	1/20/2009 19:16	1/19/2009 14:10	1/19/2009 15:45	0.100	9135	30	304.50	9.93403	1.21250	3325	0.9961
312	2.014	Stdev	1/29/2009 17:10	1/29/2009 11:35	1/28/2009 13:00	0.167	5814	30	193.80	2.94097	0.23264	3334	0.9961
312	1.946		1/27/2009 11:10	1/26/2009 14:00	1/22/2009 9:10	0.267	6446	30	214.87	4.20139	0.88194	3331	0.9961

K0 2/3/09

Verification for Ra-226 Standard 0299-G

4/2/2008	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard Mass. Used (G)	Source DPM/G
D. Roy	0299-G N1	2536.9600	52.4000	2484.5600	1.917186	0.5057	2562.667649
	0299-G N2	2520.2500	52.4000	2467.8500	1.917186	0.5056	2545.935781
	0299-G N3	2532.5000	52.4000	2480.1000	1.917186	0.5042	2565.677715
						Average =	2558.093715

Mean Value (Counting) = 2558.093715
 Stdev = 10.63610098

Certificate Value = 2437.6 dpm/mL
 Lower Limit = 2536.821513 dpm/mL
 Upper Limit = 2579.365917 dpm/mL

Rule 1 Pass/Fail **Fail**
 Two sigma = 21.27220197 dpm/mL
 10 % of Mean = 255.8093715 dpm/mL

Rule 2 (Pass/Fail) **Pass**

104.944421 **Pass**
 0.00415782 **Rule 3 (Pass/Fail)**

*exception taken due to full recovery of standard

Verification Rules

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

Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule 3 = The determined mean value shall be within 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 Gold for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 4/02/08 using source 0024-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0024. 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.

IRAD-SOP-M-001

Handwritten notes:
 5/10/08
 M. N. 2310
 1.5 ml water for 30 sec



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:	01/23/2008
Ampoule Mass (g):	5.0368 g	Expiration Date:	01/23/2009
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
		Balance ID:	

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$$

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

$$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$$

$$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$$

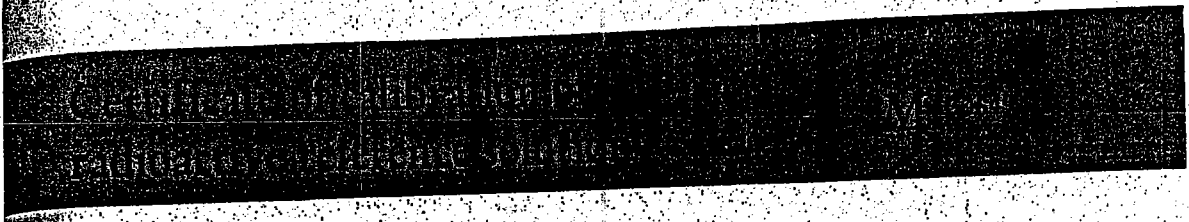
Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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	04/02/2008	04/02/2009

GEL Laboratories LLC
Version 1.0 9/18/2000

LD 2/3/09
ALLA 2/4/09

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 purity: 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 form: Carrier free in 0.5M HCL

Conformance: 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.

KB 21/3/09
WMA 21/11/09

Ra-226 WATER

Batch : LCSVER
 Date : 1/2/2009
 Analyst : KSD1

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	656	301	2.021	0.267	0.4919	20.0589	1.5634	1/30/2009 15:05
1	0.500	30	655	302	2.131	0.267	0.5554	22.6149	1.7640	2/2/2009 13:40
2	0.500	30	914	303	2.136	0.267	0.4647	26.4838	1.7397	1/30/2009 15:40
3	0.500	30	791	305	2.057	0.267	0.4845	23.8718	1.6891	1/30/2009 17:05
4	0.500	30	768	306	1.747	0.267	0.5709	27.2885	1.9605	1/30/2009 17:37
2	0.500	30	720	307	1.931	0.267	0.6113	27.3779	2.0335	2/2/2009 14:15
5	0.500	30	730	308	1.950	0.267	0.5149	23.3957	1.7254	1/30/2009 19:05
6	0.500	30	764	309	1.877	0.267	0.5908	28.0944	2.0238	1/31/2009 10:20
7	0.500	30	594	311	2.114	0.267	0.5510	20.3087	1.6667	1/31/2009 17:20
8	0.500	30	542	312	1.944	0.267	0.8009	26.8983	2.3154	2/2/2009 8:25

601112
 CW

Handwritten signature

Sample ID	Cell #	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
1	301	3	1/30/2009 10:40	LCS	0638-F	24.10	pCi/L	83%
2	302	3	2/2/2009 9:15	LCS	0638-F	24.10	pCi/L	94%
2	303	3	1/30/2009 11:05	LCS	0638-F	24.10	pCi/L	110%
3	305	3	1/30/2009 11:30	LCS	0638-F	24.10	pCi/L	99%
4	306	3	1/30/2009 11:45	LCS	0638-F	24.10	pCi/L	113%
2	307	3	2/2/2009 9:40	LCS	0638-F	24.10	pCi/L	114%
5	308	3	1/30/2009 12:00	LCS	0638-F	24.10	pCi/L	97%
3	309	3	1/30/2009 13:05	LCS	0638-F	24.10	pCi/L	117%
7	311	3	1/30/2009 13:20	LCS	0638-F	24.10	pCi/L	84%
8	312	3	1/30/2009 13:40	LCS	0638-F	24.10	pCi/L	112%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	Net CPM	Ingrowth constant
1/26/2009 16:05	1/30/2009 10:40	90.58	4.42	0.9672	1.0019	21.6000	0.4800
1/30/2009 10:00	2/2/2009 9:15	71.25	4.42	0.9672	1.0019	21.5667	0.4032
1/26/2009 16:05	1/30/2009 11:05	91.00	4.58	0.9660	1.0019	30.1997	0.4809
1/26/2009 16:05	1/30/2009 11:30	91.42	5.58	0.9587	1.0019	26.1000	0.4788
1/26/2009 16:05	1/30/2009 11:45	91.67	5.87	0.9567	1.0019	25.3330	0.4787
1/30/2009 10:00	2/2/2009 9:40	71.67	4.58	0.9660	1.0019	23.7330	0.4044
1/26/2009 16:05	1/30/2009 12:00	91.92	7.08	0.9479	1.0019	24.0667	0.4753
1/26/2009 16:05	1/30/2009 13:05	93.00	21.25	0.8518	1.0019	25.1997	0.4305
1/26/2009 16:05	1/30/2009 13:20	93.25	28.00	0.8095	1.0019	19.5330	0.4099
1/26/2009 16:05	1/30/2009 13:40	93.58	66.75	0.6041	1.0019	17.7997	0.3067

5/11/12
 071
 LEWA 2141.04

Verification for Ra-226 Standard 0638-F

	Isotope	Value	Uncertainty
D. Roy 2/2/2009	0638-F #1	24.629	1.7426
	0638-F #2	24.438	1.7557
	0638-F #3	22.791	1.6808
Mean Value (Counting) =	23.953	99.60	Pass
Stdev =	1.010781096		Rule 3 (Pass/Fail)
Target =	24.05		
Lower Limit =	21.93100448		
Upper Limit =	25.97412886		
Rule 1 Pass/Fail	Pass		
Two sigma =	2.021562191		
10 % of Mean =	2.395256667		
Rule 2 (Pass/Fail)	Pass		

- 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 standard 0638-F using 0.1 mL for each source. Each source was counted using routine Lucas cell procedures. Calibration for 0299-G was used in this verification.

140 2/4/09
[Signature]
 Amanda L. Lehn
 2/4/09

General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL-RAD-008 Isotope Pb-226
 Date Standards Prepared ^{2/11/09} 2/13/2007 Cocktail Type Used N/A
 Standard ID 0630-F Matrix of Vial/Planchett N/A
 Amount Used (g or ml) 0.1 ml Type of Scintillation Vial N/A
 Standard Activity (DPM/g or mL) 267.519 dpm/ml Pipette ID Used 1429303
 Reference Date 1/23/2004 Balance ID Used N/A
 Expiration Date 2/14/09 Quenching Agent N/A
 Residue/Carrier Agent 0.1 ml H₂O

	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				

LO 2/13/09

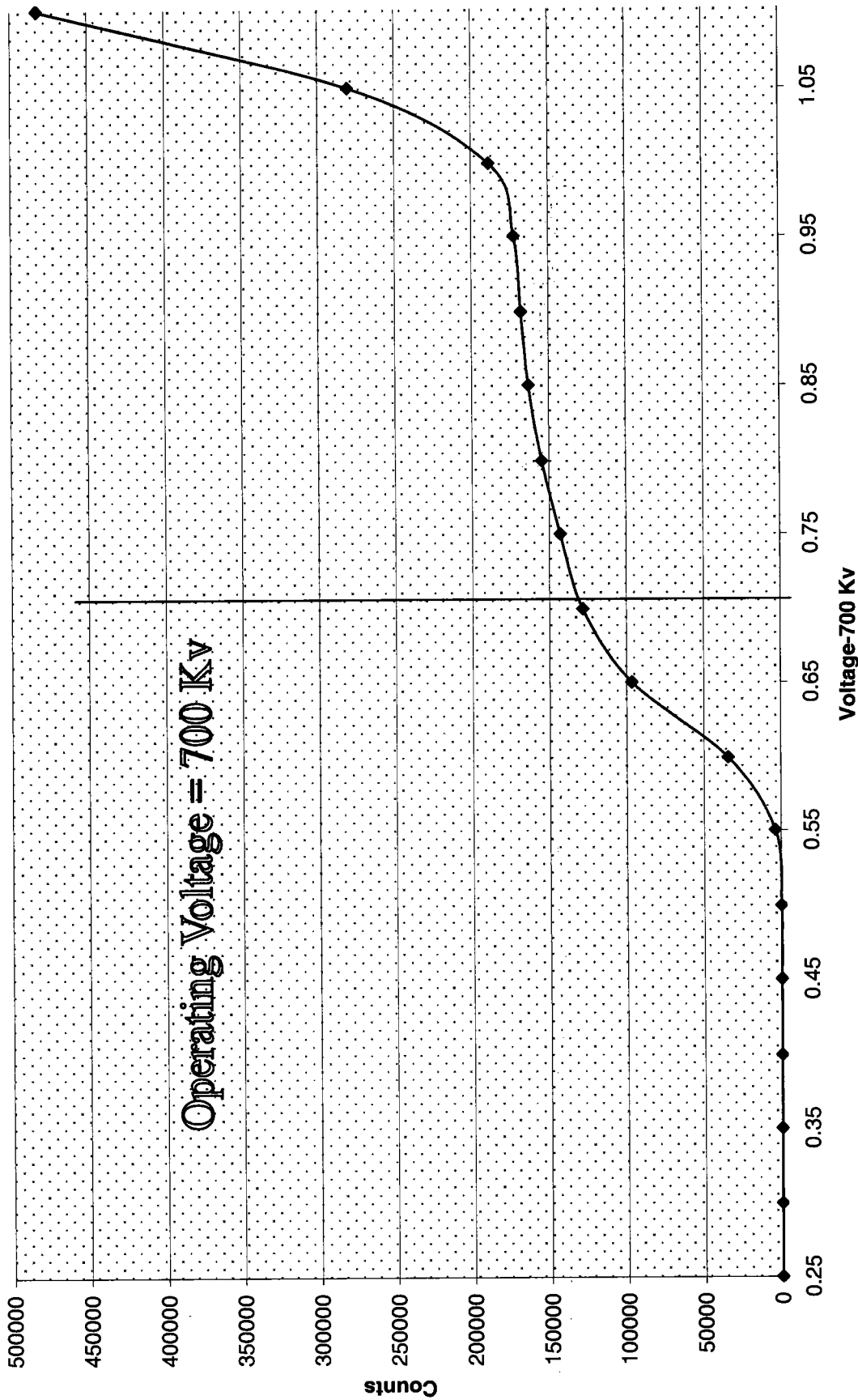
Prepared By: Kelli B. Nevel Date 2/13/09
 Reviewed By: [Signature] Date 2/14/09

Voltage Curve 1-09

Voltage Curve Ludlum # 3				
Volts	Counts	Date	Time	Detector
0.00	0	1/20/2009	13:45	3
0.05	0	1/20/2009	13:46	3
0.10	0	1/20/2009	13:47	3
0.15	0	1/20/2009	13:48	3
0.20	0	1/20/2009	13:49	3
0.25	0	1/20/2009	14:00	3
0.30	0	1/20/2009	14:01	3
0.35	0	1/20/2009	14:02	3
0.40	0	1/20/2009	14:03	3
0.45	0	1/20/2009	14:04	3
0.50	0	1/20/2009	14:05	3
0.55	3914	1/20/2009	14:06	3
0.60	34392	1/20/2009	14:07	3
0.65	96643	1/20/2009	14:08	3
0.70	128361	1/20/2009	14:09	3
0.75	142888	1/20/2009	14:10	3
0.80	154583	1/20/2009	14:11	3
0.85	163087	1/20/2009	14:12	3
0.90	167801	1/20/2009	14:13	3
0.95	172317	1/20/2009	14:14	3
1.00	188508	1/20/2009	14:15	3

KLA 2/4/09
 LW
 2/3/09

Ludlum 3 Voltage Curve



KO 213109

2/11/59
MCA

301	2.021	2/4/2009
302	2.131	2/4/2009
303	2.136	2/4/2009
305	2.057	2/4/2009
306	1.747	2/4/2009
307	1.931	2/4/2009
308	1.950	2/4/2009
309	1.877	2/4/2009
311	2.114	2/4/2009
312	1.944	2/4/2009

RE UT
2/4/09

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2/4/09
RE UT
2/4/09

General Engineering Laboratories

2040 Savage Road, Charleston, SC 29414

(843)556-8171

Lucas Cell Calibration Package

	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: Kelli Dorrel

Date: 2/28/09

Reviewed By: Angela Johnson

Date: 3/2/09

Effective Date: 3/2/09

Ra-226 Cell Constants

Standard Reference date : 12/15/1999
 standard ID : 0.299-G
 Volume added (mL) : 0.1
 Standard Reference Activity (DPM/mL) : 2446.35

Lucas cell #	Call 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
401	1.689	Average	2/23/2009 16:15	2/23/2009 10:30	2/20/2009 17:25	0.267	4580	30	152.67	243.66	2.71181	0.23958	3359	0.9960
401	1.585	Stdev	2/27/2009 13:15	2/27/2009 9:00	2/23/2009 16:05	0.267	5474	30	182.47	243.66	3.70486	0.17708	3363	0.9960
401	1.448		2/25/2009 14:40	2/25/2009 7:55	2/20/2009 17:25	0.267	5677	30	189.23	243.66	4.60417	0.28125	3361	0.9960
402	2.133	Average	2/23/2009 16:55	2/23/2009 11:05	2/20/2009 17:25	0.267	5817	30	193.90	243.66	2.73611	0.24306	3359	0.9960
402	2.173	Stdev	2/27/2009 14:10	2/27/2009 9:30	2/23/2009 16:05	0.267	7507	30	250.23	243.66	3.72569	0.19444	3363	0.9960
402	2.048		2/25/2009 15:25	2/25/2009 8:15	2/20/2009 17:25	0.267	8017	30	267.23	243.66	4.61806	0.29861	3361	0.9960
403	1.475	Average	2/23/2009 18:30	2/23/2009 11:30	2/20/2009 17:25	0.267	4011	30	133.70	243.66	2.75347	0.29167	3359	0.9960
403	1.495	Stdev	2/27/2009 14:50	2/27/2009 10:00	2/23/2009 16:05	0.267	5182	30	172.73	243.66	3.74853	0.20139	3363	0.9960
403	1.419		2/25/2009 15:55	2/25/2009 8:35	2/20/2009 17:25	0.267	5582	30	185.40	243.66	4.63194	0.30556	3361	0.9960
404	1.792	Average	2/23/2009 19:05	2/23/2009 13:10	2/20/2009 17:25	0.267	5005	30	166.83	243.66	2.82292	0.24653	3359	0.9960
404	2.142	Stdev	2/27/2009 15:25	2/27/2009 10:30	2/23/2009 16:05	0.267	7443	30	248.10	243.66	3.76736	0.20486	3363	0.9960
404	1.859		2/25/2009 20:20	2/25/2009 8:55	2/20/2009 17:25	0.267	7075	30	235.83	243.66	4.64583	0.47569	3361	0.9960
405	2.066	Average	3/2/2009 13:40	3/2/2009 10:30	2/25/2009 14:00	0.267	8602	30	286.73	243.66	4.85417	0.13194	3366	0.9960
405	1.899	Stdev	2/27/2009 16:00	2/27/2009 10:55	2/23/2009 16:05	0.267	6612	30	220.40	243.66	3.78472	0.21181	3363	0.9960
405	1.745		2/25/2009 20:55	2/25/2009 10:10	2/20/2009 17:25	0.267	6721	30	224.03	243.66	4.69792	0.44792	3361	0.9960
409	1.805	Average	2/24/2009 0:30	2/23/2009 15:20	2/20/2009 17:25	0.267	5039	30	167.97	243.66	2.91319	0.38194	3359	0.9960
409	2.153	Stdev	2/3/2009 21:10	2/3/2009 15:00	1/30/2009 10:50	0.267	7949	30	264.97	243.67	4.17361	0.25694	3339	0.9960
409	2.149		2/27/2009 16:35	2/27/2009 11:30	2/23/2009 16:05	0.267	7516	30	250.53	243.66	3.80903	0.21181	3363	0.9960
410	1.869	Average	2/26/2009 8:50	2/25/2009 13:05	2/20/2009 17:25	0.267	6838	30	227.93	243.66	4.31944	0.82292	3361	0.9960
410	1.965	Stdev	2/4/2009 8:30	2/3/2009 15:30	1/30/2009 10:50	0.267	6708	30	223.60	243.67	4.19444	0.70853	3339	0.9960
410	1.824		2/24/2009 8:00	2/23/2009 15:40	2/20/2009 17:25	0.267	4840	30	161.33	243.66	2.92708	0.68056	3359	0.9960
411	1.824	Average	2/24/2009 8:40	2/23/2009 15:55	2/20/2009 17:25	0.267	4839	30	161.30	243.66	2.93750	0.69792	3359	0.9960
411	1.911	Stdev	2/27/2009 17:45	2/27/2009 12:20	2/23/2009 16:05	0.267	6357	30	211.90	243.66	3.84375	0.22569	3363	0.9960
411	1.836		2/26/2009 9:30	2/25/2009 13:40	2/20/2009 17:25	0.267	6734	30	224.47	243.66	4.84375	0.82639	3361	0.9960
412	1.947	Average	2/26/2009 10:15	2/25/2009 14:05	2/20/2009 17:25	0.267	7137	30	237.90	243.66	4.86111	0.84028	3361	0.9960
412	2.131	Stdev	2/27/2009 18:20	2/27/2009 12:45	2/23/2009 16:05	0.267	7495	30	249.83	243.66	3.86111	0.23264	3363	0.9960
412	1.822		2/24/2009 9:40	2/23/2009 16:10	2/20/2009 17:25	0.267	4818	30	160.60	243.66	2.94792	0.72917	3359	0.9960

EffErr 0.123705 <- Put in Machines.xls (Lucas Cell Tab)

Angela J. ... 3/2/09
Miki Davel 3/2/09

401	1.574	3/2/2009
402	2.118	3/2/2009
403	1.463	3/2/2009
404	1.931	3/2/2009
405	1.903	3/2/2009
409	2.036	3/2/2009
410	1.886	3/2/2009
411	1.824	3/2/2009
412	1.967	3/2/2009

General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GLRAD-A-008 Isotope Pu-239
 Date Standards Prepared 4/15/09 Cocktail Type Used NA
 Standard ID 02996 Matrix of Vial/Planchett NA
 Amount Used (g or ml) 0.1 Type of Scintillation Vial NA
 Standard Activity (DPM/g or mL) 2446.347 Pipette ID Used 1429303
 Reference Date 4/15/09 Balance ID Used 3604026
 Expiration Date 4/15/09 Quenching Agent NA
 Residue/Carrier Agent 0.5M HCl

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
3	CA13				
43	CA143				
7	CA17				
42	CA142				
13	CA143				
44	CA144				
30	CA130				
48	CA148				
36	CA136				
35	CA135				
38	CA138				
15	CA115				
14	CA114				
46	CA146				
47	CA147				

W 3/2/09

Prepared By: Kell Deneo Date: 3/2/09
 Reviewed By: Angie J. Ghera Date: 3/2/09

Rev 1 RLM 9/10/97

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:	01/23/2008
Ampoule Mass (g):	5.0368 g	Expiration Date:	01/23/2009
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
		Balance ID:	

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

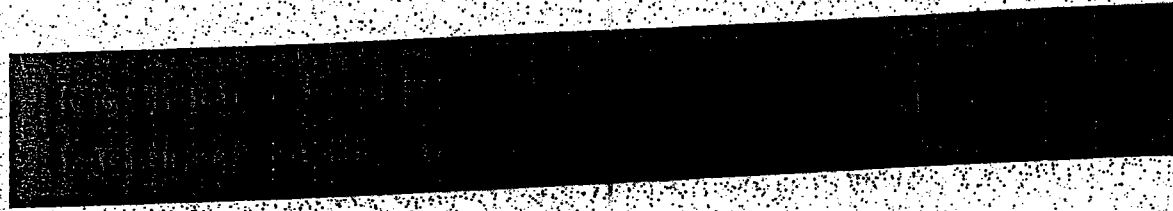
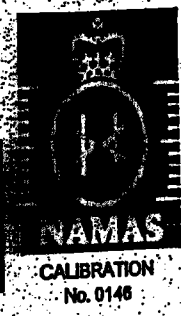
$(\text{Mass of parent(g)}) * (\text{Parent Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 122414.2500 \text{ dpm/mL}$
$(4.6634 \text{ g}) * (43.75 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (1.0012 \text{ g/mL}) / (100 \text{ mL}) = 122273.3377 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
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	04/02/2008	04/02/2009

8-21-00
Nycomed Amersham plc
Amersham Laboratories

0299



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

ved
ory

Date of issue 17th December 1999

Nycomed
Amersham
Via 31/10/99

Verification for Ra-226 Standard 0299-G

4/2/2008	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard Mass. Used (G)	Source DPM/G
D. Roy	0299-G N1	2536.9600	52.4000	2484.5600	1.917186	0.5057	2562.667649
	0299-G N2	2520.2500	52.4000	2467.8500	1.917186	0.5056	2545.935781
	0299-G N3	2532.5000	52.4000	2480.1000	1.917186	0.5042	2565.677715
						Average =	2558.093715

Mean Value (Counting) = 2558.093715 **Pass**
 Stdev = 10.63610098 0.00415782 **Rule 3 (Pass/Fail)**

Certificate Value = 2437.6 dpm/mL
 Lower Limit = 2536.821513 dpm/mL
 Upper Limit = 2579.365917 dpm/mL
Rule 1 Pass/Fail *exception taken due to full recovery of standard
 Two sigma = 21.27220197 dpm/mL
 10 % of Mean = 255.8093715 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 Gold for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 4/02/08 using source 0024-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0024. Each verification source calculation was performed as follows:

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

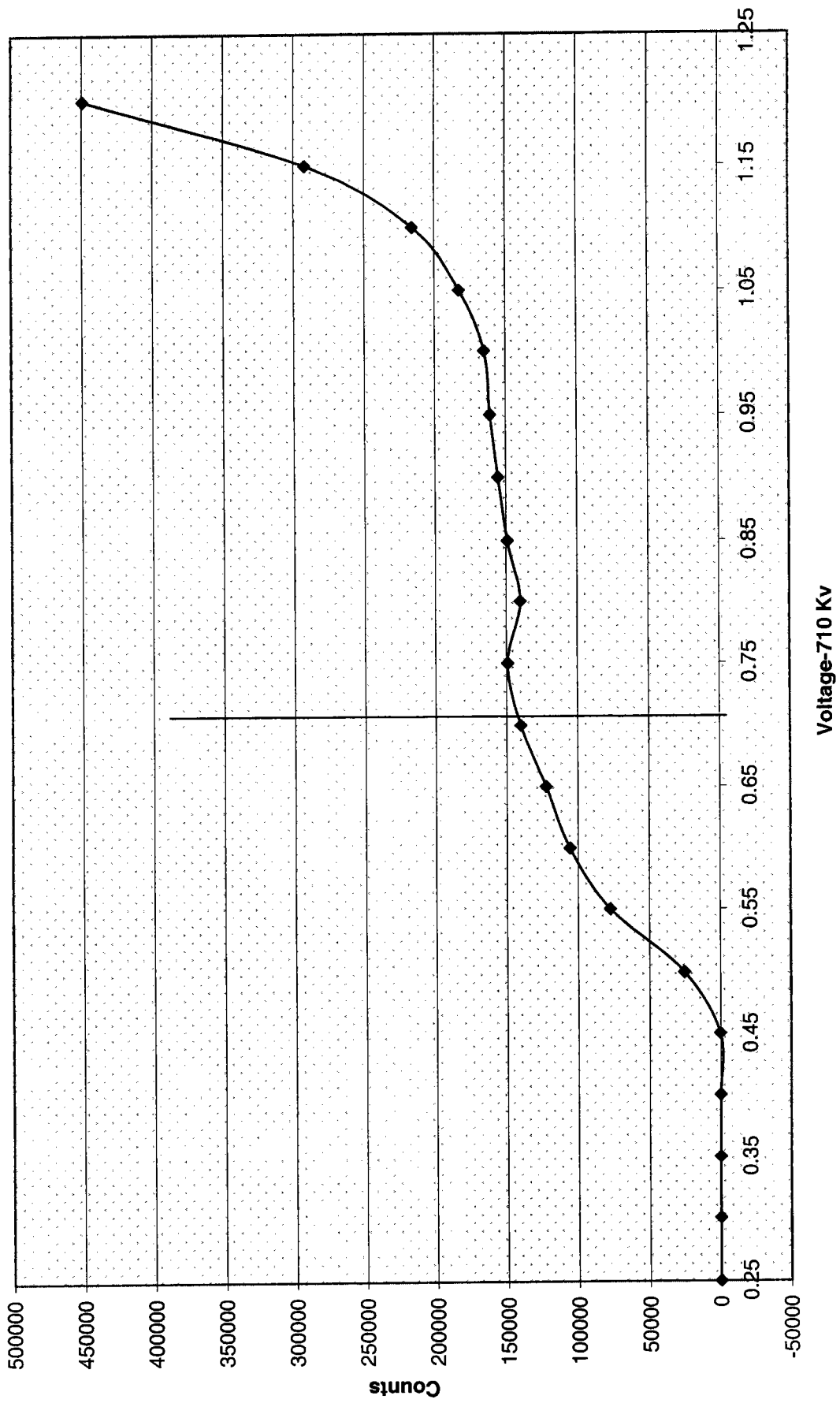
where:

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

RAD.SOP.M-001

Henry St. Johnson 4/19/08
David Dwyer 4/10/08
WMS

Ludlum 4 Voltage Curve



10/3/04

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 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: Kelli S. Dancer

Date: 3/24/09

Reviewed By: Angela Johnson

Date: 3/25/09

Effective Date: 3/25/09

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	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	
501	1.927	15	3/6/2009 7:50	3/3/2009 8:15	2/25/2009 14:00	5281	30	176.03	243.03	5.76042	2.98264	3369	0.9960
501	2.086	9	3/11/2009 10:40	3/10/2009 12:50	3/5/2009 14:00	7611	30	253.70	243.03	4.95139	0.90972	3374	0.9960
501	2.247	42	3/12/2009 13:30	3/12/2009 9:10	3/6/2009 15:25	10210	30	340.33	243.03	5.73958	0.18056	3376	0.9960
502	1.772	16	3/18/2009 8:25	3/17/2009 12:50	3/10/2009 14:00	7951	30	265.03	243.03	6.95739	0.81597	3381	0.9960
502	2.045	14	3/11/2009 11:15	3/10/2009 13:20	3/5/2009 14:00	7474	30	249.13	243.03	4.97222	0.91319	3374	0.9960
502	1.816	19	3/12/2009 14:20	3/12/2009 9:35	3/6/2009 15:25	8243	30	274.77	243.03	5.75694	0.19792	3376	0.9960
503	1.581	46	3/6/2009 9:20	3/5/2009 9:20	2/25/2009 14:00	7250	30	241.67	243.03	7.80556	1.00000	3369	0.9960
503	1.633	42	3/19/2009 20:15	3/19/2009 15:15	3/12/2009 12:10	8282	30	276.07	243.03	7.12847	0.20833	3383	0.9960
503	1.588	44	3/12/2009 14:50	3/12/2009 10:00	3/6/2009 15:25	7214	30	240.47	243.03	5.77431	0.20139	3378	0.9960
504	1.592	47	3/6/2009 10:30	3/5/2009 9:40	2/25/2009 14:00	7282	30	242.07	243.03	7.81944	1.03472	3369	0.9960
504	1.611	34	3/11/2009 12:30	3/10/2009 14:05	3/5/2009 14:00	5889	30	196.30	243.03	5.00347	0.93403	3375	0.9960
504	1.641	19	3/19/2009 20:50	3/19/2009 15:30	3/12/2009 12:10	8310	30	277.00	243.03	7.13889	0.22222	3383	0.9960
505	2.364	16	3/6/2009 12:40	3/5/2009 10:05	2/25/2009 14:00	10654	30	355.13	243.03	7.83681	1.10764	3370	0.9960
505	2.438	23	3/11/2009 13:00	3/10/2009 14:30	3/5/2009 14:00	8924	30	297.47	243.03	5.02083	0.93750	3375	0.9960
505	2.190	7	3/12/2009 17:01	3/12/2009 10:50	3/6/2009 15:25	9884	30	329.47	243.03	5.80903	0.25764	3376	0.9960
506	1.902	25	3/6/2009 13:10	3/5/2009 10:30	2/25/2009 14:00	8576	30	285.87	243.03	7.85417	1.11111	3370	0.9960
506	2.124	47	3/11/2009 13:30	3/10/2009 15:05	3/5/2009 14:00	7804	30	260.13	243.03	5.04514	0.93403	3375	0.9960
506	1.965	13	3/12/2009 17:40	3/12/2009 11:15	3/6/2009 15:25	8954	30	298.47	243.03	5.82639	0.26736	3376	0.9960
507	1.708	23	3/6/2009 13:45	3/5/2009 10:55	2/25/2009 14:00	7695	30	256.50	243.03	7.87153	1.11806	3370	0.9960
507	1.722	25	3/11/2009 14:20	3/10/2009 15:27	3/5/2009 14:00	6315	30	210.50	243.03	5.06042	0.95347	3375	0.9960
507	1.674	43	3/12/2009 18:30	3/12/2009 11:35	3/6/2009 15:25	7535	30	251.17	243.03	5.84028	0.28819	3376	0.9960
508	1.605	39	3/6/2009 14:20	3/5/2009 11:25	2/25/2009 14:00	7236	30	241.20	243.03	7.89236	1.12153	3370	0.9960
508	1.497	44	3/19/2009 21:30	3/19/2009 15:45	3/12/2009 12:10	7581	30	252.03	243.03	7.14931	0.23958	3383	0.9960
508	1.499	3	3/12/2009 20:45	3/12/2009 12:10	3/6/2009 15:25	6680	30	222.67	243.03	5.86458	0.35784	3376	0.9960
509	1.730	28	3/6/2009 14:50	3/5/2009 11:45	2/25/2009 14:00	7795	30	259.83	243.03	7.90625	1.12847	3370	0.9960
509	1.857	39	3/11/2009 15:25	3/10/2009 16:05	3/5/2009 14:00	6810	30	227.00	243.03	5.08681	0.97222	3375	0.9960
509	1.806	36	3/12/2009 21:20	3/12/2009 12:35	3/6/2009 15:25	8049	30	268.30	243.03	5.88194	0.36458	3376	0.9960
510	1.460	9	3/6/2009 15:25	3/5/2009 12:10	2/25/2009 14:00	6578	30	219.27	243.03	7.92361	1.13542	3370	0.9960
510	1.433	28	3/11/2009 16:05	3/10/2009 16:20	3/5/2009 14:00	5246	30	174.87	243.03	5.09722	0.98958	3375	0.9960
510	1.481	35	3/12/2009 21:55	3/12/2009 12:50	3/6/2009 15:25	6589	30	219.63	243.03	5.89236	0.37847	3376	0.9960
511	1.839	34	3/6/2009 16:30	3/5/2009 13:20	2/25/2009 14:00	8316	30	277.20	243.03	7.97222	1.13194	3370	0.9960
511	1.995	46	3/12/2009 16:50	3/10/2009 16:35	3/5/2009 14:00	7283	30	242.77	243.03	5.10764	1.01042	3375	0.9960
511	2.041	37	3/12/2009 22:40	3/12/2009 13:10	3/6/2009 15:25	9088	30	302.27	243.03	5.90625	0.39583	3376	0.9960
512	1.796	48	3/11/2009 17:35	3/10/2009 16:50	3/5/2009 14:00	6542	30	218.07	243.03	5.11806	1.03125	3375	0.9960
512	2.100	38	3/12/2009 23:15	3/12/2009 13:30	3/6/2009 15:25	9322	30	310.73	243.03	5.92014	0.40625	3376	0.9960
512	1.972	48	3/18/2009 13:00	3/17/2009 14:00	3/10/2009 14:00	8653	30	288.43	243.03	7.00000	0.95833	3382	0.9960

*Backgrounds are not significant enough to be considered in calculations. ANSI N42.25-1997 (B.2).

ERR 0.143768 <- Put in Machines.xls (Lucas Cell Tab)

Calibration
Ra-226 Verification-Sheet
3/14/09

Cal # 5

no 3124109
3/19/09

3/19/09

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
Cal 15	500	2/25/09 1400	3/3/09 0815	3/6/09 0750	501	5	8	5781
Cal 14	500	2/25/09 1400	2/27/09 0845	3/6/09 0840	502	5	1	4700
		2/25/09 1400	3/3/09		503	5	100 3/3/09	6800
Cal 46	500	2/25/09 1400	3/5/09 0920	3/6/09 0900	503	5	3	7250
Cal 47	500	2/25/09 1400	3/5/09 0940	3/6/09 1030	504	5	1	7262
Cal 48	500	2/25/09 1400	3/5/09 1005	3/6/09 1040	505	5	3	10654
Cal 45	500	2/25/09 1400	3/5/09 1030	3/6/09 1016	506	5	8	8576
Cal 23	500	2/25/09 1400	3/5/09 1055	3/6/09 1345	507	5	4	7695
Cal 39	500	2/25/09 1400	3/5/09 1125	3/6/09 1420	508	5	1	7236
Cal 28	500	2/25/09 1400	3/5/09 1145	3/6/09 1450	509	5	8	7795
Cal 9	500	2/25/09 1400	3/5/09 1210	3/6/09 1525	510	5	2	6578
Cal 34	500	2/25/09 1400	3/5/09 1220	3/6/09 1630	511	5	6	8316

Calibration

Ra-226 Verification Sheet

219 3116109

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background CPM	Total Counts
Cal 9	500	3/5/09 1400	3/10/09 1250	3/11/09 1040	501	5	8	7611
Cal 14	500	3/5/09 1400	3/10/09 1370	3/11/09 1115	502	5	5	7474
Cal 15	500	3/5/09 1400	3/10/09 1345	3/11/09 1155	503	5	8	7352
Cal 16	500	3/5/09 1400	3/10/09 1405	3/11/09 1230	504	5	4	5889
Cal 17	500	3/5/09 1400	3/10/09 1430	3/11/09 1280	505	5	2	8924
Cal 17	500	3/5/09 1400	3/10/09 1505	3/11/09 1530	506	5	8	7804
Cal 18	500	3/5/09 1400	3/10/09 1527	3/11/09 1410	507	5	4	6315
Cal 19	500	3/5/09 1400	3/10/09 1550	3/11/09 1455	508	5	4	6443
Cal 29	500	3/5/09 1400	3/10/09 1605	3/11/09 1525	509	5	8	6810
Cal 28	500	3/5/09 1400	3/10/09 1620	3/11/09 1610	510	5	3	5246
Cal 44	500	3/5/09 1400	3/10/09 1635	3/11/09 1650	511	5	8	7283
Cal 48	500	3/5/09 1400	3/10/09 1650	3/11/09 1735	512	5	8	6542

219 3124109

219 3124109

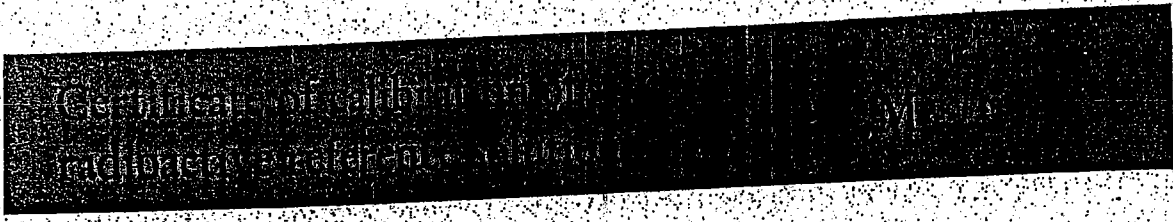
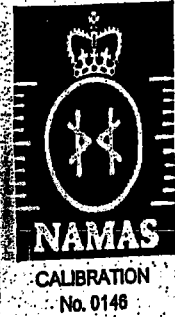
219 3124109

219 3116109

8-21-00

Nycomed Amersham plc
Amersham Laboratories

0299



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

Date of 215 17th December 1999



Standard Traceability Log Rad

Source Material Info	
Parent Code:	0299
Prepared By:	Angela Johnson
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 Johnson
Prep Date:	09/15/2000
Verification Date:	01/23/2008
Expiration Date:	01/23/2009
Primary Code:	0299-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.6634 g
Density(g/mL):	1.0012
Balance ID:	

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
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	04/02/2008	04/02/2009

GEL Laboratories LLC
Version 1.0 9/18/2000

Kelli Sporell

Verification for Ra-226 Standard 0299-G

4/2/2008	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff	Standard Mass. Used (G)	Source DPM/G
D. Roy	0299-G N1	2536.9600	52.4000	2484.5600	1.917186	0.5057	2562.667649
	0299-G N2	2520.2500	52.4000	2467.8500	1.917186	0.5056	2545.935781
	0299-G N3	2532.5000	52.4000	2480.1000	1.917186	0.5042	2565.677715
						Average =	2558.093715

Mean Value (Counting) = 2558.093715
 Stdev = 10.63610098

Certificate Value = 2437.6 dpm/mL
 Lower Limit = 2536.821513 dpm/mL
 Upper Limit = 2579.365917 dpm/mL
 Rule 1 Pass/Fail = **Fail** *exception taken due to full recovery of standard
 Two sigma = 21.27220197 dpm/mL
 10 % of Mean = 255.8093715 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 Gold for Radium source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 4/02/08 using source 0024-A (Ra-226). Calibration data is recorded in this logbook under Ra-226 0024. 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.

BAD.SOP.M-001

Handwritten notes:
 New Source 3/24/09
 David Roy 4/10/08

General Engineering Laboratories
Verification Source Preparation Sheet
Calibration

Applicable SOP Number GL RAD-A-008 Isotope RA-226
 Date Standards Prepared 4/15/09 Cocktail Type Used NA
 Standard ID 0249-G Matrix of Vial/Planchett NA
 Amount Used (g or ml) 0.1 NA
 Standard Activity (DPM/g or ml) 2446.347 Type of Scintillation Vial NA
 Reference Date 12/15/99 Pipette ID Used 1429303
 Expiration Date 4/2/09 Balance ID Used 36240216
 Residue/Carrier Agent D.5M HCl Quenching Agent NA

	Standard Number	Quenching Vol (uL) Residue Volume (mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
15	Ca115				
46	Ca146				
47	Ca147				
16	Ca116				
25	Ca125				
23	Ca123				
39	Ca139				
28	Ca128				
9	Ca19				
34	Ca134				
42	Ca142				
19	Ca119				
44	Ca144				
7	Ca17				
13	Ca113				

VLD 3/24/09

Prepared By: Kelli D'Amore Date 3/24/09
 Reviewed By: _____ Date _____

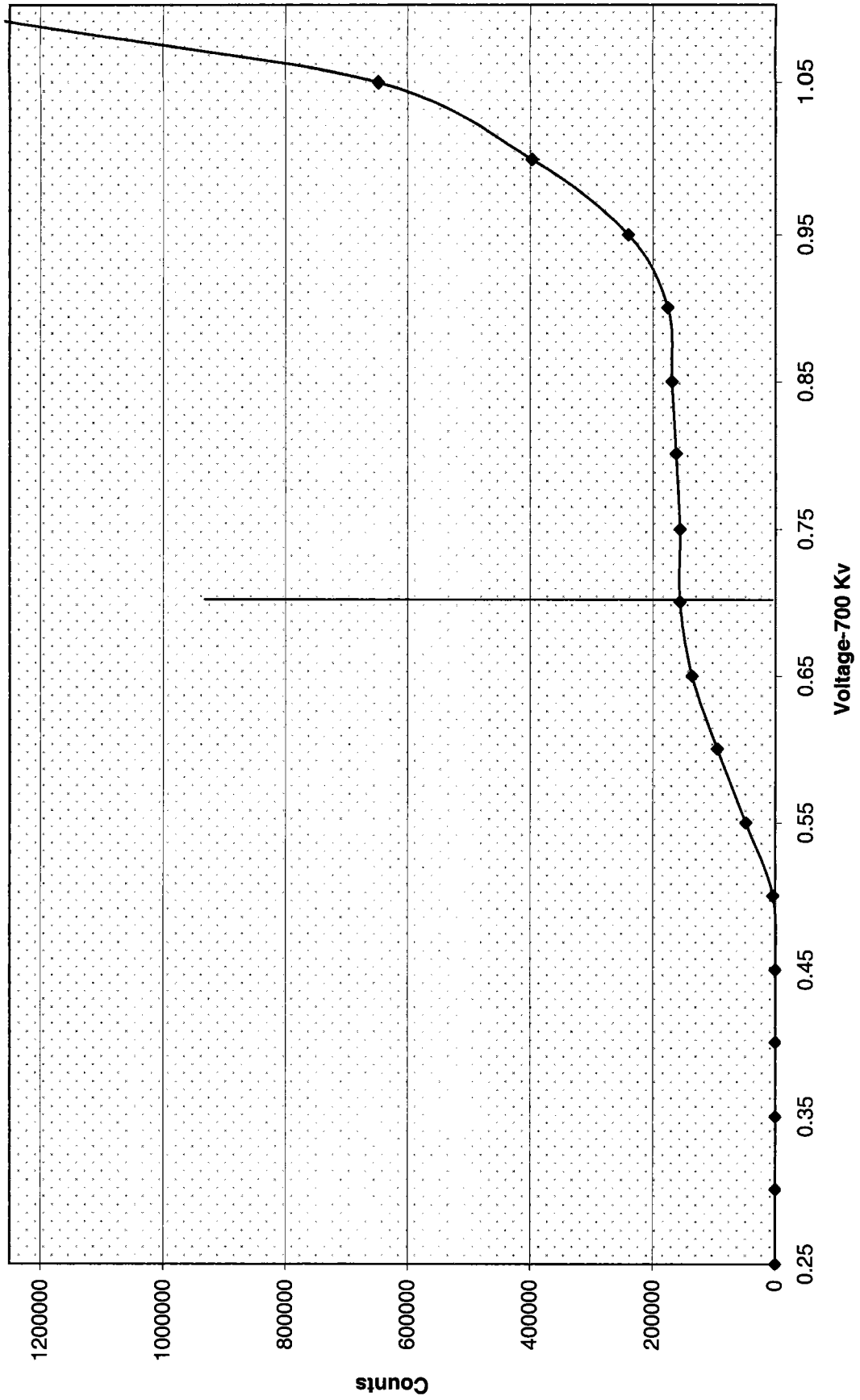
Rev 1 RLM 9/10/97

Voltage

Voltage Curve Ludlum # 5				
Volts	Counts	Date	Time	Detector
0.00	0	2/25/2009	9:20	5
0.05	0	2/25/2009	9:20	5
0.10	0	2/25/2009	9:20	5
0.15	0	2/25/2009	9:20	5
0.20	0	2/25/2009	9:20	5
0.25	0	2/25/2009	9:20	5
0.30	0	2/25/2009	9:20	5
0.35	0	2/25/2009	9:20	5
0.40	0	2/25/2009	9:20	5
0.45	0	2/25/2009	9:20	5
0.50	3611	2/25/2009	9:20	5
0.55	47984	2/25/2009	9:20	5
0.60	94752	2/25/2009	9:20	5
0.65	135854	2/25/2009	9:20	5
0.70	155952	2/25/2009	9:20	5
0.75	155696	2/25/2009	9:20	5
0.80	161972	2/25/2009	9:20	5
0.85	168840	2/25/2009	9:20	5
0.90	175598	2/25/2009	9:20	5
0.95	239969	2/25/2009	9:20	5
1.00	397249	2/25/2009	9:20	5

UD 3/25/09

Ludlum 5 Voltage Curve



KAP 3/24/09

Ra-226 WATER

Batch : LCSVER
 Date : 2/20/2008
 Analyst : DXM2

Procedure Code : LUC26RAL

Parname : 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 1	0.500	30	766	501	2.087	0.267	0.6041	28.8142	2.0728	3/16/2009 15:10
Ver 2	0.500	30	537	502	1.878	0.167	0.5682	23.0223	1.9747	3/16/2009 19:25
Ver 3	0.500	30	518	503	1.601	0.267	0.8071	25.9035	2.2832	3/16/2009 20:20
Ver 4	0.500	30	701	504	1.615	0.267	0.6021	26.2570	1.9774	3/20/2009 19:00
Ver 5	0.500	30	680	505	2.331	0.033	0.2559	23.5744	1.7758	3/16/2009 22:00
Ver 6	0.500	30	893	506	2.004	0.267	0.4859	27.0593	1.7988	3/20/2009 19:40
Ver 7	0.500	30	488	507	1.701	0.267	0.7287	22.0004	2.0008	3/16/2009 23:00
Ver 8	0.500	30	544	508	1.534	0.033	0.3760	27.7023	2.3344	3/16/2009 23:30
Ver 9	0.500	30	768	509	1.798	0.267	0.5430	25.9694	1.8657	3/20/2009 20:50
Ver 10	0.500	30	432	510	1.458	0.033	0.3700	21.6379	2.0476	3/17/2009 5:00
Ver 11	0.500	30	577	511	1.959	0.267	0.5934	21.2369	1.7694	3/17/2009 5:35
Ver 12	0.500	30	723	512	1.956	0.267	0.5945	26.7349	1.9815	3/17/2009 6:10

Sample ID	Sample Dup	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
501		5	3/16/2009 15:10	LCS	0638-F	24.05	pCi/L	120%
502		5	3/16/2009 19:25	LCS	0638-F	24.05	pCi/L	96%
503		5	3/16/2009 20:20	LCS	0638-F	24.05	pCi/L	108%
504		5	3/20/2009 19:00	LCS	0638-F	24.05	pCi/L	109%
505		5	3/16/2009 22:00	LCS	0638-F	24.05	pCi/L	98%
506		5	3/20/2009 19:40	LCS	0638-F	24.05	pCi/L	113%
507		5	3/16/2009 23:00	LCS	0638-F	24.05	pCi/L	91%
508		5	3/16/2009 23:30	LCS	0638-F	24.05	pCi/L	115%
509		5	3/20/2009 20:50	LCS	0638-F	24.05	pCi/L	108%
510		5	3/17/2009 5:00	LCS	0638-F	24.05	pCi/L	90%
511		5	3/17/2009 5:35	LCS	0638-F	24.05	pCi/L	88%
512		5	3/17/2009 6:10	LCS	0638-F	24.05	pCi/L	111%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
3/13/2009 15:30	3/16/2009 9:45	66.25	5.42	0.3936	0.9599	1.0019	25.2667	0.3785
3/13/2009 15:30	3/16/2009 10:10	66.67	9.25	0.3955	0.9325	1.0019	17.7333	0.3695
3/13/2009 15:30	3/16/2009 10:30	67.00	9.83	0.3970	0.9284	1.0019	17.0000	0.3693
3/16/2009 14:00	3/20/2009 13:05	95.08	5.92	0.5122	0.9563	1.0019	23.1000	0.4908
3/13/2009 15:30	3/16/2009 11:25	67.92	10.58	0.4012	0.9232	1.0019	22.6333	0.3711
3/16/2009 14:00	3/20/2009 13:20	95.33	6.33	0.5131	0.9533	1.0019	29.5000	0.4901
3/13/2009 15:30	3/16/2009 13:50	70.33	9.17	0.4120	0.9331	1.0019	15.9997	0.3852
3/13/2009 15:30	3/16/2009 13:50	70.33	9.67	0.4120	0.9296	1.0019	18.1000	0.3837
3/16/2009 14:00	3/20/2009 13:45	95.75	7.08	0.5147	0.9479	1.0019	25.3333	0.4888
3/13/2009 5:30	3/16/2009 14:25	80.92	14.58	0.4571	0.8957	1.0019	14.3667	0.4103
3/13/2009 5:30	3/16/2009 14:45	81.25	14.83	0.4585	0.8941	1.0019	18.9663	0.4107
3/13/2009 5:30	3/16/2009 15:00	81.50	15.17	0.4595	0.8918	1.0019	23.8330	0.4106

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
NUN 1	500	3/16/09 1530	3/16/09 0945	3/16/09 1510 3/16/09 1510 3/16/09 1510 3/16/09 1510	501	5	8	766
NUN 2	500	3/13/09 1530	3/16/09 1010	3/16/09 1925	502	5	85 140 3124109	537
NUN 3	500	3/13/09 1530	3/16/09 1030	3/16/09 2020	503	5	8	518
NUN 4	500	3/13/09 1530	3/16/09 1100	3/16/09 2115	504	5	8	577
NUN 5	500	3/13/09 1530	3/16/09 1125	3/16/09 2200	505	5	8 140 3124109	680
NUN 6	500	3/13/09 1530	3/16/09 1155	3/16/09 2230	506	5	8	707
NUN 7	500	3/13/09 1530	3/16/09 1320	3/16/09 2300	507	5	8	488
NUN 8	500	3/13/09 1530	3/16/09 1350	3/16/09 2330	508	5	8 140 3124109	544
NUN 9	500	3/13/09 1530	3/16/09 1410	3/17/09 0445 3/17/09 0515 3/17/09 0545	509	5	8	640
NUN 10	500	3/13/09 1530	3/16/09 1415	3/17/09 0500	510	5	8 140 3124109	432
NUN 11	500	3/13/09 1530	3/16/09 1445	3/17/09 0535	511	5	8	577
NUN 12	500	3/13/09 1530	3/16/09 1500	3/17/09 0610	512	5	8	723

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3/25/09
3/25/09

3/17/09
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Ra-226 Verification Sheet

Standard ID: 0638F

Volume Added (mL): 0.1

Expiration Date: 12/10

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Background Counts	Total Counts
VEN 1	500	3/16/09 1400	3/20/09 1245	3/20/09 1820	501	5	8	70
VEN 2	500	3/16/09 1400	3/20/09 1305	3/20/09 1900	504	5	8	701
VEN 3	500	3/16/09 1400	3/20/09 1320	3/30/09 1940	506	5	8	893
VEN 4	500	3/16/09 1400	3/20/09 1345	3/30/09 2050	509	5	8	768

VEN 3/24/09

VEN 3/24/09

VEN 3/24/09

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:	03/04/2007
Ampoule Mass (g):	5.01065 g	Expiration Date:	03/04/2008
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
		Balance ID:	38080204

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13636.6133 \text{ dpm/mL}$
$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13282.9676 \text{ dpm/g}$

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	01/17/2007	01/17/2008
07/17/2006	Mary Aders	2.1313	100	0638-C	282.6281 dpm/mL	07/26/2006	07/26/2007
03/28/2007	Daniel Roy	2.1025	100	0638-D	279.2744 dpm/ml	04/08/2007	04/08/2008
03/28/2007	Daniel Roy	45.468	250	0638-E	2415.7999 dpm/ml	04/09/2008	04/08/2009
12/18/2007	Daniel Roy	2.014	100	0638-F	267.519 dpm/ml	02/02/2009	02/02/2010
02/12/2008	Daniel Roy	.5004	100	0638-G	66.468 dpm/ml	03/04/2008	03/04/2009
07/23/2008	Daniel Roy	5.0607	250	0638-H	268.8845 dpm/ml	07/23/2008	07/23/2009

Verification for Ra-226 Standard 0638-F

D. Roy 2/2/2009	Isotope	Value	Uncertainty
	0638-F #1	24.629	1.7426
	0638-F #2	24.438	1.7557
	0638-F #3	22.791	1.6808
Mean Value (Counting) =	23.953	99.60	Pass
Stdev =	1.010781096		Rule 3 (Pass/Fail)
Target =	24.05		
Lower Limit =	21.93100448		
Upper Limit =	25.97412886		
Rule 1 Pass/Fail	Pass		
Two sigma =	2.021562191		
10 % of Mean =	2.395256667		
Rule 2 (Pass/Fail)	Pass		

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 standard 0638-F using 0.1 mL for each source. Each source was counted using routine Lucas cell procedures. Calibration for 0299-G was used in this verification.

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General Engineering Laboratories

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

Lucas Cell Calibration Package

	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: KDD 8/14/09

Date: 8/14/09

Reviewed By: Angela D. Jones

Date: 8/16/09

Effective Date: 8/14/09

KD 8/16/09

Ra-226 Cell Constants

Standard Reference date: 12/15/1999
Standard ID: 0299-G
Volume added (mL): 0.1
Standard Reference Activity (DPM/mL): 2446.3471

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/time flushed to cell	Date/time end of degas	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
601	2.164	Average	5/26/2009 13:30	5/26/2009 9:30	5/19/2009 14:00	10883	30	362.77	6.81250	0.16667	3451	0.9959
601	2.253	Stdev	5/22/2009 12:55	5/22/2009 9:15	5/19/2009 14:00	6378	30	212.60	2.80208	0.15278	3447	0.9959
601	2.126		5/29/2009 14:45	5/29/2009 9:50	5/22/2009 10:45	10735	30	357.83	6.96181	0.20486	3454	0.9959
602	2.007	Average	5/29/2009 15:20	5/29/2009 10:15	5/22/2009 10:45	10133	30	337.77	6.97917	0.21181	3454	0.9959
602	2.194	Stdev	5/26/2009 14:05	5/26/2009 9:55	5/19/2009 14:00	11033	30	367.77	6.82986	0.17361	3451	0.9959
602	2.304		6/2/2009 14:45	6/2/2009 11:30	5/29/2009 9:50	8575	30	285.83	4.06944	0.13542	3458	0.9959
604	2.244	Average	6/2/2009 15:50	6/2/2009 11:50	5/29/2009 9:50	8321	30	277.37	4.08333	0.16667	3458	0.9959
604	2.076	Stdev	5/29/2009 15:55	5/29/2009 10:45	5/22/2009 12:00	10451	30	348.37	6.94792	0.21528	3454	0.9959
604	2.079		5/26/2009 15:45	5/26/2009 10:20	5/19/2009 14:00	10372	30	345.73	6.84722	0.22569	3451	0.9959
605	2.096	Average	5/26/2009 16:15	5/26/2009 10:50	5/19/2009 14:00	10474	30	349.13	6.86806	0.22569	3451	0.9959
605	2.228	Stdev	5/22/2009 16:25	5/22/2009 10:45	5/19/2009 14:00	6318	30	210.60	2.86458	0.23611	3447	0.9959
605	2.122		5/29/2009 17:15	5/29/2009 11:05	5/22/2009 12:50	10587	30	352.90	6.92708	0.25694	3454	0.9959
606	2.543	Average	5/29/2009 17:45	5/29/2009 13:10	5/26/2009 9:30	7816	30	260.53	3.15278	0.19097	3454	0.9959
606	2.202	Stdev	5/26/2009 16:45	5/26/2009 12:25	5/22/2009 12:00	8057	30	268.57	4.01736	0.18056	3451	0.9959
606	2.298		6/2/2009 18:20	6/2/2009 12:55	5/29/2009 9:50	8495	30	283.17	4.12847	0.22569	3458	0.9959
607	2.454	Average	6/2/2009 19:00	6/2/2009 13:10	5/29/2009 9:50	9057	30	301.90	4.13889	0.24306	3458	0.9959
607	2.572	Stdev	5/29/2009 19:00	5/29/2009 13:25	5/26/2009 9:55	7832	30	261.07	3.14583	0.23264	3454	0.9959
607	2.325		5/26/2009 17:15	5/26/2009 12:50	5/22/2009 12:00	8527	30	284.23	4.03472	0.18403	3451	0.9959
609	2.277	Average	5/26/2009 19:20	5/26/2009 13:10	5/22/2009 12:00	8261	30	275.37	4.04861	0.25694	3451	0.9959
609	2.280	Stdev	5/22/2009 19:20	5/22/2009 12:00	5/19/2009 14:00	6473	30	215.77	2.91667	0.30556	3447	0.9959
609	2.392		5/29/2009 19:40	5/29/2009 13:45	5/26/2009 10:20	7261	30	242.03	3.14236	0.24653	3454	0.9959
611	2.488	Average	5/29/2009 20:20	5/29/2009 14:00	5/26/2009 10:50	7510	30	250.33	3.13194	0.26389	3454	0.9959
611	2.245	Stdev	5/26/2009 22:00	5/26/2009 13:25	5/22/2009 12:00	8010	30	267.00	4.05903	0.35764	3451	0.9959
611	2.187		6/2/2009 19:50	6/2/2009 13:25	5/29/2009 9:50	8052	30	268.40	4.14931	0.26736	3458	0.9959

EffErr 0.066051 ← Put in Machines.xls (Lucas Cell Tab)

Backgrounds are not significant enough to be included in calculations ANSI N42.25-1997 (B.2).

Original of 9/16/09
WJ 8/16/09

601	2.181	8/4/2009
602	2.168	8/4/2009
604	2.133	8/4/2009
605	2.149	8/4/2009
606	2.348	8/4/2009
607	2.45	8/4/2009
609	2.316	8/4/2009
611	2.307	8/4/2009

Lucas	Ra-226	
Oldest Cal	01/23/2008	
Detector	Eff Error	Cal Date
1	0.0958	8/29/2008
2	0.0772	12/19/2008
3	0.0608	1/23/2008
4	0.1237	3/2/2009
5	0.1438	3/25/2009
6	0.0661	8/4/2009
7	0.0855	11/21/2008

**General Engineering Laboratories
Calibration Source Preparation Sheet**

Applicable SOP Number GL-RAD-A-008

Isotope Ra226

Date Standards Prepared 4/5/05

Cocktail Type Used NA

Standard ID 0299-G

Matrix of Vial/Planchett NA

Amount Used (g or ml) 0.1

NA
NA

Standard Activity (DPM/g or mL) 2446.3471

Type of Scintillation Vial NA

Reference Date 12/15/99

Pipette ID Used 1429303

Expiration Date 1/26/10

Balance ID Used 38080204

Residue/Carrier Agent 0.1M HCl

Quenching Agent NA

	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				

JBG
8/4/09

JBG
8/4/09

Prepared By: Kelli Rowell Date 8/4/09

Reviewed By: Angela Gh... Date 8/4/09

Rev 1 RLM 9/10/97

Ra-226 Calibration Sheet

Standard ID: ~~0299-G~~ 0299-G
 Volume Added (mL): 0.1 *19814109

Expiration Date: ~~4/11/10~~ *19814109

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 5	500	5/22/09 1045	5/24/09 0950	5/29/09 14:45	601	6	10735
Cal 6	500	5/22/09 1045	5/24/09 1015	5/29/09 15:20	602	6	10133
Cal 7	500	5/22/09 1200	5/24/09 1045	5/29/09 15:55	604	6	10451
Cal 8	500	5/22/09 1250	5/24/09 1105	5/29/09 17:15 17:20	605	6	10587
Cal 9	500	5/24/09 0930	5/24/09 1310	5/29/09 17:45	606	6	7816
Cal 10	500	5/24/09 0955	5/24/09 1325	5/29/09 19:00	607	6	7832
Cal 11	500	5/24/09 1000	5/24/09 1345	5/29/09 19:40	609	6	7261
Cal 12	500	5/24/09 1050	5/24/09 1400	5/29/09 20:20	611	6	7510
					608	6	

*19814109
 *19814109

Ra-226 Calibration Sheet

Standard ID: ~~0299-6~~ 0299-6
 Volume Added (mL): 0.1 19 816109
 Expiration Date: ~~1126110~~ 1126110
 19 814109

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 1	500	5/19/09 1400	5/22/09 0915	5/22/09 1255	601	6	6318
Cal 2	500	5/19/09 1400	5/22/09 0945	5/22/09 1325	602	6	6358
Cal 3	500	5/19/09 1400	5/22/09 1010	5/22/09 1420	604	6	4600
Cal 4	500	5/19/09 1400	5/22/09 1045	5/22/09 1625	605	6	6318
Cal 5	500	5/19/09 1400	5/22/09 1115	5/22/09 1700	606	6	6494
Cal 6	500	5/19/09 1400	5/22/09 1140	5/22/09 1735	607	6	6428
Cal 7	500	5/19/09 1400	5/22/09 1200	5/22/09 1920	609	6	6473
Cal 8	500	5/19/09 1400	5/22/09 1250	5/22/09 2035	611	6	6455
Cal 9							
Cal 10							
Cal 11							
Cal 12							

100 814109
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 100 814109

6162-100
 814109

100 814109

219
 814109
 100 816109

Ra-226 Calibration Sheet

Standard ID: ~~10386~~ 0299-G
 Volume Added (mL): 0.1 ~~1.1~~ 419 814109
 Expiration Date: ~~11/26/10~~ 419 514109

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 9	500	5/19/09 1400	5/26/09 1330	5/26/09 1330	601	6	10883
Cal 10	500	5/19/09 1400	5/26/09 1405	5/26/09 1405	602	6	11033
Cal 11	500	5/19/09 1400	5/26/09 1545	5/26/09 1545	604	6	10372
Cal 12	500	5/19/09 1400	5/26/09 1650	5/26/09 1650	605	6	10474
Cal 1	500	5/22/09 1200	5/26/09 1725	5/26/09 1645	606	6	8557
Cal 2	500	5/22/09 1200	5/26/09 1750	5/26/09 1715	607	6	8527
Cal 3	500	5/22/09 1200	5/26/09 1810	5/26/09 1920	609	6	8261
Cal 4	500	5/22/09 1200	5/26/09 1825	5/26/09 2200	611	6	8010
				608			

419 814109
 419 814109

EEC

8-21-00

Nycomed Amersham plc
Amersham Laboratories

0299

CALIBRATION
No. 0146

ISSUED
BY:

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

Description Principal radionuclide: Radium-226

Product code: RAY44
Solution number: R4/131/89

Measurement Reference time: 1200 GMT on 15 December 1999

Nuclear data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

Expression of uncertainties 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

Approved
Signature

Date of
issue

17th December 1999

Verification for Ra-226 Standard 0299-G

M. Aders 1/26/2009	Isotope	Value DPM	Uncertainty
	0299-A #1	220.970	0.2670
	0299-A #2	241.730	0.2670
	0299-A #3	257.470	0.2670
Mean Value (Counting) =	240.057	98.52	Pass
Stdev =	18.30744475		Rule 3 (Pass/Fail)
Target =	243.67		
Lower Limit =	203.4417772		
Upper Limit =	276.6715562		
Rule 1 Pass/Fail	Pass		
Two sigma =	36.6148895		
10 % of Mean =	24.00566667		
Rule 2 (Pass/Fail)	Fail	*exception taken due to full recovery of standard	

- 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 standard 0299-A using 0.1 mL for each source. Each standard was degassed and transferred according to SOP GL-RAD-A-008. Each source was counted using Ra-226 procedures.

M. Aders 241.730
August 9th 8/4/09

Ra-226 Cell Constants

Standard Reference date: 12/15/1999
standard ID: 0299-G
Volume added (mL): 0.1
Standard Reference Activity (DPM/mL): 2446.35

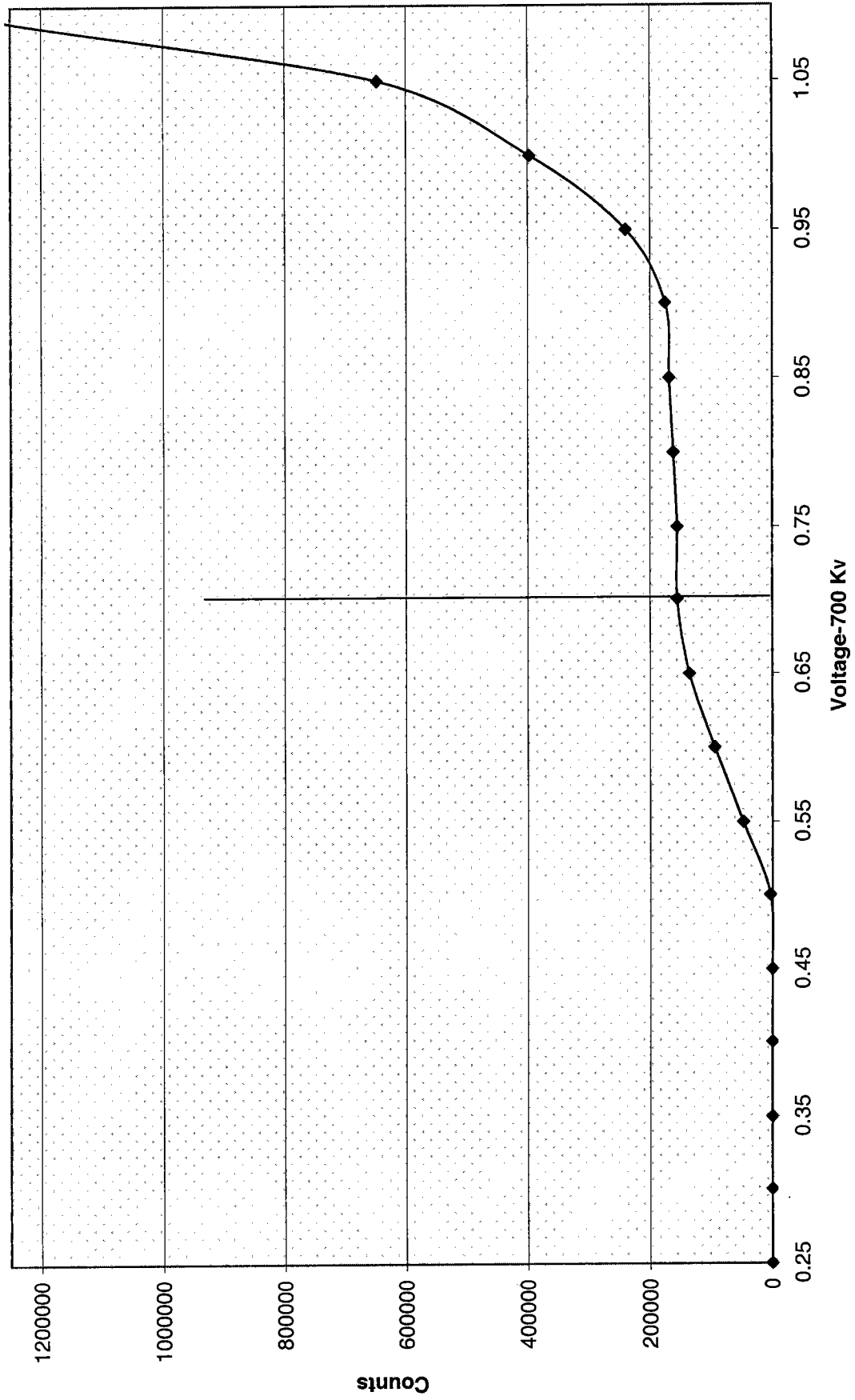
Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	bkg cpm	total counts	count time min	cpm	Known activity dpm	t1 (days) end-degas to flush	t2 (days) end-flush to count	t3 (days) Std Ref Date to count	Decay from Std Ref Date to count
301	2.021	43	39839.60764	39839.39236	39835.38194	0.267	7282	30	242.73	243.6698	4.01041667	0.2152778	3330.607639	0.996055555
302	2.131	47	39839.64583	39839.41319	39835.38194	0.267	7555	30	251.83	243.6698	4.03125	0.2326389	3330.645833	0.996055551
303	2.136	19	39839.72222	39839.43403	39835.38194	0.267	8028	30	267.60	243.6697	4.05208333	0.2881944	3330.722222	0.996055419

VOLTAGE CURVE 3_08

Voltage Curve Ludlum # 6				
Volts	Counts	Date	Time	Detector
0.00	0	5/20/2009	9:00	6
0.05	0	5/20/2009	9:01	6
0.10	0	5/20/2009	9:02	6
0.15	0	5/20/2009	9:03	6
0.20	0	5/20/2009	9:04	6
0.25	0	5/20/2009	9:05	6
0.30	0	5/20/2009	9:06	6
0.35	0	5/20/2009	9:07	6
0.40	0	5/20/2009	9:08	6
0.45	512	5/20/2009	9:09	6
0.50	3625	5/20/2009	9:10	6
0.55	47990	5/20/2009	9:11	6
0.60	94752	5/20/2009	9:12	6
0.65	135854	5/20/2009	9:13	6
0.70	155952	5/20/2009	9:14	6
0.75	155700	5/20/2009	9:15	6
0.80	161972	5/20/2009	9:16	6
0.85	168860	5/20/2009	9:17	6
0.90	175598	5/20/2009	9:18	6
0.95	239969	5/20/2009	9:19	6
1.00	397270	5/20/2009	9:20	6

M 8/4/09

Ludlum 6 Voltage Curve



WGS/105

Ra-226 WATER

Batch : LCSVER
Date : 6/2/2009
Analyst : KSD1

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 1	0.800	30	1018	601	2.181	0.267	0.2115	13.4431	0.8356	6/8/2009 15:35
ver 2	0.800	30	994	602	2.168	0.100	0.1442	13.2563	0.8279	6/8/2009 16:05
ver 3	0.800	30	955	604	2.133	0.167	0.1786	12.9119	0.8254	6/8/2009 16:40
ver 4	0.800	30	1144	605	2.149	0.267	0.2143	15.3201	0.8971	6/8/2009 17:15
ver 5	0.800	30	1046	606	2.348	0.233	0.1867	12.8971	0.7895	6/8/2009 18:30
ver 6	0.800	30	1001	607	2.450	0.267	0.1893	11.8239	0.7413	6/8/2009 19:15
ver 7	0.800	30	1060	609	2.316	0.267	0.2007	13.2848	0.8089	6/8/2009 20:05
ver 8	0.800	30	943	611	2.307	0.267	0.2053	12.0754	0.7806	6/8/2009 23:10

Handwritten notes: 8/6/09 and 8/16/09

Sample ID	Cell #	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
ver 1	601	6	6/8/2009 15:35	LCS	0638-F	15.03	pCi/L	89%
ver 2	602	6	6/8/2009 16:05	LCS	0638-F	15.03	pCi/L	88%
ver 3	604	6	6/8/2009 16:40	LCS	0638-F	15.03	pCi/L	86%
ver 4	605	6	6/8/2009 17:15	LCS	0638-F	15.03	pCi/L	102%
ver 5	606	6	6/8/2009 18:30	LCS	0638-F	15.03	pCi/L	86%
ver 6	607	6	6/8/2009 19:15	LCS	0638-F	15.03	pCi/L	79%
ver 7	609	6	6/8/2009 20:05	LCS	0638-F	15.03	pCi/L	88%
ver 8	611	6	6/8/2009 23:10	LCS	0638-F	15.03	pCi/L	80%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	constant	Net CPM	Ingrowth constant
6/2/2009 12:40	6/8/2009 12:15	143.58	3.33	0.6618	0.9751	1.0019	33.6667	0.6466
6/2/2009 12:40	6/8/2009 12:40	144.00	3.42	0.6628	0.9745	1.0019	33.0333	0.6472
6/2/2009 12:40	6/8/2009 13:05	144.42	3.58	0.6639	0.9733	1.0019	31.6663	0.6474
6/2/2009 12:40	6/8/2009 13:30	144.83	3.75	0.6650	0.9721	1.0019	37.8667	0.6476
6/2/2009 12:40	6/8/2009 13:50	145.17	4.67	0.6658	0.9654	1.0019	34.6333	0.6440
6/2/2009 12:40	6/8/2009 14:15	145.58	5.00	0.6668	0.9630	1.0019	33.0997	0.6434
6/2/2009 12:40	6/8/2009 14:35	145.92	5.50	0.6677	0.9593	1.0019	35.0667	0.6417
6/2/2009 12:40	6/8/2009 15:00	146.33	8.17	0.6687	0.9402	1.0019	31.1663	0.6299

Handwritten notes:
 8/16/09
 11/18/10/09

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

5.01065 grams 0.1M HCl solution with 50 μ g/g Ba carrier.

P O NUMBER 3231RD, Item 5

SOURCE PREPARED BY:

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

Q A APPROVED:

RCUW 1/26/04

GEL Standard Traceability Log Rad

Source Material Info	
Parent Code:	0638
Prepared By:	Amanda Fehr
Carrier Conc:	0.1M HCl
Reference Date:	01/23/2004
Ampoule Mass (g):	5.01065 g
Uncertainty:	+/- 3.3 %
LogBook No:	RC-S-037-037

A Solution Material Info	
Isotope:	Radium-226
Prepared By:	Amanda Fehr
Prep Date:	01/16/2006
Verification Date:	04/09/2009
Expiration Date:	04/09/2010
Primary Code:	0638-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.8398 g
Density(g/mL):	1.0266
Balance ID:	38080204

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

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$$

$$(\text{Mass of parent(g)}) * (\text{Parm Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13636.6133 \text{ dpm/mL}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13282.9676 \text{ dpm/g}$$

Handwritten signature
JMO 8/4/09

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	01/17/2007	01/17/2008
07/17/2006	Mary Aders	2.1313	100	0638-C	282.6281 dpm/mL	07/26/2006	07/26/2007
03/28/2007	Daniel Roy	2.1025	100	0638-D	279.2744 dpm/ml	04/08/2007	04/08/2008
03/28/2007	Daniel Roy	45.468	250	0638-E	2415.7999 dpm/ml	04/09/2009	04/09/2010
12/18/2007	Daniel Roy	2.014	100	0638-F	267.519 dpm/ml	02/02/2009	02/02/2010
02/12/2008	Daniel Roy	.5004	100	0638-G	66.468 dpm/ml	03/02/2009	03/02/2010
07/23/2008	Daniel Roy	5.0607	250	0638-H	268.8845 dpm/ml	07/17/2009	07/17/2010

GEL Laboratories LLC
Version 1.0 9/18/2000

W084116

Verification for Ra-226 Standard 0638-F

	Isotope	Value	Uncertainty
D. Roy	0638-F #1	24.629	1.7426
2/2/2009	0638-F #2	24.438	1.7557
	0638-F #3	22.791	1.6808
Mean Value (Counting) =	23.953	99.60	Pass
Stdev =	1.010781096		Rule 3 (Pass/Fail)
Target =	24.05		
Lower Limit =	21.93100448		
Upper Limit =	25.97412886		
Rule 1 Pass/Fail	Pass		
Two sigma =	2.021562191		
10 % of Mean =	2.395256667		
Rule 2 (Pass/Fail)	Pass		

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 standard 0638-F using 0.1 mL for each source. Each source was counted using routine Lucas cell procedures. Calibration for 0299-G was used in this verification.

Handwritten notes:
 0638-F #1
 2/2/2009
 Amanda [Signature]

Radium-226 Que Sheet

General Engineering Laboratories, Radiochemistry Division

Batch #: 838839

02/03/2009

Analyst: KSDI

First Client Due Date:

Internal Due Date: 02/07/2009

Spike Isotope: Radium-226 Spike Code: 003-P

Expiration Date: 12/27/08

Nom Conc:

LCS Isotope: Radium-226 LCS Code: 003-P

Expiration Date: 12/27/08

Nom Conc:

Prep Date: 12/27/08

Pipet ID:

Initials: VSD

Witness:

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 Date/Time	De-em Date/Time	Start Count Date/Time	Cell #	Det #	Bkg counts	Total Counts
1201770521-1	LCS for batch 838839	LCS	GROUND	WAJ 1	1 pCi/L	QC ACCOUNT	500	1/26/09 10:05	1/26/09 11:30	1/26/09 13:10	1/26/09 17:05	305	3	9	741
1201770522-1	LCS for batch 838839	LCS	GROUND	WAJ 1	1 pCi/L	QC ACCOUNT	500	1/26/09 10:05	1/26/09 11:45	1/26/09 13:10	1/26/09 17:57	304	3	9	748
1201770523-1	LCS for batch 838839	LCS	GROUND	WAJ 1	1 pCi/L	QC ACCOUNT	500	1/26/09 10:05	1/26/09 12:00	1/26/09 13:10	1/26/09 19:05	305	3	9	743

Comments:

Instrument ID's:

LUCAS-5028, LUCAS-13617, LUCAS-90899, LUCAS-162753, LUCAS-132286, LUC-6-178055

Data Reviewed By:

WJ Slivers

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.2.3

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

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

Batch : 838839

Analyst : KSD1
 Prep Date : 1/26/2009

Ra-226 Abundance : 1

Ra-226 Method Uncertainty : 0.0918

Procedure Code : LUC26RAL

Parname : Radium-226

Required MDA : 1 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 ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Count Raw Data			Weekly Background			Detector Efficiency (cpm/dpm)	
				Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Counts	CPM		Count Time (min.)
1201770521.1	0.5000	2.0256E-05	1/26/2009 0:00	305	30	791	26.367	8	0.267	30	1.9930
1201770522.1	0.5000	2.0256E-05	1/26/2009 0:00	306	30	768	25.600	8	0.267	30	1.9500
1201770523.1	0.5000	2.0256E-05	1/26/2009 0:00	308	30	730	24.333	8	0.267	30	2.0010

Handwritten notes:
 UNSM105
 1/26/09

Detector Efficiency Error (cpm/dpm)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	De-Gas to Ingrowth	Rn-222 Corrections Ingrowth to Count	During Count	Ra-226 Decay
0.06082	1/23/2008	1/22/2009	1/26/2009 16:05	1/30/2009 11:30	1/30/2009 17:05	0.499	0.959	1.002	1.000
0.06082	1/23/2008	1/22/2009	1/26/2009 16:05	1/30/2009 11:45	1/30/2009 17:37	0.500	0.957	1.002	1.000
0.06082	1/23/2008	1/22/2009	1/26/2009 16:05	1/30/2009 12:00	1/30/2009 19:05	0.501	0.948	1.002	1.000

K0816104
[Handwritten signature]

- Notes.
 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Results Decision Level pCi/L	Critical Level pCi/L	MDA pCi/L	Sample Act.		Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L		2 SIGMA Total Prop. Uncertainty pCi/L		Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
			Conc. pCi/L	Error pCi/L			2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L								
0.2932	0.2070	0.5083	24.6287	0.0707	26.1000	0.9422	1.7426	5.5940	LCS					24.0486	102.4%	
0.2997	0.2116	0.5196	24.4384	0.0710	25.3333	0.9286	1.7557	5.5591	LCS					24.0486	101.6%	
0.2942	0.2077	0.5101	22.7906	0.0715	24.0667	0.9055	1.6808	5.1982	LCS					24.0486	94.8%	

11/28/10
(15)

General Engineering Laboratories

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

Lucas Cell Calibration Package

(701-712)

	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?	<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"/>	
	<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: Kelli Spence

Date: 9/30/09

Reviewed By: Angela G

Date: 9/30/09

Effective Date: 9/30/09

Ra-226 Cell Constants

Standard Reference date : 12/15/1999
 standard ID : 0299-H
 Volume added (mL) : 0.1
 Standard Reference Activity (DPM/mL) : 2483.21

Lucas cell #	Cell constant	Standard Source	Date/Time of count	Date/Time flushed to cell	Date/Time end of degas	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	
701	2.180	Average	2.107	Cal 12	9/21/2009 17:00	9/18/2009 17:00	6158	30	205.27	243.02	2.82986	0.17014	3569	0.9958
701	2.025	Sidev	0.078	Cal 1	9/15/2009 17:45	9/15/2009 13:45	6595	15	439.67	243.02	14.13542	0.16667	3563	0.9958
701	2.117	Cal 1	9/18/2009 18:15	9/18/2009 13:20	9/15/2009 10:00	3219	15	214.60	243.02	3.13889	0.20486	3566	0.9958	
702	2.101	Average	2.033	Cal 2	9/24/2009 18:05	9/24/2009 14:05	3014	15	200.93	243.02	2.87847	0.16667	3572	0.9958
702	2.020	Sidev	0.063	Cal 2	9/15/2009 18:10	9/15/2009 14:10	6583	15	438.87	243.02	14.15278	0.16667	3563	0.9958
702	1.977	Cal 11	9/21/2009 17:25	9/21/2009 13:20	9/18/2009 17:00	5611	30	187.03	243.02	2.84722	0.17014	3569	0.9958	
703	2.218	Average	2.221	Cal 10	9/21/2009 18:00	9/21/2009 13:45	6317	30	210.57	243.02	2.86458	0.17708	3569	0.9958
703	2.279	Sidev	0.057	Cal 3	9/24/2009 18:25	9/24/2009 14:35	3282	15	219.47	243.02	2.89931	0.15972	3572	0.9958
703	2.165	Cal 3	9/18/2009 19:00	9/18/2009 14:55	9/15/2009 10:00	3364	15	224.27	243.02	3.20486	0.17014	3566	0.9958	
704	2.302	Average	2.235	Cal 9	9/21/2009 18:35	9/21/2009 14:20	6599	30	219.97	243.02	2.89889	0.17708	3569	0.9958
704	2.255	Sidev	0.079	Cal 4	9/24/2009 18:45	9/24/2009 15:00	3274	15	218.27	243.02	2.91667	0.15625	3572	0.9958
704	2.148	Cal 4	9/18/2009 19:15	9/18/2009 15:20	9/15/2009 10:00	3356	15	223.73	243.02	3.22222	0.16319	3566	0.9958	
705	2.032	Average	2.107	Cal 5	9/18/2009 19:40	9/18/2009 15:45	3187	15	212.47	243.02	3.23958	0.16319	3566	0.9958
705	2.090	Sidev	0.084	Cal 5	9/24/2009 19:05	9/24/2009 15:25	3050	15	203.33	243.02	2.93403	0.15278	3572	0.9958
705	2.198	Cal 8	9/21/2009 19:10	9/21/2009 14:45	9/18/2009 17:00	6321	30	210.70	243.02	2.90625	0.18403	3569	0.9958	
706	2.093	Average	2.142	Cal 7	9/21/2009 20:07	9/21/2009 15:05	6013	30	200.43	243.02	2.92014	0.20972	3569	0.9958
706	2.109	Sidev	0.071	Cal 6	9/24/2009 19:25	9/24/2009 15:45	3089	15	205.93	243.02	2.94792	0.15278	3572	0.9958
706	2.223	Cal 6	9/18/2009 19:55	9/18/2009 16:10	9/15/2009 10:00	3505	15	233.67	243.02	3.25694	0.15625	3566	0.9958	
707	2.154	Average	2.275	Cal 7	9/18/2009 20:15	9/18/2009 16:30	3406	15	227.07	243.02	3.27083	0.15625	3566	0.9958
707	2.386	Sidev	0.116	Cal 7	9/24/2009 19:45	9/24/2009 16:05	3506	15	233.73	243.02	2.96181	0.15278	3572	0.9958
707	2.287	Cal 6	9/21/2009 20:35	9/21/2009 15:25	9/18/2009 17:00	6586	30	219.53	243.02	2.93403	0.21528	3569	0.9958	
708	2.253	Average	2.188	Cal 8	9/24/2009 20:00	9/24/2009 16:30	3330	15	222.00	243.02	2.97917	0.14583	3572	0.9958
708	2.110	Sidev	0.180	Cal 1	9/28/2009 18:35	9/28/2009 15:05	7591	30	253.03	243.02	3.92014	0.14583	3576	0.9958
708	1.923	Cal 8	9/18/2009 20:25	9/18/2009 16:50	9/15/2009 10:00	3055	15	203.67	243.02	3.28472	0.14931	3566	0.9958	
709	2.088	Average	2.285	Cal 9	9/18/2009 21:03	9/18/2009 17:15	3324	15	221.60	243.02	3.30208	0.15833	3566	0.9958
709	2.352	Sidev	0.168	Cal 4	9/21/2009 21:50	9/21/2009 16:20	6823	30	227.43	243.02	2.97222	0.22917	3569	0.9958
709	2.400	Cal 9	9/24/2009 20:20	9/24/2009 16:45	9/21/2009 17:00	3554	15	236.93	243.02	2.98958	0.14931	3572	0.9958	
710	2.512	Average	2.409	Cal 3	9/21/2009 22:21	9/21/2009 16:35	7291	30	243.03	243.02	2.98284	0.24028	3569	0.9958
710	2.436	Sidev	0.119	cal 10	9/24/2009 20:50	9/24/2009 17:00	3611	15	240.73	243.02	3.00000	0.15972	3572	0.9958
710	2.279	Cal 10	9/18/2009 21:20	9/18/2009 17:30	9/15/2009 10:00	3635	15	242.39	243.02	3.31250	0.15972	3566	0.9958	
711	2.212	Average	2.242	Cal 11	9/18/2009 21:37	9/18/2009 17:45	3536	15	235.73	243.02	3.32292	0.16111	3566	0.9958
711	2.302	Sidev	0.052	Cal 11	9/24/2009 22:05	9/24/2009 17:15	6263	15	226.33	243.02	3.01042	0.20139	3572	0.9958
711	2.211	Cal 2	9/21/2009 22:52	9/21/2009 16:55	9/18/2009 17:00	6432	30	214.40	243.02	2.99653	0.24792	3569	0.9958	
712	2.292	Average	2.069	Cal 1	9/21/2009 23:40	9/21/2009 17:10	6657	30	221.90	243.02	3.00694	0.27083	3569	0.9958
712	1.928	Sidev	0.195	Cal 11	9/15/2009 22:15	9/15/2009 17:35	6263	15	417.53	243.02	14.29514	0.19444	3563	0.9958
712	1.989	Cal 12	9/24/2009 22:27	9/24/2009 17:30	9/21/2009 17:00	2938	15	195.87	243.02	3.02083	0.20625	3572	0.9958	

EffEr 0.065186 <- Put in Machines.xls (Lucas Cell Tab)

A19
9/30/09

#7

Ra-226 Calibration Sheet

Standard ID: 0299-H

Volume Added (mL): 0.1

Expiration Date: 8/1/10 ✕ 15 min

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 1	500	9/11/09 10:30	9/15/09 13:45	9/15/09 17:45	701	7	6595
Cal 2	500	9/11/09 10:30	9/15/09 14:10	9/15/09 18:10	702	7	6583
Cal 3	500	9/11/09 10:30	9/15/09 14:35	9/15/09 18:45	703	7	5672
Cal 4		9/11/09 10:30	9/15/09 15:15	9/15/09 19:00	704	7	6039
Cal 5		9/11/09 10:30	9/15/09 15:40	9/15/09 19:15	705	7	5579
Cal 6		9/11/09 10:30	9/15/09 16:05	9/15/09 19:45	706	7	5347
Cal 7		9/11/09 10:30	9/15/09 16:30	9/15/09 2:00	707	7	5376
Cal 8		9/11/09 10:30	9/15/09 16:45	9/15/09 2:30	708	7	6203
Cal 9		9/11/09 10:30	9/15/09 17:05	9/15/09 2:11	709	7	6458
Cal 10		9/11/09 10:30	9/15/09 17:20	9/15/09 2:55	710	7	5935
Cal 11	500	9/11/09 10:30	9/15/09 17:35	9/15/09 2:25	711	7	6263

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

9/13/09

Ra-226 Calibration Sheet

Standard ID: 62M-4
 Volume Added (mL): 0.1
 Expiration Date: 6/1/10

* 15min

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 1	500	9/15/09 9/15/09	9/18/09 1320	9/18/09 1815	101	7	3219
Cal 2	500	9/15/09 1000	9/18/09 1425	9/18/09 1835	102	7	3420
Cal 3	500	9/15/09 1000	9/18/09 1455	9/18/09 1900	103	7	3364
Cal 4	500	9/15/09 1000	9/18/09 1520	9/18/09 1915	104	7	3356
Cal 5	500	9/15/09 1000	9/18/09 1545	9/18/09 1940	105	7	3187
Cal 6	500	9/15/09 1000	9/18/09 1610	9/18/09 1965	106	7	3505
Cal 7	500	9/15/09 1000	9/18/09 1630 1630	9/18/09 2015	107	7	3406
Cal 8	500	9/15/09 1000	9/18/09 1650 1650	9/18/09 2025	108	7	3055
Cal 9	500	9/15/09 1000	9/18/09 1715	9/18/09 2103	109	7	3324
Cal 10	500	9/15/09 1000	9/18/09 1730	9/18/09 2120	110	7	3635
Cal 11	500	9/15/09 1000	9/18/09 1745	9/18/09 2137 2142	111	7	3536
Cal 12	500	9/11/09 1000	9/18/09 1800	9/18/09 2218	112	7	5663

10/1/09

11/09/130105

* 9/30/09

11/09/130105

Ra-226 Calibration Sheet

Standard ID: 02944
 Volume Added (mL): 0.1
 Expiration Date: 9/1/10

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 17	500	9/18/09 1700	9/21/09 1555	9/21/09 1700	701	7	6158
Cal 11	500	9/18/09 1700	9/21/09 1520	9/21/09 1725	702	7	5611
Cal 10	500	9/18/09 1700	9/21/09 1545	9/21/09 1800	703	7	6317
Cal 9	500	9/18/09 1700	9/21/09 1420	9/21/09 1835	704	7	6599
Cal 8	500	9/18/09 1700	9/21/09 1445	9/21/09 1910	705	7	6321
Cal 7	500	9/18/09 1700	9/21/09 1505	9/21/09 2007	706	7	6013
Cal 6	500	9/18/09 1700	9/21/09 1525	9/21/09 2035	707	7	6586
Cal 5	500	9/18/09 1700	9/21/09 1505	9/21/09 2112	708	7	7155
Cal 4	500	9/18/09 1700	9/21/09 1620	9/21/09 2150	709	7	6823
Cal 3	500	9/18/09 1700	9/21/09 1635	9/21/09 2221	710	7	7291
Cal 2	500	9/18/09 1700	9/21/09 1655	9/21/09 2252	711	7	6432
Cal 1	500	9/18/09 1700	9/21/09 1710	9/21/09 2340	712	7	6657

9/21/09

9/21/09

9/30/09

Ra-226 Calibration Sheet

Standard ID: 01199-1

Volume Added (mL): 0.1

Expiration Date: 07/10

* 15 min counts

W/10/09/10

Sample ID	Volume (mL)	End Degas Date/Time	End De-em Date/Time	Start Count Date/Time	Cell #	Det #	Total Counts
Cal 1	500	01/21/09 1700	01/21/09 1730	01/24/09 1745	701	7	3125
Cal 2	500	01/21/09 1700	01/21/09 1705	01/24/09 1805	702	7	3014
Cal 3	500	01/21/09 1700	01/21/09 1735	01/24/09 1825	703	7	3292
Cal 4	500	01/21/09 1700	01/21/09 1900	01/24/09 1845	704	7	3274
Cal 5	500	01/21/09 1700	01/21/09 1525	01/24/09 1905	705	7	3050
Cal 6	500	01/21/09 1700	01/21/09 1945	01/24/09 1925	706	7	3089
Cal 7	500	01/21/09 1700	01/21/09 1605	01/24/09 1945	707	7	3506
Cal 8	500	01/21/09 1700	01/21/09 1620	01/24/09 2000	708	7	3330
Cal 9	500	01/21/09 1700	01/21/09 1645	01/24/09 2020	709	7	3554
Cal 10	500	01/21/09 1700	01/21/09 1700	01/24/09 2050	710	7	3611
Cal 11	500	01/21/09 1700	01/21/09 1715	01/24/09 2205	711	7	3395
Cal 12	500	01/21/09 1700	01/21/09 1730	01/24/09 2227	712	7	2938

W/11/20/09

01/30/09

ee'd

8-21-00

Nycomed Amersham plc
Amersham Laboratories

0299



CALIBRATION
No. 0140



ISSUED
BY:

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

Description Principal radionuclide: Radium-226

Product code: RAY44
Solution number: R4/131/89

Measurement Reference time: 1200 GMT on 15 December 1999

Nuclear data Nuclear data quoted on this certificate are taken from the Joint European File, Version 2.2.

Expression of uncertainties 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

Approved
Signature

Date of
issue
263

17th December 1999

WD9120109

Nycomed

GEL 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:	01/23/2008
Ampoule Mass (g):	5.0368 g	Expiration Date:	01/23/2009
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
		Balance ID:	

Calculations Converting parent activity to dpm/mL/dppm/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
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	01/26/2009	01/26/2010
08/07/2009	Mary Aders	5.0767	250	0299-H	2483.2133 dpm/mL	08/07/2009	08/07/2010

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 0299-H

M. Aders 8/7/2009	Isotope	Value	Uncertainty
	0299-H	111.440	2.5408
	0299-H	115.924	2.5878
	0299-H	111.780	2.5407
Mean Value (Counting) =	113.048	101.49	Pass
Stdev =	2.496414563		Rule 3 (Pass/Fail)
Target =	111.39		
Lower Limit =	108.0550709		
Upper Limit =	118.0407291		
Rule 1 Pass/Fail	Pass		
Two sigma =	4.992829126		
10 % of Mean =	11.30479		
Rule 2 (Pass/Fail)	Pass		

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 0299-H by transferring portions of the degassed standard into tared glass liquid scintillation vials. 10 mL of DI Water and 10 mL of mineral oil were added to each vial and the vials were shaken. A Blank vial was prepared in a similar fashion using 10 mL of DI Water and 10 mL of mineral oil. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Red using source standard verification. 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

Handwritten signature: Amanda L. Fein 8/13/09

Radon-222 Liquid

Filename : RN222.XLS
 File type : Excel
 Version # : 1.2.4

LCS S/N : 0299-H
 Spike Exp Date : 8/7/2010
 Spike Activity (dpm/ml) : 2472.85
 Spike Volume Added : 0.10

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml) : N/A
 Spike Volume Added : N/A
 Spike Date/Time : 8/7/2009 14:00

Procedure Code : LSC222RNL
 Parname : Radon-222
 Required MDA : 200 pCi/L
 Half-life of Radon-222 : 3.823 days

Batch : 891920
 Analyst : MLA
 Prep Date : 8/7/2009

Rn-222 Abundance : 1

Rn-222 Method Uncertainty : 0.1111

Geometry : 10ML MINERAL OIL/10ML
 SAMPLE

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

Sample Characteristics			Count raw Data								
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Background Count Time (min.)	Count Start Date/Time	Sample Decay	
1	1201897268.1	1.0000	2.0399E-05	8-2	15	43.3	517.53	8.47	15	8/12/2009 7:48	0.380
2	1201897269.1	1.0000	2.0399E-05	8-3	15	44.6	538.8	8.47	15	8/12/2009 8:04	0.380
3	1201897270.1	1.0000	2.0399E-05	8-4	15	45	520.6	8.47	15	8/12/2009 8:20	0.379

0.379

Calibration Data				Backgrounds				Correction Factors			Net Sample
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Rack Position #	Count Start Date/Time	Spike Date/Time	Rn-222 Ingrowth	Rn-222 Count Correction	Activity for MS pCi/L
1	LSCRED	7/28/2009	7/31/2010	3.5654	0.00792	8-1	8/12/2009 7:31	8/7/2009 14:00	0.577	0.577	
2	LSCRED	7/28/2009	7/31/2010	3.5654	0.00792	8-1	8/12/2009 7:31	8/7/2009 14:00	0.578	0.578	
3	LSCRED	7/28/2009	7/31/2010	3.5654	0.00792	8-1	8/12/2009 7:31	8/7/2009 14:00	0.579	0.579	

8/13/09

- Notes:
 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA		MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error pCi/L	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty		Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
			MDA pCi/L	MDA pCi/L						pCi/L	Total Prop. pCi/L						
1	0.5420	0.3827	200	200	0.8092	111.4397	0.0141	509.0600	5.9217	2.5408	24.4606		LCS			111.3896	100.0%
2	0.5412	0.3821	200	200	0.8080	115.9238	0.0139	530.3300	6.0403	2.5678	25.4391		LCS			111.3896	104.1%
3	0.5404	0.3816	200	200	0.8068	111.7802	0.0140	512.1300	5.9390	2.5407	24.5345		LCS			111.3896	100.4%

REV 2/13/15

12 AUG 2009 07:48

ID: R14-232

12 AUG 2009 07:48

USER: IC COMMENT: RED

PRESET TIME : 15.00

DATA CALC : CPM HH : YES SAMPLE REPEATS : 1 PRINTER : EDIT

COUNT BLANK : NO IDW : NO REPLICATES : 1 RS232 : EDIT

TWO PHASE : NO AQW : NO CYCLE REPEATS : 1 DISK : OFF

SCINTILLATOR: LIQUID LUMEX: NO LOW SAMPLE RES: 0

LOW LEVEL : YES HALF LIFE CORRECTION DATE: none

CHAN: 600.0 - 975.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

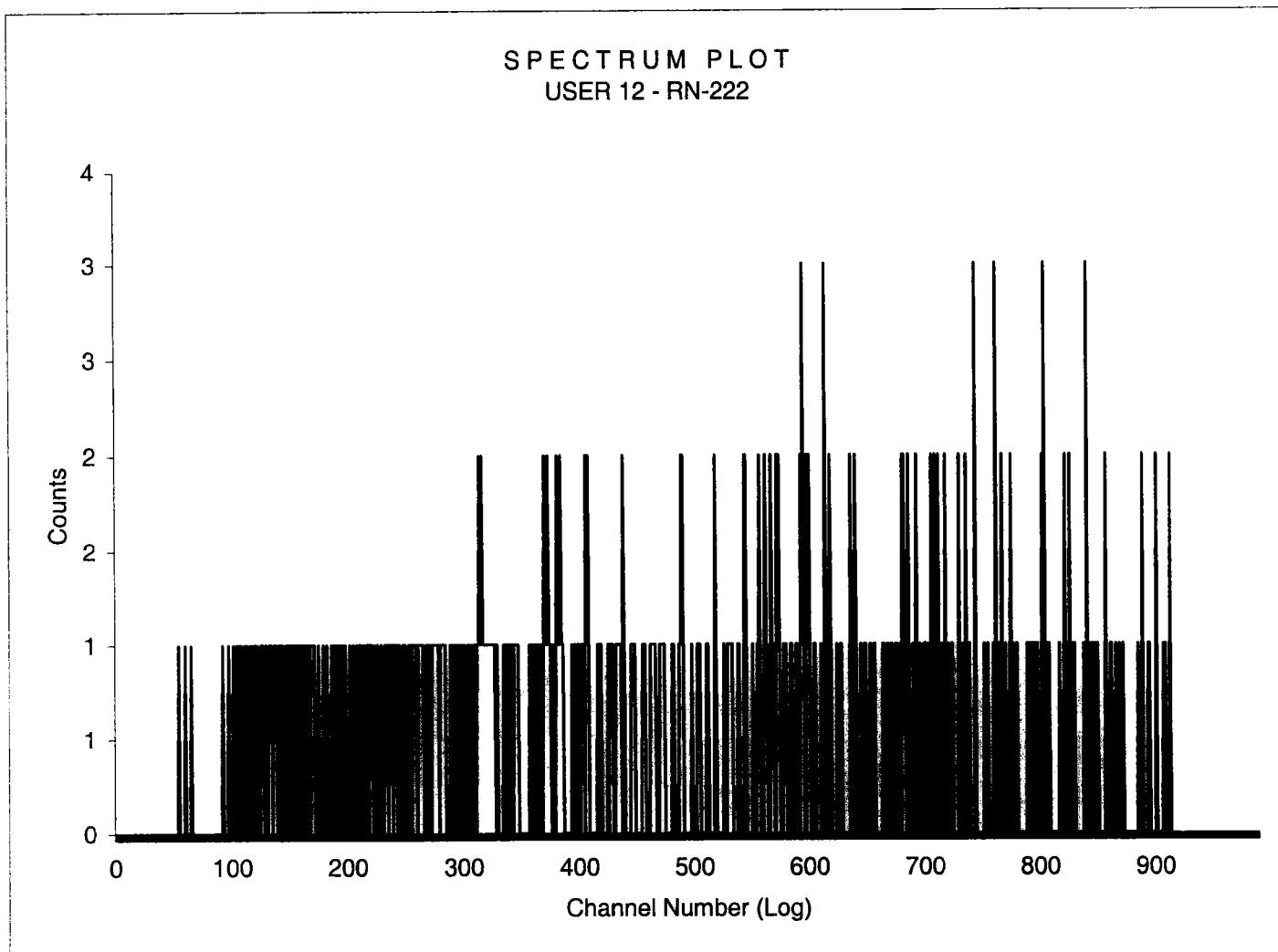
CHAN: 0.0 - 900.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	HH	WIND1 RAW CPM	WIND2 RAW CPM	WIND1		WIND2		LUMEX %	ELAPSED TIME
						CPM	%ERROR	CPM	%ERROR		
1	3-1	15.00	39.1	9.47	27.73	9.47	17.75	27.73	9.61	0.67	15.00
2	3-2	15.00	43.3	517.53	607.33	517.53	2.27	607.33	2.10	0.97	15.00
3	3-3	15.00	44.6	538.80	628.67	538.80	2.22	628.67	2.06	0.97	15.00
4	3-4	15.00	45.0	520.60	610.00	520.60	2.26	610.00	2.09	0.97	15.00

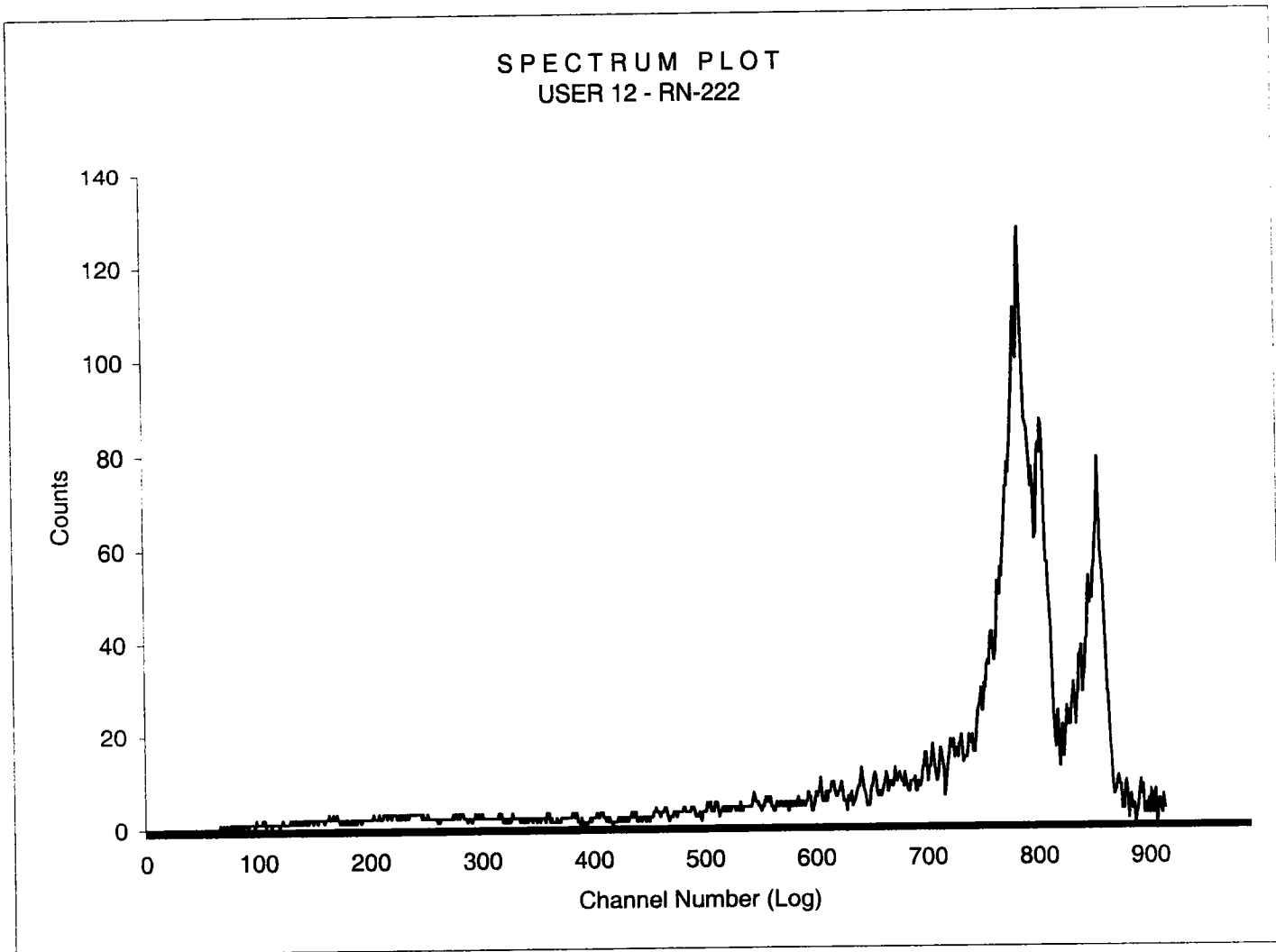
Handwritten signature

Sample Count Start Time:	12 Aug 2009 07:31:52		
Data Capture Date	12 Aug 2009 07:47:25		
User Filename	S12081208-1A.XLS		
	U12081208-1A.XLS		
Spectrum Type	Log Counts		
User Number	12		
User Id	RN-222		
User Comment	RED		
Isotope Name	14C		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	1	8-1	15.00
H#, Total Counts:	39.1	422	
Start, End, X-Axis:	0	990	Channel Number



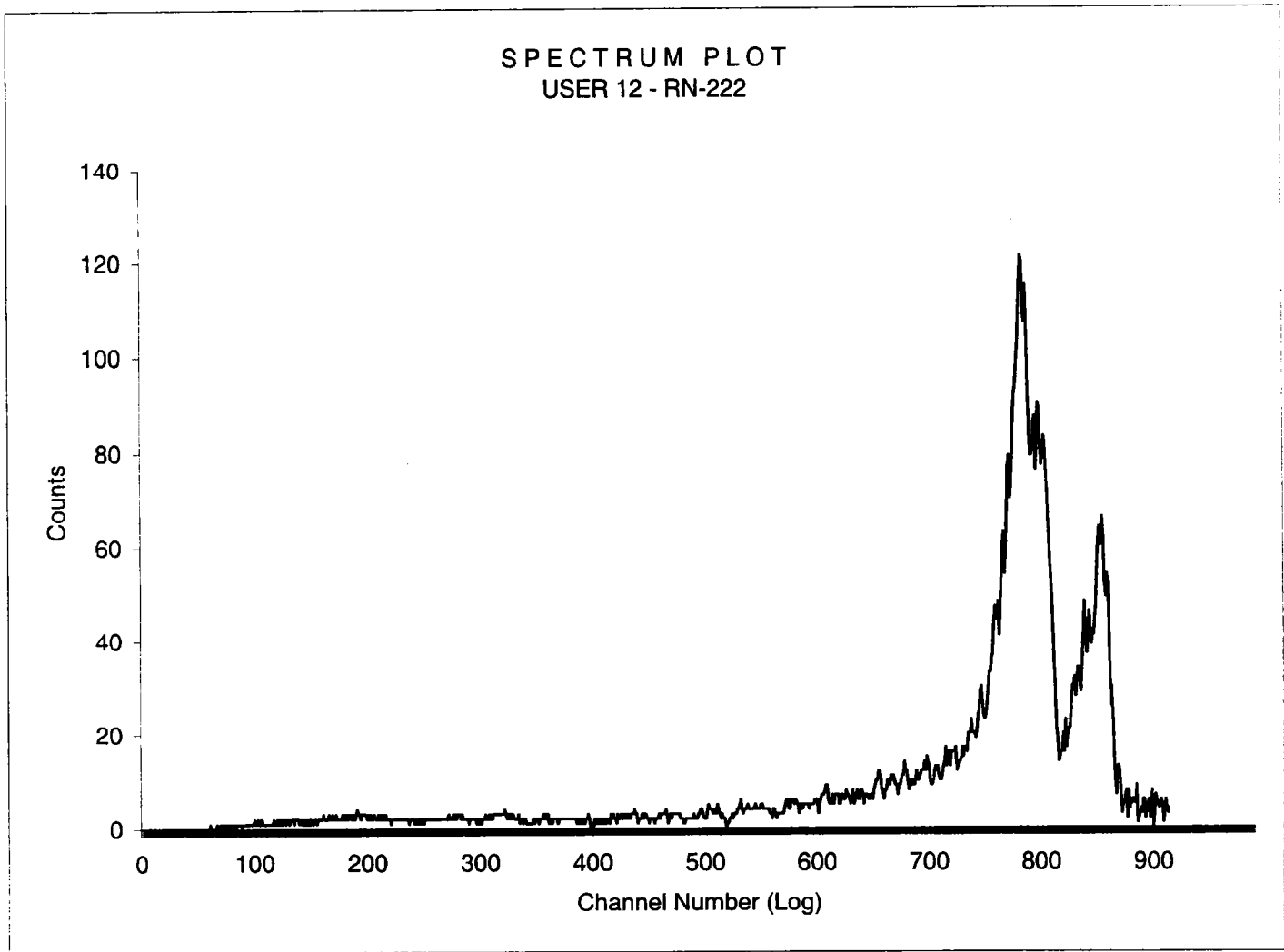
Handwritten: 07/5
31:3109

Sample Count Start Time: 12 Aug 2009 07:48:04
Data Capture Date: 12 Aug 2009 08:03:28
User Filename: S12081208-2A.XLS
U12081208-1A.XLS
Spectrum Type: Log Counts
User Number: 12
User Id: RN-222
User Comment: RED
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 2 8-2 15.00
H#, Total Counts: 43.3 9166
Start, End, X-Axis: 0 990 Channel Number

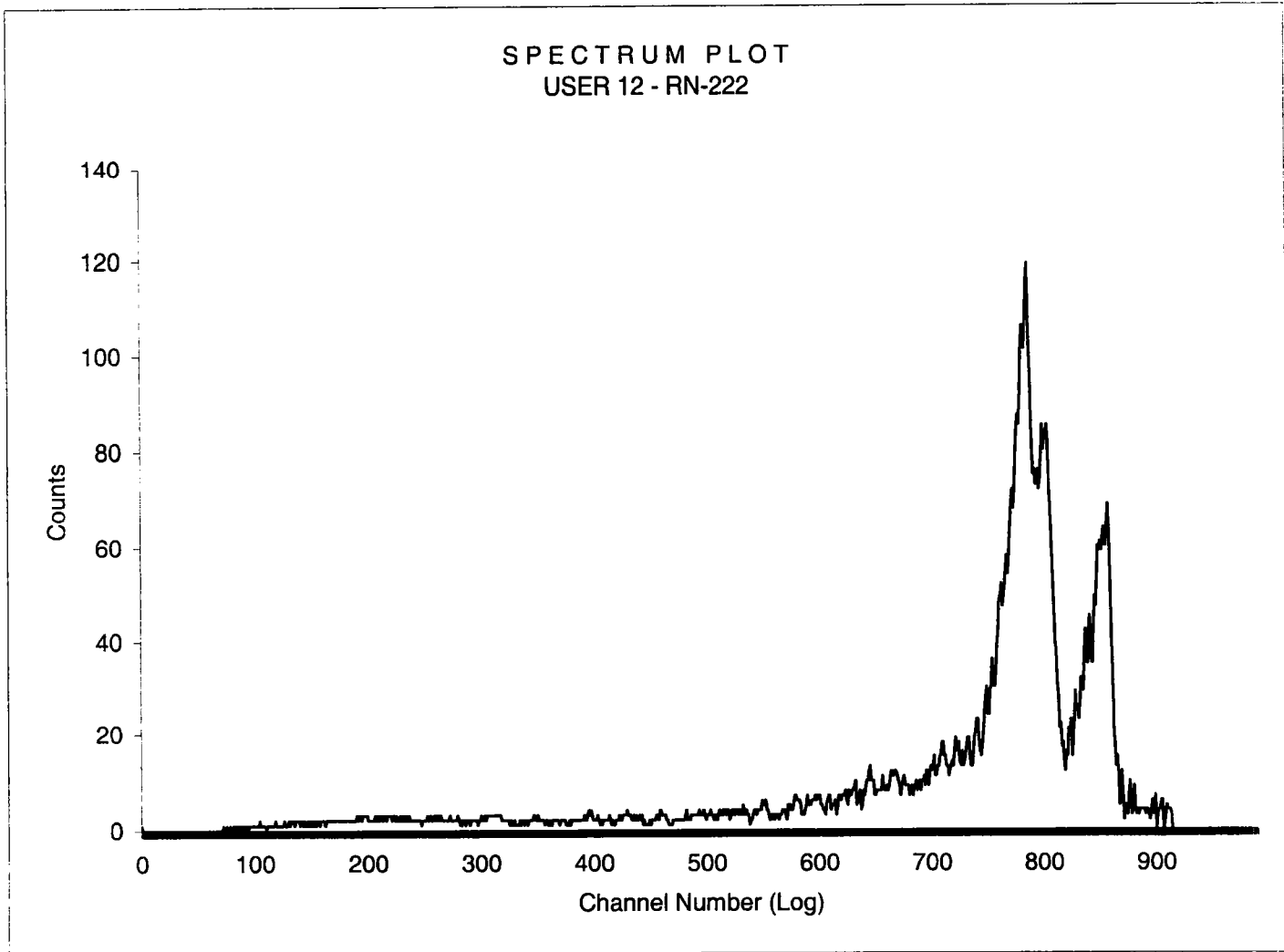


Handwritten:
3/13/07

Sample Count Start Time: 12 Aug 2009 08:04:11
Data Capture Date 12 Aug 2009 08:19:35
User Filename S12081208-3A.XLS
U12081208-1A.XLS
Spectrum Type Log Counts
User Number 12
User Id RN-222
User Comment RED
Isotope Name ^{14}C
Scintillator LIQUID
Sample, Rack-Pos, Time: 3 8-3 15.00
H#, Total Counts: 44.6 9492
Start, End, X-Axis: 0 990 Channel Number



Sample Count Start Time: 12 Aug 2009 08:20:17
Data Capture Date: 12 Aug 2009 08:35:41
User Filename: S12081208-4A.XLS
U12081208-1A.XLS
Spectrum Type: Log Counts
User Number: 12
User Id: RN-222
User Comment: RED
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 4 8-4 15.00
H#, Total Counts: 45.0 9197
Start, End, X-Axis: 0 990 Channel Number



Handwritten: CR-4
3/12/09

Radon 222 Que Sheet

08/07/2009

Batch #: 891920 Analyst: MLA First Client Due Date: 08/17/2009 Internal Due Date: 08/17/2009
 Spike Isotope: Radium-226 Spike Code: 0299-A Expiration Date: 02/29/10 Vol: 1
 LCS Isotope: Radium-226 LCS Code: 0299-A Expiration Date: 02/29/10 Vol: 1
 Prep Date: 07/21/09 Pipet ID: 270968 Initials: MLA Witness: Comments:

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collection Date	Label	Wet/Dry Sample Mass (g/mL)	LSC Rack #	Time Spike Added
1201897268-1	LCS for batch 891920	LCS		.2 pCi/mL	DRINKING WATQC ACCOUNT		20-JUL-09 12:00 PM	<u>13</u>			1400
1201897269-1	LCS for batch 891920	LCS		.2 pCi/mL	DRINKING WATQC ACCOUNT		20-JUL-09 12:00 PM				1400
1201897270-1	LCS for batch 891920	LCS		.2 pCi/mL	DRINKING WATQC ACCOUNT		20-JUL-09 12:00 PM				1400

Bkg Rack #: _____

Comments: _____ Data Reviewed By: _____

Instrument Used: LS6000 (Red) 7065155, LS6500 (Black) 7069123, LS6500 (Blue) 7067083, LS6500 (Green) 7067404
 Wallac (Yellow) 4040127, Wallac (Pink) 2200082, Purple 7069123, Silver 7060656

GEL Laboratories LLC, Radiochemistry Division

08/11/09

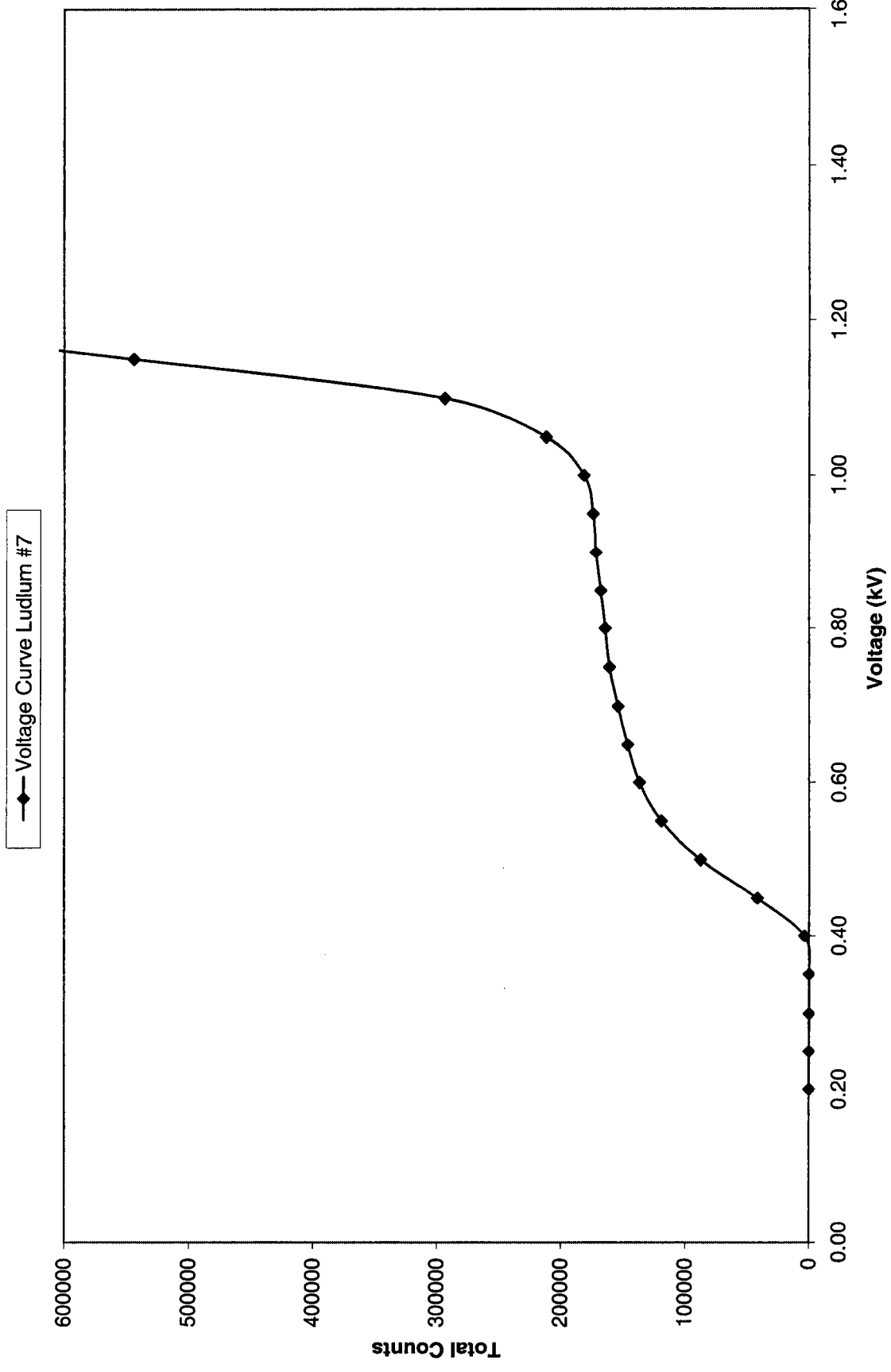
Voltage Curve Ludlum #7

Voltage (kV)	Count Time (min)	Counts	Date/Time
0.20	1.00	0	9/15/09 12:13
0.25	1.00	0	9/15/09 12:14
0.30	1.00	0	9/15/09 12:15
0.35	1.00	0	9/15/09 12:16
0.40	1.00	3788	9/15/09 12:17
0.45	1.00	41827	9/15/09 12:18
0.50	1.00	87578	9/15/09 12:19
0.55	1.00	119153	9/15/09 12:20
0.60	1.00	136757	9/15/09 12:21
0.65	1.00	146242	9/15/09 12:22
0.70	1.00	154066	9/15/09 12:23
0.75	1.00	160997	9/15/09 12:24
0.80	1.00	164506	9/15/09 12:25
0.85	1.00	168023	9/15/09 12:26
0.90	1.00	171900	9/15/09 12:27
0.95	1.00	174082	9/15/09 12:28
1.00	1.00	181331	9/15/09 12:29
1.05	1.00	211928	9/15/09 12:30
1.10	1.00	293552	9/15/09 12:31
1.15	1.00	544079	9/15/09 12:32
1.20	1.00	827973	9/15/09 12:33
1.25	1.00	1214090	9/15/09 12:34

Detector set to operate at 0.70 kV

JK
9/30/09

Ludlum Detector Voltage Curve



JKG
9/30/09

DAILY CALIBRATION RANGE

Trial	Counts	Date	Time	Detector
1	154335	9/15/2009	13:30	7
2	153698	9/15/2009	13:31	7
3	153933	9/15/2009	13:32	7
4	154196	9/15/2009	13:33	7
5	154114	9/15/2009	13:34	7
6	153766	9/15/2009	13:35	7
7	154409	9/15/2009	13:36	7
8	154086	9/15/2009	13:37	7
9	153833	9/15/2009	13:38	7
10	153689	9/15/2009	13:39	7
11	148183	9/16/2009	10:25	7
12	148142	9/16/2009	10:35	7
13	148193	9/16/2009	10:36	7
14	147463	9/16/2009	10:37	7
15	147251	9/16/2009	10:39	7
16	146697	9/17/2009	4:25	7
17	146925	9/17/2009	5:45	7
18	147238	9/17/2009	6:00	7
19	147239	9/17/2009	6:15	7
20	146836	9/17/2009	6:30	7

STATISTICS	
Average	150711.30
St. Dev.	3407.47
+ 3 S.D.	160933.72
+ 2 S.D.	157526.25
Average	150711.30
- 2 S.D.	143896.35
- 3 S.D.	140488.88
UPPER	160934
LOWER	140489

Handwritten: 9/30/09

701	2.107	9/30/2009
702	2.033	9/30/2009
703	2.221	9/30/2009
704	2.235	9/30/2009
705	2.107	9/30/2009
706	2.142	9/30/2009
707	2.275	9/30/2009
708	2.188	9/30/2009
709	2.285	9/30/2009
710	2.409	9/30/2009
711	2.242	9/30/2009
712	2.069	9/30/2009

Handwritten signature and date: 9/30/09

Ra-226 WATER

Batch : LCSVER
 Date : 9/22/2009
 Analyst : KSD1

Procedure Code : LUC26RAL

Parname : 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 1	0.500	15	636	701	2.107	0.267	0.5512	24.6163	1.9283	9/30/2009 9:20
VER 2	0.500	15	625	702	2.033	0.267	0.5247	27.0835	2.1404	9/29/2009 16:10
VER 3	0.500	15	625	703	2.221	0.267	0.4811	24.8342	1.9627	9/29/2009 16:45
VER 4	0.500	15	587	704	2.235	0.267	0.4786	23.1944	1.8925	9/29/2009 17:15
VER 5	0.500	15	511	705	2.107	0.267	0.5081	21.4146	1.8751	9/29/2009 17:50
VER 6	0.500	15	580	706	2.142	0.267	0.4998	23.9310	1.9645	9/29/2009 18:25
VER 7	0.500	15	539	707	2.275	0.267	0.4643	20.6372	1.7586	9/29/2009 18:40
VER 8	0.500	15	525	708	2.188	0.267	0.4816	20.8572	1.8013	9/29/2009 19:00
VER 9	0.500	15	559	709	2.285	0.267	0.4615	21.2888	1.7807	9/29/2009 19:40
VER 10	0.500	15	694	710	2.409	0.267	0.4093	23.4767	1.7593	9/30/2009 9:50
VER 11	0.500	15	537	711	2.242	0.267	0.4690	20.7776	1.7739	9/29/2009 20:20
VER 12	0.500	15	552	712	2.069	0.267	0.5096	23.2132	1.9542	9/29/2009 21:10

Handwritten signature and date: 9/30/09

Sample ID	Det #	Run Date	Sample Type	Standard ID	NC	NC units	Recovery/RPD
701	7	9/29/2009 15:35	LCS	0638-F	24.05	pCi/L	102%
702	7	9/29/2009 16:10	LCS	0638-F	24.05	pCi/L	113%
703	7	9/29/2009 16:45	LCS	0638-F	24.05	pCi/L	103%
704	7	9/29/2009 17:15	LCS	0638-F	24.05	pCi/L	96%
705	7	9/29/2009 17:50	LCS	0638-F	24.05	pCi/L	89%
706	7	9/29/2009 18:25	LCS	0638-F	24.05	pCi/L	100%
707	7	9/29/2009 18:40	LCS	0638-F	24.05	pCi/L	86%
708	7	9/29/2009 19:00	LCS	0638-F	24.05	pCi/L	87%
709	7	9/29/2009 19:40	LCS	0638-F	24.05	pCi/L	89%
710	7	9/29/2009 20:00	LCS	0638-F	24.05	pCi/L	98%
711	7	9/29/2009 20:20	LCS	0638-F	24.05	pCi/L	86%
712	7	9/29/2009 21:10	LCS	0638-F	24.05	pCi/L	97%

DEGASSING DATE/TIME	DE-EMAN. DATE/TIME	DEGASS-DE-EM	dE-EM-COUNT	constant	constant	Net CPM	Ingrowth constant
9/22/2009 14:30	9/30/2009 6:00	183.50	3.33	0.7498	0.9751	42.1333	0.7318
9/22/2009 14:30	9/29/2009 10:00	163.50	6.17	0.7090	0.9545	41.4000	0.6774
9/22/2009 14:30	9/29/2009 10:15	163.75	6.50	0.7095	0.9521	41.4000	0.6762
9/22/2009 14:30	9/29/2009 10:30	164.00	6.75	0.7101	0.9503	38.8667	0.6755
9/22/2009 14:30	9/29/2009 10:50	164.33	7.00	0.7108	0.9485	33.8000	0.6749
9/22/2009 14:30	9/29/2009 11:15	164.75	7.17	0.7117	0.9473	38.4000	0.6749
9/22/2009 14:30	9/29/2009 12:45	166.25	5.92	0.7150	0.9563	35.6663	0.6844
9/22/2009 14:30	9/29/2009 13:10	166.67	5.83	0.7159	0.9569	34.7333	0.6857
9/22/2009 14:30	9/29/2009 13:35	167.08	6.08	0.7168	0.9551	37.0000	0.6852
9/22/2009 14:30	9/30/2009 6:30	184.00	3.33	0.7507	0.9751	46.0000	0.7328
9/22/2009 14:30	9/29/2009 14:20	167.83	6.00	0.7184	0.9557	35.5333	0.6872
9/22/2009 14:30	9/29/2009 14:40	168.17	6.50	0.7191	0.9521	36.5333	0.6853

Handwritten signature and date: 9/30/09

Re-226 Verification Sheet

VNS #7

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
VN1	500	9/29/09 1430	9/29/09 1040	9/29/09 1535	701	7	8	488
VN 2	500	9/29/09 1430	9/29/09 1000	9/29/09 1610	702	7	8	685
VN 3	500	9/29/09 1430	9/29/09 1015	9/29/09 1645	703	7	1	625
VN 4	500	9/29/09 1430	9/29/09 1030	9/29/09 1715	704	7	3	587
VN 5	500	9/29/09 1430	9/29/09 1050	9/29/09 1750	705	7	1	511
VN 6	500	9/29/09 1430	9/29/09 1115	9/29/09 1825	706	7	6	580
VN 7	500	9/29/09 1430	9/29/09 1145	9/29/09 1840	707	7	1	539
VN 8	500	9/29/09 1430	9/29/09 1310	9/29/09 1900	708	7	6	525
VN 9	500	9/29/09 1430	9/29/09 1335	9/29/09 1940	709	7	5	559
VN 10	500	9/29/09 1430	9/29/09 1400	9/29/09 2000	710	7	4	322
VN 11	500	9/29/09 1430	9/29/09 1420	9/29/09 2020	711	7	7	537
VN 12	500	9/29/09 1430	9/29/09 1440	9/29/09 2110	712	7	3	552

419
9/30/09

419
9/30/09

419
9/30/09

General Engineering Laboratories Verification Source Preparation Sheet

Applicable SOP Number GL RAD-A-008 Isotope RA 226
 Date Standards Prepared 7/31/09 Cocktail Type Used NA
 Standard ID DL2814 Matrix of Vial/Planchett NA
 Amount Used (g or ml) 0.1 Type of Scintillation Vial NA
 Standard Activity (DPM/g or mL) 268.8845 Pipette ID Used 1429303
 Reference Date 11/23/04 Balance ID Used 38080104
 Expiration Date 7/17/10 Quenching Agent NA
 Residue/Carrier Agent NA

	Standard Number	Quenching Vol (uL) Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
1	VEN 1				
2	VEN 2				
3	VEN 3				
4	VEN 4				
5	VEN 5				
6	VEN 6				
7	VEN 7				
8	VEN 8				
9	VEN 9				
10	VEN 10				
11	VEN 11				
12	VEN 12				
13	VEN 16				
14	VEN 17				

~~/~~

9/30/09

Prepared By: Kelli & Denise Date: 9/30/09
 Reviewed By: Aggie & Jk Date: 9/30/09

Rev 1 RLM 9/10/97

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 - U.S.A.

0638

Phone (404) 352-8677
Fax (404) 352-2837

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: γ -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:

MCW 1/26/04

Standard Traceability Log Rad

WARNING! Training must be completed!!
Alphalims will be locked out if training is not completed within 1 week of assignment Contact
Quality if additional time is needed to complete training

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:	04/09/2009
Ampoule Mass (g):	5.01065 g	Expiration Date:	04/09/2010
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
		Balance ID:	38080204

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

$$(\text{Mass of parent(g)} * (\text{Parm Activity (dps)} * (\text{conversion dpm to dps}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)})$$

$$(\text{Mass of parent(g)} * (\text{Parm Activity (dps)} * (\text{conversion dpm to dps}) * (\text{conversion dpm to dps}) / (\text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)})$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13636.6133 \text{ dpm/mL}$$

$$(4.8398 \text{ g}) * (23530 \text{ dps}) * (60 \text{ dpm/dps}) / (1.0266 \text{ g/mL}) / (5.01065 \text{ g} * 100 \text{ mL}) = 13282.9676 \text{ dpm/g}$$

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	01/17/2007	01/17/2008
07/17/2006	Mary Aders	2.1313	100	0638-C	282.6281 dpm/mL	07/26/2006	07/26/2007
03/28/2007	Daniel Roy	2.1025	100	0638-D	279.2744 dpm/ml	04/08/2007	04/08/2008
03/28/2007	Daniel Roy	45.468	250	0638-E	2415.7999 dpm/ml	04/09/2009	04/09/2010
12/18/2007	Daniel Roy	2.014	100	0638-F	267.519 dpm/ml	02/02/2009	02/02/2010
02/12/2008	Daniel Roy	.5004	100	0638-G	66.468 dpm/ml	03/02/2009	03/02/2010
07/23/2008	Daniel Roy	5.0607	250	0638-H	268.8845 dpm/ml	07/17/2009	07/17/2010

GEL Laboratories LLC
Version 1.0 9/18/2000

VN 61260106

Verification for Ra-226 Standard 0638-H

M. Aders 7/17/2009	Isotope 0638-H 0638-H 0638-H	Value 12.025 10.739 12.348	Uncertainty 1.2237 1.1752 1.2298
Mean Value (Counting) =	11.704	96.86	Pass
Stdev =	0.85081728		Rule 3 (Pass/Fail)
Target =	12.08		
Lower Limit =	10.00223211		
Upper Limit =	13.40550123		
Rule 1 Pass/Fail	Pass		
Two sigma =	1.701634559		
10 % of Mean =	1.170386667		
Rule 2 (Pass/Fail)	Fail		*Exception taken due to full recovery of standard

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-H by transferring portions of the degassed standard into tared glass liquid scintillation vials. 10 mL of DI Water and 10 mL of mineral oil were added to each vial and the vials were shaken. A Blank vial was prepared in a similar fashion using 10 mL of DI Water and 10 mL of mineral oil. The standard verification vials and Background source were dark adapted for two hours and counted on LSC Green using source standard verification. 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

Angela D. H. 7/30/09
Henry J. Adams 7/20/09
Nancy M. Hart 7/20/09

Radon-222 Liquid

Filename : RN222.XLS
 File type : Excel
 Version # : 1.2.4

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml) : N/A
 Spike Volume Added : N/A
 Spike Date/Time : 7/17/2009 15:00

LCS S/N : 0638-H
 LCS Exp Date : 7/23/2009
 LCS Activity (dpm/ml) : 268.25
 LCS Volume Added : 0.10

Batch : 886194
 Analyst : MLA
 Prep Date : 7/17/2009

Procedure Code : LSC99TCL
 Parmname : Radon-222
 Required MDA : 50
 Half-life of Radon-222 : 3.823 days

Rn-222 Abundance : 1
 Rn-222 Method Uncertainty : 0.0556
 Geometry : 10ML MINERAL OIL/10ML SAMPLE

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

Sample Characteristics			Count raw Data			Background			Sample Decay	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Count Time (min.)	Count Start Date/Time	Sample Decay
1	1201883284.1	1.0000	2.0399E-05	22-2	15	50.3	43.73	15	7/20/2009 11:53	0.594
2	1201883285.1	1.0000	2.0399E-05	22-3	15	50	38.2	15	7/20/2009 12:09	0.592
3	1201883286.1	1.0000	2.0399E-05	22-4	15	49.1	45.4	15	7/20/2009 12:26	0.591

Calibration Data				Backgrounds				Correction Factors			Net Sample Activity for MS pCi/L	
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Rack Position #	Count Start Date/Time	Spike Date/Time	Rn-222 Ingrowth	Rn-222 Count Correction	Net Sample Activity for MS pCi/L	
1	LSCGREEN	3/25/2009	3/31/2010	3.4365	0.00792	22-1	7/20/2009 11:36	7/17/2009 15:00	0.406	0.406	0.406	
2	LSCGREEN	3/25/2009	3/31/2010	3.4365	0.00792	22-1	7/20/2009 11:36	7/17/2009 15:00	0.408	0.408	0.408	
3	LSCGREEN	3/25/2009	3/31/2010	3.4365	0.00792	22-1	7/20/2009 11:36	7/17/2009 15:00	0.409	0.409	0.409	

- Notes:
- 1 - Results are decay corrected to Sample Date/Time
 - 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 - 3 - Spike Nominals are decay corrected to Sample Date/Time

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error pCi/L	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
									Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L						
1	0.8104	0.5722	50	1.2114	12.0246	0.0525	35.8600	1.8619	1.2237	1.8026		LCS			12.0832	99.5%
2	0.8078	0.5703	50	1.2075	10.7393	0.0564	32.1300	1.7939	1.1752	1.6669		LCS			12.0832	88.9%
3	0.8053	0.5685	50	1.2037	12.3477	0.0514	37.0600	1.8833	1.2298	1.8330		LCS			12.0832	102.2%

Radon 222 Que Sheet

07/17/2009

Batch #: 886194 Analyst: MLA First Client Due Date: _____ Internal Due Date: 07/22/2009
 Spike Isotope: Radium-226 Spike Code: C03281 Expiration Date: 7/23/09 Vol: 0.1 Nom Conc: _____
 LCS Isotope: Radium-226 LCS Code: _____ Expiration Date: _____ Vol: _____ Nom Conc: _____
 Prep Date: 7/17/09 Pipet ID: 2971055 Initials: MLA Witness: _____ Comments: _____

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collection Date	Label	Wet/Dry Sample Mass (g/mL)	LSC Rack #	Time Spike Added
1201883284-1	LCS for batch 886194	LCS	50 pCi/L	50 pCi/L	WATER	QC ACCOUNT	15-JUL-09 10:45 AM	1		22-2	
1201883285-1	LCS for batch 886194	LCS	50 pCi/L	50 pCi/L	WATER	QC ACCOUNT	15-JUL-09 10:45 AM	2		22-3	
1201883286-1	LCS for batch 886194	LCS	50 pCi/L	50 pCi/L	WATER	QC ACCOUNT	15-JUL-09 10:45 AM	3		22-4	

Bkg Rack #: 22-1

Comments: _____ Data Reviewed By: _____

ID: RIV-222

20 JUL 2009 11:46

USER: LA COMMENT: GREEN

PRESET TIME: 15.00

DATA CALC :	CPM	H#	: YES	SAMPLE REPEATS :	1	PRINTER	: EDIT
COUNT BLANK :	NO	IC#	: NO	REPLICATES :	1	RS232	: EDIT
T&D PHASE :	NO	ADC	: NO	CYCLE REPEATS :	1	DISK	: OFF
SCINTILLATOR:	LIQUID	LUMEX:	YES	LOW SAMPLE REJ:	0	RWM LIST	: OFF
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:				none	

CHAN: 600.0 - 875.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

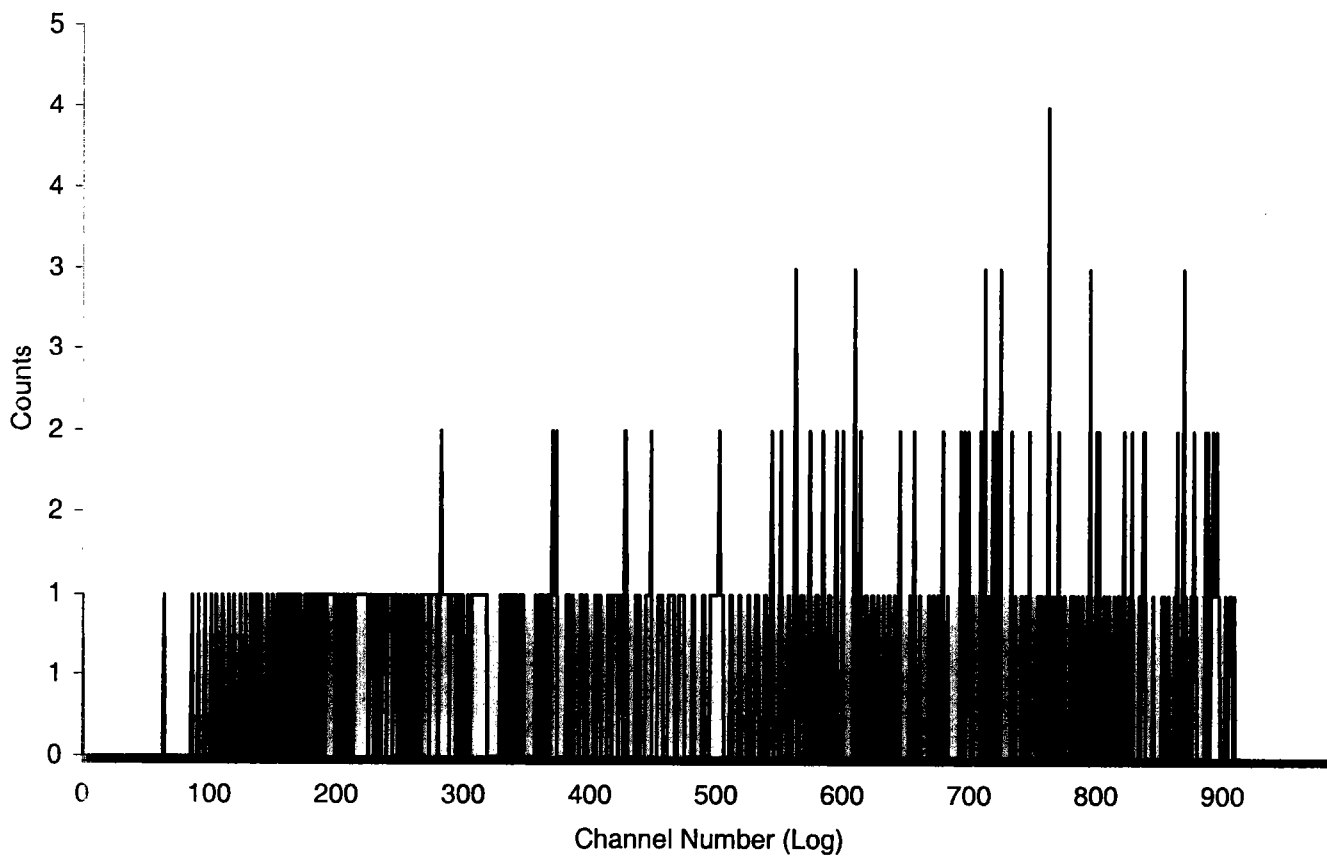
CHAN: 300.0 - 900.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		
1	20-1	15.00	47.9	8.20	18.03	19.13	11.81	0.38	15.92
2	20-2	15.00	50.3	43.73	7.81	60.67	6.63	0.16	32.28
3	20-3	15.00	50.0	38.20	8.36	52.27	7.14	0.17	48.66
4	20-4	15.00	49.1	45.40	7.66	62.93	6.51	0.15	65.03

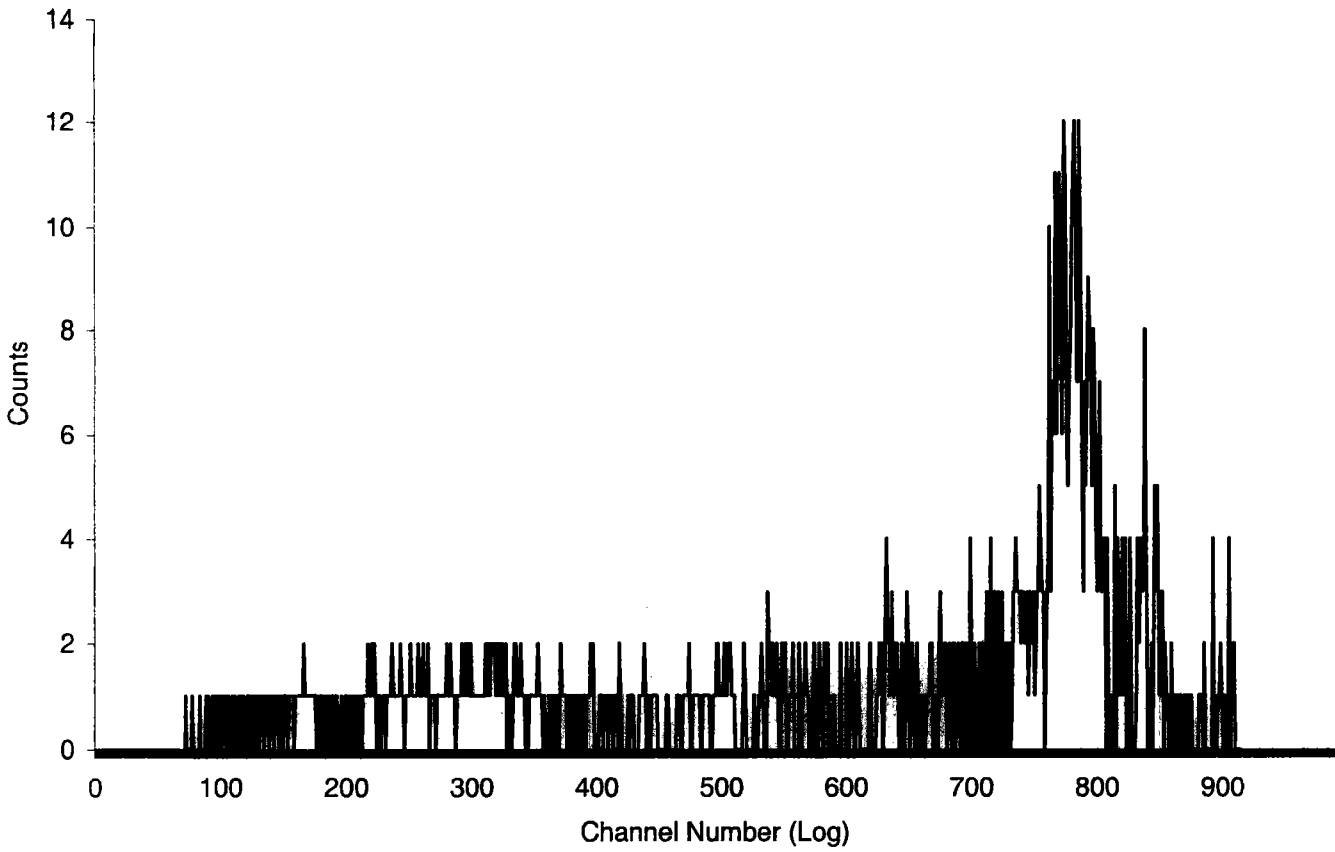
Sample Count Start Time:	20 Jul 2009 11:36:58		
Data Capture Date	20 Jul 2009 11:52:21		
User Filename	S16072022-1B.XLS		
	U16072022-1B.XLS		
Spectrum Type	Log Counts		
User Number	16		
User Id	RN-222		
User Comment	GREEN		
Isotope Name	14C		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	1	22-1	15.00
H#, Total Counts:	47.9	412	
Start, End, X-Axis:	0	990	Channel Number

SPECTRUM PLOT
USER 16 - RN-222



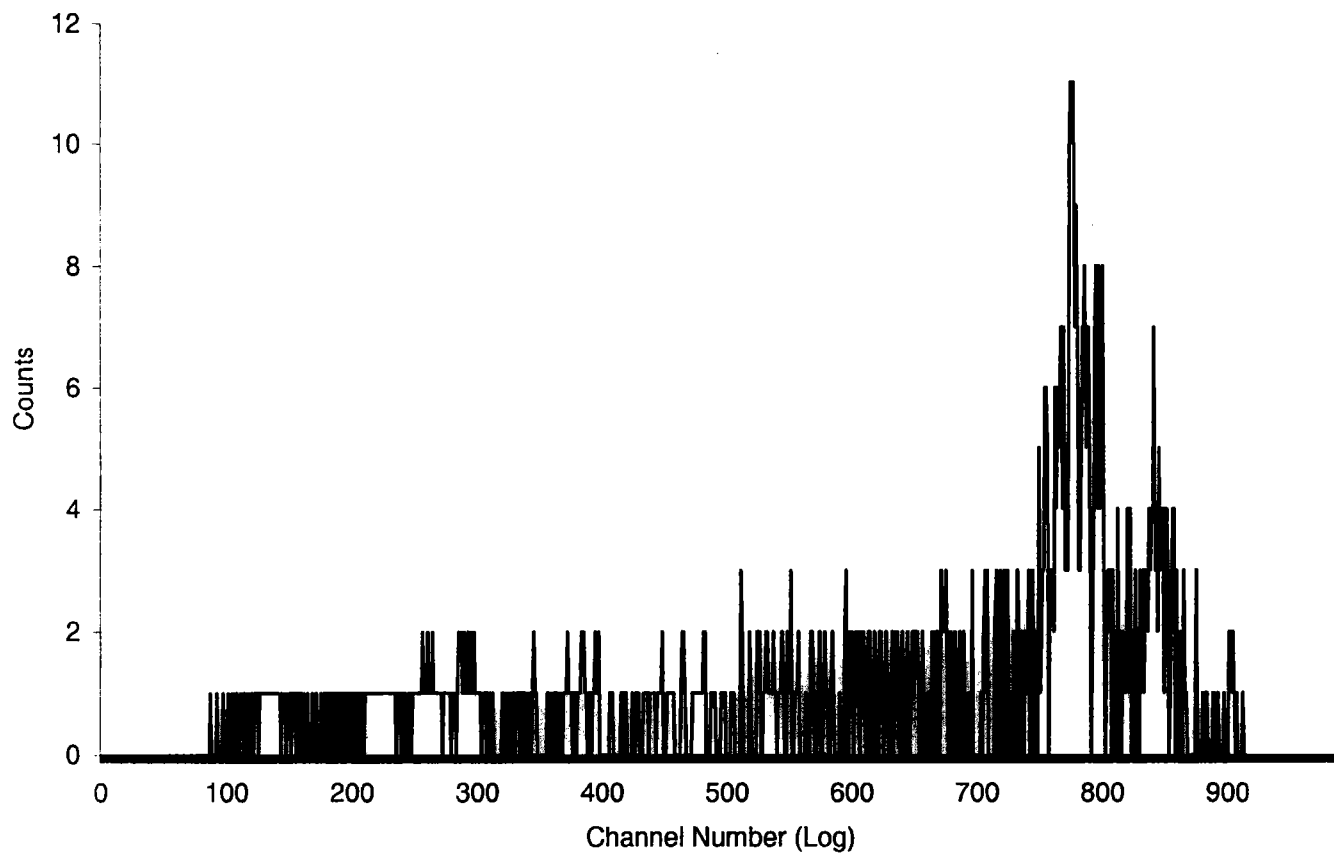
Sample Count Start Time: 20 Jul 2009 11:53:20
Data Capture Date: 20 Jul 2009 12:08:43
User Filename: S16072022-2B.XLS
U16072022-1B.XLS
Spectrum Type: Log Counts
User Number: 16
User Id: RN-222
User Comment: GREEN
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 2 22-2 15.00
H#, Total Counts: 50.3 1100
Start, End, X-Axis: 0 990 Channel Number

SPECTRUM PLOT
USER 16 - RN-222



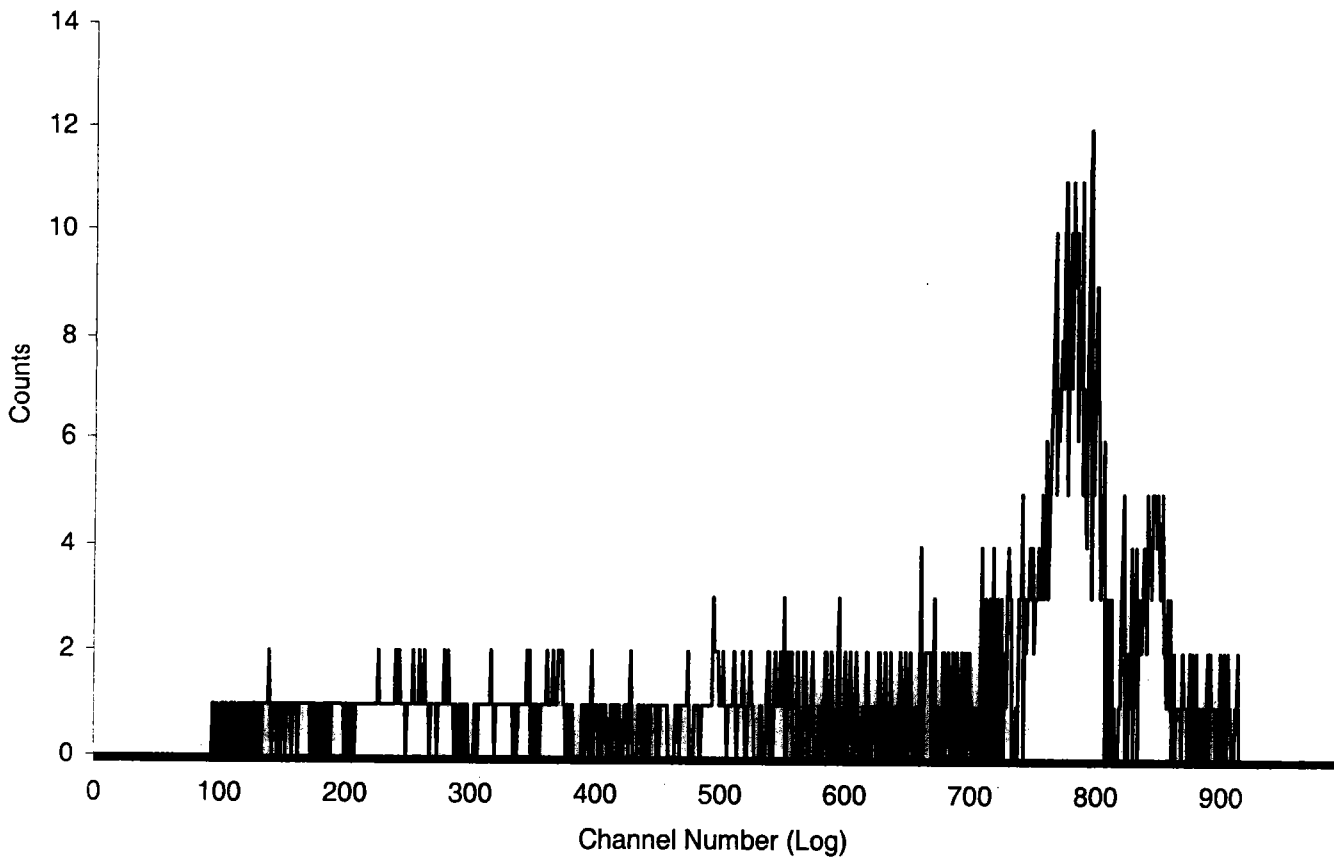
Sample Count Start Time: 20 Jul 2009 12:09:43
Data Capture Date: 20 Jul 2009 12:25:05
User Filename: S16072022-3B.XLS
U16072022-1B.XLS
Spectrum Type: Log Counts
User Number: 16
User Id: RN-222
User Comment: GREEN
Isotope Name: ^{14}C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 3 22-3 15.00
H#, Total Counts: 50.0 956
Start, End, X-Axis: 0 990 Channel Number

SPECTRUM PLOT
USER 16 - RN-222



Sample Count Start Time: 20 Jul 2009 12:26:05
Data Capture Date: 20 Jul 2009 12:41:28
User Filename: S16072022-4B.XLS
U16072022-1B.XLS
Spectrum Type: Log Counts
User Number: 16
User Id: RN-222
User Comment: GREEN
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 4 22-4 15.00
H#, Total Counts: 49.1 1123
Start, End, X-Axis: 0 990 Channel Number

SPECTRUM PLOT
USER 16 - RN-222



GAS FLOW PROPORTIONAL COUNTERS

General Engineering Laboratories

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

Gas Flow Proportional Counter Calibration Package

Method: Ra-228 (LB4100)

	YES	NO	Comments
1) Is all calibration standard information enclosed for: primary standard certificate? secondary 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"/>	Average Efficiency
	<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"/>		
5) Is the method Carrier Standardization included?			n/m

Prepared By: 

Date: 7/2/09

Reviewed By: 

Date: 7/2/09

Effective Date: 7/2/09

Ra-228 Calibration LB4100 Detectors

Detector #	Source #	Seperation date	Count date	Ac-228 decay (dec)	Spike Vol. Ra-228 (mL)	Std. Act. Ra-228 dpm/mL	Standard Nominal dpm	Seperation time		Beta cpm	corrected* cpm	Ra-228 eff (cpm/dpm)
								Decay Corrected	Volume corrected			
								raw beta	ct. time (min)			
A1	1	7/1/09 10:45	7/1/2009 19:45	0.3618	1.5	6363.2	9544.8	14312	7	2044.6	5650.451935	0.5920
A1	2	7/1/09 10:45	7/1/2009 20:23	0.3372	1.5	6363.2	9544.8	13406	7	1915.1	5678.831855	0.5950
A1	3	7/1/09 10:45	7/1/2009 20:14	0.3425	1.5	6363.2	9544.8	13510	7	1930.0	5634.986037	0.5904
A1	4	7/1/09 10:45	7/1/2009 20:06	0.3477	1.5	6363.2	9544.8	13173	7	1881.9	5411.558512	0.5670
A2	1	7/1/09 10:45	7/1/2009 20:06	0.3477	1.5	6363.2	9544.8	13044	7	1863.4	5358.732334	0.5614
A2	2	7/1/09 10:45	7/1/2009 19:45	0.3618	1.5	6363.2	9544.8	13149	7	1878.4	5191.293495	0.5439
A2	3	7/1/09 10:45	7/1/2009 20:23	0.3372	1.5	6363.2	9544.8	12665	7	1809.3	5364.941477	0.5621
A2	4	7/1/09 10:45	7/1/2009 20:14	0.3425	1.5	6363.2	9544.8	12143	7	1734.7	5064.813875	0.5306
A3	1	7/1/09 10:45	7/1/2009 20:14	0.3425	1.5	6363.2	9544.8	13110	7	1872.9	5468.147072	0.5729
A3	2	7/1/09 10:45	7/1/2009 20:06	0.3477	1.5	6363.2	9544.8	12992	7	1856.0	5337.536949	0.5592
A3	3	7/1/09 10:45	7/1/2009 19:45	0.3618	1.5	6363.2	9544.8	13187	7	1883.9	5206.296092	0.5455
A3	4	7/1/09 10:45	7/1/2009 20:23	0.3372	1.5	6363.2	9544.8	12227	7	1748.7	5179.403035	0.5426
A4	1	7/1/09 10:45	7/1/2009 20:23	0.3372	1.5	6363.2	9544.8	0	7	0.0	0	0.0000
A4	2	7/1/09 10:45	7/1/2009 20:14	0.3425	1.5	6363.2	9544.8	0	7	0.0	0	0.0000
A4	3	7/1/09 10:45	7/1/2009 20:06	0.3477	1.5	6363.2	9544.8	1	7	0.1	0.410832585	0.0000
A4	4	7/1/09 10:45	7/1/2009 19:45	0.3618	1.5	6363.2	9544.8	1	7	0.1	0.394805194	0.0000
B1	1	7/1/09 10:45	7/1/2009 20:31	0.3323	1.5	6363.2	9544.8	11346	7	1620.9	4877.864129	0.5110
B1	2	7/1/09 10:45	7/1/2009 20:59	0.3150	1.5	6363.2	9544.8	11955	7.5	1594.0	5060.550375	0.5302
B1	3	7/1/09 10:45	7/1/2009 20:50	0.3206	1.5	6363.2	9544.8	12374	7.5	1649.9	5146.322987	0.5392
B1	4	7/1/09 10:45	7/1/2009 20:39	0.3267	1.5	6363.2	9544.8	11749	7.5	1566.5	4794.329075	0.5023
B2	1	7/1/09 10:45	7/1/2009 20:39	0.3267	1.5	6363.2	9544.8	11855	7.5	1580.7	4837.583725	0.5068
B2	2	7/1/09 10:45	7/1/2009 20:31	0.3323	1.5	6363.2	9544.8	11193	7	1599.0	4811.889177	0.5041
B2	3	7/1/09 10:45	7/1/2009 20:59	0.3150	1.5	6363.2	9544.8	11275	7.5	1503.3	4772.706439	0.5000
B2	4	7/1/09 10:45	7/1/2009 20:50	0.3206	1.5	6363.2	9544.8	11535	7.5	1538.0	4797.384488	0.5026
B3	1	7/1/09 10:45	7/1/2009 20:50	0.3206	1.5	6363.2	9544.8	11857	7.5	1580.9	4931.45819	0.5167
B3	2	7/1/09 10:45	7/1/2009 20:39	0.3267	1.5	6363.2	9544.8	11336	7.5	1511.5	4625.799165	0.4846
B3	3	7/1/09 10:45	7/1/2009 20:31	0.3323	1.5	6363.2	9544.8	10797	7	1542.4	4641.793563	0.4863
B3	4	7/1/09 10:45	7/1/2009 20:59	0.3150	1.5	6363.2	9544.8	10470	7.5	1398.0	4432.088884	0.4643
B4	1	7/1/09 10:45	7/1/2009 20:59	0.3150	1.5	6363.2	9544.8	10999	7.5	1466.5	4656.021551	0.4878
B4	2	7/1/09 10:45	7/1/2009 20:50	0.3206	1.5	6363.2	9544.8	11461	7.5	1528.1	4766.757385	0.4994
B4	3	7/1/09 10:45	7/1/2009 20:40	0.3267	1.5	6363.2	9544.8	11008	7.5	1467.7	4492.095338	0.4706
B4	4	7/1/09 10:45	7/1/2009 20:31	0.3323	1.5	6363.2	9544.8	9783	7	1397.6	4205.991416	0.4407
C1	1	7/1/09 10:45	7/1/2009 21:07	0.3100	1.5	6363.2	9544.8	10578	7.5	1410.4	4549.36662	0.4766
C1	2	7/1/09 10:45	7/1/2009 21:35	0.2944	1.5	6363.2	9544.8	10627	8	1328.4	4511.572327	0.4727
C1	3	7/1/09 10:45	7/1/2009 21:26	0.2993	1.5	6363.2	9544.8	10782	8	1347.8	4503.540516	0.4718
C1	4	7/1/09 10:45	7/1/2009 21:16	0.3051	1.5	6363.2	9544.8	10001	7.5	1333.5	4370.7709	0.4579
C2	1	7/1/09 10:45	7/1/2009 21:16	0.3051	1.5	6363.2	9544.8	12199	7.5	1626.5	5331.370283	0.5586
C2	2	7/1/09 10:45	7/1/2009 21:07	0.3100	1.5	6363.2	9544.8	12229	7.5	1630.5	5259.425637	0.5510
C2	3	7/1/09 10:45	7/1/2009 21:35	0.2944	1.5	6363.2	9544.8	12414	8	1551.8	5270.22291	0.5522
C2	4	7/1/09 10:45	7/1/2009 21:26	0.2993	1.5	6363.2	9544.8	11925	8	1490.6	4981.116994	0.5219
C3	1	7/1/09 10:45	7/1/2009 21:26	0.2993	1.5	6363.2	9544.8	13141	8	1642.6	5489.044731	0.5751
C3	2	7/1/09 10:45	7/1/2009 21:16	0.3051	1.5	6363.2	9544.8	12674	7.5	1689.9	5538.961142	0.5803
C3	3	7/1/09 10:45	7/1/2009 21:07	0.3100	1.5	6363.2	9544.8	12199	7.5	1626.5	5246.687687	0.5497
C3	4	7/1/09 10:45	7/1/2009 21:35	0.2944	1.5	6363.2	9544.8	12044	8	1505.5	5113.303821	0.5357
C4	1	7/1/09 10:45	7/1/2009 21:35	0.2944	1.5	6363.2	9544.8	12658	8	1582.3	5373.978725	0.5630
C4	2	7/1/09 10:45	7/1/2009 21:26	0.2992	1.5	6363.2	9544.8	13120	8	1640.0	5480.44467	0.5742
C4	3	7/1/09 10:45	7/1/2009 21:16	0.3051	1.5	6363.2	9544.8	12240	7.5	1632.0	5349.456266	0.5605
C4	4	7/1/09 10:45	7/1/2009 21:07	0.3100	1.5	6363.2	9544.8	11995	7.5	1599.3	5158.948996	0.5405
D1	1	7/1/09 10:45	7/1/2009 21:46	0.2882	1.5	6363.2	9544.8	13008	8	1626.0	5642.032339	0.5911
D1	2	7/1/09 10:45	7/1/2009 22:19	0.2711	1.5	6363.2	9544.8	10674	7	1524.9	5624.62003	0.5893
D1	3	7/1/09 10:45	7/1/2009 22:09	0.2762	1.5	6363.2	9544.8	10924	7	1560.6	5650.918253	0.5920
D1	4	7/1/09 10:45	7/1/2009 21:58	0.2820	1.5	6363.2	9544.8	10636	7	1519.4	5387.80639	0.5645
D2	1	7/1/09 10:45	7/1/2009 21:58	0.2820	1.5	6363.2	9544.8	12055	7	1722.1	6106.619597	0.6398
D2	2	7/1/09 10:45	7/1/2009 21:46	0.2882	1.5	6363.2	9544.8	14016	8	1752.0	6079.237797	0.6369
D2	3	7/1/09 10:45	7/1/2009 22:19	0.2711	1.5	6363.2	9544.8	11697	7	1671.0	6163.685637	0.6458
D2	4	7/1/09 10:45	7/1/2009 22:09	0.2762	1.5	6363.2	9544.8	11472	7	1638.9	5934.581242	0.6218
D3	1	7/1/09 10:45	7/1/2009 22:09	0.2762	1.5	6363.2	9544.8	12072	7	1724.6	6244.96729	0.6543
D3	2	7/1/09 10:45	7/1/2009 21:58	0.2820	1.5	6363.2	9544.8	12274	7	1753.4	6217.556941	0.6514
D3	3	7/1/09 10:45	7/1/2009 21:46	0.2882	1.5	6363.2	9544.8	13577	8	1697.1	5889.0124	0.6170
D3	4	7/1/09 10:45	7/1/2009 22:19	0.2711	1.5	6363.2	9544.8	11077	7	1582.4	5836.979208	0.6115
D4	1	7/1/09 10:45	7/1/2009 22:19	0.2711	1.5	6363.2	9544.8	11753	7	1679.0	6193.388661	0.6489
D4	2	7/1/09 10:45	7/1/2009 22:09	0.2762	1.5	6363.2	9544.8	12148	7	1735.4	6284.282856	0.6584
D4	3	7/1/09 10:45	7/1/2009 21:58	0.2820	1.5	6363.2	9544.8	12137	7	1733.9	6148.350426	0.6442
D4	4	7/1/09 10:45	7/1/2009 21:46	0.2882	1.5	6363.2	9544.8	13588	8	1698.5	5893.783641	0.6175
E1	1	7/1/09 10:45	7/1/2009 22:47	0.2573	1.5	6363.2	9544.8	11061	8.5	1301.3	5057.676785	0.5299
E1	2	7/1/09 10:45	7/1/2009 23:35	0.2347	1.5	6363.2	9544.8	11891	10	1189.1	5065.999157	0.5308
E1	3	7/1/09 10:45	7/1/2009 23:06	0.2482	1.5	6363.2	9544.8	10686	8.5	1254.8	5055.369515	0.5296
E1	4	7/1/09 10:45	7/1/2009 22:56	0.2528	1.5	6363.2	9544.8	10435	8.5	1227.6	4855.745827	0.5087
E2	1	7/1/09 10:45	7/1/2009 22:56	0.2528	1.5	6363.2	9544.8	11765	8.5	1386.5	5483.944856	0.5745
E2	2	7/1/09 10:45	7/1/2009 22:47	0.2573	1.5	6363.2	9544.8	11972	8.5	1408.5	5474.234379	0.5735
E2	3	7/1/09 10:45	7/1/2009 23:35	0.2347	1.5	6363.2	9544.8	12860	10	1286.0	5479.000128	0.5740
E2	4	7/1/09 10:45	7/1/2009 23:06	0.2482	1.5	6363.2	9544.8	11188	8.5	1316.2	5302.94828	0.5556
E3	1	7/1/09 10:45	7/1/2009 23:06	0.2482	1.5	6363.2	9544.8	10133	8.5	1192.1	4802.893719	0.5032
E3	2	7/1/09 10:45	7/1/2009 22:56	0.2528	1.5	6363.2	9544.8	10161	8.5	1195.4	4728.244691	0.4954
E3	3	7/1/09 10:45	7/1/2009 22:47	0.2573	1.5	6363.2	9544.8	10256	8.5	1206.6	4689.588021	0.4913

E3	4	7/1/09 10:45	7/1/2009 23:35	0.2347	1.5	6363.2	9544.8	10524	10	1052.4	4483.747849	0.4698	0.4899
E4	1	7/1/09 10:45	7/1/2009 23:35	0.2347	1.5	6363.2	9544.8	12442	10	1244.2	5301.077419	0.5554	
E4	2	7/1/09 10:45	7/1/2009 23:06	0.2482	1.5	6363.2	9544.8	11506	8.5	1353.6	5453.675627	0.5714	
E4	3	7/1/09 10:45	7/1/2009 22:56	0.2528	1.5	6363.2	9544.8	11279	8.5	1326.9	5248.651009	0.5499	Average EFF
E4	4	7/1/09 10:45	7/1/2009 22:47	0.2573	1.5	6363.2	9544.8	11203	8.5	1318.0	5122.606726	0.5367	0.5533

*Background is considered negligible

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine
1	1 A1	7	86	14312	7/1/2009 19:45	7/1/2009 19:52	LB4100
2	2 A1	7	80	13406	7/1/2009 20:23	7/1/2009 20:30	LB4100
3	3 A1	7	53	13510	7/1/2009 20:14	7/1/2009 20:21	LB4100
4	4 A1	7	87	13173	7/1/2009 20:06	7/1/2009 20:13	LB4100
1	1 A2	7	91	13044	7/1/2009 20:06	7/1/2009 20:13	LB4100
2	2 A2	7	78	13149	7/1/2009 19:45	7/1/2009 19:52	LB4100
3	3 A2	7	75	12665	7/1/2009 20:23	7/1/2009 20:30	LB4100
4	4 A2	7	107	12143	7/1/2009 20:14	7/1/2009 20:21	LB4100
1	1 A3	7	89	13110	7/1/2009 20:14	7/1/2009 20:21	LB4100
2	2 A3	7	80	12992	7/1/2009 20:06	7/1/2009 20:13	LB4100
3	3 A3	7	82	13187	7/1/2009 19:45	7/1/2009 19:52	LB4100
4	4 A3	7	99	12227	7/1/2009 20:23	7/1/2009 20:30	LB4100
1	1 A4	7	0	0	7/1/2009 20:23	7/1/2009 20:30	LB4100
2	2 A4	7	0	0	7/1/2009 20:14	7/1/2009 20:21	LB4100
3	3 A4	7	0	1	7/1/2009 20:06	7/1/2009 20:13	LB4100
4	4 A4	7	0	1	7/1/2009 19:45	7/1/2009 19:52	LB4100
1	1 B1	7	74	11346	7/1/2009 20:31	7/1/2009 20:38	LB4100
2	2 B1	7.5	97	11955	7/1/2009 20:59	7/1/2009 21:06	LB4100
3	3 B1	7.5	97	12374	7/1/2009 20:50	7/1/2009 20:57	LB4100
4	4 B1	7.5	142	11749	7/1/2009 20:39	7/1/2009 20:47	LB4100
1	1 B2	7.5	90	11855	7/1/2009 20:39	7/1/2009 20:47	LB4100
2	2 B2	7	104	11193	7/1/2009 20:31	7/1/2009 20:38	LB4100
3	3 B2	7.5	72	11275	7/1/2009 20:59	7/1/2009 21:06	LB4100
4	4 B2	7.5	152	11535	7/1/2009 20:50	7/1/2009 20:57	LB4100
1	1 B3	7.5	121	11857	7/1/2009 20:50	7/1/2009 20:57	LB4100
2	2 B3	7.5	94	11336	7/1/2009 20:39	7/1/2009 20:47	LB4100
3	3 B3	7	105	10797	7/1/2009 20:31	7/1/2009 20:38	LB4100
4	4 B3	7.5	150	10470	7/1/2009 20:59	7/1/2009 21:07	LB4100
1	1 B4	7.5	61	10999	7/1/2009 20:59	7/1/2009 21:07	LB4100
2	2 B4	7.5	101	11461	7/1/2009 20:50	7/1/2009 20:57	LB4100
3	3 B4	7.5	80	11008	7/1/2009 20:40	7/1/2009 20:47	LB4100
4	4 B4	7	100	9783	7/1/2009 20:31	7/1/2009 20:38	LB4100
1	1 C1	7.5	86	10578	7/1/2009 21:07	7/1/2009 21:15	LB4100
2	2 C1	8	78	10627	7/1/2009 21:35	7/1/2009 21:43	LB4100
3	3 C1	8	73	10782	7/1/2009 21:26	7/1/2009 21:34	LB4100
4	4 C1	7.5	144	10001	7/1/2009 21:16	7/1/2009 21:23	LB4100
1	1 C2	7.5	77	12199	7/1/2009 21:16	7/1/2009 21:23	LB4100
2	2 C2	7.5	72	12229	7/1/2009 21:07	7/1/2009 21:15	LB4100
3	3 C2	8	68	12414	7/1/2009 21:35	7/1/2009 21:43	LB4100
4	4 C2	8	98	11925	7/1/2009 21:26	7/1/2009 21:34	LB4100
1	1 C3	8	84	13141	7/1/2009 21:26	7/1/2009 21:34	LB4100
2	2 C3	7.5	82	12674	7/1/2009 21:16	7/1/2009 21:23	LB4100
3	3 C3	7.5	96	12199	7/1/2009 21:07	7/1/2009 21:15	LB4100
4	4 C3	8	110	12044	7/1/2009 21:35	7/1/2009 21:43	LB4100
1	1 C4	8	81	12658	7/1/2009 21:35	7/1/2009 21:43	LB4100
2	2 C4	8	101	13120	7/1/2009 21:26	7/1/2009 21:34	LB4100
3	3 C4	7.5	82	12240	7/1/2009 21:16	7/1/2009 21:23	LB4100
4	4 C4	7.5	125	11995	7/1/2009 21:07	7/1/2009 21:15	LB4100
1	1 D1	8	122	13008	7/1/2009 21:46	7/1/2009 21:54	LB4100
2	2 D1	7	94	10674	7/1/2009 22:19	7/1/2009 22:26	LB4100
3	3 D1	7	80	10924	7/1/2009 22:09	7/1/2009 22:16	LB4100
4	4 D1	7	169	10636	7/1/2009 21:58	7/1/2009 22:05	LB4100

1	1 D2	7	87	12055	7/1/2009 21:58	7/1/2009 22:05	LB4100
2	2 D2	8	125	14016	7/1/2009 21:46	7/1/2009 21:54	LB4100
3	3 D2	7	91	11697	7/1/2009 22:19	7/1/2009 22:26	LB4100
4	4 D2	7	139	11472	7/1/2009 22:09	7/1/2009 22:16	LB4100
1	1 D3	7	77	12072	7/1/2009 22:09	7/1/2009 22:16	LB4100
2	2 D3	7	124	12274	7/1/2009 21:58	7/1/2009 22:05	LB4100
3	3 D3	8	111	13577	7/1/2009 21:46	7/1/2009 21:54	LB4100
4	4 D3	7	138	11077	7/1/2009 22:19	7/1/2009 22:26	LB4100
1	1 D4	7	103	11753	7/1/2009 22:19	7/1/2009 22:26	LB4100
2	2 D4	7	113	12148	7/1/2009 22:09	7/1/2009 22:16	LB4100
3	3 D4	7	96	12137	7/1/2009 21:58	7/1/2009 22:05	LB4100
4	4 D4	8	148	13588	7/1/2009 21:46	7/1/2009 21:54	LB4100
1	1 E1	8.5	101	11061	7/1/2009 22:47	7/1/2009 22:55	LB4100
2	2 E1	10	119	11891	7/1/2009 23:35	7/1/2009 23:45	LB4100
3	3 E1	8.5	86	10666	7/1/2009 23:06	7/1/2009 23:14	LB4100
4	4 E1	8.5	136	10435	7/1/2009 22:56	7/1/2009 23:04	LB4100
1	1 E2	8.5	106	11785	7/1/2009 22:56	7/1/2009 23:04	LB4100
2	2 E2	8.5	121	11972	7/1/2009 22:47	7/1/2009 22:55	LB4100
3	3 E2	10	100	12860	7/1/2009 23:35	7/1/2009 23:45	LB4100
4	4 E2	8.5	139	11188	7/1/2009 23:06	7/1/2009 23:14	LB4100
1	1 E3	8.5	127	10133	7/1/2009 23:06	7/1/2009 23:14	LB4100
2	2 E3	8.5	132	10161	7/1/2009 22:56	7/1/2009 23:04	LB4100
3	3 E3	8.5	109	10256	7/1/2009 22:47	7/1/2009 22:55	LB4100
4	4 E3	10	157	10524	7/1/2009 23:35	7/1/2009 23:45	LB4100
1	1 E4	10	129	12442	7/1/2009 23:35	7/1/2009 23:45	LB4100
2	2 E4	8.5	118	11506	7/1/2009 23:06	7/1/2009 23:14	LB4100
3	3 E4	8.5	98	11279	7/1/2009 22:56	7/1/2009 23:04	LB4100
4	4 E4	8.5	123	11203	7/1/2009 22:47	7/1/2009 22:55	LB4100

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.2.3

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

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

Batch : 595514
 Analyst : DXM2
 Prep Date : 6/30/2009

LCS S/N : 0503-B
 LCS Exp Date : 9/13/2009
 LCS Activity (dpm/ml): 182.48
 LCS Volume Added: 2.00

Procedure Code : GFC90SRL
 Pariname : Radium-228
 Required MDA : 3 pCi/L
 Halfife of Ra-228 : 5.75 years
 Halfife of Ac-228 : 6.13 hours
 Batch counted on : LB4100
 BKG Count time : 500 min

Ra-228 Abundance : 1

Ra-228 Method Uncertainty : 0.0784

Tracer S/N : 0112-J
 Tracer Exp Date : 2/17/2010
 Tracer Volume Added: 0.10

Calibration Date : 6/1/2008

Calibration Due Date : 3/1/2009

Sample Characteristics				Tracer Calculations				Tracer Samp.			
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Tracer Concentration (Ba-133 Ref.) (cpm)	Tracer Ref. Count Uncertainty (cpm)	Tracer Concentration (Ba-133 Samp.) (cpm)	Tracer Count Uncertainty (cpm)	Tracer Aliquot (mL)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)	
1	1201245712.1	1.0000	2.0399E-05	229.3	4.13%	231.2	4.11%	0.1	0.000701	0.000701	
2	1201245713.1	1.0000	2.0399E-05	229.3	4.13%	248.1	3.95%	0.1	0.000701	0.000701	
3	1201245714.1	1.0000	2.0399E-05	229.3	4.13%	261.9	3.83%	0.1	0.000701	0.000701	
4	1201245715.1	1.0000	2.0399E-05	229.3	4.13%	276.5	3.71%	0.1	0.000701	0.000701	
5	1201245716.1	1.0000	2.0399E-05	229.3	4.13%	242.7	4.00%	0.1	0.000701	0.000701	
6	1201245717.1	1.0000	2.0399E-05	229.3	4.13%	235.5	4.07%	0.1	0.000701	0.000701	
7	1201245718.1	1.0000	2.0399E-05	229.3	4.13%	258.7	3.85%	0.1	0.000701	0.000701	
8	1201245719.1	1.0000	2.0399E-05	229.3	4.13%	256.6	3.87%	0.1	0.000701	0.000701	
9	1201245720.1	1.0000	2.0399E-05	229.3	4.13%	231.2	4.13%	0.1	0.000701	0.000701	
10	1201245721.1	1.0000	2.0399E-05	229.3	4.13%	248.1	4.13%	0.1	0.000701	0.000701	
11	1201245722.1	1.0000	2.0399E-05	229.3	4.13%	261.9	4.11%	0.1	0.000701	0.000701	
12	1201245723.1	1.0000	2.0399E-05	229.3	4.13%	276.5	4.11%	0.1	0.000701	0.000701	
13	1201245724.1	1.0000	2.0399E-05	229.3	4.13%	242.7	4.11%	0.1	0.000701	0.000701	
14	1201245725.1	1.0000	2.0399E-05	229.3	4.13%	235.5	4.11%	0.1	0.000701	0.000701	
15	1201245726.1	1.0000	2.0399E-05	229.3	4.13%	258.7	4.11%	0.1	0.000701	0.000701	
16	1201245727.1	1.0000	2.0399E-05	229.3	4.13%	256.6	4.11%	0.1	0.000701	0.000701	
17	1201245728.1	1.0000	2.0399E-05	229.3	4.13%	231.2	4.11%	0.1	0.000701	0.000701	
18	1201245729.1	1.0000	2.0399E-05	229.3	4.13%	248.1	4.11%	0.1	0.000701	0.000701	
19	1201245730.1	1.0000	2.0399E-05	229.3	4.13%	261.9	4.11%	0.1	0.000701	0.000701	
20	1201245731.1	1.0000	2.0399E-05	229.3	4.13%	276.5	4.11%	0.1	0.000701	0.000701	

Count raw Data		Counting		Gross Counts		Beta	Detector	Detector	Detector	Weekly Bkg		Count	Ra-228	Ac-228	Ac-228	Calculated	Sample
Pos.	Detector ID	Time (min.)	Alpha	Beta	Beta	cpm	Efficiency (cpm/dpm)	Efficiency Error (cpm/dpm)	cpm	cpm	Time (min.)	Start Date/Time	Decay	Decay	Correction	Sample Recovery %	Recovery Error %
1	A1	15	6	1459	97.267	0.5861	0.01870	1.140	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	100.83%	3.08%	
2	A2	15	17	1307	87.133	0.5495	0.01949	1.114	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	108.20%	3.02%	
3	A3	15	15	1527	101.800	0.5551	0.02780	2.590	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	114.22%	2.99%	
4	A4	15	0	16	1.067	0.0000	0.01530	42.454	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	120.58%	2.95%	
5	B1	15	7	1097	73.133	0.5207	0.01808	1.336	500	7/2/2009 5:40	7/2/2009 11:54	0.999	0.494	1.014	105.84%	3.04%	
6	B2	15	18	1335	89.000	0.5034	0.01942	2.462	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	102.70%	3.06%	
7	B3	15	20	1329	88.600	0.4880	0.01849	1.260	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	112.82%	2.99%	
8	B4	15	9	1187	79.133	0.4746	0.02075	1.002	500	7/2/2009 5:40	7/2/2009 10:39	0.999	0.569	1.014	111.91%	3.00%	
9	C1	15	12	1185	79.000	0.4698	0.01902	1.310	500	7/2/2009 5:40	7/2/2009 10:57	0.999	0.550	1.014	100.83%	3.08%	
10	C2	15	14	1345	89.667	0.5459	0.01220	16.594	500	7/2/2009 5:40	7/2/2009 11:53	0.999	0.495	1.014	108.20%	3.08%	
11	C3	15	10	1504	100.267	0.5602	0.02111	1.088	500	7/2/2009 5:40	7/2/2009 10:57	0.999	0.550	1.014	114.22%	3.08%	
12	C4	15	8	1616	107.733	0.5595	0.02048	2.848	500	7/2/2009 5:40	7/2/2009 10:57	0.999	0.550	1.014	120.58%	3.08%	
13	D1	15	12	1482	98.800	0.5842	0.01320	1.034	500	7/2/2009 5:40	7/2/2009 11:02	0.999	0.545	1.014	105.84%	3.08%	
14	D2	15	11	1609	107.267	0.6361	0.03039	1.404	500	7/2/2009 5:40	7/2/2009 11:02	0.999	0.545	1.014	102.70%	3.08%	
15	D3	15	9	1689	112.600	0.6336	0.07231	0.950	500	7/2/2009 5:40	7/2/2009 11:02	0.999	0.545	1.014	112.82%	3.08%	
16	D4	15	26	1662	110.800	0.6422	0.05596	2.518	500	7/2/2009 5:40	7/2/2009 11:02	0.999	0.545	1.014	111.91%	3.08%	
17	E1	15	16	1210	80.667	0.5248	0.02284	1.590	500	7/2/2009 5:40	7/2/2009 11:18	0.999	0.529	1.014	100.83%	3.08%	
18	E2	15	19	1768	117.867	0.5694	0.02185	1.000	500	7/2/2009 5:40	7/2/2009 11:18	0.999	0.529	1.014	108.20%	3.08%	
19	E3	15	14	1169	77.933	0.4899	0.05054	2.006	500	7/2/2009 5:40	7/2/2009 11:18	0.999	0.529	1.014	114.22%	3.08%	
20	E4	15	14	1547	103.133	0.5533	0.04966	0.914	500	7/2/2009 5:40	7/2/2009 11:18	0.999	0.529	1.014	120.58%	3.08%	

- Notes:
 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

* indicates results calculated at 100% recovery

Pos.	Decision Level		Critical Level	Required MDA	MDA	Sample Act. Conc.	Sample Act. Error	Net Count Rate	Net Count Rate Error	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
	pCi/L	pCi/L								Counting Uncertainty	Total Prop. Uncertainty						
1	*	0.8939	0.6311	3	1.5364	131.8069	0.0447	96.1267	2.5469	6.8448	23.3157		LCS			164.3951	80.2%
2	*	0.9424	0.6654	3	1.6232	125.7965	0.0456	86.0193	2.4106	6.9097	22.3632		LCS			164.3951	76.5%
3	*	1.4227	1.0045	3	2.2985	143.6471	0.0485	99.2100	2.6061	7.3959	25.9585		LCS			164.3951	87.4%
4	*	#####	#####	3	#####	-1576311.1110	0.0346	-41.3873	0.3950	29486.2445	29489.2890		LCS			164.3951	#####
5	*	1.2556	0.8865	3	2.1288	127.7429	0.0469	71.7973	2.2087	7.7022	22.8713		LCS			164.3951	77.7%
6	*	1.5294	1.0798	3	2.4788	138.1498	0.0459	86.5380	2.4369	7.6248	24.6025		LCS			164.3951	84.0%
7	*	1.1287	0.7968	3	1.9230	143.8337	0.0449	87.3400	2.4309	7.8463	25.4633		LCS			164.3951	87.5%
8	*	1.0349	0.7306	3	1.8000	132.3002	0.0468	78.1313	2.2873	7.6244	23.6819		LCS			164.3951	80.5%
9	*	1.2369	0.8732	3	2.1004	137.5054	0.0468	77.6900	2.2955	7.9632	24.6016		LCS			164.3951	83.6%
10	*	4.2094	2.9719	3	6.2823	123.6725	0.0472	73.0727	2.4517	8.1329	22.1796		LCS			164.3951	75.2%
11	*	0.9453	0.6674	3	1.6316	147.2054	0.0455	99.1787	2.5859	7.5225	26.1588		LCS			164.3951	89.5%
12	*	1.5312	1.0810	3	2.4593	155.8638	0.0449	104.8853	2.6810	7.8089	27.6066		LCS			164.3951	94.8%
13	*	0.8917	0.6296	3	1.5464	140.4184	0.0426	97.7660	2.5669	7.2259	24.5506		LCS			164.3951	85.4%
14	*	0.9544	0.6738	3	1.6115	139.6581	0.0501	105.8627	2.6747	6.9159	25.4660		LCS			164.3951	85.0%
15	*	0.7882	0.5565	3	1.3779	147.8798	0.0823	111.6500	2.7402	7.1135	32.9508		LCS			164.3951	90.0%
16	*	1.2659	0.8937	3	2.0488	141.4812	0.0686	108.2820	2.7188	6.9626	28.8924		LCS			164.3951	86.1%
17	*	1.2685	0.8955	3	2.1206	130.2858	0.0483	79.0767	2.3197	7.4909	23.5097		LCS			164.3951	79.3%
18	*	0.9270	0.6545	3	1.6127	177.4443	0.0447	116.8667	2.8035	8.3432	31.3906		LCS			164.3951	107.9%
19	*	1.5261	1.0774	3	2.5078	133.9943	0.0664	75.9273	2.2803	7.8873	26.9746		LCS			164.3951	81.5%
20	*	0.9121	0.6439	3	1.6004	159.7213	0.0638	102.2193	2.6225	8.0315	31.6443		LCS			164.3951	97.2%

* Detector AH will not be used during this calibration cycle. SGL 7/2/09

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Total Counts	Count Start Time	Count End Time	Machine
1	A1	15	6	1459		7/2/2009 10:39	7/2/2009 10:54	LB4100
2	A2	15	17	1307		7/2/2009 10:39	7/2/2009 10:54	LB4100
3	A3	15	15	1527		7/2/2009 10:39	7/2/2009 10:54	LB4100
4	A4	15	0	16		7/2/2009 10:39	7/2/2009 10:54	LB4100
1	B1	15	7	1097		7/2/2009 11:54	7/2/2009 12:09	LB4100
6	B2	15	18	1335		7/2/2009 10:39	7/2/2009 10:54	LB4100
7	B3	15	20	1329		7/2/2009 10:39	7/2/2009 10:54	LB4100
8	B4	15	9	1187		7/2/2009 10:39	7/2/2009 10:54	LB4100
1	C1	15	12	1185		7/2/2009 10:57	7/2/2009 11:12	LB4100
2	C2	15	14	1345		7/2/2009 11:53	7/2/2009 12:08	LB4100
3	C3	15	10	1504		7/2/2009 10:57	7/2/2009 11:12	LB4100
4	C4	15	8	1616		7/2/2009 10:57	7/2/2009 11:12	LB4100
5	D1	15	12	1482		7/2/2009 11:02	7/2/2009 11:17	LB4100
6	D2	15	11	1609		7/2/2009 11:02	7/2/2009 11:17	LB4100
7	D3	15	9	1689		7/2/2009 11:02	7/2/2009 11:17	LB4100
8	D4	15	26	1662		7/2/2009 11:02	7/2/2009 11:17	LB4100
1	E1	15	16	1210		7/2/2009 11:18	7/2/2009 11:33	LB4100
2	E2	15	19	1768		7/2/2009 11:18	7/2/2009 11:33	LB4100
3	E3	15	14	1169		7/2/2009 11:18	7/2/2009 11:33	LB4100
4	E4	15	14	1547		7/2/2009 11:18	7/2/2009 11:33	LB4100

Ra-228	Cal Date	7/2/2009	Exp Date	7/31/2009	
LB4100	A0	A1	A2	A3	A4
A1	5.86074E-01				
A2	5.49508E-01				
A3	5.55050E-01				
A4	2.11015E-05				
B1	5.20673E-01				
B2	5.03404E-01				
B3	4.87992E-01				
B4	4.74627E-01				
C1	4.69765E-01				
C2	5.45903E-01				
C3	5.60200E-01				
C4	5.59541E-01				
D1	5.84229E-01				
D2	6.36056E-01				
D3	6.33552E-01				
D4	6.42229E-01				
E1	5.24757E-01				
E2	5.69423E-01				
E3	4.89913E-01				
E4	5.53338E-01				
F1					
F2					
F3					
F4					
G1					
G2					
G3					
G4					
H1					
H2					
H3					
H4					

Plateau Raw Data

Detector #	Sample I.D.	Pgm time (min)	Total (counts)	Voltage	%slope/100V	Date/Time
A1	Sr-90'	0.11	1	750	1.2	7/1/2009 15:09
A1	Sr-90'	0.12	1	780	2.2	7/1/2009 15:09
A1	Sr-90'	0.5	71	810	3.6	7/1/2009 15:10
A1	Sr-90'	0.5	197	840	6.3	7/1/2009 15:11
A1	Sr-90'	0.5	436	870	9.1	7/1/2009 15:11
A1	Sr-90'	0.5	768	900	11.7	7/1/2009 15:12
A1	Sr-90'	0.5	1146	930	14.3	7/1/2009 15:12
A1	Sr-90'	0.5	1601	960	17.2	7/1/2009 15:13
A1	Sr-90'	0.5	2167	990	20.3	7/1/2009 15:14
A1	Sr-90'	0.5	2839	1020	23.6	7/1/2009 15:14
A1	Sr-90'	0.5	3575	1050	27.3	7/1/2009 15:15
A1	Sr-90'	0.5	4430	1080	33.0	7/1/2009 15:16
A1	Sr-90'	0.5	5461	1110	38.9	7/1/2009 15:16
A1	Sr-90'	0.5	6850	1140	44.3	7/1/2009 15:17
A1	Sr-90'	0.5	8198	1170	46.9	7/1/2009 15:18
A1	Sr-90'	0.5	9713	1200	44.5	7/1/2009 15:18
A1	Sr-90'	0.5	11070	1230	40.2	7/1/2009 15:19
A1	Sr-90'	0.5	12096	1260	32.3	7/1/2009 15:20
A1	Sr-90'	0.5	13036	1290	23.4	7/1/2009 15:20
A1	Sr-90'	0.5	13569	1320	14.3	7/1/2009 15:21
A1	Sr-90'	0.5	13839	1350	7.0	7/1/2009 15:21
A1	Sr-90'	0.5	13834	1380	5.3	7/1/2009 15:22
A1	Sr-90'	0.5	13947	1410	3.7	7/1/2009 15:23
A1	Sr-90'	0.5	14310	1440	4.9	7/1/2009 15:23
A1	Sr-90'	0.5	14159	1470	1.6	7/1/2009 15:24
A1	Sr-90'	0.5	14463	1500	-0.7	7/1/2009 15:25
A1	Sr-90'	0.5	14107	1530	0.8	7/1/2009 15:25
A1	Sr-90'	0.5	14237	1560	-1.5	7/1/2009 15:53
A1	Sr-90'	0.5	14392	1590	0.1	7/1/2009 15:53
A1	Sr-90'	0.5	14095	1620	16.5	7/1/2009 15:54
A1	Sr-90'	0.5	14197	1650	16.6	7/1/2009 15:55
A2	Sr-90'	0.11	5	750	16.4	7/1/2009 15:09
A2	Sr-90'	0.5	52	780	16.3	7/1/2009 15:09
A2	Sr-90'	0.5	164	810	5.3	7/1/2009 15:10
A2	Sr-90'	0.5	362	840	8.4	7/1/2009 15:11
A2	Sr-90'	0.5	643	870	11.5	7/1/2009 15:11
A2	Sr-90'	0.5	1065	900	15.3	7/1/2009 15:12
A2	Sr-90'	0.5	1537	930	19.4	7/1/2009 15:12
A2	Sr-90'	0.5	2206	960	23.9	7/1/2009 15:13
A2	Sr-90'	0.5	2982	990	29.1	7/1/2009 15:14
A2	Sr-90'	0.5	3922	1020	32.4	7/1/2009 15:14
A2	Sr-90'	0.5	5045	1050	38.2	7/1/2009 15:15
A2	Sr-90'	0.5	6034	1080	44.5	7/1/2009 15:16
A2	Sr-90'	0.5	7649	1110	49.6	7/1/2009 15:16
A2	Sr-90'	0.5	9297	1140	57.5	7/1/2009 15:17
A2	Sr-90'	0.5	10846	1170	55.5	7/1/2009 15:18
A2	Sr-90'	0.5	13066	1200	52.9	7/1/2009 15:18
A2	Sr-90'	0.5	14085	1230	46.3	7/1/2009 15:19
A2	Sr-90'	0.5	15618	1260	35.4	7/1/2009 15:20
A2	Sr-90'	0.5	16518	1290	29.3	7/1/2009 15:20
A2	Sr-90'	0.5	17153	1320	18.3	7/1/2009 15:21
A2	Sr-90'	0.5	17712	1350	9.3	7/1/2009 15:21
A2	Sr-90'	0.5	17772	1380	1.8	7/1/2009 15:22
A2	Sr-90'	0.5	17602	1410	-1.3	7/1/2009 15:23
A2	Sr-90'	0.5	17483	1440	-1.1	7/1/2009 15:23
A2	Sr-90'	0.5	17666	1470	1.0	7/1/2009 15:24
A2	Sr-90'	0.5	17571	1500	2.6	7/1/2009 15:25
A2	Sr-90'	0.5	17710	1530	2.0	7/1/2009 15:25
A2	Sr-90'	0.5	17851	1560	1.0	7/1/2009 15:53
A2	Sr-90'	0.5	17830	1590	-1.5	7/1/2009 15:53

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A2	Sr-90'	0.5	17655	1620	20.6	7/1/2009 15:54
A2	Sr-90'	0.5	17586	1650	20.6	7/1/2009 15:55
A3	Sr-90'	0.12	2	750	20.5	7/1/2009 15:09
A3	Sr-90'	0.11	10	780	20.3	7/1/2009 15:09
A3	Sr-90'	0.5	158	810	6.3	7/1/2009 15:10
A3	Sr-90'	0.5	412	840	9.8	7/1/2009 15:11
A3	Sr-90'	0.5	752	870	13.1	7/1/2009 15:11
A3	Sr-90'	0.5	1186	900	16.1	7/1/2009 15:12
A3	Sr-90'	0.5	1743	930	20.3	7/1/2009 15:12
A3	Sr-90'	0.5	2332	960	24.4	7/1/2009 15:13
A3	Sr-90'	0.5	3228	990	28.2	7/1/2009 15:14
A3	Sr-90'	0.5	4102	1020	33.6	7/1/2009 15:14
A3	Sr-90'	0.5	5082	1050	38.9	7/1/2009 15:15
A3	Sr-90'	0.5	6439	1080	47.4	7/1/2009 15:16
A3	Sr-90'	0.5	7892	1110	54.0	7/1/2009 15:16
A3	Sr-90'	0.5	9804	1140	56.5	7/1/2009 15:17
A3	Sr-90'	0.5	11495	1170	55.1	7/1/2009 15:18
A3	Sr-90'	0.5	13109	1200	49.0	7/1/2009 15:18
A3	Sr-90'	0.5	14504	1230	41.8	7/1/2009 15:19
A3	Sr-90'	0.5	15649	1260	31.8	7/1/2009 15:20
A3	Sr-90'	0.5	16497	1290	21.3	7/1/2009 15:20
A3	Sr-90'	0.5	16882	1320	11.8	7/1/2009 15:21
A3	Sr-90'	0.5	17082	1350	6.1	7/1/2009 15:21
A3	Sr-90'	0.5	17120	1380	5.1	7/1/2009 15:22
A3	Sr-90'	0.5	17292	1410	4.4	7/1/2009 15:23
A3	Sr-90'	0.5	17541	1440	3.6	7/1/2009 15:23
A3	Sr-90'	0.5	17524	1470	1.1	7/1/2009 15:24
A3	Sr-90'	0.5	17542	1500	-0.5	7/1/2009 15:25
A3	Sr-90'	0.5	17462	1530	-0.2	7/1/2009 15:25
A3	Sr-90'	0.5	17501	1560	-0.4	7/1/2009 15:53
A3	Sr-90'	0.5	17517	1590	0.0	7/1/2009 15:53
A3	Sr-90'	0.5	17449	1620	-0.4	7/1/2009 15:54
A3	Sr-90'	0.5	17488	1650	-0.5	7/1/2009 15:55
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A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:10
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:11
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:11
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:12
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:12
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:13
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:14
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:14
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:15
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:16
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:16
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:17
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:18
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:18
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:19
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:20
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:20
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:21
A4	Sr-90'	0.11	0		#DIV/0!	7/1/2009 15:21
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:22
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:23
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:23
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:24
A4	Sr-90'	0.13	0		#DIV/0!	7/1/2009 15:25
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:25
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:26
A4	Sr-90'	0.12	0		#DIV/0!	7/1/2009 15:53

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A4	Sr-90'	0.12	0			7/1/2009 15:54
A4	Sr-90'	0.12	0			7/1/2009 15:55
B1	Sr-90'	0.11	2	750	0.1	7/1/2009 15:09
B1	Sr-90'	0.12	5	780	1.2	7/1/2009 15:09
B1	Sr-90'	0.5	74	810	2.8	7/1/2009 15:10
B1	Sr-90'	0.5	259	840	4.9	7/1/2009 15:10
B1	Sr-90'	0.5	604	870	8.8	7/1/2009 15:10
B1	Sr-90'	0.5	1066	900	12.3	7/1/2009 15:11
B1	Sr-90'	0.5	1521	930	16.1	7/1/2009 15:12
B1	Sr-90'	0.5	2215	960	20.5	7/1/2009 15:12
B1	Sr-90'	0.5	3106	990	24.7	7/1/2009 15:13
B1	Sr-90'	0.5	3985	1020	29.4	7/1/2009 15:14
B1	Sr-90'	0.5	5047	1050	34.3	7/1/2009 15:14
B1	Sr-90'	0.5	6386	1080	39.2	7/1/2009 15:15
B1	Sr-90'	0.5	7782	1110	46.0	7/1/2009 15:16
B1	Sr-90'	0.5	9521	1140	53.3	7/1/2009 15:16
B1	Sr-90'	0.5	11467	1170	58.8	7/1/2009 15:17
B1	Sr-90'	0.5	13368	1200	61.3	7/1/2009 15:18
B1	Sr-90'	0.5	15059	1230	60.4	7/1/2009 15:18
B1	Sr-90'	0.5	16782	1260	52.4	7/1/2009 15:19
B1	Sr-90'	0.5	17615	1290	40.4	7/1/2009 15:20
B1	Sr-90'	0.5	18143	1320	27.3	7/1/2009 15:20
B1	Sr-90'	0.5	18471	1350	17.5	7/1/2009 15:21
B1	Sr-90'	0.5	18973	1380	17.1	7/1/2009 15:22
B1	Sr-90'	0.5	19758	1410	14.4	7/1/2009 15:22
B1	Sr-90'	0.5	19657	1440	12.4	7/1/2009 15:23
B1	Sr-90'	0.5	19984	1470	11.1	7/1/2009 15:24
B1	Sr-90'	0.49	20518	1500	5.9	7/1/2009 15:25
B1	Sr-90'	0.47	20211	1530	4.2	7/1/2009 15:26
B1	Sr-90'	0.43	20172	1560	1.5	7/1/2009 15:54
B1	Sr-90'	0.41	20383	1590	0.2	7/1/2009 15:55
B1	Sr-90'	0.4	20465	1620	1.5	7/1/2009 15:57
B1	Sr-90'	0.39	20290	1650		7/1/2009 15:58
B2	Sr-90'	0.11	0	750		7/1/2009 16:00
B2	Sr-90'	0.11	9	780		7/1/2009 15:09
B2	Sr-90'	0.5	109	810	5.8	7/1/2009 15:09
B2	Sr-90'	0.5	325	840	5.8	7/1/2009 15:10
B2	Sr-90'	0.5	717	870	9.8	7/1/2009 15:10
B2	Sr-90'	0.5	1181	900	13.6	7/1/2009 15:11
B2	Sr-90'	0.5	1714	930	17.1	7/1/2009 15:12
B2	Sr-90'	0.5	2393	960	21.6	7/1/2009 15:12
B2	Sr-90'	0.5	3345	990	26.7	7/1/2009 15:13
B2	Sr-90'	0.5	4370	1020	34.1	7/1/2009 15:14
B2	Sr-90'	0.5	5845	1050	41.0	7/1/2009 15:14
B2	Sr-90'	0.5	7288	1080	47.3	7/1/2009 15:15
B2	Sr-90'	0.5	8981	1110	53.3	7/1/2009 15:16
B2	Sr-90'	0.5	10794	1140	59.1	7/1/2009 15:16
B2	Sr-90'	0.5	12959	1170	66.4	7/1/2009 15:17
B2	Sr-90'	0.5	15256	1200	70.8	7/1/2009 15:18
B2	Sr-90'	0.5	17372	1230	68.7	7/1/2009 15:18
B2	Sr-90'	0.5	18895	1260	55.6	7/1/2009 15:19
B2	Sr-90'	0.5	19482	1290	39.3	7/1/2009 15:20
B2	Sr-90'	0.5	20099	1320	27.6	7/1/2009 15:20
B2	Sr-90'	0.49	20913	1350	15.3	7/1/2009 15:21
B2	Sr-90'	0.5	20913	1350	7.7	7/1/2009 15:22
B2	Sr-90'	0.48	20468	1380	0.8	7/1/2009 15:22
B2	Sr-90'	0.46	20449	1410	-1.9	7/1/2009 15:23
B2	Sr-90'	0.46	20458	1440	1.9	7/1/2009 15:24
B2	Sr-90'	0.45	20631	1470	-0.2	7/1/2009 15:25
B2	Sr-90'	0.43	20659	1500	-0.4	7/1/2009 15:26
B2	Sr-90'	0.4	20326	1530	-4.0	7/1/2009 15:54
B2	Sr-90'	0.37	20546	1560	-1.6	7/1/2009 15:55
B2	Sr-90'	0.35	20090	1590	1.1	7/1/2009 15:57

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B2	Sr-90'	0.34	20530	1620		7/1/2009 15:58
B2	Sr-90'	0.33	20505	1650		7/1/2009 16:00
B3	Sr-90'	0.16	4	750		7/1/2009 15:09
B3	Sr-90'	0.11	7	780		7/1/2009 15:09
B3	Sr-90'	0.5	123	810	5.1	7/1/2009 15:10
B3	Sr-90'	0.5	351	840	8.9	7/1/2009 15:10
B3	Sr-90'	0.5	602	870	12.1	7/1/2009 15:11
B3	Sr-90'	0.5	1104	900	16.3	7/1/2009 15:12
B3	Sr-90'	0.5	1561	930	20.0	7/1/2009 15:12
B3	Sr-90'	0.5	2320	960	23.4	7/1/2009 15:13
B3	Sr-90'	0.5	3001	990	28.5	7/1/2009 15:14
B3	Sr-90'	0.5	3889	1020	32.8	7/1/2009 15:14
B3	Sr-90'	0.5	5051	1050	39.8	7/1/2009 15:15
B3	Sr-90'	0.5	6217	1080	46.0	7/1/2009 15:16
B3	Sr-90'	0.5	7803	1110	53.0	7/1/2009 15:16
B3	Sr-90'	0.5	9410	1140	58.7	7/1/2009 15:17
B3	Sr-90'	0.5	11403	1170	61.2	7/1/2009 15:18
B3	Sr-90'	0.5	13228	1200	58.5	7/1/2009 15:18
B3	Sr-90'	0.5	15074	1230	47.7	7/1/2009 15:19
B3	Sr-90'	0.5	16346	1260	34.9	7/1/2009 15:20
B3	Sr-90'	0.5	17002	1290	21.9	7/1/2009 15:20
B3	Sr-90'	0.5	17498	1320	17.0	7/1/2009 15:21
B3	Sr-90'	0.5	17784	1350	19.0	7/1/2009 15:22
B3	Sr-90'	0.5	18505	1380	19.3	7/1/2009 15:22
B3	Sr-90'	0.5	19344	1410	19.5	7/1/2009 15:23
B3	Sr-90'	0.5	19614	1440	14.7	7/1/2009 15:24
B3	Sr-90'	0.5	20160	1470	8.1	7/1/2009 15:25
B3	Sr-90'	0.49	20302	1500	4.3	7/1/2009 15:26
B3	Sr-90'	0.46	20220	1530	0.7	7/1/2009 15:54
B3	Sr-90'	0.42	20225	1560	1.2	7/1/2009 15:55
B3	Sr-90'	0.4	20304	1590	1.4	7/1/2009 15:57
B3	Sr-90'	0.39	20442	1620		7/1/2009 15:58
B3	Sr-90'	0.38	20327	1650		7/1/2009 16:00
B4	Sr-90'	0.12	0	750		7/1/2009 15:09
B4	Sr-90'	0.11	6	780		7/1/2009 15:09
B4	Sr-90'	0.5	96	810	5.1	7/1/2009 15:10
B4	Sr-90'	0.5	302	840	8.3	7/1/2009 15:10
B4	Sr-90'	0.5	616	870	11.7	7/1/2009 15:11
B4	Sr-90'	0.5	992	900	15.1	7/1/2009 15:12
B4	Sr-90'	0.5	1511	930	18.6	7/1/2009 15:12
B4	Sr-90'	0.5	2118	960	22.1	7/1/2009 15:13
B4	Sr-90'	0.5	2837	990	26.1	7/1/2009 15:14
B4	Sr-90'	0.5	3650	1020	32.3	7/1/2009 15:14
B4	Sr-90'	0.5	4667	1050	38.3	7/1/2009 15:15
B4	Sr-90'	0.5	6052	1080	44.6	7/1/2009 15:16
B4	Sr-90'	0.5	7378	1110	51.6	7/1/2009 15:16
B4	Sr-90'	0.5	8977	1140	54.8	7/1/2009 15:17
B4	Sr-90'	0.5	10948	1170	57.4	7/1/2009 15:18
B4	Sr-90'	0.5	12490	1200	54.0	7/1/2009 15:18
B4	Sr-90'	0.5	14225	1230	42.7	7/1/2009 15:19
B4	Sr-90'	0.5	15436	1260	31.5	7/1/2009 15:20
B4	Sr-90'	0.5	15887	1290	20.5	7/1/2009 15:20
B4	Sr-90'	0.5	16380	1320	16.2	7/1/2009 15:21
B4	Sr-90'	0.5	16833	1350	18.5	7/1/2009 15:22
B4	Sr-90'	0.5	17391	1380	17.3	7/1/2009 15:22
B4	Sr-90'	0.5	18163	1410	16.2	7/1/2009 15:23
B4	Sr-90'	0.5	18306	1440	15.9	7/1/2009 15:24
B4	Sr-90'	0.5	18799	1470	17.1	7/1/2009 15:25
B4	Sr-90'	0.5	19464	1500	16.9	7/1/2009 15:53
B4	Sr-90'	0.48	20148	1530	13.5	7/1/2009 15:54
B4	Sr-90'	0.45	20170	1560	7.4	7/1/2009 15:55
B4	Sr-90'	0.43	20474	1590	1.8	7/1/2009 15:57

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B4	Sr-90'	0.42	20404	1620	23.6	7/1/2009 15:58
B4	Sr-90'	0.4	20306	1650	23.8	7/1/2009 16:00
C1	Sr-90'	0.11	3	750	23.7	7/1/2009 15:09
C1	Sr-90'	0.12	8	780	23.5	7/1/2009 15:09
C1	Sr-90'	0.5	135	810	5.9	7/1/2009 15:10
C1	Sr-90'	0.5	353	840	9.2	7/1/2009 15:10
C1	Sr-90'	0.5	711	870	12.0	7/1/2009 15:11
C1	Sr-90'	0.5	1103	900	14.8	7/1/2009 15:11
C1	Sr-90'	0.5	1565	930	18.4	7/1/2009 15:12
C1	Sr-90'	0.5	2153	960	22.0	7/1/2009 15:13
C1	Sr-90'	0.5	2943	990	26.8	7/1/2009 15:13
C1	Sr-90'	0.5	3707	1020	31.9	7/1/2009 15:14
C1	Sr-90'	0.5	4809	1050	37.8	7/1/2009 15:15
C1	Sr-90'	0.5	6002	1080	44.8	7/1/2009 15:15
C1	Sr-90'	0.5	7464	1110	49.4	7/1/2009 15:16
C1	Sr-90'	0.5	9096	1140	54.5	7/1/2009 15:16
C1	Sr-90'	0.5	10669	1170	56.4	7/1/2009 15:17
C1	Sr-90'	0.5	12567	1200	51.0	7/1/2009 15:18
C1	Sr-90'	0.5	14181	1230	44.2	7/1/2009 15:18
C1	Sr-90'	0.5	14993	1260	33.0	7/1/2009 15:19
C1	Sr-90'	0.5	16093	1290	22.2	7/1/2009 15:20
C1	Sr-90'	0.5	16566	1320	14.2	7/1/2009 15:20
C1	Sr-90'	0.5	16722	1350	6.5	7/1/2009 15:21
C1	Sr-90'	0.5	16806	1380	5.5	7/1/2009 15:22
C1	Sr-90'	0.5	16948	1410	4.8	7/1/2009 15:22
C1	Sr-90'	0.5	17275	1440	1.1	7/1/2009 15:23
C1	Sr-90'	0.5	17203	1470	-0.4	7/1/2009 15:23
C1	Sr-90'	0.5	16846	1500	-1.1	7/1/2009 15:24
C1	Sr-90'	0.5	17103	1530	-1.1	7/1/2009 15:25
C1	Sr-90'	0.5	17160	1560	0.7	7/1/2009 15:25
C1	Sr-90'	0.5	16887	1590	-1.3	7/1/2009 15:26
C1	Sr-90'	0.5	17065	1620		7/1/2009 15:27
C1	Sr-90'	0.5	16958	1650		7/1/2009 15:27
C2	Sr-90'	0.11	0	750		7/1/2009 15:09
C2	Sr-90'	0.12	1	780		7/1/2009 15:09
C2	Sr-90'	0.5	47	810	3.2	7/1/2009 15:10
C2	Sr-90'	0.5	176	840	5.8	7/1/2009 15:10
C2	Sr-90'	0.5	397	870	9.0	7/1/2009 15:11
C2	Sr-90'	0.5	700	900	12.3	7/1/2009 15:11
C2	Sr-90'	0.5	1129	930	15.6	7/1/2009 15:12
C2	Sr-90'	0.5	1653	960	19.5	7/1/2009 15:13
C2	Sr-90'	0.5	2258	990	24.3	7/1/2009 15:13
C2	Sr-90'	0.5	3063	1020	28.9	7/1/2009 15:14
C2	Sr-90'	0.5	4071	1050	33.8	7/1/2009 15:15
C2	Sr-90'	0.5	5074	1080	39.0	7/1/2009 15:15
C2	Sr-90'	0.5	6319	1110	46.0	7/1/2009 15:16
C2	Sr-90'	0.5	7785	1140	53.8	7/1/2009 15:17
C2	Sr-90'	0.5	9615	1170	56.3	7/1/2009 15:17
C2	Sr-90'	0.5	11493	1200	55.4	7/1/2009 15:18
C2	Sr-90'	0.5	12903	1230	51.4	7/1/2009 15:18
C2	Sr-90'	0.5	14448	1260	43.4	7/1/2009 15:19
C2	Sr-90'	0.5	15845	1290	36.3	7/1/2009 15:20
C2	Sr-90'	0.5	16538	1320	26.0	7/1/2009 15:20
C2	Sr-90'	0.5	17303	1350	16.2	7/1/2009 15:21
C2	Sr-90'	0.5	17622	1380	8.3	7/1/2009 15:22
C2	Sr-90'	0.5	17729	1410	1.2	7/1/2009 15:22
C2	Sr-90'	0.5	17572	1440	-0.5	7/1/2009 15:23
C2	Sr-90'	0.5	17507	1470	0.5	7/1/2009 15:23
C2	Sr-90'	0.5	17657	1500	2.7	7/1/2009 15:24
C2	Sr-90'	0.5	17758	1530	1.4	7/1/2009 15:25
C2	Sr-90'	0.5	17852	1560	1.7	7/1/2009 15:25
C2	Sr-90'	0.5	17621	1590	0.7	7/1/2009 15:26

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C2	Sr-90'	0.5	17984	1620		7/1/2009 15:27
C2	Sr-90'	0.5	17797	1650		7/1/2009 15:27
C3	Sr-90'	0.11	0	750		7/1/2009 15:09
C3	Sr-90'	0.11	1	780		7/1/2009 15:09
C3	Sr-90'	0.11	5	810	3.3	7/1/2009 15:10
C3	Sr-90'	0.5	146	840	6.5	7/1/2009 15:10
C3	Sr-90'	0.5	419	870	10.9	7/1/2009 15:11
C3	Sr-90'	0.5	776	900	14.3	7/1/2009 15:11
C3	Sr-90'	0.5	1319	930	17.7	7/1/2009 15:12
C3	Sr-90'	0.5	1837	960	21.7	7/1/2009 15:13
C3	Sr-90'	0.5	2548	990	25.2	7/1/2009 15:13
C3	Sr-90'	0.5	3420	1020	31.1	7/1/2009 15:14
C3	Sr-90'	0.5	4313	1050	36.7	7/1/2009 15:15
C3	Sr-90'	0.5	5621	1080	42.8	7/1/2009 15:15
C3	Sr-90'	0.5	6946	1110	51.9	7/1/2009 15:16
C3	Sr-90'	0.5	8517	1140	58.5	7/1/2009 15:17
C3	Sr-90'	0.5	10649	1170	64.5	7/1/2009 15:17
C3	Sr-90'	0.5	12537	1200	67.2	7/1/2009 15:18
C3	Sr-90'	0.5	14612	1230	64.4	7/1/2009 15:18
C3	Sr-90'	0.5	16617	1260	56.7	7/1/2009 15:19
C3	Sr-90'	0.5	18266	1290	44.5	7/1/2009 15:20
C3	Sr-90'	0.5	19218	1320	30.5	7/1/2009 15:20
C3	Sr-90'	0.5	19990	1350	17.2	7/1/2009 15:21
C3	Sr-90'	0.5	20330	1380	9.3	7/1/2009 15:22
C3	Sr-90'	0.5	20293	1410	3.9	7/1/2009 15:22
C3	Sr-90'	0.5	20457	1440	1.2	7/1/2009 15:23
C3	Sr-90'	0.49	20504	1470	2.9	7/1/2009 15:23
C3	Sr-90'	0.49	20402	1500	-0.1	7/1/2009 15:24
C3	Sr-90'	0.5	20751	1530	-0.7	7/1/2009 15:25
C3	Sr-90'	0.49	20326	1560	1.1	7/1/2009 15:25
C3	Sr-90'	0.49	20435	1590	1.3	7/1/2009 15:26
C3	Sr-90'	0.5	20730	1620		7/1/2009 15:27
C3	Sr-90'	0.5	20748	1650		7/1/2009 15:27
C4	Sr-90'	0.12	0	750		7/1/2009 15:09
C4	Sr-90'	0.11	0	780		7/1/2009 15:09
C4	Sr-90'	0.11	2	810	2.1	7/1/2009 15:10
C4	Sr-90'	0.5	103	840	4.3	7/1/2009 15:10
C4	Sr-90'	0.5	259	870	6.9	7/1/2009 15:11
C4	Sr-90'	0.5	521	900	9.3	7/1/2009 15:11
C4	Sr-90'	0.5	831	930	11.9	7/1/2009 15:12
C4	Sr-90'	0.5	1216	960	14.4	7/1/2009 15:13
C4	Sr-90'	0.5	1699	990	17.6	7/1/2009 15:13
C4	Sr-90'	0.5	2244	1020	21.6	7/1/2009 15:14
C4	Sr-90'	0.5	2955	1050	25.8	7/1/2009 15:15
C4	Sr-90'	0.5	3821	1080	31.0	7/1/2009 15:15
C4	Sr-90'	0.5	4783	1110	35.5	7/1/2009 15:16
C4	Sr-90'	0.5	5977	1140	38.8	7/1/2009 15:17
C4	Sr-90'	0.5	7204	1170	43.3	7/1/2009 15:17
C4	Sr-90'	0.5	8425	1200	44.9	7/1/2009 15:18
C4	Sr-90'	0.5	10053	1230	42.6	7/1/2009 15:18
C4	Sr-90'	0.5	11280	1260	36.6	7/1/2009 15:19
C4	Sr-90'	0.5	12165	1290	28.3	7/1/2009 15:20
C4	Sr-90'	0.5	12855	1320	20.1	7/1/2009 15:20
C4	Sr-90'	0.5	13515	1350	13.9	7/1/2009 15:21
C4	Sr-90'	0.5	13616	1380	8.4	7/1/2009 15:22
C4	Sr-90'	0.5	13872	1410	4.0	7/1/2009 15:22
C4	Sr-90'	0.5	13942	1440	3.0	7/1/2009 15:23
C4	Sr-90'	0.5	13948	1470	1.3	7/1/2009 15:23
C4	Sr-90'	0.5	14027	1500	3.1	7/1/2009 15:24
C4	Sr-90'	0.5	14021	1530	2.0	7/1/2009 15:25
C4	Sr-90'	0.5	14373	1560	0.9	7/1/2009 15:25
C4	Sr-90'	0.5	14078	1590	0.1	7/1/2009 15:26

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C4	Sr-90'	0.5	14134	1620		7/1/2009 15:27
C4	Sr-90'	0.5	14161	1650		7/1/2009 15:27
D1	Sr-90'	0.11	0	750		7/1/2009 15:09
D1	Sr-90'	0.11	1	780		7/1/2009 15:09
D1	Sr-90'	0.5	72	810	5.0	7/1/2009 15:10
D1	Sr-90'	0.5	270	840	8.8	7/1/2009 15:11
D1	Sr-90'	0.5	615	870	13.4	7/1/2009 15:11
D1	Sr-90'	0.5	1053	900	17.1	7/1/2009 15:12
D1	Sr-90'	0.5	1693	930	20.6	7/1/2009 15:13
D1	Sr-90'	0.5	2291	960	23.8	7/1/2009 15:14
D1	Sr-90'	0.5	3080	990	28.2	7/1/2009 15:15
D1	Sr-90'	0.5	3936	1020	34.8	7/1/2009 15:15
D1	Sr-90'	0.5	5093	1050	40.1	7/1/2009 15:16
D1	Sr-90'	0.5	6502	1080	48.6	7/1/2009 15:17
D1	Sr-90'	0.5	7816	1110	56.3	7/1/2009 15:18
D1	Sr-90'	0.5	9861	1140	62.6	7/1/2009 15:19
D1	Sr-90'	0.5	11853	1170	66.5	7/1/2009 15:19
D1	Sr-90'	0.5	13871	1200	63.1	7/1/2009 15:20
D1	Sr-90'	0.5	15783	1230	56.3	7/1/2009 15:21
D1	Sr-90'	0.5	17367	1260	45.6	7/1/2009 15:22
D1	Sr-90'	0.5	18552	1290	32.7	7/1/2009 15:22
D1	Sr-90'	0.5	19322	1320	19.4	7/1/2009 15:23
D1	Sr-90'	0.5	19713	1350	10.4	7/1/2009 15:24
D1	Sr-90'	0.5	19695	1380	5.3	7/1/2009 15:25
D1	Sr-90'	0.5	19923	1410	2.4	7/1/2009 15:26
D1	Sr-90'	0.5	20015	1440	-0.9	7/1/2009 15:26
D1	Sr-90'	0.5	19909	1470	-2.8	7/1/2009 15:27
D1	Sr-90'	0.5	19560	1500	-3.0	7/1/2009 15:28
D1	Sr-90'	0.5	19731	1530	-0.4	7/1/2009 15:29
D1	Sr-90'	0.5	19656	1560	1.3	7/1/2009 15:30
D1	Sr-90'	0.5	19805	1590	0.8	7/1/2009 15:30
D1	Sr-90'	0.5	19711	1620		7/1/2009 15:31
D1	Sr-90'	0.5	19827	1650		7/1/2009 15:32
D2	Sr-90'	0.11	2	750		7/1/2009 15:09
D2	Sr-90'	0.11	0	780		7/1/2009 15:09
D2	Sr-90'	0.12	8	810	3.7	7/1/2009 15:10
D2	Sr-90'	0.5	183	840	7.3	7/1/2009 15:11
D2	Sr-90'	0.5	461	870	11.1	7/1/2009 15:11
D2	Sr-90'	0.5	873	900	14.3	7/1/2009 15:12
D2	Sr-90'	0.5	1331	930	17.1	7/1/2009 15:13
D2	Sr-90'	0.5	1899	960	20.1	7/1/2009 15:14
D2	Sr-90'	0.5	2520	990	24.9	7/1/2009 15:15
D2	Sr-90'	0.5	3298	1020	30.4	7/1/2009 15:15
D2	Sr-90'	0.5	4359	1050	36.7	7/1/2009 15:16
D2	Sr-90'	0.5	5534	1080	42.9	7/1/2009 15:17
D2	Sr-90'	0.5	6912	1110	48.8	7/1/2009 15:18
D2	Sr-90'	0.5	8458	1140	55.7	7/1/2009 15:19
D2	Sr-90'	0.5	10221	1170	60.7	7/1/2009 15:19
D2	Sr-90'	0.5	12229	1200	59.3	7/1/2009 15:20
D2	Sr-90'	0.5	14132	1230	54.2	7/1/2009 15:21
D2	Sr-90'	0.5	15397	1260	44.8	7/1/2009 15:22
D2	Sr-90'	0.5	16761	1290	32.3	7/1/2009 15:22
D2	Sr-90'	0.5	17632	1320	23.4	7/1/2009 15:23
D2	Sr-90'	0.5	17862	1350	14.5	7/1/2009 15:24
D2	Sr-90'	0.5	18357	1380	8.4	7/1/2009 15:25
D2	Sr-90'	0.5	18569	1410	4.9	7/1/2009 15:26
D2	Sr-90'	0.5	18543	1440	-2.0	7/1/2009 15:26
D2	Sr-90'	0.5	18507	1470	-1.9	7/1/2009 15:27
D2	Sr-90'	0.5	18087	1500	-0.4	7/1/2009 15:28
D2	Sr-90'	0.5	18508	1530	1.2	7/1/2009 15:29
D2	Sr-90'	0.5	18487	1560	2.0	7/1/2009 15:30
D2	Sr-90'	0.5	18483	1590		7/1/2009 15:30

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D2	Sr-90'	0.5	18406	1620		7/1/2009 15:31
D2	Sr-90'	0.5	18558	1650		7/1/2009 15:32
D3	Sr-90'	0.11	0	750		7/1/2009 15:09
D3	Sr-90'	0.11	2	780		7/1/2009 15:09
D3	Sr-90'	0.11	13	810	3.5	7/1/2009 15:10
D3	Sr-90'	0.5	180	840	7.3	7/1/2009 15:11
D3	Sr-90'	0.5	443	870	11.9	7/1/2009 15:11
D3	Sr-90'	0.5	889	900	16.7	7/1/2009 15:12
D3	Sr-90'	0.5	1450	930	21.0	7/1/2009 15:13
D3	Sr-90'	0.5	2177	960	24.5	7/1/2009 15:14
D3	Sr-90'	0.5	2948	990	29.5	7/1/2009 15:15
D3	Sr-90'	0.5	3811	1020	35.9	7/1/2009 15:15
D3	Sr-90'	0.5	5065	1050	43.8	7/1/2009 15:16
D3	Sr-90'	0.5	6499	1080	51.6	7/1/2009 15:17
D3	Sr-90'	0.5	8172	1110	58.7	7/1/2009 15:18
D3	Sr-90'	0.5	10000	1140	67.5	7/1/2009 15:19
D3	Sr-90'	0.5	12119	1170	72.7	7/1/2009 15:19
D3	Sr-90'	0.5	14648	1200	75.0	7/1/2009 15:20
D3	Sr-90'	0.5	16756	1230	69.6	7/1/2009 15:21
D3	Sr-90'	0.5	18932	1260	50.7	7/1/2009 15:22
D3	Sr-90'	0.49	20419	1290	28.7	7/1/2009 15:22
D3	Sr-90'	0.47	20417	1320	7.9	7/1/2009 15:23
D3	Sr-90'	0.45	20316	1350	1.1	7/1/2009 15:24
D3	Sr-90'	0.44	20172	1380	-0.5	7/1/2009 15:25
D3	Sr-90'	0.45	20699	1410	3.2	7/1/2009 15:26
D3	Sr-90'	0.44	20157	1440	0.3	7/1/2009 15:26
D3	Sr-90'	0.45	20796	1470	-3.9	7/1/2009 15:27
D3	Sr-90'	0.44	20171	1500	-0.2	7/1/2009 15:28
D3	Sr-90'	0.44	20106	1530	0.5	7/1/2009 15:29
D3	Sr-90'	0.44	20476	1560	4.9	7/1/2009 15:30
D3	Sr-90'	0.45	20713	1590	3.7	7/1/2009 15:30
D3	Sr-90'	0.45	20599	1620		7/1/2009 15:31
D3	Sr-90'	0.45	20602	1650		7/1/2009 15:32
D4	Sr-90'	0.11	1	750		7/1/2009 15:09
D4	Sr-90'	0.11	1	780		7/1/2009 15:09
D4	Sr-90'	0.11	7	810	3.2	7/1/2009 15:10
D4	Sr-90'	0.5	147	840	7.0	7/1/2009 15:11
D4	Sr-90'	0.5	404	870	11.2	7/1/2009 15:11
D4	Sr-90'	0.5	853	900	15.0	7/1/2009 15:12
D4	Sr-90'	0.5	1327	930	17.8	7/1/2009 15:13
D4	Sr-90'	0.5	1936	960	20.5	7/1/2009 15:14
D4	Sr-90'	0.5	2527	990	24.2	7/1/2009 15:15
D4	Sr-90'	0.5	3323	1020	29.1	7/1/2009 15:15
D4	Sr-90'	0.5	4264	1050	36.1	7/1/2009 15:16
D4	Sr-90'	0.5	5435	1080	42.7	7/1/2009 15:17
D4	Sr-90'	0.5	6888	1110	51.1	7/1/2009 15:18
D4	Sr-90'	0.5	8412	1140	56.9	7/1/2009 15:19
D4	Sr-90'	0.5	10433	1170	59.9	7/1/2009 15:19
D4	Sr-90'	0.5	12204	1200	61.4	7/1/2009 15:20
D4	Sr-90'	0.5	13978	1230	56.9	7/1/2009 15:21
D4	Sr-90'	0.5	15844	1260	49.4	7/1/2009 15:22
D4	Sr-90'	0.5	17152	1290	38.6	7/1/2009 15:22
D4	Sr-90'	0.5	18022	1320	24.6	7/1/2009 15:23
D4	Sr-90'	0.5	18681	1350	14.6	7/1/2009 15:24
D4	Sr-90'	0.5	18775	1380	10.1	7/1/2009 15:25
D4	Sr-90'	0.5	18959	1410	5.8	7/1/2009 15:26
D4	Sr-90'	0.5	19392	1440	2.8	7/1/2009 15:26
D4	Sr-90'	0.5	19243	1470	-2.5	7/1/2009 15:27
D4	Sr-90'	0.5	19058	1500	-4.4	7/1/2009 15:28
D4	Sr-90'	0.5	18753	1530	-2.5	7/1/2009 15:29
D4	Sr-90'	0.5	18970	1560	2.3	7/1/2009 15:30
D4	Sr-90'	0.5	18909	1590	2.7	7/1/2009 15:30

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D4	Sr-90'	0.5	19318	1620		7/1/2009 15:31
D4	Sr-90'	0.5	18979	1650		7/1/2009 15:32
E1	Sr-90'	0.11	2	750		7/1/2009 16:53
E1	Sr-90'	0.11	5	780		7/1/2009 16:54
E1	Sr-90'	0.5	105	810	4.8	7/1/2009 16:54
E1	Sr-90'	0.5	272	840	7.7	7/1/2009 16:55
E1	Sr-90'	0.5	586	870	10.2	7/1/2009 16:55
E1	Sr-90'	0.5	917	900	12.7	7/1/2009 16:56
E1	Sr-90'	0.5	1310	930	15.1	7/1/2009 16:57
E1	Sr-90'	0.5	1822	960	17.8	7/1/2009 16:57
E1	Sr-90'	0.5	2394	990	21.9	7/1/2009 16:58
E1	Sr-90'	0.5	3047	1020	26.4	7/1/2009 16:59
E1	Sr-90'	0.5	3979	1050	30.7	7/1/2009 16:59
E1	Sr-90'	0.5	4991	1080	36.2	7/1/2009 17:00
E1	Sr-90'	0.5	6025	1110	40.8	7/1/2009 17:00
E1	Sr-90'	0.5	7460	1140	44.7	7/1/2009 17:01
E1	Sr-90'	0.5	8857	1170	46.7	7/1/2009 17:02
E1	Sr-90'	0.5	10283	1200	42.6	7/1/2009 17:02
E1	Sr-90'	0.5	11614	1230	36.4	7/1/2009 17:03
E1	Sr-90'	0.5	12474	1260	28.4	7/1/2009 17:04
E1	Sr-90'	0.5	13226	1290	20.6	7/1/2009 17:04
E1	Sr-90'	0.5	13737	1320	14.1	7/1/2009 17:05
E1	Sr-90'	0.5	14075	1350	7.7	7/1/2009 17:05
E1	Sr-90'	0.5	14159	1380	3.5	7/1/2009 17:06
E1	Sr-90'	0.5	14167	1410	2.0	7/1/2009 17:07
E1	Sr-90'	0.5	14219	1440	3.8	7/1/2009 17:07
E1	Sr-90'	0.5	14348	1470	3.2	7/1/2009 17:08
E1	Sr-90'	0.5	14643	1500	0.4	7/1/2009 17:09
E1	Sr-90'	0.5	14432	1530	-0.1	7/1/2009 17:09
E1	Sr-90'	0.5	14241	1560	-0.1	7/1/2009 17:10
E1	Sr-90'	0.5	14536	1590	2.5	7/1/2009 17:10
E1	Sr-90'	0.5	14569	1620		7/1/2009 17:11
E1	Sr-90'	0.5	14650	1650		7/1/2009 17:12
E2	Sr-90'	0.11	1	750		7/1/2009 16:53
E2	Sr-90'	0.11	3	780		7/1/2009 16:54
E2	Sr-90'	0.5	81	810	4.5	7/1/2009 16:54
E2	Sr-90'	0.5	238	840	7.9	7/1/2009 16:55
E2	Sr-90'	0.5	551	870	11.3	7/1/2009 16:55
E2	Sr-90'	0.5	958	900	15.1	7/1/2009 16:56
E2	Sr-90'	0.5	1416	930	18.1	7/1/2009 16:57
E2	Sr-90'	0.5	2066	960	21.2	7/1/2009 16:57
E2	Sr-90'	0.5	2713	990	25.8	7/1/2009 16:58
E2	Sr-90'	0.5	3496	1020	30.6	7/1/2009 16:59
E2	Sr-90'	0.5	4569	1050	37.2	7/1/2009 16:59
E2	Sr-90'	0.5	5734	1080	44.5	7/1/2009 17:00
E2	Sr-90'	0.5	7168	1110	50.7	7/1/2009 17:00
E2	Sr-90'	0.5	8866	1140	56.4	7/1/2009 17:01
E2	Sr-90'	0.5	10605	1170	58.5	7/1/2009 17:02
E2	Sr-90'	0.5	12472	1200	55.9	7/1/2009 17:02
E2	Sr-90'	0.5	14141	1230	48.8	7/1/2009 17:03
E2	Sr-90'	0.5	15488	1260	37.9	7/1/2009 17:04
E2	Sr-90'	0.5	16420	1290	27.4	7/1/2009 17:04
E2	Sr-90'	0.5	17015	1320	19.0	7/1/2009 17:05
E2	Sr-90'	0.5	17485	1350	12.1	7/1/2009 17:05
E2	Sr-90'	0.5	17805	1380	6.0	7/1/2009 17:06
E2	Sr-90'	0.5	17843	1410	2.5	7/1/2009 17:07
E2	Sr-90'	0.5	17729	1440	0.6	7/1/2009 17:07
E2	Sr-90'	0.5	17899	1470	0.2	7/1/2009 17:08
E2	Sr-90'	0.5	17869	1500	1.8	7/1/2009 17:09
E2	Sr-90'	0.5	17806	1530	0.0	7/1/2009 17:09
E2	Sr-90'	0.5	18040	1560	2.2	7/1/2009 17:10
E2	Sr-90'	0.5	17819	1590	1.9	7/1/2009 17:10

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E2	Sr-90'	0.5	18188	1620		7/1/2009 17:11
E2	Sr-90'	0.5	18023	1650		7/1/2009 17:12
E3	Sr-90'	0.11	6	750		7/1/2009 16:53
E3	Sr-90'	0.5	100	780		7/1/2009 16:54
E3	Sr-90'	0.5	299	810	8.2	7/1/2009 16:54
E3	Sr-90'	0.5	562	840	12.0	7/1/2009 16:55
E3	Sr-90'	0.5	998	870	15.3	7/1/2009 16:55
E3	Sr-90'	0.5	1557	900	18.2	7/1/2009 16:56
E3	Sr-90'	0.5	2103	930	21.5	7/1/2009 16:57
E3	Sr-90'	0.5	2734	960	25.7	7/1/2009 16:57
E3	Sr-90'	0.5	3637	990	32.2	7/1/2009 16:58
E3	Sr-90'	0.5	4648	1020	38.0	7/1/2009 16:59
E3	Sr-90'	0.5	5981	1050	43.0	7/1/2009 16:59
E3	Sr-90'	0.5	7264	1080	48.2	7/1/2009 17:00
E3	Sr-90'	0.5	8773	1110	52.4	7/1/2009 17:00
E3	Sr-90'	0.5	10478	1140	56.1	7/1/2009 17:01
E3	Sr-90'	0.5	12239	1170	54.1	7/1/2009 17:02
E3	Sr-90'	0.5	13953	1200	47.1	7/1/2009 17:02
E3	Sr-90'	0.5	15145	1230	37.8	7/1/2009 17:03
E3	Sr-90'	0.5	16088	1260	27.2	7/1/2009 17:04
E3	Sr-90'	0.5	16835	1290	18.2	7/1/2009 17:04
E3	Sr-90'	0.5	17187	1320	9.6	7/1/2009 17:05
E3	Sr-90'	0.5	17323	1350	4.3	7/1/2009 17:05
E3	Sr-90'	0.5	17281	1380	4.2	7/1/2009 17:06
E3	Sr-90'	0.5	17438	1410	2.2	7/1/2009 17:07
E3	Sr-90'	0.5	17763	1440	1.7	7/1/2009 17:07
E3	Sr-90'	0.5	17411	1470	-0.9	7/1/2009 17:08
E3	Sr-90'	0.5	17545	1500	-0.4	7/1/2009 17:09
E3	Sr-90'	0.5	17408	1530	2.9	7/1/2009 17:09
E3	Sr-90'	0.5	17704	1560	1.8	7/1/2009 17:10
E3	Sr-90'	0.5	17768	1590	0.6	7/1/2009 17:10
E3	Sr-90'	0.5	17641	1620		7/1/2009 17:11
E3	Sr-90'	0.5	17535	1650		7/1/2009 17:12
E4	Sr-90'	0.12	0	750		7/1/2009 16:53
E4	Sr-90'	0.12	1	780		7/1/2009 16:54
E4	Sr-90'	0.5	62	810	3.5	7/1/2009 16:54
E4	Sr-90'	0.5	205	840	6.0	7/1/2009 16:55
E4	Sr-90'	0.5	428	870	8.7	7/1/2009 16:55
E4	Sr-90'	0.5	712	900	12.1	7/1/2009 16:56
E4	Sr-90'	0.5	1114	930	15.5	7/1/2009 16:57
E4	Sr-90'	0.5	1670	960	17.6	7/1/2009 16:57
E4	Sr-90'	0.5	2269	990	21.0	7/1/2009 16:58
E4	Sr-90'	0.5	2774	1020	25.3	7/1/2009 16:59
E4	Sr-90'	0.5	3713	1050	30.9	7/1/2009 16:59
E4	Sr-90'	0.5	4742	1080	38.0	7/1/2009 17:00
E4	Sr-90'	0.5	5922	1110	41.9	7/1/2009 17:00
E4	Sr-90'	0.5	7364	1140	46.6	7/1/2009 17:01
E4	Sr-90'	0.5	8687	1170	48.0	7/1/2009 17:02
E4	Sr-90'	0.5	10345	1200	46.5	7/1/2009 17:02
E4	Sr-90'	0.5	11633	1230	42.6	7/1/2009 17:03
E4	Sr-90'	0.5	12867	1260	35.1	7/1/2009 17:04
E4	Sr-90'	0.5	13814	1290	27.5	7/1/2009 17:04
E4	Sr-90'	0.5	14521	1320	17.8	7/1/2009 17:05
E4	Sr-90'	0.5	14937	1350	11.4	7/1/2009 17:05
E4	Sr-90'	0.5	14976	1380	6.8	7/1/2009 17:06
E4	Sr-90'	0.5	15298	1410	4.0	7/1/2009 17:07
E4	Sr-90'	0.5	15356	1440	3.4	7/1/2009 17:07
E4	Sr-90'	0.5	15348	1470	2.5	7/1/2009 17:08
E4	Sr-90'	0.5	15467	1500	1.5	7/1/2009 17:09
E4	Sr-90'	0.5	15614	1530	-0.3	7/1/2009 17:09
E4	Sr-90'	0.5	15441	1560	-2.2	7/1/2009 17:10
E4	Sr-90'	0.5	15310	1590	-0.7	7/1/2009 17:10

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E4	Sr-90'	0.5	15285	1620		7/1/2009 17:11
E4	Sr-90'	0.5	15594	1650		7/1/2009 17:12
F1	Sr-90'	0.11	1	750		7/1/2009 16:53
F1	Sr-90'	0.5	41	780		7/1/2009 16:54
F1	Sr-90'	0.5	140	810	5.8	7/1/2009 16:54
F1	Sr-90'	0.5	386	840	9.6	7/1/2009 16:55
F1	Sr-90'	0.5	692	870	13.4	7/1/2009 16:55
F1	Sr-90'	0.5	1203	900	17.5	7/1/2009 16:56
F1	Sr-90'	0.5	1739	930	22.0	7/1/2009 16:57
F1	Sr-90'	0.5	2486	960	24.4	7/1/2009 16:57
F1	Sr-90'	0.5	3345	990	28.5	7/1/2009 16:58
F1	Sr-90'	0.5	4063	1020	33.4	7/1/2009 16:59
F1	Sr-90'	0.5	5218	1050	39.9	7/1/2009 16:59
F1	Sr-90'	0.5	6559	1080	49.9	7/1/2009 17:00
F1	Sr-90'	0.5	8089	1110	56.9	7/1/2009 17:00
F1	Sr-90'	0.5	10105	1140	63.2	7/1/2009 17:01
F1	Sr-90'	0.5	11973	1170	63.6	7/1/2009 17:02
F1	Sr-90'	0.5	14100	1200	60.5	7/1/2009 17:02
F1	Sr-90'	0.5	15625	1230	51.4	7/1/2009 17:03
F1	Sr-90'	0.5	17349	1260	40.8	7/1/2009 17:04
F1	Sr-90'	0.5	18058	1290	29.0	7/1/2009 17:04
F1	Sr-90'	0.5	19007	1320	16.9	7/1/2009 17:05
F1	Sr-90'	0.5	19153	1350	11.1	7/1/2009 17:05
F1	Sr-90'	0.5	19337	1380	4.5	7/1/2009 17:06
F1	Sr-90'	0.5	19560	1410	4.6	7/1/2009 17:07
F1	Sr-90'	0.5	19474	1440	2.9	7/1/2009 17:07
F1	Sr-90'	0.5	19777	1470	2.2	7/1/2009 17:08
F1	Sr-90'	0.5	19660	1500	2.0	7/1/2009 17:09
F1	Sr-90'	0.5	19795	1530	1.4	7/1/2009 17:09
F1	Sr-90'	0.5	19765	1560	1.5	7/1/2009 17:10
F1	Sr-90'	0.5	19927	1590	-0.9	7/1/2009 17:10
F1	Sr-90'	0.5	19825	1620		7/1/2009 17:11
F1	Sr-90'	0.5	19634	1650		7/1/2009 17:12
F2	Sr-90'	0.11	3	750		7/1/2009 16:53
F2	Sr-90'	0.5	75	780		7/1/2009 16:54
F2	Sr-90'	0.5	255	810	8.6	7/1/2009 16:54
F2	Sr-90'	0.5	549	840	12.8	7/1/2009 16:55
F2	Sr-90'	0.5	1053	870	16.1	7/1/2009 16:56
F2	Sr-90'	0.5	1600	900	20.7	7/1/2009 16:56
F2	Sr-90'	0.5	2150	930	24.4	7/1/2009 16:57
F2	Sr-90'	0.5	3108	960	30.2	7/1/2009 16:57
F2	Sr-90'	0.5	3956	990	37.2	7/1/2009 16:58
F2	Sr-90'	0.5	5225	1020	43.1	7/1/2009 16:59
F2	Sr-90'	0.5	6673	1050	52.0	7/1/2009 16:59
F2	Sr-90'	0.5	8221	1080	57.9	7/1/2009 17:00
F2	Sr-90'	0.5	10263	1110	65.3	7/1/2009 17:00
F2	Sr-90'	0.5	12122	1140	70.5	7/1/2009 17:01
F2	Sr-90'	0.5	14514	1170	70.5	7/1/2009 17:02
F2	Sr-90'	0.5	16669	1200	64.7	7/1/2009 17:02
F2	Sr-90'	0.5	18558	1230	50.8	7/1/2009 17:03
F2	Sr-90'	0.5	19798	1260	30.8	7/1/2009 17:04
F2	Sr-90'	0.5	20571	1290	14.2	7/1/2009 17:04
F2	Sr-90'	0.48	20276	1320	4.2	7/1/2009 17:05
F2	Sr-90'	0.48	20444	1350	-2.3	7/1/2009 17:05
F2	Sr-90'	0.48	20498	1380	-0.7	7/1/2009 17:06
F2	Sr-90'	0.47	20110	1410	0.6	7/1/2009 17:07
F2	Sr-90'	0.47	20341	1440	0.6	7/1/2009 17:07
F2	Sr-90'	0.48	20608	1470	2.6	7/1/2009 17:08
F2	Sr-90'	0.47	20343	1500	1.8	7/1/2009 17:09
F2	Sr-90'	0.48	20506	1530	-0.2	7/1/2009 17:09
F2	Sr-90'	0.48	20655	1560	1.8	7/1/2009 17:10
F2	Sr-90'	0.47	20420	1590	-0.3	7/1/2009 17:10

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F2	Sr-90'	0.48	20663	1620		7/1/2009 17:11
F2	Sr-90'	0.47	20459	1650		7/1/2009 17:12
F3	Sr-90'	0.11	4	750		7/1/2009 16:53
F3	Sr-90'	0.5	50	780		7/1/2009 16:54
F3	Sr-90'	0.5	177	810	6.3	7/1/2009 16:54
F3	Sr-90'	0.5	380	840	10.6	7/1/2009 16:55
F3	Sr-90'	0.5	779	870	14.1	7/1/2009 16:56
F3	Sr-90'	0.5	1332	900	17.5	7/1/2009 16:56
F3	Sr-90'	0.5	1821	930	21.0	7/1/2009 16:57
F3	Sr-90'	0.5	2490	960	24.7	7/1/2009 16:57
F3	Sr-90'	0.5	3348	990	30.7	7/1/2009 16:58
F3	Sr-90'	0.5	4268	1020	37.1	7/1/2009 16:59
F3	Sr-90'	0.5	5535	1050	43.6	7/1/2009 16:59
F3	Sr-90'	0.5	6954	1080	49.9	7/1/2009 17:00
F3	Sr-90'	0.5	8548	1110	54.8	7/1/2009 17:00
F3	Sr-90'	0.5	10239	1140	59.6	7/1/2009 17:01
F3	Sr-90'	0.5	12114	1170	60.8	7/1/2009 17:02
F3	Sr-90'	0.5	14106	1200	57.4	7/1/2009 17:02
F3	Sr-90'	0.5	15735	1230	48.0	7/1/2009 17:03
F3	Sr-90'	0.5	17035	1260	35.4	7/1/2009 17:04
F3	Sr-90'	0.5	17852	1290	25.4	7/1/2009 17:04
F3	Sr-90'	0.5	18355	1320	15.1	7/1/2009 17:05
F3	Sr-90'	0.5	18889	1350	7.9	7/1/2009 17:05
F3	Sr-90'	0.5	18778	1380	4.9	7/1/2009 17:06
F3	Sr-90'	0.5	18827	1410	2.1	7/1/2009 17:07
F3	Sr-90'	0.5	19124	1440	2.7	7/1/2009 17:07
F3	Sr-90'	0.5	19026	1470	1.2	7/1/2009 17:08
F3	Sr-90'	0.5	19090	1500	-0.3	7/1/2009 17:09
F3	Sr-90'	0.5	19021	1530	0.7	7/1/2009 17:09
F3	Sr-90'	0.5	19089	1560	1.2	7/1/2009 17:10
F3	Sr-90'	0.5	19128	1590	2.1	7/1/2009 17:10
F3	Sr-90'	0.5	19221	1620		7/1/2009 17:11
F3	Sr-90'	0.5	19274	1650		7/1/2009 17:12
F4	Sr-90'	0.12	0	750		7/1/2009 16:53
F4	Sr-90'	0.11	0	780		7/1/2009 16:54
F4	Sr-90'	0.5	125	810	5.6	7/1/2009 16:54
F4	Sr-90'	0.5	346	840	9.4	7/1/2009 16:55
F4	Sr-90'	0.5	671	870	13.3	7/1/2009 16:56
F4	Sr-90'	0.5	1133	900	16.8	7/1/2009 16:56
F4	Sr-90'	0.5	1726	930	20.4	7/1/2009 16:57
F4	Sr-90'	0.5	2343	960	24.5	7/1/2009 16:57
F4	Sr-90'	0.5	3123	990	28.7	7/1/2009 16:58
F4	Sr-90'	0.5	4105	1020	34.6	7/1/2009 16:59
F4	Sr-90'	0.5	5144	1050	40.7	7/1/2009 16:59
F4	Sr-90'	0.5	6524	1080	46.8	7/1/2009 17:00
F4	Sr-90'	0.5	8020	1110	53.6	7/1/2009 17:00
F4	Sr-90'	0.5	9687	1140	59.4	7/1/2009 17:01
F4	Sr-90'	0.5	11603	1170	59.9	7/1/2009 17:02
F4	Sr-90'	0.5	13644	1200	58.2	7/1/2009 17:02
F4	Sr-90'	0.5	15027	1230	50.3	7/1/2009 17:03
F4	Sr-90'	0.5	16711	1260	38.9	7/1/2009 17:04
F4	Sr-90'	0.5	17608	1290	27.3	7/1/2009 17:04
F4	Sr-90'	0.5	18185	1320	15.4	7/1/2009 17:05
F4	Sr-90'	0.5	18391	1350	9.8	7/1/2009 17:05
F4	Sr-90'	0.5	18626	1380	5.6	7/1/2009 17:06
F4	Sr-90'	0.5	18863	1410	3.4	7/1/2009 17:07
F4	Sr-90'	0.5	18792	1440	2.1	7/1/2009 17:07
F4	Sr-90'	0.5	18816	1470	-0.5	7/1/2009 17:08
F4	Sr-90'	0.5	18962	1500	1.5	7/1/2009 17:09
F4	Sr-90'	0.5	18700	1530	1.6	7/1/2009 17:09
F4	Sr-90'	0.5	19073	1560	0.5	7/1/2009 17:10
F4	Sr-90'	0.5	18996	1590	1.6	7/1/2009 17:10

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F4	Sr-90'	0.5	18893	1620		7/1/2009 17:11
F4	Sr-90'	0.5	19035	1650		7/1/2009 17:12
G1	Sr-90'	0.11	2	750		7/1/2009 16:53
G1	Sr-90'	0.11	8	780		7/1/2009 16:54
G1	Sr-90'	0.5	142	810	5.3	7/1/2009 16:54
G1	Sr-90'	0.5	309	840	8.5	7/1/2009 16:54
G1	Sr-90'	0.5	643	870	11.6	7/1/2009 16:55
G1	Sr-90'	0.5	1029	900	14.5	7/1/2009 16:56
G1	Sr-90'	0.5	1529	930	17.1	7/1/2009 16:56
G1	Sr-90'	0.5	2045	960	20.8	7/1/2009 16:57
G1	Sr-90'	0.5	2698	990	24.9	7/1/2009 16:58
G1	Sr-90'	0.5	3567	1020	30.5	7/1/2009 16:58
G1	Sr-90'	0.5	4501	1050	34.9	7/1/2009 16:59
G1	Sr-90'	0.5	5717	1080	42.1	7/1/2009 16:59
G1	Sr-90'	0.5	6865	1110	49.7	7/1/2009 17:00
G1	Sr-90'	0.5	8707	1140	54.5	7/1/2009 17:01
G1	Sr-90'	0.5	10467	1170	57.3	7/1/2009 17:01
G1	Sr-90'	0.5	12095	1200	52.8	7/1/2009 17:02
G1	Sr-90'	0.5	13759	1230	47.4	7/1/2009 17:03
G1	Sr-90'	0.5	14976	1260	37.0	7/1/2009 17:03
G1	Sr-90'	0.5	16137	1290	25.1	7/1/2009 17:04
G1	Sr-90'	0.5	16455	1320	16.0	7/1/2009 17:04
G1	Sr-90'	0.5	16791	1350	8.1	7/1/2009 17:05
G1	Sr-90'	0.5	17045	1380	5.8	7/1/2009 17:06
G1	Sr-90'	0.5	17060	1410	2.2	7/1/2009 17:06
G1	Sr-90'	0.5	17183	1440	0.5	7/1/2009 17:07
G1	Sr-90'	0.5	17051	1470	-0.1	7/1/2009 17:08
G1	Sr-90'	0.5	17124	1500	0.2	7/1/2009 17:08
G1	Sr-90'	0.5	17071	1530	1.3	7/1/2009 17:09
G1	Sr-90'	0.5	17202	1560	0.7	7/1/2009 17:09
G1	Sr-90'	0.5	17214	1590	1.5	7/1/2009 17:10
G1	Sr-90'	0.5	17159	1620		7/1/2009 17:11
G1	Sr-90'	0.5	17321	1650		7/1/2009 17:11
G2	Sr-90'	0.11	2	750		7/1/2009 16:53
G2	Sr-90'	0.11	8	780		7/1/2009 16:54
G2	Sr-90'	0.5	148	810	5.7	7/1/2009 16:54
G2	Sr-90'	0.5	324	840	9.1	7/1/2009 16:54
G2	Sr-90'	0.5	700	870	12.3	7/1/2009 16:55
G2	Sr-90'	0.5	1101	900	15.5	7/1/2009 16:56
G2	Sr-90'	0.5	1601	930	18.8	7/1/2009 16:56
G2	Sr-90'	0.5	2197	960	23.0	7/1/2009 16:57
G2	Sr-90'	0.5	2979	990	28.0	7/1/2009 16:58
G2	Sr-90'	0.5	3866	1020	33.2	7/1/2009 16:58
G2	Sr-90'	0.5	4971	1050	38.4	7/1/2009 16:59
G2	Sr-90'	0.5	6177	1080	44.0	7/1/2009 16:59
G2	Sr-90'	0.5	7579	1110	50.4	7/1/2009 17:00
G2	Sr-90'	0.5	9156	1140	56.2	7/1/2009 17:01
G2	Sr-90'	0.5	11042	1170	59.0	7/1/2009 17:01
G2	Sr-90'	0.5	12872	1200	58.2	7/1/2009 17:02
G2	Sr-90'	0.5	14577	1230	50.9	7/1/2009 17:03
G2	Sr-90'	0.5	16124	1260	38.8	7/1/2009 17:03
G2	Sr-90'	0.5	17054	1290	26.4	7/1/2009 17:04
G2	Sr-90'	0.5	17456	1320	16.4	7/1/2009 17:04
G2	Sr-90'	0.5	17867	1350	9.5	7/1/2009 17:05
G2	Sr-90'	0.5	18172	1380	5.6	7/1/2009 17:06
G2	Sr-90'	0.5	18119	1410	3.2	7/1/2009 17:06
G2	Sr-90'	0.5	18174	1440	2.4	7/1/2009 17:07
G2	Sr-90'	0.5	18347	1470	2.6	7/1/2009 17:08
G2	Sr-90'	0.5	18411	1500	2.6	7/1/2009 17:08
G2	Sr-90'	0.5	18383	1530	0.5	7/1/2009 17:09
G2	Sr-90'	0.5	18551	1560	0.4	7/1/2009 17:09
G2	Sr-90'	0.5	18352	1590	-1.0	7/1/2009 17:10

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G2	Sr-90'	0.5	18482	1620		7/1/2009 17:11
G2	Sr-90'	0.5	18274	1650		7/1/2009 17:11
G3	Sr-90'	0.11	1	750		7/1/2009 16:53
G3	Sr-90'	0.12	0	780		7/1/2009 16:54
G3	Sr-90'	0.5	43	810	2.8	7/1/2009 16:54
G3	Sr-90'	0.5	140	840	6.1	7/1/2009 16:54
G3	Sr-90'	0.5	346	870	10.0	7/1/2009 16:55
G3	Sr-90'	0.5	770	900	13.8	7/1/2009 16:56
G3	Sr-90'	0.5	1233	930	17.3	7/1/2009 16:56
G3	Sr-90'	0.5	1759	960	21.4	7/1/2009 16:57
G3	Sr-90'	0.5	2451	990	25.6	7/1/2009 16:58
G3	Sr-90'	0.5	3366	1020	31.4	7/1/2009 16:58
G3	Sr-90'	0.5	4276	1050	35.9	7/1/2009 16:59
G3	Sr-90'	0.5	5558	1080	42.3	7/1/2009 16:59
G3	Sr-90'	0.5	6744	1110	49.0	7/1/2009 17:00
G3	Sr-90'	0.5	8480	1140	55.9	7/1/2009 17:01
G3	Sr-90'	0.5	10165	1170	63.6	7/1/2009 17:01
G3	Sr-90'	0.5	12235	1200	67.0	7/1/2009 17:02
G3	Sr-90'	0.5	14404	1230	67.4	7/1/2009 17:03
G3	Sr-90'	0.5	16407	1260	59.3	7/1/2009 17:03
G3	Sr-90'	0.5	18185	1290	47.6	7/1/2009 17:04
G3	Sr-90'	0.5	19233	1320	33.5	7/1/2009 17:04
G3	Sr-90'	0.5	20131	1350	19.1	7/1/2009 17:05
G3	Sr-90'	0.5	20459	1380	9.5	7/1/2009 17:06
G3	Sr-90'	0.49	20432	1410	3.7	7/1/2009 17:06
G3	Sr-90'	0.49	20500	1440	1.6	7/1/2009 17:07
G3	Sr-90'	0.49	20665	1470	-0.3	7/1/2009 17:08
G3	Sr-90'	0.49	20578	1500	-1.6	7/1/2009 17:08
G3	Sr-90'	0.48	20348	1530	-1.6	7/1/2009 17:09
G3	Sr-90'	0.48	20420	1560	1.5	7/1/2009 17:09
G3	Sr-90'	0.48	20503	1590	3.3	7/1/2009 17:10
G3	Sr-90'	0.48	20725	1620		7/1/2009 17:11
G3	Sr-90'	0.48	20692	1650		7/1/2009 17:11
G4	Sr-90'	0.12	0	750		7/1/2009 16:53
G4	Sr-90'	0.12	2	780		7/1/2009 16:54
G4	Sr-90'	0.12	10	810	2.1	7/1/2009 16:54
G4	Sr-90'	0.5	96	840	4.3	7/1/2009 16:54
G4	Sr-90'	0.5	266	870	7.1	7/1/2009 16:55
G4	Sr-90'	0.5	522	900	9.6	7/1/2009 16:56
G4	Sr-90'	0.5	858	930	11.1	7/1/2009 16:56
G4	Sr-90'	0.5	1238	960	13.8	7/1/2009 16:57
G4	Sr-90'	0.5	1580	990	16.0	7/1/2009 16:58
G4	Sr-90'	0.5	2232	1020	19.4	7/1/2009 16:58
G4	Sr-90'	0.5	2756	1050	24.6	7/1/2009 16:59
G4	Sr-90'	0.5	3567	1080	28.0	7/1/2009 16:59
G4	Sr-90'	0.5	4603	1110	33.4	7/1/2009 17:00
G4	Sr-90'	0.5	5501	1140	38.6	7/1/2009 17:01
G4	Sr-90'	0.5	6802	1170	41.7	7/1/2009 17:01
G4	Sr-90'	0.5	8262	1200	44.3	7/1/2009 17:02
G4	Sr-90'	0.5	9472	1230	42.5	7/1/2009 17:03
G4	Sr-90'	0.5	10818	1260	38.5	7/1/2009 17:03
G4	Sr-90'	0.5	11904	1290	32.4	7/1/2009 17:04
G4	Sr-90'	0.5	12821	1320	23.7	7/1/2009 17:04
G4	Sr-90'	0.5	13335	1350	16.3	7/1/2009 17:05
G4	Sr-90'	0.5	13662	1380	8.9	7/1/2009 17:06
G4	Sr-90'	0.5	13925	1410	5.9	7/1/2009 17:06
G4	Sr-90'	0.5	13865	1440	2.8	7/1/2009 17:07
G4	Sr-90'	0.5	14125	1470	0.9	7/1/2009 17:08
G4	Sr-90'	0.5	13975	1500	2.0	7/1/2009 17:08
G4	Sr-90'	0.5	14009	1530	2.4	7/1/2009 17:09
G4	Sr-90'	0.5	14226	1560	3.7	7/1/2009 17:09
G4	Sr-90'	0.5	14366	1590	2.1	7/1/2009 17:10

Plateau Raw Data

G4	Sr-90'	0.5	14354	1620		7/1/2009 17:11
G4	Sr-90'	0.5	14254	1650		7/1/2009 17:11
H1	Sr-90'	0.11	3	750		7/1/2009 16:53
H1	Sr-90'	0.12	4	780		7/1/2009 16:54
H1	Sr-90'	0.5	120	810	5.0	7/1/2009 16:54
H1	Sr-90'	0.5	277	840	8.3	7/1/2009 16:55
H1	Sr-90'	0.5	613	870	11.3	7/1/2009 16:55
H1	Sr-90'	0.5	1000	900	15.1	7/1/2009 16:56
H1	Sr-90'	0.5	1459	930	18.3	7/1/2009 16:56
H1	Sr-90'	0.5	2112	960	22.4	7/1/2009 16:57
H1	Sr-90'	0.5	2797	990	26.1	7/1/2009 16:58
H1	Sr-90'	0.5	3684	1020	31.3	7/1/2009 16:58
H1	Sr-90'	0.5	4585	1050	36.5	7/1/2009 16:59
H1	Sr-90'	0.5	5908	1080	43.0	7/1/2009 17:00
H1	Sr-90'	0.5	7164	1110	49.9	7/1/2009 17:00
H1	Sr-90'	0.5	8847	1140	54.0	7/1/2009 17:01
H1	Sr-90'	0.5	10607	1170	56.0	7/1/2009 17:01
H1	Sr-90'	0.5	12293	1200	52.8	7/1/2009 17:02
H1	Sr-90'	0.5	13845	1230	45.0	7/1/2009 17:03
H1	Sr-90'	0.5	15147	1260	35.9	7/1/2009 17:03
H1	Sr-90'	0.5	15927	1290	24.6	7/1/2009 17:04
H1	Sr-90'	0.5	16632	1320	15.7	7/1/2009 17:05
H1	Sr-90'	0.5	16799	1350	10.3	7/1/2009 17:05
H1	Sr-90'	0.5	17067	1380	6.6	7/1/2009 17:06
H1	Sr-90'	0.5	17254	1410	5.4	7/1/2009 17:06
H1	Sr-90'	0.5	17390	1440	2.6	7/1/2009 17:07
H1	Sr-90'	0.5	17444	1470	-1.0	7/1/2009 17:08
H1	Sr-90'	0.5	17357	1500	-0.5	7/1/2009 17:08
H1	Sr-90'	0.5	17121	1530	1.8	7/1/2009 17:09
H1	Sr-90'	0.5	17478	1560	3.5	7/1/2009 17:10
H1	Sr-90'	0.5	17655	1590	2.8	7/1/2009 17:10
H1	Sr-90'	0.5	17621	1620	20.4	7/1/2009 17:11
H1	Sr-90'	0.5	17476	1650		7/1/2009 17:11
H2	Sr-90'	0.11	0	750		7/1/2009 16:53
H2	Sr-90'	0.11	2	780		7/1/2009 16:54
H2	Sr-90'	0.11	9	810	3.0	7/1/2009 16:54
H2	Sr-90'	0.5	130	840	5.7	7/1/2009 16:55
H2	Sr-90'	0.5	386	870	8.8	7/1/2009 16:55
H2	Sr-90'	0.5	671	900	11.9	7/1/2009 16:56
H2	Sr-90'	0.5	1065	930	14.0	7/1/2009 16:56
H2	Sr-90'	0.5	1570	960	18.0	7/1/2009 16:57
H2	Sr-90'	0.5	2032	990	22.2	7/1/2009 16:58
H2	Sr-90'	0.5	2889	1020	26.1	7/1/2009 16:58
H2	Sr-90'	0.5	3732	1050	31.4	7/1/2009 16:59
H2	Sr-90'	0.5	4634	1080	34.9	7/1/2009 17:00
H2	Sr-90'	0.5	5875	1110	40.7	7/1/2009 17:00
H2	Sr-90'	0.5	7057	1140	46.8	7/1/2009 17:01
H2	Sr-90'	0.5	8628	1170	52.3	7/1/2009 17:01
H2	Sr-90'	0.5	10272	1200	54.8	7/1/2009 17:02
H2	Sr-90'	0.5	12110	1230	50.3	7/1/2009 17:03
H2	Sr-90'	0.5	13536	1260	42.6	7/1/2009 17:03
H2	Sr-90'	0.5	14535	1290	31.4	7/1/2009 17:04
H2	Sr-90'	0.5	15451	1320	21.6	7/1/2009 17:05
H2	Sr-90'	0.5	15866	1350	13.4	7/1/2009 17:05
H2	Sr-90'	0.5	16110	1380	7.8	7/1/2009 17:06
H2	Sr-90'	0.5	16214	1410	5.3	7/1/2009 17:06
H2	Sr-90'	0.5	16443	1440	2.9	7/1/2009 17:07
H2	Sr-90'	0.5	16489	1470	1.2	7/1/2009 17:08
H2	Sr-90'	0.5	16408	1500	0.0	7/1/2009 17:08
H2	Sr-90'	0.5	16413	1530	1.6	7/1/2009 17:09
H2	Sr-90'	0.5	16476	1560	0.9	7/1/2009 17:10
H2	Sr-90'	0.5	16689	1590	0.2	7/1/2009 17:10

Plateau Raw Data

H2	Sr-90'	0.5	16407	1620		7/1/2009 17:11
H2	Sr-90'	0.5	16470	1650		7/1/2009 17:11
H3	Sr-90'	0.11	0	750		7/1/2009 16:53
H3	Sr-90'	0.11	2	780		7/1/2009 16:54
H3	Sr-90'	0.11	10	810	2.2	7/1/2009 16:54
H3	Sr-90'	0.5	107	840	5.0	7/1/2009 16:55
H3	Sr-90'	0.5	281	870	8.6	7/1/2009 16:55
H3	Sr-90'	0.5	620	900	12.4	7/1/2009 16:56
H3	Sr-90'	0.5	1041	930	16.8	7/1/2009 16:56
H3	Sr-90'	0.5	1590	960	20.0	7/1/2009 16:57
H3	Sr-90'	0.5	2316	990	24.3	7/1/2009 16:58
H3	Sr-90'	0.5	2989	1020	29.6	7/1/2009 16:58
H3	Sr-90'	0.5	3989	1050	35.8	7/1/2009 16:59
H3	Sr-90'	0.5	5187	1080	42.4	7/1/2009 17:00
H3	Sr-90'	0.5	6593	1110	48.1	7/1/2009 17:00
H3	Sr-90'	0.5	8042	1140	56.1	7/1/2009 17:01
H3	Sr-90'	0.5	9778	1170	62.8	7/1/2009 17:01
H3	Sr-90'	0.5	12005	1200	68.0	7/1/2009 17:02
H3	Sr-90'	0.5	14024	1230	67.5	7/1/2009 17:03
H3	Sr-90'	0.5	16121	1260	59.0	7/1/2009 17:03
H3	Sr-90'	0.5	17840	1290	49.1	7/1/2009 17:04
H3	Sr-90'	0.5	18952	1320	33.9	7/1/2009 17:05
H3	Sr-90'	0.5	19970	1350	20.2	7/1/2009 17:05
H3	Sr-90'	0.5	20148	1380	11.3	7/1/2009 17:06
H3	Sr-90'	0.5	20279	1410	3.1	7/1/2009 17:06
H3	Sr-90'	0.5	20488	1440	1.9	7/1/2009 17:07
H3	Sr-90'	0.49	20260	1470	1.2	7/1/2009 17:08
H3	Sr-90'	0.5	20448	1500	0.3	7/1/2009 17:08
H3	Sr-90'	0.49	20478	1530	0.5	7/1/2009 17:09
H3	Sr-90'	0.49	20420	1560	-1.7	7/1/2009 17:10
H3	Sr-90'	0.49	20351	1590	-1.3	7/1/2009 17:10
H3	Sr-90'	0.49	20252	1620		7/1/2009 17:11
H3	Sr-90'	0.49	20370	1650		7/1/2009 17:11
H4	Sr-90'	0.12	1	750		7/1/2009 16:53
H4	Sr-90'	0.11	3	780		7/1/2009 16:54
H4	Sr-90'	0.11	6	810	2.6	7/1/2009 16:54
H4	Sr-90'	0.5	150	840	5.2	7/1/2009 16:55
H4	Sr-90'	0.5	313	870	8.6	7/1/2009 16:55
H4	Sr-90'	0.5	632	900	11.7	7/1/2009 16:56
H4	Sr-90'	0.5	1050	930	16.1	7/1/2009 16:56
H4	Sr-90'	0.5	1541	960	19.0	7/1/2009 16:57
H4	Sr-90'	0.5	2266	990	21.7	7/1/2009 16:58
H4	Sr-90'	0.5	2881	1020	26.3	7/1/2009 16:58
H4	Sr-90'	0.5	3633	1050	31.4	7/1/2009 16:59
H4	Sr-90'	0.5	4798	1080	36.1	7/1/2009 17:00
H4	Sr-90'	0.5	6014	1110	42.2	7/1/2009 17:00
H4	Sr-90'	0.5	7109	1140	46.2	7/1/2009 17:01
H4	Sr-90'	0.5	8810	1170	50.5	7/1/2009 17:01
H4	Sr-90'	0.5	10328	1200	53.0	7/1/2009 17:02
H4	Sr-90'	0.5	11973	1230	48.7	7/1/2009 17:03
H4	Sr-90'	0.5	13484	1260	43.5	7/1/2009 17:03
H4	Sr-90'	0.5	14544	1290	33.5	7/1/2009 17:04
H4	Sr-90'	0.5	15574	1320	21.0	7/1/2009 17:05
H4	Sr-90'	0.5	15946	1350	13.2	7/1/2009 17:05
H4	Sr-90'	0.5	15928	1380	8.1	7/1/2009 17:06
H4	Sr-90'	0.5	16344	1410	7.2	7/1/2009 17:06
H4	Sr-90'	0.5	16589	1440	5.8	7/1/2009 17:07
H4	Sr-90'	0.5	16693	1470	1.0	7/1/2009 17:08
H4	Sr-90'	0.5	16624	1500	0.0	7/1/2009 17:08
H4	Sr-90'	0.5	16474	1530	-1.0	7/1/2009 17:09
H4	Sr-90'	0.5	16692	1560	-0.1	7/1/2009 17:10
H4	Sr-90'	0.5	16507	1590	-0.7	7/1/2009 17:10

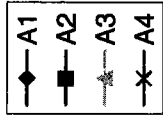
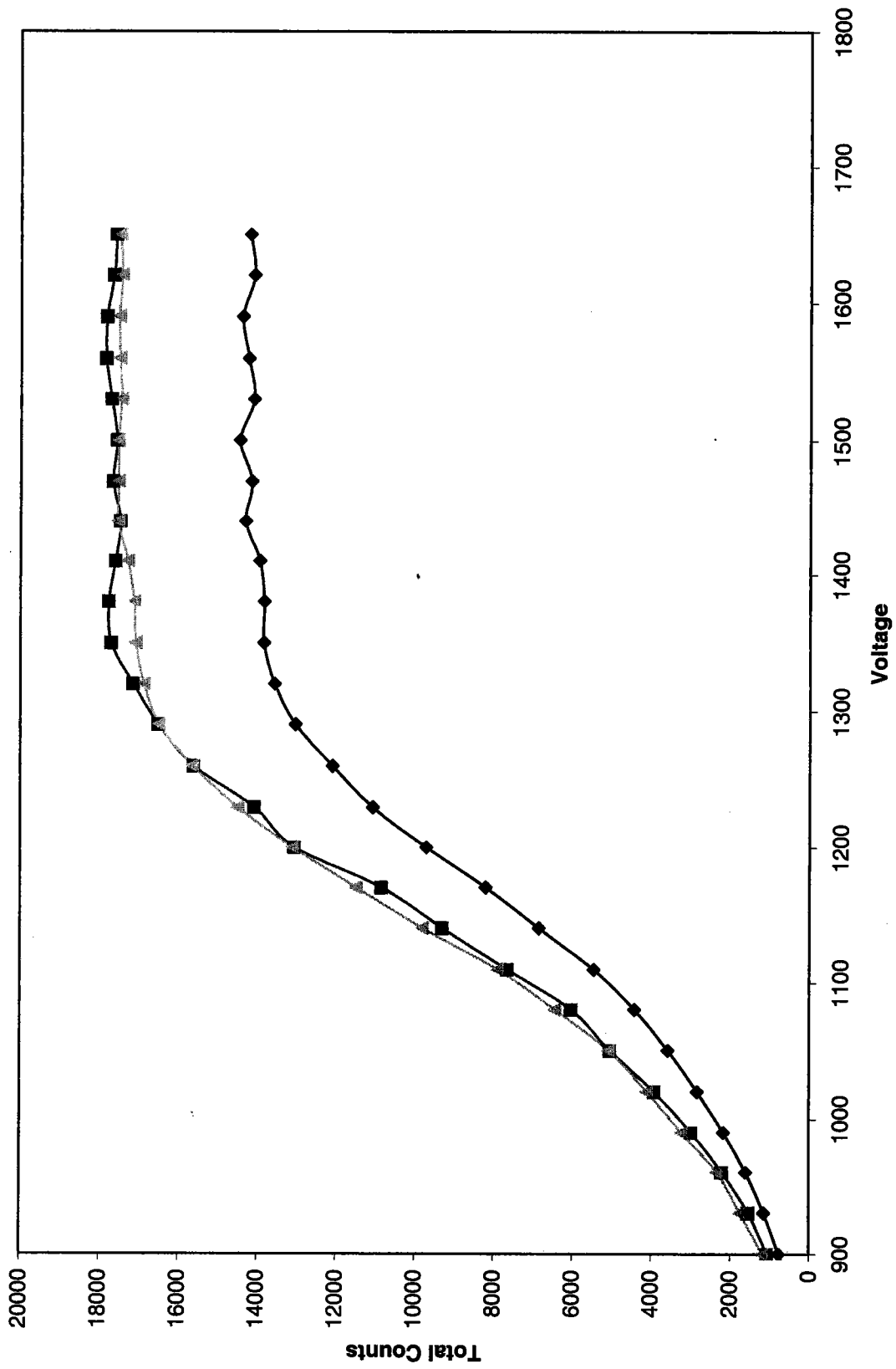
Plateau Raw Data

H4 Sr-90'
H4 Sr-90'

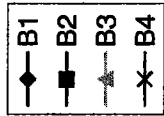
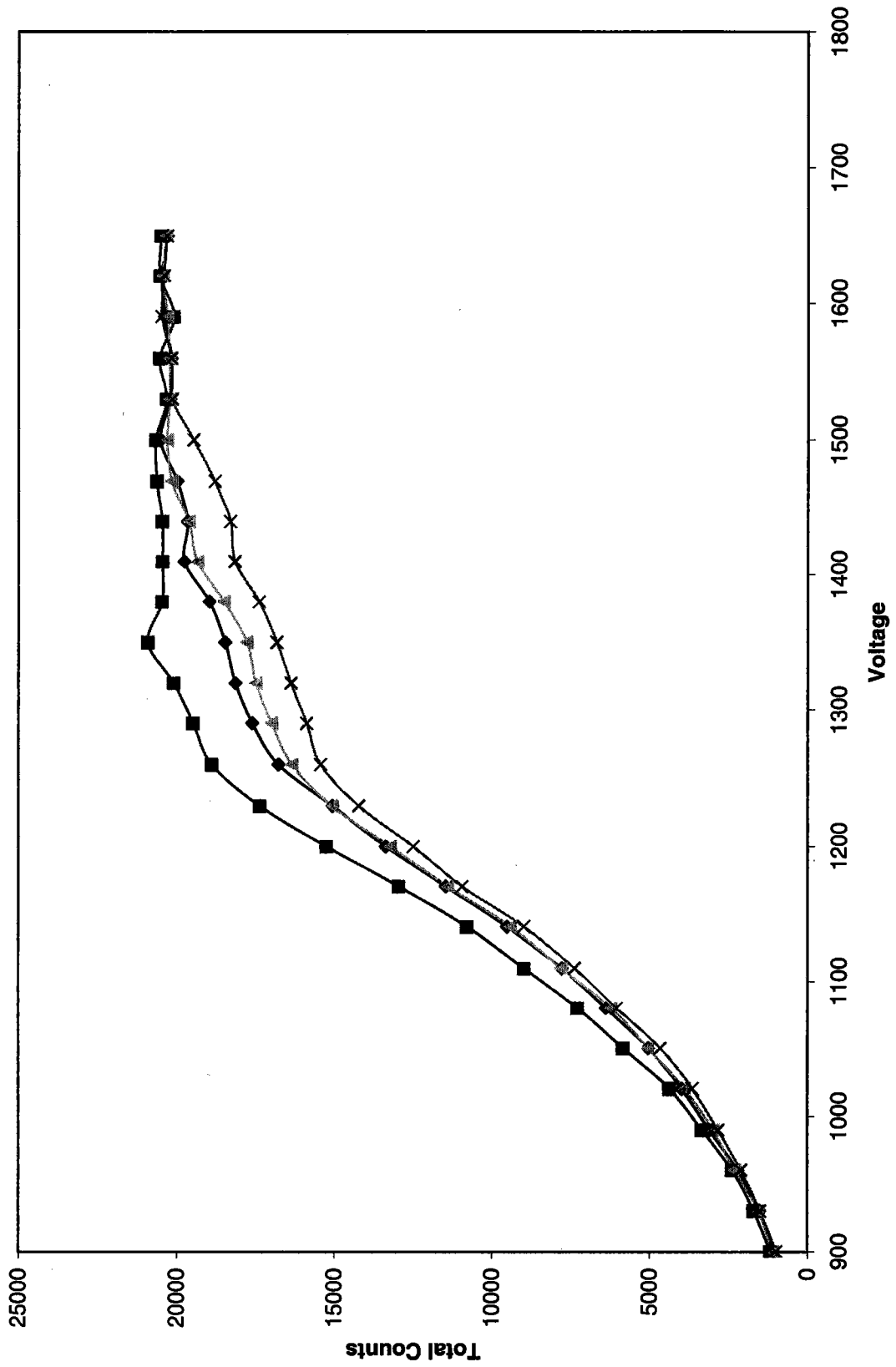
0.5 16597 1620
0.5 16414 1650

7/1/2009 17:11
7/1/2009 17:11

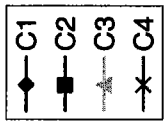
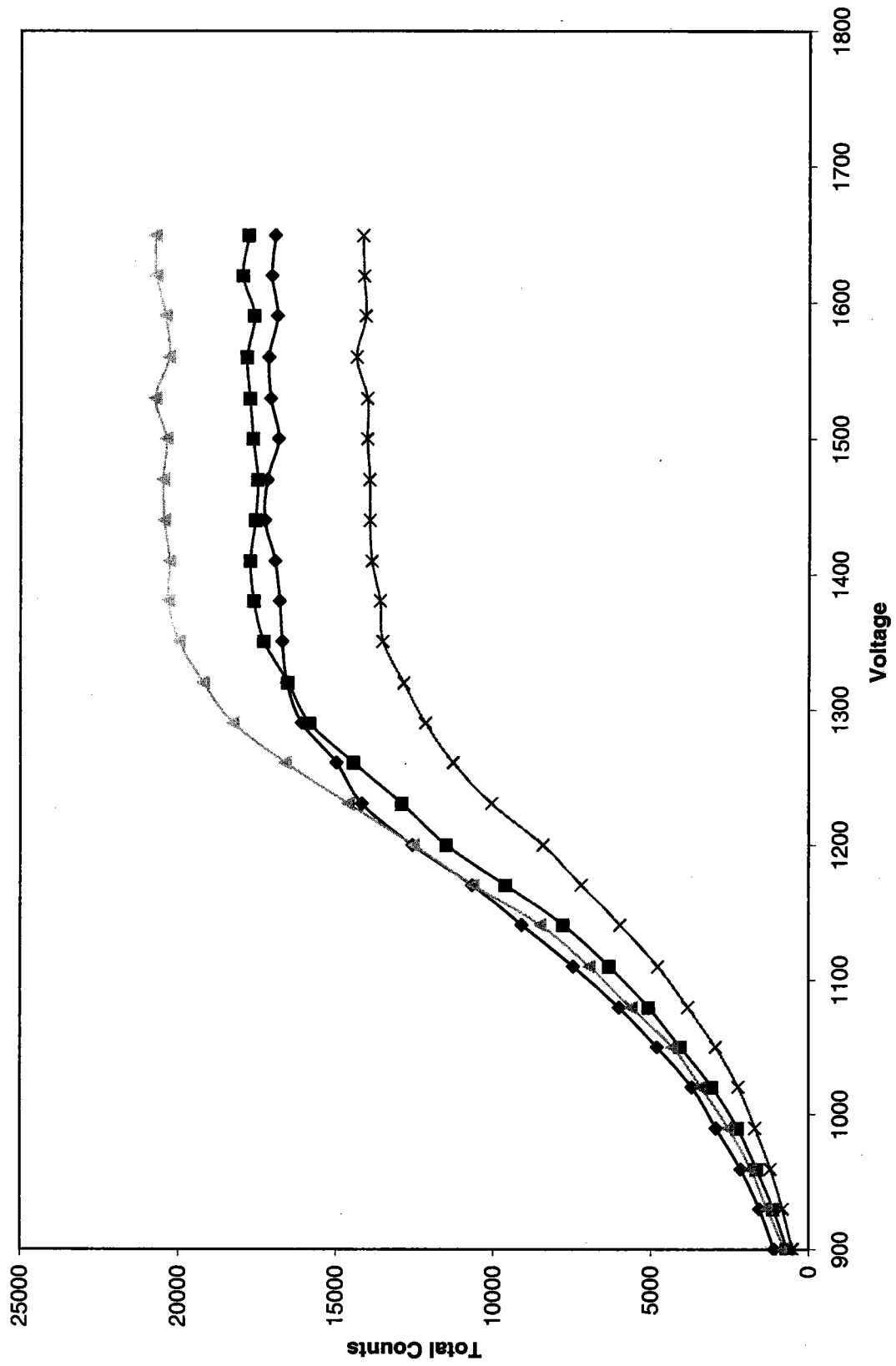
LB4100 Plateau - A Drawer



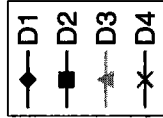
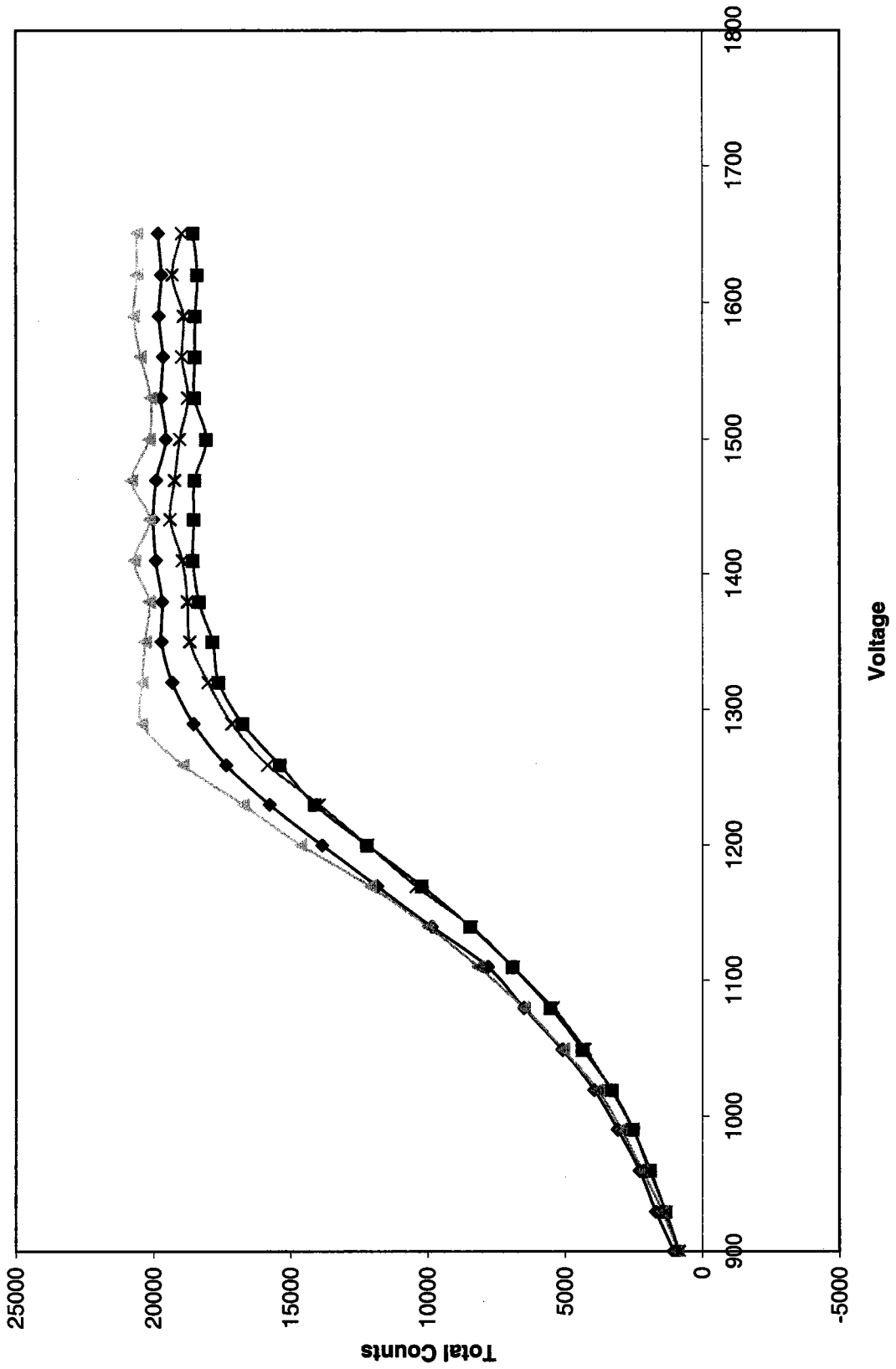
LB4100 Plateau - B Drawer



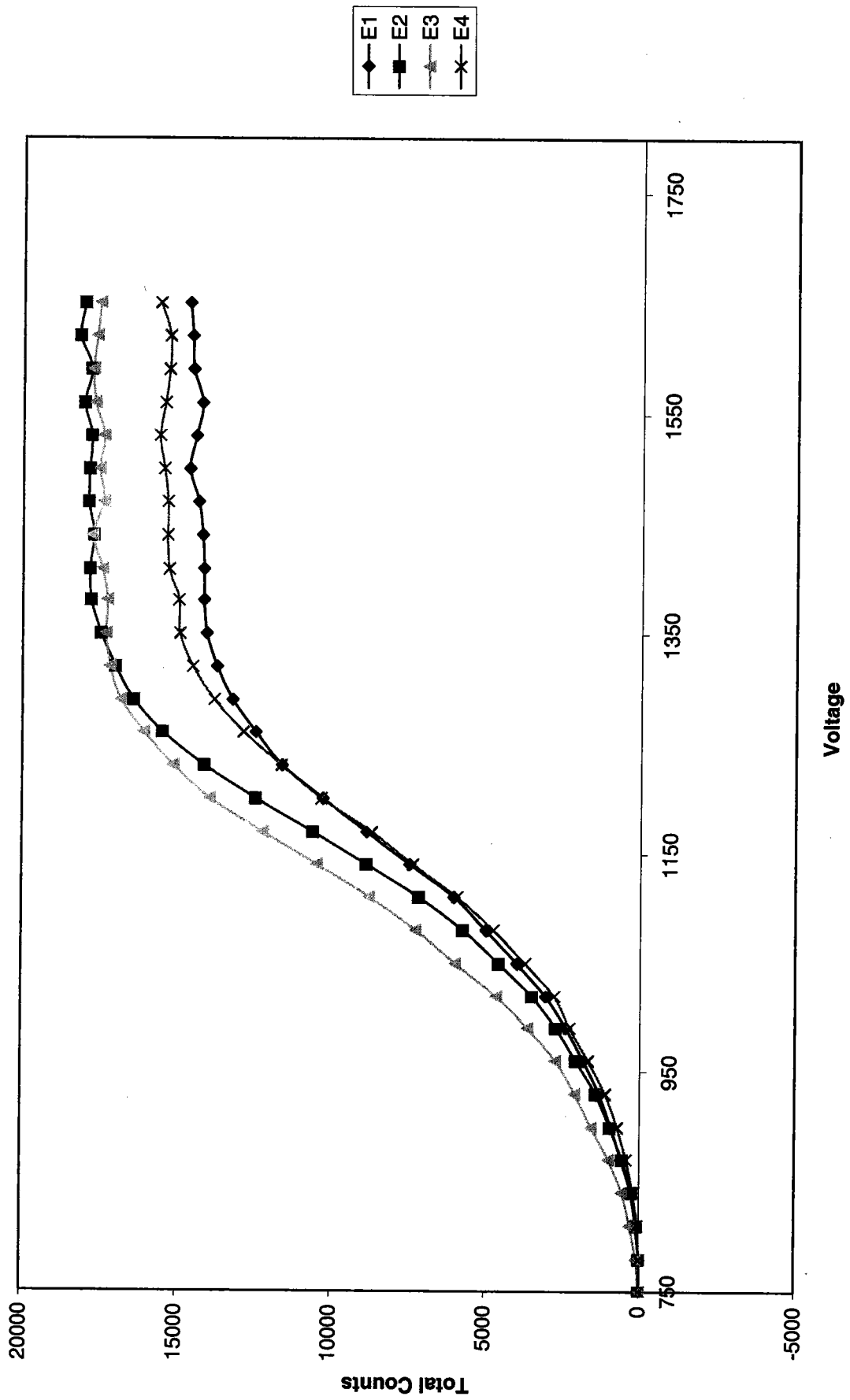
LB4100 Plateau - C Drawer



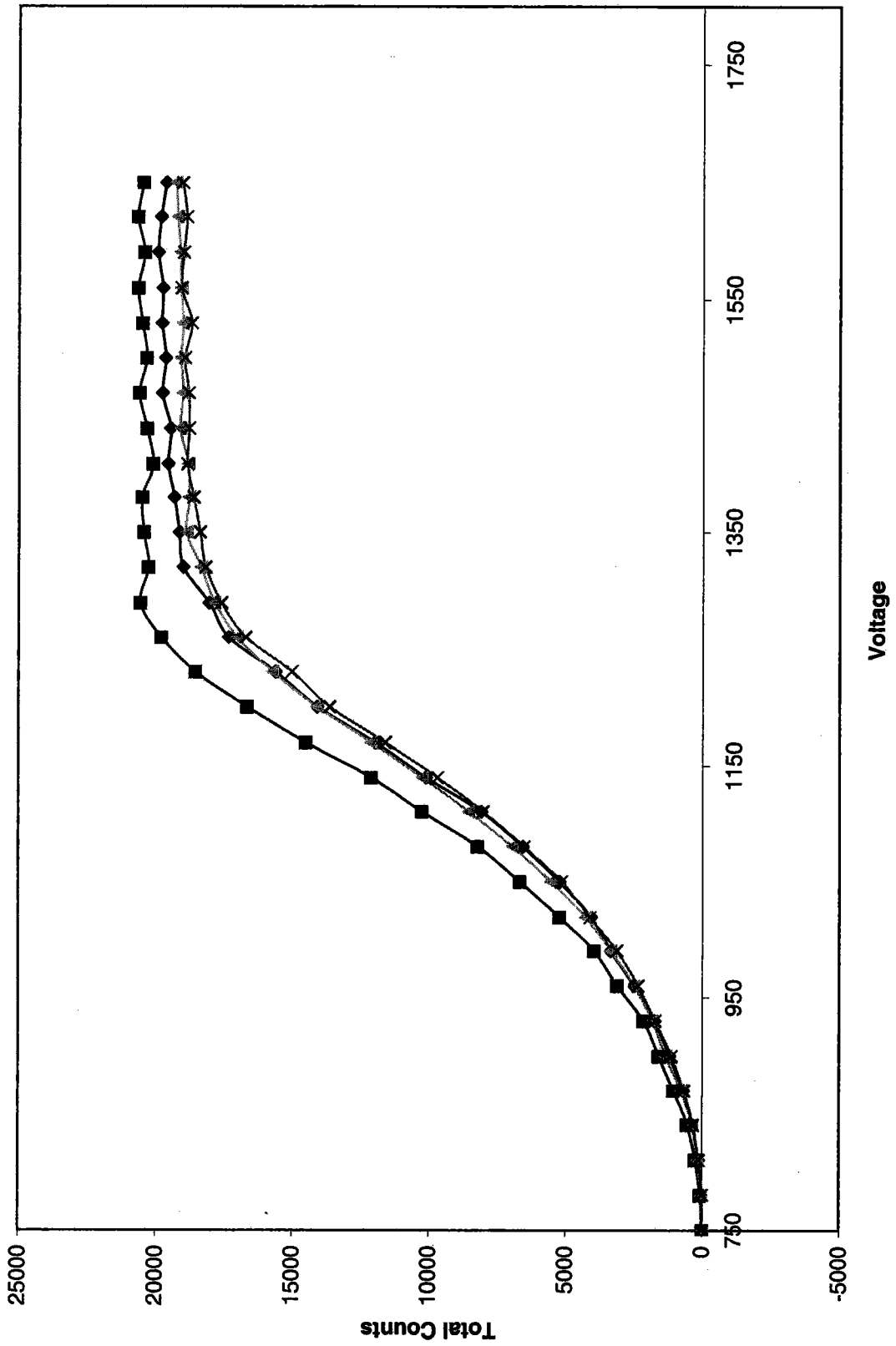
LB4100 Plateau - D Drawer



LB4100 Plateau - E Drawer

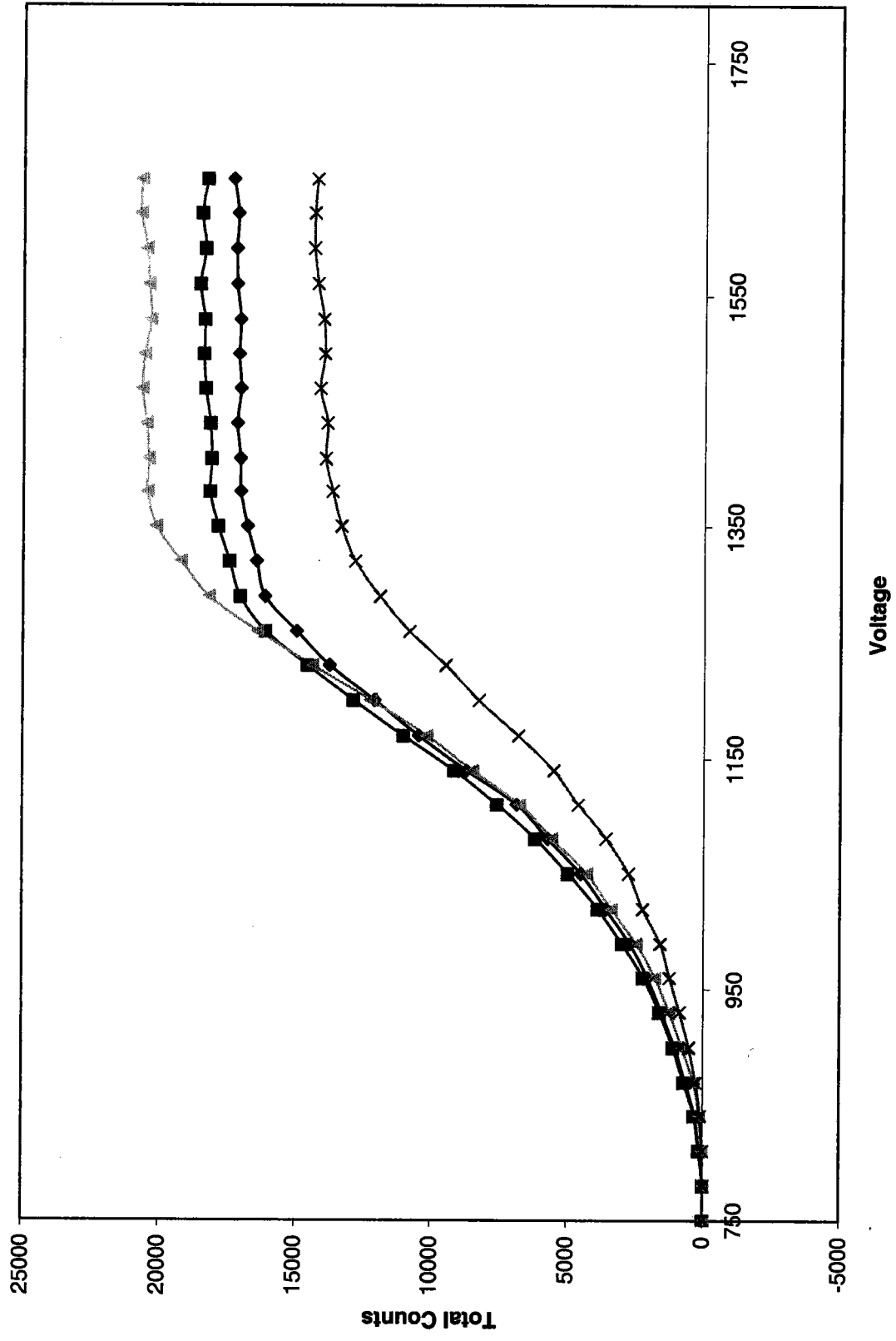


LB4100 Plateau - F Drawer



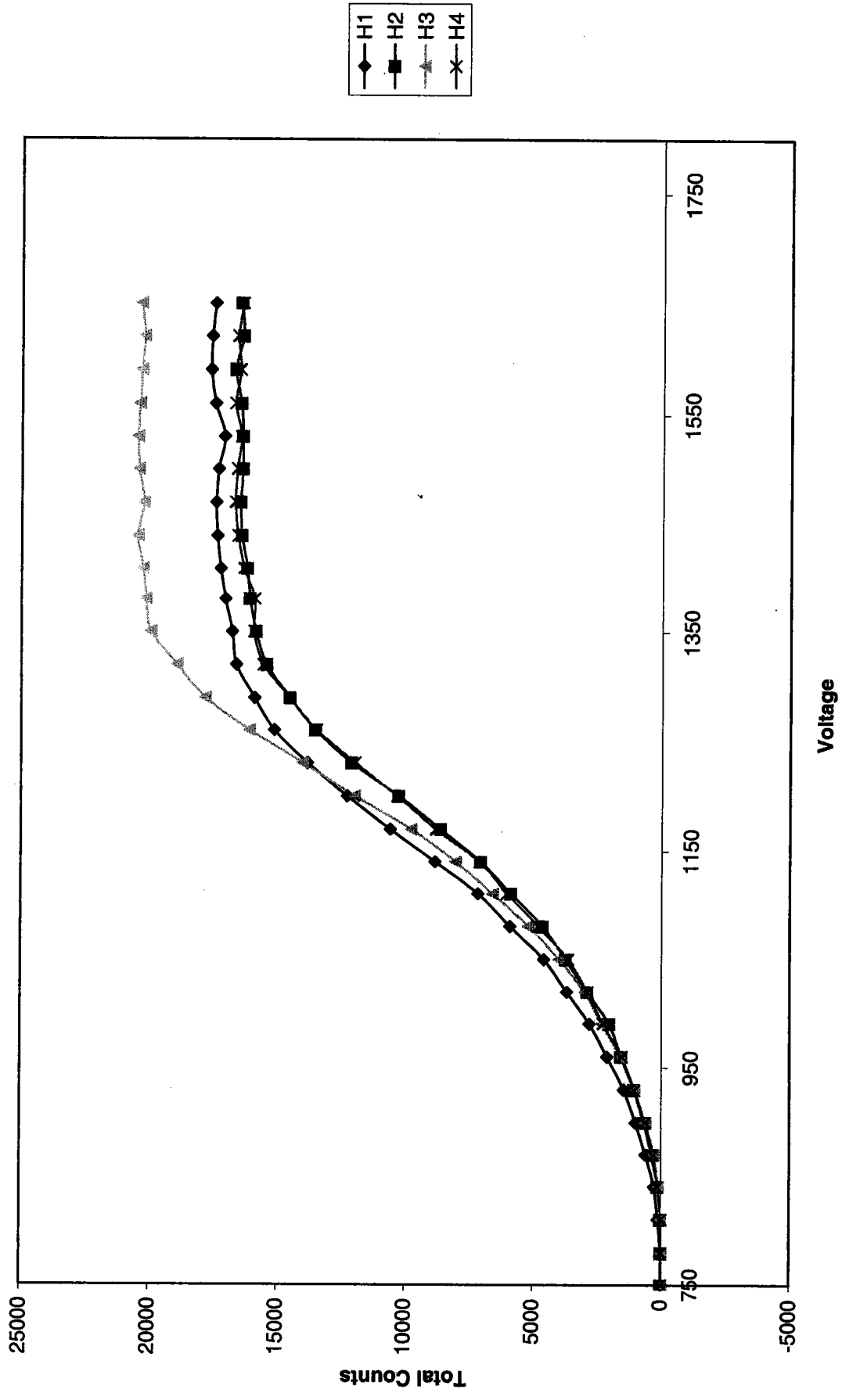
F1
F2
F3
F4

LB4100 Plateau - G Drawer



Legend:
-◆- G1
-■- G2
-▲- G3
-×- G4

LB4100 Plateau - H Drawer



CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

66002-278

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):	2.367 E4
HALF-LIFE:	5.75 years
CALIBRATION DATE:	April 23, 2003 12:00 EST
TOTAL UNCERTAINTY*:	2.4%

*95% Confidence Level

Impurities: γ -impurities (other than decay products) <0.1%,
Ra-226 <0.1%

5.31628 grams 4M HCl solution with 100 μ g/g Ba carrier.

P O NUMBER 3219 RD, Item 1

SOURCE PREPARED BY:

M. Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED:

LM. Monty 4-23-03



Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0553-A	Isotope:	Radium-228 SPIKE
Prepared By:	Lonnie Morris	Prepared By:	Lonnie Morris
Carrier Conc:	0.5M HCl	Prep Date:	04/25/2003
Reference Date:	04/23/2003	Verification Date:	04/27/2005
Ampoule Mass (g):	5.0235 g	Expiration Date:	04/27/2006
Uncertainty:	+/-	Primary Code:	0553-B
LogBook No:	RC-S-035-068	Dilution(mL):	1000 mL
		Mass of Parent(g):	30.535 g
		Density(g/mL):	
		Balance ID:	

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

$(\text{Mass of parent(g)}) * (\text{Parm Activity (dpm/mL)}) * (\text{conversion dpm to dpm}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (dpm/mL)}) * (\text{conversion dpm to dpm}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(30.535 \text{ g}) * (13419.8626 \text{ dpm/mL}) * (1 \text{ dpm/dpm}) / (1000 \text{ mL}) = 409.7755 \text{ dpm/mL}$
$(30.535 \text{ g}) * (13419.8626 \text{ dpm/mL}) * (1 \text{ dpm/dpm}) / (\text{g/mL}) / (1000 \text{ mL}) = \text{dpm/g}$

Secondary Standards

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

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: γ -impurities <0.1%5.02617 grams 0.1M HCl solution with 110 μ g/g Ba carrier.

P O NUMBER 3208RD, Item 2

SOURCE PREPARED BY: M. Taskaeva
M. Taskaeva, RadiochemistQ A APPROVED: M. M. 10-2-02



Standard Traceability Log Rad

Source Material Info	
Parent Code:	0503
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	10/01/2002
Ampoule Mass (g):	5.02617 g
Uncertainty:	+/- 3.6 %
LogBook No:	RC S 035 018

A Solution Material Info	
Isotope:	Radium-228
Prepared By:	Angela Johnson
Prep Date:	02/20/2003
Verification Date:	04/09/2004
Expiration Date:	04/09/2005
Primary Code:	0503-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.4737 g
Density(g/mL):	0.9992
Balance ID:	

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

$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (60 \text{ dpm/dps}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10355.2060 \text{ dpm/mL}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (60 \text{ dpm/dps}) / (0.9992 \text{ g/mL}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10363.0820 \text{ dpm/g}$

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	09/13/2008	09/13/2009

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 0503-B

D. Roy 9/13/2008	Isotope	Detector CPM	BKG CPM	NET CPM	Detector Eff Mass. Used (mL)	Standard Source DPM/mL
	0503-B	1962.0000	45.6000	1916.4000	9.263763	206.8705773
	0503-B	1963.2000	45.6000	1937.6000	9.263763	209.1590642
	0503-B	1927.0000	45.6000	1881.4000	9.263763	203.092415

Mean Value (Counting) = 206.3740189
 Stdev = 3.063655617

Certificate Value = 200.596
 Lower Limit = 200.2467076
 Upper Limit = 212.5013301
 Rule 1 Pass/Fail Pass
 Two sigma = 6.127311233
 10 % of Mean = 20.63740189
 Rule 2 (Pass/Fail) Pass

102.890426
 0.01484516 Rule 3 (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 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 Gold for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 9/13/08 using source 0683-A (Ra-228). Calibration data is recorded in this logbook under Ra-228 0683-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

David J. Roy 9/16/08
Angela Johnson 9/17/08

2011/6
22

16 SEP 2008 16:24

ID: TOTAL ACTIVITY

USER:11 COMMENT:GOLD
PRESET TIME : 5.00
DATA CALC : CPM H# :YES SAMPLE REPEATS: 1 PRINTER : STD
COUNT BLANK : NO IC# : NO REPLICATES : 1 RS232 :EDIT
TWO PHASE : NO AGC : NO CYCLE REPEATS : 1 DISK : OFF
SCINTILLATOR: LIQUID LUMEX:YES LOW SAMPLE REJ: 0
LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

CHAN: 0.0 - 990.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 0.0 - 1000.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		
1	11-1	5.00	98.2	50.40	12.60	54.00	12.17	0.41	5.55
2	11-2	1.30	99.3	7802.31	1.99	7803.08	1.99	0.00	7.81
3	11-3	1.30	100.4	7782.31	1.99	7786.15	1.99	0.00	10.14
4	11-4	1.35	99.2	7581.48	1.98	7585.19	1.98	0.01	12.51
5	11-5	5.00	97.9	45.60	13.25	47.20	13.02	0.43	18.61
6	11-6	5.00	110.7	1962.00	2.02	1964.80	2.02	0.01	24.65
7	11-7	5.00	110.8	1983.20	2.01	1984.80	2.01	0.01	30.75
8	11-8	5.00	110.7	1927.00	2.04	1927.80	2.04	0.02	36.85

8/16/08
28

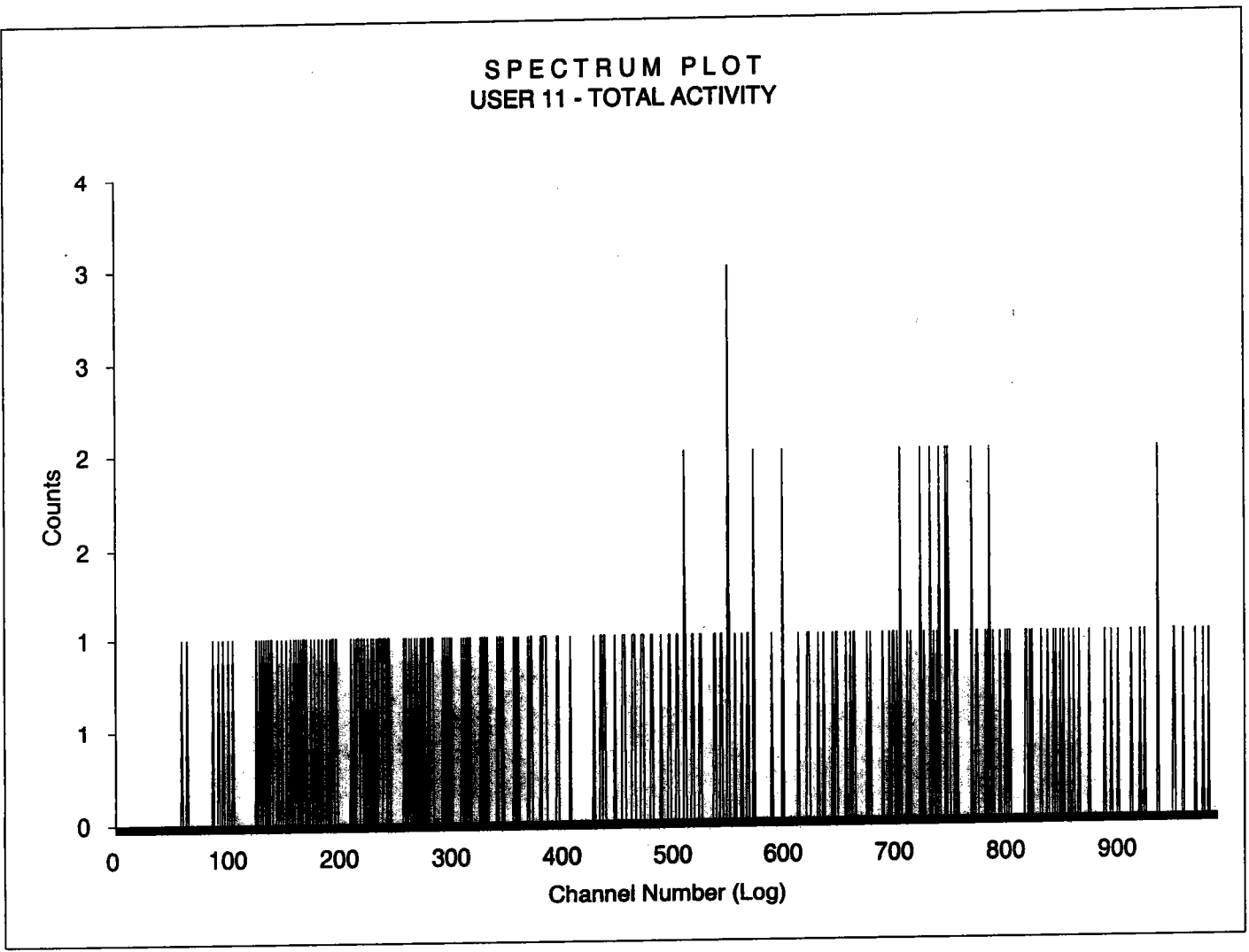
Sample Count Start Time:
Data Capture Date:
User Filename:

16 Sep 2008 16:46:59

9/16/2008 16:52:01
S11091611-5A.WK1
U11091611-1A.WK1

Spectrum Type
User Number:
User Id:
User Comment:
Isotope Name:
Scintillator:
Sample, Rack-Pos, Time:
H#, Total Counts:
Start, End, X-Axis:

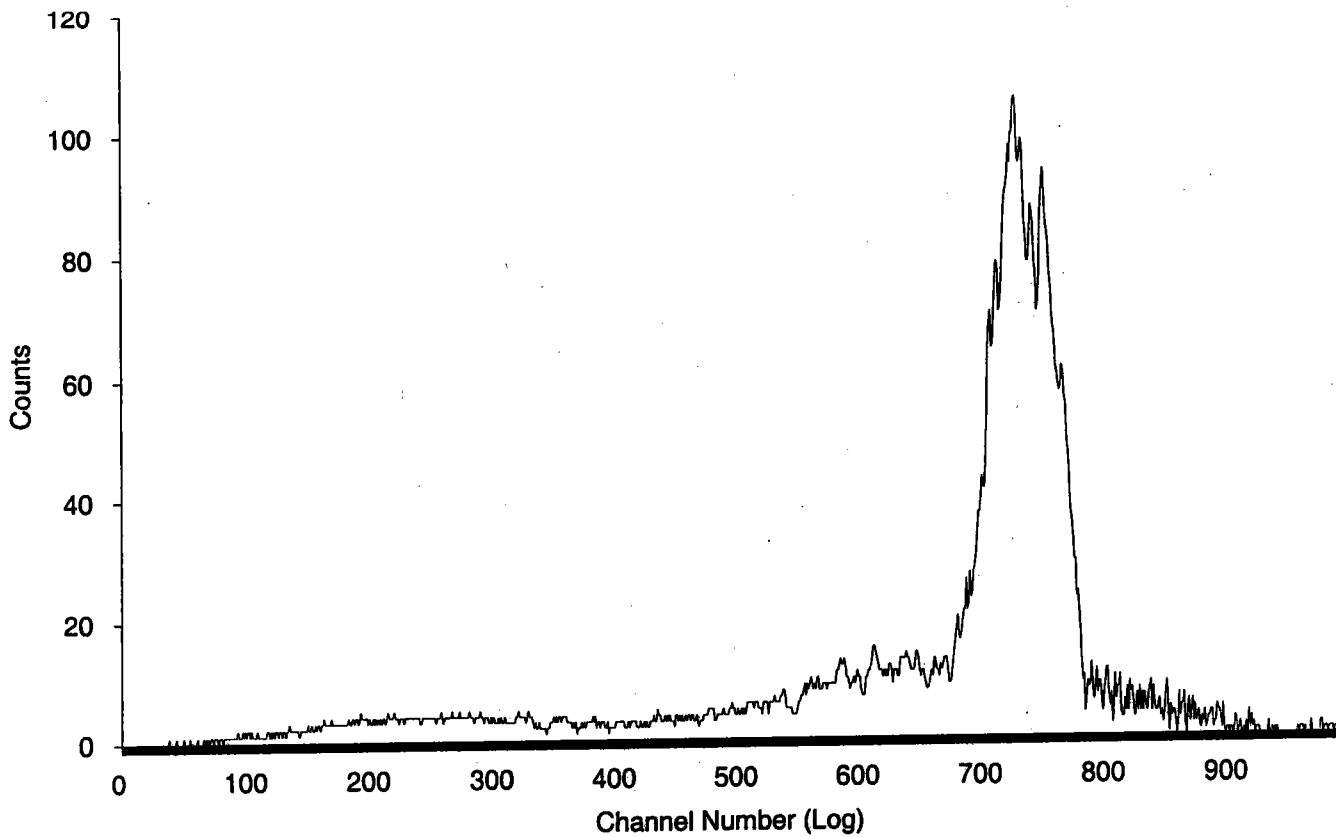
Log Counts
11
TOTAL ACTIVITY
GOLD
14C
LIQUID
5 11-5 5.00
97.9 69
0 990 Channel Number



9/16/08

Sample Count Start Time: 16 Sep 2008 16:53:01
Data Capture Date: 9/16/2008 16:58:06
User Filename: S11091611-6A.WK1
U11091611-1A.WK1
Spectrum Type Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 6 11-6 5.00
H#, Total Counts: 110.7 7666
Start, End, X-Axis: 0 990 Channel Number

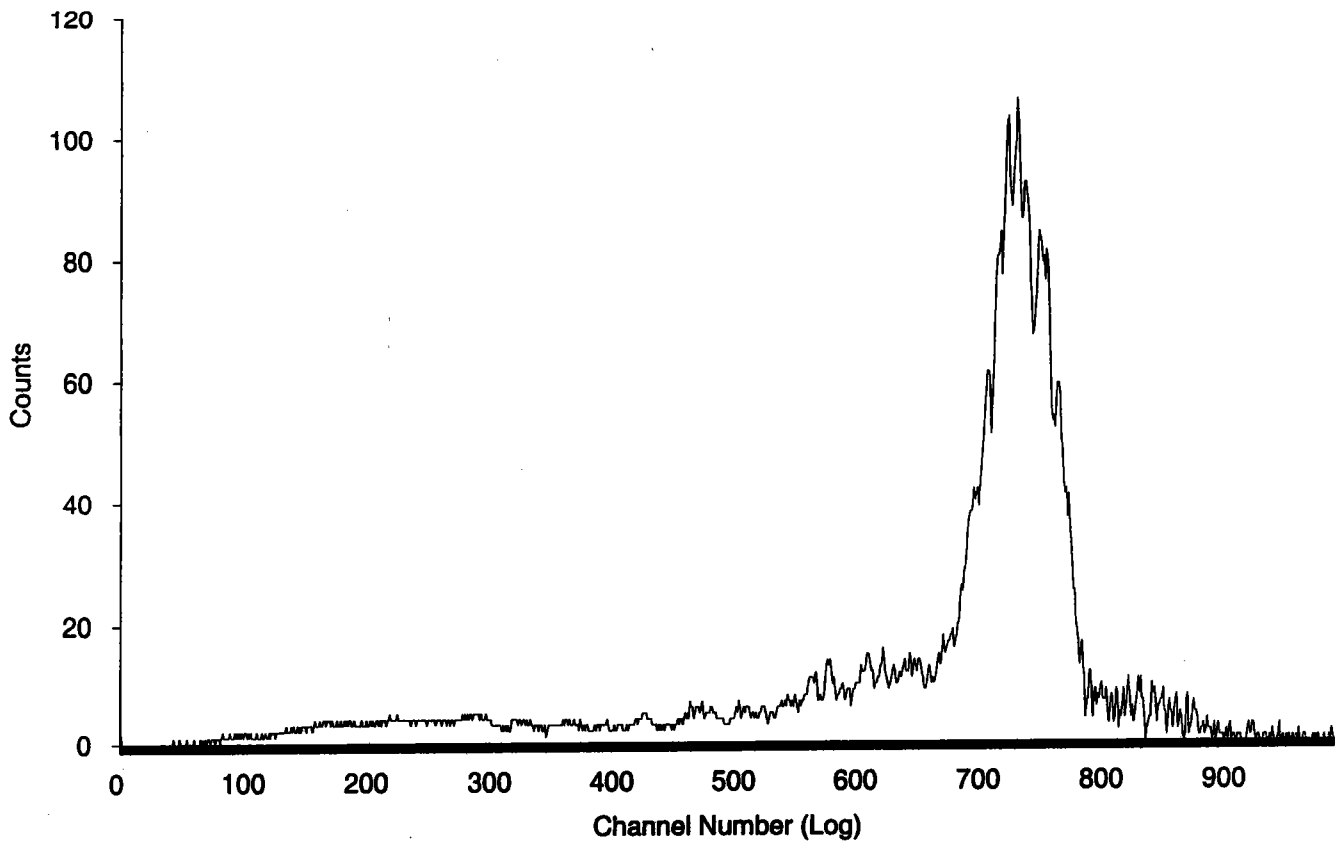
SPECTRUM PLOT
USER 11 - TOTAL ACTIVITY



8/19/16
LSD

Sample Count Start Time:	16 Sep 2008 16:59:07
Data Capture Date:	9/16/2008 17:04:12
User Filename:	S11091611-7A.WK1 U11091611-1A.WK1
Spectrum Type	Log Counts
User Number:	11
User Id:	TOTAL ACTIVITY
User Comment:	GOLD
Isotope Name:	14C
Scintillator:	LIQUID
Sample, Rack-Pos, Time:	7 11-7 5.00
H#, Total Counts:	110.8 7726
Start, End, X-Axis:	0 990 Channel Number

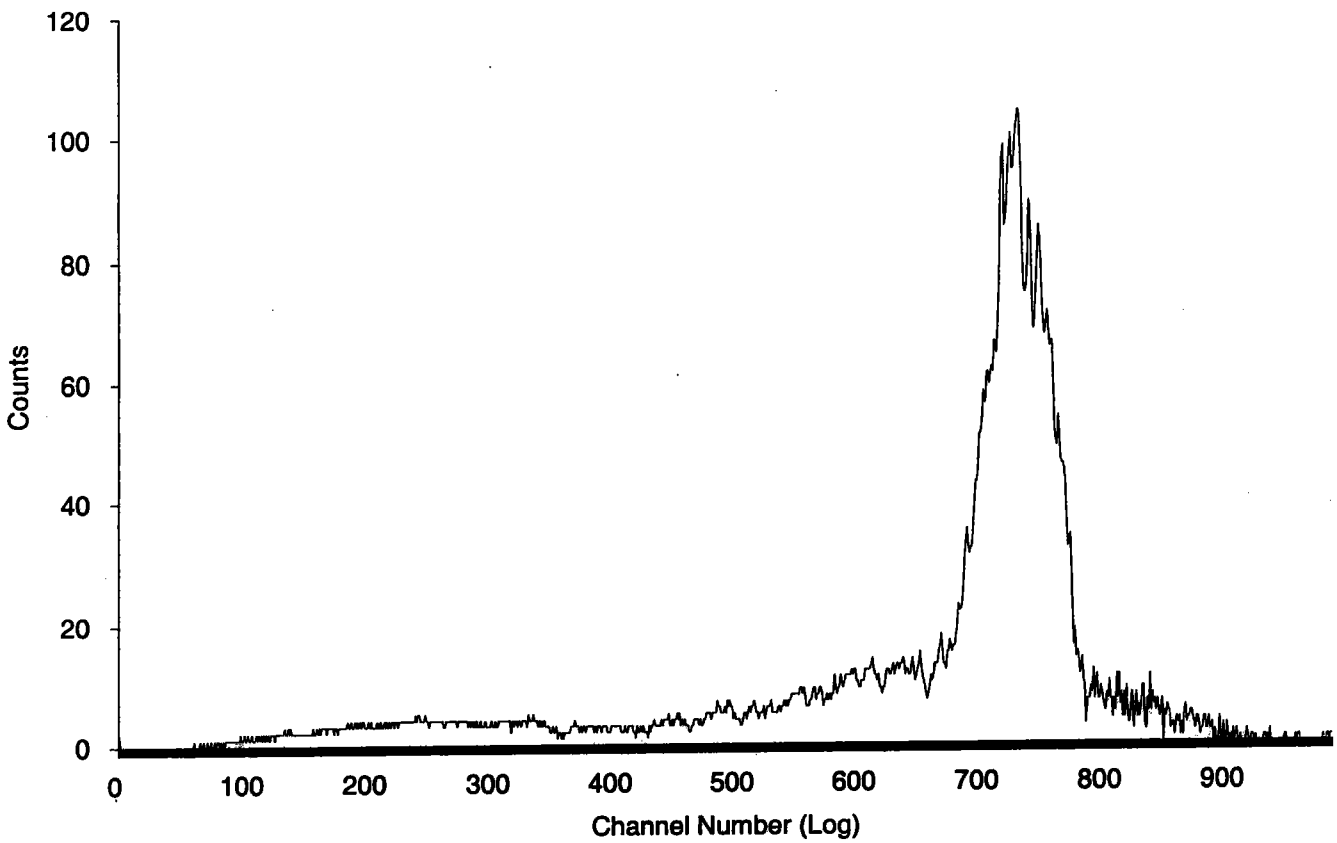
SPECTRUM PLOT
USER 11 - TOTAL ACTIVITY



9/16/08
S

Sample Count Start Time: 16 Sep 2008 17:05:13
Data Capture Date: 9/16/2008 17:10:18
User Filename: S11091611-8A.WK1
U11091611-1A.WK1
Spectrum Type: Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 8 11-8 5.00
H#, Total Counts: 110.7 7557
Start, End, X-Axis: 0 990 Channel Number

SPECTRUM PLOT
USER 11 - TOTAL ACTIVITY



Radium-228 Que Sheet

SRS 6/30/09

Batch #: 881540
 Analyst: DXM2
 First Client Due Date: Internal Due Date: 07/03/2009
 Spike Isotope: Radium-228
 Spike Code: NA
 Expiration Date: NA
 LCS Isotope: Radium-228
 LCS Code: DS03-B
 Expiration Date: 9/13/09
 Tracer Isotope: Barium-133
 Tracer Code: 0112-J
 Expiration Date: 2/17/10
 Prep Date: 6/30/09
 Initials: JRS
 Pipet ID: 1734218
 Balance ID: NA
 Ac-228 Separation Date/Time: 7-2-09 0540
 Witness: JRS 6/30/09

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collect Date & Time	Pos. #	Vol (mL)	Det #	Ba Yield (%)	Gamma Det. #
1201872112-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	1	20		100.83	↑
1201872113-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	2	20		108.20	
1201872114-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	3	20		114.22	
1201872115-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	4	20		120.58	WZAL
1201872116-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	5	20		105.84	
1201872117-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	6	20		102.70	
1201872118-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	7	20		112.82	
1201872119-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	8	20		111.91	↓

JRS 7/1/09

[Handwritten Signature]

Data Reviewed By: _____

Comments: _____

ASSAY 30-Jun-09 19:32:06

Protocol id 8 228_REC
Time limit 180
Count limit 50000
Isotope Ba-133
Protocol date 9-Apr-07 10:03:07
Run id. 54

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	97	1	180	779	229.3	4.13		19:32:13
2	97	2	180	785	231.2	4.11	100.83	19:35:24
3	97	3	180	835	248.1	3.95	108.20	19:38:35
4	97	4	180	877	261.9	3.83	114.22	19:41:47
5	97	5	180	921	276.5	3.71	120.58	19:44:58
6	72	6	180	819	242.7	4	105.84	19:48:17
7	72	7	180	798	235.5	4.07	102.70	19:51:28
8	72	8	180	867	258.7	3.85	112.82	19:54:40
9	72	9	180	861	256.6	3.87	111.91	19:57:51

END OF ASSAY

[Handwritten signature]
7/2/09

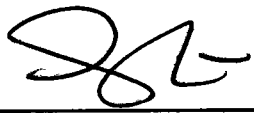
General Engineering Laboratories

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

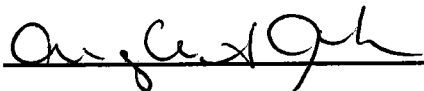
Gas Flow Proportional Counter Calibration Package

Method: Ra-228 (AC)

	YES	NO	Comments
1) Is all calibration standard information enclosed for: primary standard certificate? secondary 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?			Average Efficiency
	<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"/>		
5) Is the method Carrier Standardization included?			N/A

Prepared By: 

Date: 7/2/09

Reviewed By: 

Date: 7/2/09

Effective Date: 7/2/09

Ra-228 Calibration PROTEAN Detectors

Detector #	Source #	Seperation date	Count date	Ac-228 decay (dec)	Spike Vol. Ra-228 (mL)	Std. Act. Ra-228 dpm/mL	Standard Nominal dpm	raw beta counts	ct. time (min)	Beta cpm	corrected* cpm	Ra-228 eff (cpm/dpm)	Seperation time	
													Decay Corrected	Volume corrected
1A	1	7/1/09 10:45	7/1/2009 13:36	0.7249	1.5	6363.2	9544.8	13564	3	4521.3	6237.434348	0.6535		
1A	2	7/1/09 10:45	7/1/2009 13:52	0.7032	1.5	6363.2	9544.8	12775	3	4258.3	6055.521583	0.6344		
1A	3	7/1/09 10:45	7/1/2009 13:48	0.7083	1.5	6363.2	9544.8	12750	3	4250.0	6000.085083	0.6286	Average EFF	
1A	4	7/1/09 10:45	7/1/2009 13:41	0.7170	1.5	6363.2	9544.8	12410	3	4136.7	5769.683602	0.6045	0.6303	
1B	1	7/1/09 10:45	7/1/2009 13:41	0.7174	1.5	6363.2	9544.8	13292	3	4430.7	6176.07771	0.6471		
1B	2	7/1/09 10:45	7/1/2009 13:36	0.7246	1.5	6363.2	9544.8	13274	3	4424.7	6106.181463	0.6397		
1B	3	7/1/09 10:45	7/1/2009 13:52	0.7031	1.5	6363.2	9544.8	12699	3	4233.0	6020.43969	0.6308	Average EFF	
1B	4	7/1/09 10:45	7/1/2009 13:48	0.7082	1.5	6363.2	9544.8	12072	3	4024.0	5682.267909	0.5953	0.6282	
1C	1	7/1/09 10:45	7/1/2009 13:48	0.7085	1.5	6363.2	9544.8	12813	3	4271.0	6028.410186	0.6316		
1C	2	7/1/09 10:45	7/1/2009 13:41	0.7172	1.5	6363.2	9544.8	12979	3	4326.3	6032.15531	0.6320		
1C	3	7/1/09 10:45	7/1/2009 13:36	0.7245	1.5	6363.2	9544.8	12755	3	4251.7	5688.722998	0.6149	Average EFF	
1C	4	7/1/09 10:45	7/1/2009 13:52	0.7030	1.5	6363.2	9544.8	11917	3	3972.3	5650.765354	0.5920	0.6176	
1D	1	7/1/09 10:45	7/1/2009 13:52	0.7033	1.5	6363.2	9544.8	12473	3	4157.7	5911.258105	0.6193		
1D	2	7/1/09 10:45	7/1/2009 13:48	0.7084	1.5	6363.2	9544.8	12484	3	4161.3	5874.170562	0.6154		
1D	3	7/1/09 10:45	7/1/2009 13:41	0.7171	1.5	6363.2	9544.8	12289	3	4096.3	5712.363902	0.5985	Average EFF	
1D	4	7/1/09 10:45	7/1/2009 13:36	0.7243	1.5	6363.2	9544.8	12115	3	4038.3	5575.47435	0.5841	0.6043	
2A	1	7/1/09 10:45	7/1/2009 13:57	0.6960	1.5	6363.2	9544.8	12499	3	4166.3	5986.085459	0.6272		
2A	2	7/1/09 10:45	7/1/2009 14:15	0.6728	1.5	6363.2	9544.8	12103	3	4034.3	5996.6905	0.6283		
2A	3	7/1/09 10:45	7/1/2009 14:09	0.6815	1.5	6363.2	9544.8	11968	3	3989.3	5854.110901	0.6133	Average EFF	
2A	4	7/1/09 10:45	7/1/2009 14:02	0.6899	1.5	6363.2	9544.8	11855	3	3951.7	5728.227222	0.6001	0.6172	
2B	1	7/1/09 10:45	7/1/2009 14:02	0.6903	1.5	6363.2	9544.8	12471	3	4157.0	6022.266434	0.6309		
2B	2	7/1/09 10:45	7/1/2009 13:57	0.6958	1.5	6363.2	9544.8	12492	3	4164.0	5984.232843	0.6270		
2B	3	7/1/09 10:45	7/1/2009 14:15	0.6727	1.5	6363.2	9544.8	11892	3	3964.0	5892.884561	0.6174	Average EFF	
2B	4	7/1/09 10:45	7/1/2009 14:09	0.6814	1.5	6363.2	9544.8	11539	3	3846.3	5644.974311	0.5914	0.6167	
2C	1	7/1/09 10:45	7/1/2009 14:08	0.6817	1.5	6363.2	9544.8	12050	3	4016.7	5892.005142	0.6173		
2C	2	7/1/09 10:45	7/1/2009 14:02	0.6901	1.5	6363.2	9544.8	11914	3	3971.3	5754.571355	0.6029		
2C	3	7/1/09 10:45	7/1/2009 13:58	0.6957	1.5	6363.2	9544.8	11994	3	3998.0	5746.92868	0.6021	Average EFF	
2C	4	7/1/09 10:45	7/1/2009 14:15	0.6726	1.5	6363.2	9544.8	10889	3	3629.7	5396.37168	0.5654	0.5969	
2D	1	7/1/09 10:45	7/1/2009 14:15	0.6729	1.5	6363.2	9544.8	12010	3	4003.3	5949.493049	0.6233		
2D	2	7/1/09 10:45	7/1/2009 14:08	0.6816	1.5	6363.2	9544.8	12124	3	4041.3	5929.303014	0.6212		
2D	3	7/1/09 10:45	7/1/2009 14:02	0.6900	1.5	6363.2	9544.8	12168	3	4056.0	5878.360714	0.6159	Average EFF	
2D	4	7/1/09 10:45	7/1/2009 13:58	0.6954	1.5	6363.2	9544.8	11692	3	3897.3	5604.158523	0.5871	0.6119	
3A	1	7/1/09 10:45	7/1/2009 14:19	0.6675	1.5	6363.2	9544.8	11194	3	3731.3	5589.748519	0.5856		
3A	2	7/1/09 10:45	7/1/2009 14:30	0.6482	1.5	6363.2	9544.8	14227	4	3556.8	5486.792678	0.5748		
3A	3	7/1/09 10:45	7/1/2009 14:35	0.6548	1.5	6363.2	9544.8	14180	4	3545.0	5414.108112	0.5672	Average EFF	
3A	4	7/1/09 10:45	7/1/2009 14:25	0.6608	1.5	6363.2	9544.8	13754	4	3438.5	5203.464549	0.5452	0.5682	
3B	1	7/1/09 10:45	7/1/2009 14:25	0.6612	1.5	6363.2	9544.8	15370	4	3842.5	5811.010789	0.6088		
3B	2	7/1/09 10:45	7/1/2009 14:20	0.6673	1.5	6363.2	9544.8	11695	3	3898.3	5842.303251	0.6121		
3B	3	7/1/09 10:45	7/1/2009 14:35	0.6481	1.5	6363.2	9544.8	14905	4	3726.3	5749.171166	0.6023	Average EFF	
3B	4	7/1/09 10:45	7/1/2009 14:30	0.6547	1.5	6363.2	9544.8	14220	4	3555.0	5430.231301	0.5689	0.5980	
3C	1	7/1/09 10:45	7/1/2009 14:29	0.6552	1.5	6363.2	9544.8	15644	4	3911.0	5969.527404	0.6254		
3C	2	7/1/09 10:45	7/1/2009 14:25	0.6611	1.5	6363.2	9544.8	15964	4	3991.0	6036.911214	0.6325		
3C	3	7/1/09 10:45	7/1/2009 14:20	0.6672	1.5	6363.2	9544.8	11701	3	3900.3	5846.033242	0.6125	Average EFF	
3C	4	7/1/09 10:45	7/1/2009 14:35	0.6480	1.5	6363.2	9544.8	14729	4	3682.3	5682.352456	0.5953	0.6164	
3D	1	7/1/09 10:45	7/1/2009 14:35	0.6484	1.5	6363.2	9544.8	15152	4	3788.0	5842.430209	0.6121		
3D	2	7/1/09 10:45	7/1/2009 14:30	0.6550	1.5	6363.2	9544.8	15168	4	3792.0	5789.343603	0.6065		
3D	3	7/1/09 10:45	7/1/2009 14:25	0.6610	1.5	6363.2	9544.8	15295	4	3823.8	5785.011122	0.6061	Average EFF	
3D	4	7/1/09 10:45	7/1/2009 14:20	0.6670	1.5	6363.2	9544.8	10942	3	3647.3	5468.022172	0.5729	0.5994	
4A	1	7/1/09 10:45	7/1/2009 14:40	0.6418	1.5	6363.2	9544.8	15298	4	3824.5	5959.288371	0.6243		
4A	2	7/1/09 10:45	7/1/2009 15:00	0.6187	1.5	6363.2	9544.8	14897	4	3724.3	6019.957238	0.6307		
4A	3	7/1/09 10:45	7/1/2009 14:53	0.6266	1.5	6363.2	9544.8	15050	4	3762.5	6005.095127	0.6291	Average EFF	
4A	4	7/1/09 10:45	7/1/2009 14:48	0.6325	1.5	6363.2	9544.8	14462	4	3615.5	5715.951787	0.5989	0.6208	
4B	1	7/1/09 10:45	7/1/2009 14:48	0.6329	1.5	6363.2	9544.8	15335	4	3833.8	6057.768128	0.6347		
4B	2	7/1/09 10:45	7/1/2009 14:41	0.6416	1.5	6363.2	9544.8	15513	4	3878.3	6044.745331	0.6333		
4B	3	7/1/09 10:45	7/1/2009 15:00	0.6186	1.5	6363.2	9544.8	14521	4	3630.3	5868.58525	0.6148	Average EFF	
4B	4	7/1/09 10:45	7/1/2009 14:53	0.6265	1.5	6363.2	9544.8	14328	4	3582.0	5717.547589	0.5990	0.6205	
4C	1	7/1/09 10:45	7/1/2009 14:53	0.6268	1.5	6363.2	9544.8	14733	4	3683.3	5876.583259	0.6157		
4C	2	7/1/09 10:45	7/1/2009 14:48	0.6327	1.5	6363.2	9544.8	14902	4	3725.5	5888.011911	0.6169		
4C	3	7/1/09 10:45	7/1/2009 14:41	0.6414	1.5	6363.2	9544.8	14856	4	3714.0	5790.010842	0.6066	Average EFF	
4C	4	7/1/09 10:45	7/1/2009 15:00	0.6185	1.5	6363.2	9544.8	13733	4	3433.3	5550.795964	0.5816	0.6052	
4D	1	7/1/09 10:45	7/1/2009 15:00	0.6188	1.5	6363.2	9544.8	14167	4	3541.8	5723.884149	0.5997		
4D	2	7/1/09 10:45	7/1/2009 14:53	0.6267	1.5	6363.2	9544.8	14204	4	3551.0	5666.467573	0.5937		
4D	3	7/1/09 10:45	7/1/2009 14:48	0.6326	1.5	6363.2	9544.8	14131	4	3532.8	5584.07765	0.5850	Average EFF	
4D	4	7/1/09 10:45	7/1/2009 14:41	0.6413	1.5	6363.2	9544.8	13978	4	3494.5	5449.182717	0.5709	0.5873	
5A	1	7/1/09 10:45	7/1/2009 15:06	0.6112	1.5	6363.2	9544.8	14870	4	3717.5	6082.165089	0.6372		
5A	2	7/1/09 10:45	7/1/2009 15:21	0.5943	1.5	6363.2	9544.8	14487	4	3621.8	6094.223373	0.6385		
5A	3	7/1/09 10:45	7/1/2009 15:17	0.5996	1.5	6363.2	9544.8	14259	4	3564.8	5945.170793	0.6229	Average EFF	
5A	4	7/1/09 10:45	7/1/2009 15:12	0.6047	1.5	6363.2	9544.8	13957	4	3489.3	5770.592799	0.6046	0.6258	
5B	1	7/1/09 10:45	7/1/2009 15:12	0.6050	1.5	6363.2	9544.8	14869	4	3717.3	6144.005028	0.6437		
5B	2	7/1/09 10:45	7/1/2009 15:06	0.6111	1.5	6363.2	9544.8	14821	4	3705.3	6063.072791	0.6352		
5B	3	7/1/09 10:45	7/1/2009 15:21	0.5942	1.5	6363.2	9544.8	14289	4	3572.3	6011.872812	0.6299	Average EFF	
5B	4	7/1/09 10:45	7/1/2009 15:17	0.5995	1.5	6363.2	9544.8	13809	4	3452.3	5758.629577	0.6033	0.6280	
5C	1	7/1/09 10:45	7/1/2009 15:17	0.5994	1.5	6363.2	9544.8	14676	4	3669.0	6120.953053	0.6413		
5C	2	7/1/09 10:45	7/1/2009 15:12	0.6049	1.5	6363.2	9544.8	15122	4	3780.5	6249.917577	0.6548		
5C	3	7/1/09 10:45	7/1/2009 15:07	0.6108	1.5	6363.2	9544.8	14958	4	3739.5	6121.8025	0.6414	Average EFF	

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5C	4	7/1/09 10:45	7/1/2009 15:21	0.5941	1.5	6363.2	9544.8	13831	4	3457.8	5819.905873	0.6097	0.6368
5D	1	7/1/09 10:45	7/1/2009 15:21	0.5943	1.5	6363.2	9544.8	14321	4	3580.3	6024.014899	0.6311	
5D	2	7/1/09 10:45	7/1/2009 15:17	0.5993	1.5	6363.2	9544.8	14642	4	3680.5	6107.538025	0.6399	
5D	3	7/1/09 10:45	7/1/2009 15:12	0.6048	1.5	6363.2	9544.8	14443	4	3610.8	5970.409434	0.6255	Average EFF
5D	4	7/1/09 10:45	7/1/2009 15:07	0.6107	1.5	6363.2	9544.8	13954	4	3488.5	5711.973074	0.5984	0.6237
6A	1	7/1/09 10:45	7/1/2009 15:27	0.5885	1.5	6363.2	9544.8	14018	4	3504.5	5955.42076	0.6239	
6A	2	7/1/09 10:45	7/1/2009 15:40	0.5735	1.5	6363.2	9544.8	12283	3.5	3509.4	6118.819734	0.6411	
6A	3	7/1/09 10:45	7/1/2009 15:36	0.5779	1.5	6363.2	9544.8	12111	3.5	3460.3	5987.187856	0.6273	Average EFF
6A	4	7/1/09 10:45	7/1/2009 15:32	0.5826	1.5	6363.2	9544.8	11598	3.5	3313.7	5687.952648	0.5959	0.6221
6B	1	7/1/09 10:45	7/1/2009 15:32	0.5824	1.5	6363.2	9544.8	12151	3.5	3471.7	5961.398905	0.6246	
6B	2	7/1/09 10:45	7/1/2009 15:27	0.5885	1.5	6363.2	9544.8	14371	4	3592.8	6105.389624	0.6397	
6B	3	7/1/09 10:45	7/1/2009 15:40	0.5734	1.5	6363.2	9544.8	11705	3.5	3344.3	5831.983307	0.6110	Average EFF
6B	4	7/1/09 10:45	7/1/2009 15:36	0.5779	1.5	6363.2	9544.8	11388	3.5	3253.7	5630.295163	0.5899	0.6163
6C	1	7/1/09 10:45	7/1/2009 15:36	0.5778	1.5	6363.2	9544.8	12161	3.5	3474.6	6013.224586	0.6300	
6C	2	7/1/09 10:45	7/1/2009 15:32	0.5821	1.5	6363.2	9544.8	12083	3.5	3452.3	5930.638446	0.6213	
6C	3	7/1/09 10:45	7/1/2009 15:27	0.5883	1.5	6363.2	9544.8	13638	4	3409.5	5795.433731	0.6072	Average EFF
6C	4	7/1/09 10:45	7/1/2009 15:40	0.5733	1.5	6363.2	9544.8	11218	3.5	3205.1	5590.212659	0.5857	0.6111
6D	1	7/1/09 10:45	7/1/2009 15:40	0.5732	1.5	6363.2	9544.8	11987	3.5	3424.9	5974.547886	0.6259	
6D	2	7/1/09 10:45	7/1/2009 15:36	0.5777	1.5	6363.2	9544.8	12183	3.5	3480.9	6025.235519	0.6313	
6D	3	7/1/09 10:45	7/1/2009 15:32	0.5819	1.5	6363.2	9544.8	11882	3.5	3394.9	5833.810262	0.6112	Average EFF
6D	4	7/1/09 10:45	7/1/2009 15:27	0.5881	1.5	6363.2	9544.8	13018	4	3254.5	5533.899914	0.5798	0.6120
7A	1	7/1/09 10:45	7/1/2009 15:46	0.5673	1.5	6363.2	9544.8	12007	3.5	3430.6	6047.285806	0.6336	
7A	2	7/1/09 10:45	7/1/2009 16:00	0.5525	1.5	6363.2	9544.8	11655	3.5	3330.0	6027.30696	0.6315	
7A	3	7/1/09 10:45	7/1/2009 15:56	0.5569	1.5	6363.2	9544.8	11445	3.5	3270.0	5871.972756	0.6152	Average EFF
7A	4	7/1/09 10:45	7/1/2009 15:50	0.5627	1.5	6363.2	9544.8	11121	3.5	3177.4	5846.694018	0.5916	0.6180
7B	1	7/1/09 10:45	7/1/2009 15:51	0.5622	1.5	6363.2	9544.8	11988	3.5	3419.4	6082.664171	0.6373	
7B	2	7/1/09 10:45	7/1/2009 15:46	0.5673	1.5	6363.2	9544.8	12050	3.5	3442.9	6069.322745	0.6359	
7B	3	7/1/09 10:45	7/1/2009 16:00	0.5524	1.5	6363.2	9544.8	11675	3.5	3335.7	6038.785014	0.6327	Average EFF
7B	4	7/1/09 10:45	7/1/2009 15:56	0.5567	1.5	6363.2	9544.8	11271	3.5	3220.3	5784.331251	0.6060	0.6280
7C	1	7/1/09 10:45	7/1/2009 15:56	0.5566	1.5	6363.2	9544.8	11781	3.5	3366.0	6047.202464	0.6336	
7C	2	7/1/09 10:45	7/1/2009 15:51	0.5621	1.5	6363.2	9544.8	11760	3.5	3360.0	5978.073192	0.6263	
7C	3	7/1/09 10:45	7/1/2009 15:46	0.5670	1.5	6363.2	9544.8	11766	3.5	3361.7	5928.878357	0.6212	Average EFF
7C	4	7/1/09 10:45	7/1/2009 16:00	0.5523	1.5	6363.2	9544.8	10888	3.5	3110.9	5632.598965	0.5901	0.6178
7D	1	7/1/09 10:45	7/1/2009 16:00	0.5522	1.5	6363.2	9544.8	11805	3.5	3315.7	6004.271132	0.6291	
7D	2	7/1/09 10:45	7/1/2009 15:56	0.5565	1.5	6363.2	9544.8	11920	3.5	3405.7	6119.509991	0.6411	
7D	3	7/1/09 10:45	7/1/2009 15:51	0.5619	1.5	6363.2	9544.8	11933	3.5	3409.4	6067.346561	0.6357	Average EFF
7D	4	7/1/09 10:45	7/1/2009 15:46	0.5668	1.5	6363.2	9544.8	11305	3.5	3230.0	5698.36602	0.5970	0.6257
8A	1	7/1/09 10:45	7/1/2009 16:06	0.5466	1.5	6363.2	9544.8	11673	3.5	3335.1	6101.651756	0.6393	
8A	2	7/1/09 10:45	7/1/2009 16:19	0.5333	1.5	6363.2	9544.8	11172	3.5	3192.0	5985.379105	0.6271	
8A	3	7/1/09 10:45	7/1/2009 16:15	0.5377	1.5	6363.2	9544.8	11258	3.5	3216.6	5982.329368	0.6268	Average EFF
8A	4	7/1/09 10:45	7/1/2009 16:10	0.5424	1.5	6363.2	9544.8	10977	3.5	3136.3	5782.059146	0.6058	0.6247
8B	1	7/1/09 10:45	7/1/2009 16:10	0.5423	1.5	6363.2	9544.8	11583	3.5	3309.4	6102.412618	0.6393	
8B	2	7/1/09 10:45	7/1/2009 16:06	0.5466	1.5	6363.2	9544.8	11758	3.5	3359.4	6146.082528	0.6439	
8B	3	7/1/09 10:45	7/1/2009 16:19	0.5332	1.5	6363.2	9544.8	11499	3.5	3285.4	6161.727069	0.6456	Average EFF
8B	4	7/1/09 10:45	7/1/2009 16:15	0.5376	1.5	6363.2	9544.8	10844	3.5	3098.3	5763.600098	0.6038	0.6332
8C	1	7/1/09 10:45	7/1/2009 16:15	0.5375	1.5	6363.2	9544.8	11539	3.5	3296.9	6133.782218	0.6426	
8C	2	7/1/09 10:45	7/1/2009 16:10	0.5422	1.5	6363.2	9544.8	11774	3.5	3364.0	6204.011354	0.6500	
8C	3	7/1/09 10:45	7/1/2009 16:06	0.5465	1.5	6363.2	9544.8	11611	3.5	3317.4	6070.574762	0.6380	Average EFF
8C	4	7/1/09 10:45	7/1/2009 16:19	0.5331	1.5	6363.2	9544.8	10809	3.5	3088.3	5793.080291	0.6069	0.6339
8D	1	7/1/09 10:45	7/1/2009 16:19	0.5330	1.5	6363.2	9544.8	11301	3.5	3228.9	6057.336905	0.6346	
8D	2	7/1/09 10:45	7/1/2009 16:15	0.5374	1.5	6363.2	9544.8	11412	3.5	3260.6	6067.58377	0.6357	
8D	3	7/1/09 10:45	7/1/2009 16:10	0.5421	1.5	6363.2	9544.8	11660	3.5	3331.4	6145.874775	0.6439	Average EFF
8D	4	7/1/09 10:45	7/1/2009 16:06	0.5464	1.5	6363.2	9544.8	10918	3.5	3119.4	5709.327085	0.5982	0.6281
9A	1	7/1/09 10:45	7/1/2009 16:24	0.5280	1.5	6363.2	9544.8	11805	3.5	3315.7	6280.207813	0.6580	
9A	2	7/1/09 10:45	7/1/2009 16:42	0.5106	1.5	6363.2	9544.8	11281	3.5	3223.1	6313.016372	0.6614	
9A	3	7/1/09 10:45	7/1/2009 16:33	0.5196	1.5	6363.2	9544.8	11301	3.5	3228.9	6214.402502	0.6511	Average EFF
9A	4	7/1/09 10:45	7/1/2009 16:29	0.5236	1.5	6363.2	9544.8	10987	3.5	3139.1	5995.155865	0.6281	0.6496
9B	1	7/1/09 10:45	7/1/2009 16:29	0.5235	1.5	6363.2	9544.8	11151	3.5	3186.0	6085.406803	0.6376	
9B	2	7/1/09 10:45	7/1/2009 16:24	0.5280	1.5	6363.2	9544.8	11462	3.5	3274.9	6202.821366	0.6499	
9B	3	7/1/09 10:45	7/1/2009 16:42	0.5104	1.5	6363.2	9544.8	11004	3.5	3144.0	6180.125852	0.6454	Average EFF
9B	4	7/1/09 10:45	7/1/2009 16:33	0.5195	1.5	6363.2	9544.8	10581	3.5	3023.1	5819.569586	0.6097	0.6356
9C	1	7/1/09 10:45	7/1/2009 16:33	0.5194	1.5	6363.2	9544.8	11026	3.5	3150.3	6064.890483	0.6354	
9C	2	7/1/09 10:45	7/1/2009 16:29	0.5235	1.5	6363.2	9544.8	11281	3.5	3223.1	6157.122814	0.6451	
9C	3	7/1/09 10:45	7/1/2009 16:24	0.5279	1.5	6363.2	9544.8	11016	3.5	3147.4	5962.583098	0.6247	Average EFF
9C	4	7/1/09 10:45	7/1/2009 16:42	0.5103	1.5	6363.2	9544.8	10297	3.5	2942.0	5765.244836	0.6040	0.6273
9D	1	7/1/09 10:45	7/1/2009 16:38	0.5146	1.5	6363.2	9544.8	11135	3.5	3181.4	6182.4976	0.6477	
9D	2	7/1/09 10:45	7/1/2009 16:33	0.5193	1.5	6363.2	9544.8	11412	3.5	3260.6	6278.391381	0.6578	
9D	3	7/1/09 10:45	7/1/2009 16:29	0.5234	1.5	6363.2	9544.8	11340	3.5	3240.0	6190.682442	0.6486	Average EFF
9D	4	7/1/09 10:45	7/1/2009 16:24	0.5278	1.5	6363.2	9544.8	10912	3.5	3117.7	5907.401951	0.6189	0.6433
10A	1	7/1/09 10:45	7/1/2009 16:47	0.5057	1.5	6363.2	9544.8	10991	3.5	3140.3	6209.984837	0.6506	
10A	2	7/1/09 10:45	7/1/2009 17:12	0.4824	1.5	6363.2	9544.8	11959	4	2989.8	6198.168046	0.6494	
10A	3	7/1/09 10:45	7/1/2009 16:58	0.4958	1.5	6363.2	9544.8	10553	3.5	3015.1	6081.381423	0.6371	Average EFF
10A	4	7/1/09 10:45	7/1/2009 16:53	0.5003	1.5	6363.2	9544.8	10338	3.5	2953.7	5903.409852	0.6185	0.6389
10B	1	7/1/09 10:45	7/1/2009 17:03	0.4910	1.5	6363.2	9544.8	11110	4	2777.5	5856.748417	0.5927	
10B	2	7/1/09 10:45	7/1/2009 16:47	0.5057	1.5	6363.2	9544.8	10812	3.5	3089.1	6109.231533	0.6401	
10B	3	7/1/09 10:45	7/1/2009 17:12	0.4822	1.5	6363.2	9544.8	11422	4	2855.5	5921.333197	0.6204	Average EFF
10B	4	7/1/09 10:45	7/1/2009 16:58	0.4957	1.5	6363.2	9544.8	9967	3.5	2847.7	5744.946895	0.6019	0.6137
10C	1	7/1/09 10:45	7/1/2009 16:58	0.4956	1.5	6363.2	9544.8	10482	3.5	2994.9	6042.548531	0.6331	
10C	2	7/1/09 10:45	7/1										

10D	3	7/1/09 10:45	7/1/2009 16:53	0.5000	1.5	6363.2	9544.8	10643	3.5	3040.9	6081.577364	0.6372	Average EFF
10D	4	7/1/09 10:45	7/1/2009 16:48	0.5053	1.5	6363.2	9544.8	10064	3.5	2875.4	5690.501596	0.5962	0.6320
11A	1	7/1/09 10:45	7/1/2009 11:56	0.8745	1.5	6363.2	9544.8	14773	3	4924.3	5631.22443	0.5900	
11A	2	7/1/09 10:45	7/1/2009 12:08	0.8547	1.5	6363.2	9544.8	14429	3	4809.7	5627.17636	0.5896	
11A	3	7/1/09 10:45	7/1/2009 12:04	0.8607	1.5	6363.2	9544.8	14454	3	4818.0	5597.851728	0.5865	Average EFF
11A	4	7/1/09 10:45	7/1/2009 12:00	0.8677	1.5	6363.2	9544.8	14013	3	4671.0	5383.193838	0.5640	0.5825
11B	1	7/1/09 10:45	7/1/2009 12:00	0.8681	1.5	6363.2	9544.8	16203	3	5401.0	6221.768068	0.6518	
11B	2	7/1/09 10:45	7/1/2009 11:56	0.8742	1.5	6363.2	9544.8	16106	3	5368.7	6141.073627	0.6434	
11B	3	7/1/09 10:45	7/1/2009 12:08	0.8545	1.5	6363.2	9544.8	15643	3	5214.3	6102.154531	0.6393	Average EFF
11B	4	7/1/09 10:45	7/1/2009 12:04	0.8606	1.5	6363.2	9544.8	15133	3	5044.3	5861.738123	0.6141	0.6372
11C	1	7/1/09 10:45	7/1/2009 12:04	0.8609	1.5	6363.2	9544.8	15637	3	5212.3	6054.305139	0.6343	
11C	2	7/1/09 10:45	7/1/2009 12:00	0.8680	1.5	6363.2	9544.8	15919	3	5308.3	6113.481467	0.6405	
11C	3	7/1/09 10:45	7/1/2009 11:56	0.8740	1.5	6363.2	9544.8	16452	3	5484.0	6274.376359	0.6574	Average EFF
11C	4	7/1/09 10:45	7/1/2009 12:08	0.8544	1.5	6363.2	9544.8	14887	3	4962.3	5808.157492	0.6085	0.6352
11D	1	7/1/09 10:45	7/1/2009 12:08	0.8548	1.5	6363.2	9544.8	15607	3	5202.3	6085.822645	0.6376	
11D	2	7/1/09 10:45	7/1/2009 12:04	0.8608	1.5	6363.2	9544.8	15944	3	5314.7	6174.138045	0.6469	
11D	3	7/1/09 10:45	7/1/2009 12:00	0.8679	1.5	6363.2	9544.8	16098	3	5366.0	6182.998937	0.6478	Average EFF
11D	4	7/1/09 10:45	7/1/2009 11:56	0.8738	1.5	6363.2	9544.8	15191	3	5063.7	5794.733717	0.6071	0.6348
12A	1	7/1/09 10:45	7/1/2009 12:15	0.8437	1.5	6363.2	9544.8	15450	3	5150.0	6104.026984	0.6395	
12A	2	7/1/09 10:45	7/1/2009 12:28	0.8234	1.5	6363.2	9544.8	15016	3	5005.3	6078.958269	0.6369	
12A	3	7/1/09 10:45	7/1/2009 12:24	0.8296	1.5	6363.2	9544.8	14984	3	4994.7	6020.558384	0.6308	Average EFF
12A	4	7/1/09 10:45	7/1/2009 12:20	0.8358	1.5	6363.2	9544.8	14530	3	4843.3	5794.58497	0.6071	0.6286
12B	1	7/1/09 10:45	7/1/2009 12:20	0.8362	1.5	6363.2	9544.8	15404	3	5134.7	6140.835636	0.6433	
12B	2	7/1/09 10:45	7/1/2009 12:15	0.8437	1.5	6363.2	9544.8	15607	3	5202.3	6166.05496	0.6460	
12B	3	7/1/09 10:45	7/1/2009 12:28	0.8232	1.5	6363.2	9544.8	15060	3	5020.0	6097.91718	0.6389	Average EFF
12B	4	7/1/09 10:45	7/1/2009 12:24	0.8295	1.5	6363.2	9544.8	14553	3	4851.0	5848.11587	0.6127	0.6352
12C	1	7/1/09 10:45	7/1/2009 12:24	0.8300	1.5	6363.2	9544.8	15183	3	5061.0	6097.649845	0.6388	
12C	2	7/1/09 10:45	7/1/2009 12:20	0.8361	1.5	6363.2	9544.8	15651	3	5217.0	6239.881493	0.6537	
12C	3	7/1/09 10:45	7/1/2009 12:15	0.8436	1.5	6363.2	9544.8	15216	3	5072.0	6012.519531	0.6299	Average EFF
12C	4	7/1/09 10:45	7/1/2009 12:28	0.8231	1.5	6363.2	9544.8	14117	3	4705.7	5716.805229	0.5989	0.6304
12D	1	7/1/09 10:45	7/1/2009 12:28	0.8235	1.5	6363.2	9544.8	15174	3	5058.0	6141.959419	0.6435	
12D	2	7/1/09 10:45	7/1/2009 12:24	0.8298	1.5	6363.2	9544.8	15137	3	5045.7	6080.699807	0.6371	
12D	3	7/1/09 10:45	7/1/2009 12:20	0.8359	1.5	6363.2	9544.8	15418	3	5139.3	6148.142699	0.6441	Average EFF
12D	4	7/1/09 10:45	7/1/2009 12:15	0.8434	1.5	6363.2	9544.8	14566	3	4855.3	5758.75774	0.6031	0.6320
13A	1	7/1/09 10:45	7/1/2009 12:33	0.8153	1.5	6363.2	9544.8	15230	3	5076.7	6226.552932	0.6524	
13A	2	7/1/09 10:45	7/1/2009 12:50	0.7902	1.5	6363.2	9544.8	14784	3	4928.0	6236.596242	0.6534	
13A	3	7/1/09 10:45	7/1/2009 12:41	0.8031	1.5	6363.2	9544.8	14851	3	4950.3	6164.384216	0.6458	Average EFF
13A	4	7/1/09 10:45	7/1/2009 12:37	0.8090	1.5	6363.2	9544.8	14183	3	4727.7	5843.553624	0.6122	0.6410
13B	1	7/1/09 10:45	7/1/2009 12:37	0.8094	1.5	6363.2	9544.8	15625	3	5208.3	6434.850276	0.6742	
13B	2	7/1/09 10:45	7/1/2009 12:33	0.8153	1.5	6363.2	9544.8	15450	3	5150.0	6316.496573	0.6618	
13B	3	7/1/09 10:45	7/1/2009 12:50	0.7901	1.5	6363.2	9544.8	14689	3	4896.3	6197.297391	0.6493	Average EFF
13B	4	7/1/09 10:45	7/1/2009 12:41	0.8029	1.5	6363.2	9544.8	14377	3	4792.3	5968.757323	0.6253	0.6526
13C	1	7/1/09 10:45	7/1/2009 12:41	0.8033	1.5	6363.2	9544.8	15426	3	5142.0	6401.251014	0.6707	
13C	2	7/1/09 10:45	7/1/2009 12:37	0.8093	1.5	6363.2	9544.8	15315	3	5105.0	6307.973396	0.6609	
13C	3	7/1/09 10:45	7/1/2009 12:33	0.8152	1.5	6363.2	9544.8	15288	3	5096.0	6251.048762	0.6549	Average EFF
13C	4	7/1/09 10:45	7/1/2009 12:50	0.7900	1.5	6363.2	9544.8	14222	3	4740.7	6001.209943	0.6287	0.6538
13D	1	7/1/09 10:45	7/1/2009 12:50	0.7903	1.5	6363.2	9544.8	14492	3	4830.7	6112.65055	0.6404	
13D	2	7/1/09 10:45	7/1/2009 12:46	0.7958	1.5	6363.2	9544.8	14858	3	4952.7	6223.19528	0.6520	
13D	3	7/1/09 10:45	7/1/2009 12:37	0.8082	1.5	6363.2	9544.8	14873	3	4957.7	6126.881339	0.6419	Average EFF
13D	4	7/1/09 10:45	7/1/2009 12:33	0.8151	1.5	6363.2	9544.8	14389	3	4796.3	5884.197712	0.6165	0.6377
14A	1	7/1/09 10:45	7/1/2009 12:54	0.7834	1.5	6363.2	9544.8	14463	3	4821.0	6153.596507	0.6447	
14A	2	7/1/09 10:45	7/1/2009 13:17	0.7507	1.5	6363.2	9544.8	14137	3	4712.3	6277.53373	0.6577	
14A	3	7/1/09 10:45	7/1/2009 13:13	0.7571	1.5	6363.2	9544.8	14022	3	4674.0	6173.627369	0.6468	Average EFF
14A	4	7/1/09 10:45	7/1/2009 13:02	0.7727	1.5	6363.2	9544.8	13451	3	4483.7	5802.830587	0.6080	0.6393
14B	1	7/1/09 10:45	7/1/2009 13:01	0.7730	1.5	6363.2	9544.8	14039	3	4679.7	6054.030301	0.6343	
14B	2	7/1/09 10:45	7/1/2009 12:54	0.7834	1.5	6363.2	9544.8	14398	3	4799.3	6126.324754	0.6418	
14B	3	7/1/09 10:45	7/1/2009 13:17	0.7505	1.5	6363.2	9544.8	13475	3	4491.7	5984.510182	0.6270	Average EFF
14B	4	7/1/09 10:45	7/1/2009 13:13	0.7569	1.5	6363.2	9544.8	13077	3	4359.0	5758.643863	0.6033	0.6266
14C	1	7/1/09 10:45	7/1/2009 13:12	0.7573	1.5	6363.2	9544.8	14116	3	4705.3	6213.281445	0.6510	
14C	2	7/1/09 10:45	7/1/2009 13:02	0.7729	1.5	6363.2	9544.8	14187	3	4729.0	6118.427365	0.6410	
14C	3	7/1/09 10:45	7/1/2009 12:55	0.7832	1.5	6363.2	9544.8	14409	3	4803.0	6132.734423	0.6425	Average EFF
14C	4	7/1/09 10:45	7/1/2009 13:17	0.7505	1.5	6363.2	9544.8	13229	3	4409.7	5875.993199	0.6156	0.6375
14D	1	7/1/09 10:45	7/1/2009 13:17	0.7508	1.5	6363.2	9544.8	13927	3	4642.3	6183.314452	0.6478	
14D	2	7/1/09 10:45	7/1/2009 13:12	0.7572	1.5	6363.2	9544.8	14089	3	4696.3	6202.348821	0.6498	
14D	3	7/1/09 10:45	7/1/2009 13:02	0.7728	1.5	6363.2	9544.8	13912	3	4637.3	6000.768164	0.6287	Average EFF
14D	4	7/1/09 10:45	7/1/2009 12:55	0.7830	1.5	6363.2	9544.8	13545	3	4515.0	5766.084113	0.6041	0.6326

*Background is considered negligible

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time
1 1A		3	126	13564	7/1/2009 13:36	7/1/2009 13:39
2 1A		3	136	12775	7/1/2009 13:52	7/1/2009 13:55
3 1A		3	135	12750	7/1/2009 13:48	7/1/2009 13:51
4 1A		3	142	12410	7/1/2009 13:41	7/1/2009 13:44
1 1B		3	115	13292	7/1/2009 13:41	7/1/2009 13:44
2 1B		3	136	13274	7/1/2009 13:36	7/1/2009 13:39
3 1B		3	131	12699	7/1/2009 13:52	7/1/2009 13:55
4 1B		3	129	12072	7/1/2009 13:48	7/1/2009 13:51
1 1C		3	207	12813	7/1/2009 13:48	7/1/2009 13:51
2 1C		3	221	12979	7/1/2009 13:41	7/1/2009 13:44
3 1C		3	189	12755	7/1/2009 13:36	7/1/2009 13:39
4 1C		3	179	11917	7/1/2009 13:52	7/1/2009 13:55
1 1D		3	558	12473	7/1/2009 13:52	7/1/2009 13:55
2 1D		3	582	12484	7/1/2009 13:48	7/1/2009 13:51
3 1D		3	632	12289	7/1/2009 13:41	7/1/2009 13:44
4 1D		3	568	12115	7/1/2009 13:36	7/1/2009 13:39
1 2A		3	424	12499	7/1/2009 13:57	7/1/2009 14:00
2 2A		3	449	12103	7/1/2009 14:15	7/1/2009 14:18
3 2A		3	419	11968	7/1/2009 14:09	7/1/2009 14:12
4 2A		3	417	11855	7/1/2009 14:02	7/1/2009 14:05
1 2B		3	42	12471	7/1/2009 14:02	7/1/2009 14:05
2 2B		3	39	12492	7/1/2009 13:57	7/1/2009 14:00
3 2B		3	54	11892	7/1/2009 14:15	7/1/2009 14:18
4 2B		3	69	11539	7/1/2009 14:09	7/1/2009 14:12
1 2C		3	504	12050	7/1/2009 14:08	7/1/2009 14:11
2 2C		3	527	11914	7/1/2009 14:02	7/1/2009 14:05
3 2C		3	496	11994	7/1/2009 13:58	7/1/2009 14:01
4 2C		3	499	10889	7/1/2009 14:15	7/1/2009 14:18
1 2D		3	543	12010	7/1/2009 14:15	7/1/2009 14:18
2 2D		3	508	12124	7/1/2009 14:08	7/1/2009 14:11
3 2D		3	542	12168	7/1/2009 14:02	7/1/2009 14:05
4 2D		3	544	11692	7/1/2009 13:58	7/1/2009 14:01
1 3A		3	1397	11194	7/1/2009 14:19	7/1/2009 14:22
2 3A		4	1809	14227	7/1/2009 14:35	7/1/2009 14:39
3 3A		4	1757	14180	7/1/2009 14:30	7/1/2009 14:34
4 3A		4	1725	13754	7/1/2009 14:25	7/1/2009 14:29
1 3B		4	914	15370	7/1/2009 14:25	7/1/2009 14:29
2 3B		3	731	11695	7/1/2009 14:20	7/1/2009 14:23
3 3B		4	960	14905	7/1/2009 14:35	7/1/2009 14:39
4 3B		4	922	14220	7/1/2009 14:30	7/1/2009 14:34
1 3C		4	671	15644	7/1/2009 14:29	7/1/2009 14:33
2 3C		4	722	15964	7/1/2009 14:25	7/1/2009 14:29
3 3C		3	558	11701	7/1/2009 14:20	7/1/2009 14:23
4 3C		4	647	14729	7/1/2009 14:35	7/1/2009 14:39
1 3D		4	651	15152	7/1/2009 14:35	7/1/2009 14:39
2 3D		4	722	15168	7/1/2009 14:30	7/1/2009 14:34
3 3D		4	684	15295	7/1/2009 14:25	7/1/2009 14:29
4 3D		3	466	10942	7/1/2009 14:20	7/1/2009 14:23
1 4A		4	412	15298	7/1/2009 14:40	7/1/2009 14:44
2 4A		4	407	14897	7/1/2009 15:00	7/1/2009 15:04
3 4A		4	389	15050	7/1/2009 14:53	7/1/2009 14:57

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7/2/09

4 4A	4	417	14462	7/1/2009 14:48	7/1/2009 14:52
1 4B	4	58	15335	7/1/2009 14:48	7/1/2009 14:52
2 4B	4	61	15513	7/1/2009 14:41	7/1/2009 14:45
3 4B	4	53	14521	7/1/2009 15:00	7/1/2009 15:04
4 4B	4	72	14328	7/1/2009 14:53	7/1/2009 14:57
1 4C	4	532	14733	7/1/2009 14:53	7/1/2009 14:57
2 4C	4	545	14902	7/1/2009 14:48	7/1/2009 14:52
3 4C	4	486	14856	7/1/2009 14:41	7/1/2009 14:45
4 4C	4	540	13733	7/1/2009 15:00	7/1/2009 15:04
1 4D	4	1158	14167	7/1/2009 15:00	7/1/2009 15:04
2 4D	4	1192	14204	7/1/2009 14:53	7/1/2009 14:57
3 4D	4	1136	14131	7/1/2009 14:48	7/1/2009 14:52
4 4D	4	1149	13978	7/1/2009 14:41	7/1/2009 14:45
1 5A	4	424	14870	7/1/2009 15:06	7/1/2009 15:10
2 5A	4	395	14487	7/1/2009 15:21	7/1/2009 15:25
3 5A	4	403	14259	7/1/2009 15:17	7/1/2009 15:21
4 5A	4	389	13957	7/1/2009 15:12	7/1/2009 15:16
1 5B	4	428	14869	7/1/2009 15:12	7/1/2009 15:16
2 5B	4	440	14821	7/1/2009 15:06	7/1/2009 15:10
3 5B	4	420	14289	7/1/2009 15:21	7/1/2009 15:25
4 5B	4	414	13809	7/1/2009 15:17	7/1/2009 15:21
1 5C	4	436	14676	7/1/2009 15:17	7/1/2009 15:21
2 5C	4	443	15122	7/1/2009 15:12	7/1/2009 15:16
3 5C	4	433	14958	7/1/2009 15:07	7/1/2009 15:11
4 5C	4	416	13831	7/1/2009 15:21	7/1/2009 15:25
1 5D	4	451	14321	7/1/2009 15:21	7/1/2009 15:25
2 5D	4	452	14642	7/1/2009 15:17	7/1/2009 15:21
3 5D	4	444	14443	7/1/2009 15:12	7/1/2009 15:16
4 5D	4	414	13954	7/1/2009 15:07	7/1/2009 15:11
1 6A	4	272	14018	7/1/2009 15:27	7/1/2009 15:31
2 6A	3.5	246	12283	7/1/2009 15:40	7/1/2009 15:44
3 6A	3.5	231	12111	7/1/2009 15:36	7/1/2009 15:40
4 6A	3.5	229	11598	7/1/2009 15:32	7/1/2009 15:35
1 6B	3.5	540	12151	7/1/2009 15:32	7/1/2009 15:36
2 6B	4	592	14371	7/1/2009 15:27	7/1/2009 15:31
3 6B	3.5	498	11705	7/1/2009 15:40	7/1/2009 15:44
4 6B	3.5	498	11388	7/1/2009 15:36	7/1/2009 15:40
1 6C	3.5	462	12161	7/1/2009 15:36	7/1/2009 15:40
2 6C	3.5	468	12083	7/1/2009 15:32	7/1/2009 15:36
3 6C	4	534	13638	7/1/2009 15:27	7/1/2009 15:31
4 6C	3.5	455	11218	7/1/2009 15:40	7/1/2009 15:44
1 6D	3.5	456	11987	7/1/2009 15:40	7/1/2009 15:44
2 6D	3.5	468	12183	7/1/2009 15:36	7/1/2009 15:40
3 6D	3.5	496	11882	7/1/2009 15:32	7/1/2009 15:36
4 6D	4	525	13018	7/1/2009 15:27	7/1/2009 15:31
1 7A	3.5	466	12007	7/1/2009 15:46	7/1/2009 15:50
2 7A	3.5	491	11655	7/1/2009 16:00	7/1/2009 16:04
3 7A	3.5	444	11445	7/1/2009 15:56	7/1/2009 15:59
4 7A	3.5	477	11121	7/1/2009 15:50	7/1/2009 15:54
1 7B	3.5	418	11968	7/1/2009 15:51	7/1/2009 15:54
2 7B	3.5	448	12050	7/1/2009 15:46	7/1/2009 15:50
3 7B	3.5	460	11675	7/1/2009 16:00	7/1/2009 16:04

4 7B	3.5	413	11271	7/1/2009 15:56	7/1/2009 16:00
1 7C	3.5	471	11781	7/1/2009 15:56	7/1/2009 16:00
2 7C	3.5	457	11760	7/1/2009 15:51	7/1/2009 15:54
3 7C	3.5	454	11766	7/1/2009 15:46	7/1/2009 15:50
4 7C	3.5	406	10888	7/1/2009 16:00	7/1/2009 16:04
1 7D	3.5	359	11605	7/1/2009 16:00	7/1/2009 16:04
2 7D	3.5	391	11920	7/1/2009 15:56	7/1/2009 16:00
3 7D	3.5	386	11933	7/1/2009 15:51	7/1/2009 15:55
4 7D	3.5	400	11305	7/1/2009 15:46	7/1/2009 15:50
1 8A	3.5	348	11673	7/1/2009 16:06	7/1/2009 16:09
2 8A	3.5	340	11172	7/1/2009 16:19	7/1/2009 16:22
3 8A	3.5	298	11258	7/1/2009 16:15	7/1/2009 16:18
4 8A	3.5	327	10977	7/1/2009 16:10	7/1/2009 16:13
1 8B	3.5	124	11583	7/1/2009 16:10	7/1/2009 16:13
2 8B	3.5	112	11758	7/1/2009 16:06	7/1/2009 16:09
3 8B	3.5	110	11499	7/1/2009 16:19	7/1/2009 16:23
4 8B	3.5	102	10844	7/1/2009 16:15	7/1/2009 16:18
1 8C	3.5	202	11539	7/1/2009 16:15	7/1/2009 16:18
2 8C	3.5	196	11774	7/1/2009 16:10	7/1/2009 16:14
3 8C	3.5	203	11611	7/1/2009 16:06	7/1/2009 16:09
4 8C	3.5	207	10809	7/1/2009 16:19	7/1/2009 16:23
1 8D	3.5	240	11301	7/1/2009 16:19	7/1/2009 16:23
2 8D	3.5	248	11412	7/1/2009 16:15	7/1/2009 16:18
3 8D	3.5	233	11660	7/1/2009 16:10	7/1/2009 16:14
4 8D	3.5	235	10918	7/1/2009 16:06	7/1/2009 16:10
1 9A	3.5	39	11605	7/1/2009 16:24	7/1/2009 16:28
2 9A	3.5	49	11281	7/1/2009 16:42	7/1/2009 16:46
3 9A	3.5	47	11301	7/1/2009 16:33	7/1/2009 16:36
4 9A	3.5	64	10987	7/1/2009 16:29	7/1/2009 16:32
1 9B	3.5	53	11151	7/1/2009 16:29	7/1/2009 16:32
2 9B	3.5	39	11462	7/1/2009 16:24	7/1/2009 16:28
3 9B	3.5	45	11004	7/1/2009 16:42	7/1/2009 16:46
4 9B	3.5	51	10581	7/1/2009 16:33	7/1/2009 16:36
1 9C	3.5	49	11026	7/1/2009 16:33	7/1/2009 16:36
2 9C	3.5	49	11281	7/1/2009 16:29	7/1/2009 16:32
3 9C	3.5	40	11016	7/1/2009 16:24	7/1/2009 16:28
4 9C	3.5	60	10297	7/1/2009 16:42	7/1/2009 16:46
1 9D	3.5	65	11135	7/1/2009 16:38	7/1/2009 16:41
2 9D	3.5	53	11412	7/1/2009 16:33	7/1/2009 16:37
3 9D	3.5	54	11340	7/1/2009 16:29	7/1/2009 16:32
4 9D	3.5	77	10912	7/1/2009 16:24	7/1/2009 16:28
1 10A	3.5	71	10991	7/1/2009 16:47	7/1/2009 16:51
2 10A	4	106	11959	7/1/2009 17:12	7/1/2009 17:16
3 10A	3.5	70	10553	7/1/2009 16:58	7/1/2009 17:01
4 10A	3.5	95	10338	7/1/2009 16:53	7/1/2009 16:56
1 10B	4	139	11110	7/1/2009 17:03	7/1/2009 17:07
2 10B	3.5	102	10812	7/1/2009 16:47	7/1/2009 16:51
3 10B	4	103	11422	7/1/2009 17:12	7/1/2009 17:16
4 10B	3.5	110	9967	7/1/2009 16:58	7/1/2009 17:01
1 10C	3.5	74	10482	7/1/2009 16:58	7/1/2009 17:01
2 10C	3.5	79	10535	7/1/2009 16:53	7/1/2009 16:57
3 10C	3.5	87	10723	7/1/2009 16:47	7/1/2009 16:51

4 10C	4	95	11066	7/1/2009 17:13	7/1/2009 17:17
1 10D	4	102	12021	7/1/2009 17:13	7/1/2009 17:17
2 10D	3.5	75	10614	7/1/2009 16:58	7/1/2009 17:01
3 10D	3.5	78	10643	7/1/2009 16:53	7/1/2009 16:57
4 10D	3.5	81	10064	7/1/2009 16:48	7/1/2009 16:51
1 11A	3	31	14773	7/1/2009 11:56	7/1/2009 11:59
2 11A	3	23	14429	7/1/2009 12:08	7/1/2009 12:11
3 11A	3	33	14454	7/1/2009 12:04	7/1/2009 12:07
4 11A	3	49	14013	7/1/2009 12:00	7/1/2009 12:03
1 11B	3	43	16203	7/1/2009 12:00	7/1/2009 12:03
2 11B	3	53	16106	7/1/2009 11:56	7/1/2009 11:59
3 11B	3	46	15643	7/1/2009 12:08	7/1/2009 12:11
4 11B	3	42	15133	7/1/2009 12:04	7/1/2009 12:07
1 11C	3	27	15637	7/1/2009 12:04	7/1/2009 12:07
2 11C	3	38	15919	7/1/2009 12:00	7/1/2009 12:03
3 11C	3	33	16452	7/1/2009 11:56	7/1/2009 11:59
4 11C	3	46	14887	7/1/2009 12:08	7/1/2009 12:11
1 11D	3	43	15607	7/1/2009 12:08	7/1/2009 12:11
2 11D	3	42	15944	7/1/2009 12:04	7/1/2009 12:07
3 11D	3	32	16098	7/1/2009 12:00	7/1/2009 12:03
4 11D	3	39	15191	7/1/2009 11:56	7/1/2009 11:59
1 12A	3	29	15450	7/1/2009 12:15	7/1/2009 12:18
2 12A	3	28	15016	7/1/2009 12:28	7/1/2009 12:31
3 12A	3	31	14984	7/1/2009 12:24	7/1/2009 12:27
4 12A	3	46	14530	7/1/2009 12:20	7/1/2009 12:23
1 12B	3	26	15404	7/1/2009 12:20	7/1/2009 12:23
2 12B	3	31	15607	7/1/2009 12:15	7/1/2009 12:18
3 12B	3	34	15060	7/1/2009 12:28	7/1/2009 12:31
4 12B	3	49	14553	7/1/2009 12:24	7/1/2009 12:27
1 12C	3	24	15183	7/1/2009 12:24	7/1/2009 12:27
2 12C	3	44	15651	7/1/2009 12:20	7/1/2009 12:23
3 12C	3	46	15216	7/1/2009 12:15	7/1/2009 12:18
4 12C	3	60	14117	7/1/2009 12:28	7/1/2009 12:31
1 12D	3	48	15174	7/1/2009 12:28	7/1/2009 12:31
2 12D	3	37	15137	7/1/2009 12:24	7/1/2009 12:27
3 12D	3	25	15418	7/1/2009 12:20	7/1/2009 12:23
4 12D	3	59	14566	7/1/2009 12:15	7/1/2009 12:18
1 13A	3	50	15230	7/1/2009 12:33	7/1/2009 12:36
2 13A	3	36	14784	7/1/2009 12:50	7/1/2009 12:53
3 13A	3	41	14851	7/1/2009 12:41	7/1/2009 12:44
4 13A	3	49	14183	7/1/2009 12:37	7/1/2009 12:40
1 13B	3	39	15625	7/1/2009 12:37	7/1/2009 12:40
2 13B	3	41	15450	7/1/2009 12:33	7/1/2009 12:36
3 13B	3	37	14689	7/1/2009 12:50	7/1/2009 12:53
4 13B	3	47	14377	7/1/2009 12:41	7/1/2009 12:44
1 13C	3	54	15426	7/1/2009 12:41	7/1/2009 12:44
2 13C	3	41	15315	7/1/2009 12:37	7/1/2009 12:40
3 13C	3	36	15288	7/1/2009 12:33	7/1/2009 12:36
4 13C	3	34	14222	7/1/2009 12:50	7/1/2009 12:53
1 13D	3	47	14492	7/1/2009 12:50	7/1/2009 12:53
2 13D	3	50	14858	7/1/2009 12:46	7/1/2009 12:49
3 13D	3	43	14873	7/1/2009 12:37	7/1/2009 12:40

4 13D	3	47	14389	7/1/2009 12:33	7/1/2009 12:36
1 14A	3	44	14463	7/1/2009 12:54	7/1/2009 12:57
2 14A	3	41	14137	7/1/2009 13:17	7/1/2009 13:20
3 14A	3	45	14022	7/1/2009 13:13	7/1/2009 13:16
4 14A	3	51	13451	7/1/2009 13:02	7/1/2009 13:05
1 14B	3	42	14039	7/1/2009 13:01	7/1/2009 13:04
2 14B	3	36	14398	7/1/2009 12:54	7/1/2009 12:57
3 14B	3	47	13475	7/1/2009 13:17	7/1/2009 13:20
4 14B	3	47	13077	7/1/2009 13:13	7/1/2009 13:16
1 14C	3	26	14116	7/1/2009 13:12	7/1/2009 13:15
2 14C	3	35	14187	7/1/2009 13:02	7/1/2009 13:05
3 14C	3	37	14409	7/1/2009 12:55	7/1/2009 12:58
4 14C	3	38	13229	7/1/2009 13:17	7/1/2009 13:20
1 14D	3	16	13927	7/1/2009 13:17	7/1/2009 13:20
2 14D	3	32	14089	7/1/2009 13:12	7/1/2009 13:15
3 14D	3	16	13912	7/1/2009 13:02	7/1/2009 13:05
4 14D	3	47	13545	7/1/2009 12:55	7/1/2009 12:58

Radium-228 Liquid

Filename : RA228.XLS
 File Type : Excel
 Version # : 1.2.3

Batch : 595514
 Analyst : AFI
 Prep Date : 7/12/2009

Re-228 Abundance : 1
 Re-228 Method Uncertainty : 0.0784
 Calibration Date : 6/2/2008
 Calibration Due Date : 6/30/2009

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 : GFC90SRL
 Pararmame : Radium-228
 Required MDA : 1 pCi/L
 Half-life of Re-228 : 5.75 years
 Half-life of Ac-228 : 6.13 hours
 Batch counted on : PIC
 BKG Count time : 500 min

Pos.	Sample Characteristics			Count raw Data			Counting			Detector			Weekly Bkg			Separation			Count			Ra-228			Ac-228			Calculated			Results		
	Sample ID	Sample Aliquot	Sample Aliquot	Sample Date/Time	Pos.	Detector	Time (min.)	Alpha	Beta	Gross Counts	Beta cpm	Efficiency Error (cpm/dpm)	Efficiency Error (cpm/dpm)	Count (min.)	cpm	Date/Time	Date/Time	Start Date/Time	Start Date/Time	Decay	Decay	Count	Count	Correction	Recovery %	Sample Recovery Error %	Pos.						
1	1201245712.1	1.0000	2.0399E-05	7/1/2009 0:00	1	1A	15	36	1980	132.000	0.6303	0.00600	500	0.312	7/2/2009 5:40	7/2/2009 8:39	7/2/2009 8:40	7/2/2009 8:40	1.000	0.713	1.014	1.014	100.83%	1.00%	1								
2	1201245713.1	1.0000	2.0399E-05	7/1/2009 0:00	2	1B	15	27	1959	130.600	0.6292	0.00469	500	0.342	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.712	1.014	1.014	108.20%	1.00%	2								
3	1201245714.1	1.0000	2.0399E-05	7/1/2009 0:00	3	1C	15	44	2108	140.533	0.6176	0.00344	500	0.716	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.712	1.014	1.014	114.22%	1.00%	3								
4	1201245715.1	1.0000	2.0399E-05	7/1/2009 0:00	4	1D	15	108	2265	151.000	0.6043	0.00511	500	0.524	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.675	1.014	1.014	120.58%	1.00%	4								
5	1201245716.1	1.0000	2.0399E-05	7/1/2009 0:00	5	2A	15	69	1838	122.533	0.6172	0.00349	500	0.450	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.675	1.014	1.014	105.84%	1.00%	5								
6	1201245717.1	1.0000	2.0399E-05	7/1/2009 0:00	6	2B	15	8	2053	136.867	0.6167	0.00383	500	1.428	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.712	1.014	1.014	102.70%	1.00%	6								
7	1201245718.1	1.0000	2.0399E-05	7/1/2009 0:00	7	2C	15	96	1982	132.133	0.5969	0.00575	500	0.334	7/2/2009 5:40	7/2/2009 8:40	7/2/2009 8:40	7/2/2009 8:40	1.000	0.711	1.014	1.014	112.82%	1.00%	7								
8	1201245719.1	1.0000	2.0399E-05	7/1/2009 0:00	8	2D	15	233	1645	109.667	0.5682	0.00643	500	0.378	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.675	1.014	1.014	111.91%	1.00%	8								
9	1201245720.1	1.0000	2.0399E-05	7/1/2009 0:00	9	3A	15	99	1821	121.400	0.5980	0.00655	500	1.710	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.675	1.014	1.014	114.22%	1.00%	9								
10	1201245721.1	1.0000	2.0399E-05	7/1/2009 0:00	10	3B	15	96	1942	129.467	0.60635	0.00535	500	0.822	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.675	1.014	1.014	120.58%	1.00%	10								
11	1201245722.1	1.0000	2.0399E-05	7/1/2009 0:00	11	3C	15	90	2076	138.400	0.5994	0.00464	500	0.630	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.675	1.014	1.014	105.84%	1.00%	11								
12	1201245723.1	1.0000	2.0399E-05	7/1/2009 0:00	12	3D	15	79	1877	125.133	0.6208	0.00744	500	0.890	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.675	1.014	1.014	102.70%	1.00%	12								
13	1201245724.1	1.0000	2.0399E-05	7/1/2009 0:00	13	4A	15	13	1909	127.267	0.6205	0.00196	500	1.838	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.674	1.014	1.014	112.82%	1.00%	13								
14	1201245725.1	1.0000	2.0399E-05	7/1/2009 0:00	14	4B	15	45	1974	131.600	0.6052	0.00426	500	1.260	7/2/2009 5:40	7/2/2009 9:08	7/2/2009 9:08	7/2/2009 9:08	1.000	0.684	1.014	1.014	111.91%	1.00%	14								
15	1201245726.1	1.0000	2.0399E-05	7/1/2009 0:00	15	4C	15	181	1880	125.333	0.5673	0.00816	500	1.070	7/2/2009 5:40	7/2/2009 9:26	7/2/2009 9:26	7/2/2009 9:26	1.000	0.654	1.014	1.014	100.83%	1.00%	15								
16	1201245727.1	1.0000	2.0399E-05	7/1/2009 0:00	16	4D	15	53	1818	121.200	0.6258	0.00816	500	1.004	7/2/2009 5:40	7/2/2009 9:26	7/2/2009 9:26	7/2/2009 9:26	1.000	0.651	1.014	1.014	108.20%	1.00%	16								
17	1201245728.1	1.0000	2.0399E-05	7/1/2009 0:00	17	5A	15	59	1785	119.000	0.6280	0.00816	500	1.050	7/2/2009 5:40	7/2/2009 9:26	7/2/2009 9:26	7/2/2009 9:26	1.000	0.653	1.014	1.014	114.22%	1.00%	17								
18	1201245729.1	1.0000	2.0399E-05	7/1/2009 0:00	18	5B	15	43	2009	133.933	0.6368	0.00816	500	0.946	7/2/2009 5:40	7/2/2009 9:26	7/2/2009 9:26	7/2/2009 9:26	1.000	0.652	1.014	1.014	120.58%	1.00%	18								
19	1201245730.1	1.0000	2.0399E-05	7/1/2009 0:00	19	5C	15	59	2107	140.467	0.6237	0.00816	500	1.248	7/2/2009 5:40	7/2/2009 9:26	7/2/2009 9:26	7/2/2009 9:26	1.000	0.652	1.014	1.014	105.84%	1.00%	19								
20	1201245731.1	1.0000	2.0399E-05	7/1/2009 0:00	20	5D	15	35	1800	120.000	0.6221	0.00816	500	1.004	7/2/2009 5:40	7/2/2009 9:27	7/2/2009 9:27	7/2/2009 9:27	1.000	0.651	1.014	1.014	108.20%	1.00%	20								
21	1201245732.1	1.0000	2.0399E-05	7/1/2009 0:00	21	6A	15	71	1816	121.067	0.6163	0.00816	500	0.764	7/2/2009 5:40	7/2/2009 9:27	7/2/2009 9:27	7/2/2009 9:27	1.000	0.651	1.014	1.014	112.82%	1.00%	21								
22	1201245733.1	1.0000	2.0399E-05	7/1/2009 0:00	22	6B	15	81	1833	128.667	0.6111	0.00816	500	1.836	7/2/2009 5:40	7/2/2009 9:27	7/2/2009 9:27	7/2/2009 9:27	1.000	0.651	1.014	1.014	112.82%	1.00%	22								
23	1201245734.1	1.0000	2.0399E-05	7/1/2009 0:00	23	6C	15	81	1826	121.733	0.6120	0.00816	500	0.362	7/2/2009 5:40	7/2/2009 9:47	7/2/2009 9:47	7/2/2009 9:47	1.000	0.627	1.014	1.014	111.91%	1.00%	23								
24	1201245735.1	1.0000	2.0399E-05	7/1/2009 0:00	24	6D	15	75	1711	114.067	0.6180	0.00816	500	1.944	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.627	1.014	1.014	100.83%	1.00%	24								
25	1201245736.1	1.0000	2.0399E-05	7/1/2009 0:00	25	7A	15	45	1788	119.200	0.6332	0.00816	500	1.846	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.628	1.014	1.014	114.22%	1.00%	25								
26	1201245737.1	1.0000	2.0399E-05	7/1/2009 0:00	26	7B	15	59	1783	118.867	0.6280	0.00816	500	0.378	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.627	1.014	1.014	108.20%	1.00%	26								
27	1201245738.1	1.0000	2.0399E-05	7/1/2009 0:00	27	7C	15	74	1934	128.933	0.6178	0.00816	500	0.302	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.627	1.014	1.014	114.22%	1.00%	27								
28	1201245739.1	1.0000	2.0399E-05	7/1/2009 0:00	28	7D	15	83	1963	130.867	0.6257	0.00816	500	0.396	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.626	1.014	1.014	105.84%	1.00%	28								
29	1201245740.1	1.0000	2.0399E-05	7/1/2009 0:00	29	8A	15	49	1653	110.200	0.6247	0.00816	500	0.788	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.626	1.014	1.014	102.70%	1.00%	29								
30	1201245741.1	1.0000	2.0399E-05	7/1/2009 0:00	30	8B	15	20	1788	119.200	0.6332	0.00816	500	1.946	7/2/2009 5:40	7/2/2009 9:48	7/2/2009 9:48	7/2/2009 9:48	1.000	0.626	1.014	1.014	112.82%	1.00%	30								
31	1201245742.1	1.0000	2.0399E-05	7/1/2009 0:00	31	8C	15	34	1820	128.000	0.6339	0.00816	500	1.312	7/2/2009 5:40	7/2/2009 10:07	7/2/2009 10:07	7/2/2009 10:07	1.000	0.626	1.014	1.014	111.91%	1.00%	31								
32	1201245743.1	1.0000	2.0399E-05	7/1/2009 0:00	32	8D	15	17	1782	118.800	0.6281	0.00816	500	0.676	7/2/2009 5:40	7/2/2009 10:07	7/2/2009 10:07	7/2/2009 10:07	1.000	0.626	1.014	1.014	111.91%	1.00%	32								
33	1201245744.1	1.0000	2.0399E-05	7/1/2009 0:00	33	9A	15	15	1689	112.600	0.6496	0.00816	500	0.380	7/2/2009 5:40	7/2/2009 10:06	7/2/2009 10:06	7/2/2009 10:06	1.000	0.605	1.014	1.014	100.83%	1.00%	33								
34	1201245745.1	1.0000	2.0399E-05	7/1/2009 0:00	34	9B	15	13	1706	113.733	0.6356	0.00816	500	1.206	7/2/2009 5:40	7/2/2009 10:06	7/2/2009 10:06	7/2/2009 10:06	1.000	0.605	1.014	1.014	114.22%	1.00%	34								
35	1201245746.1	1.0000	2.0399E-05	7/1/2009 0:00	35	9C	15	13	1802	120.133	0.6273	0.00816	500	0.370	7/2/2009 5:40	7/2/2009 10:22	7/2/2009 10:22	7/2/2009 10:22	1.000	0.587	1.014	1.014	111.91%	1.00%	35								
36	1201245747.1	1.0000	2.0399E-05	7/1/2009 0:00	36	9D	15	15	1945	128.667	0.6433	0.00816	500	0.324	7/2/2009 5:40	7/2/2009 10:06	7/2/2009 10:06	7/2/2009 10:06	1.000	0.605	1.014	1.014	105.84%	1.00%	36								
37	1201245748.1	1.0000	2.0399E-05	7/1/2009 0:00	37	10A	15	10	1708	113.867	0.6389	0.00816	500	0.316	7/2/2009 5:40	7/2/2009 10:06	7/2/2009 10:06	7/2/2009 10:06	1.000	0.604	1.014	1.014	102.70%	1.00%	37								
38	1201245749.1	1.0000	2.0399E-05	7/1/2009 0:00	38	10B	15	19	1743	116.200	0.6137	0.00816	500	0.596	7/2/2009 5:40	7/2/2009 10:07	7/2/2009 10:07	7/2/2009 10:07	1.000	0.604													

July 7/2/09

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Normalis are decay corrected to Sample Date/Time

indicates results calculated at 100% recovery

Decision Level	Critical Level	Required MDA	MDA	Sample Act. Conc.		Sample Error	Net Count Rate	Net Count Rate	Net Count Rate	2 SIGMA Counting		Total Prop. Uncertainty	Sample Type	Nominal pCi/L	Recovery
				pCi/L	Conc.					CPM	CPM				
0.3471	0.2451	1	0.6937	134.0279	0.0254	131.6880	2.9666	5.9178	21.6466	LCS	164.3409	81.6%			
0.3647	0.2575	1	0.7192	133.0399	0.0251	130.2590	2.9508	5.9071	21.4655	LCS	164.3409	81.0%			
0.5889	0.3790	1	0.9659	145.2921	0.0243	139.8173	3.0611	6.2347	23.3752	LCS	164.3409	88.4%			
0.4695	0.3314	1	0.8755	159.8828	0.0239	150.4760	3.1730	6.6057	25.6756	LCS	164.3409	97.3%			
0.4261	0.3008	1	0.8097	127.0000	0.0257	122.0633	2.8583	5.8279	20.5368	LCS	164.3409	77.3%			
0.7599	0.5395	1	1.2813	141.0616	0.0247	135.4387	3.0211	6.1673	22.7300	LCS	164.3409	85.8%			
0.3798	0.2681	1	0.7515	141.8559	0.0253	131.7993	2.9681	6.2613	22.9053	LCS	164.3409	86.3%			
0.4150	0.2830	1	0.8072	145.8182	0.0251	131.8887	2.9696	6.4352	23.5274	LCS	164.3409	88.7%			
0.6347	0.4481	1	1.1343	129.8854	0.0284	108.9047	2.7042	6.3116	21.1935	LCS	164.3409	78.9%			
0.9035	0.6379	1	1.5022	135.4510	0.0266	119.6900	2.8455	6.3115	21.9803	LCS	164.3409	82.4%			
0.6078	0.4291	1	1.0779	141.2594	0.0255	128.6447	2.9382	6.3235	22.8259	LCS	164.3409	86.0%			
0.5473	0.3864	1	0.9987	155.5960	0.0247	137.7700	3.0378	6.7244	25.0636	LCS	164.3409	94.7%			
0.6283	0.4436	1	1.1054	135.5336	0.0264	124.2433	2.8986	6.1761	21.9739	LCS	164.3409	83.3%			
0.9036	0.6379	1	1.4942	136.9155	0.0254	125.4287	2.9134	6.2333	22.1127	LCS	164.3409	88.8%			
0.7676	0.5419	1	1.3079	145.9826	0.0252	130.3400	2.9624	6.5032	23.5621	LCS	164.3409	90.0%			
0.4809	0.3395	1	0.9027	134.9611	0.0269	120.7040	2.8427	6.2312	21.9265	LCS	164.3409	82.1%			
0.8974	0.4924	1	1.2076	131.4742	0.0271	117.9500	2.8170	6.1544	21.3797	LCS	164.3409	80.0%			
0.6530	0.4610	1	1.1419	148.2299	0.0259	132.9873	2.9894	6.4406	23.6659	LCS	164.3409	89.0%			
0.7661	0.5409	1	1.3064	156.3706	0.0255	139.2187	3.0605	6.7377	25.2668	LCS	164.3409	95.2%			
0.6899	0.4871	1	1.1997	134.1863	0.0270	118.9960	2.8288	6.2523	21.8127	LCS	164.3409	81.7%			
0.6079	0.4292	1	1.0862	137.0396	0.0269	120.3027	2.8412	6.3436	22.2643	LCS	164.3409	83.4%			
0.9509	0.6713	1	1.5725	146.0056	0.0264	127.0307	2.9317	6.6044	23.6775	LCS	164.3409	88.8%			
0.4376	0.3090	1	0.8562	144.5849	0.0276	113.7227	2.7577	6.3903	21.8573	LCS	164.3409	88.0%			
0.4227	0.2984	1	0.8330	134.2390	0.0275	118.4887	2.8152	6.4094	22.3723	LCS	164.3409	92.4%			
0.4360	0.3079	1	0.8480	137.6373	0.0270	118.4887	2.8152	6.7858	24.6088	LCS	164.3409	92.6%			
0.3962	0.2797	1	0.7956	151.8935	0.0262	128.6313	2.9319	6.6518	23.4785	LCS	164.3409	77.8%			
0.4480	0.3081	1	0.8657	152.1131	0.0261	130.4707	2.9539	6.7499	24.6318	LCS	164.3409	82.2%			
0.6932	0.4470	1	1.1278	127.8251	0.0279	109.4120	2.7108	6.2072	20.8618	LCS	164.3409	89.2%			
0.8917	0.6931	1	1.6167	135.1471	0.0273	117.2540	2.8197	6.3699	21.9896	LCS	164.3409	86.1%			
0.5779	0.4080	1	1.0463	146.5864	0.0263	127.3240	2.9214	6.5922	23.7610	LCS	164.3409	86.1%			
0.8422	0.5946	1	1.4301	141.4935	0.0272	117.4880	2.8147	6.6441	23.0149	LCS	164.3409	79.4%			
0.4379	0.3091	1	0.8509	130.5505	0.0276	112.2200	2.7400	6.2478	21.2682	LCS	164.3409	81.4%			
0.7972	0.5629	1	1.3635	133.7974	0.0277	112.5273	2.7540	6.4182	21.9026	LCS	164.3409	81.4%			
0.4475	0.3159	1	0.8728	144.2924	0.0269	119.7633	2.8301	6.6832	23.4437	LCS	164.3409	87.8%			
0.8154	0.5757	1	1.3863	150.8313	0.0263	128.3747	2.9406	6.7718	24.4459	LCS	164.3409	91.8%			
0.4063	0.2868	1	0.8104	134.4151	0.0285	119.5507	2.7553	6.3927	21.8871	LCS	164.3409	82.2%			
0.4205	0.2969	1	0.8358	146.9063	0.0268	121.4093	2.8489	6.7565	23.8548	LCS	164.3409	89.4%			
0.4437	0.3182	1	0.8728	144.8386	0.0271	117.5853	2.8041	6.7699	23.5500	LCS	164.3409	86.1%			
0.3432	0.2423	1	0.6763	135.4546	0.0253	141.3227	3.0733	5.7736	21.8705	LCS	164.3409	82.4%			
0.3289	0.2322	1	0.6397	131.6931	0.0247	150.2887	3.1684	5.4434	21.2189	LCS	164.3409	80.1%			
0.2949	0.2082	1	0.5922	148.9038	0.0237	169.2980	3.3626	5.7929	23.8966	LCS	164.3409	90.5%			
0.3379	0.2385	1	0.6530	151.8473	0.0235	172.6707	3.3968	5.8549	24.3615	LCS	164.3409	92.4%			
0.4616	0.3400	1	0.8577	131.6889	0.0249	148.2120	3.2186	5.4891	21.2301	LCS	164.3409	80.1%			
0.7498	0.5287	1	1.2332	134.8966	0.0246	153.3873	3.3053	5.6483	21.7215	LCS	164.3409	82.1%			
0.4447	0.3140	1	0.8052	148.8317	0.0238	162.8880	3.3090	5.6202	23.8982	LCS	164.3409	90.6%			
0.6180	0.4363	1	1.0494	143.9479	0.0241	162.8880	3.3090	5.7315	23.1384	LCS	164.3409	87.8%			
0.3427	0.2420	1	0.6680	135.0873	0.0248	148.3533	3.1490	5.6202	21.7752	LCS	164.3409	82.2%			
0.5997	0.4234	1	1.0256	129.5009	0.0251	144.7940	3.1202	5.4697	20.8960	LCS	164.3409	78.9%			
0.3316	0.2341	1	0.6469	146.0021	0.0240	163.4967	3.3053	5.7852	23.4616	LCS	164.3409	88.8%			
0.6355	0.4487	1	1.0805	159.6717	0.0235	174.3747	3.4225	6.1425	25.6134	LCS	164.3409	97.2%			
0.3136	0.2214	1	0.6255	132.0625	0.0251	144.5507	3.1078	5.5650	21.3060	LCS	164.3409	80.4%			
1.4618	1.0321	1	2.2506	135.6135	0.0254	145.4707	3.1861	5.8215	21.9790	LCS	164.3409	82.5%			
0.3185	0.2249	1	0.6330	141.6298	0.0245	154.5427	3.2193	5.7718	22.7000	LCS	164.3409	86.2%			
0.3327	0.2349	1	0.6546	146.7439	0.0242	158.8520	3.2579	5.8988	23.6017	LCS	164.3409	89.3%			

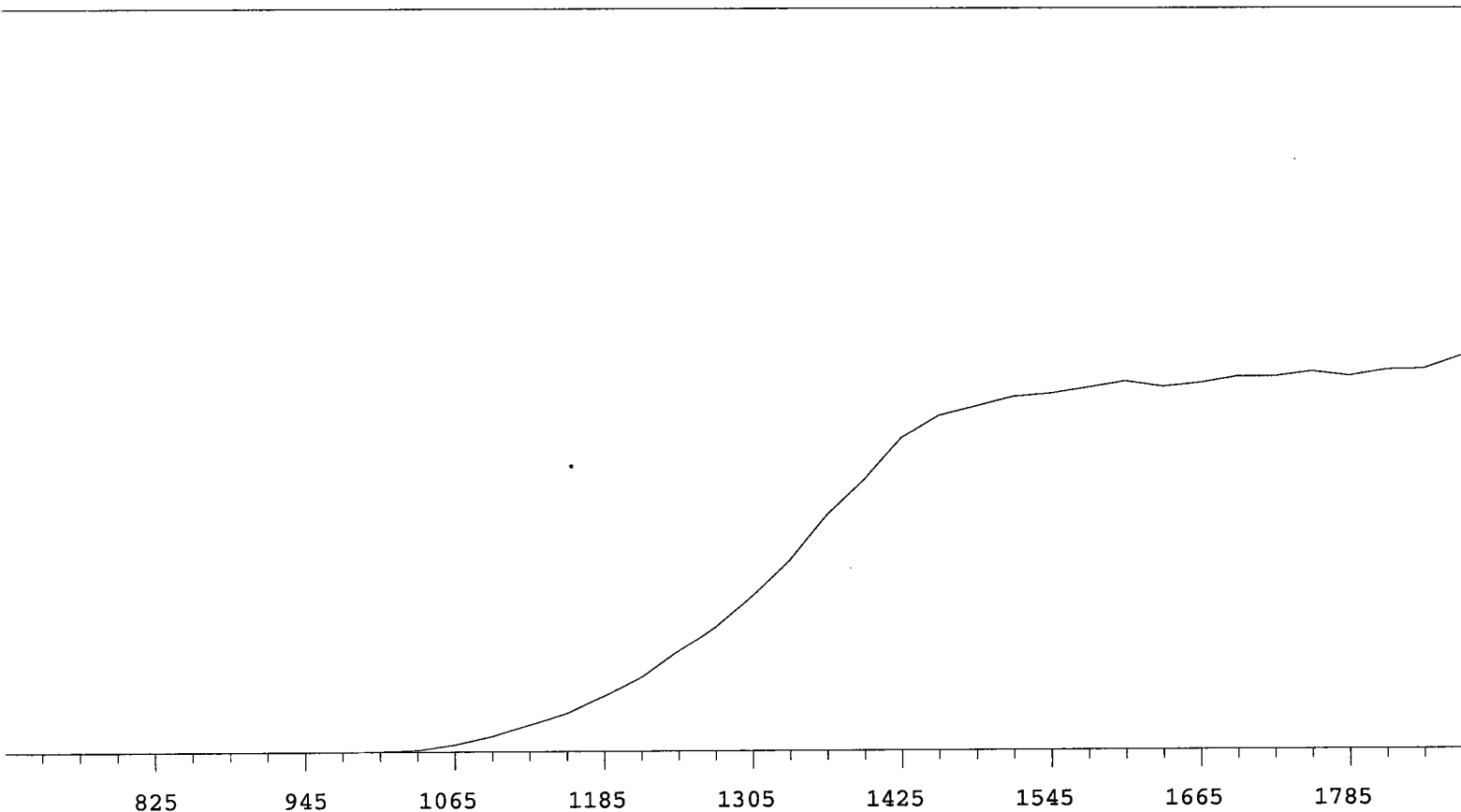
SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine
1	1A	15	36	1980	7/2/2009 8:39	7/2/2009 8:54	Protean
2	1B	15	27	1959	7/2/2009 8:40	7/2/2009 8:55	Protean
3	1C	15	44	2108	7/2/2009 8:40	7/2/2009 8:55	Protean
4	1D	15	108	2265	7/2/2009 8:40	7/2/2009 8:55	Protean
5	2A	15	69	1838	7/2/2009 8:40	7/2/2009 8:55	Protean
6	2B	15	8	2053	7/2/2009 8:40	7/2/2009 8:55	Protean
7	2C	15	96	1982	7/2/2009 8:40	7/2/2009 8:55	Protean
8	2D	15	93	1984	7/2/2009 9:08	7/2/2009 9:23	Protean
1	3A	15	233	1645	7/2/2009 9:08	7/2/2009 9:23	Protean
2	3B	15	99	1821	7/2/2009 9:08	7/2/2009 9:23	Protean
3	3C	15	96	1942	7/2/2009 9:08	7/2/2009 9:23	Protean
4	3D	15	90	2076	7/2/2009 9:08	7/2/2009 9:23	Protean
5	4A	15	79	1877	7/2/2009 9:08	7/2/2009 9:23	Protean
6	4B	15	13	1909	7/2/2009 9:08	7/2/2009 9:23	Protean
7	4C	15	97	1974	7/2/2009 9:09	7/2/2009 9:24	Protean
8	4D	15	181	1880	7/2/2009 9:25	7/2/2009 9:40	Protean
1	5A	15	53	1818	7/2/2009 9:26	7/2/2009 9:41	Protean
2	5B	15	59	1785	7/2/2009 9:26	7/2/2009 9:41	Protean
3	5C	15	43	2009	7/2/2009 9:26	7/2/2009 9:41	Protean
4	5D	15	59	2107	7/2/2009 9:26	7/2/2009 9:41	Protean
5	6A	15	35	1800	7/2/2009 9:27	7/2/2009 9:42	Protean
6	6B	15	71	1816	7/2/2009 9:27	7/2/2009 9:42	Protean
7	6C	15	81	1933	7/2/2009 9:27	7/2/2009 9:42	Protean
8	6D	15	81	1826	7/2/2009 9:47	7/2/2009 10:02	Protean
1	7A	15	75	1711	7/2/2009 9:48	7/2/2009 10:03	Protean
2	7B	15	59	1783	7/2/2009 9:48	7/2/2009 10:03	Protean
3	7C	15	74	1934	7/2/2009 9:48	7/2/2009 10:03	Protean
4	7D	15	83	1963	7/2/2009 9:48	7/2/2009 10:03	Protean
5	8A	15	49	1653	7/2/2009 9:48	7/2/2009 10:03	Protean
6	8B	15	20	1788	7/2/2009 9:48	7/2/2009 10:03	Protean
7	8C	15	34	1920	7/2/2009 9:48	7/2/2009 10:03	Protean
8	8D	15	45	1782	7/2/2009 10:07	7/2/2009 10:22	Protean
1	9A	15	17	1689	7/2/2009 10:06	7/2/2009 10:21	Protean
2	9B	15	13	1706	7/2/2009 10:06	7/2/2009 10:21	Protean
3	9C	15	13	1802	7/2/2009 10:06	7/2/2009 10:21	Protean
4	9D	15	15	1945	7/2/2009 10:06	7/2/2009 10:21	Protean
5	10A	15	10	1708	7/2/2009 10:07	7/2/2009 10:22	Protean
6	10B	15	19	1743	7/2/2009 10:07	7/2/2009 10:22	Protean
7	10C	15	15	1826	7/2/2009 10:07	7/2/2009 10:22	Protean
8	10D	15	14	1769	7/2/2009 10:22	7/2/2009 10:37	Protean
1	11A	15	19	2125	7/2/2009 7:26	7/2/2009 7:41	Protean
2	11B	15	22	2260	7/2/2009 7:26	7/2/2009 7:41	Protean
3	11C	15	13	2544	7/2/2009 7:26	7/2/2009 7:41	Protean
4	11D	15	14	2596	7/2/2009 7:26	7/2/2009 7:41	Protean
5	12A	15	17	2235	7/2/2009 7:26	7/2/2009 7:41	Protean
6	12B	15	10	2330	7/2/2009 7:26	7/2/2009 7:41	Protean
7	12C	15	16	2530	7/2/2009 7:26	7/2/2009 7:41	Protean
8	12D	15	10	2463	7/2/2009 7:26	7/2/2009 7:41	Protean
1	13A	15	11	2231	7/2/2009 7:49	7/2/2009 8:04	Protean
2	13B	15	13	2190	7/2/2009 7:49	7/2/2009 8:04	Protean
3	13C	15	11	2458	7/2/2009 7:49	7/2/2009 8:04	Protean

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7/2/09

4	13D	15	12	2635	7/2/2009 7:50	7/2/2009 8:05	Protean
5	14A	15	11	2173	7/2/2009 7:50	7/2/2009 8:05	Protean
6	14B	15	11	2281	7/2/2009 7:50	7/2/2009 8:05	Protean
7	14C	15	14	2323	7/2/2009 7:50	7/2/2009 8:05	Protean
8	14D	15	14	2388	7/2/2009 7:50	7/2/2009 8:05	Protean

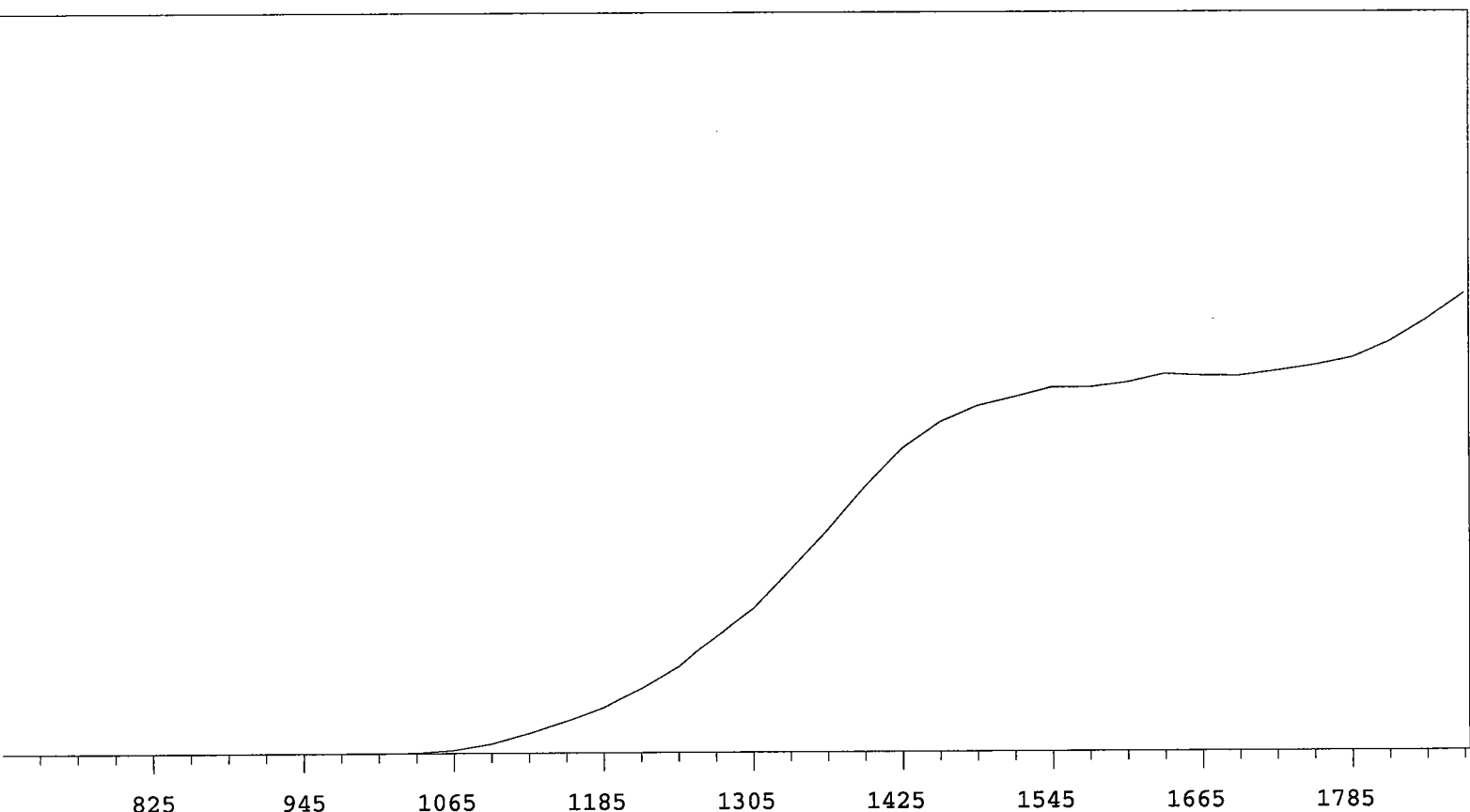
Ra-228 Protean	Cal Date A0	7/2/2009 A1	Exp Date A2	7/31/2009 A3	A4
1A	6.30258E-01				
1B	6.28221E-01				
1C	6.17615E-01				
1D	6.04341E-01				
2A	6.17224E-01				
2B	6.16681E-01				
2C	5.96919E-01				
2D	6.11886E-01				
3A	5.68218E-01				
3B	5.98041E-01				
3C	6.16431E-01				
3D	5.99405E-01				
4A	6.20765E-01				
4B	6.20459E-01				
4C	6.05183E-01				
4D	5.87325E-01				
5A	6.25790E-01				
5B	6.28027E-01				
5C	6.36802E-01				
5D	6.23741E-01				
6A	6.22050E-01				
6B	6.16280E-01				
6C	6.11053E-01				
6D	6.12043E-01				
7A	6.17961E-01				
7B	6.27962E-01				
7C	6.17791E-01				
7D	6.25720E-01				
8A	6.24723E-01				
8B	6.33167E-01				
8C	6.33890E-01				
8D	6.28089E-01				
9A	6.496412E-01				
9B	6.356321E-01				
9C	6.273008E-01				
9D	6.432553E-01				
10A	6.389066E-01				
10B	6.137441E-01				
10C	6.249999E-01				
10D	6.319781E-01				
11A	5.82502E-01				
11B	6.37172E-01				
11C	6.35171E-01				
11D	6.34840E-01				
12A	6.28566E-01				
12B	6.35234E-01				
12C	6.30366E-01				
12D	6.31956E-01				
13A	6.40953E-01				

13B	6.52643E-01
13C	6.53798E-01
13D	6.37701E-01
14A	6.39290E-01
14B	6.26611E-01
14C	6.37531E-01
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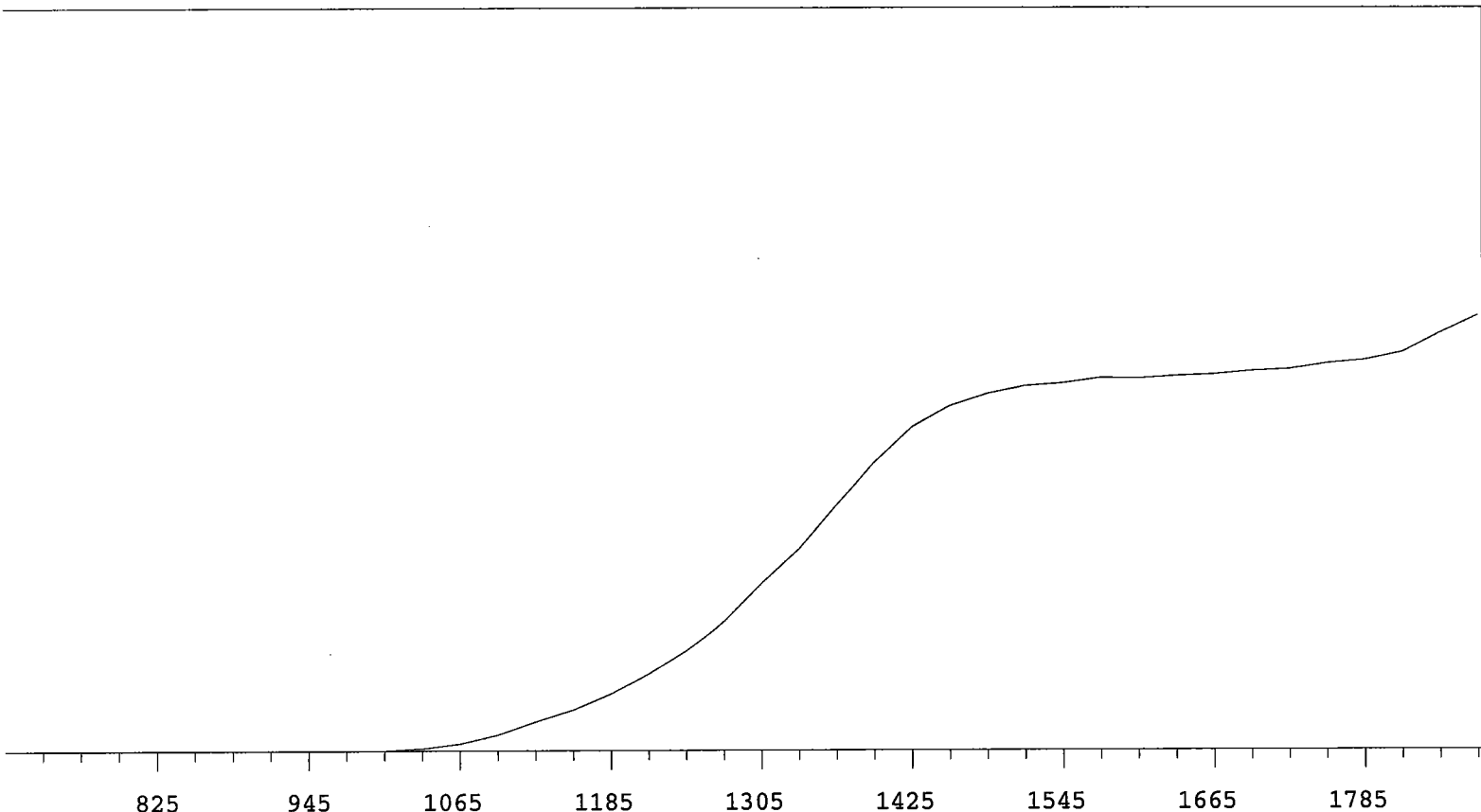
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	11640	+69.78
735	1		1335	14241	+62.88
765	0		1365	17534	+55.91
795	0	+0.00	1395	20127	+45.04
825	0	>100	1425	23254	+31.29
855	1	>100	1455	24902	+20.41
885	0	+55.56	1485	25605	+10.49
915	2	+66.67	1515	26310	+6.44
945	0	>100	1545	26535	+5.31
975	2	>100	1575	26953	+2.79
1005	42	>100	1605	27399	+1.83
1035	145	>100	1635	27000	+1.71
1065	544	>100	1665	27255	+1.62
1095	1136	>100	1695	27723	+3.14
1125	1967	>100	1725	27705	+1.56
1155	2845	>100	1755	28072	+1.15
1185	4078	>100	1785	27729	+1.43
1215	5483	+93.18	1815	28194	+3.24
1245	7400	+83.35	1845	28243	
1275	9328	+75.40	1875	29191	

Alpha Volts: 1575 Beta Volts: 1575

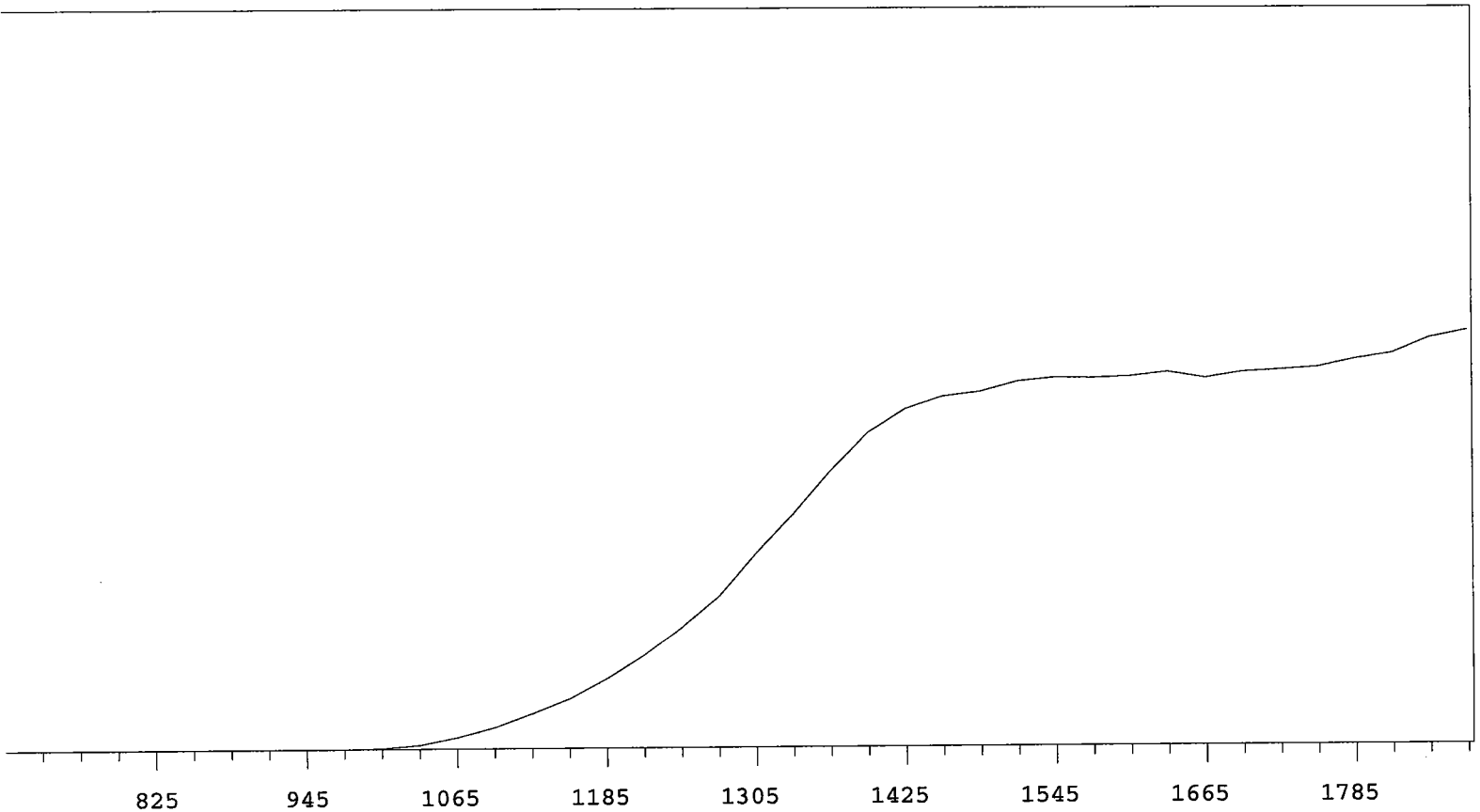


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	13188	+75.92
735	0		1335	16818	+67.60
765	0	+55.56	1365	20420	+59.86
795	1	+83.33	1395	24341	+47.85
825	1	+55.56	1425	27854	+35.51
855	0	>100	1455	30288	+23.26
885	1	+0.00	1485	31798	+14.54
915	0	+0.00	1515	32622	+8.32
945	1	>100	1545	33496	+5.11
975	0	>100	1575	33475	+4.43
1005	4	>100	1605	33903	+3.09
1035	56	>100	1635	34654	+2.46
1065	292	>100	1665	34485	+1.74
1095	890	>100	1695	34445	+1.84
1125	1841	>100	1725	34908	+3.91
1155	2936	>100	1755	35401	+6.80
1185	4179	>100	1785	36062	+10.27
1215	5837	>100	1815	37505	+14.30
1245	7821	+91.28	1845	39508	
1275	10638	+83.88	1875	41843	

Alpha Volts: 1575 Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	14817	+71.06
735	0		1335	17823	+63.34
765	1	+0.00	1365	21704	+53.63
795	0	>100	1395	25422	+42.55
825	1	-55.56	1425	28424	+29.21
855	1	+55.56	1455	30244	+18.11
885	0	>100	1485	31305	+10.10
915	1	>100	1515	31989	+6.07
945	0	>100	1545	32223	+3.43
975	4	>100	1575	32671	+2.15
1005	32	>100	1605	32621	+1.68
1035	206	>100	1635	32837	+1.52
1065	639	>100	1665	32961	+2.01
1095	1416	>100	1695	33249	+2.64
1125	2551	>100	1725	33409	+3.21
1155	3619	>100	1755	33931	+4.07
1185	5037	+98.68	1785	34234	+7.20
1215	6875	+91.19	1815	34909	+10.28
1245	8915	+85.53	1845	36660	
1275	11519	+77.28	1875	38205	

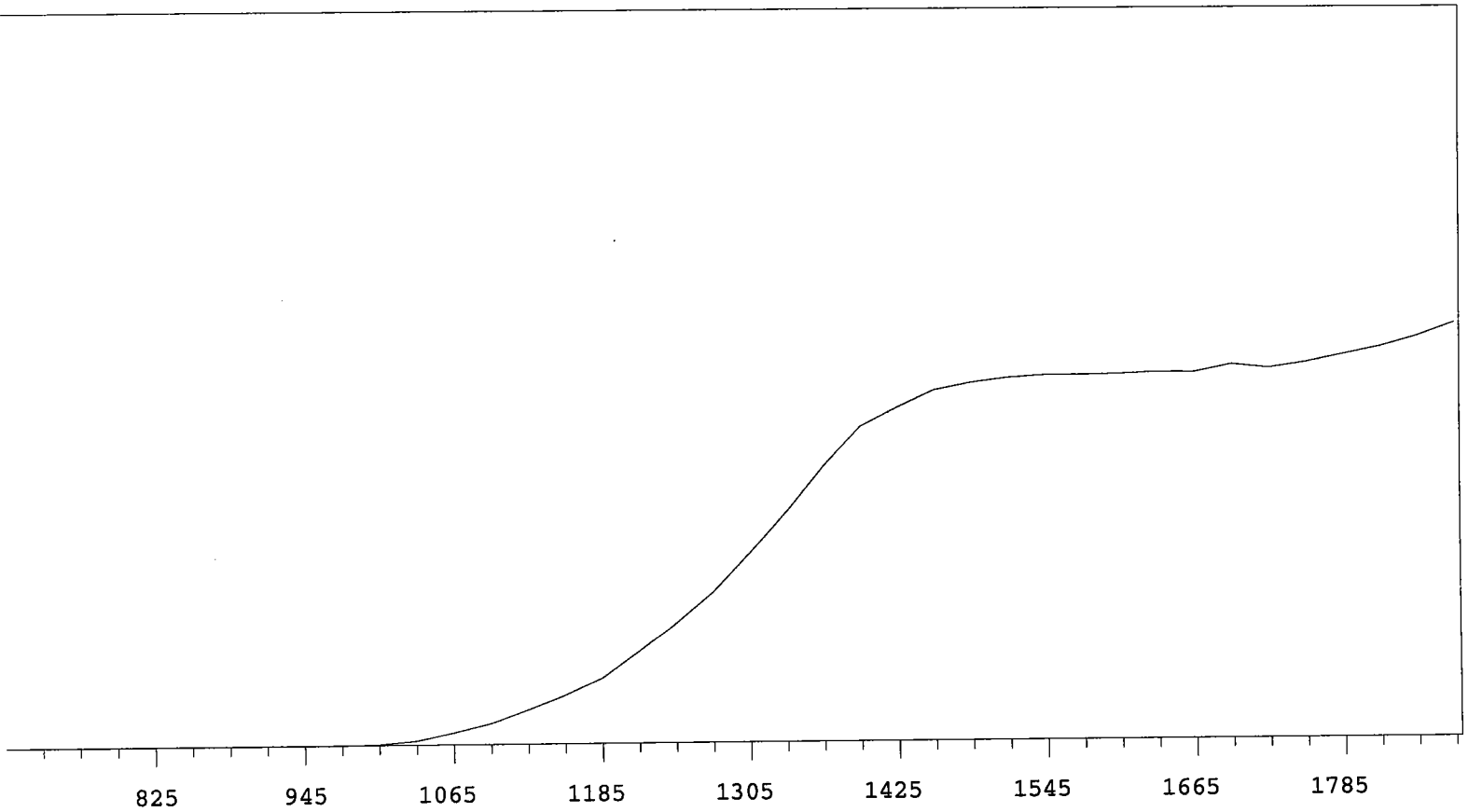


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	15202	+66.36
735	1		1335	18216	+57.86
765	0	+0.00	1365	21597	+45.58
795	1	+0.00	1395	24648	+32.96
825	0	+0.00	1425	26505	+19.92
855	1	>100	1455	27475	+11.42
885	0	>100	1485	27836	+7.08
915	0	>100	1515	28609	+4.51
945	0	>100	1545	28896	+2.93
975	8	>100	1575	28862	+1.66
1005	75	>100	1605	28969	+0.36
1035	303	>100	1635	29292	+0.80
1065	872	>100	1665	28836	+1.06
1095	1656	>100	1695	29279	+1.48
1125	2729	>100	1725	29439	+3.59
1155	3862	>100	1755	29642	+4.07
1185	5425	+98.19	1785	30243	+6.51
1215	7256	+88.82	1815	30699	+7.79
1245	9510	+81.89	1845	31876	
1275	11944	+74.07	1875	32444	

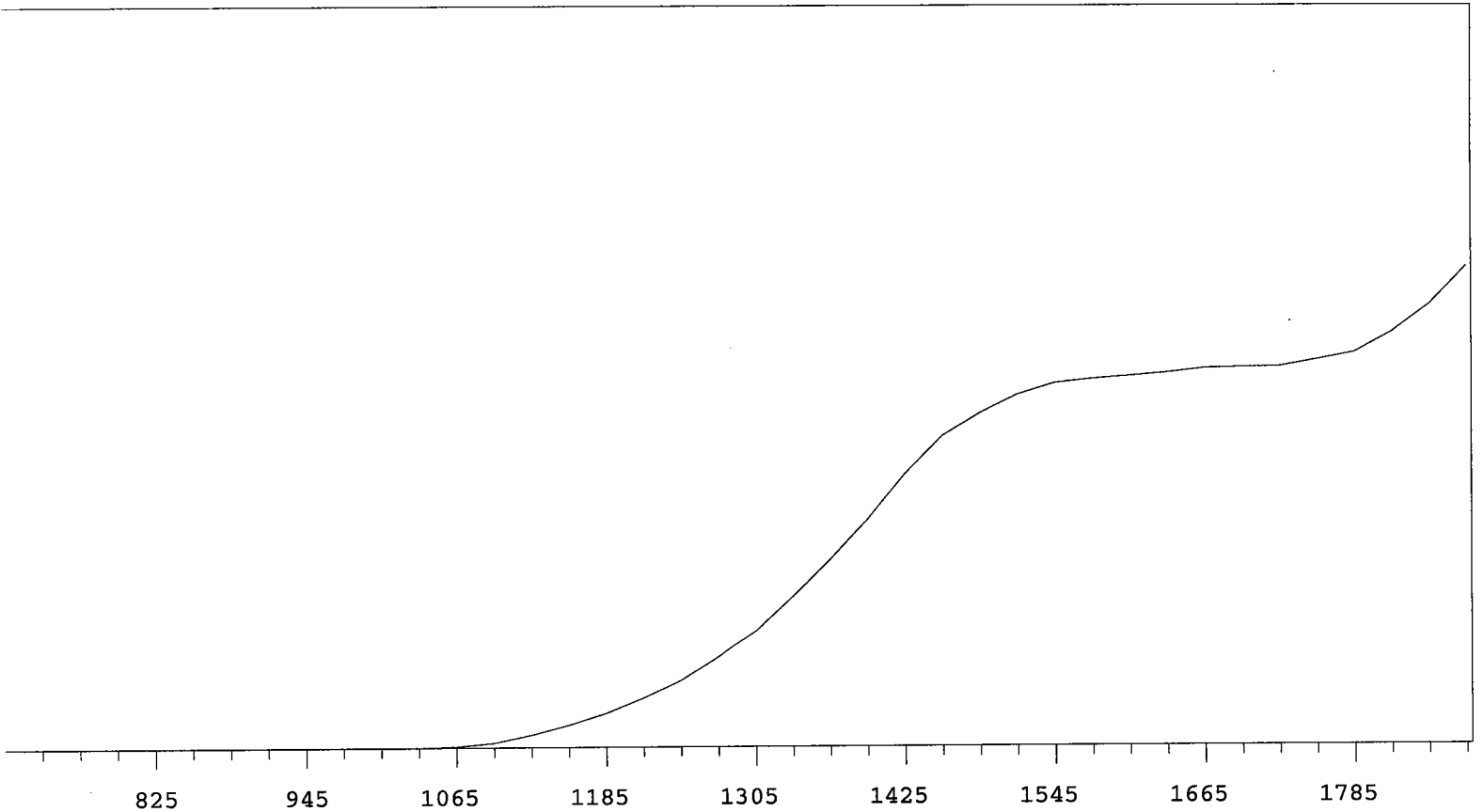
MPC 9600 Plateau
 Alpha Volts: 705

Instrument 2 MPC 9604 Detector A
 Beta Volts: 1575

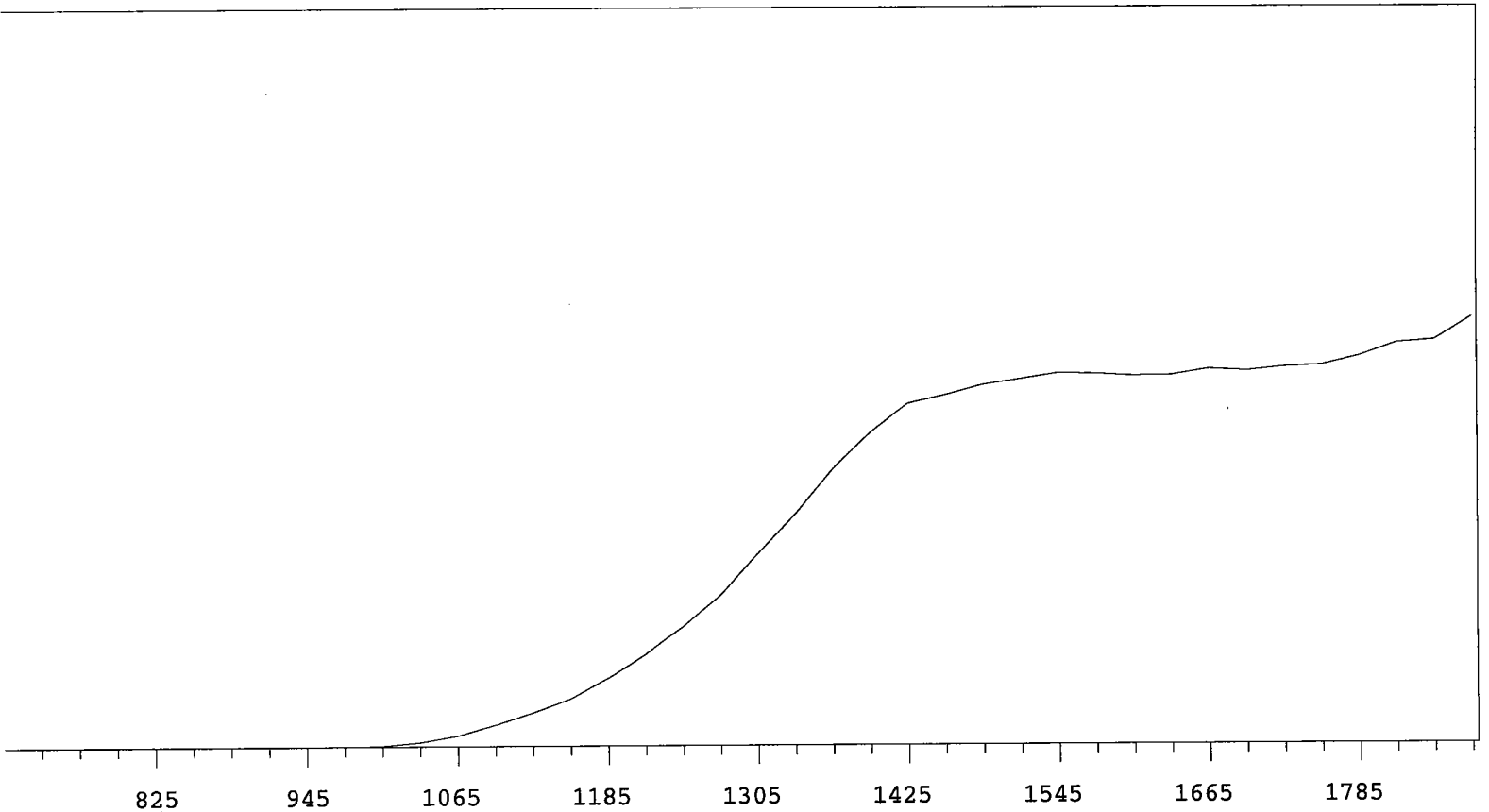
7/1/2009



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19017	+67.45
735	1		1335	23157	+59.23
765	0	+83.33	1365	27625	+45.78
795	0	-83.33	1395	31465	+32.72
825	1	>100	1425	33352	+20.41
855	0	>100	1455	35084	+11.74
885	1	+100.00	1485	35819	+7.11
915	1	>100	1515	36292	+3.35
945	2	>100	1545	36527	+1.63
975	12	>100	1575	36540	+0.87
1005	91	>100	1605	36585	+0.48
1035	421	>100	1635	36742	+1.76
1065	1239	>100	1665	36691	+1.53
1095	2155	>100	1695	37461	+1.89
1125	3527	>100	1725	37073	+3.07
1155	4974	>100	1755	37603	+4.02
1185	6647	+97.44	1785	38346	+6.58
1215	9250	+89.00	1815	39111	+7.95
1245	12041	+82.15	1845	40115	
1275	15094	+73.81	1875	41409	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	12541	+83.18
735	1		1335	16192	+74.48
765	0		1365	20083	+67.17
795	0	>100	1395	24273	+58.43
825	0	>100	1425	29090	+46.86
855	0	>100	1455	33223	+34.56
885	0	>100	1485	35608	+22.67
915	0	>100	1515	37581	+13.63
945	1	>100	1545	38762	+8.18
975	2	>100	1575	39185	+4.42
1005	3	>100	1605	39484	+3.06
1035	14	>100	1635	39806	+2.61
1065	127	>100	1665	40264	+2.03
1095	500	>100	1695	40353	+2.32
1125	1332	>100	1725	40431	+3.28
1155	2373	>100	1755	41127	+7.09
1185	3614	>100	1785	41882	+12.40
1215	5227	>100	1815	44049	+18.52
1245	7060	+97.33	1845	46950	
1275	9574	+90.30	1875	51097	

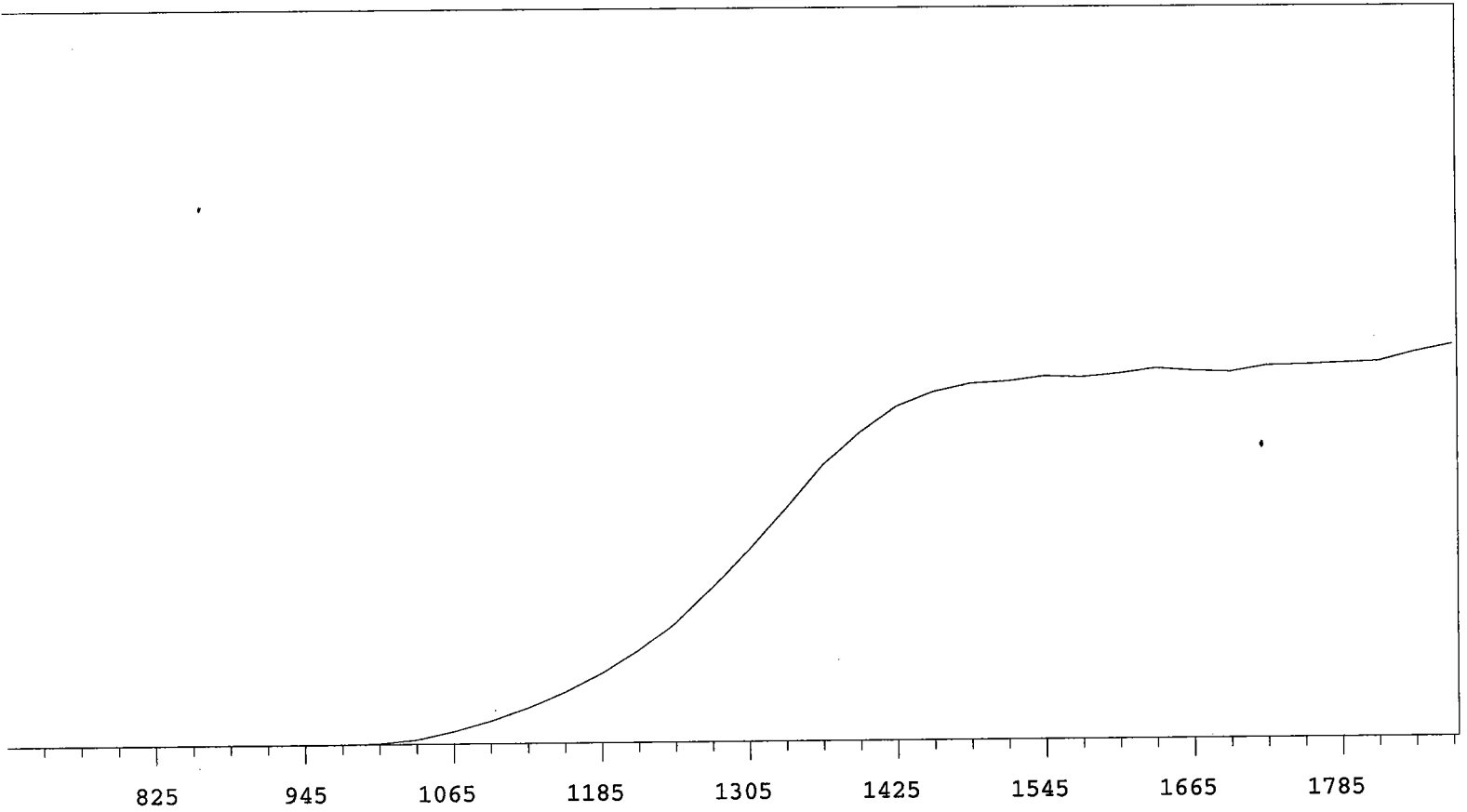


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	18216	+67.74
735	0		1335	21995	+58.11
765	0		1365	26173	+46.11
795	0	>100	1395	29479	+32.75
825	0	>100	1425	32186	+20.62
855	0	>100	1455	33022	+12.13
885	0	>100	1485	33981	+7.22
915	1	>100	1515	34520	+4.95
945	0	>100	1545	35095	+2.07
975	17	>100	1575	35014	+0.38
1005	87	>100	1605	34812	+0.55
1035	438	>100	1635	34859	+1.11
1065	1055	>100	1665	35460	+1.94
1095	2114	>100	1695	35273	+1.95
1125	3282	>100	1725	35629	+2.73
1155	4625	>100	1755	35811	+5.77
1185	6554	+97.66	1785	36656	+6.44
1215	8743	+88.09	1815	37896	+9.21
1245	11345	+81.31	1845	38145	
1275	14261	+74.60	1875	40283	

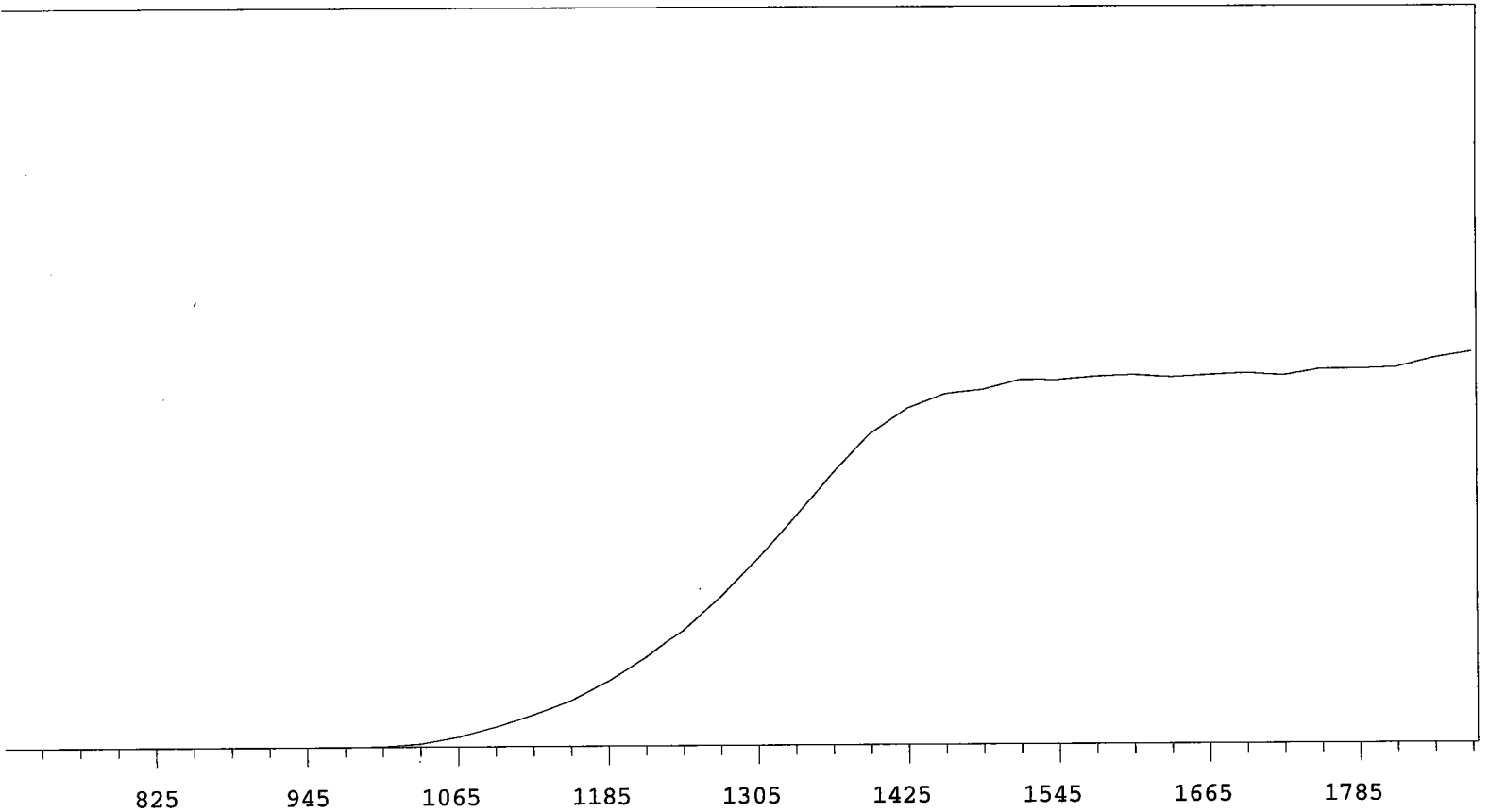
MPC 9600 Plateau
Alpha Volts: 705

Instrument 2 MPC 9604 Detector D
Beta Volts: 1575

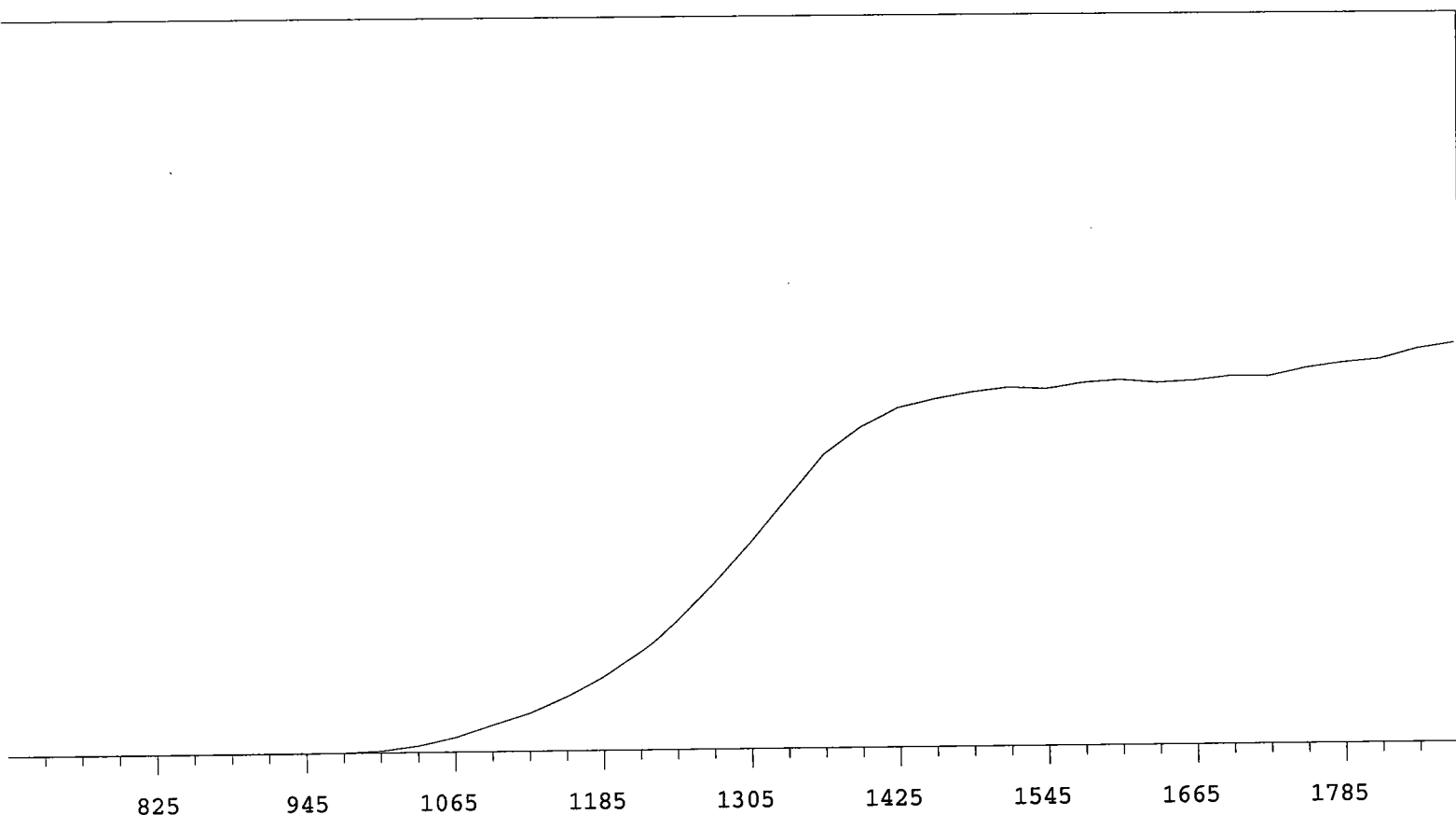
7/1/2009



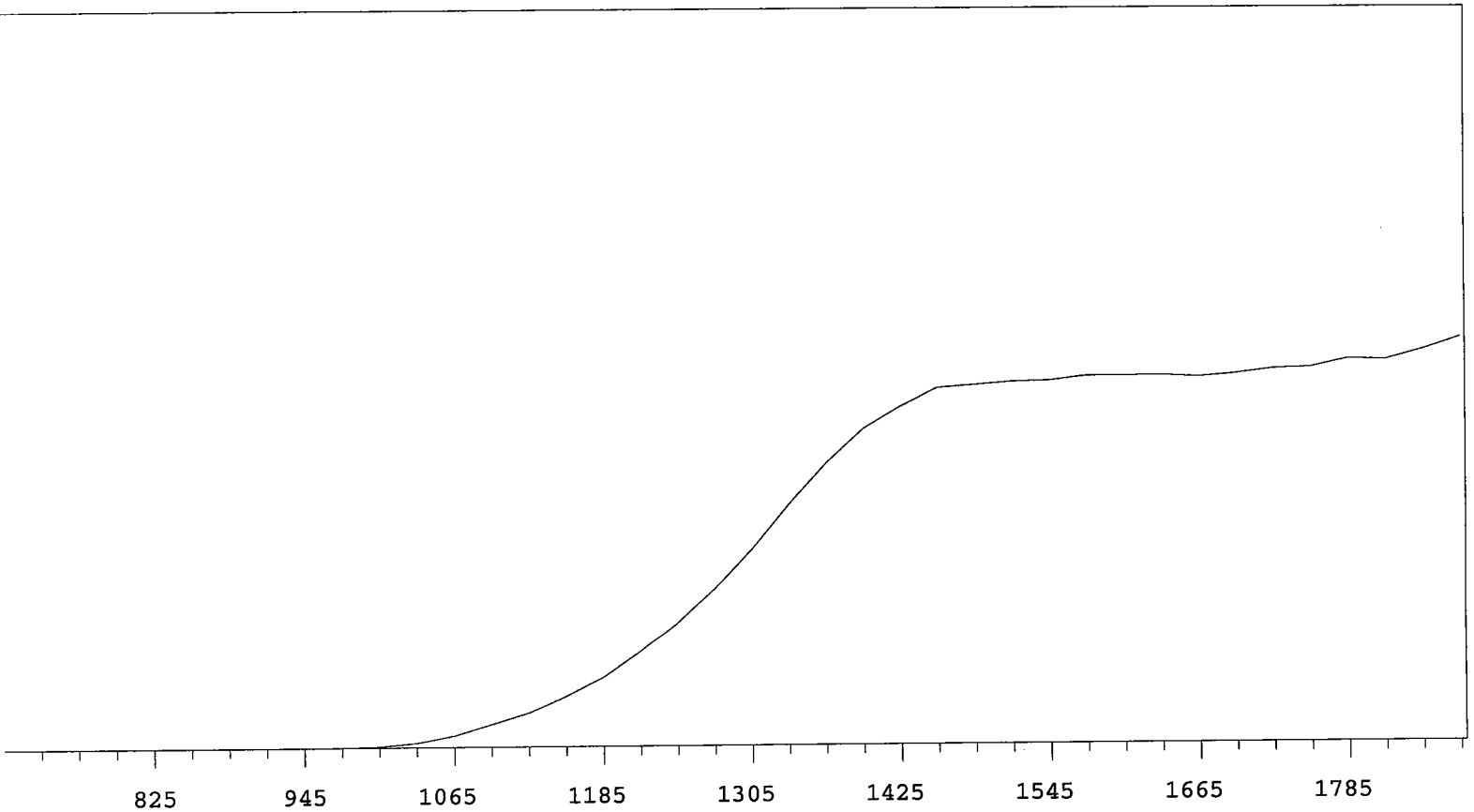
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	18675	+65.94
735	0		1335	22620	+55.69
765	0	+83.33	1365	26869	+44.63
795	2	+55.56	1395	29957	+32.08
825	1	>100	1425	32494	+20.49
855	0	>100	1455	33836	+11.98
885	0	>100	1485	34627	+6.45
915	0	>100	1515	34849	+3.22
945	2	>100	1545	35298	+1.98
975	9	>100	1575	35180	+2.37
1005	89	>100	1605	35503	+1.57
1035	439	>100	1635	36006	+0.99
1065	1198	>100	1665	35722	+0.89
1095	2164	>100	1695	35597	+0.93
1125	3436	>100	1725	36188	+1.86
1155	4917	>100	1755	36272	+1.90
1185	6762	+96.59	1785	36389	+2.55
1215	9006	+89.14	1815	36529	+4.39
1245	11800	+81.34	1845	37459	
1275	15132	+73.59	1875	38170	



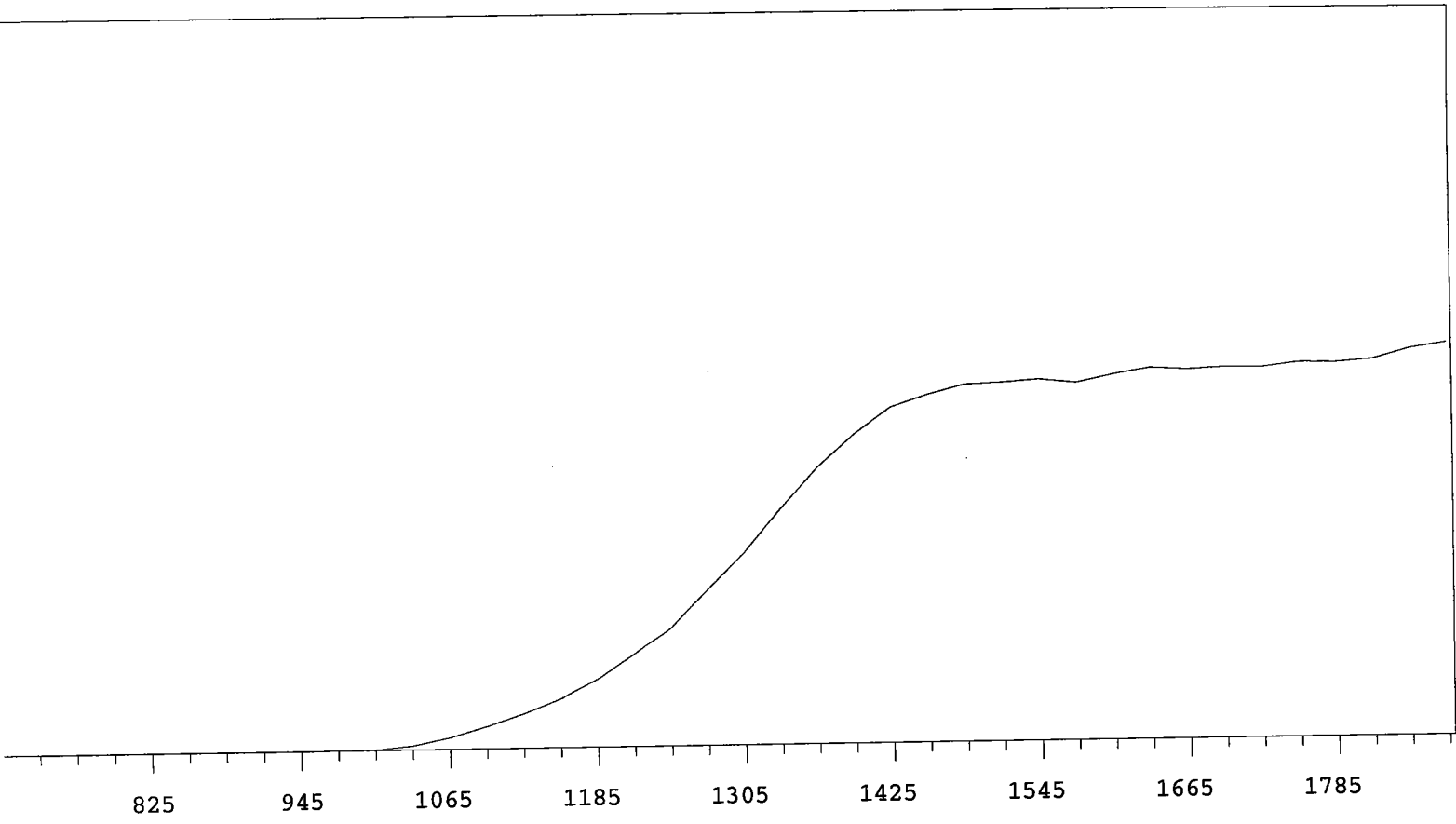
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	16654	+68.57
735	0		1335	20416	+59.26
765	0	+55.56	1365	24191	+47.28
795	1	>100	1395	27643	+34.04
825	1	+0.00	1425	29891	+21.08
855	1	>100	1455	31183	+12.30
885	0	>100	1485	31558	+6.67
915	0	>100	1515	32444	+4.05
945	0	>100	1545	32413	+2.90
975	9	>100	1575	32704	+0.81
1005	53	>100	1605	32837	+0.71
1035	302	>100	1635	32629	+0.49
1065	878	>100	1665	32797	+0.16
1095	1805	>100	1695	32964	+1.32
1125	2887	>100	1725	32746	+1.40
1155	4163	>100	1755	33308	+1.56
1185	5842	+99.81	1785	33318	+3.21
1215	7959	+90.90	1815	33456	+3.92
1245	10323	+83.03	1845	34283	
1275	13250	+75.91	1875	34815	



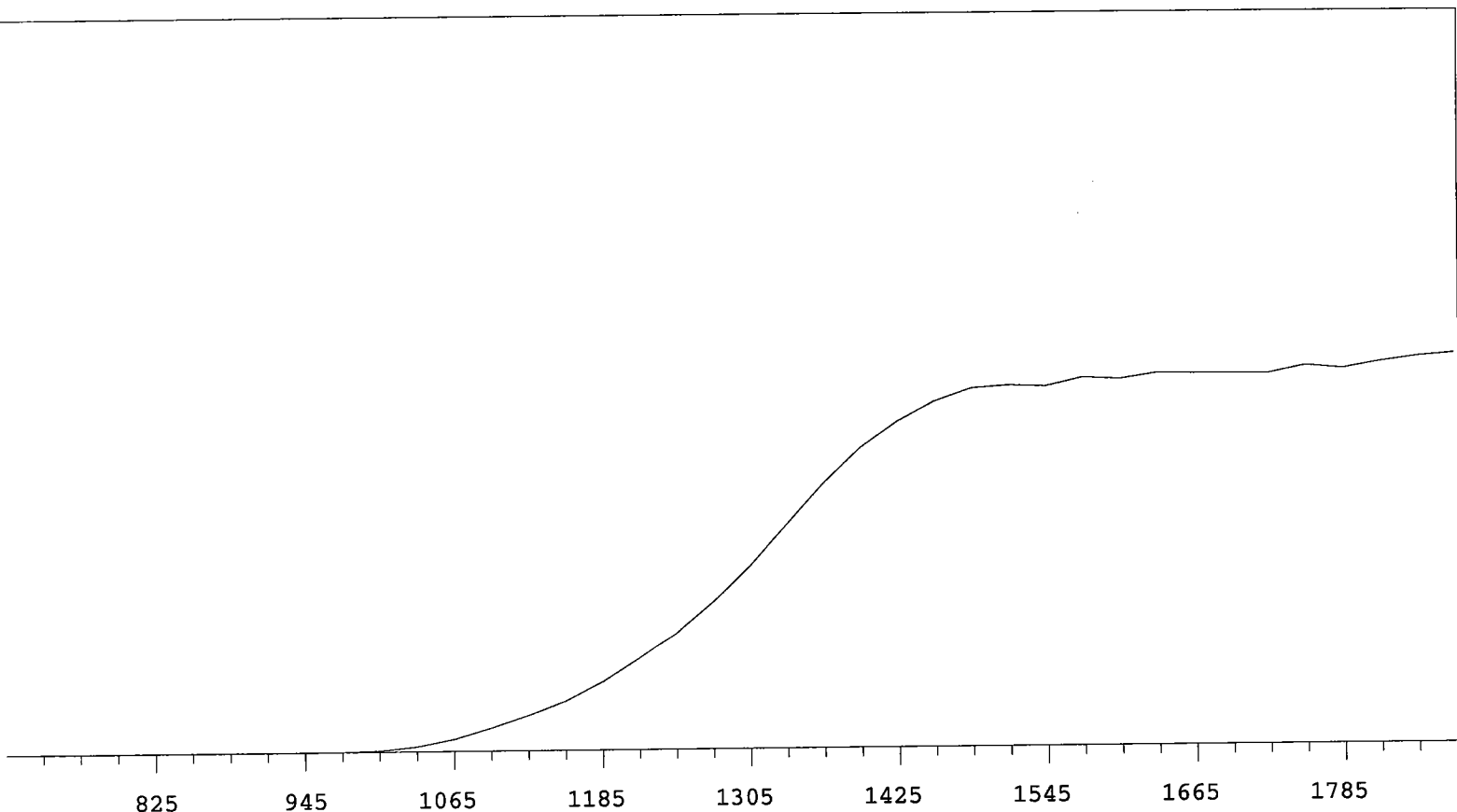
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	19810	+64.73
735	1		1335	23962	+52.62
765	0	-55.56	1365	28091	+39.27
795	0	>100	1395	30594	+25.61
825	1	>100	1425	32381	+14.86
855	3	+33.33	1455	33206	+8.91
885	0	+0.00	1485	33832	+4.41
915	1	>100	1515	34260	+3.01
945	2	>100	1545	34071	+2.33
975	29	>100	1575	34623	+1.34
1005	165	>100	1605	34848	+1.22
1035	613	>100	1635	34564	+0.89
1065	1394	>100	1665	34733	+1.01
1095	2558	>100	1695	35144	+2.76
1125	3702	>100	1725	35084	+3.66
1155	5222	>100	1755	35839	+3.97
1185	7161	+96.06	1785	36332	+5.39
1215	9507	+89.18	1815	36654	+5.35
1245	12552	+81.52	1845	37609	
1275	16030	+73.64	1875	38164	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	21412	+66.80
735	1		1335	26262	+56.32
765	1		1365	30679	+43.71
795	0	>100	1395	34466	+31.61
825	0	+0.00	1425	36949	+20.14
855	0	>100	1455	38998	+11.16
885	1	>100	1485	39313	+5.34
915	1	>100	1515	39625	+2.44
945	1	>100	1545	39751	+2.04
975	17	>100	1575	40227	+1.45
1005	122	>100	1605	40228	+0.56
1035	533	>100	1635	40255	+0.13
1065	1287	>100	1665	40075	+1.22
1095	2493	>100	1695	40384	+1.95
1125	3753	>100	1725	40900	+3.50
1155	5482	>100	1755	41028	+3.05
1185	7538	+99.39	1785	41899	+3.71
1215	10305	+90.31	1815	41767	+5.64
1245	13415	+82.57	1845	42852	
1275	17141	+75.13	1875	44132	



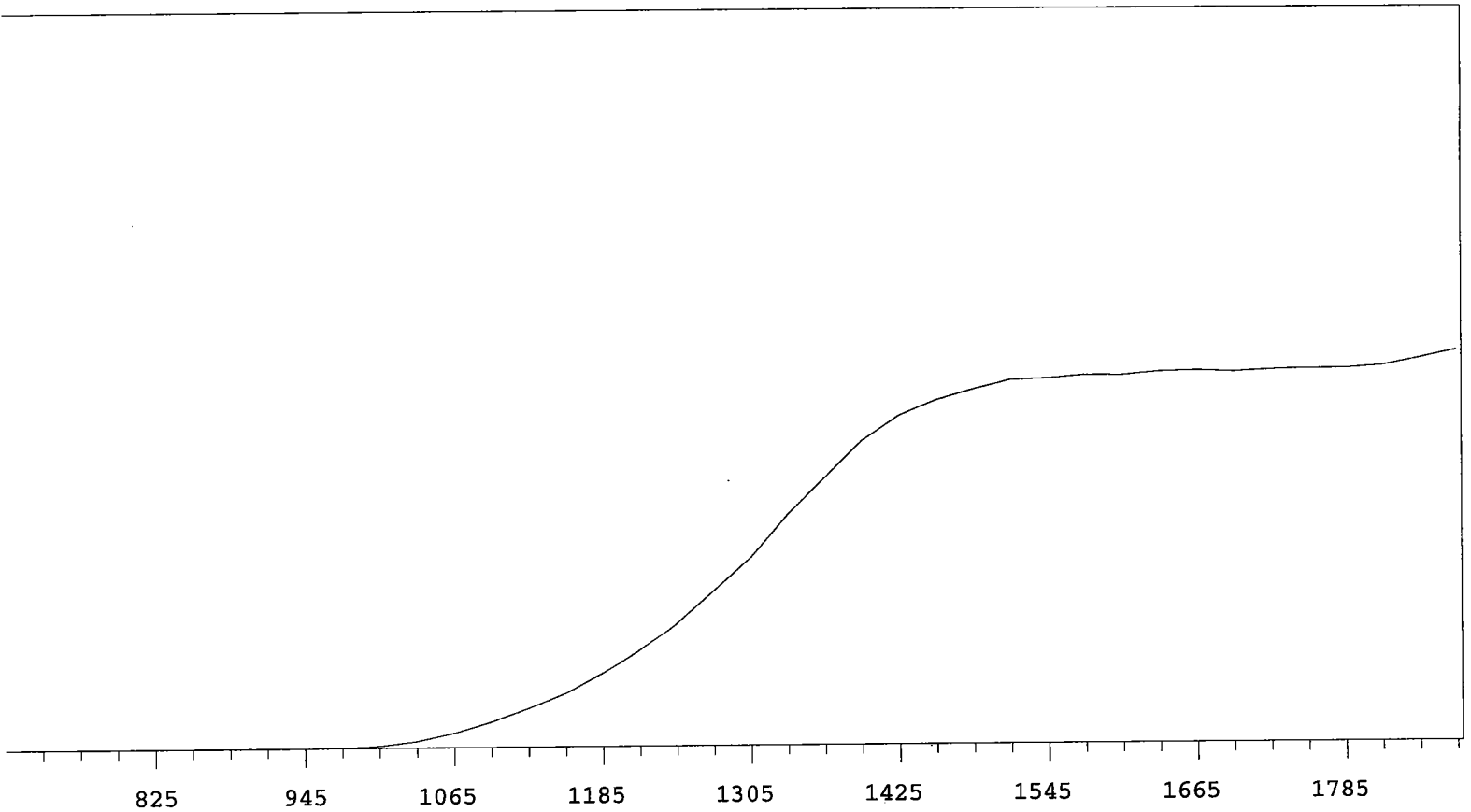
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	14171	+66.45
735	1		1335	17362	+54.90
765	0	+0.00	1365	20310	+43.83
795	1	>100	1395	22647	+30.82
825	0	+83.33	1425	24551	+20.19
855	0	-83.33	1455	25440	+11.69
885	1	>100	1485	26124	+5.90
915	0	>100	1515	26245	+2.21
945	1	>100	1545	26428	+1.39
975	12	>100	1575	26151	+2.69
1005	51	>100	1605	26721	+2.72
1035	298	>100	1635	27168	+2.80
1065	848	>100	1665	27007	+0.87
1095	1649	>100	1695	27135	+0.70
1125	2535	>100	1725	27089	+1.24
1155	3602	>100	1755	27414	+1.43
1185	5036	+98.31	1785	27373	+3.21
1215	6880	+91.37	1815	27581	+4.34
1245	8822	+82.29	1845	28332	
1275	11546	+74.61	1875	28750	



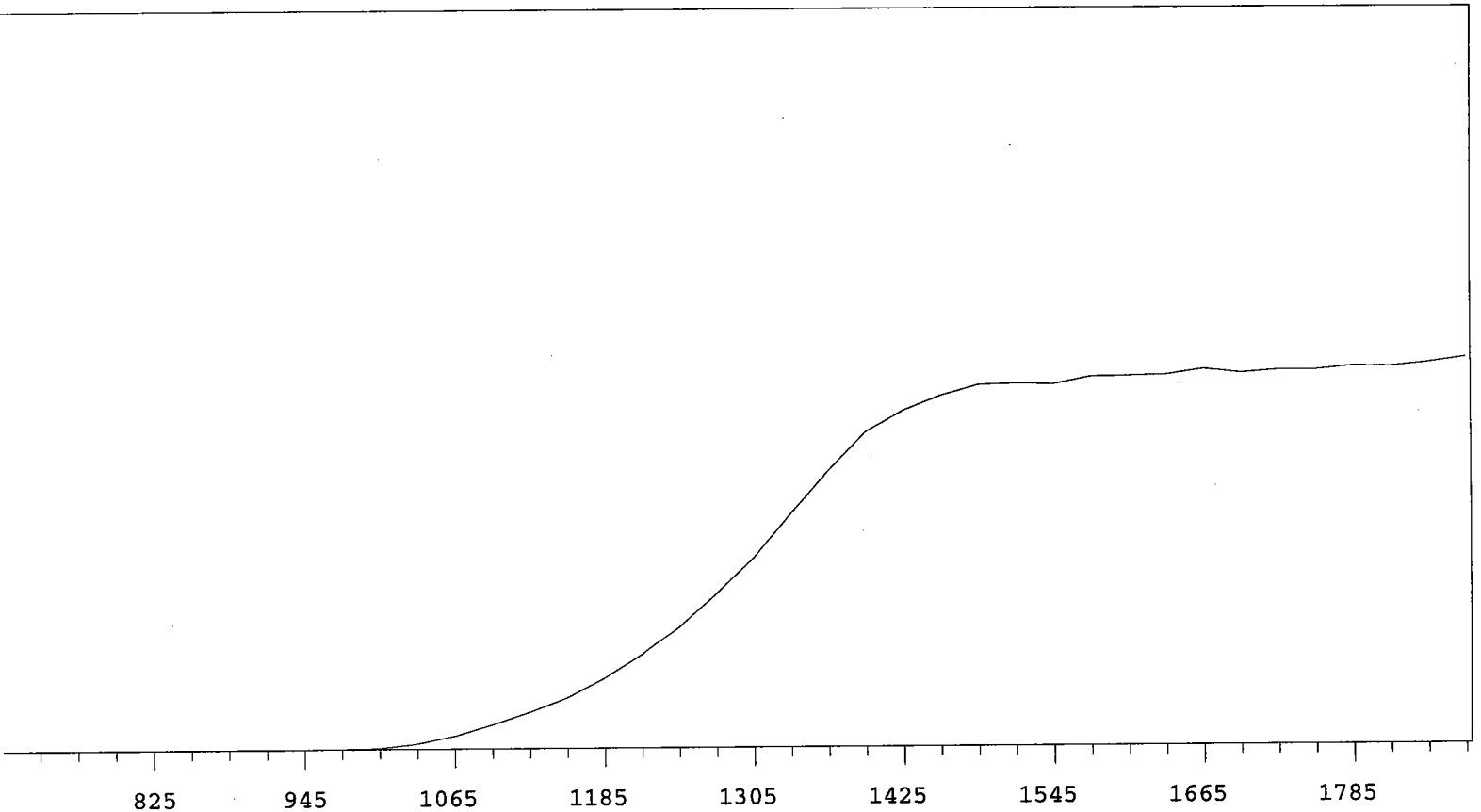
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16442	+66.24
735	0		1335	20146	+57.40
765	0		1365	23769	+46.40
795	0	>100	1395	26926	+34.68
825	2	+55.56	1425	29276	+24.40
855	1	>100	1455	31037	+15.28
885	0	-55.56	1485	32197	+7.91
915	3	>100	1515	32425	+4.33
945	0	>100	1545	32314	+2.14
975	16	>100	1575	33071	+2.66
1005	114	>100	1605	32918	+2.52
1035	451	>100	1635	33435	+1.02
1065	1100	>100	1665	33382	+0.73
1095	2068	>100	1695	33349	+1.07
1125	3189	>100	1725	33324	+1.28
1155	4386	>100	1755	34001	+2.26
1185	6094	+94.81	1785	33701	+3.08
1215	8184	+87.09	1815	34304	+2.97
1245	10489	+78.88	1845	34744	
1275	13273	+72.66	1875	35012	

MPC 9600 Plateau
 Alpha Volts: 705

Instrument 4 MPC 9604 Detector B 7/1/2009
 Beta Volts: 1575



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	15747	+62.38
735	1		1335	19230	+54.19
765	0	+0.00	1365	22255	+44.46
795	1	>100	1395	25299	+32.45
825	0	>100	1425	27370	+22.24
855	0	>100	1455	28625	+14.10
885	0	>100	1485	29467	+8.56
915	0	>100	1515	30213	+5.29
945	2	>100	1545	30326	+2.77
975	31	>100	1575	30564	+1.57
1005	176	>100	1605	30548	+1.52
1035	550	>100	1635	30820	+0.85
1065	1218	>100	1665	30898	+0.79
1095	2114	>100	1695	30779	+0.44
1125	3212	>100	1725	30934	+0.45
1155	4416	>100	1755	31008	+0.96
1185	6066	+92.28	1785	30991	+2.01
1215	7936	+85.60	1815	31196	+3.80
1245	10288	+76.79	1845	31781	
1275	13020	+70.59	1875	32406	

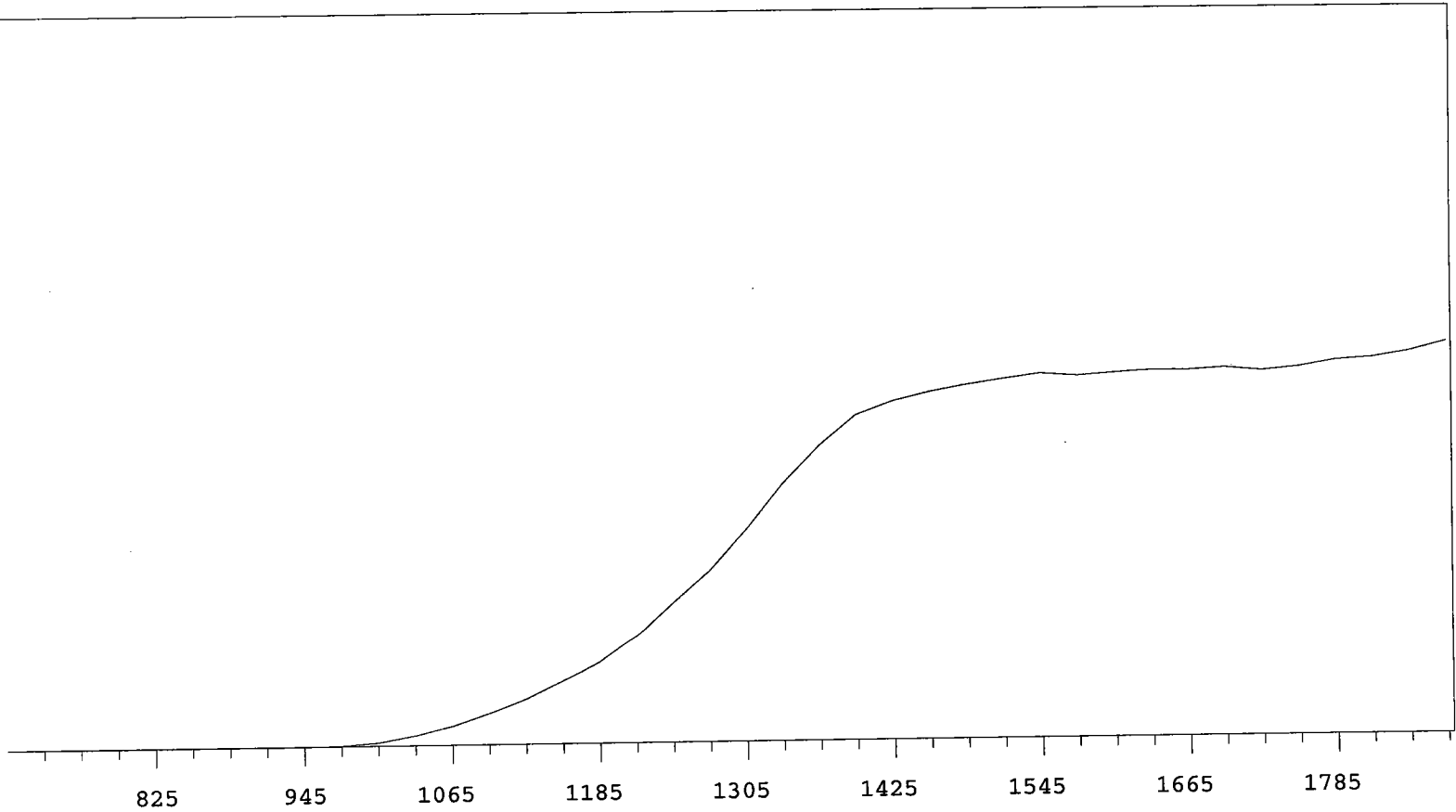


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19796	+65.77
735	1		1335	24338	+57.55
765	0	+55.56	1365	28686	+45.86
795	2	+0.00	1395	32750	+32.27
825	0	-55.56	1425	34919	+20.83
855	1	>100	1455	36434	+11.45
885	0	>100	1485	37487	+5.80
915	0	>100	1515	37623	+3.32
945	2	>100	1545	37528	+2.07
975	24	>100	1575	38277	+2.12
1005	134	>100	1605	38338	+2.70
1035	558	>100	1635	38426	+1.12
1065	1361	>100	1665	39007	+1.06
1095	2511	>100	1695	38592	+0.64
1125	3762	>100	1725	38870	+0.63
1155	5246	>100	1755	38868	+1.30
1185	7268	+96.29	1785	39238	+1.45
1215	9733	+88.98	1815	39169	+2.34
1245	12701	+79.94	1845	39570	
1275	16176	+73.13	1875	40086	

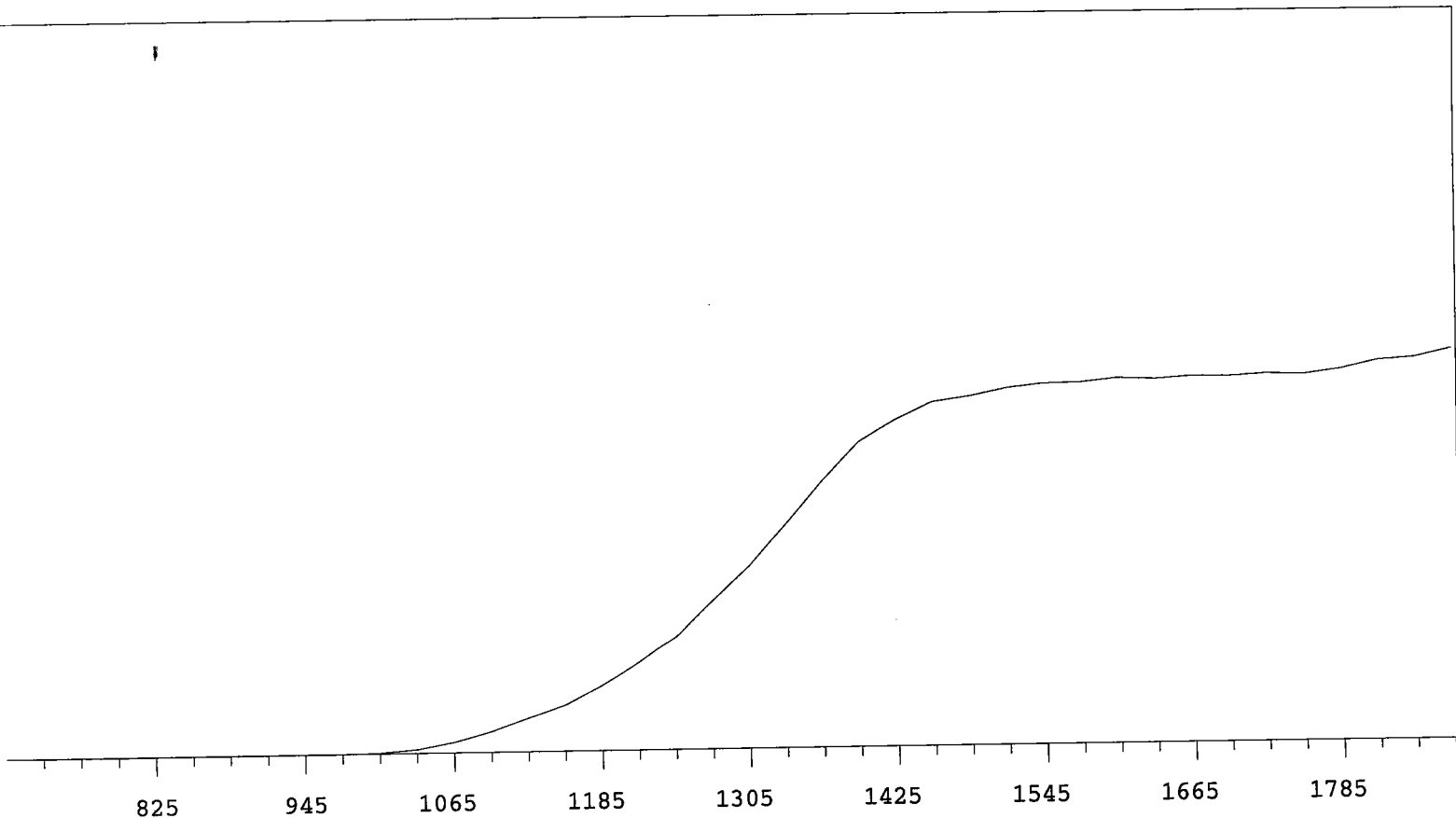
MPC 9600 Plateau
Alpha Volts: 705

Instrument 4 MPC 9604 Detector D
Beta Volts: 1575

7/1/2009



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	18491	+61.09
735	0		1335	22444	+51.56
765	0	+0.00	1365	25756	+37.44
795	0	>100	1395	28379	+23.82
825	1	+83.33	1425	29517	+14.00
855	1	+55.56	1455	30309	+8.08
885	0	+0.00	1485	30874	+6.03
915	1	>100	1515	31345	+3.66
945	1	>100	1545	31782	+2.17
975	60	>100	1575	31567	+1.31
1005	297	>100	1605	31789	+0.78
1035	855	>100	1635	31963	+1.34
1065	1647	>100	1665	31956	+0.29
1095	2700	>100	1695	32123	+0.20
1125	3921	>100	1725	31850	+1.46
1155	5471	+96.54	1755	32114	+2.39
1185	7042	+90.21	1785	32665	+3.95
1215	9405	+82.23	1815	32876	+4.96
1245	12266	+76.33	1845	33399	
1275	14989	+69.38	1875	34206	

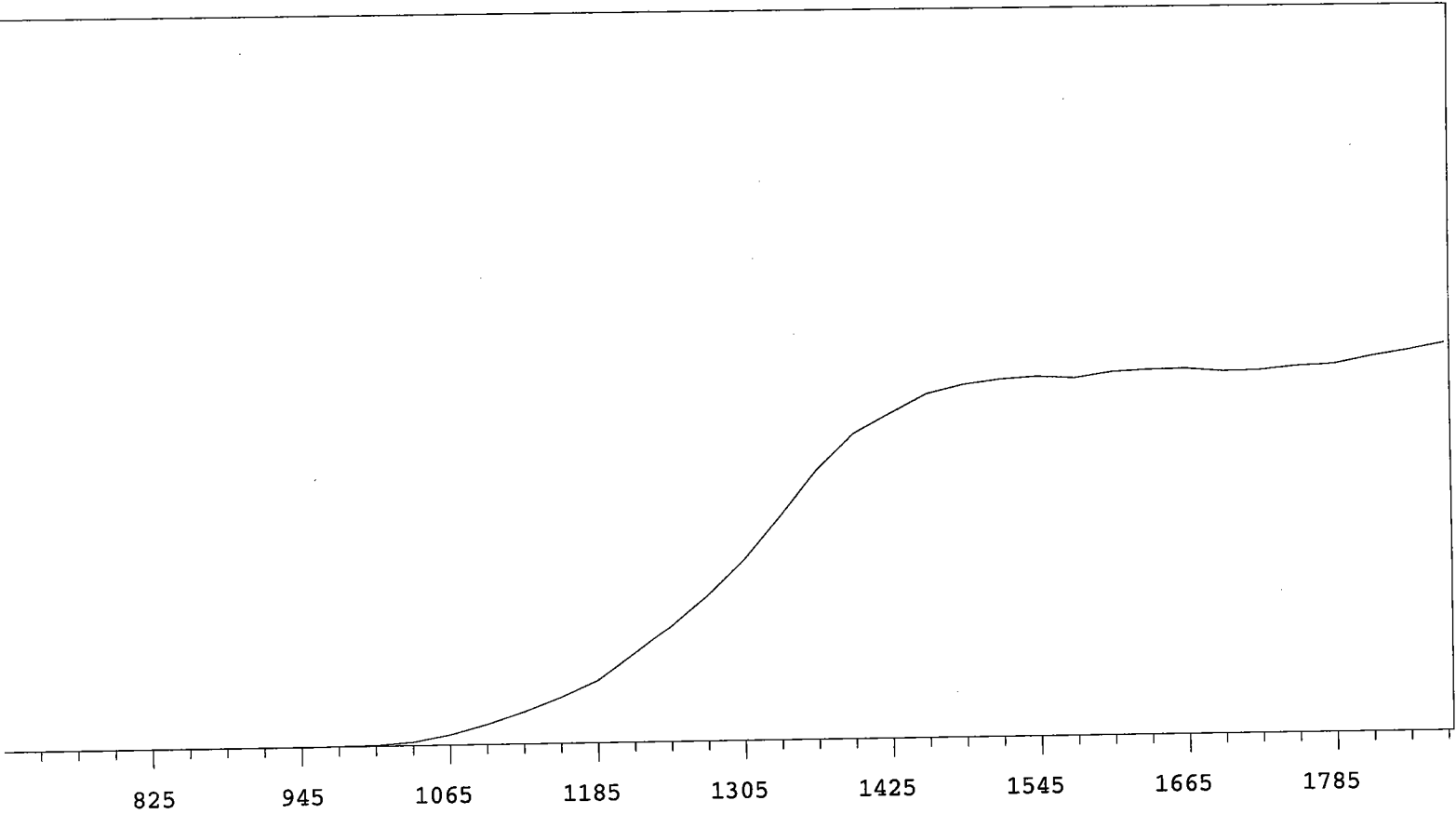


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	13974	+68.00
735	0		1335	17170	+58.62
765	1		1365	20456	+47.04
795	1	+83.33	1395	23332	+33.83
825	1	-83.33	1425	24996	+21.10
855	1	>100	1455	26290	+12.40
885	0	-55.56	1485	26683	+7.74
915	0	>100	1515	27270	+4.43
945	1	>100	1545	27590	+3.48
975	9	>100	1575	27635	+1.71
1005	76	>100	1605	27932	+1.20
1035	308	>100	1635	27807	+0.88
1065	814	>100	1665	28006	+0.62
1095	1600	>100	1695	27964	+0.63
1125	2598	>100	1725	28112	+0.98
1155	3596	>100	1755	28020	+2.84
1185	5065	+96.05	1785	28392	+3.76
1215	6773	+90.23	1815	29028	+5.17
1245	8717	+81.43	1845	29220	
1275	11391	+74.83	1875	29849	

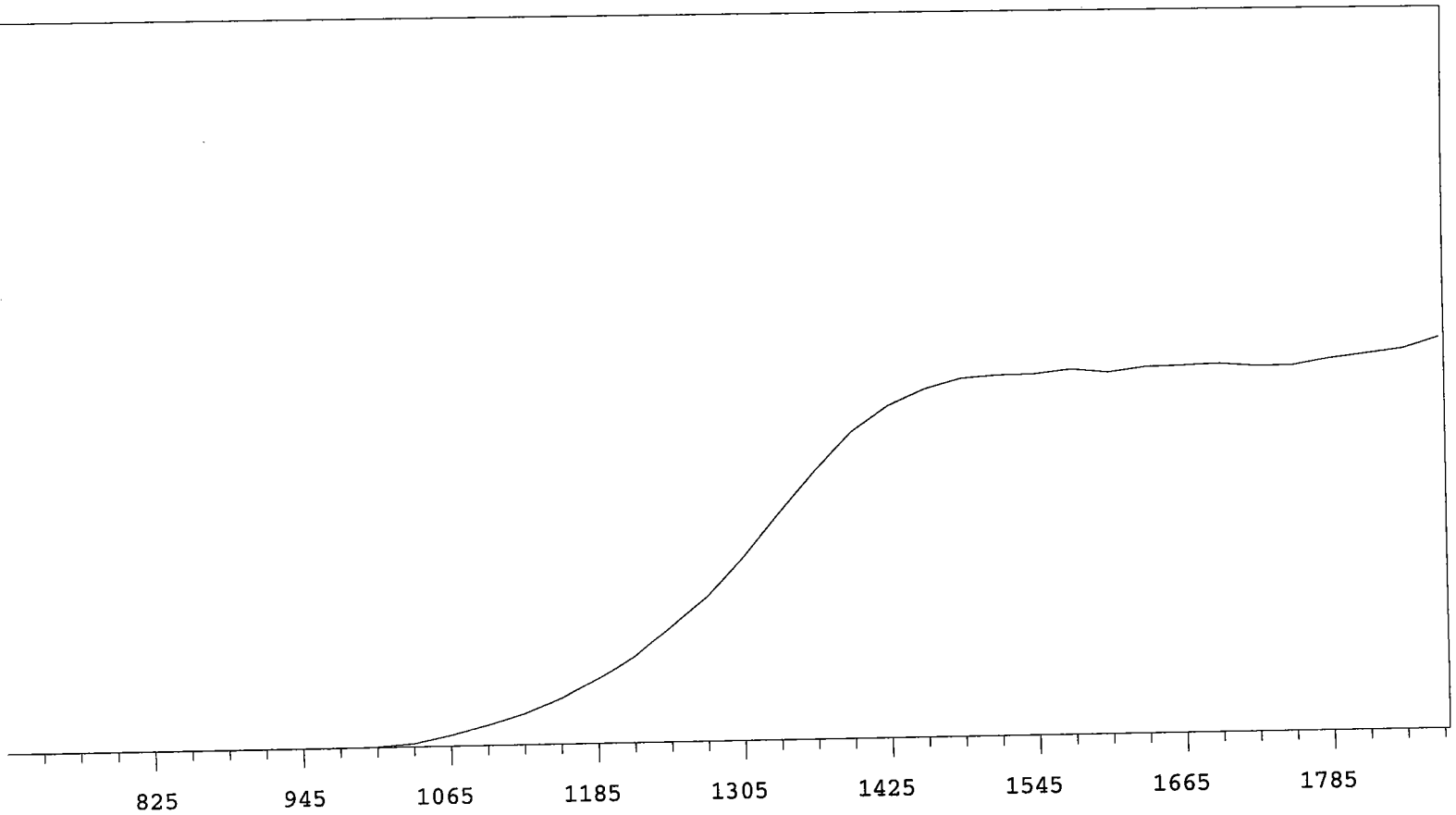
MPC 9600 Plateau
Alpha Volts: 705

Instrument 5 MPC 9604 Detector B
Beta Volts: 1575

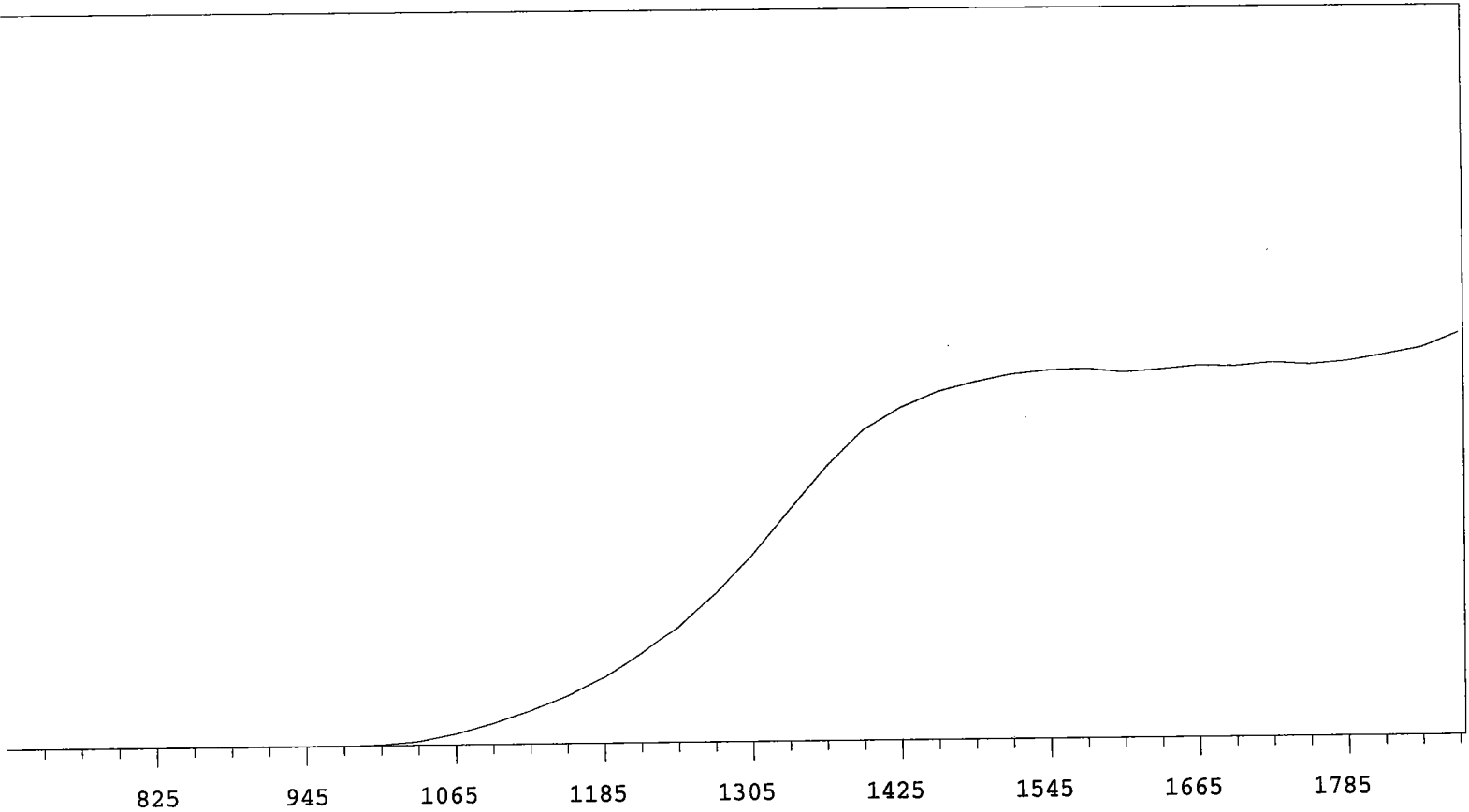
7/1/2009



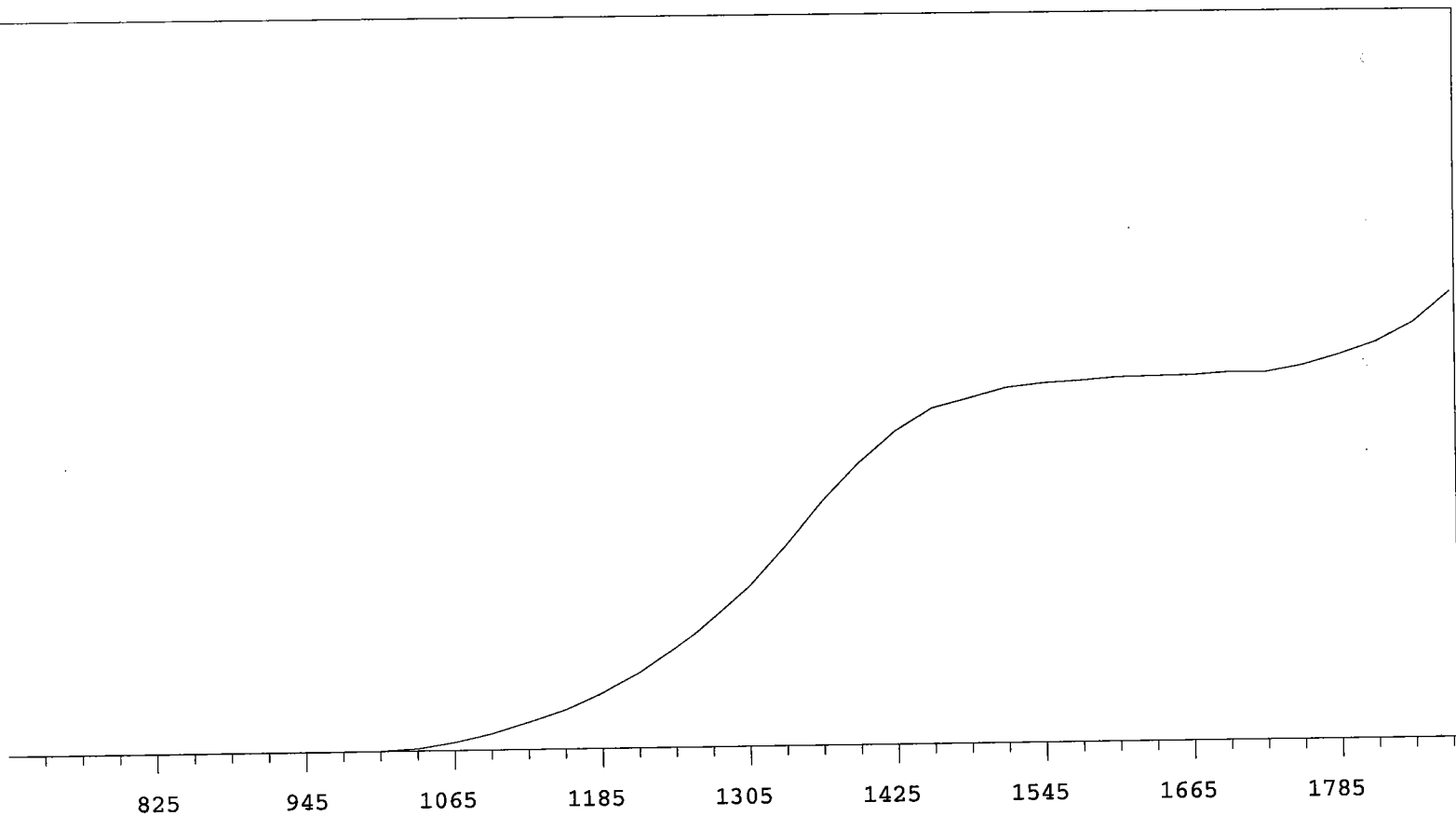
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	17414	+68.46
735	0		1335	21540	+59.98
765	0		1365	25854	+46.75
795	0	>100	1395	29222	+33.38
825	1	>100	1425	31128	+21.52
855	1	+41.67	1455	32995	+13.26
885	2	-33.33	1485	33846	+8.09
915	0	>100	1515	34289	+3.25
945	1	>100	1545	34528	+2.00
975	17	>100	1575	34311	+1.78
1005	87	>100	1605	34866	+1.78
1035	336	>100	1635	35046	+1.14
1065	1010	>100	1665	35087	-0.26
1095	1955	>100	1695	34795	+0.11
1125	3124	>100	1725	34857	+0.93
1155	4486	>100	1755	35220	+2.81
1185	6017	>100	1785	35363	+3.98
1215	8507	+91.20	1815	36028	+4.79
1245	11148	+82.59	1845	36577	
1275	14003	+74.21	1875	37207	



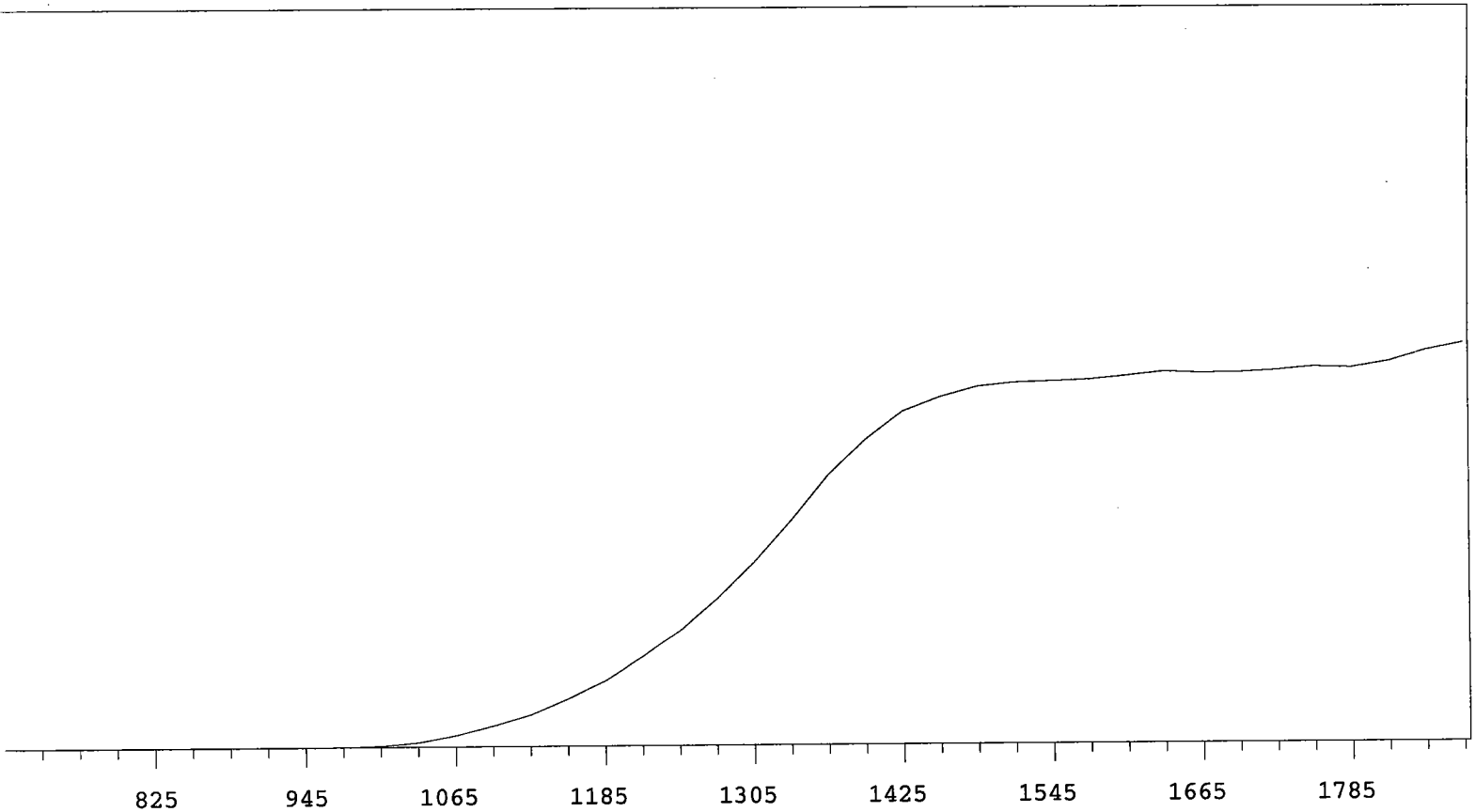
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	17085	+68.24
735	0		1335	21135	+59.99
765	0		1365	25066	+47.39
795	0	>100	1395	28530	+33.93
825	0	>100	1425	30823	+22.30
855	1	>100	1455	32287	+12.93
885	0	>100	1485	33217	+6.71
915	1	>100	1515	33474	+3.57
945	2	>100	1545	33517	+1.17
975	7	>100	1575	33921	+1.13
1005	56	>100	1605	33584	+1.27
1035	305	>100	1635	34014	+1.12
1065	982	>100	1665	34116	+0.98
1095	1874	>100	1695	34225	-0.22
1125	2890	>100	1725	33980	+0.58
1155	4260	>100	1755	33971	+1.96
1185	6001	>100	1785	34541	+3.64
1215	8050	+91.54	1815	34954	+5.38
1245	10895	+82.98	1845	35375	
1275	13556	+76.26	1875	36384	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	15025	+68.87
735	0		1335	18640	+58.97
765	0		1365	22048	+45.84
795	0	>100	1395	24877	+32.08
825	0	>100	1425	26653	+20.83
855	0	>100	1455	27899	+13.08
885	0	>100	1485	28670	+8.43
915	0	>100	1515	29257	+5.13
945	0	>100	1545	29568	+2.06
975	6	>100	1575	29683	+0.52
1005	81	>100	1605	29362	+0.57
1035	318	>100	1635	29589	+0.80
1065	897	>100	1665	29870	+1.82
1095	1710	>100	1695	29783	+0.90
1125	2714	>100	1725	30077	+0.75
1155	3925	>100	1755	29889	+2.02
1185	5395	+97.31	1785	30152	+3.33
1215	7282	+88.49	1815	30656	+6.54
1245	9426	+81.36	1845	31211	
1275	12007	+75.65	1875	32389	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16217	+71.57
735	0		1335	20184	+63.76
765	0		1365	24605	+53.98
795	0	>100	1395	28528	+41.40
825	0	>100	1425	31675	+28.02
855	0	>100	1455	33899	+17.93
885	0	>100	1485	34826	+10.65
915	0	>100	1515	35815	+6.13
945	0	>100	1545	36225	+4.15
975	7	>100	1575	36456	+2.28
1005	31	>100	1605	36747	+1.47
1035	238	>100	1635	36801	+1.26
1065	810	>100	1665	36859	+0.85
1095	1637	>100	1695	37095	+1.85
1125	2743	>100	1725	37072	+4.01
1155	3932	>100	1755	37724	+6.65
1185	5579	>100	1785	38802	+10.33
1215	7602	+94.41	1815	40036	+14.71
1245	10078	+84.86	1845	41975	
1275	13091	+77.67	1875	45123	

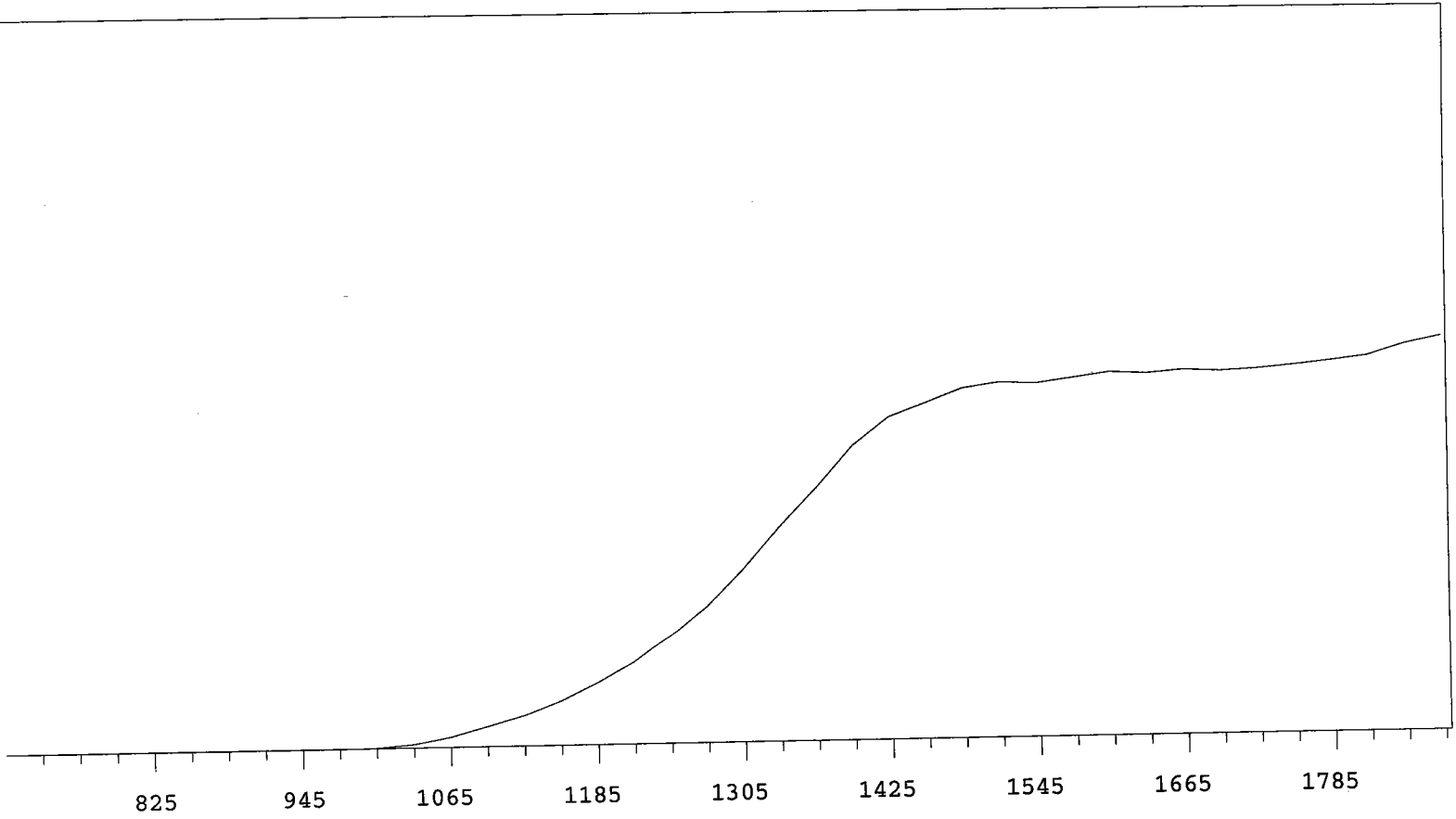


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	20094	+68.67
735	0		1335	24665	+59.40
765	0		1365	29591	+47.86
795	0	>100	1395	33376	+34.51
825	1	+83.33	1425	36440	+22.50
855	1	-83.33	1455	38024	+13.58
885	0	>100	1485	39187	+7.04
915	0	>100	1515	39608	+3.63
945	5	>100	1545	39722	+2.10
975	18	>100	1575	39894	+2.32
1005	125	>100	1605	40298	+2.09
1035	482	>100	1635	40711	+1.41
1065	1255	>100	1665	40574	+0.80
1095	2318	>100	1695	40608	+1.02
1125	3540	>100	1725	40839	+1.28
1155	5288	>100	1755	41201	+1.97
1185	7168	+98.51	1785	41065	+3.74
1215	9760	+88.48	1815	41711	+5.42
1245	12656	+81.52	1845	42917	
1275	16065	+74.58	1875	43699	

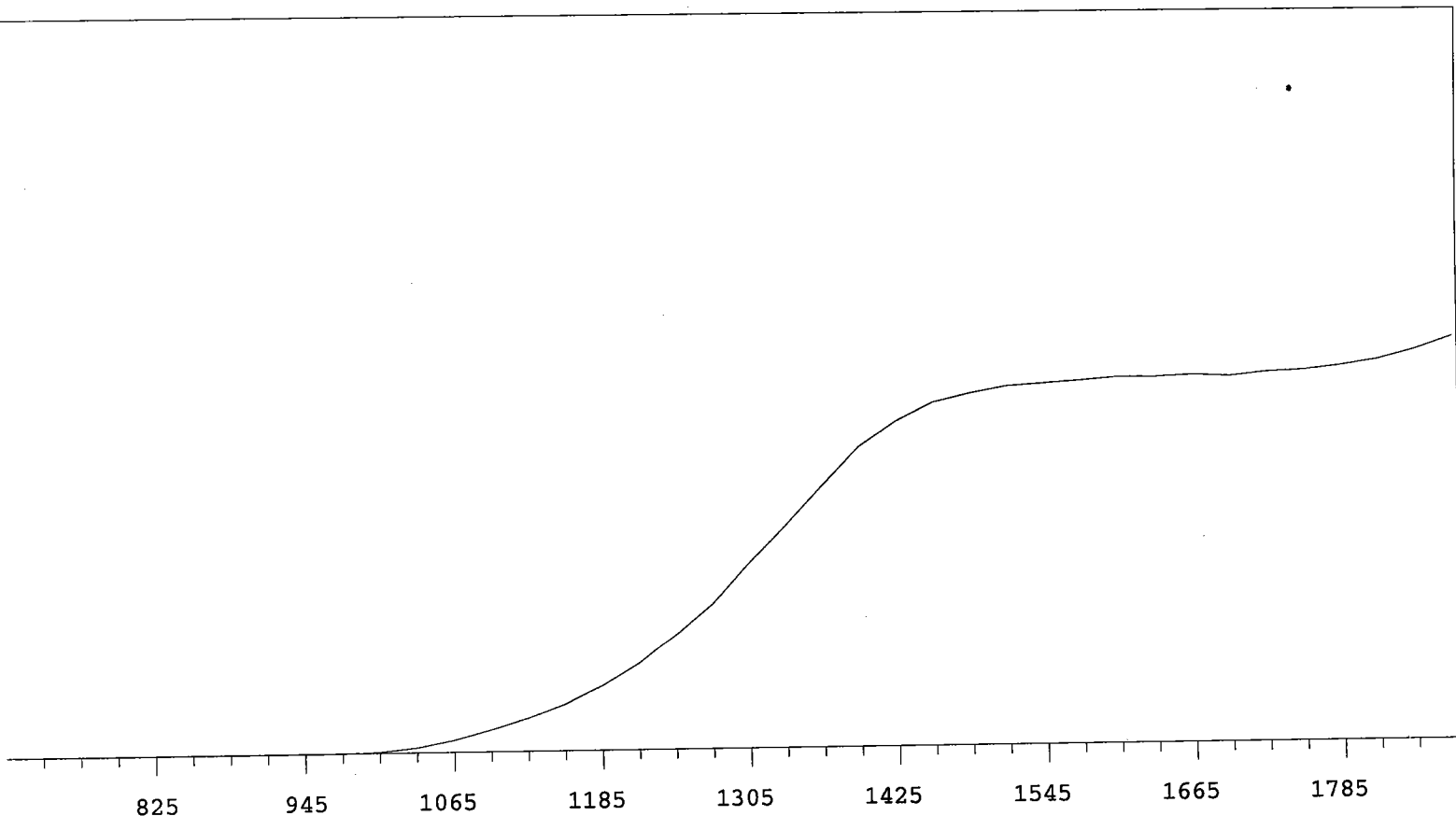
MPC 9600 Plateau
 Alpha Volts: 705

Instrument 6 MPC 9604 Detector C
 Beta Volts: 1575

7/1/2009



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	17350	+67.80
735	0		1335	21371	+60.27
765	1	+0.00	1365	25084	+49.32
795	0	>100	1395	29177	+36.15
825	0	+0.00	1425	31927	+24.86
855	0	>100	1455	33217	+14.70
885	1	>100	1485	34545	+7.74
915	1	>100	1515	35097	+4.64
945	2	>100	1545	34927	+2.96
975	8	>100	1575	35439	+2.21
1005	70	>100	1605	35939	+2.41
1035	353	>100	1635	35763	+0.94
1065	990	>100	1665	36053	+0.35
1095	1956	>100	1695	35886	+1.15
1125	3024	>100	1725	36066	+1.77
1155	4400	>100	1755	36379	+3.03
1185	6173	+99.75	1785	36768	+4.80
1215	8230	+89.85	1815	37193	+6.14
1245	10904	+82.36	1845	38320	
1275	13747	+76.18	1875	39061	

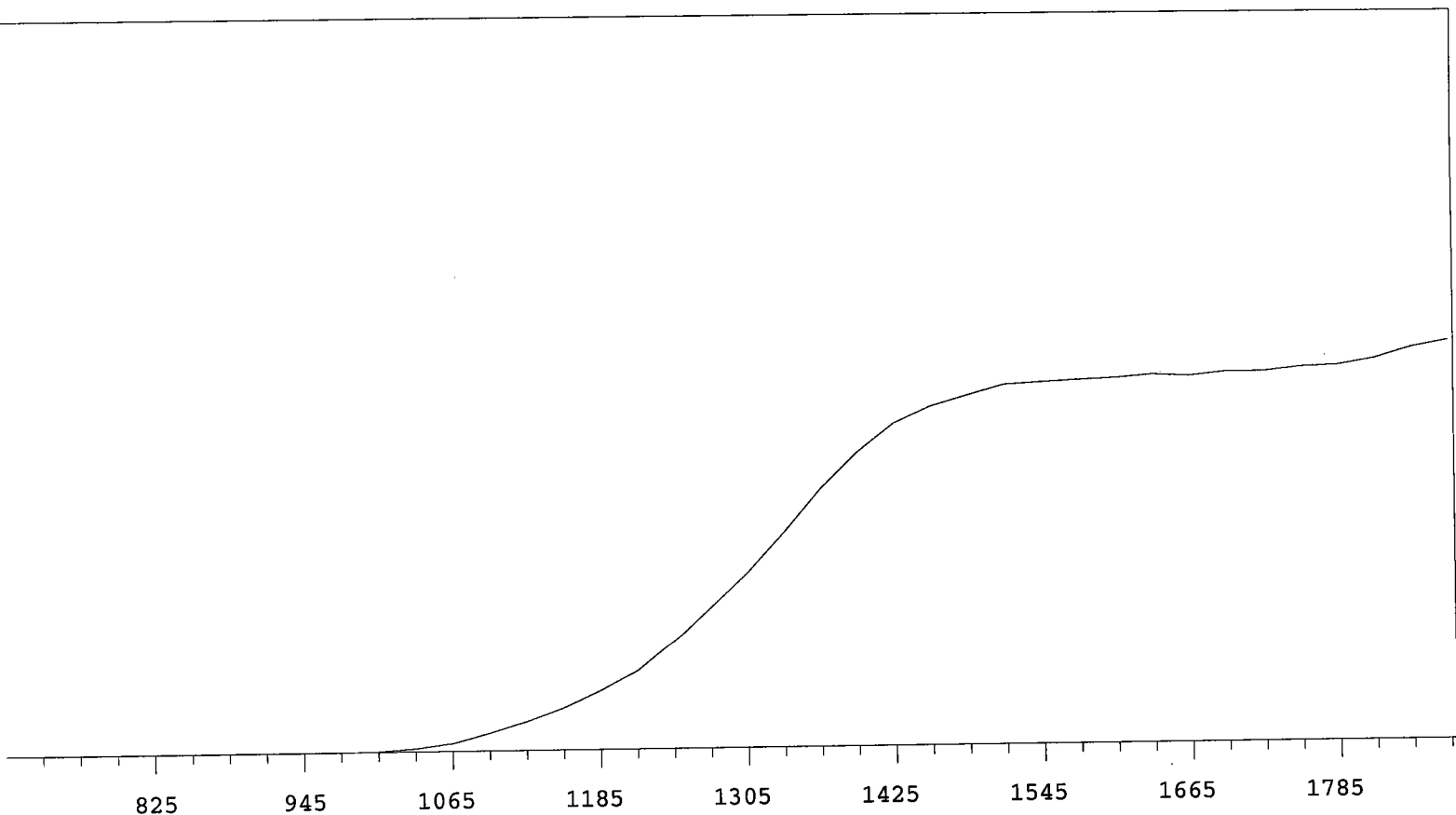


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	17954	+65.82
735	0		1335	21482	+57.64
765	0		1365	25373	+45.78
795	1	+0.00	1395	29042	+34.80
825	0	>100	1425	31373	+23.29
855	0	+0.00	1455	33143	+14.25
885	0	>100	1485	34006	+8.49
915	1	>100	1515	34662	+4.71
945	0	>100	1545	34892	+3.14
975	14	>100	1575	35129	+1.86
1005	109	>100	1605	35411	+1.49
1035	481	>100	1635	35380	+0.62
1065	1177	>100	1665	35554	+0.65
1095	2133	>100	1695	35385	+1.18
1125	3243	>100	1725	35755	+1.89
1155	4554	>100	1755	35907	+3.26
1185	6285	+98.38	1785	36305	+4.62
1215	8468	+89.75	1815	36870	+6.98
1245	11266	+83.13	1845	37807	
1275	14088	+74.43	1875	39047	

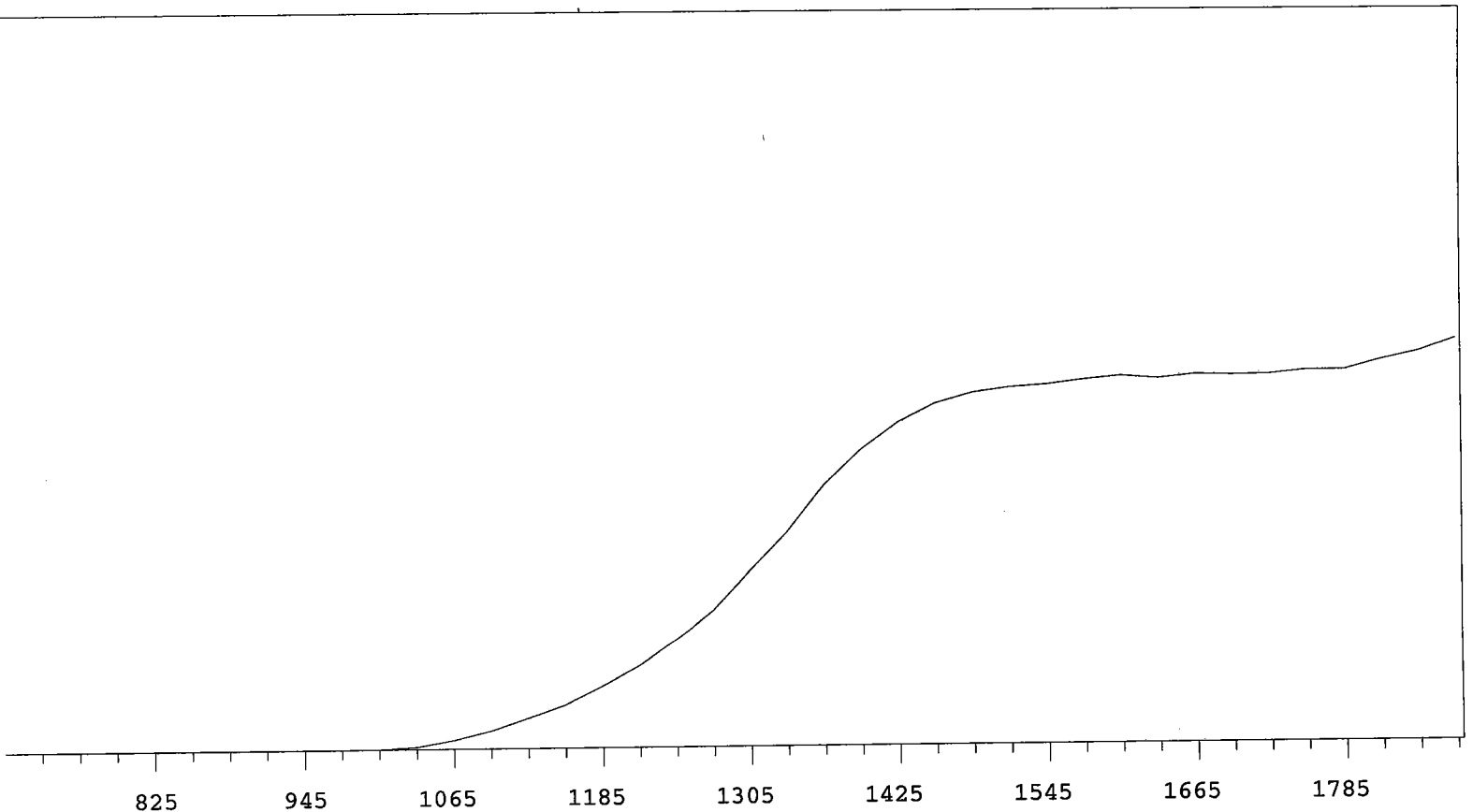
MPC 9600 Plateau
Alpha Volts: 705

Instrument 7 MPC 9604 Detector A
Beta Volts: 1575

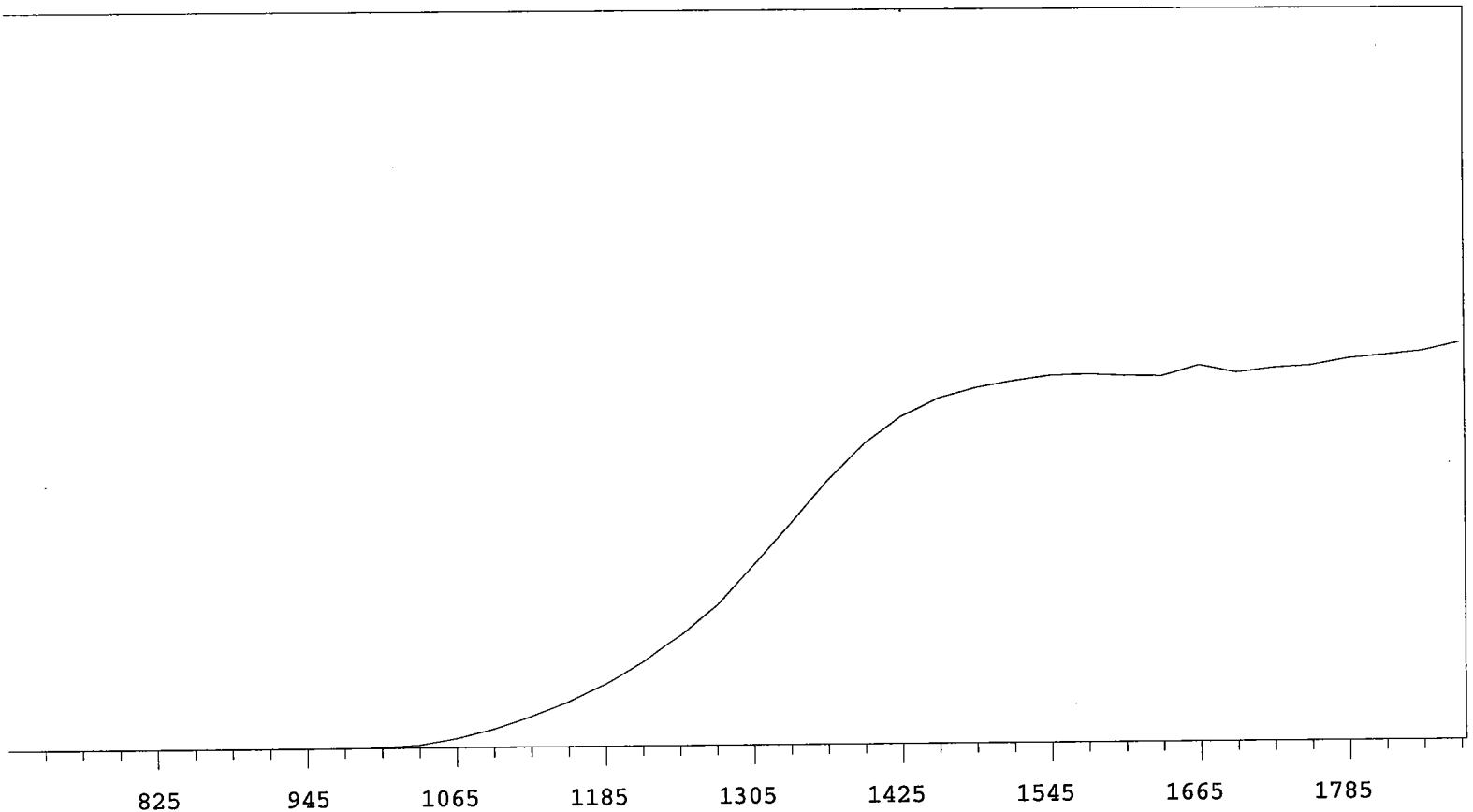
7/1/2009



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	13228	+70.36
735	0		1335	16271	+60.12
765	0		1365	19506	+49.19
795	0	>100	1395	22188	+36.46
825	1	+83.33	1425	24373	+24.43
855	1	-83.33	1455	25649	+15.99
885	0	-55.56	1485	26433	+9.58
915	0	>100	1515	27195	+5.74
945	1	>100	1545	27367	+3.24
975	3	>100	1575	27490	+1.86
1005	42	>100	1605	27608	+1.22
1035	242	>100	1635	27841	+1.33
1065	613	>100	1665	27695	+1.11
1095	1353	>100	1695	27999	+1.42
1125	2213	>100	1725	27992	+2.04
1155	3256	>100	1755	28289	+2.52
1185	4474	>100	1785	28408	+4.56
1215	5932	+94.10	1815	28863	+5.70
1245	8072	+87.32	1845	29664	
1275	10579	+79.61	1875	30148	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16978	+70.97
735	0		1335	20569	+61.39
765	0		1365	24989	+48.97
795	0	>100	1395	28389	+36.69
825	0	>100	1425	30977	+24.05
855	0	>100	1455	32727	+14.93
885	0	>100	1485	33697	+8.42
915	1	>100	1515	34195	+4.89
945	1	>100	1545	34437	+3.49
975	3	>100	1575	34850	+2.11
1005	34	>100	1605	35174	+1.62
1035	221	>100	1635	34923	+0.68
1065	825	>100	1665	35250	+0.35
1095	1709	>100	1695	35171	+1.24
1125	2873	>100	1725	35237	+1.02
1155	4078	>100	1755	35584	+2.79
1185	5858	>100	1785	35587	+4.59
1215	7809	+91.82	1815	36485	+6.74
1245	10336	+85.02	1845	37270	
1275	13215	+77.79	1875	38453	

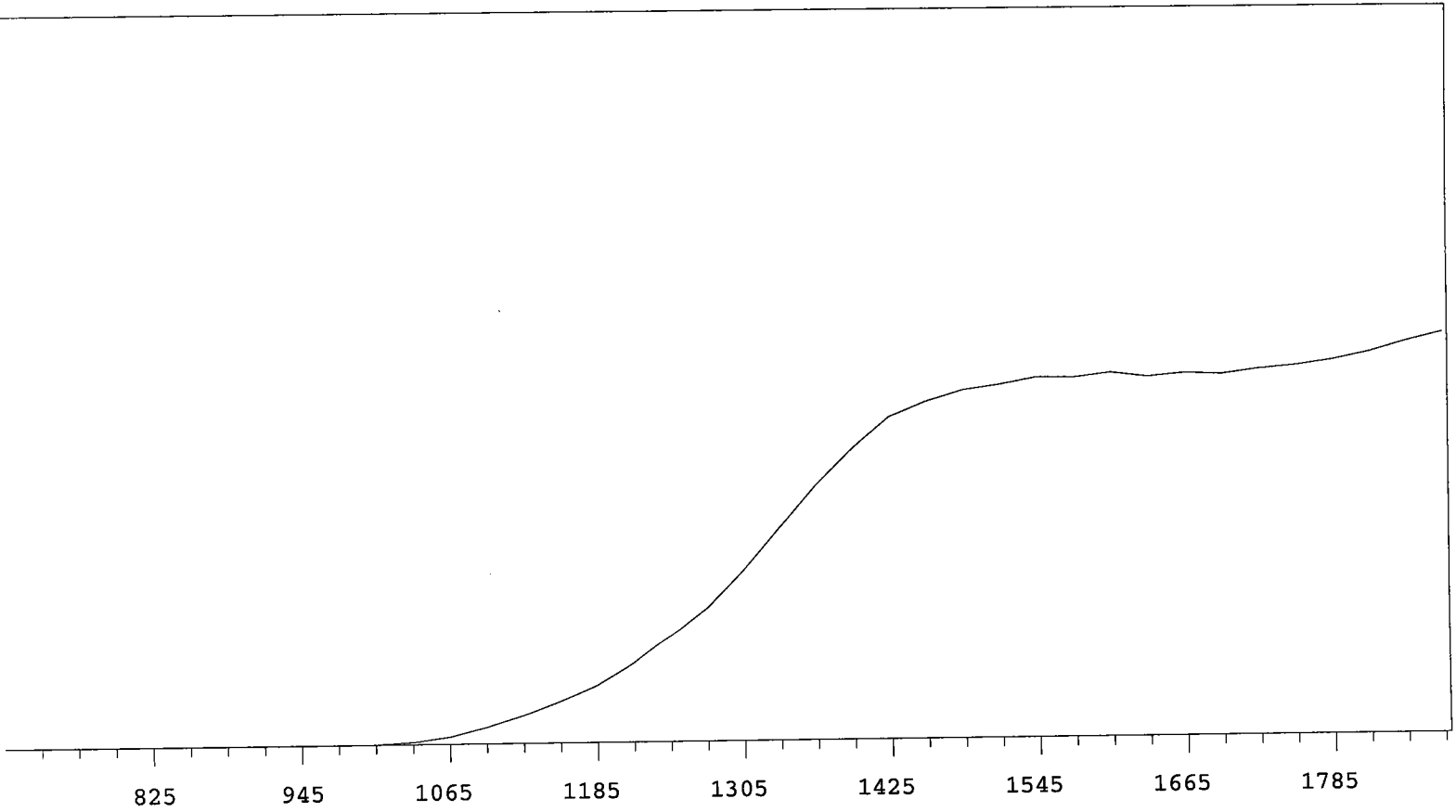


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16543	+70.03
735	0		1335	20257	+60.71
765	0		1365	24245	+48.17
795	0	>100	1395	27602	+35.50
825	0	>100	1425	30019	+23.48
855	0	>100	1455	31614	+14.53
885	0	>100	1485	32522	+8.91
915	0	>100	1515	33103	+5.28
945	0	>100	1545	33572	+2.60
975	4	>100	1575	33695	+0.70
1005	57	>100	1605	33525	+1.48
1035	277	>100	1635	33477	+0.99
1065	817	>100	1665	34432	+1.49
1095	1666	>100	1695	33745	+1.43
1125	2766	>100	1725	34149	+1.60
1155	4077	>100	1755	34350	+3.69
1185	5667	>100	1785	34955	+3.62
1215	7694	+91.50	1815	35251	+4.44
1245	10209	+84.83	1845	35592	
1275	12950	+77.50	1875	36382	

MPC 9600 Plateau
 Alpha Volts: 705

Instrument 7 MPC 9604 Detector D
 Beta Volts: 1575

7/1/2009

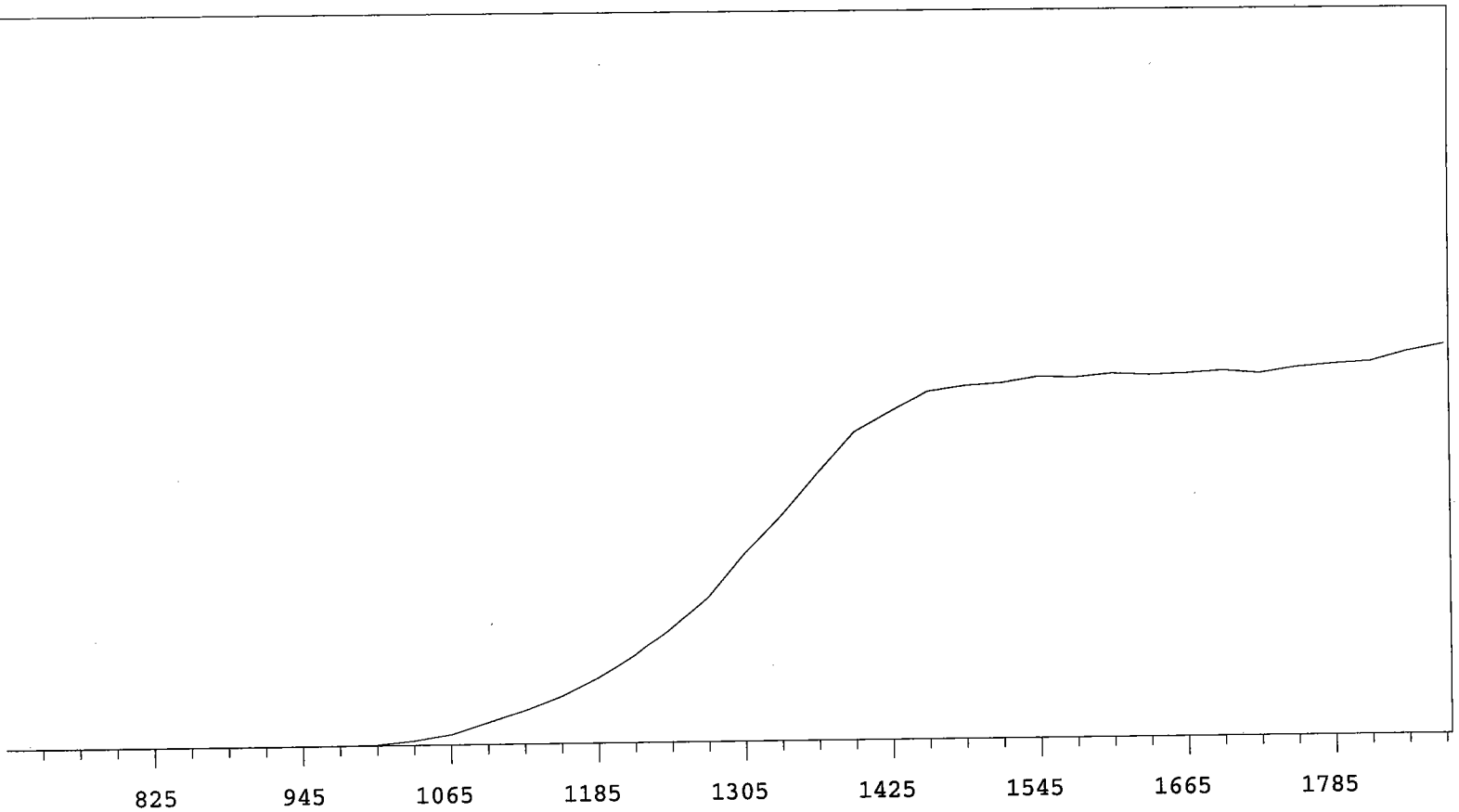


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	14016	+71.42
735	0		1335	17436	+62.21
765	0		1365	20814	+50.32
795	0	>100	1395	23760	+36.91
825	0	>100	1425	26302	+24.91
855	0	>100	1455	27519	+15.17
885	0	>100	1485	28410	+8.91
915	0	>100	1515	28843	+5.41
945	0	>100	1545	29396	+3.58
975	5	>100	1575	29357	+1.54
1005	29	>100	1605	29719	+0.51
1035	204	>100	1635	29358	+0.23
1065	609	>100	1665	29623	+0.57
1095	1354	>100	1695	29509	+2.12
1125	2316	>100	1725	29896	+2.84
1155	3418	>100	1755	30165	+4.42
1185	4654	>100	1785	30570	+5.65
1215	6455	+92.99	1815	31180	+6.95
1245	8669	+86.45	1845	31995	
1275	10931	+79.15	1875	32717	

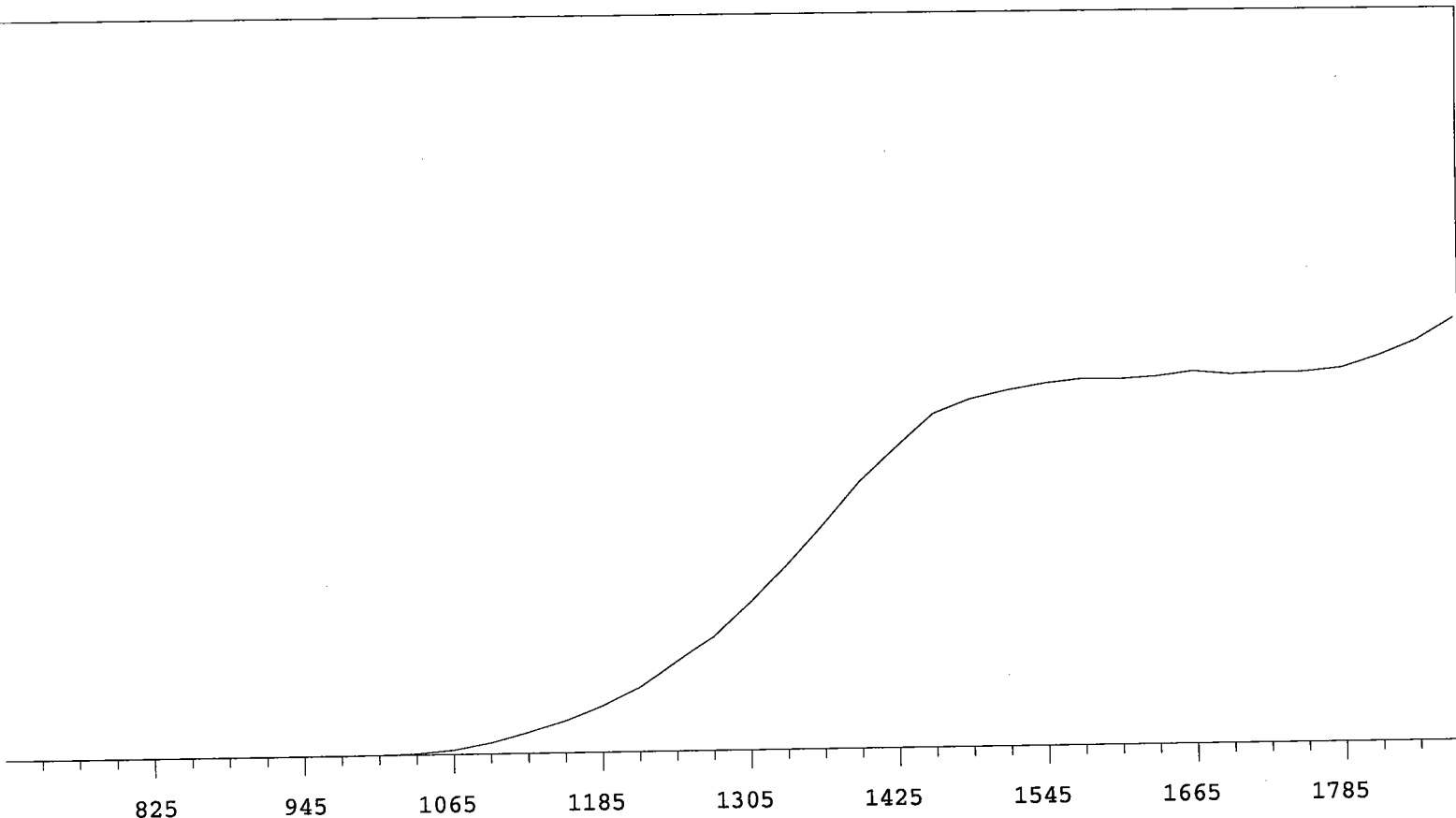
MPC 9600 Plateau
Alpha Volts: 705

Instrument 8 MPC 9604 Detector A
Beta Volts: 1575

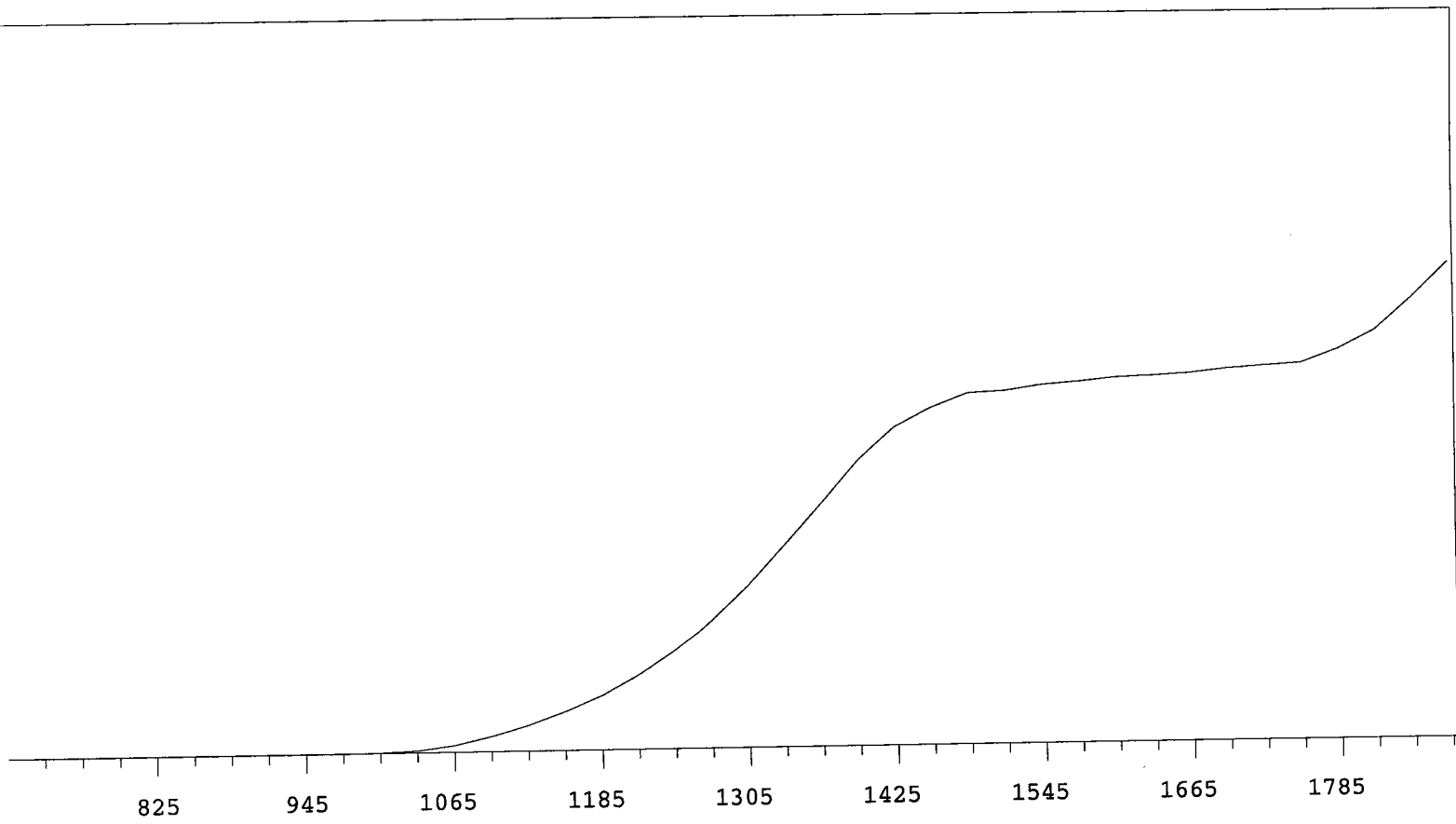
7/1/2009



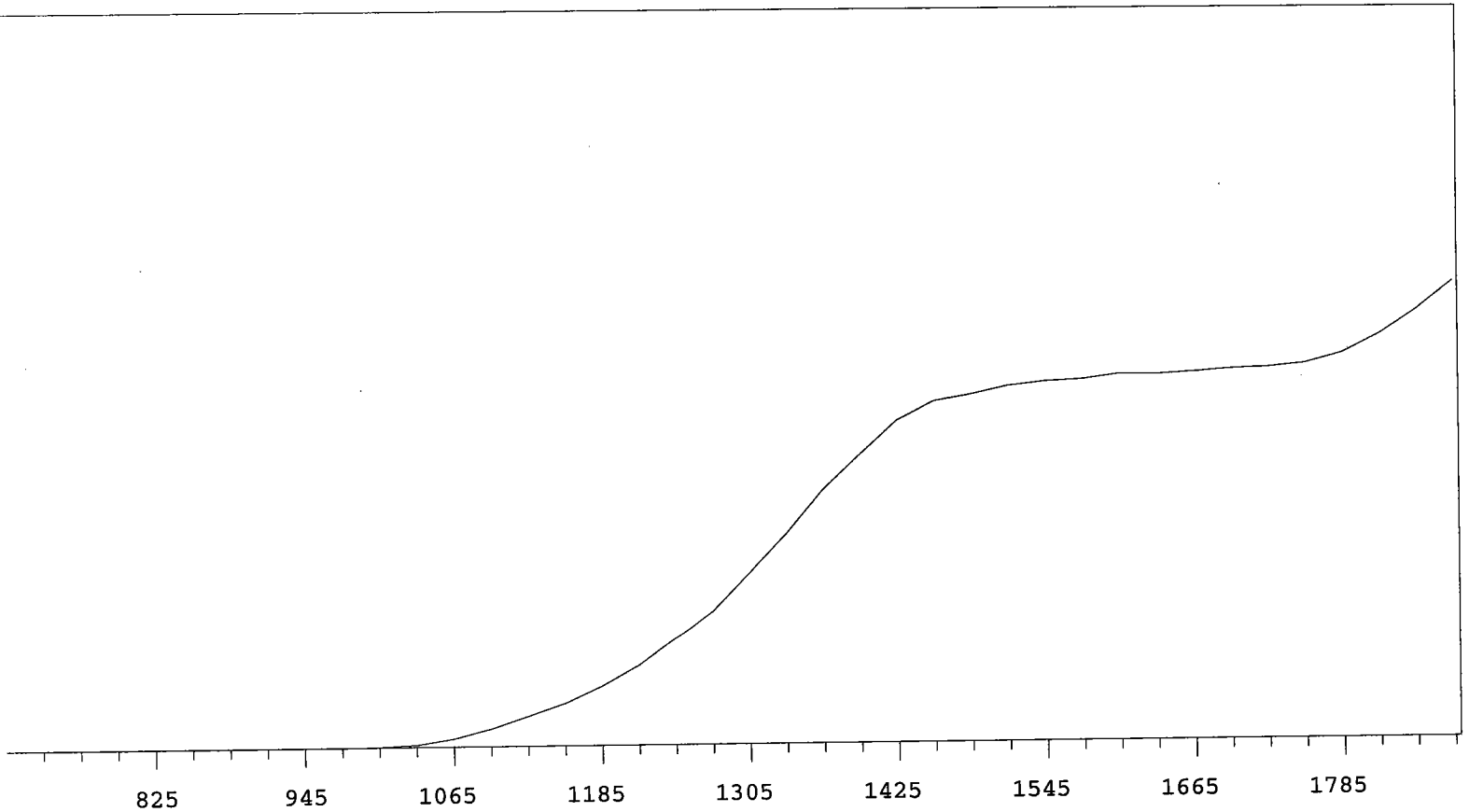
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	19482	+67.45
735	0		1335	23344	+59.35
765	0		1365	27793	+45.86
795	0	>100	1395	31916	+34.29
825	0	>100	1425	33979	+21.61
855	0	>100	1455	35993	+11.71
885	0	>100	1485	36530	+7.04
915	0	>100	1515	36796	+3.11
945	1	>100	1545	37393	+2.44
975	9	>100	1575	37279	+1.41
1005	96	>100	1605	37650	+0.49
1035	468	>100	1635	37458	+0.91
1065	1084	>100	1665	37579	+0.12
1095	2286	>100	1695	37828	+1.10
1125	3479	>100	1725	37535	+1.72
1155	4912	>100	1755	38104	+2.18
1185	6819	+98.23	1785	38416	+4.12
1215	9153	+89.05	1815	38633	+4.92
1245	12105	+83.21	1845	39649	
1275	15122	+75.24	1875	40366	



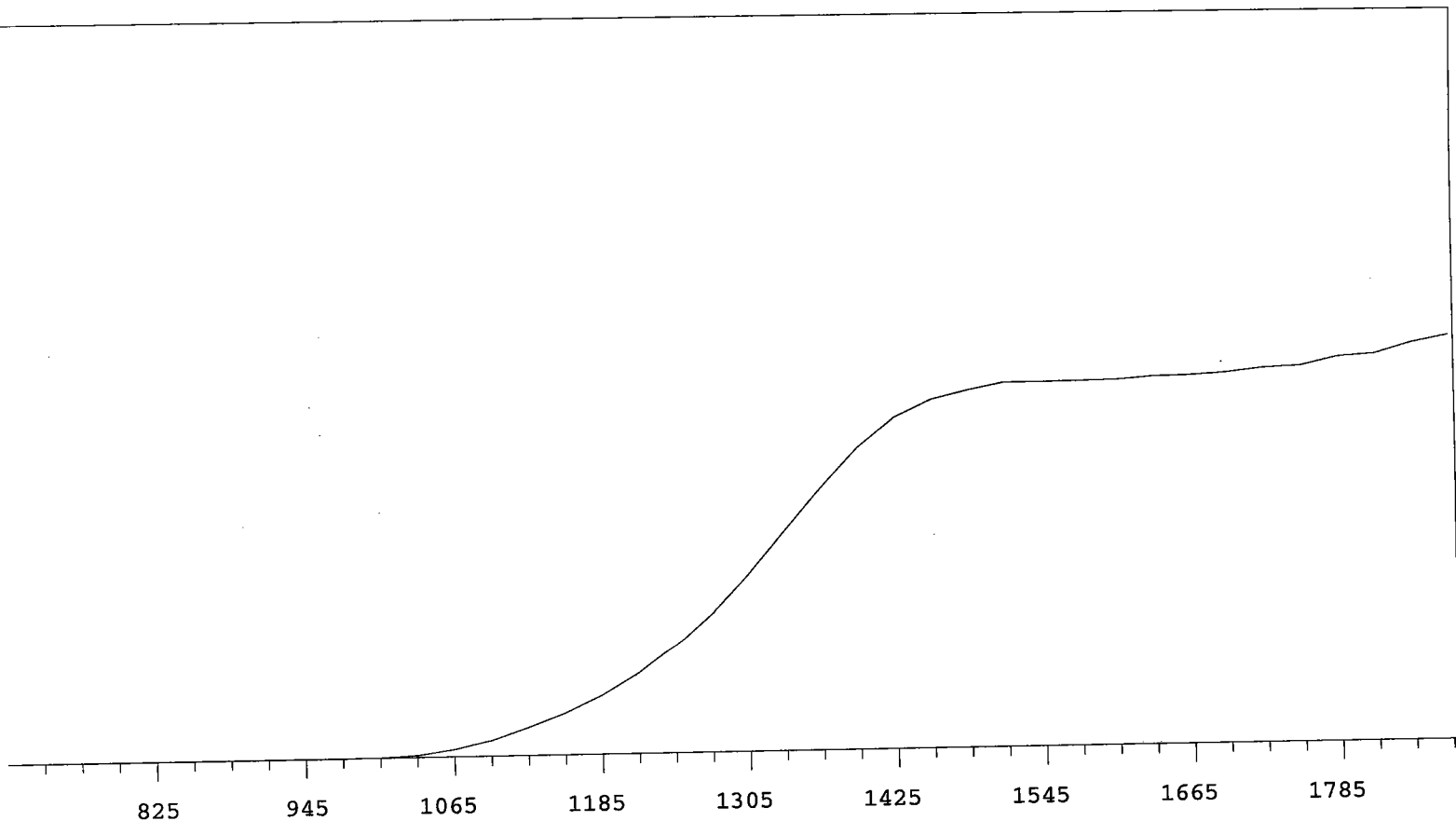
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16337	+74.91
735	0		1335	20471	+68.07
765	0		1365	25012	+57.86
795	0	>100	1395	29694	+47.48
825	0	>100	1425	33409	+35.17
855	0	>100	1455	37013	+23.27
885	0	>100	1485	38629	+14.35
915	0	>100	1515	39529	+7.69
945	0	>100	1545	40284	+4.34
975	0	>100	1575	40711	+2.52
1005	20	>100	1605	40642	+1.97
1035	122	>100	1635	40879	+1.11
1065	511	>100	1665	41405	+0.98
1095	1263	>100	1695	41011	+0.30
1125	2390	>100	1725	41182	+0.41
1155	3641	>100	1755	41178	+3.28
1185	5246	>100	1785	41573	+6.47
1215	7212	+98.32	1815	42858	+10.82
1245	9897	+89.80	1845	44440	
1275	12742	+82.40	1875	46780	



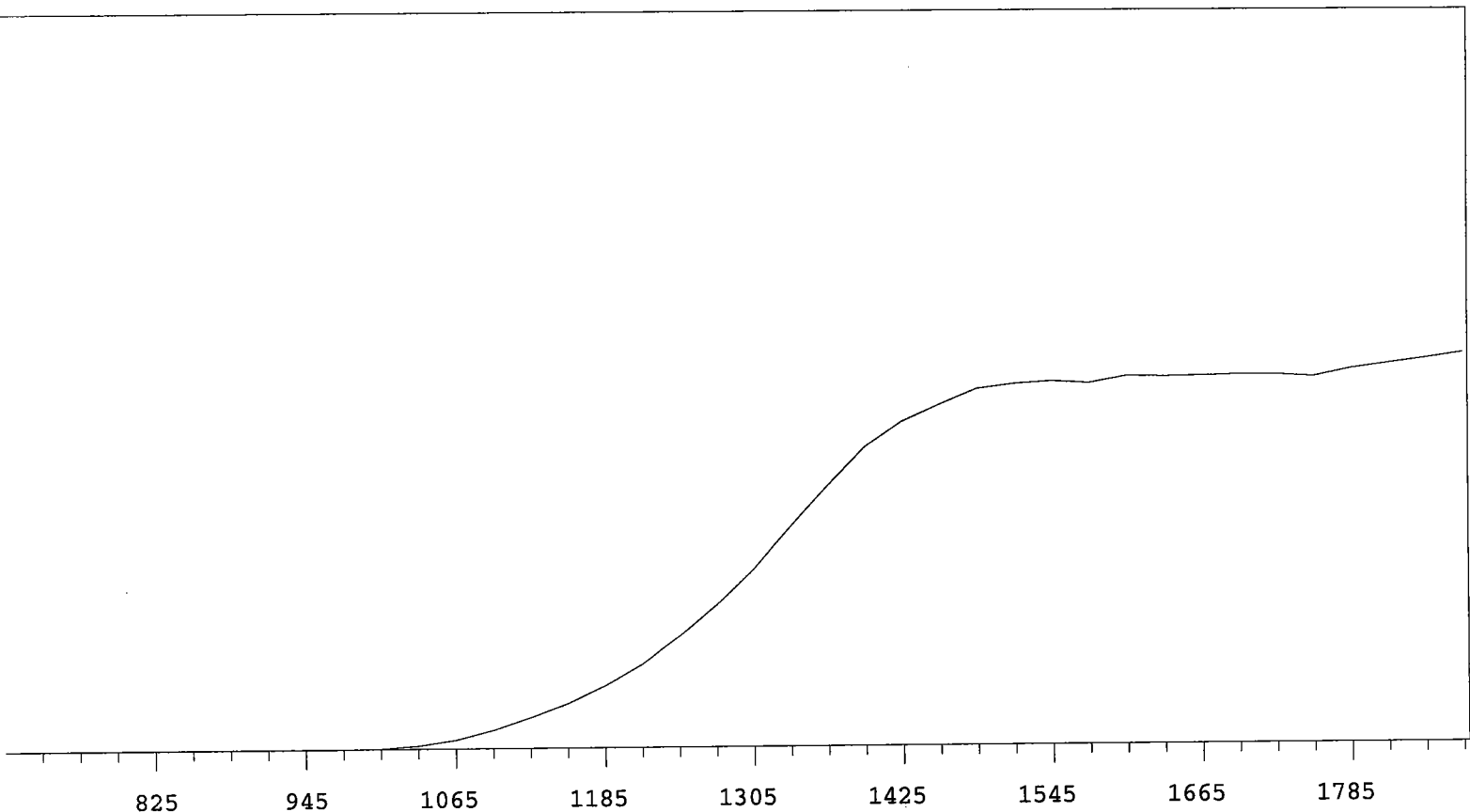
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16303	+72.82
735	0		1335	20309	+64.32
765	0		1365	24364	+53.82
795	0	>100	1395	28527	+40.95
825	0	>100	1425	31774	+28.74
855	0	>100	1455	33631	+16.87
885	0	>100	1485	35030	+9.25
915	0	>100	1515	35208	+5.21
945	0	>100	1545	35741	+3.27
975	4	>100	1575	36019	+2.95
1005	46	>100	1605	36373	+2.21
1035	202	>100	1635	36484	+2.27
1065	697	>100	1665	36713	+2.28
1095	1532	>100	1695	37093	+2.46
1125	2614	>100	1725	37325	+4.17
1155	3953	>100	1755	37543	+7.52
1185	5474	>100	1785	38833	+13.43
1215	7466	+93.09	1815	40656	+19.49
1245	9842	+86.73	1845	43753	
1275	12814	+80.29	1875	47246	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16889	+70.18
735	0		1335	20600	+61.29
765	1	+0.00	1365	24824	+50.40
795	0	>100	1395	28208	+38.85
825	0	>100	1425	31539	+25.79
855	0	>100	1455	33391	+16.06
885	0	>100	1485	33991	+8.60
915	0	>100	1515	34782	+5.01
945	0	>100	1545	35201	+4.10
975	5	>100	1575	35380	+2.50
1005	47	>100	1605	35849	+1.87
1035	243	>100	1635	35784	+1.79
1065	792	>100	1665	36000	+1.43
1095	1744	>100	1695	36269	+2.10
1125	2933	>100	1725	36381	+3.46
1155	4123	>100	1755	36733	+6.86
1185	5780	>100	1785	37669	+11.78
1215	7791	+91.58	1815	39465	+16.64
1245	10478	+84.93	1845	41803	
1275	13118	+77.50	1875	44665	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16226	+71.71
735	0		1335	20083	+61.95
765	1	+0.00	1365	23913	+49.99
795	0	>100	1395	27526	+36.97
825	0	>100	1425	30193	+24.54
855	0	>100	1455	31747	+14.71
885	0	>100	1485	32544	+7.71
915	0	>100	1515	33198	+3.66
945	0	>100	1545	33188	+1.51
975	2	>100	1575	33227	+0.73
1005	33	>100	1605	33278	+1.04
1035	203	>100	1635	33518	+1.38
1065	668	>100	1665	33565	+1.95
1095	1403	>100	1695	33774	+1.99
1125	2545	>100	1725	34135	+3.30
1155	3800	>100	1755	34244	+3.67
1185	5363	>100	1785	35022	+4.84
1215	7355	+95.00	1815	35229	+5.93
1245	9807	+87.69	1845	36179	
1275	12700	+80.28	1875	36821	



VOLTS COUNTS %/100 Volts

VOLTS COUNTS %/100 Volts

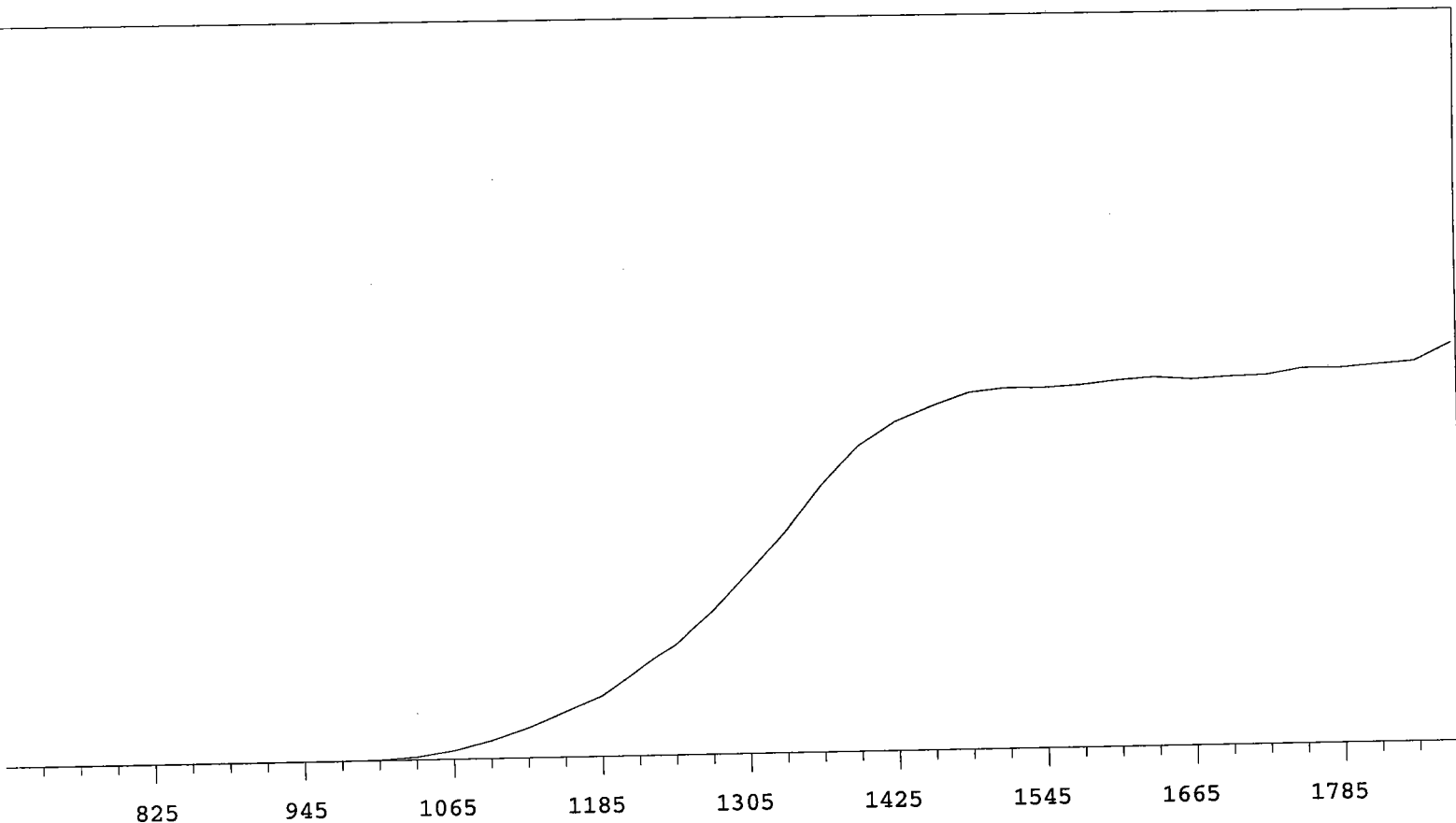
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 1005 45 >100
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 1065 836 >100
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1305 16723 +68.78
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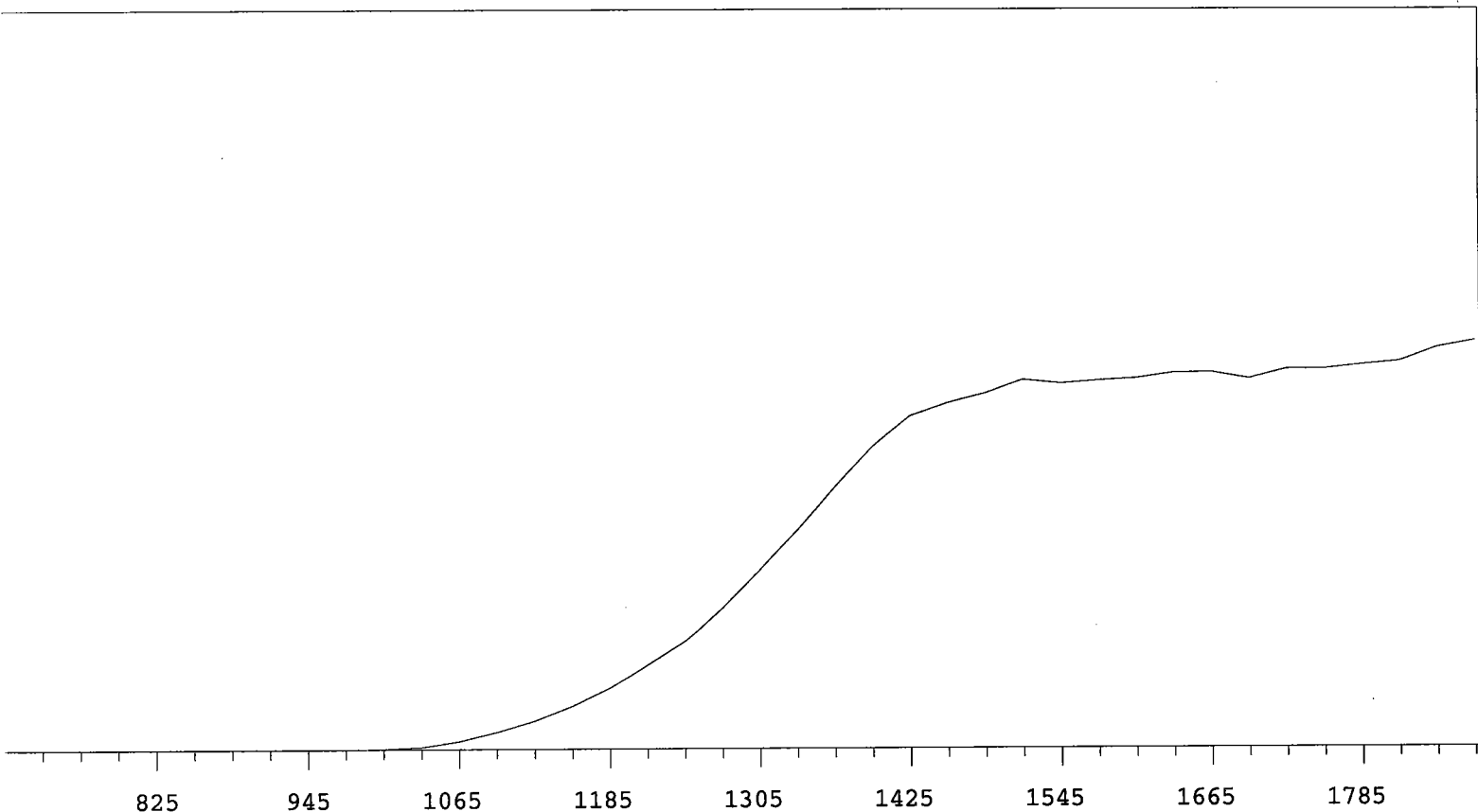
MPC 9600 Plateau
Alpha Volts: 870

Instrument 9 MPC 9604 Detector C
Beta Volts: 1530

7/1/2009



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	20192	+70.39
735	0		1335	24524	+60.97
765	0		1365	29650	+48.44
795	0	>100	1395	33904	+35.09
825	0	>100	1425	36549	+22.73
855	0	>100	1455	38217	+13.58
885	1	>100	1485	39628	+7.51
915	1	>100	1515	40035	+3.73
945	2	>100	1545	40020	+1.92
975	3	>100	1575	40236	+2.06
1005	64	>100	1605	40680	+1.62
1035	349	>100	1635	40953	+1.03
1065	970	>100	1665	40643	+0.43
1095	1982	>100	1695	40882	+1.41
1125	3328	>100	1725	40979	+2.18
1155	5012	>100	1755	41654	+2.20
1185	6669	>100	1785	41602	+2.27
1215	9448	+92.67	1815	41935	+4.50
1245	12293	+86.58	1845	42259	
1275	15917	+76.99	1875	44183	



VOLTS COUNTS %/100 Volts

VOLTS COUNTS %/100 Volts

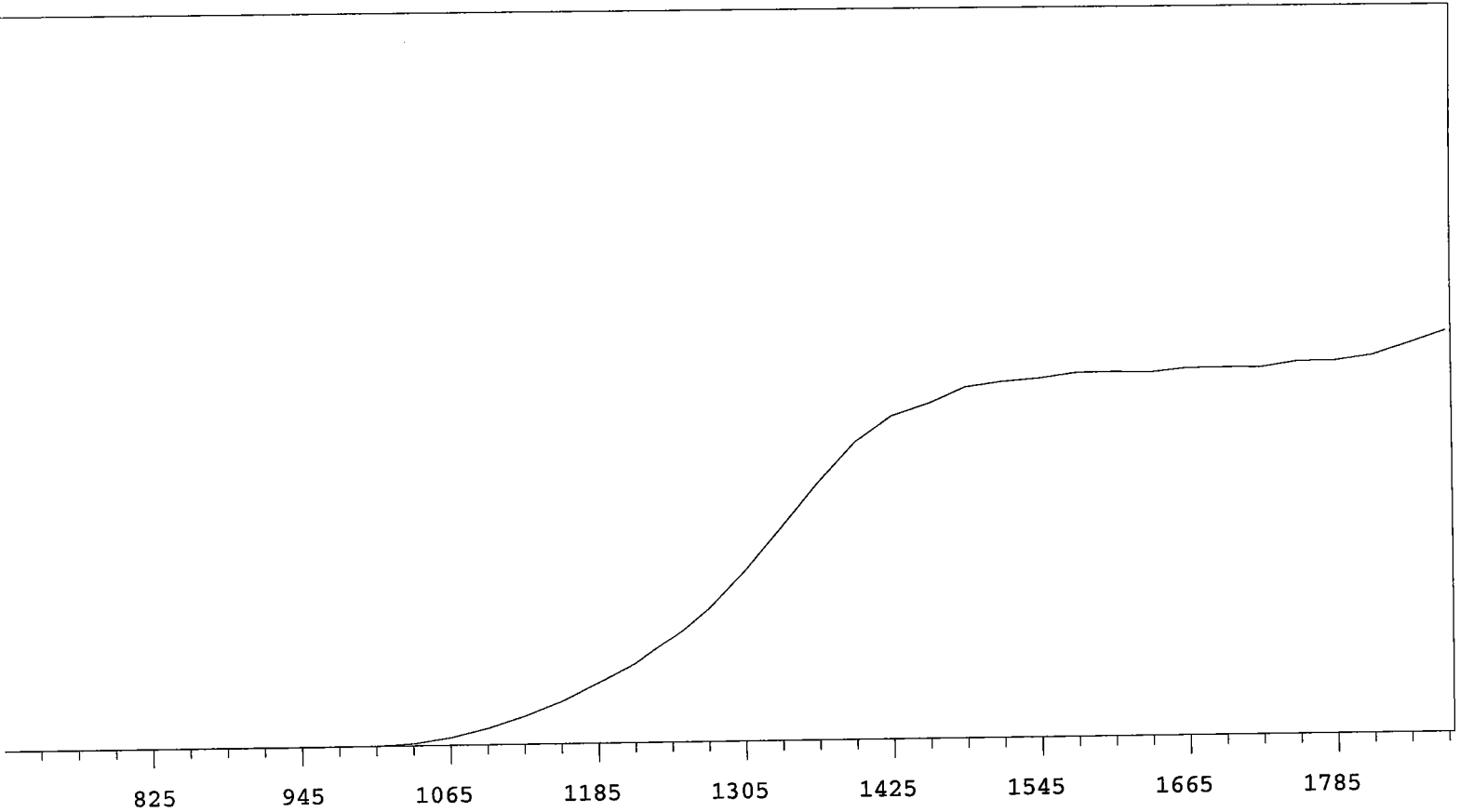
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	1	>100
945	0	>100
975	5	>100
1005	35	>100
1035	186	>100
1065	618	>100
1095	1280	>100
1125	2141	>100
1155	3268	>100
1185	4659	>100
1215	6343	+90.68
1245	8064	+83.46
1275	10497	+77.03

1305	13319	+70.94
1335	16319	+61.35
1365	19577	+50.27
1395	22498	+36.85
1425	24782	+23.90
1455	25761	+15.37
1485	26486	+8.38
1515	27503	+5.11
1545	27223	+2.67
1575	27453	+1.71
1605	27604	+2.70
1635	28021	+0.78
1665	28059	+1.05
1695	27548	+0.90
1725	28280	+2.16
1755	28290	+3.51
1785	28600	+4.46
1815	28879	+6.35
1845	29913	
1875	30417	

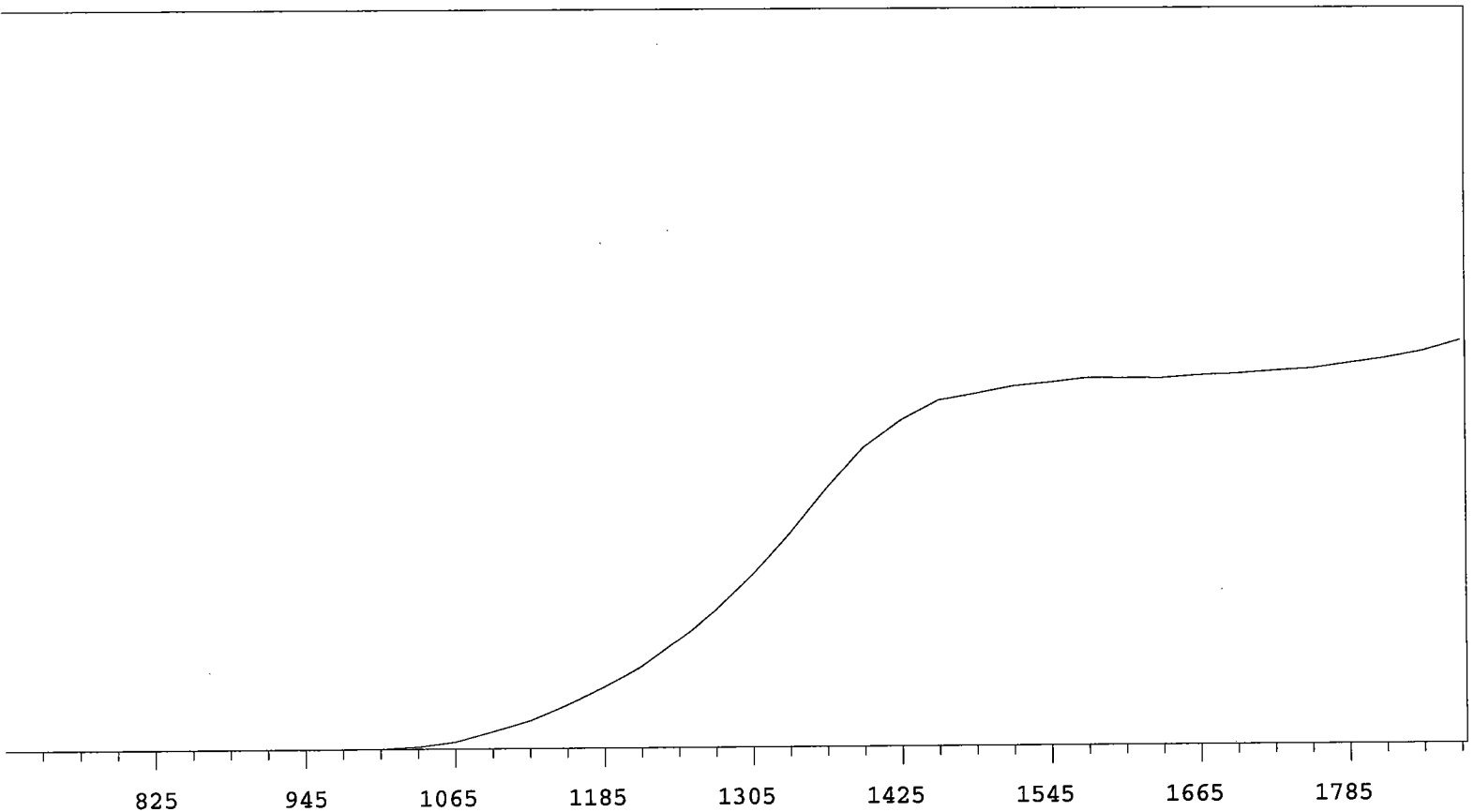
MPC 9600 Plateau
Alpha Volts: 870

Instrument 10 MPC 9604 Detector A
Beta Volts: 1552

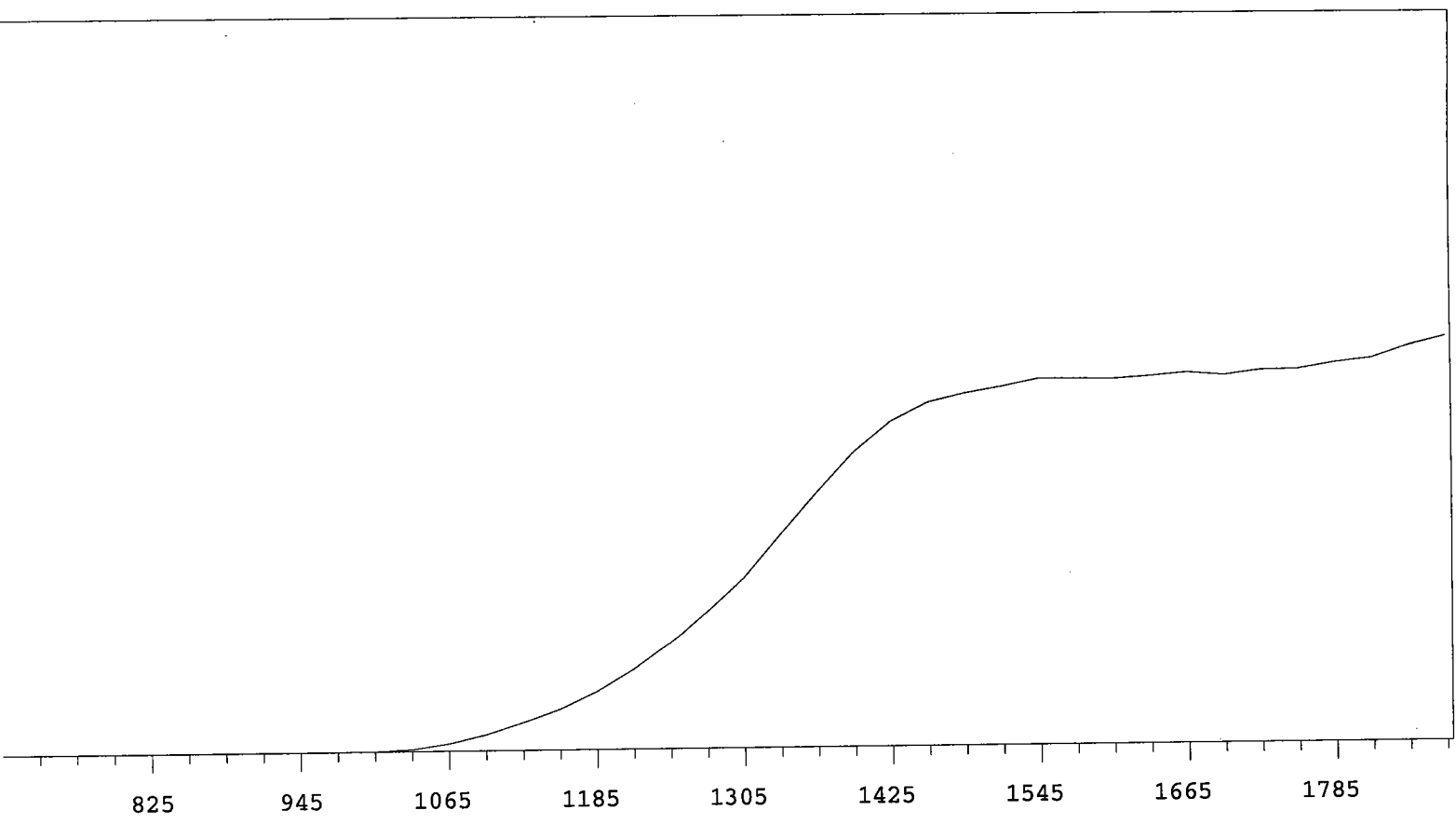
7/1/2009



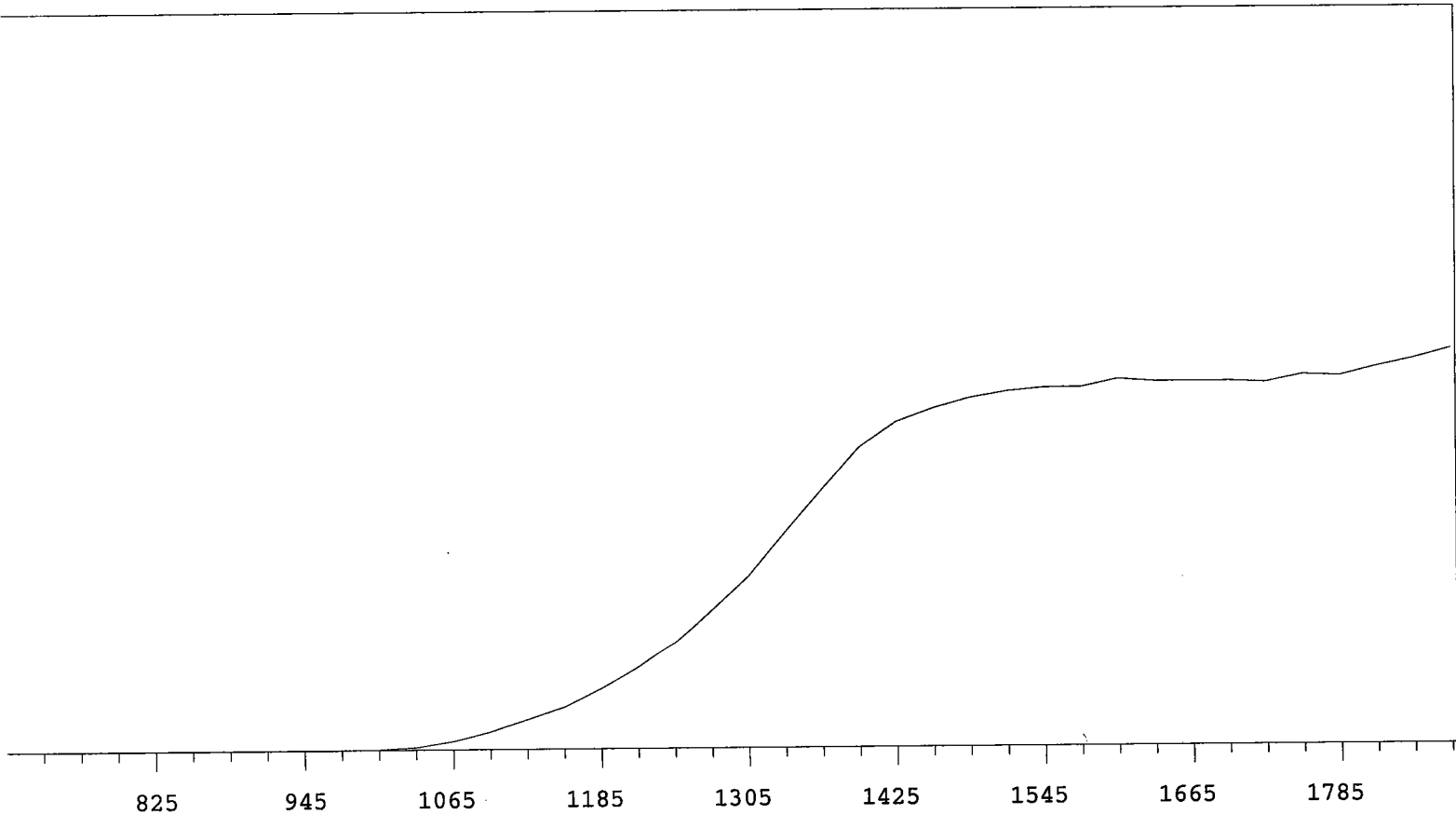
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	16076	+72.76
735	1		1335	19985	+63.85
765	0		1365	24102	+50.95
795	0	>100	1395	27819	+36.01
825	0	>100	1425	30228	+23.86
855	0	>100	1455	31343	+14.40
885	0	>100	1485	32811	+8.77
915	0	>100	1515	33243	+6.10
945	0	>100	1545	33518	+3.25
975	1	>100	1575	34010	+1.98
1005	37	>100	1605	34061	+1.59
1035	198	>100	1635	33973	+0.97
1065	687	>100	1665	34346	+0.93
1095	1491	>100	1695	34366	+1.72
1125	2580	>100	1725	34341	+1.54
1155	3920	>100	1755	34860	+2.47
1185	5588	>100	1785	34897	+4.50
1215	7384	+91.32	1815	35377	+6.60
1245	9794	+84.81	1845	36458	
1275	12572	+79.73	1875	37630	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	14469	+71.08
735	0		1335	17904	+63.07
765	0		1365	21677	+51.20
795	0	>100	1395	25027	+38.06
825	0	>100	1425	27237	+24.55
855	0	>100	1455	28914	+14.61
885	0	>100	1485	29480	+8.48
915	0	>100	1515	30075	+5.06
945	1	>100	1545	30374	+3.42
975	7	>100	1575	30738	+1.68
1005	28	>100	1605	30703	+1.08
1035	190	>100	1635	30679	+0.77
1065	597	>100	1665	30902	+1.46
1095	1474	>100	1695	30992	+1.89
1125	2383	>100	1725	31224	+2.40
1155	3680	>100	1755	31397	+3.27
1185	5131	>100	1785	31826	+4.13
1215	6808	+89.95	1815	32236	+5.59
1245	8990	+83.03	1845	32782	
1275	11493	+77.30	1875	33632	

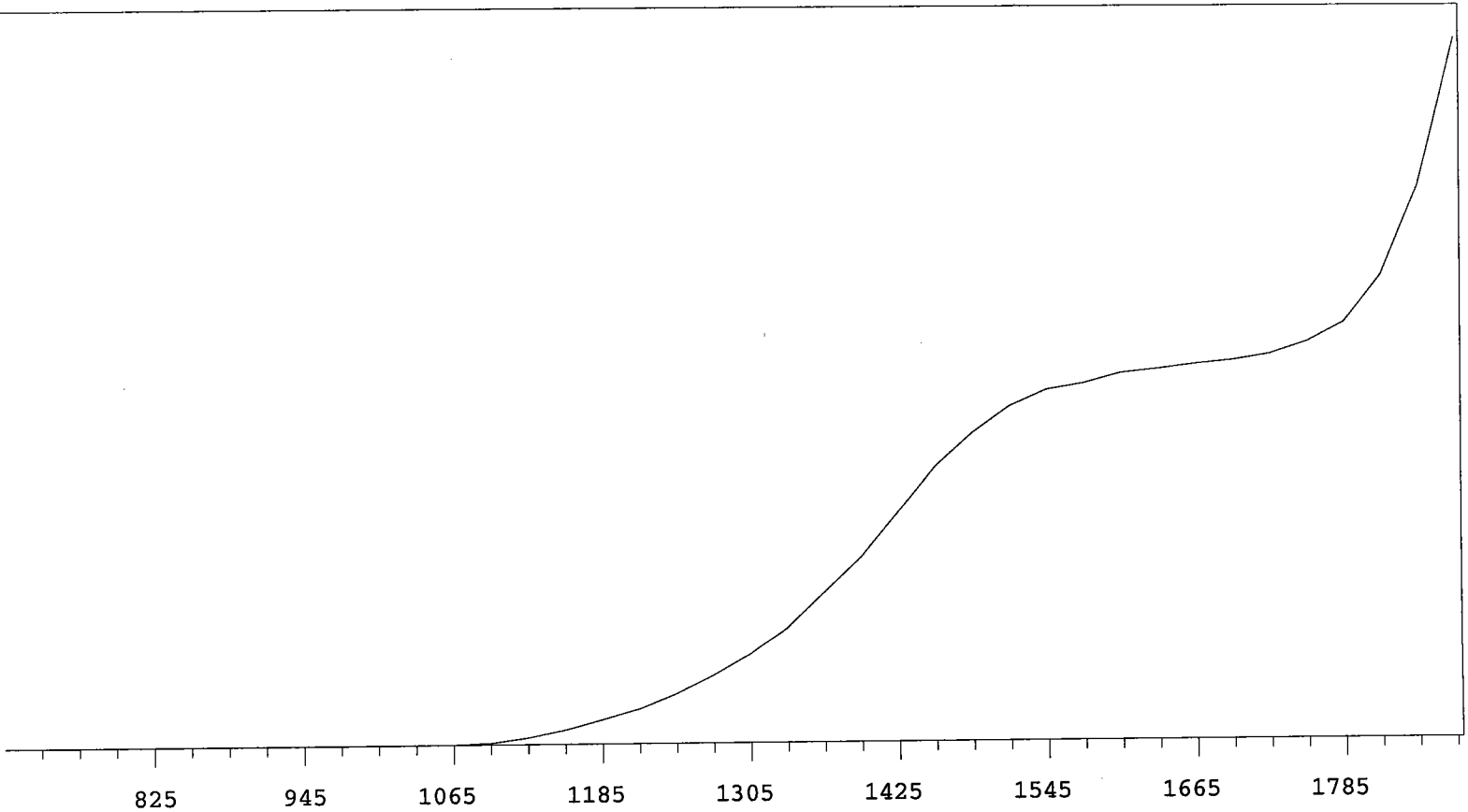


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	18051	+71.16
735	0		1335	22586	+62.34
765	0		1365	26973	+51.47
795	0	>100	1395	31137	+38.24
825	0	>100	1425	34321	+25.70
855	0	>100	1455	36267	+15.37
885	1	>100	1485	37197	+9.21
915	0	>100	1515	37851	+5.38
945	2	>100	1545	38622	+3.00
975	2	>100	1575	38600	+1.55
1005	36	>100	1605	38538	+1.03
1035	220	>100	1635	38786	+0.91
1065	780	>100	1665	39129	+1.38
1095	1712	>100	1695	38832	+1.20
1125	2926	>100	1725	39323	+2.00
1155	4297	>100	1755	39390	+3.35
1185	6097	>100	1785	40031	+4.86
1215	8397	+95.11	1815	40466	+6.64
1245	11155	+85.84	1845	41713	
1275	14430	+78.79	1875	42620	

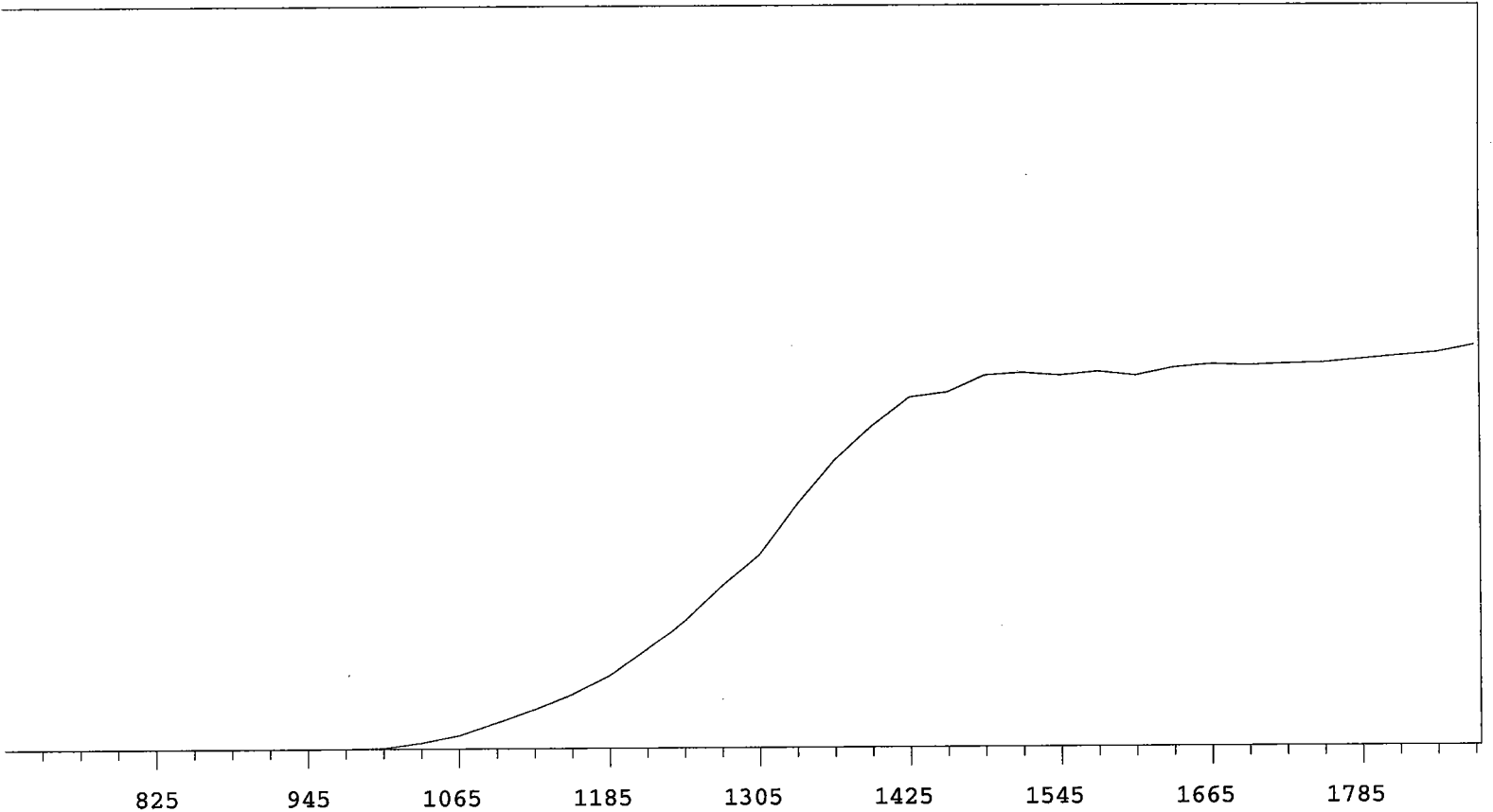


VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	15430	+69.87
735	0		1335	19258	+61.49
765	0		1365	23018	+50.06
795	0	>100	1395	26562	+35.34
825	0	>100	1425	28750	+22.67
855	0	>100	1455	29911	+13.20
885	0	>100	1485	30798	+8.01
915	0	>100	1515	31375	+4.83
945	0	>100	1545	31684	+3.74
975	3	>100	1575	31721	+2.38
1005	49	>100	1605	32398	+1.44
1035	244	>100	1635	32154	+0.64
1065	764	>100	1665	32157	-0.77
1095	1584	>100	1695	32152	+0.99
1125	2677	>100	1725	32029	+1.41
1155	3763	>100	1755	32699	+3.00
1185	5395	>100	1785	32566	+4.71
1215	7350	+93.71	1815	33351	+5.92
1245	9655	+83.52	1845	34031	
1275	12504	+76.82	1875	34941	

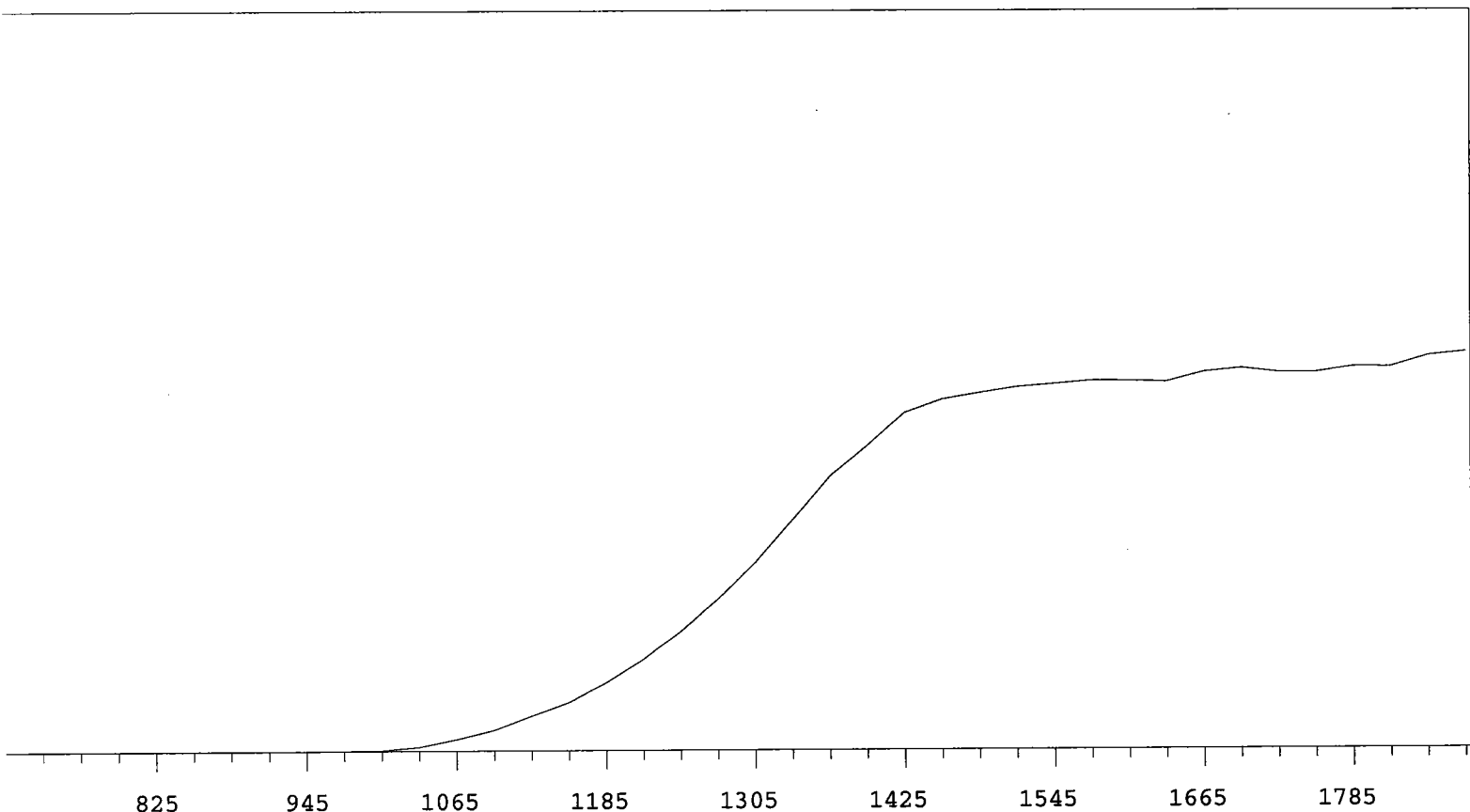
Alpha Volts: 1515 Beta Volts: 1515



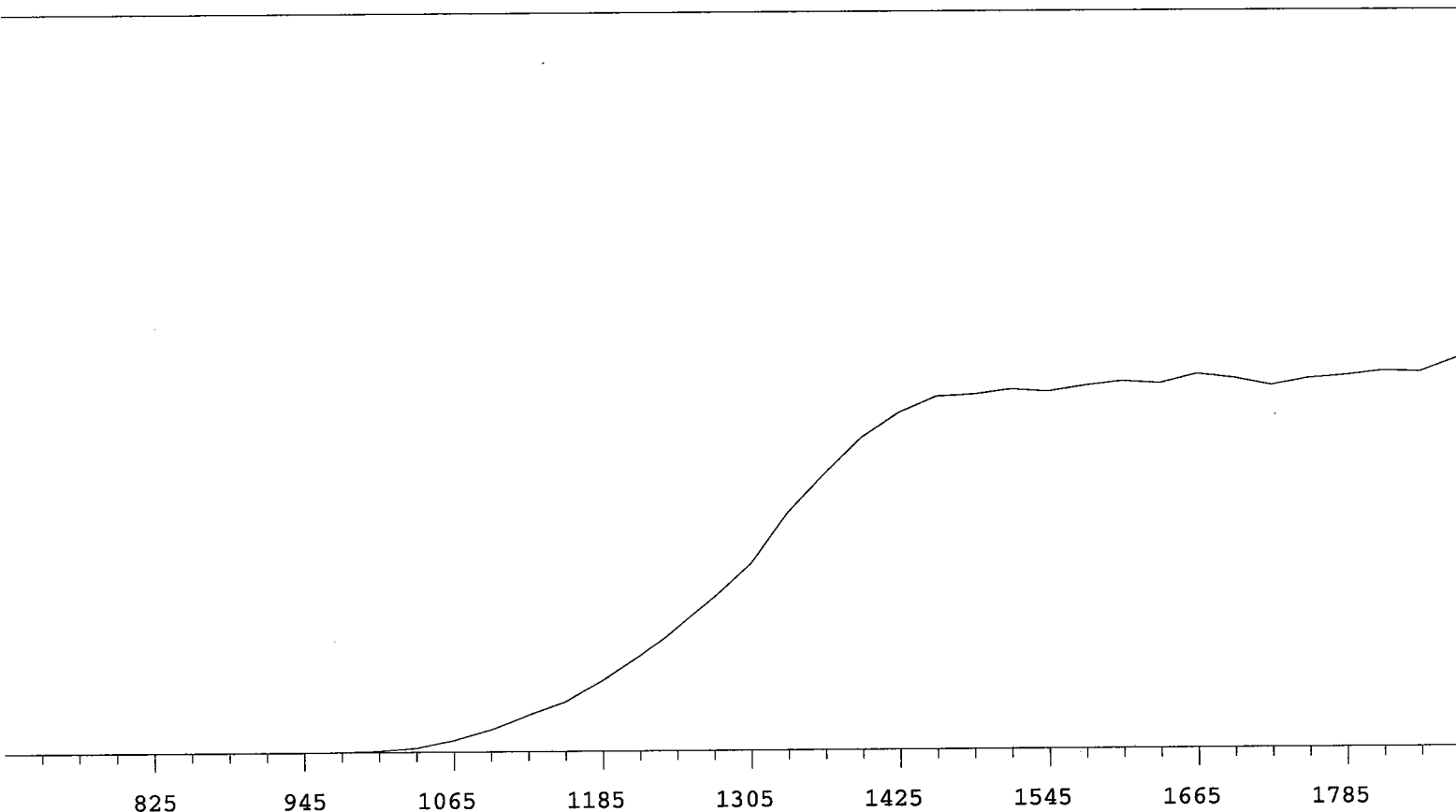
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	3225	+87.64
735	1		1335	4189	+80.15
765	0		1365	5428	+75.12
795	0	>100	1395	6662	+68.60
825	0	>100	1425	8241	+58.14
855	0	>100	1455	9857	+46.65
885	0	>100	1485	11018	+33.24
915	0	>100	1515	11953	+21.01
945	1	+0.00	1545	12538	+13.57
975	0	>100	1575	12760	+8.35
1005	0	>100	1605	13114	+5.84
1035	2	>100	1635	13258	+4.78
1065	9	>100	1665	13430	+3.99
1095	61	>100	1695	13551	+5.46
1125	248	>100	1725	13771	+8.65
1155	528	>100	1755	14204	+16.44
1185	882	>100	1785	14916	+30.03
1215	1270	>100	1815	16579	+48.74
1245	1786	>100	1845	19717	
1275	2478	+93.67	1875	25029	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	8947	+65.63
735	0		1335	11238	+56.58
765	0		1365	13246	+46.66
795	0	>100	1395	14838	+30.69
825	0	>100	1425	16166	+20.11
855	0	>100	1455	16396	+11.95
885	0	>100	1485	17161	+5.61
915	1	>100	1515	17274	+3.59
945	0	>100	1545	17144	-0.00
975	11	>100	1575	17323	+0.80
1005	47	>100	1605	17136	+2.21
1035	280	>100	1635	17484	+1.94
1065	610	>100	1665	17638	+2.16
1095	1192	>100	1695	17580	+0.85
1125	1789	>100	1725	17655	+1.05
1155	2466	>100	1755	17700	+1.98
1185	3337	+94.91	1785	17857	+2.38
1215	4526	+88.85	1815	18006	+3.36
1245	5885	+78.40	1845	18140	
1275	7518	+72.09	1875	18468	



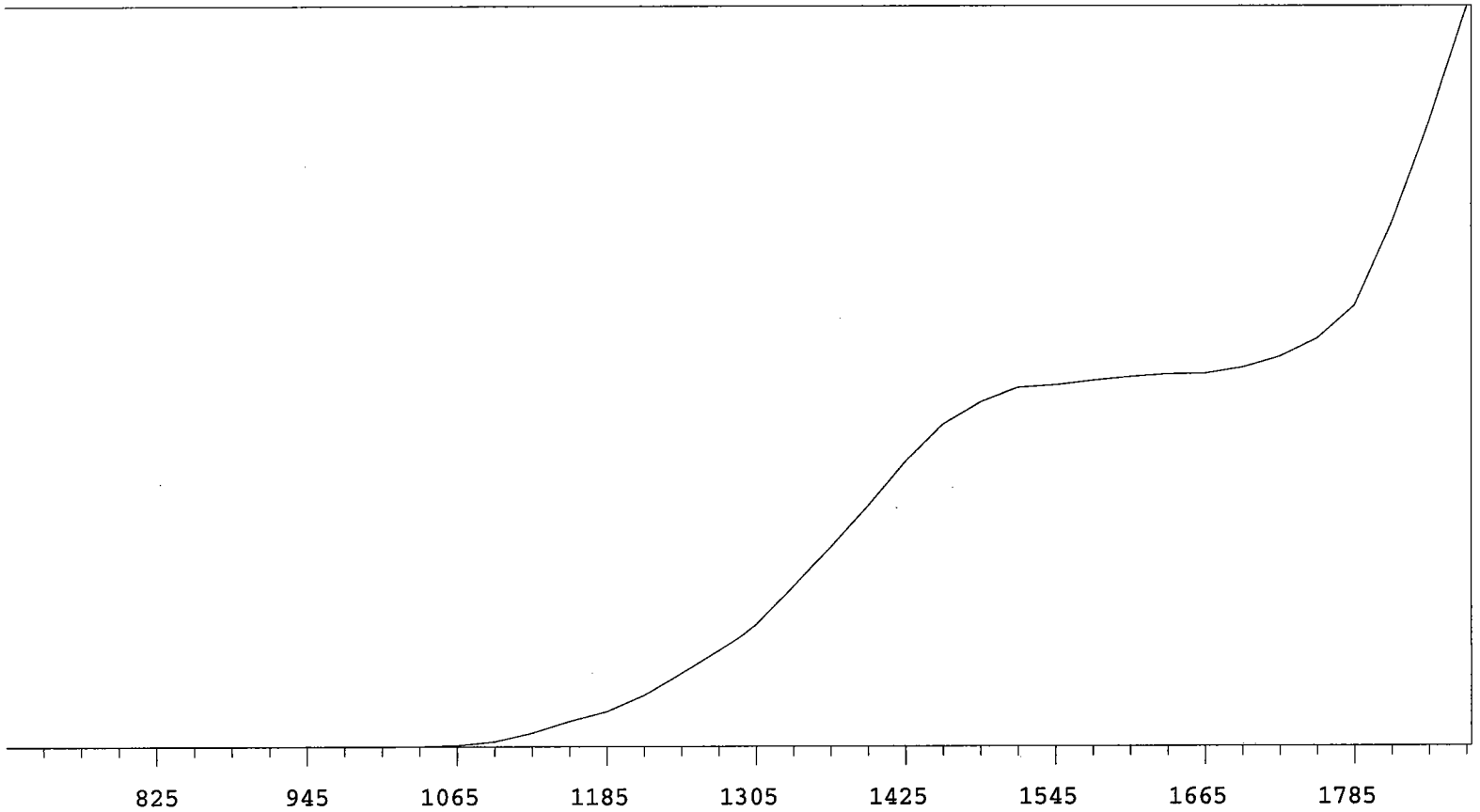
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	8636	+66.44
735	0		1335	10593	+56.56
765	0	+0.00	1365	12582	+46.23
795	0	>100	1395	13957	+33.45
825	1	+0.00	1425	15443	+21.49
855	0	>100	1455	16048	+13.14
885	0	+0.00	1485	16331	+6.45
915	0	>100	1515	16603	+4.19
945	1	>100	1545	16736	+2.73
975	7	>100	1575	16884	+1.11
1005	46	>100	1605	16875	+1.91
1035	191	>100	1635	16813	+2.86
1065	540	>100	1665	17257	+2.60
1095	957	>100	1695	17425	+1.58
1125	1597	>100	1725	17238	+0.49
1155	2217	>100	1755	17230	+0.63
1185	3154	+98.74	1785	17482	+3.27
1215	4239	+89.75	1815	17468	+4.46
1245	5550	+79.98	1845	17977	
1275	6980	+73.12	1875	18163	



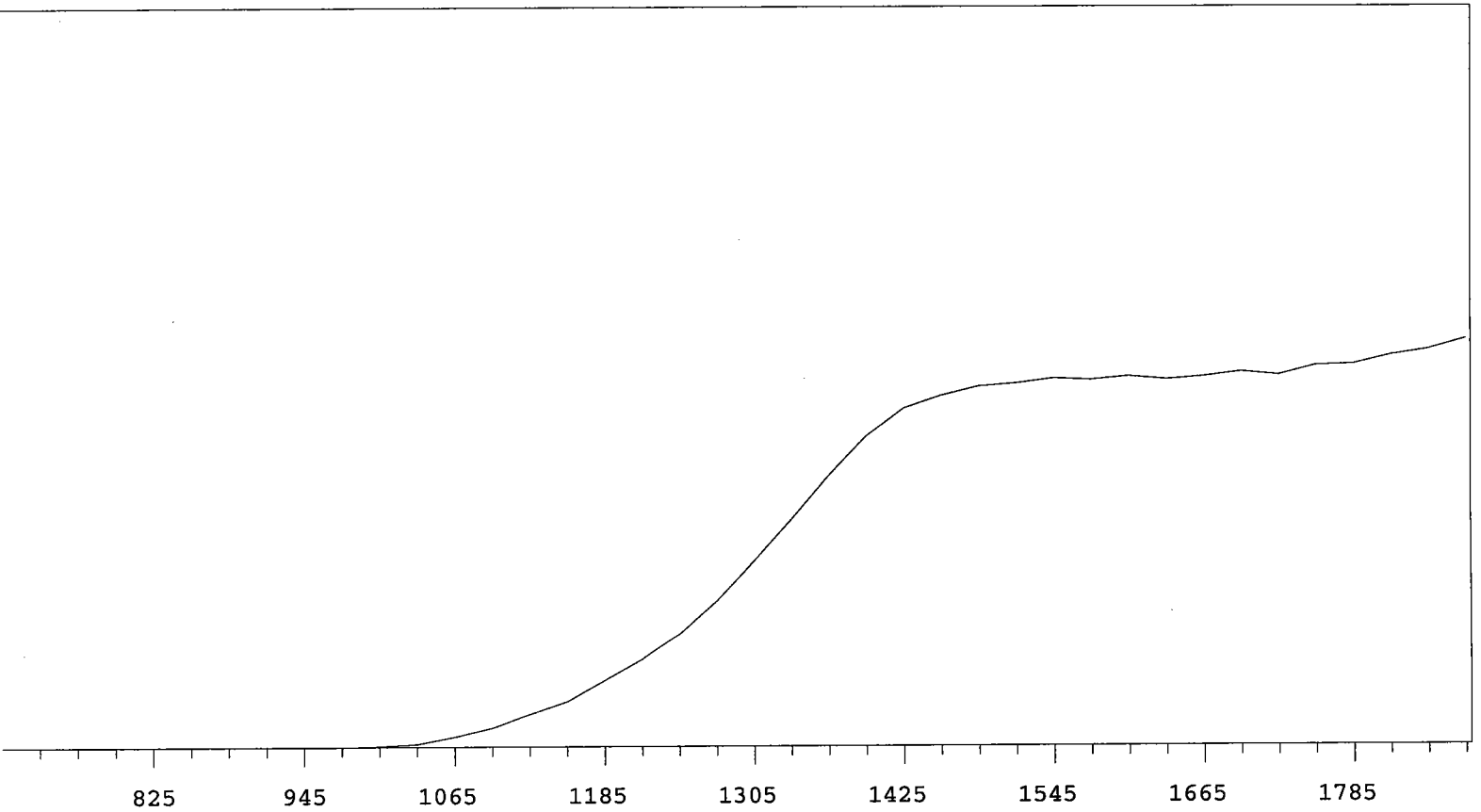
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	7679	+65.97
735	0		1335	9737	+57.57
765	0		1365	11301	+45.87
795	0	>100	1395	12767	+31.71
825	0	>100	1425	13767	+19.90
855	1	+83.33	1455	14399	+10.72
885	1	+55.56	1485	14467	+4.38
915	0	>100	1515	14671	+2.12
945	1	>100	1545	14576	+2.61
975	9	>100	1575	14808	+1.80
1005	60	>100	1605	14974	+3.15
1035	173	>100	1635	14872	+1.76
1065	480	>100	1665	15248	-0.41
1095	911	>100	1695	15067	-0.27
1125	1508	>100	1725	14784	-0.43
1155	2024	>100	1755	15044	+2.01
1185	2872	+97.38	1785	15163	+2.82
1215	3858	+89.30	1815	15333	+3.61
1245	5070	+78.02	1845	15278	
1275	6322	+73.30	1875	15817	

Alpha Volts: 705

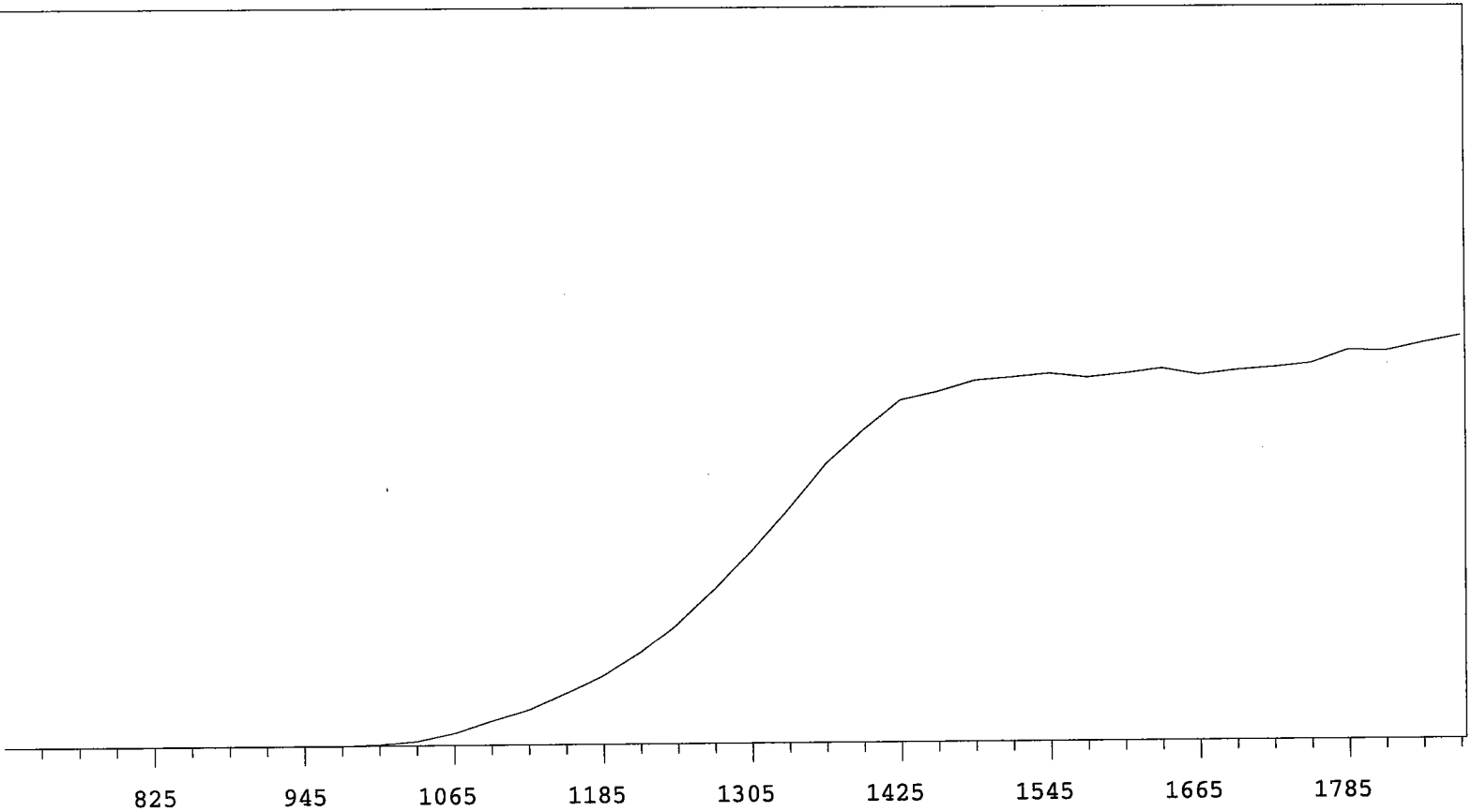
Beta Volts: 1515



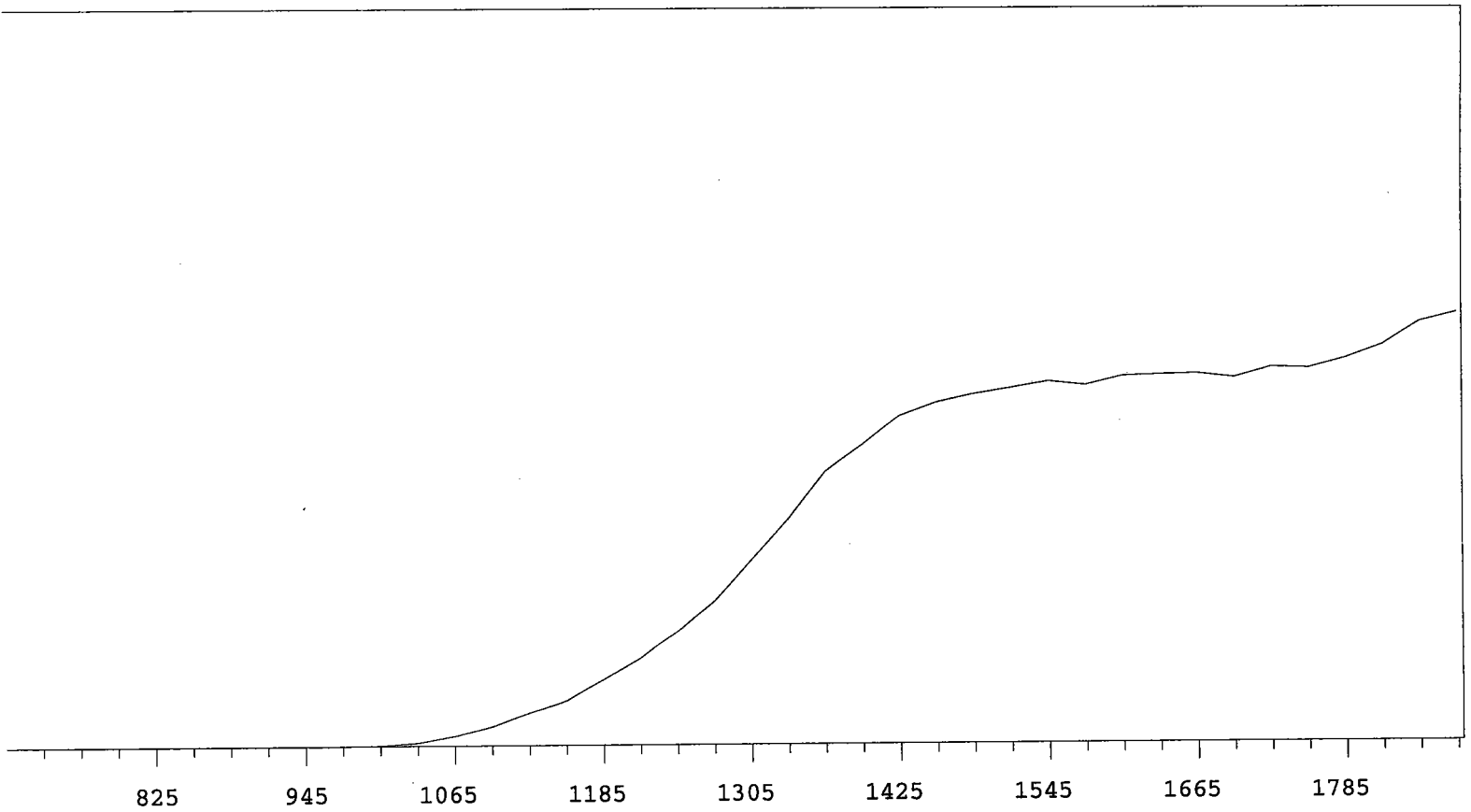
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	6302	+80.03
735	1		1335	8191	+73.78
765	0		1365	10140	+66.18
795	0	>100	1395	12247	+55.83
825	0	>100	1425	14468	+43.92
855	0	>100	1455	16303	+31.28
885	0	>100	1485	17411	+18.64
915	0	>100	1515	18150	+9.87
945	0	>100	1545	18275	+5.30
975	1	>100	1575	18496	+3.16
1005	3	>100	1605	18685	+2.66
1035	17	>100	1635	18820	+2.63
1065	84	>100	1665	18855	+4.16
1095	267	>100	1695	19152	+7.70
1125	709	>100	1725	19706	+13.90
1155	1299	>100	1755	20640	+26.51
1185	1813	>100	1785	22308	+40.92
1215	2638	>100	1815	26460	+51.46
1245	3777	+96.47	1845	31616	
1275	4915	+87.98	1875	37348	



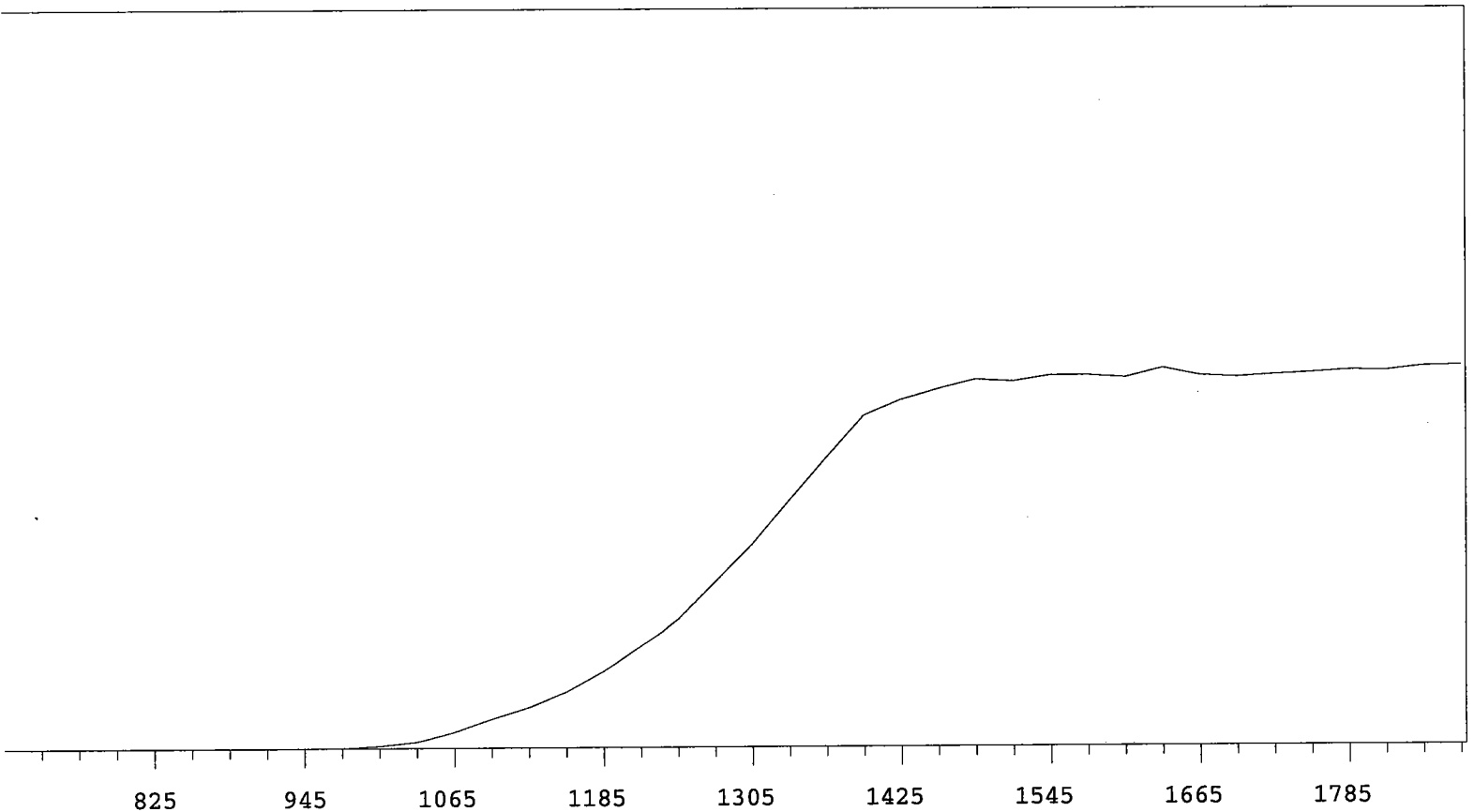
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	10207	+70.42
735	0		1335	12473	+60.75
765	0		1365	14900	+48.87
795	0	>100	1395	17101	+35.36
825	0	>100	1425	18643	+22.53
855	1	+83.33	1455	19350	+12.34
885	1	-83.33	1485	19848	+6.68
915	0	-55.56	1515	20014	+3.51
945	0	>100	1545	20278	+2.03
975	1	>100	1575	20186	+0.80
1005	43	>100	1605	20375	+0.32
1035	165	>100	1635	20209	+1.36
1065	557	>100	1665	20364	+0.83
1095	1055	>100	1695	20607	+2.43
1125	1775	>100	1725	20429	+2.51
1155	2470	>100	1755	20924	+3.64
1185	3617	+98.46	1785	20984	+5.11
1215	4757	+90.95	1815	21470	+5.63
1245	6186	+83.59	1845	21773	
1275	8021	+77.85	1875	22346	



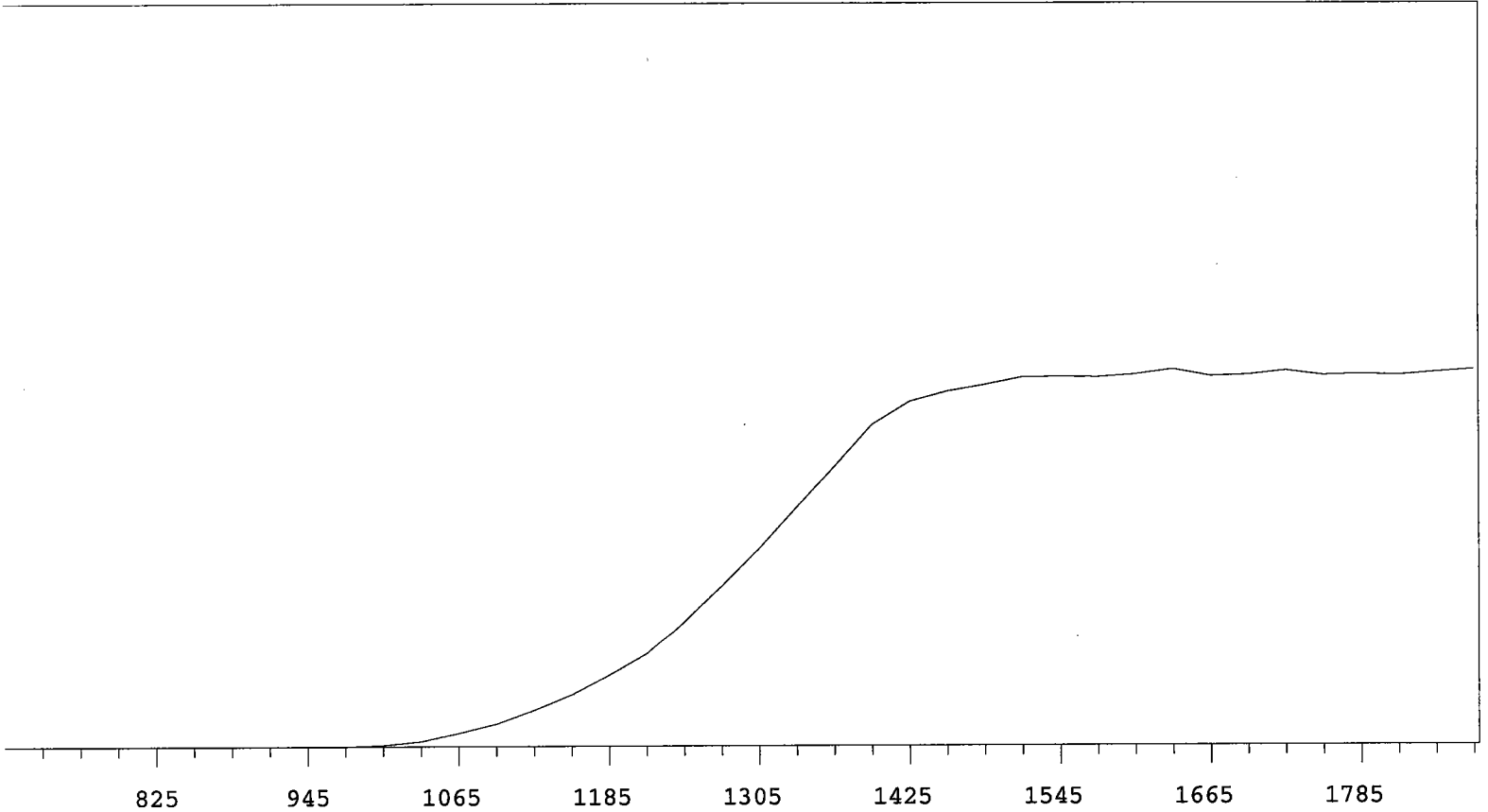
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	9543	+67.01
735	0		1335	11617	+56.47
765	0		1365	13791	+45.47
795	0	>100	1395	15387	+31.66
825	0	>100	1425	16819	+20.02
855	0	>100	1455	17210	+11.63
885	1	+0.00	1485	17742	+6.05
915	0	>100	1515	17892	+3.04
945	0	>100	1545	18070	+1.09
975	7	>100	1575	17856	+1.43
1005	52	>100	1605	18054	+0.42
1035	214	>100	1635	18287	+1.06
1065	590	>100	1665	17969	+0.78
1095	1201	>100	1695	18187	+1.48
1125	1759	>100	1725	18317	+4.89
1155	2569	>100	1755	18518	+4.76
1185	3440	+95.13	1785	19156	+5.18
1215	4583	+87.74	1815	19100	+5.18
1245	5985	+81.67	1845	19496	
1275	7682	+74.54	1875	19842	



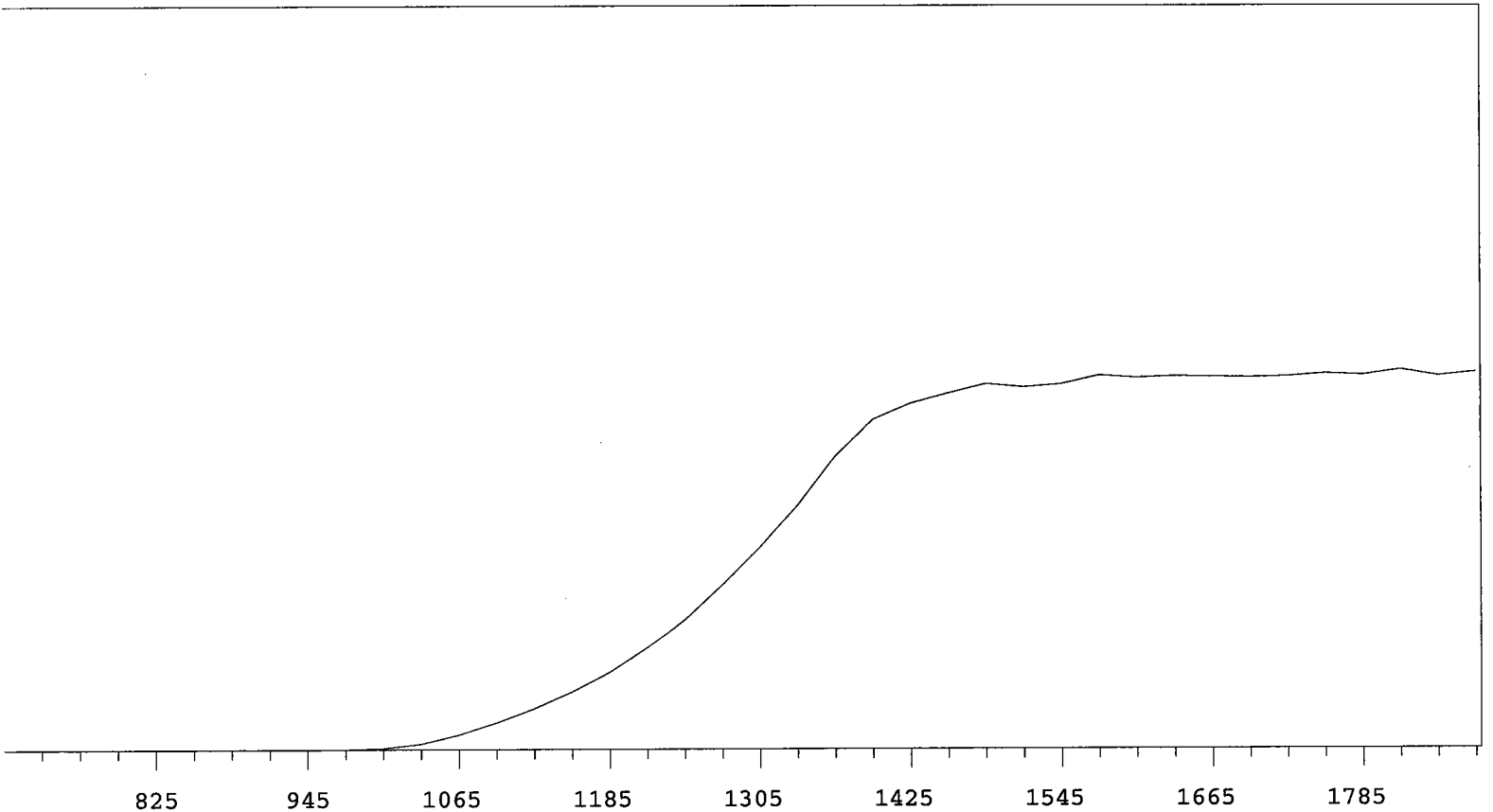
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	9144	+69.92
735	0		1335	11120	+58.43
765	0		1365	13399	+45.40
795	0	>100	1395	14711	+32.57
825	0	>100	1425	16134	+20.69
855	0	>100	1455	16805	+13.46
885	0	>100	1485	17209	+7.90
915	0	>100	1515	17500	+4.31
945	0	>100	1545	17812	+3.48
975	4	>100	1575	17629	+2.80
1005	26	>100	1605	18066	+2.23
1035	169	>100	1635	18122	+1.44
1065	483	>100	1665	18166	+1.20
1095	955	>100	1695	17967	+1.60
1125	1639	>100	1725	18469	+3.41
1155	2233	>100	1755	18409	+6.35
1185	3262	+98.61	1785	18884	+9.47
1215	4306	+89.77	1815	19535	+11.98
1245	5662	+82.36	1845	20630	
1275	7113	+76.36	1875	21076	



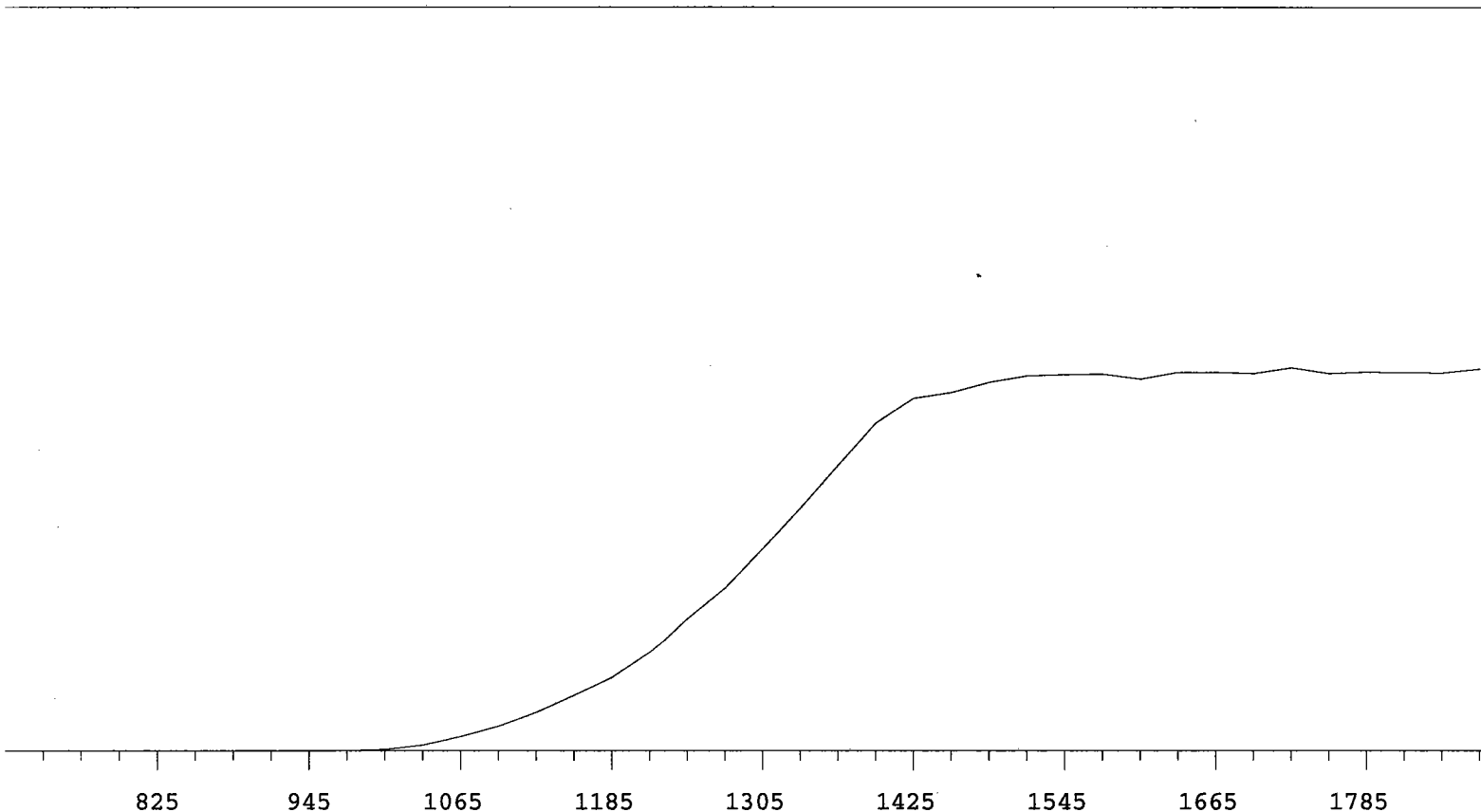
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	9209	+64.55
735	1		1335	11200	+55.94
765	0	+55.56	1365	13123	+43.27
795	2	>100	1395	14957	+29.04
825	0	+0.00	1425	15658	+17.41
855	0	>100	1455	16123	+8.01
885	1	>100	1485	16530	+4.92
915	0	>100	1515	16437	+2.71
945	1	>100	1545	16704	+0.83
975	14	>100	1575	16707	+2.14
1005	104	>100	1605	16602	+0.55
1035	281	>100	1635	17024	-0.28
1065	720	>100	1665	16684	-0.42
1095	1302	>100	1695	16597	-0.85
1125	1834	>100	1725	16711	+1.27
1155	2544	>100	1755	16796	+1.51
1185	3485	+92.28	1785	16903	+1.57
1215	4624	+85.50	1815	16880	+1.46
1245	5878	+77.82	1845	17066	
1275	7515	+71.49	1875	17085	



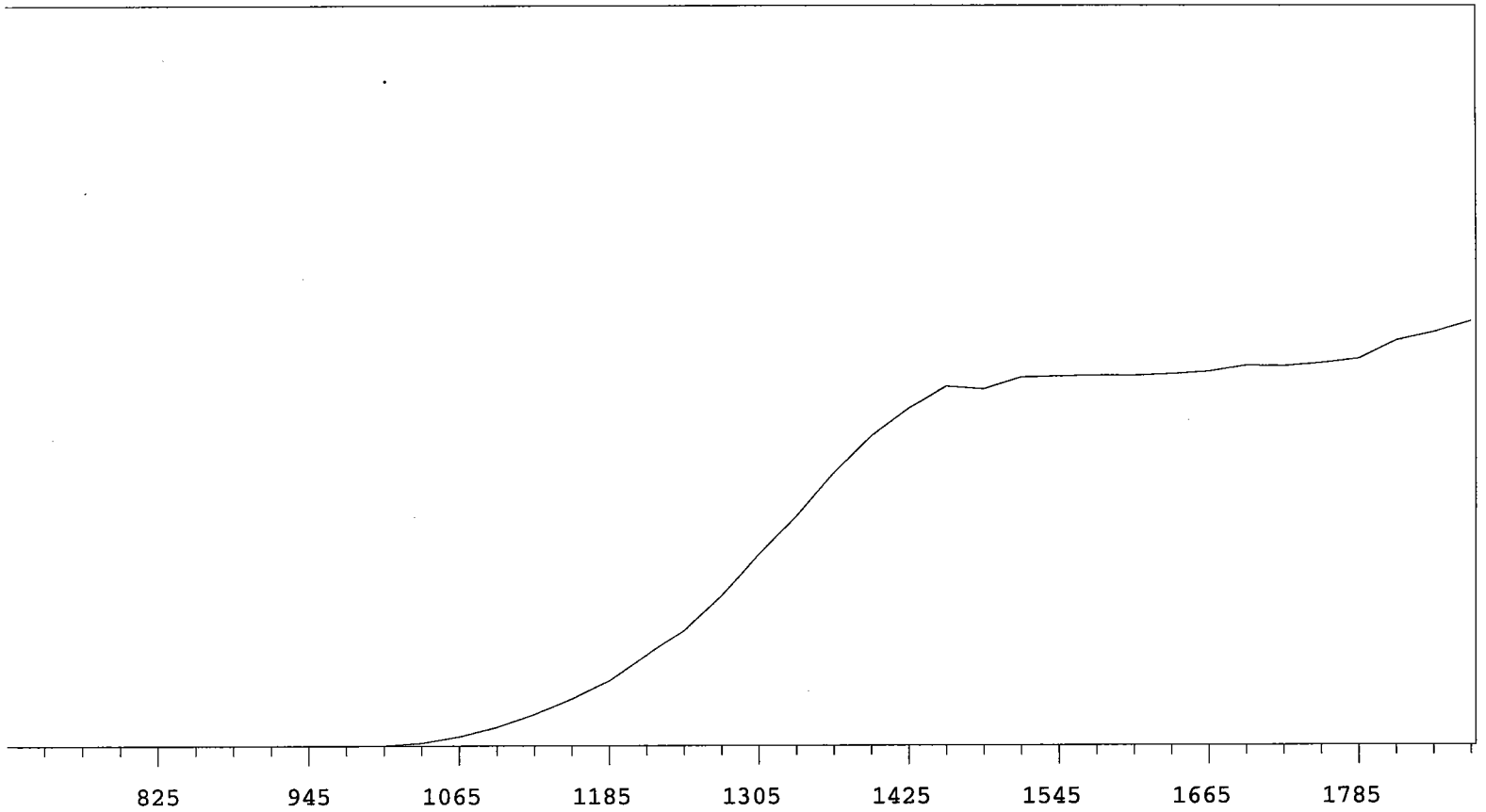
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	9666	+64.39
735	0		1335	11722	+55.91
765	0		1365	13680	+44.91
795	0	>100	1395	15677	+31.56
825	0	>100	1425	16786	+19.46
855	0	>100	1455	17283	+10.57
885	0	>100	1485	17608	+5.95
915	1	>100	1515	17972	+3.32
945	0	>100	1545	18006	+1.84
975	4	>100	1575	17970	+1.58
1005	70	>100	1605	18104	+0.74
1035	257	>100	1635	18351	+0.24
1065	648	>100	1665	18016	+0.16
1095	1116	>100	1695	18080	-0.63
1125	1784	>100	1725	18283	+0.29
1155	2560	>100	1755	18047	-0.47
1185	3531	+96.11	1785	18110	-0.32
1215	4568	+89.22	1815	18040	+1.17
1245	6137	+81.65	1845	18200	
1275	7855	+74.42	1875	18320	



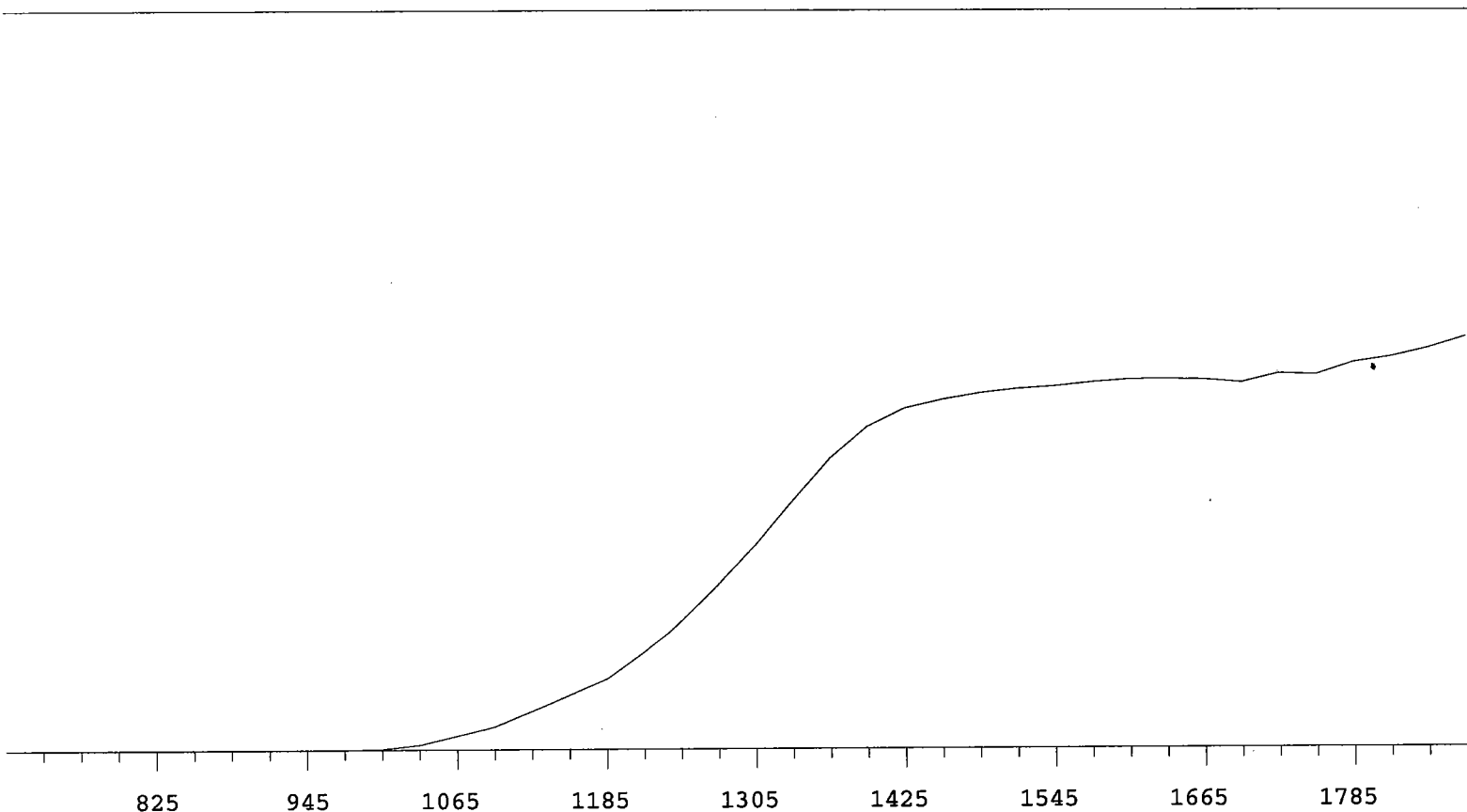
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	11573	+64.95
735	0		1335	13929	+56.47
765	0		1365	16726	+43.82
795	0	>100	1395	18834	+29.38
825	0	>100	1425	19743	+16.84
855	0	>100	1455	20314	+7.95
885	0	>100	1485	20860	+4.16
915	0	>100	1515	20670	+3.23
945	0	>100	1545	20844	+2.09
975	9	>100	1575	21330	+2.48
1005	93	>100	1605	21188	+1.16
1035	325	>100	1635	21280	-0.32
1065	834	>100	1665	21237	+0.08
1095	1525	>100	1695	21202	+0.42
1125	2318	>100	1725	21254	+0.60
1155	3233	>100	1755	21406	+1.41
1185	4357	+92.07	1785	21326	+0.42
1215	5755	+85.64	1815	21619	+0.16
1245	7438	+78.35	1845	21282	
1275	9463	+70.89	1875	21478	



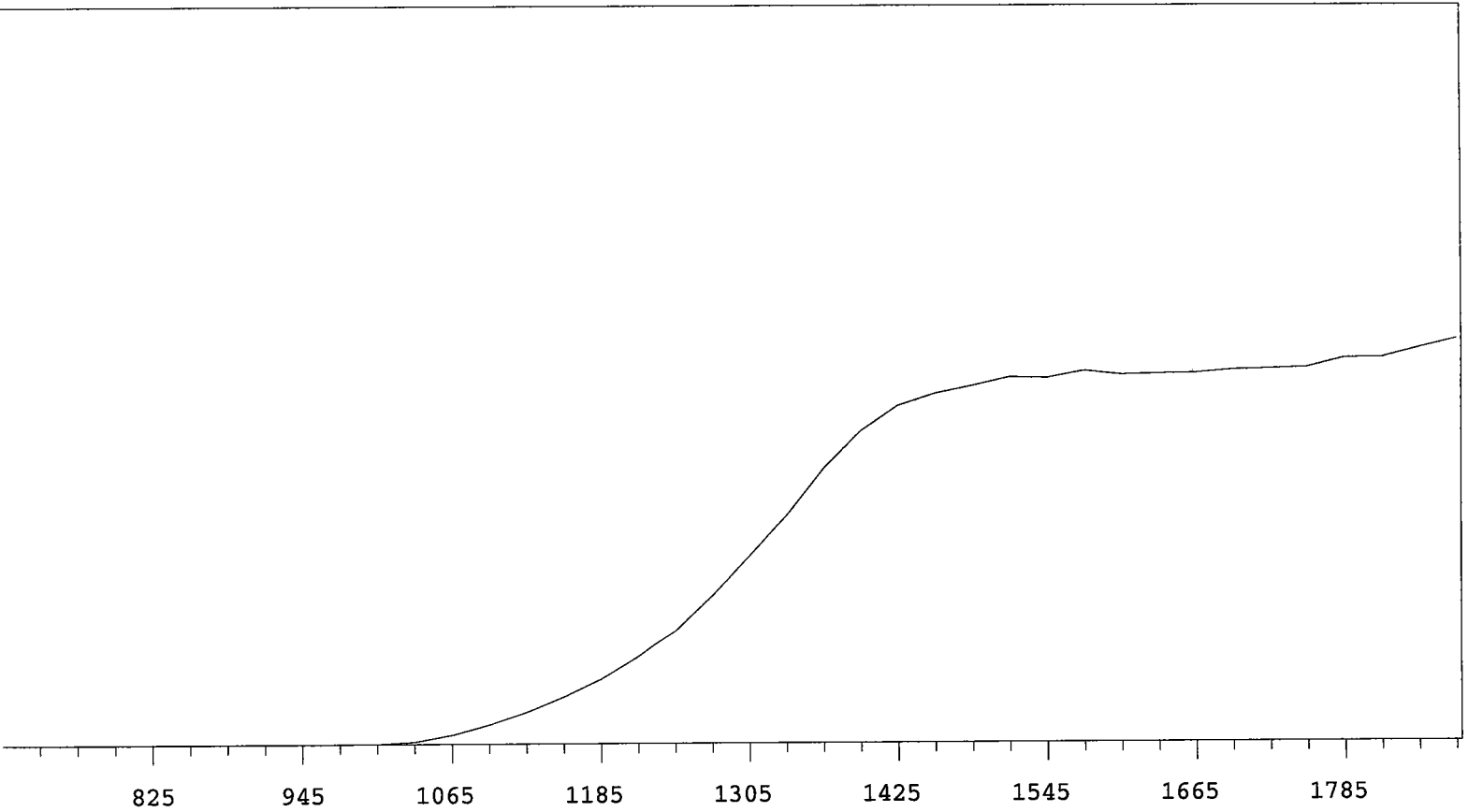
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	1		1305	7524	+61.93
735	0		1335	9002	+55.36
765	0		1365	10542	+44.70
795	0	>100	1395	12064	+31.21
825	0	>100	1425	12981	+19.20
855	0	>100	1455	13192	+10.41
885	0	>100	1485	13570	+5.93
915	0	>100	1515	13820	+4.08
945	0	>100	1545	13866	+0.75
975	9	>100	1575	13880	+0.21
1005	58	>100	1605	13695	+0.59
1035	228	>100	1635	13950	+0.77
1065	544	>100	1665	13954	+1.92
1095	936	>100	1695	13911	+0.19
1125	1468	>100	1725	14116	+0.02
1155	2110	>100	1755	13908	-0.24
1185	2770	+94.71	1785	13960	-0.81
1215	3670	+85.91	1815	13939	+0.71
1245	4937	+79.46	1845	13931	
1275	6066	+70.79	1875	14071	



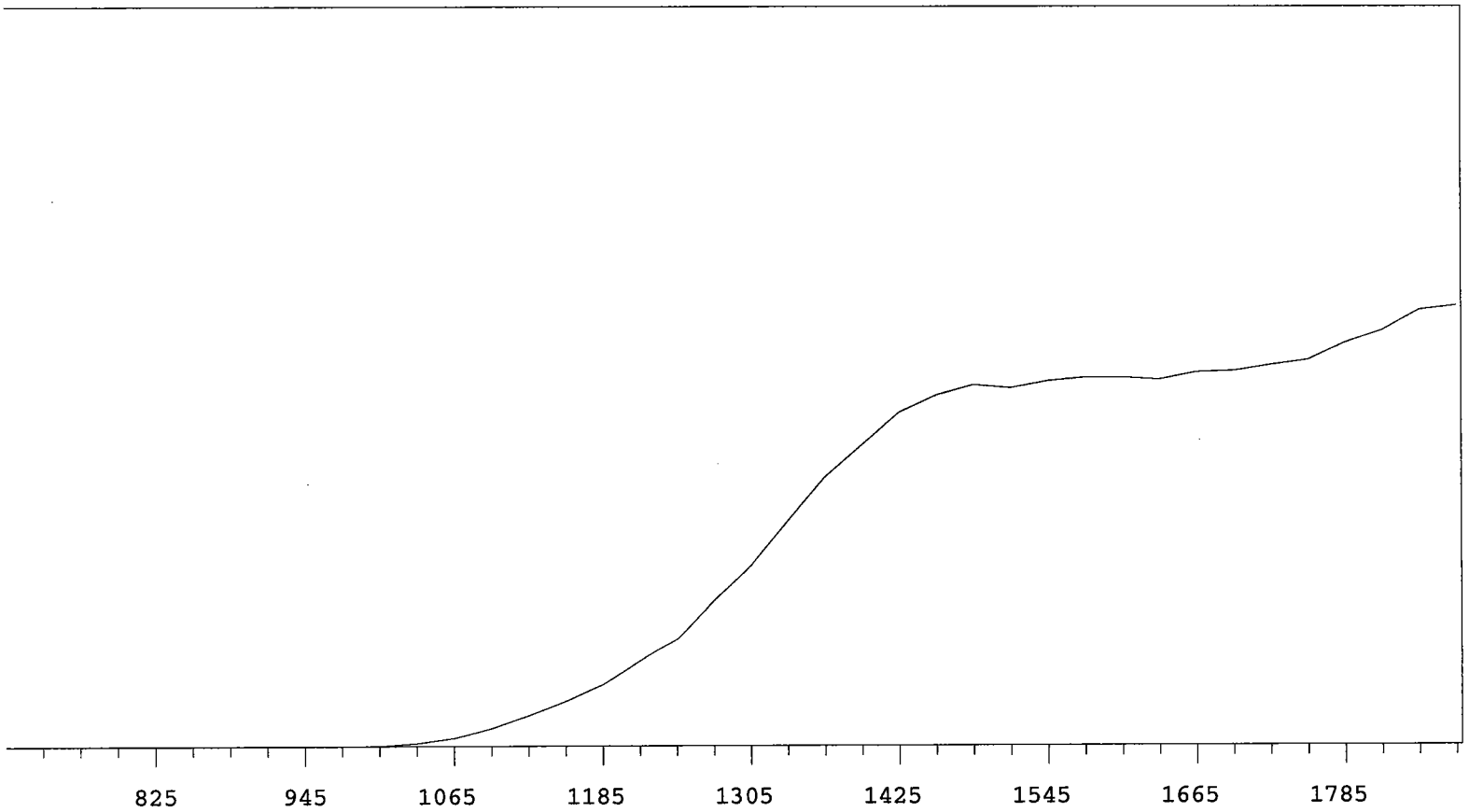
VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	8778	+67.49
735	0		1335	10502	+57.68
765	0		1365	12516	+46.36
795	0	>100	1395	14215	+35.88
825	0	>100	1425	15472	+22.01
855	0	>100	1455	16469	+12.99
885	1	+0.00	1485	16342	+6.70
915	0	>100	1515	16874	+3.07
945	0	>100	1545	16918	+2.53
975	0	>100	1575	16950	+0.58
1005	18	>100	1605	16943	+0.95
1035	137	>100	1635	17008	+2.13
1065	430	>100	1665	17130	+2.45
1095	865	>100	1695	17403	+2.43
1125	1444	>100	1725	17377	+2.43
1155	2151	>100	1755	17515	+4.88
1185	2981	>100	1785	17710	+7.54
1215	4168	+92.14	1815	18533	+9.04
1245	5377	+84.73	1845	18905	
1275	6924	+74.92	1875	19415	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	8797	+65.44
735	0		1335	10726	+54.47
765	0		1365	12570	+41.11
795	0	>100	1395	13917	+26.79
825	0	>100	1425	14687	+15.44
855	1	+0.00	1455	15048	+8.47
885	0	>100	1485	15318	+5.00
915	0	>100	1515	15494	+3.76
945	0	>100	1545	15606	+3.04
975	3	>100	1575	15776	+2.35
1005	40	>100	1605	15889	+1.44
1035	210	>100	1635	15907	-0.16
1065	590	>100	1665	15881	+0.64
1095	983	>100	1695	15741	+1.21
1125	1645	>100	1725	16124	+3.63
1155	2342	>100	1755	16076	+5.41
1185	3045	+96.43	1785	16588	+5.79
1215	4201	+90.42	1815	16830	+7.53
1245	5579	+83.64	1845	17185	
1275	7121	+74.44	1875	17682	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	10118	+69.76
735	0		1335	12269	+59.65
765	0		1365	14810	+47.35
795	0	>100	1395	16773	+33.46
825	0	>100	1425	18104	+20.13
855	0	>100	1455	18720	+11.98
885	1	+0.00	1485	19122	+6.50
915	0	>100	1515	19580	+4.77
945	0	>100	1545	19527	+2.48
975	2	>100	1575	19902	+0.81
1005	21	>100	1605	19690	+0.53
1035	132	>100	1635	19739	+0.23
1065	491	>100	1665	19765	+1.29
1095	1036	>100	1695	19932	+1.40
1125	1698	>100	1725	19976	+2.72
1155	2517	>100	1755	20051	+2.92
1185	3468	>100	1785	20523	+4.26
1215	4721	+91.83	1815	20542	+5.57
1245	6175	+85.13	1845	21035	
1275	8025	+76.82	1875	21528	



VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	8095	+71.16
735	0		1335	10052	+58.38
765	0		1365	11990	+47.92
795	0	>100	1395	13400	+35.01
825	0	>100	1425	14808	+23.58
855	0	>100	1455	15554	+13.45
885	0	>100	1485	15987	+6.39
915	0	>100	1515	15861	+3.45
945	0	>100	1545	16156	+2.18
975	1	>100	1575	16297	+1.72
1005	14	>100	1605	16297	+1.33
1035	130	>100	1635	16208	+1.62
1065	363	>100	1665	16526	+2.92
1095	785	>100	1695	16581	+3.94
1125	1357	>100	1725	16832	+5.91
1155	1996	>100	1755	17039	+8.68
1185	2735	+99.45	1785	17800	+11.53
1215	3785	+94.20	1815	18351	+11.46
1245	4857	+86.43	1845	19265	
1275	6571	+78.80	1875	19468	

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

66002-278

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):	2.367 E4
HALF-LIFE:	5.75 years
CALIBRATION DATE:	April 23, 2003 12:00 EST
TOTAL UNCERTAINTY*:	2.4%

*95% Confidence Level

Impurities: γ -impurities (other than decay products) <0.1%,
Ra-226 <0.1%

5.31628 grams 4M HCl solution with 100 μ g/g Ba carrier.

P O NUMBER 3219 RD, Item 1

SOURCE PREPARED BY:

M. Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED:

J.M. Muth 4-23-03



Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0553-A	Isotope:	Radium-228 SPIKE
Prepared By:	Lonnie Morris	Prepared By:	Lonnie Morris
Carrier Conc:	0.5M HCl	Prep Date:	04/25/2003
Reference Date:	04/23/2003	Verification Date:	04/27/2005
Ampoule Mass (g):	5.0235 g	Expiration Date:	04/27/2006
Uncertainty:	+/-	Primary Code:	0553-B
LogBook No:	RC-S-035-068	Dilution(mL):	1000 mL
		Mass of Parent(g):	30.535 g
		Density(g/mL):	
		Balance ID:	

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

$(\text{Mass of parent(g)}) * (\text{Parent Activity (dpm/mL)}) * (\text{conversion dpm to dpm}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (dpm/mL)}) * (\text{conversion dpm to dpm}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(30.535 \text{ g}) * (13419.8626 \text{ dpm/mL}) * (1 \text{ dpm/dpm}) / (1000 \text{ mL}) = 409.7755 \text{ dpm/mL}$
$(30.535 \text{ g}) * (13419.8626 \text{ dpm/mL}) * (1 \text{ dpm/dpm}) / (\text{g/mL}) / (1000 \text{ mL}) = \text{dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date

GEL Laboratories LLC
Version 1.0 9/18/2000

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: γ -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. Mty 10202



Standard Traceability Log Rad

Source Material Info		A Solution Material Info	
Parent Code:	0503	Isotope:	Radium-228
Prepared By:	Angela Johnson	Prepared By:	Angela Johnson
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
		Balance ID:	

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

$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (dps)}) * (\text{conversion dpm to dps}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (60 \text{ dpm/dps}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10355.2060 \text{ dpm/mL}$
$(4.4737 \text{ g}) * (19390 \text{ dps}) * (60 \text{ dpm/dps}) / (0.9992 \text{ g/mL}) / (5.02617 \text{ g} * 100 \text{ mL}) = 10363.0820 \text{ dpm/g}$

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	09/13/2008	09/13/2009

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 0503-B

D. Roy 9/13/2008		Standard	
Isotope	Detector CPM	NET CPM	Source DPM/mL
0503-B	1962.0000	1916.4000	206.8705773
0503-B	1983.2000	1937.6000	209.1590642
0503-B	1927.0000	1881.4000	203.092415
			206.3740189

Mean Value (Counting) = 206.3740189 dpm/mL **Pass**
 Stdev = 3.063655617 dpm/mL Rule 3 (Pass/Fail)

Certificate Value = 200.596 dpm/mL
 Lower Limit = 200.2467076 dpm/mL
 Upper Limit = 212.5013301 dpm/mL
 Rule 1 Pass/Fail **Pass**
 Two sigma = 6.127311233
 10 % of Mean = 20.63740189
 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 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 Gold for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 9/13/08 using source 0683-A (Ra-228). Calibration data is recorded in this logbook under Ra-228 0683-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

David D. Perry 9/16/08

Angela Johnson 9/17/08

5/19/16
28

16 SEP 2008 16:24

ID: TOTAL ACTIVITY

USER:11 COMMENT:GOLD

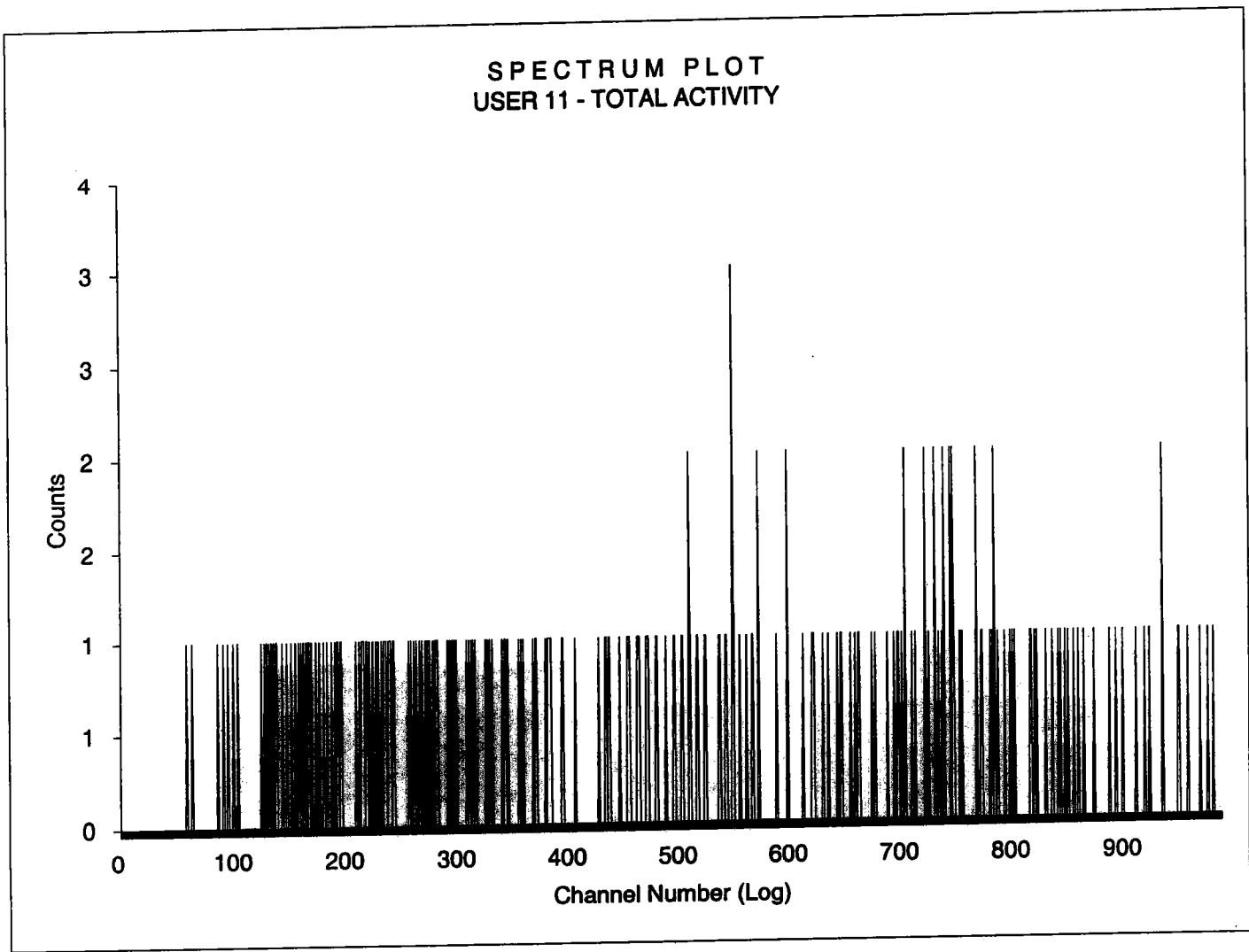
PRESET TIME : 5.00
 DATA CALC : CPM H# :YES SAMPLE REPEATS: 1 PRINTER : STD
 COUNT BLANK : NO IC# : NO REPLICATES : 1 RS232 :EDIT
 TWO PHASE : NO AQC : NO CYCLE REPEATS : 1 DISK : OFF
 SCINTILLATOR: LIQUID LUMEX:YES LOW SAMPLE REJ: 0
 LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

CHAN: 0.0 - 990.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0
 CHAN: 0.0 - 1000.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		
1	11-1	5.00	98.2	50.40	12.60	54.00	12.17	0.41	5.55
2	11-2	1.30	99.3	7802.31	1.99	7803.08	1.99	0.00	7.81
3	11-3	1.30	100.4	7782.31	1.99	7786.15	1.99	0.00	10.14
4	11-4	1.35	99.2	7581.48	1.98	7585.19	1.98	0.01	12.51
5	11-5	5.00	97.9	45.60	13.25	47.20	13.02	0.43	18.61
6	11-6	5.00	110.7	1962.00	2.02	1964.80	2.02	0.01	24.65
7	11-7	5.00	110.8	1983.20	2.01	1984.80	2.01	0.01	30.75
8	11-8	5.00	110.7	1927.00	2.04	1927.80	2.04	0.02	36.85

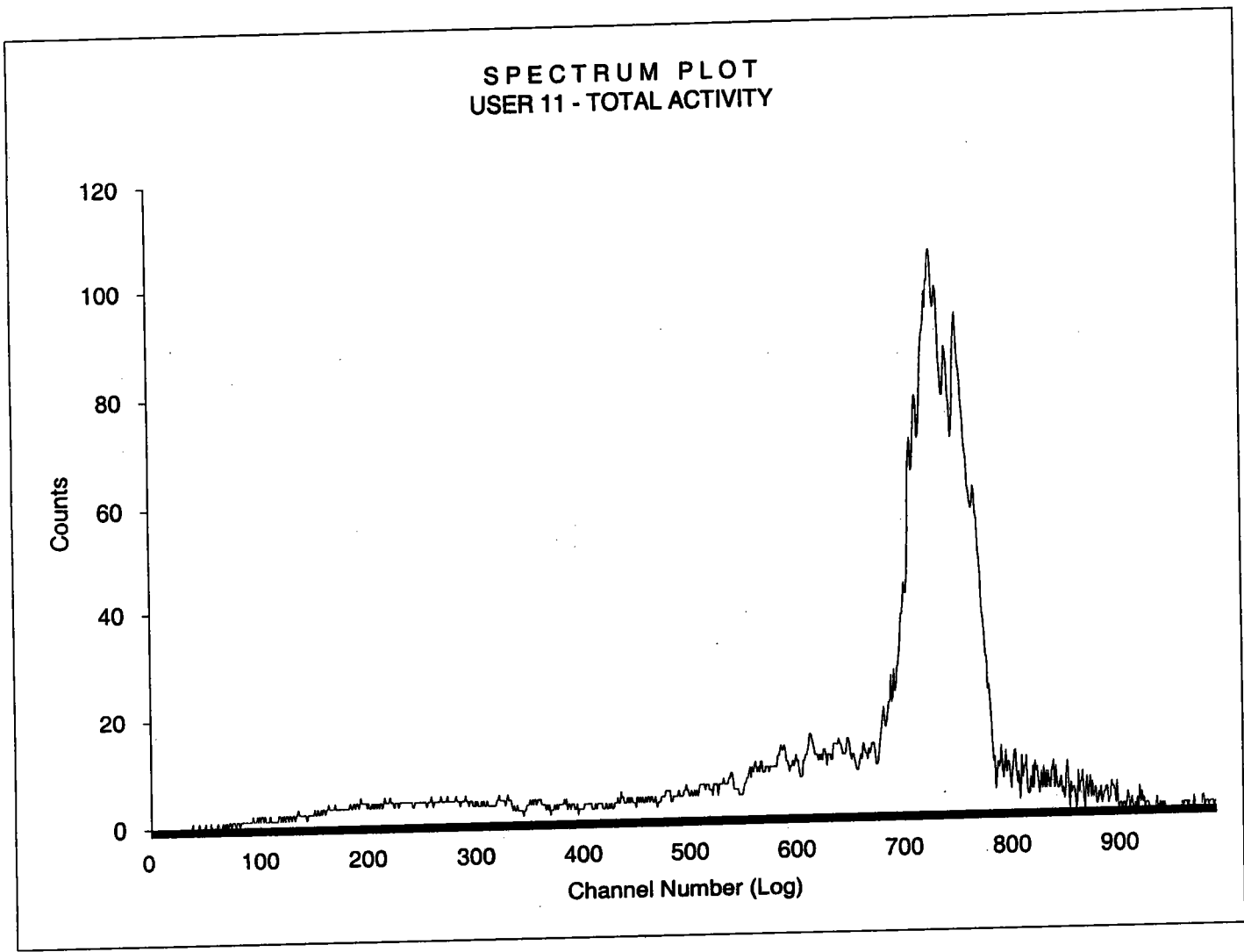
8/16/08
228

Sample Count Start Time: 16 Sep 2008 16:46:59
Data Capture Date: 9/16/2008 16:52:01
User Filename: S11091611-5A.WK1
U11091611-1A.WK1
Spectrum Type: Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 5 11-5 5.00
H#, Total Counts: 97.9 69
Start, End, X-Axis: 0 990 Channel Number



50/9/16
25

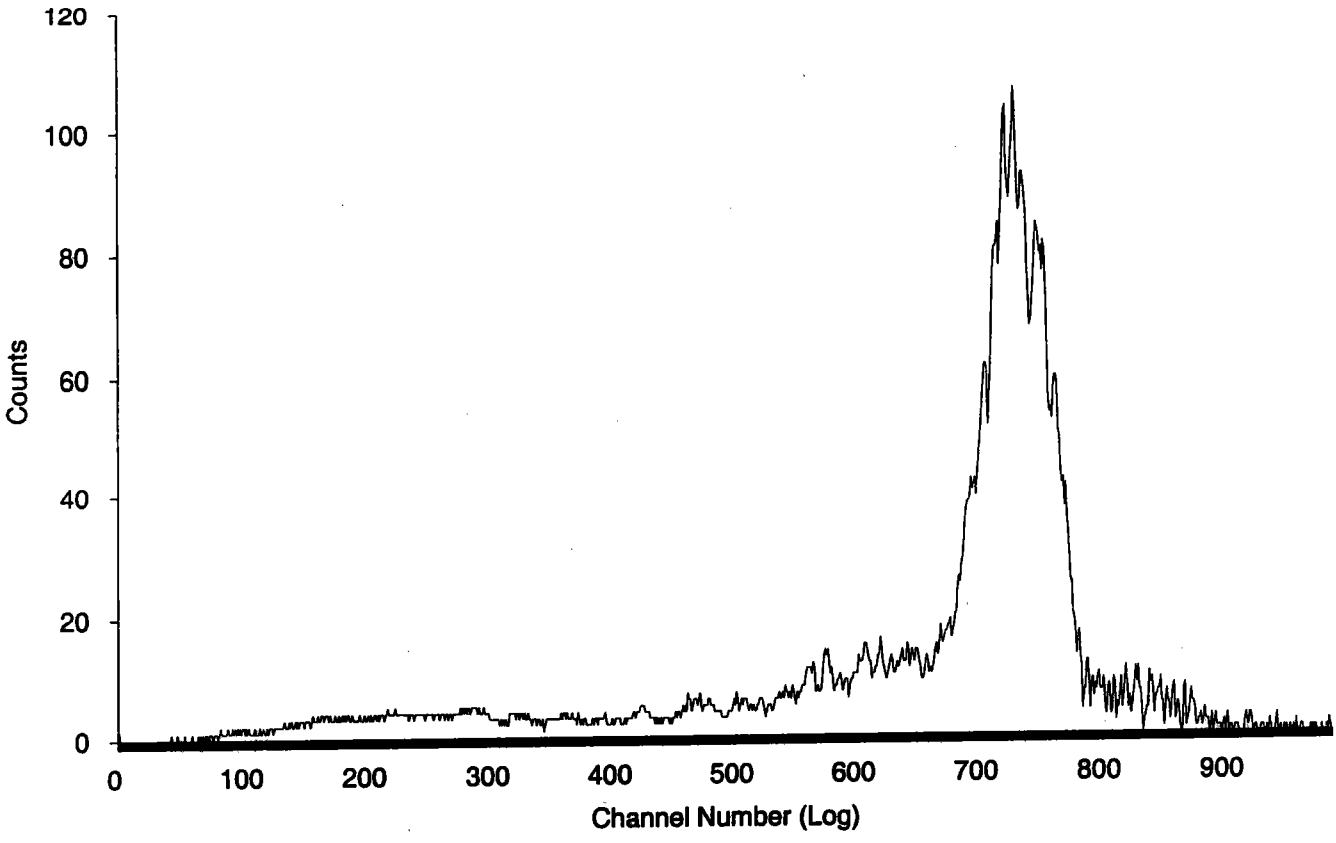
Sample Count Start Time: 16 Sep 2008 16:53:01
Data Capture Date: 9/16/2008 16:58:06
User Filename: S11091611-6A.WK1
U11091611-1A.WK1
Spectrum Type: Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 6 11-6 5.00
H#, Total Counts: 110.7 7666
Start, End, X-Axis: 0 990 Channel Number



8/16/08
SJS

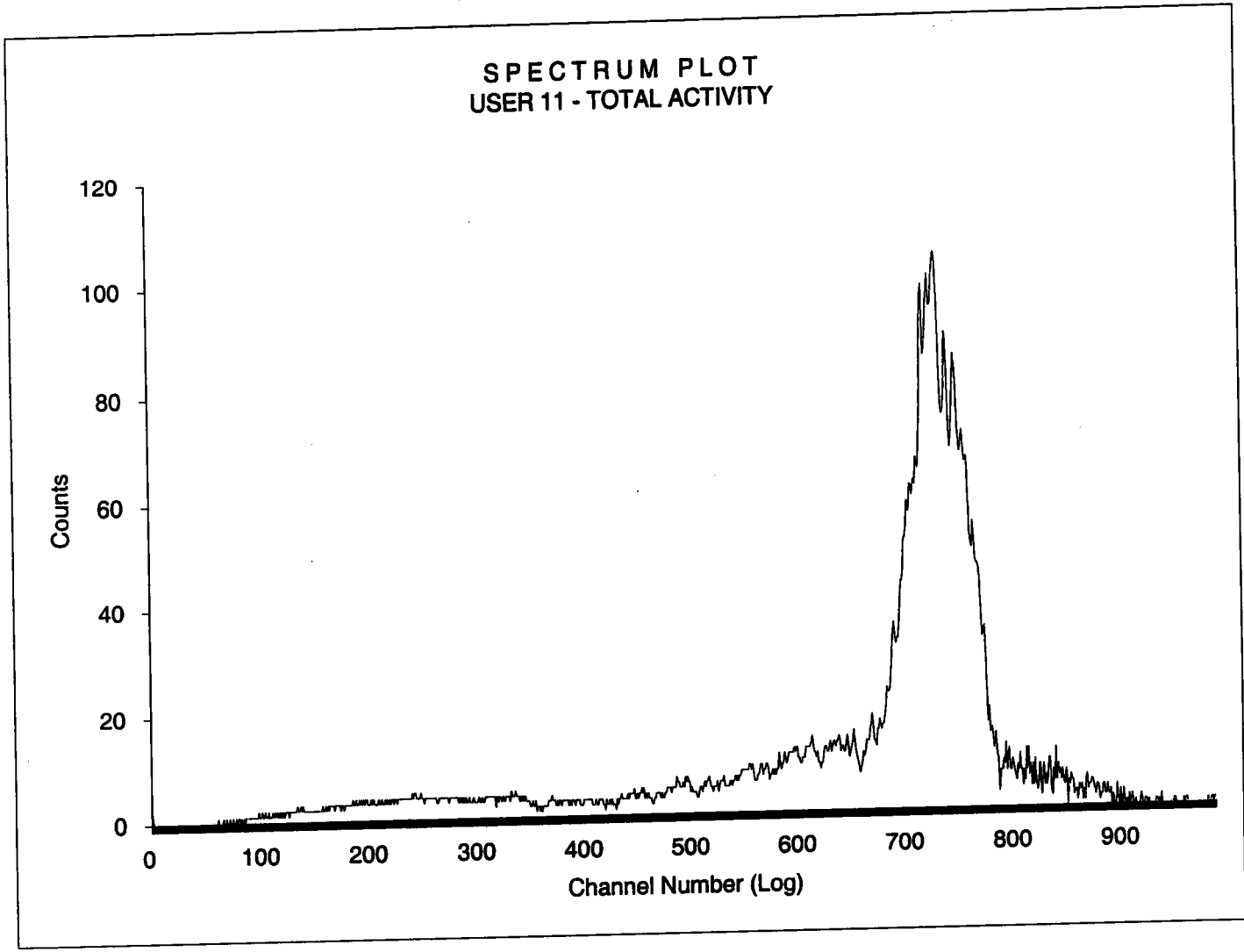
Sample Count Start Time: 16 Sep 2008 16:59:07
Data Capture Date: 9/16/2008 17:04:12
User Filename: S11091611-7A.WK1
U11091611-1A.WK1
Spectrum Type: Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 7 11-7 5.00
H#, Total Counts: 110.8 7726
Start, End, X-Axis: 0 990 Channel Number

SPECTRUM PLOT
USER 11 - TOTAL ACTIVITY



9/16/08
11-8

Sample Count Start Time: 16 Sep 2008 17:05:13
Data Capture Date: 9/16/2008 17:10:18
User Filename: S11091611-8A.WK1
U11091611-1A.WK1
Spectrum Type: Log Counts
User Number: 11
User Id: TOTAL ACTIVITY
User Comment: GOLD
Isotope Name: 14C
Scintillator: LIQUID
Sample, Rack-Pos, Time: 8 11-8 5.00
H#, Total Counts: 110.7 7557
Start, End, X-Axis: 0 990 Channel Number



Radium-228 Que Sheet

SR 6/30/09

Batch #: 881540 Analyst: DXM2 Internal Due Date: 07/03/2009
 Spike Isotope: Radium-228 Spike Code: NA Ac-228 Ingrow: 2025 6/30/09
 LCS Isotope: Radium-228 LCS Code: 0503-B Expiration Date: 9/13/09
 Tracer Isotope: Barium-133 Tracer Code: 0112-2 Expiration Date: 2/17/10
 Prep Date: 6/30/09 Initials: JRS Pipet ID: 1734212 Balance ID: NA
 Ac-228 Separation Date/Time: 7-2-09 0540 Witness: JRS 6/30/09

Sample ID	Client Description	Type	Hazard Code	Min CRDL	Matrix	Client	Collect Date & Time	Pos. #	Vol (mL)	Det #	Ba Yield (%)	Gamma Det. #
1201872112-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	1	20		100.83	↑
1201872113-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	2	20		108.20	
1201872114-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	3	20		114.22	
1201872115-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	4	20		120.58	WZAL
1201872116-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	5	20		105.84	
1201872117-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	6	20		102.70	
1201872118-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	7	20		112.82	
1201872119-1	LCS for batch 881540	LCS		3 pCi/L	GROUND WATI	QC ACCOUNT	16-JUN-09 03:56 PM	8	20		111.91	↓

JRS 7/2/09

SLC 7/2/09

Data Reviewed By:

Comments:

ASSAY 30-Jun-09 19:32:06

Protocol id 8 228_REC
Time limit 180
Count limit 50000
Isotope Ba-133
Protocol date 9-Apr-07 10:03:07
Run id. 54

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT	TIME
1	97	1	180	779	229.3	4.13			19:32:13
2	97	2	180	785	231.2	4.11	100.83		19:35:24
3	97	3	180	835	248.1	3.95	108.20		19:38:35
4	97	4	180	877	261.9	3.83	114.22		19:41:47
5	97	5	180	921	276.5	3.71	120.58		19:44:58
6	72	6	180	819	242.7	4	105.84		19:48:17
7	72	7	180	798	235.5	4.07	102.70		19:51:28
8	72	8	180	867	258.7	3.85	112.82		19:54:40
9	72	9	180	861	256.6	3.87	111.91		19:57:51

END OF ASSAY

[Handwritten signature]
7/2/09

ALPHA SPECTROSCOPY

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
 Fair 3/2/0

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 rule 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.

Robertson 02/20/03

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 (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 ⁻¹ at 22.8 °C [b]*		
Solution mass	Approximately 5.15 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L ⁻¹)	Mass Fraction (g·g ⁻¹)
	H ₂ O	54	0.94
	HNO ₃	1.0	0.06
	HCl	<0.001	<4 × 10 ⁻⁵
	²⁴⁴ Cm +3	5 × 10 ⁻¹¹	1 × 10 ⁻¹¹
Radiological Properties:			
Radionuclide	Curium-244		
Reference time	1230 EST, 1 February 1996 [c]		
Massic activity of the solution [d]	37.06 Bq·g ⁻¹ 24.12 Bq·g ⁻¹		
Relative expanded uncertainty (k=2)	0.68% [e] [f]		
Alpha-particle-emitting daughters	Plutonium-240: (0.22 ± 0.11) Bq·g ⁻¹ [b] [c]		
Alpha-particle-emitting impurities	Curium-243: (0.005 ± 0.004) Bq·g ⁻¹ [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		

37.06 x 2 2004

6

- [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 λ (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):	3.759 E3
HALF-LIFE:	74.6 years
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:

W.M. [Signature] 9-6-02

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 ⁽¹⁾ *
Solution mass	Approximately 5 grams
Solution composition	Neptunium-237 in 2 mol·L ⁻¹ nitric acid
Reference time	March 1992
Radioactivity concentration	97.0 Bq·g ⁻¹
Overall uncertainty	1.28 percent ⁽²⁾
Photon-emitting impurities	None detected ⁽³⁾
Alpha-particle-emitting impurities	None detected ⁽⁴⁾
Half life	(2.14 ± 0.11) × 10 ⁶ years ⁽⁵⁾
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

NOTES

- (1) Approximately five milliliters of solution. Ampoule specifications:
- | | |
|----------------------|------------------------|
| body diameter | 16.5 ± 0.5 mm |
| wall thickness | 0.60 ± 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 113
 Detector : 45-111B4
 Calibration Date/Time : 17-SEP-2009 15:08:33
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.774
CM-244	4320A	2/28/10	5795.020	5794.950

Energy/Channel Equation : see above
 Energy Calibration Zero : 2386.732
 Energy Calibration Slope : 5.009326
 Energy Calibration Quadratic : 2.6770448E-04
 Energy Calibration Range : 7797.000

Instrument : CHAMBER 114
 Detector : 78258
 Calibration Date/Time : 17-SEP-2009 15:08:44
 Calibration Source Id : AESS-007

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.722
NP-237	4341	2/28/10	4768.800	4768.568
CM-244	4320A	2/28/10	5795.020	5794.894

Energy/Channel Equation : see above
 Energy Calibration Zero : 2339.893
 Energy Calibration Slope : 4.993507
 Energy Calibration Quadratic : 2.3911390E-04
 Energy Calibration Range : 7704.000

Instrument : CHAMBER 115
 Detector : 45-132FF4
 Calibration Date/Time : 17-SEP-2009 15:08:54
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5794.872

Energy/Channel Equation : see above
 Energy Calibration Zero : 2361.262
 Energy Calibration Slope : 5.000648
 Energy Calibration Quadratic : 2.6309560E-04
 Energy Calibration Range : 7758.000

Instrument : CHAMBER 116
 Detector : 45-132FF2
 Calibration Date/Time : 17-SEP-2009 15:09:06
 Calibration Source Id : AESS-008
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2359.730
 Energy Calibration Slope : 4.985509
 Energy Calibration Quadratic : 2.6726534E-04
 Energy Calibration Range : 7745.000

Instrument : CHAMBER 117
 Detector : 33450
 Calibration Date/Time : 17-SEP-2009 15:09:16
 Calibration Source Id : AESS-003
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.491
 NP-237 4341 2/28/10 4768.800 4768.339
 CM-244 4320A 2/28/10 5795.020 5794.819
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2385.651
 Energy Calibration Slope : 4.970261
 Energy Calibration Quadratic : 2.8056922E-04
 Energy Calibration Range : 7769.000

Instrument : CHAMBER 118
 Detector : 75544
 Calibration Date/Time : 17-SEP-2009 15:09:28
 Calibration Source Id : AESS-009
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2346.819
 Energy Calibration Slope : 4.967181
 Energy Calibration Quadratic : 2.8012006E-04
 Energy Calibration Range : 7727.000

Instrument : CHAMBER 119
 Detector : 74429
 Calibration Date/Time : 2-FEB-2009 15:15:38
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3112.902
NP-237	4341	2/28/10	4768.800	4669.281
CM-244	4320A	2/28/10	5795.020	5706.875

Energy/Channel Equation : see above
 Energy Calibration Zero : 2437.949
 Energy Calibration Slope : 5.036866
 Energy Calibration Quadratic :
 Energy Calibration Range : 7596.000

Instrument : CHAMBER 120
 Detector : 74430
 Calibration Date/Time : 17-SEP-2009 15:09:40
 Calibration Source Id : AESS-010

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.710
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2314.428
 Energy Calibration Slope : 4.966161
 Energy Calibration Quadratic : 2.5640638E-04
 Energy Calibration Range : 7669.000

Instrument : CHAMBER 121
 Detector : 75545
 Calibration Date/Time : 17-SEP-2009 15:09:49
 Calibration Source Id : AESS-005

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2338.861
 Energy Calibration Slope : 4.942947
 Energy Calibration Quadratic : 2.9029930E-04
 Energy Calibration Range : 7705.000

Instrument : CHAMBER 122
 Detector : 75546
 Calibration Date/Time : 17-SEP-2009 15:09:59
 Calibration Source Id : AESS-011

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5794.807

Energy/Channel Equation : see above
 Energy Calibration Zero : 2335.373
 Energy Calibration Slope : 4.957498
 Energy Calibration Quadratic : 2.7508504E-04
 Energy Calibration Range : 7700.000

Instrument : CHAMBER 123
 Detector : 45-142V3
 Calibration Date/Time : 17-SEP-2009 15:10:08
 Calibration Source Id : AESS-006

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.112

Energy/Channel Equation : see above
 Energy Calibration Zero : 2378.713
 Energy Calibration Slope : 4.974333
 Energy Calibration Quadratic : 2.5756090E-04
 Energy Calibration Range : 7743.000

Instrument : CHAMBER 124
 Detector : 45-142V2
 Calibration Date/Time : 17-SEP-2009 15:10:17
 Calibration Source Id : AESS-012

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.748
NP-237	4341	2/28/10	4768.800	4768.555
CM-244	4320A	2/28/10	5795.020	5794.792

Energy/Channel Equation : see above
 Energy Calibration Zero : 2392.695
 Energy Calibration Slope : 5.013852
 Energy Calibration Quadratic : 2.6642549E-04
 Energy Calibration Range : 7806.000

Instrument : CHAMBER 125
 Detector : 75547
 Calibration Date/Time : 17-SEP-2009 15:10:26
 Calibration Source Id : AESS-013
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.724
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2346.597
 Energy Calibration Slope : 4.937986
 Energy Calibration Quadratic : 2.8199228E-04
 Energy Calibration Range : 7699.000

Instrument : CHAMBER 126
 Detector : 75548
 Calibration Date/Time : 17-SEP-2009 15:10:43
 Calibration Source Id : AESS-019
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.630
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2351.075
 Energy Calibration Slope : 5.037023
 Energy Calibration Quadratic : 1.9564512E-04
 Energy Calibration Range : 7714.000

Instrument : CHAMBER 127
 Detector : 78770
 Calibration Date/Time : 17-SEP-2009 15:10:52
 Calibration Source Id : AESS-014
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.015
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2339.960
 Energy Calibration Slope : 4.959275
 Energy Calibration Quadratic : 2.7139953E-04
 Energy Calibration Range : 7703.000

Instrument : CHAMBER 128
 Detector : 75549
 Calibration Date/Time : 17-SEP-2009 15:11:01
 Calibration Source Id : AESS-020

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.687
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2332.893
 Energy Calibration Slope : 5.000373
 Energy Calibration Quadratic : 2.3169331E-04
 Energy Calibration Range : 7696.000

Instrument : CHAMBER 129
 Detector : 76227
 Calibration Date/Time : 17-SEP-2009 15:11:11
 Calibration Source Id : AESS-015

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.775
NP-237	4341	2/28/10	4768.800	4768.764
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2349.422
 Energy Calibration Slope : 4.954164
 Energy Calibration Quadratic : 2.6775626E-04
 Energy Calibration Range : 7703.000

Instrument : CHAMBER 130
 Detector : 76228
 Calibration Date/Time : 17-SEP-2009 15:11:20
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.546
NP-237	4341	2/28/10	4768.800	4768.433
CM-244	4320A	2/28/10	5795.020	5794.777

Energy/Channel Equation : see above
 Energy Calibration Zero : 2341.580
 Energy Calibration Slope : 4.993090
 Energy Calibration Quadratic : 2.1626826E-04
 Energy Calibration Range : 7681.000

Instrument : CHAMBER 131
 Detector : 33448
 Calibration Date/Time : 17-SEP-2009 15:11:29
 Calibration Source Id : AESS-016
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.958
 NP-237 4341 2/28/10 4768.800 4768.209
 CM-244 4320A 2/28/10 5795.020 5794.532
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2411.500
 Energy Calibration Slope : 4.968785
 Energy Calibration Quadratic : 2.8956254E-04
 Energy Calibration Range : 7803.000

Instrument : CHAMBER 132
 Detector : 67579
 Calibration Date/Time : 17-SEP-2009 15:11:39
 Calibration Source Id : AESS-022
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.807
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2330.434
 Energy Calibration Slope : 5.033886
 Energy Calibration Quadratic : 2.1528341E-04
 Energy Calibration Range : 7711.000

Instrument : CHAMBER 133
 Detector : 76229
 Calibration Date/Time : 17-SEP-2009 15:11:48
 Calibration Source Id : AESS-017
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.772
 NP-237 4341 2/28/10 4768.800 4768.493
 CM-244 4320A 2/28/10 5795.020 5795.019
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2312.054
 Energy Calibration Slope : 4.909425
 Energy Calibration Quadratic : 2.5591909E-04
 Energy Calibration Range : 7608.000

Instrument : CHAMBER 134
 Detector : 76230
 Calibration Date/Time : 17-SEP-2009 15:11:57
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.690
CM-244	4320A	2/28/10	5795.020	5794.888

Energy/Channel Equation : see above
 Energy Calibration Zero : 2332.446
 Energy Calibration Slope : 4.965801
 Energy Calibration Quadratic : 2.4601555E-04
 Energy Calibration Range : 7675.000

Instrument : CHAMBER 135
 Detector : 64270
 Calibration Date/Time : 17-SEP-2009 15:12:06
 Calibration Source Id : AESS-018

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.697
NP-237	4341	2/28/10	4768.800	4768.428
CM-244	4320A	2/28/10	5795.020	5794.686

Energy/Channel Equation : see above
 Energy Calibration Zero : 2343.759
 Energy Calibration Slope : 4.952811
 Energy Calibration Quadratic : 2.7405450E-04
 Energy Calibration Range : 7703.000

Instrument : CHAMBER 136
 Detector : 68549
 Calibration Date/Time : 17-SEP-2009 15:12:16
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.402
NP-237	4341	2/28/10	4768.800	4769.943
CM-244	4320A	2/28/10	5795.020	5797.448

Energy/Channel Equation : see above
 Energy Calibration Zero : 2342.322
 Energy Calibration Slope : 5.020517
 Energy Calibration Quadratic : 2.2833873E-04
 Energy Calibration Range : 7723.000

Instrument : CHAMBER 137
 Detector : 64288
 Calibration Date/Time : 16-SEP-2009 12:25:39
 Calibration Source Id : AESS-025

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.831
NP-237	4341	2/28/10	4768.800	4768.466
CM-244	4320A	2/28/10	5795.020	5794.813

Energy/Channel Equation : see above
 Energy Calibration Zero : 2384.608
 Energy Calibration Slope : 5.017363
 Energy Calibration Quadratic : 3.1012692E-04
 Energy Calibration Range : 7848.000

Instrument : CHAMBER 138
 Detector : 65877
 Calibration Date/Time : 16-SEP-2009 12:25:51
 Calibration Source Id : AESS-031

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.721
NP-237	4341	2/28/10	4768.800	4768.624
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2381.507
 Energy Calibration Slope : 4.981775
 Energy Calibration Quadratic : 3.0701407E-04
 Energy Calibration Range : 7805.000

Instrument : CHAMBER 139
 Detector : 76231
 Calibration Date/Time : 16-SEP-2009 12:26:02
 Calibration Source Id : AESS-026

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.667
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2352.536
 Energy Calibration Slope : 4.942561
 Energy Calibration Quadratic : 2.9986945E-04
 Energy Calibration Range : 7728.000

Instrument : CHAMBER 140
 Detector : 78771
 Calibration Date/Time : 16-SEP-2009 12:26:12
 Calibration Source Id : AESS-032

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.880
NP-237	4341	2/28/10	4768.800	4768.746
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2344.410
 Energy Calibration Slope : 4.964199
 Energy Calibration Quadratic : 2.9030148E-04
 Energy Calibration Range : 7732.000

Instrument : CHAMBER 141
 Detector : 76232
 Calibration Date/Time : 16-SEP-2009 12:26:23
 Calibration Source Id : AESS-027

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.756
NP-237	4341	2/28/10	4768.800	4768.664
CM-244	4320A	2/28/10	5795.020	5794.921

Energy/Channel Equation : see above
 Energy Calibration Zero : 2359.530
 Energy Calibration Slope : 4.949186
 Energy Calibration Quadratic : 2.9451301E-04
 Energy Calibration Range : 7736.000

Instrument : CHAMBER 142
 Detector : 64261
 Calibration Date/Time : 16-SEP-2009 12:26:33
 Calibration Source Id : AESS-033

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.702
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2380.580
 Energy Calibration Slope : 4.968856
 Energy Calibration Quadratic : 3.0223309E-04
 Energy Calibration Range : 7786.000

Instrument : CHAMBER 143
 Detector : 65882
 Calibration Date/Time : 16-SEP-2009 12:26:43
 Calibration Source Id : AESS-028
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2353.411
 Energy Calibration Slope : 4.964171
 Energy Calibration Quadratic : 2.8231755E-04
 Energy Calibration Range : 7733.000

Instrument : CHAMBER 144
 Detector : 75551
 Calibration Date/Time : 16-SEP-2009 12:26:53
 Calibration Source Id : AESS-034
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.045
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2347.296
 Energy Calibration Slope : 4.959377
 Energy Calibration Quadratic : 2.8099009E-04
 Energy Calibration Range : 7720.000

Instrument : CHAMBER 145
 Detector : 72526
 Calibration Date/Time : 16-SEP-2009 12:27:03
 Calibration Source Id : AESS-029
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2354.857
 Energy Calibration Slope : 4.970427
 Energy Calibration Quadratic : 2.8643355E-04
 Energy Calibration Range : 7745.000

Instrument : CHAMBER 146
 Detector : 72527
 Calibration Date/Time : 16-SEP-2009 12:27:13
 Calibration Source Id : AESS-035
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.019
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2349.628
 Energy Calibration Slope : 4.953955
 Energy Calibration Quadratic : 2.6576858E-04
 Energy Calibration Range : 7701.000

Instrument : CHAMBER 147
 Detector : 75550
 Calibration Date/Time : 16-SEP-2009 12:27:23
 Calibration Source Id : AESS-030
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2346.748
 Energy Calibration Slope : 4.969914
 Energy Calibration Quadratic : 2.5925279E-04
 Energy Calibration Range : 7708.000

Instrument : CHAMBER 148
 Detector : 74429
 Calibration Date/Time : 16-SEP-2009 12:27:33
 Calibration Source Id : AESS-036
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2346.190
 Energy Calibration Slope : 4.957554
 Energy Calibration Quadratic : 2.8058770E-04
 Energy Calibration Range : 7717.000

Instrument : CHAMBER 149
 Detector : 33449
 Calibration Date/Time : 15-SEP-2009 13:29:50
 Calibration Source Id : AESS-037

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.962
CM-244	4320A	2/28/10	5795.020	5795.120

Energy/Channel Equation : see above
 Energy Calibration Zero : 2390.249
 Energy Calibration Slope : 4.945051
 Energy Calibration Quadratic : 3.1025134E-04
 Energy Calibration Range : 7779.000

Instrument : CHAMBER 150
 Detector : 75552
 Calibration Date/Time : 15-SEP-2009 13:30:04
 Calibration Source Id : AESS-043

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2355.846
 Energy Calibration Slope : 4.963627
 Energy Calibration Quadratic : 2.8320536E-04
 Energy Calibration Range : 7736.000

Instrument : CHAMBER 151
 Detector : 75556
 Calibration Date/Time : 15-SEP-2009 13:30:37
 Calibration Source Id : AESS-038

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.876
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2346.769
 Energy Calibration Slope : 4.917734
 Energy Calibration Quadratic : 2.9527576E-04
 Energy Calibration Range : 7692.000

Instrument : CHAMBER 152
 Detector : 76222
 Calibration Date/Time : 15-SEP-2009 13:30:48
 Calibration Source Id : AESS-044

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.772
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2342.471
 Energy Calibration Slope : 4.955277
 Energy Calibration Quadratic : 2.6035175E-04
 Energy Calibration Range : 7690.000

Instrument : CHAMBER 153
 Detector : 76223
 Calibration Date/Time : 15-SEP-2009 13:31:00
 Calibration Source Id : AESS-039

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.192
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2333.990
 Energy Calibration Slope : 4.951685
 Energy Calibration Quadratic : 2.7959119E-04
 Energy Calibration Range : 7698.000

Instrument : CHAMBER 154
 Detector : 76224
 Calibration Date/Time : 15-SEP-2009 13:31:26
 Calibration Source Id : AESS-045

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2342.016
 Energy Calibration Slope : 4.948280
 Energy Calibration Quadratic : 2.8570730E-04
 Energy Calibration Range : 7709.000

Instrument : CHAMBER 155
 Detector : 75553
 Calibration Date/Time : 15-SEP-2009 13:31:39
 Calibration Source Id : AESS-040

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.184
NP-237	4341	2/28/10	4768.800	4768.936
CM-244	4320A	2/28/10	5795.020	5795.140

Energy/Channel Equation : see above
 Energy Calibration Zero : 2366.281
 Energy Calibration Slope : 4.966718
 Energy Calibration Quadratic : 2.9833001E-04
 Energy Calibration Range : 7765.000

Instrument : CHAMBER 156
 Detector : 75554
 Calibration Date/Time : 15-SEP-2009 13:31:49
 Calibration Source Id : AESS-046

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3189.446
NP-237	4341	2/28/10	4768.800	5162.066
CM-244	4320A	2/28/10	5795.020	5800.248

Energy/Channel Equation : see above
 Energy Calibration Zero : 2363.858
 Energy Calibration Slope : 4.985206
 Energy Calibration Quadratic : 2.8685082E-04
 Energy Calibration Range : 7769.000

Instrument : CHAMBER 157
 Detector : 75555
 Calibration Date/Time : 15-SEP-2009 13:32:00
 Calibration Source Id : AESS-041

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2360.555
 Energy Calibration Slope : 4.963046
 Energy Calibration Quadratic : 2.9731516E-04
 Energy Calibration Range : 7754.000

Instrument : CHAMBER 158
 Detector : 33451
 Calibration Date/Time : 15-SEP-2009 13:32:11
 Calibration Source Id : AESS-047

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2391.673
 Energy Calibration Slope : 4.990663
 Energy Calibration Quadratic : 3.2096857E-04
 Energy Calibration Range : 7839.000

Instrument : CHAMBER 159
 Detector : 76225
 Calibration Date/Time : 15-SEP-2009 13:32:21
 Calibration Source Id : AESS-042

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.819
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2354.535
 Energy Calibration Slope : 4.988183
 Energy Calibration Quadratic : 2.8453415E-04
 Energy Calibration Range : 7761.000

Instrument : CHAMBER 160
 Detector : 76226
 Calibration Date/Time : 15-SEP-2009 13:32:31
 Calibration Source Id : AESS-048

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.745
CM-244	4320A	2/28/10	5795.020	5794.943

Energy/Channel Equation : see above
 Energy Calibration Zero : 2354.507
 Energy Calibration Slope : 5.015394
 Energy Calibration Quadratic : 2.5826940E-04
 Energy Calibration Range : 7761.000

Subsection 2: Background Calibration

Instrument : CHAMBER 113
 Detector : 45-111B4
 Background Analysis Date/Time : 13-SEP-2009 12:07:37
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.706	3302.190	1.000000	0.3000000	100.0000	95.00000
NP-237	4433.295	4905.578	9.000000	2.700000	33.33334	95.00000
CM-244	5531.363	5884.629	11.00000	3.300000	30.15113	95.00000

Instrument : CHAMBER 114
 Detector : 78258
 Background Analysis Date/Time : 13-SEP-2009 12:07:42
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.034	3302.376	1.000000	0.3000000	100.0000	95.00000
NP-237	4432.616	4901.658	1.000000	0.3000000	100.0000	95.00000
CM-244	5533.073	5883.287	3.000000	0.9000000	57.73503	95.00000

Instrument : CHAMBER 115
 Detector : 45-132FF4
 Background Analysis Date/Time : 13-SEP-2009 12:07:47
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.454	3300.485	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.893	4906.309	7.000000	2.100000	37.79645	95.00000
CM-244	5530.846	5883.358	10.00000	3.000000	31.62278	95.00000

Instrument : CHAMBER 116
 Detector : 45-132FF2
 Background Analysis Date/Time : 13-SEP-2009 12:07:52
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.147	3301.366	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4433.104	4903.545	7.000000	2.100000	37.79645	95.00000
CM-244	5532.219	5884.159	18.00000	5.400000	23.57022	95.00000

Instrument : CHAMBER 117
 Detector : 33450
 Background Analysis Date/Time : 13-SEP-2009 12:07:56
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.160	3299.532	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.233	4904.181	9.000000	2.700000	33.33334	95.00000
CM-244	5532.536	5884.461	14.00000	4.200000	26.72612	95.00000

Instrument : CHAMBER 118
 Detector : 75544
 Background Analysis Date/Time : 13-SEP-2009 12:08:02
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.246	3300.695	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.648	4905.687	4.000000	1.200000	50.00000	95.00000
CM-244	5534.149	5886.128	10.00000	3.000000	31.62278	95.00000

Instrument : CHAMBER 119
 Detector : 74429
 Background Analysis Date/Time : 13-SEP-2009 12:08:06
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.004	3299.253	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4432.548	4906.013	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5530.584	5883.165	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 120
 Detector : 74430
 Background Analysis Date/Time : 13-SEP-2009 12:08:12
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.533	3297.646	2.000000	0.6000000	70.71068	95.00000
NP-237	4435.084	4903.407	2.000000	0.6000000	70.71068	95.00000
CM-244	5534.300	5884.438	2.000000	0.6000000	70.71068	95.00000

Instrument : CHAMBER 121
 Detector : 75545
 Background Analysis Date/Time : 13-SEP-2009 12:08:17
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.369	3298.608	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.997	4903.847	3.000000	0.9000000	57.73503	95.00000
CM-244	5530.990	5882.362	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 122
 Detector : 75546
 Background Analysis Date/Time : 13-SEP-2009 12:08:22
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.526	3302.417	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.926	4903.828	13.00000	3.900000	27.73501	95.00000
CM-244	5530.663	5887.014	17.00000	5.100000	24.25356	95.00000

Instrument : CHAMBER 123
 Detector : 45-142V3
 Background Analysis Date/Time : 13-SEP-2009 12:08:27
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.415	3297.641	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.564	4904.117	4.000000	1.200000	50.00000	95.00000
CM-244	5535.344	5885.681	8.000000	2.400000	35.35534	95.00000

Instrument : CHAMBER 124
 Detector : 45-142V2
 Background Analysis Date/Time : 13-SEP-2009 12:08:33
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.039	3298.711	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.637	4902.902	5.000000	1.500000	44.72136	95.00000
CM-244	5534.267	5882.317	5.000000	1.500000	44.72136	95.00000

Instrument : CHAMBER 125
 Detector : 75547
 Background Analysis Date/Time : 13-SEP-2009 12:08:38
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.290	3300.040	2.000000	0.6000000	70.71068	95.00000
NP-237	4434.085	4901.751	2.000000	0.6000000	70.71068	95.00000
CM-244	5532.412	5882.738	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 126
 Detector : 75548
 Background Analysis Date/Time : 13-SEP-2009 12:08:44
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.846	3299.840	2.000000	0.6000000	70.71068	95.00000
NP-237	4433.552	4902.802	10.00000	3.000000	31.62278	95.00000
CM-244	5533.398	5882.628	5.000000	1.500000	44.72136	95.00000

Instrument : CHAMBER 127
 Detector : 78770
 Background Analysis Date/Time : 13-SEP-2009 12:08:49
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.252	3302.146	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.433	4903.142	2.000000	0.6000000	70.71068	95.00000
CM-244	5534.926	5885.739	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 128
 Detector : 75549
 Background Analysis Date/Time : 13-SEP-2009 12:08:54
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.918	3301.506	2.000000	0.6000000	70.71068	95.00000
NP-237	4437.567	4901.469	5.000000	1.500000	44.72136	95.00000
CM-244	5532.764	5882.821	1.000000	0.3000000	100.0000	95.00000

Instrument : CHAMBER 129
 Detector : 76227
 Background Analysis Date/Time : 13-SEP-2009 12:08:58
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.942	3300.379	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.988	4903.888	7.000000	2.100000	37.79645	95.00000
CM-244	5534.503	5884.627	4.000000	1.200000	50.00000	95.00000

Instrument : CHAMBER 130
 Detector : 76228
 Background Analysis Date/Time : 13-SEP-2009 12:09:04
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.288	3298.075	3.000000	0.9000000	57.73503	95.00000
NP-237	4435.444	4902.612	12.00000	3.600000	28.86751	95.00000
CM-244	5530.953	5884.486	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 131
 Detector : 33448
 Background Analysis Date/Time : 13-SEP-2009 12:09:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.775	3300.047	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.944	4905.225	5.000000	1.500000	44.72136	95.00000
CM-244	5534.242	5886.644	5.000000	1.500000	44.72136	95.00000

Instrument : CHAMBER 132
 Detector : 67579
 Background Analysis Date/Time : 13-SEP-2009 12:09:14
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.478	3299.760	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.728	4906.447	7.000000	2.100000	37.79645	95.00000
CM-244	5534.199	5884.992	3.000000	0.9000000	57.73503	95.00000

Instrument : CHAMBER 133
 Detector : 76229
 Background Analysis Date/Time : 13-SEP-2009 12:09:19
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.448	3299.164	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.532	4903.111	3.000000	0.9000000	57.73503	95.00000
CM-244	5532.731	5884.588	5.000000	1.500000	44.72136	95.00000

Instrument : CHAMBER 134
 Detector : 76230
 Background Analysis Date/Time : 13-SEP-2009 12:09:24
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.219	3300.010	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.624	4902.916	35.00000	10.50000	16.90309	95.00000
CM-244	5532.171	5886.589	7.000000	2.100000	37.79645	95.00000

Instrument : CHAMBER 135
 Detector : 64270
 Background Analysis Date/Time : 13-SEP-2009 12:09:28
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.256	3299.743	1.000000	0.3000000	100.0000	95.00000
NP-237	4436.015	4904.361	7.000000	2.100000	37.79645	95.00000
CM-244	5530.434	5886.345	10.00000	3.000000	31.62278	95.00000

Instrument : CHAMBER 136
 Detector : 68549
 Background Analysis Date/Time : 13-SEP-2009 12:09:33
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.690	3299.356	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4433.911	4904.417	19.00000	5.700000	22.94157	95.00000
CM-244	5532.210	5883.186	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 137
 Detector : 64288
 Background Analysis Date/Time : 13-SEP-2009 12:09:37
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.157	3297.781	3.000000	0.9000000	57.73503	95.00000
NP-237	4435.908	4901.616	4.000000	1.200000	50.00000	95.00000
CM-244	5533.626	5885.457	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 138
 Detector : 65877
 Background Analysis Date/Time : 13-SEP-2009 12:09:42
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.797	3298.359	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4433.795	4901.574	16.00000	4.800000	25.00000	95.00000
CM-244	5534.629	5884.088	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 139
 Detector : 76231
 Background Analysis Date/Time : 13-SEP-2009 12:09:46
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.097	3302.448	7.000000	2.100000	37.79645	95.00000
NP-237	4434.583	4904.027	9.000000	2.700000	33.33334	95.00000
CM-244	5532.194	5884.250	7.000000	2.100000	37.79645	95.00000

Instrument : CHAMBER 140
 Detector : 78771
 Background Analysis Date/Time : 13-SEP-2009 12:09:51
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.623	3298.088	3.000000	0.9000000	57.73503	95.00000
NP-237	4433.734	4904.340	8.000000	2.400000	35.35534	95.00000
CM-244	5533.806	5886.466	1.000000	0.3000000	100.0000	95.00000

Instrument : CHAMBER 141
 Detector : 76232
 Background Analysis Date/Time : 13-SEP-2009 12:09:56
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.803	3300.386	27.00000	8.100000	19.24501	95.00000
NP-237	4433.014	4902.508	26.00000	7.800000	19.61161	95.00000
CM-244	5530.609	5882.563	14.00000	4.200000	26.72612	95.00000

Instrument : CHAMBER 142
 Detector : 64261
 Background Analysis Date/Time : 13-SEP-2009 12:10:00
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.279	3300.003	3.000000	0.9000000	57.73503	95.00000
NP-237	4437.328	4903.684	13.00000	3.900000	27.73501	95.00000
CM-244	5534.720	5883.018	16.00000	4.800000	25.00000	95.00000

Instrument : CHAMBER 143
 Detector : 65882
 Background Analysis Date/Time : 13-SEP-2009 12:10:05
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.414	3301.724	9.000000	2.700000	33.33334	95.00000
NP-237	4436.178	4906.076	12.00000	3.600000	28.86751	95.00000
CM-244	5534.405	5886.338	8.000000	2.400000	35.35534	95.00000

Instrument : CHAMBER 144
 Detector : 75551
 Background Analysis Date/Time : 13-SEP-2009 12:10:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.731	3299.721	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4433.065	4902.473	11.00000	3.300000	30.15113	95.00000
CM-244	5535.430	5887.007	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 145
 Detector : 72526
 Background Analysis Date/Time : 13-SEP-2009 12:10:13
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.721	3299.421	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.677	4906.422	5.000000	1.500000	44.72136	95.00000
CM-244	5530.652	5883.277	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 146
 Detector : 72527
 Background Analysis Date/Time : 13-SEP-2009 12:10:17
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.088	3300.474	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.771	4903.488	6.000000	1.800000	40.82483	95.00000
CM-244	5533.810	5883.749	15.00000	4.500000	25.81989	95.00000

Instrument : CHAMBER 147
 Detector : 75550
 Background Analysis Date/Time : 13-SEP-2009 12:10:22
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.181	3300.391	5.000000	1.500000	44.72136	95.00000
NP-237	4433.176	4901.748	17.00000	5.100000	24.25356	95.00000
CM-244	5533.043	5883.438	7.000000	2.100000	37.79645	95.00000

Instrument : CHAMBER 148
 Detector : 74429
 Background Analysis Date/Time : 13-SEP-2009 12:10:27
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.384	3298.254	7.000000	2.100000	37.79645	95.00000
NP-237	4436.330	4905.591	5.000000	1.500000	44.72136	95.00000
CM-244	5533.038	5884.458	5.000000	1.500000	44.72136	95.00000

Instrument : CHAMBER 149
 Detector : 33449
 Background Analysis Date/Time : 13-SEP-2009 12:10:31
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.123	3300.525	5.000000	1.500000	44.72136	95.00000
NP-237	4433.492	4903.565	7.000000	2.100000	37.79645	95.00000
CM-244	5532.823	5885.611	8.000000	2.400000	35.35534	95.00000

Instrument : CHAMBER 150
 Detector : 75552
 Background Analysis Date/Time : 13-SEP-2009 12:10:36
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.795	3299.018	4.000000	1.200000	50.00000	95.00000
NP-237	4433.345	4903.215	6.000000	1.800000	40.82483	95.00000
CM-244	5531.531	5883.467	8.000000	2.400000	35.35534	95.00000

Instrument : CHAMBER 151
 Detector : 75556
 Background Analysis Date/Time : 13-SEP-2009 12:10:41
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.065	3301.859	4.000000	1.200000	50.00000	95.00000
NP-237	4433.320	4905.527	3.000000	0.9000000	57.73503	95.00000
CM-244	5530.408	5885.912	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 152
 Detector : 76222
 Background Analysis Date/Time : 13-SEP-2009 12:10:46
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.057	3298.427	2.000000	0.6000000	70.71068	95.00000
NP-237	4433.408	4906.063	4.000000	1.200000	50.00000	95.00000
CM-244	5530.659	5885.565	7.000000	2.100000	37.79645	95.00000

Instrument : CHAMBER 153
 Detector : 76223
 Background Analysis Date/Time : 13-SEP-2009 12:10:51
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.484	3300.080	6.000000	1.800000	40.82483	95.00000
NP-237	4437.092	4905.894	12.000000	3.600000	28.86751	95.00000
CM-244	5532.708	5883.766	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 154
 Detector : 76224
 Background Analysis Date/Time : 13-SEP-2009 12:10:55
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.121	3297.561	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.389	4903.288	1.000000	0.300000	100.0000	95.00000
CM-244	5530.382	5887.013	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 155
 Detector : 75553
 Background Analysis Date/Time : 13-SEP-2009 12:11:00
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.782	3300.412	1.000000	0.300000	100.0000	95.00000
NP-237	4437.153	4903.167	6.000000	1.800000	40.82483	95.00000
CM-244	5533.649	5886.970	10.000000	3.000000	31.62278	95.00000

Instrument : CHAMBER 156
 Detector : 75554
 Background Analysis Date/Time : 13-SEP-2009 12:11:05
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.491	3301.031	8.000000	2.400000	35.35534	95.00000
NP-237	4435.135	4901.821	15.000000	4.500000	25.81989	95.00000
CM-244	5532.917	5886.438	4.000000	1.200000	50.00000	95.00000

Instrument : CHAMBER 157
 Detector : 75555
 Background Analysis Date/Time : 13-SEP-2009 12:11:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.619	3299.042	2.000000	0.6000000	70.71068	95.00000
NP-237	4434.971	4905.888	4.000000	1.200000	50.00000	95.00000
CM-244	5530.610	5883.642	4.000000	1.200000	50.00000	95.00000

Instrument : CHAMBER 158
 Detector : 33451
 Background Analysis Date/Time : 13-SEP-2009 12:11:14
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.107	3300.392	6.000000	1.800000	40.82483	95.00000
NP-237	4434.046	4903.553	8.000000	2.400000	35.35534	95.00000
CM-244	5533.886	5884.921	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 159
 Detector : 76225
 Background Analysis Date/Time : 13-SEP-2009 12:11:19
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.563	3302.370	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4437.078	4903.944	7.000000	2.100000	37.79645	95.00000
CM-244	5535.224	5883.443	3.000000	0.9000000	57.73503	95.00000

Instrument : CHAMBER 160
 Detector : 76226
 Background Analysis Date/Time : 13-SEP-2009 12:11:23
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.547	3301.417	2.000000	0.6000000	70.71068	95.00000
NP-237	4433.329	4905.681	15.00000	4.500000	25.81989	95.00000
CM-244	5531.326	5884.399	7.000000	2.100000	37.79645	95.00000

Subsection 3: Efficiency Calibration

Instrument : CHAMBER 113
 Detector : 45-111B4
 Standard ID : AESS-001
 Standard Reference Date : 20-FEB-2008 09:54:53
 Calibration Analysis Date/Time : 17-SEP-2009 07:22:34
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:08:33
 Average Efficiency : 0.2493664
 Average Efficiency Error : 6.8753385E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.6698	28-FEB-2010	2991.706	3302.190	15200.00	0.2463616	1.0587734E-02	67.05293
NP-237	171.0024	28-FEB-2010	4433.295	4905.578	12844.00	0.2503200	1.2709484E-02	68.82748
CM-244	158.1060	28-FEB-2010	5531.363	5884.629	11294.00	0.2528249	1.2863314E-02	69.69121

Instrument : CHAMBER 114
 Detector : 78258
 Standard ID : AESS-007
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 17-SEP-2009 07:22:42
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:08:44
 Average Efficiency : 0.2549134
 Average Efficiency Error : 7.0137801E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.7342	28-FEB-2010	2988.034	3302.376	15415.00	0.2522229	1.0836960E-02	47.39108
NP-237	205.0260	28-FEB-2010	4432.616	4901.658	15874.00	0.2580762	1.3065383E-02	60.20995
CM-244	199.6806	28-FEB-2010	5533.073	5883.287	14411.00	0.2556491	1.2958678E-02	47.07045

Instrument : CHAMBER 115
 Detector : 45-132FF4
 Standard ID : AESS-002
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 17-SEP-2009 07:22:48
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:08:54
 Average Efficiency : 0.2607451
 Average Efficiency Error : 7.1741594E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1144	28-FEB-2010	2990.454	3300.485	15582.00	0.2633568	1.1313187E-02	59.06649
NP-237	200.4990	28-FEB-2010	4434.893	4906.309	15600.00	0.2593181	1.3131134E-02	67.99342
CM-244	196.5558	28-FEB-2010	5530.846	5883.358	14362.00	0.2586598	1.3111949E-02	66.45667

Instrument : CHAMBER 116
 Detector : 45-132FF2
 Standard ID : AESS-008
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 17-SEP-2009 07:22:54
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:06
 Average Efficiency : 0.2642209
 Average Efficiency Error : 7.2657783E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.0418	28-FEB-2010	2992.147	3301.366	15928.00	0.2614976	1.1229084E-02	58.63169
NP-237	209.2716	28-FEB-2010	4433.104	4903.545	16584.00	0.2641209	1.3364404E-02	67.71608
CM-244	199.6488	28-FEB-2010	5532.219	5884.159	15127.00	0.2683146	1.3592103E-02	63.73655

Instrument : CHAMBER 117
 Detector : 33450
 Standard ID : AESS-003
 Standard Reference Date : 15-FEB-2008 13:12:27
 Calibration Analysis Date/Time : 17-SEP-2009 07:22:59
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:16
 Average Efficiency : 0.2539330
 Average Efficiency Error : 6.9886767E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.9740	28-FEB-2010	2991.160	3299.532	15096.00	0.2515729	1.0813041E-02	72.94815
NP-237	203.2080	28-FEB-2010	4434.233	4904.181	15475.00	0.2538008	1.2853066E-02	68.32410
CM-244	197.2236	28-FEB-2010	5532.536	5884.461	14342.00	0.2575089	1.3053890E-02	66.10744

Instrument : CHAMBER 118
 Detector : 75544
 Standard ID : AESS-009
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:06
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:28
 Average Efficiency : 0.2562016
 Average Efficiency Error : 7.0496872E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.3736	28-FEB-2010	2992.246	3300.695	15488.00	0.2575730	1.1065898E-02	48.08698
NP-237	204.0192	28-FEB-2010	4435.648	4905.687	15474.00	0.2527997	1.2802343E-02	51.47660
CM-244	197.2128	28-FEB-2010	5534.149	5886.128	14364.00	0.2578340	1.3070064E-02	51.26923

Instrument : CHAMBER 119
 Detector : 74429
 Standard ID : AESS-004
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:12
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 2-FEB-2009 15:15:38
 Average Efficiency : 0.2936279
 Average Efficiency Error : 1.2630888E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.1222	28-FEB-2010	2992.004	3299.253	14305.00	0.2936279	1.2630888E-02	65.91196
NP-237	204.2586	28-FEB-2010	4432.548	4906.013	0.0000000E+00	0.0000000E+00	0.0000000E+00	0.0000000E+00
CM-244	198.8100	28-FEB-2010	5530.584	5883.165	0.0000000E+00	0.0000000E+00	0.0000000E+00	0.0000000E+00

Instrument : CHAMBER 120
 Detector : 74430
 Standard ID : AESS-010
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:19
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:40
 Average Efficiency : 0.2607642
 Average Efficiency Error : 7.1738800E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.0008	28-FEB-2010	2989.533	3297.646	15530.00	0.2600539	1.1171980E-02	51.65312
NP-237	202.9926	28-FEB-2010	4435.084	4903.407	15890.00	0.2609192	1.3209156E-02	58.42772
CM-244	196.2330	28-FEB-2010	5534.300	5884.438	14492.00	0.2616084	1.3259737E-02	53.52900

Instrument : CHAMBER 121
 Detector : 75545
 Standard ID : AESS-005
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:26
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:49
 Average Efficiency : 0.2451099
 Average Efficiency Error : 6.7468924E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.7452	28-FEB-2010	2991.369	3298.608	14990.00	0.2406018	1.0342800E-02	48.96049
NP-237	209.5938	28-FEB-2010	4434.997	4903.847	15464.00	0.2459217	1.2454119E-02	62.72179
CM-244	202.7478	28-FEB-2010	5530.990	5882.362	14372.00	0.2510890	1.2728020E-02	56.59771

Instrument : CHAMBER 122
 Detector : 75546
 Standard ID : AESS-011
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:33
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:09:59
 Average Efficiency : 0.2511206
 Average Efficiency Error : 6.9071823E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	212.8284	28-FEB-2010	2989.526	3302.417	15637.00	0.2485339	1.0675786E-02	50.53908
NP-237	214.4868	28-FEB-2010	4434.926	4903.828	16238.00	0.2522937	1.2769196E-02	58.55772
CM-244	208.4184	28-FEB-2010	5530.663	5887.014	14930.00	0.2536814	1.2853005E-02	49.92265

Instrument : CHAMBER 123
 Detector : 45-142V3
 Standard ID : AESS-006
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:40
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:10:08
 Average Efficiency : 0.2596290
 Average Efficiency Error : 7.1429913E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6952	28-FEB-2010	2989.415	3297.641	15549.00	0.2582173	1.1092825E-02	65.43886
NP-237	204.7038	28-FEB-2010	4435.564	4904.117	15822.00	0.2576210	1.3042886E-02	67.03554
CM-244	195.0060	28-FEB-2010	5535.344	5885.681	14523.00	0.2637896	1.3369960E-02	69.14881

Instrument : CHAMBER 124
 Detector : 45-142V2
 Standard ID : AESS-012
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:47
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:10:17
 Average Efficiency : 0.2573053
 Average Efficiency Error : 7.0782932E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.2200	28-FEB-2010	2988.039	3298.711	15522.00	0.2546119	1.0938271E-02	67.72288
NP-237	205.8930	28-FEB-2010	4435.637	4902.902	16168.00	0.2617298	1.3247415E-02	71.34655
CM-244	203.1954	28-FEB-2010	5534.267	5882.317	14734.00	0.2568478	1.3015599E-02	72.65984

Instrument : CHAMBER 125
 Detector : 75547
 Standard ID : AESS-013
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 17-SEP-2009 07:23:54
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:10:26
 Average Efficiency : 0.2582467
 Average Efficiency Error : 7.1037016E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6544	28-FEB-2010	2988.290	3300.040	15695.00	0.2606819	1.1196902E-02	49.19345
NP-237	210.2526	28-FEB-2010	4434.085	4901.751	16039.00	0.2542721	1.2871174E-02	57.62983
CM-244	201.9108	28-FEB-2010	5532.412	5882.738	14766.00	0.2590335	1.3125989E-02	51.15325

Instrument : CHAMBER 126
 Detector : 75548
 Standard ID : AESS-019
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:03
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:10:43
 Average Efficiency : 0.2528757
 Average Efficiency Error : 6.9609745E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.6468	28-FEB-2010	2988.846	3299.840	14908.00	0.2463797	1.0592219E-02	51.21568
NP-237	202.9140	28-FEB-2010	4433.552	4902.802	15759.00	0.2588291	1.3104737E-02	56.16846
CM-244	199.3140	28-FEB-2010	5533.398	5882.628	14458.00	0.2568124	1.3017087E-02	52.26496

Instrument : CHAMBER 127
 Detector : 78770
 Standard ID : AESS-014
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:09
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:10:52
 Average Efficiency : 0.2474696
 Average Efficiency Error : 6.8085734E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	214.7088	28-FEB-2010	2989.252	3302.146	15471.00	0.2437071	1.0470388E-02	48.16148
NP-237	211.7160	28-FEB-2010	4434.433	4903.142	15929.00	0.2507826	1.2695607E-02	58.40179
CM-244	207.3882	28-FEB-2010	5534.926	5885.739	14624.00	0.2496737	1.2653272E-02	52.79491

Instrument : CHAMBER 128
 Detector : 75549
 Standard ID : AESS-020
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:16
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:01
 Average Efficiency : 0.2534627
 Average Efficiency Error : 6.9763800E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	205.5870	28-FEB-2010	2991.918	3301.506	15064.00	0.2478480	1.0653354E-02	48.72564
NP-237	203.4984	28-FEB-2010	4437.567	4901.469	15680.00	0.2568161	1.3003596E-02	61.32889
CM-244	197.1096	28-FEB-2010	5532.764	5882.821	14387.00	0.2585539	1.3106194E-02	50.94863

Instrument : CHAMBER 129
 Detector : 76227
 Standard ID : AESS-015
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:21
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:11
 Average Efficiency : 0.2630869
 Average Efficiency Error : 7.2373999E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0270	28-FEB-2010	2987.942	3300.379	15637.00	0.2592492	1.1136069E-02	51.14825
NP-237	200.6460	28-FEB-2010	4435.988	4903.888	16067.00	0.2668864	1.3509459E-02	61.16219
CM-244	195.9270	28-FEB-2010	5534.503	5884.627	14653.00	0.2649124	1.3425237E-02	55.22726

Instrument : CHAMBER 130
 Detector : 76228
 Standard ID : AESS-021
 Standard Reference Date : 19-FEB-2008 15:31:52
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:25
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:20
 Average Efficiency : 0.2483380
 Average Efficiency Error : 6.8345908E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.3608	28-FEB-2010	2989.288	3298.075	15085.00	0.2448552	1.0524444E-02	49.62173
NP-237	210.1548	28-FEB-2010	4435.444	4902.612	15873.00	0.2517098	1.2743165E-02	56.97301
CM-244	200.7390	28-FEB-2010	5530.953	5884.486	14177.00	0.2500546	1.2677893E-02	51.59090

Instrument : CHAMBER 131
 Detector : 33448
 Standard ID : AESS-016
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:30
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:29
 Average Efficiency : 0.2501664
 Average Efficiency Error : 6.8896543E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0534	28-FEB-2010	2991.775	3300.047	14580.00	0.2416933	1.0394993E-02	94.70427
NP-237	199.3962	28-FEB-2010	4434.944	4905.225	15408.00	0.2575527	1.3043756E-02	97.00230
CM-244	198.6402	28-FEB-2010	5534.242	5886.644	14360.00	0.2560634	1.2980316E-02	84.26888

Instrument : CHAMBER 132
 Detector : 67579
 Standard ID : AESS-022
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:36
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:39
 Average Efficiency : 0.2502582
 Average Efficiency Error : 6.8874490E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	209.6724	28-FEB-2010	2988.478	3299.760	15157.00	0.2445240	1.0509308E-02	47.44493
NP-237	206.8830	28-FEB-2010	4435.728	4906.447	15902.00	0.2561820	1.2969248E-02	59.39411
CM-244	203.0208	28-FEB-2010	5534.199	5884.992	14501.00	0.2530044	1.2823543E-02	54.36437

Instrument : CHAMBER 133
 Detector : 76229
 Standard ID : AESS-017
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:41
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:48
 Average Efficiency : 0.2438080
 Average Efficiency Error : 6.7106839E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.0798	28-FEB-2010	2989.448	3299.164	15021.00	0.2418610	1.0396539E-02	54.98614
NP-237	208.5846	28-FEB-2010	4434.532	4903.111	15484.00	0.2474312	1.2530360E-02	61.05153
CM-244	205.5828	28-FEB-2010	5532.731	5884.588	14106.00	0.2430393	1.2323108E-02	54.34287

Instrument : CHAMBER 134
 Detector : 76230
 Standard ID : AESS-023
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:46
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:11:57
 Average Efficiency : 0.2444534
 Average Efficiency Error : 6.7299884E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	207.4764	28-FEB-2010	2992.219	3300.010	14779.00	0.2409492	1.0360401E-02	46.56962
NP-237	207.4998	28-FEB-2010	4435.624	4902.916	15337.00	0.2462044	1.2469973E-02	55.22544
CM-244	199.8804	28-FEB-2010	5532.171	5886.589	13986.00	0.2478311	1.2567575E-02	48.04740

Instrument : CHAMBER 135
 Detector : 64270
 Standard ID : AESS-018
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:53
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:12:06
 Average Efficiency : 0.2526507
 Average Efficiency Error : 6.9530043E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.1856	28-FEB-2010	2992.256	3299.743	15152.00	0.2534960	1.0894979E-02	56.63107
NP-237	208.8990	28-FEB-2010	4436.015	4904.361	15645.00	0.2496088	1.2639027E-02	67.14091
CM-244	198.1458	28-FEB-2010	5530.434	5886.345	14246.00	0.2546374	1.2909472E-02	60.82066

Instrument : CHAMBER 136
 Detector : 68549
 Standard ID : AESS-024
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 17-SEP-2009 07:24:58
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 17-SEP-2009 15:12:16
 Average Efficiency : 0.2485794
 Average Efficiency Error : 6.8427753E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.5218	28-FEB-2010	2988.690	3299.356	14903.00	0.2476970	1.0648914E-02	56.69555
NP-237	205.6662	28-FEB-2010	4433.911	4904.417	15511.00	0.2513022	1.2726229E-02	83.91869
CM-244	198.3060	28-FEB-2010	5532.210	5883.186	13838.00	0.2471603	1.2535414E-02	66.08641

Instrument : CHAMBER 137
 Detector : 64288
 Standard ID : AESS-025
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:27
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:25:39
 Average Efficiency : 0.2528386
 Average Efficiency Error : 6.9739525E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.5670	28-FEB-2010	2991.157	3297.781	14785.00	0.2557061	1.0994853E-02	66.23147
NP-237	167.9916	28-FEB-2010	4435.908	4901.616	12861.00	0.2551677	1.2955310E-02	79.15361
CM-244	157.2432	28-FEB-2010	5533.626	5885.457	10964.00	0.2468996	1.2568292E-02	71.74486

Instrument : CHAMBER 138
 Detector : 65877
 Standard ID : AESS-031
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:32
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:25:51
 Average Efficiency : 0.2560047
 Average Efficiency Error : 7.0619099E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.6650	28-FEB-2010	2988.797	3298.359	14674.00	0.2562743	1.1020770E-02	57.98399
NP-237	162.9186	28-FEB-2010	4433.795	4901.574	12708.00	0.2599091	1.3198568E-02	62.78986
CM-244	153.1968	28-FEB-2010	5534.629	5884.088	10904.00	0.2519520	1.2826724E-02	60.43048

Instrument : CHAMBER 139
 Detector : 76231
 Standard ID : AESS-026
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:37
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:02
 Average Efficiency : 0.2492872
 Average Efficiency Error : 7.3094456E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.5072	28-FEB-2010	2990.097	3302.448	14822.00	0.2512630	1.2732445E-02	51.16375
NP-237	168.0294	28-FEB-2010	4434.583	4904.027	12686.00	0.2516089	1.2777339E-02	56.09538
CM-244	160.5822	28-FEB-2010	5532.194	5884.250	11118.00	0.2451757	1.2477465E-02	51.18374

Instrument : CHAMBER 140
 Detector : 78771
 Standard ID : AESS-032
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:42
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:12
 Average Efficiency : 0.2526492
 Average Efficiency Error : 6.9693825E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.2364	28-FEB-2010	2989.623	3298.088	14531.00	0.2517187	1.0826853E-02	46.10829
NP-237	165.9822	28-FEB-2010	4433.734	4904.340	12513.00	0.2512438	1.2761484E-02	54.69451
CM-244	153.7938	28-FEB-2010	5533.806	5886.466	11096.00	0.2554495	1.3000681E-02	47.20534

Instrument : CHAMBER 141
 Detector : 76232
 Standard ID : AESS-027
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:47
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:23
 Average Efficiency : 0.2547455
 Average Efficiency Error : 7.4726613E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.4238	28-FEB-2010	2987.803	3300.386	14389.00	0.2514884	1.2749074E-02	55.20152
NP-237	161.6154	28-FEB-2010	4433.014	4902.508	12459.00	0.2568074	1.3045154E-02	58.63324
CM-244	148.1754	28-FEB-2010	5530.609	5882.563	10718.00	0.2560930	1.3041621E-02	54.14653

Instrument : CHAMBER 142
 Detector : 64261
 Standard ID : AESS-033
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:52
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:33
 Average Efficiency : 0.2603842
 Average Efficiency Error : 7.1830968E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.4158	28-FEB-2010	2991.279	3300.003	14554.00	0.2558129	1.1002630E-02	53.68588
NP-237	161.7816	28-FEB-2010	4437.328	4903.684	12703.00	0.2616512	1.3287083E-02	68.08553
CM-244	147.2670	28-FEB-2010	5534.720	5883.018	11068.00	0.2659896	1.3537915E-02	58.50507

Instrument : CHAMBER 143
 Detector : 65882
 Standard ID : AESS-028
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:03:57
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:43
 Average Efficiency : 0.2438162
 Average Efficiency Error : 7.1521485E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.6542	28-FEB-2010	2988.414	3301.724	14343.00	0.2429526	1.2316748E-02	45.85791
NP-237	168.1992	28-FEB-2010	4436.178	4906.076	12465.00	0.2469572	1.2544546E-02	55.41743
CM-244	156.7614	28-FEB-2010	5534.405	5886.338	10698.00	0.2416553	1.2306704E-02	49.25873

Instrument : CHAMBER 144
 Detector : 75551
 Standard ID : AESS-034
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:04:02
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:26:53
 Average Efficiency : 0.2432079
 Average Efficiency Error : 6.7124735E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.5488	28-FEB-2010	2991.731	3299.721	14149.00	0.2386236	1.0268736E-02	49.42162
NP-237	167.2962	28-FEB-2010	4433.065	4902.473	12333.00	0.2456661	1.2481030E-02	52.43185
CM-244	154.4388	28-FEB-2010	5535.430	5887.007	10803.00	0.2476103	1.2607776E-02	51.75169

Instrument : CHAMBER 145
 Detector : 72526
 Standard ID : AESS-029
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:04:08
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:27:03
 Average Efficiency : 0.2494907
 Average Efficiency Error : 7.3155323E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.5742	28-FEB-2010	2990.721	3299.421	14837.00	0.2489683	1.2615955E-02	50.61446
NP-237	169.7700	28-FEB-2010	4435.677	4906.422	12664.00	0.2486207	1.2625882E-02	55.75652
CM-244	154.8234	28-FEB-2010	5530.652	5883.277	10970.00	0.2509164	1.2772597E-02	53.06380

Instrument : CHAMBER 146
 Detector : 72527
 Standard ID : AESS-035
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:04:13
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:27:13
 Average Efficiency : 0.2521794
 Average Efficiency Error : 6.9540716E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.6666	28-FEB-2010	2988.088	3300.474	14792.00	0.2518262	1.0827903E-02	50.57500
NP-237	168.2934	28-FEB-2010	4435.771	4903.488	12795.00	0.2533910	1.2866129E-02	58.62805
CM-244	158.8128	28-FEB-2010	5533.810	5883.749	11284.00	0.2514743	1.2794847E-02	52.59344

Instrument : CHAMBER 147
 Detector : 75550
 Standard ID : AESS-030
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 16-SEP-2009 07:04:19
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:27:23
 Average Efficiency : 0.2462009
 Average Efficiency Error : 7.2221002E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.9792	28-FEB-2010	2992.181	3300.391	14151.00	0.2405333	1.2196311E-02	44.26603
NP-237	166.3758	28-FEB-2010	4433.176	4901.748	12552.00	0.2513769	1.2767726E-02	56.17089
CM-244	157.1856	28-FEB-2010	5533.043	5883.438	10973.00	0.2472064	1.2583700E-02	52.54537

Instrument : CHAMBER 148
 Detector : 74429
 Standard ID : AESS-036
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 16-SEP-2009 07:04:24
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 16-SEP-2009 12:27:33
 Average Efficiency : 0.2474463
 Average Efficiency Error : 6.8263425E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.3204	28-FEB-2010	2990.384	3298.254	14523.00	0.2439571	1.0493157E-02	54.37553
NP-237	167.4312	28-FEB-2010	4436.330	4905.591	12624.00	0.2512974	1.2762434E-02	58.03280
CM-244	156.4188	28-FEB-2010	5533.038	5884.458	10990.00	0.2487361	1.2661190E-02	52.85587

Instrument : CHAMBER 149
 Detector : 33449
 Standard ID : AESS-037
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:20
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:29:50
 Average Efficiency : 0.2442746
 Average Efficiency Error : 6.7418939E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7372	28-FEB-2010	2988.123	3300.525	14041.00	0.2401365	1.0335403E-02	63.60672
NP-237	167.1294	28-FEB-2010	4433.492	4903.565	12391.00	0.2470920	1.2552506E-02	63.37567
CM-244	154.7664	28-FEB-2010	5532.823	5885.611	10826.00	0.2475891	1.2606204E-02	58.70196

Instrument : CHAMBER 150
 Detector : 75552
 Standard ID : AESS-043
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:25
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:30:04
 Average Efficiency : 0.2497773
 Average Efficiency Error : 6.8896711E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7708	28-FEB-2010	2990.795	3299.018	14579.00	0.2492991	1.0722128E-02	50.95595
NP-237	168.7422	28-FEB-2010	4433.345	4903.215	12583.00	0.2485292	1.2622490E-02	60.02569
CM-244	156.3252	28-FEB-2010	5531.531	5883.467	11119.00	0.2517459	1.2811826E-02	53.55379

Instrument : CHAMBER 151
 Detector : 75556
 Standard ID : AESS-038
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:30
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:30:37
 Average Efficiency : 0.2445973
 Average Efficiency Error : 6.7483815E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1408	28-FEB-2010	2991.065	3301.859	14594.00	0.2466028	1.0605961E-02	51.54713
NP-237	170.0886	28-FEB-2010	4433.320	4905.527	12551.00	0.2459524	1.2492075E-02	61.04260
CM-244	157.7460	28-FEB-2010	5530.408	5885.912	10724.00	0.2406166	1.2253285E-02	55.41215

Instrument : CHAMBER 152
 Detector : 76222
 Standard ID : AESS-044
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:36
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:30:48
 Average Efficiency : 0.2467650
 Average Efficiency Error : 6.8100104E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4510	28-FEB-2010	2991.057	3298.427	14281.00	0.2483825	1.0686823E-02	51.43459
NP-237	166.6248	28-FEB-2010	4433.408	4906.063	12493.00	0.2498989	1.2693445E-02	55.87722
CM-244	155.8290	28-FEB-2010	5530.659	5885.565	10640.00	0.2416724	1.2308771E-02	51.92970

Instrument : CHAMBER 153
 Detector : 76223
 Standard ID : AESS-039
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:41
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:31:00
 Average Efficiency : 0.2530614
 Average Efficiency Error : 6.9837277E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.2418	28-FEB-2010	2992.484	3300.080	14284.00	0.2512709	1.0811096E-02	45.25198
NP-237	159.1506	28-FEB-2010	4437.092	4905.894	12330.00	0.2581708	1.3116390E-02	53.88176
CM-244	151.7142	28-FEB-2010	5532.708	5883.766	10746.00	0.2507173	1.2767147E-02	50.96059

Instrument : CHAMBER 154
 Detector : 76224
 Standard ID : AESS-045
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:46
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:31:26
 Average Efficiency : 0.2566059
 Average Efficiency Error : 7.0827994E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	186.9936	28-FEB-2010	2990.121	3297.561	14209.00	0.2569968	1.1058494E-02	47.64388
NP-237	160.8066	28-FEB-2010	4434.389	4903.288	12086.00	0.2505226	1.2731740E-02	51.56582
CM-244	145.8384	28-FEB-2010	5530.382	5887.013	10826.00	0.2627504	1.3378122E-02	46.75677

Instrument : CHAMBER 155
 Detector : 75553
 Standard ID : AESS-040
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:52
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:31:39
 Average Efficiency : 0.2586447
 Average Efficiency Error : 7.1315672E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4828	28-FEB-2010	2991.782	3300.412	14971.00	0.2603490	1.1191908E-02	52.31090
NP-237	166.8174	28-FEB-2010	4437.153	4903.167	12889.00	0.2575112	1.3073887E-02	61.10300
CM-244	155.0100	28-FEB-2010	5533.649	5886.970	11275.00	0.2574479	1.3098875E-02	53.76326

Instrument : CHAMBER 156
 Detector : 75554
 Standard ID : AESS-046
 Standard Reference Date : 19-FEB-2008 19:35:48
 Calibration Analysis Date/Time : 15-SEP-2009 07:17:57
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:31:49
 Average Efficiency : 0.2458351
 Average Efficiency Error : 6.7870235E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.7474	28-FEB-2010	2991.491	3301.031	12844.31	0.2400144	1.0333307E-02	49.77089
NP-237	164.6658	28-FEB-2010	4435.135	4901.821	97.08801	0.2506796	1.2734897E-02	61.19961
CM-244	151.3824	28-FEB-2010	5532.917	5886.438	10151.71	0.0000000E+00	0.0000000E+00	52.61485

Instrument : CHAMBER 157
 Detector : 75555
 Standard ID : AESS-041
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:18:03
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:32:00
 Average Efficiency : 0.2474201
 Average Efficiency Error : 6.8232059E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.9034	28-FEB-2010	2990.619	3299.042	14777.00	0.2450977	1.0538791E-02	51.15771
NP-237	171.2268	28-FEB-2010	4434.971	4905.888	12804.00	0.2492367	1.2655036E-02	55.90152
CM-244	159.5796	28-FEB-2010	5530.610	5883.642	11223.00	0.2489554	1.2667720E-02	51.75545

Instrument : CHAMBER 158
 Detector : 33451
 Standard ID : AESS-047
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 15-SEP-2009 07:18:08
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:32:11
 Average Efficiency : 0.2493795
 Average Efficiency Error : 6.8797250E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.4804	28-FEB-2010	2990.107	3300.392	14422.00	0.2469665	1.0623971E-02	68.44221
NP-237	168.3948	28-FEB-2010	4434.046	4903.553	12588.00	0.2491289	1.2652891E-02	70.67268
CM-244	154.6032	28-FEB-2010	5533.886	5884.921	11059.00	0.2531897	1.2886493E-02	68.82631

Instrument : CHAMBER 159
 Detector : 76225
 Standard ID : AESS-042
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 15-SEP-2009 07:18:13
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:32:21
 Average Efficiency : 0.2508302
 Average Efficiency Error : 6.9238753E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	188.7090	28-FEB-2010	2987.563	3302.370	14009.00	0.2510785	1.0806765E-02	45.91304
NP-237	159.6558	28-FEB-2010	4437.078	4903.944	12079.00	0.2521446	1.2814357E-02	56.71059
CM-244	150.5208	28-FEB-2010	5535.224	5883.443	10596.00	0.2491983	1.2692972E-02	51.46926

Instrument : CHAMBER 160
 Detector : 76226
 Standard ID : AESS-048
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 15-SEP-2009 07:18:19
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 15-SEP-2009 13:32:31
 Average Efficiency : 0.2441046
 Average Efficiency Error : 6.7402101E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	191.8350	28-FEB-2010	2990.547	3301.417	13828.00	0.2437831	1.0495425E-02	76.67180
NP-237	161.5530	28-FEB-2010	4433.329	4905.681	11940.00	0.2462660	1.2518029E-02	87.79373
CM-244	151.1856	28-FEB-2010	5531.326	5884.399	10356.00	0.2424449	1.2354254E-02	77.67188

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 161
 Detector : 70321
 Calibration Date/Time : 21-SEP-2009 14:45:33
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.798
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2376.675
 Energy Calibration Slope : 4.903314
 Energy Calibration Quadratic : 3.3071014E-04
 Energy Calibration Range : 7744.000

Instrument : CHAMBER 162
 Detector : 70323
 Calibration Date/Time : 21-SEP-2009 14:45:43
 Calibration Source Id : AESS-007

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2372.249
 Energy Calibration Slope : 4.921350
 Energy Calibration Quadratic : 3.0858925E-04
 Energy Calibration Range : 7735.000

Instrument : CHAMBER 163
 Detector : 70324
 Calibration Date/Time : 21-SEP-2009 14:46:06
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2383.315
 Energy Calibration Slope : 4.921310
 Energy Calibration Quadratic : 3.3110939E-04
 Energy Calibration Range : 7770.000

Instrument : CHAMBER 164
 Detector : 70325
 Calibration Date/Time : 21-SEP-2009 14:46:16
 Calibration Source Id : AESS-008
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2381.492
 Energy Calibration Slope : 4.935361
 Energy Calibration Quadratic : 3.1875577E-04
 Energy Calibration Range : 7770.000

Instrument : CHAMBER 165
 Detector : 72544
 Calibration Date/Time : 21-SEP-2009 14:46:29
 Calibration Source Id : AESS-003
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2386.890
 Energy Calibration Slope : 4.958474
 Energy Calibration Quadratic : 2.9448030E-04
 Energy Calibration Range : 7773.000

Instrument : CHAMBER 166
 Detector : 74545
 Calibration Date/Time : 21-SEP-2009 14:47:27
 Calibration Source Id : AESS-009
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2376.522
 Energy Calibration Slope : 4.921530
 Energy Calibration Quadratic : 3.3686910E-04
 Energy Calibration Range : 7769.000

Instrument : CHAMBER 167
 Detector : 72546
 Calibration Date/Time : 21-SEP-2009 14:48:04
 Calibration Source Id : AESS-004

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2378.613
 Energy Calibration Slope : 4.924971
 Energy Calibration Quadratic : 3.2533024E-04
 Energy Calibration Range : 7763.000

Instrument : CHAMBER 168
 Detector : 72547
 Calibration Date/Time : 21-SEP-2009 14:48:25
 Calibration Source Id : AESS-010

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2381.283
 Energy Calibration Slope : 4.946027
 Energy Calibration Quadratic : 3.0436489E-04
 Energy Calibration Range : 7765.000

Instrument : CHAMBER 169
 Detector : 72548
 Calibration Date/Time : 21-SEP-2009 14:48:47
 Calibration Source Id : AESS-005

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.001
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2384.302
 Energy Calibration Slope : 4.926007
 Energy Calibration Quadratic : 3.2111545E-04
 Energy Calibration Range : 7765.000

Instrument : CHAMBER 170
 Detector : 72549
 Calibration Date/Time : 21-SEP-2009 14:49:16
 Calibration Source Id : AESS-011
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2384.736
 Energy Calibration Slope : 4.931669
 Energy Calibration Quadratic : 3.3333997E-04
 Energy Calibration Range : 7784.000

Instrument : CHAMBER 171
 Detector : 78260
 Calibration Date/Time : 21-SEP-2009 14:49:40
 Calibration Source Id : AESS-006
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.120
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2375.901
 Energy Calibration Slope : 4.923372
 Energy Calibration Quadratic : 3.1892414E-04
 Energy Calibration Range : 7752.000

Instrument : CHAMBER 172
 Detector : 78772
 Calibration Date/Time : 21-SEP-2009 14:49:54
 Calibration Source Id : AESS-012
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2374.003
 Energy Calibration Slope : 4.928030
 Energy Calibration Quadratic : 3.2592146E-04
 Energy Calibration Range : 7762.000

Instrument : CHAMBER 173
 Detector : 74431
 Calibration Date/Time : 21-SEP-2009 14:50:04
 Calibration Source Id : AESS-013
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2368.870
 Energy Calibration Slope : 4.977422
 Energy Calibration Quadratic : 2.7764533E-04
 Energy Calibration Range : 7757.000

Instrument : CHAMBER 174
 Detector : 74432
 Calibration Date/Time : 21-SEP-2009 14:50:13
 Calibration Source Id : AESS-019
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2361.911
 Energy Calibration Slope : 5.039232
 Energy Calibration Quadratic : 2.0001861E-04
 Energy Calibration Range : 7732.000

Instrument : CHAMBER 175
 Detector : 74433
 Calibration Date/Time : 21-SEP-2009 14:50:24
 Calibration Source Id : AESS-014
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.019
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2364.263
 Energy Calibration Slope : 4.969145
 Energy Calibration Quadratic : 2.8674255E-04
 Energy Calibration Range : 7753.000

Instrument : CHAMBER 176
 Detector : 74434
 Calibration Date/Time : 21-SEP-2009 14:50:36
 Calibration Source Id : AESS-020

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2359.390
 Energy Calibration Slope : 5.025916
 Energy Calibration Quadratic : 2.3010977E-04
 Energy Calibration Range : 7747.000

Instrument : CHAMBER 177
 Detector : 74435
 Calibration Date/Time : 21-SEP-2009 14:50:46
 Calibration Source Id : AESS-015

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2363.896
 Energy Calibration Slope : 4.971116
 Energy Calibration Quadratic : 2.8296176E-04
 Energy Calibration Range : 7751.000

Instrument : CHAMBER 178
 Detector : 74436
 Calibration Date/Time : 21-SEP-2009 14:50:57
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2357.960
 Energy Calibration Slope : 4.995038
 Energy Calibration Quadratic : 2.5281982E-04
 Energy Calibration Range : 7738.000

Instrument : CHAMBER 179
 Detector : 74437
 Calibration Date/Time : 21-SEP-2009 14:51:07
 Calibration Source Id : AESS-016

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2362.475
 Energy Calibration Slope : 4.962544
 Energy Calibration Quadratic : 2.9229760E-04
 Energy Calibration Range : 7751.000

Instrument : CHAMBER 180
 Detector : 74438
 Calibration Date/Time : 21-SEP-2009 14:51:16
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2357.168
 Energy Calibration Slope : 5.024229
 Energy Calibration Quadratic : 2.2182068E-04
 Energy Calibration Range : 7735.000

Instrument : CHAMBER 181
 Detector : 74439
 Calibration Date/Time : 21-SEP-2009 14:51:26
 Calibration Source Id : AESS-017

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2361.833
 Energy Calibration Slope : 4.977290
 Energy Calibration Quadratic : 2.7170058E-04
 Energy Calibration Range : 7743.000

Instrument : CHAMBER 182
 Detector : 74440
 Calibration Date/Time : 21-SEP-2009 14:51:42
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.675
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2351.365
 Energy Calibration Slope : 5.006705
 Energy Calibration Quadratic : 2.3110739E-04
 Energy Calibration Range : 7721.000

Instrument : CHAMBER 183
 Detector : 74441
 Calibration Date/Time : 21-SEP-2009 14:51:54
 Calibration Source Id : AESS-018

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2365.306
 Energy Calibration Slope : 4.968304
 Energy Calibration Quadratic : 2.8504903E-04
 Energy Calibration Range : 7752.000

Instrument : CHAMBER 184
 Detector : 74442
 Calibration Date/Time : 21-SEP-2009 14:52:17
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2357.045
 Energy Calibration Slope : 5.026213
 Energy Calibration Quadratic : 2.2053947E-04
 Energy Calibration Range : 7735.000

Instrument : CHAMBER 185
 Detector : 68615
 Calibration Date/Time : 21-SEP-2009 14:52:26
 Calibration Source Id : AESS-025
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2363.439
 Energy Calibration Slope : 4.921171
 Energy Calibration Quadratic : 2.9912216E-04
 Energy Calibration Range : 7716.000

Instrument : CHAMBER 186
 Detector : 68616
 Calibration Date/Time : 21-SEP-2009 14:52:35
 Calibration Source Id : AESS-031
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2362.841
 Energy Calibration Slope : 4.954493
 Energy Calibration Quadratic : 2.7342763E-04
 Energy Calibration Range : 7723.000

Instrument : CHAMBER 187
 Detector : 68620
 Calibration Date/Time : 21-SEP-2009 14:52:45
 Calibration Source Id : AESS-026
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2375.999
 Energy Calibration Slope : 4.962572
 Energy Calibration Quadratic : 3.0889659E-04
 Energy Calibration Range : 7782.000

Instrument : CHAMBER 188
 Detector : 68621
 Calibration Date/Time : 21-SEP-2009 14:57:16
 Calibration Source Id : AESS-032

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2372.483
 Energy Calibration Slope : 4.952415
 Energy Calibration Quadratic : 3.0726261E-04
 Energy Calibration Range : 7766.000

Instrument : CHAMBER 189
 Detector : 68622
 Calibration Date/Time : 21-SEP-2009 14:53:03
 Calibration Source Id : AESS-027

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2360.450
 Energy Calibration Slope : 4.959707
 Energy Calibration Quadratic : 2.6419348E-04
 Energy Calibration Range : 7716.000

Instrument : CHAMBER 190
 Detector : 68623
 Calibration Date/Time : 21-SEP-2009 14:53:12
 Calibration Source Id : AESS-033

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2356.994
 Energy Calibration Slope : 4.952447
 Energy Calibration Quadratic : 2.7996209E-04
 Energy Calibration Range : 7722.000

Instrument : CHAMBER 191
 Detector : 68624
 Calibration Date/Time : 21-SEP-2009 14:53:21
 Calibration Source Id : AESS-028

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2375.194
 Energy Calibration Slope : 4.970817
 Energy Calibration Quadratic : 3.1015038E-04
 Energy Calibration Range : 7791.000

Instrument : CHAMBER 192
 Detector : 74430
 Calibration Date/Time : 21-SEP-2009 14:53:32
 Calibration Source Id : AESS-034

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2368.673
 Energy Calibration Slope : 4.975485
 Energy Calibration Quadratic : 3.0052042E-04
 Energy Calibration Range : 7779.000

Instrument : CHAMBER 193
 Detector : 68627
 Calibration Date/Time : 21-SEP-2009 14:53:41
 Calibration Source Id : AESS-029

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2366.307
 Energy Calibration Slope : 4.926867
 Energy Calibration Quadratic : 3.0849138E-04
 Energy Calibration Range : 7735.000

Instrument : CHAMBER 194
 Detector : 68635
 Calibration Date/Time : 21-SEP-2009 14:53:50
 Calibration Source Id : AESS-035

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.001
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2363.136
 Energy Calibration Slope : 4.944215
 Energy Calibration Quadratic : 2.9438949E-04
 Energy Calibration Range : 7735.000

Instrument : CHAMBER 195
 Detector : 68636
 Calibration Date/Time : 21-SEP-2009 14:53:59
 Calibration Source Id : AESS-030

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2364.925
 Energy Calibration Slope : 4.962630
 Energy Calibration Quadratic : 2.7555652E-04
 Energy Calibration Range : 7736.000

Instrument : CHAMBER 196
 Detector : 68637
 Calibration Date/Time : 21-SEP-2009 14:54:08
 Calibration Source Id : AESS-036

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.798
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2367.455
 Energy Calibration Slope : 4.936808
 Energy Calibration Quadratic : 2.9704699E-04
 Energy Calibration Range : 7734.000

Instrument : CHAMBER 197
 Detector : 78894
 Calibration Date/Time : 21-SEP-2009 14:42:21
 Calibration Source Id : AESS-037

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2367.634
 Energy Calibration Slope : 4.977818
 Energy Calibration Quadratic : 2.8380580E-04
 Energy Calibration Range : 7763.000

Instrument : CHAMBER 198
 Detector : 78895
 Calibration Date/Time : 21-SEP-2009 14:54:28
 Calibration Source Id : AESS-043

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2368.665
 Energy Calibration Slope : 4.961154
 Energy Calibration Quadratic : 2.8666743E-04
 Energy Calibration Range : 7749.000

Instrument : CHAMBER 199
 Detector : 78896
 Calibration Date/Time : 21-SEP-2009 14:54:37
 Calibration Source Id : AESS-038

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2369.988
 Energy Calibration Slope : 4.975040
 Energy Calibration Quadratic : 2.8448759E-04
 Energy Calibration Range : 7763.000

Instrument : CHAMBER 200
 Detector : 78900
 Calibration Date/Time : 21-SEP-2009 14:54:46
 Calibration Source Id : AESS-044
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2368.958
 Energy Calibration Slope : 4.954888
 Energy Calibration Quadratic : 3.0549458E-04
 Energy Calibration Range : 7763.000

Instrument : CHAMBER 201
 Detector : 78902
 Calibration Date/Time : 21-SEP-2009 14:54:55
 Calibration Source Id : AESS-039
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2361.867
 Energy Calibration Slope : 4.974102
 Energy Calibration Quadratic : 2.9147897E-04
 Energy Calibration Range : 7761.000

Instrument : CHAMBER 202
 Detector : 78903
 Calibration Date/Time : 21-SEP-2009 14:55:05
 Calibration Source Id : AESS-045
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2354.252
 Energy Calibration Slope : 4.963346
 Energy Calibration Quadratic : 2.8640320E-04
 Energy Calibration Range : 7737.000

Instrument : CHAMBER 203
 Detector : 78905
 Calibration Date/Time : 21-SEP-2009 14:55:14
 Calibration Source Id : AESS-040

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2365.971
 Energy Calibration Slope : 4.956215
 Energy Calibration Quadratic : 3.0086067E-04
 Energy Calibration Range : 7757.000

Instrument : CHAMBER 204
 Detector : 78907
 Calibration Date/Time : 21-SEP-2009 14:55:23
 Calibration Source Id : AESS-046

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.019

Energy/Channel Equation : see above
 Energy Calibration Zero : 2364.131
 Energy Calibration Slope : 4.970463
 Energy Calibration Quadratic : 2.7864033E-04
 Energy Calibration Range : 7746.000

Instrument : CHAMBER 205
 Detector : 78908
 Calibration Date/Time : 21-SEP-2009 14:55:32
 Calibration Source Id : AESS-041

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2369.855
 Energy Calibration Slope : 4.963379
 Energy Calibration Quadratic : 2.9518205E-04
 Energy Calibration Range : 7762.000

Instrument : CHAMBER 206
 Detector : 78909
 Calibration Date/Time : 21-SEP-2009 14:55:41
 Calibration Source Id : AESS-047

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2367.801
 Energy Calibration Slope : 4.940775
 Energy Calibration Quadratic : 3.1145863E-04
 Energy Calibration Range : 7754.000

Instrument : CHAMBER 207
 Detector : 78910
 Calibration Date/Time : 21-SEP-2009 14:55:50
 Calibration Source Id : AESS-042

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2367.063
 Energy Calibration Slope : 4.985894
 Energy Calibration Quadratic : 2.7485727E-04
 Energy Calibration Range : 7761.000

Instrument : CHAMBER 208
 Detector : 78911
 Calibration Date/Time : 21-SEP-2009 14:56:00
 Calibration Source Id : AESS-048

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2366.635
 Energy Calibration Slope : 4.964264
 Energy Calibration Quadratic : 3.0284186E-04
 Energy Calibration Range : 7768.000

Subsection 2: Background Calibration

Instrument : CHAMBER 161
 Detector : 70321
 Background Analysis Date/Time : 20-SEP-2009 15:51:51
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.771	3300.133	1.000000	0.3000000	100.0000	95.00000
NP-237	4437.452	4905.776	11.00000	3.300000	30.15113	95.00000
CM-244	5533.229	5885.267	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 162
 Detector : 70323
 Background Analysis Date/Time : 20-SEP-2009 15:51:55
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.239	3298.296	1.000000	0.3000000	100.0000	95.00000
NP-237	4436.702	4904.841	3.000000	0.9000000	57.73503	95.00000
CM-244	5531.500	5882.828	10.00000	3.000000	31.62278	95.00000

Instrument : CHAMBER 163
 Detector : 70324
 Background Analysis Date/Time : 20-SEP-2009 15:52:00
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.643	3300.046	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4435.946	4905.743	20.00000	6.000000	22.36068	95.00000
CM-244	5535.155	5882.911	12.00000	3.600000	28.86751	95.00000

Instrument : CHAMBER 164
 Detector : 70325
 Background Analysis Date/Time : 20-SEP-2009 15:52:04
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.351	3300.390	2.000000	0.6000000	70.71068	95.00000
NP-237	4432.597	4902.599	13.00000	3.900000	27.73501	95.00000
CM-244	5531.973	5884.930	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 165
 Detector : 72544
 Background Analysis Date/Time : 20-SEP-2009 15:52:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.177	3299.087	2.000000	0.6000000	70.71068	95.00000
NP-237	4432.981	4902.991	5.000000	1.500000	44.72136	95.00000
CM-244	5531.772	5884.104	7.000000	2.100000	37.79645	95.00000

Instrument : CHAMBER 166
 Detector : 74545
 Background Analysis Date/Time : 20-SEP-2009 15:52:13
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.972	3298.535	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.387	4905.732	7.000000	2.100000	37.79645	95.00000
CM-244	5530.676	5884.311	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 167
 Detector : 72546
 Background Analysis Date/Time : 20-SEP-2009 15:52:18
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.306	3300.867	1.000000	0.3000000	100.0000	95.00000
NP-237	4436.966	4901.435	16.00000	4.800000	25.00000	95.00000
CM-244	5530.518	5883.394	9.000000	2.700000	33.33334	95.00000

Instrument : CHAMBER 168
 Detector : 72547
 Background Analysis Date/Time : 20-SEP-2009 15:52:22
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.229	3301.657	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.347	4904.144	14.00000	4.200000	26.72612	95.00000
CM-244	5532.888	5885.320	10.00000	3.000000	31.62278	95.00000

Instrument : CHAMBER 169
 Detector : 72548
 Background Analysis Date/Time : 20-SEP-2009 15:52:26
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.054	3301.559	7.000000	2.100000	37.79645	95.00000
NP-237	4437.192	4906.601	22.000000	6.600000	21.32007	95.00000
CM-244	5535.250	5882.471	13.000000	3.900000	27.73501	95.00000

Instrument : CHAMBER 170
 Detector : 72549
 Background Analysis Date/Time : 20-SEP-2009 15:52:31
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.361	3298.395	1.000000	0.3000000	100.0000	95.00000
NP-237	4436.739	4902.328	14.000000	4.200000	26.72612	95.00000
CM-244	5533.108	5887.023	12.000000	3.600000	28.86751	95.00000

Instrument : CHAMBER 171
 Detector : 78260
 Background Analysis Date/Time : 20-SEP-2009 15:52:36
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.303	3297.640	3.000000	0.9000000	57.73503	95.00000
NP-237	4432.543	4901.594	10.000000	3.000000	31.62278	95.00000
CM-244	5535.033	5887.339	8.000000	2.400000	35.35534	95.00000

Instrument : CHAMBER 172
 Detector : 78772
 Background Analysis Date/Time : 20-SEP-2009 15:52:40
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.091	3301.893	2.000000	0.6000000	70.71068	95.00000
NP-237	4433.700	4903.740	15.000000	4.500000	25.81989	95.00000
CM-244	5533.343	5886.514	6.000000	1.800000	40.82483	95.00000

Instrument : CHAMBER 173
 Detector : 74431
 Background Analysis Date/Time : 20-SEP-2009 15:52:45
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.339	3299.195	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.469	4905.977	7.000000	2.100000	37.79645	95.00000
CM-244	5534.997	5887.255	28.00000	8.400001	18.89822	95.00000

Instrument : CHAMBER 174
 Detector : 74432
 Background Analysis Date/Time : 20-SEP-2009 15:52:49
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.852	3301.015	5.000000	1.500000	44.72136	95.00000
NP-237	4435.608	4905.341	7.000000	2.100000	37.79645	95.00000
CM-244	5531.406	5886.389	21.00000	6.300000	21.82179	95.00000

Instrument : CHAMBER 175
 Detector : 74433
 Background Analysis Date/Time : 20-SEP-2009 15:52:53
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.886	3298.444	3.000000	0.9000000	57.73503	95.00000
NP-237	4434.203	4904.756	10.00000	3.000000	31.62278	95.00000
CM-244	5534.062	5886.590	23.00000	6.900000	20.85144	95.00000

Instrument : CHAMBER 176
 Detector : 74434
 Background Analysis Date/Time : 20-SEP-2009 15:52:58
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.225	3302.172	2.000000	0.6000000	70.71068	95.00000
NP-237	4432.630	4903.602	3.000000	0.9000000	57.73503	95.00000
CM-244	5532.053	5883.416	19.00000	5.700000	22.94157	95.00000

Instrument : CHAMBER 177
 Detector : 74435
 Background Analysis Date/Time : 20-SEP-2009 15:53:02
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.707	3298.313	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.012	4904.435	5.000000	1.500000	44.72136	95.00000
CM-244	5533.475	5885.809	18.00000	5.400000	23.57022	95.00000

Instrument : CHAMBER 178
 Detector : 74436
 Background Analysis Date/Time : 20-SEP-2009 15:53:06
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.348	3300.873	3.000000	0.9000000	57.73503	95.00000
NP-237	4432.820	4902.942	9.000000	2.700000	33.33334	95.00000
CM-244	5530.837	5887.508	19.00000	5.700000	22.94157	95.00000

Instrument : CHAMBER 179
 Detector : 74437
 Background Analysis Date/Time : 20-SEP-2009 15:53:11
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.396	3300.692	2.000000	0.6000000	70.71068	95.00000
NP-237	4435.850	4906.313	3.000000	0.9000000	57.73503	95.00000
CM-244	5535.639	5882.885	32.00000	9.600000	17.67767	95.00000

Instrument : CHAMBER 180
 Detector : 74438
 Background Analysis Date/Time : 20-SEP-2009 15:53:16
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.663	3299.349	1.000000	0.3000000	100.0000	95.00000
NP-237	4433.569	4903.757	13.00000	3.900000	27.73501	95.00000
CM-244	5530.967	5886.867	29.00000	8.700001	18.56953	95.00000

Instrument : CHAMBER 181
 Detector : 74439
 Background Analysis Date/Time : 20-SEP-2009 15:53:20
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.239	3302.087	2.000000	0.6000000	70.71068	95.00000
NP-237	4432.597	4902.658	3.000000	0.9000000	57.73503	95.00000
CM-244	5530.942	5882.719	27.00000	8.100000	19.24501	95.00000

Instrument : CHAMBER 182
 Detector : 74440
 Background Analysis Date/Time : 20-SEP-2009 15:53:24
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.945	3300.794	1.000000	0.3000000	100.0000	95.00000
NP-237	4432.572	4902.020	5.000000	1.500000	44.72136	95.00000
CM-244	5533.775	5884.077	33.00000	9.900001	17.40777	95.00000

Instrument : CHAMBER 183
 Detector : 74441
 Background Analysis Date/Time : 20-SEP-2009 15:53:29
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.798	3299.272	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.624	4904.963	5.000000	1.500000	44.72136	95.00000
CM-244	5533.945	5886.272	42.00000	12.60000	15.43033	95.00000

Instrument : CHAMBER 184
 Detector : 74442
 Background Analysis Date/Time : 20-SEP-2009 15:53:33
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.768	3299.551	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.041	4904.303	1.000000	0.3000000	100.0000	95.00000
CM-244	5531.580	5887.500	28.00000	8.400001	18.89822	95.00000

Instrument : CHAMBER 185
 Detector : 68615
 Background Analysis Date/Time : 20-SEP-2009 15:53:38
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.255	3299.191	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4436.568	4904.026	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
CM-244	5534.840	5885.460	35.00000	10.50000	16.90309	95.00000

Instrument : CHAMBER 186
 Detector : 68616
 Background Analysis Date/Time : 20-SEP-2009 15:53:42
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.448	3298.893	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.968	4903.217	3.000000	0.9000000	57.73503	95.00000
CM-244	5534.439	5884.968	30.00000	9.000000	18.25742	95.00000

Instrument : CHAMBER 187
 Detector : 68620
 Background Analysis Date/Time : 20-SEP-2009 15:53:46
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.069	3299.571	4.000000	1.200000	50.00000	95.00000
NP-237	4436.508	4902.892	10.00000	3.000000	31.62278	95.00000
CM-244	5534.129	5882.618	35.00000	10.50000	16.90309	95.00000

Instrument : CHAMBER 188
 Detector : 68621
 Background Analysis Date/Time : 20-SEP-2009 15:53:50
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.307	3299.196	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4433.812	4904.473	3.000000	0.9000000	57.73503	95.00000
CM-244	5534.433	5887.575	21.00000	6.300000	21.82179	95.00000

Instrument : CHAMBER 189
 Detector : 68622
 Background Analysis Date/Time : 20-SEP-2009 15:53:55
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.567	3302.212	2.000000	0.6000000	70.71068	95.00000
NP-237	4433.165	4906.352	5.000000	1.500000	44.72136	95.00000
CM-244	5531.737	5887.138	29.00000	8.700001	18.56953	95.00000

Instrument : CHAMBER 190
 Detector : 68623
 Background Analysis Date/Time : 20-SEP-2009 15:53:59
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.470	3297.949	3.000000	0.9000000	57.73503	95.00000
NP-237	4434.559	4903.208	45.00000	13.50000	14.90712	95.00000
CM-244	5535.128	5886.122	75.00000	22.50000	11.54701	95.00000

Instrument : CHAMBER 191
 Detector : 68624
 Background Analysis Date/Time : 20-SEP-2009 15:54:03
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.297	3300.325	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.026	4906.466	4.000000	1.200000	50.00000	95.00000
CM-244	5533.499	5882.588	39.00000	11.70000	16.01282	95.00000

Instrument : CHAMBER 192
 Detector : 74430
 Background Analysis Date/Time : 20-SEP-2009 15:54:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.254	3299.423	1.000000	0.3000000	100.0000	95.00000
NP-237	4433.037	4905.173	6.000000	1.800000	40.82483	95.00000
CM-244	5531.571	5885.579	27.00000	8.100000	19.24501	95.00000

Instrument : CHAMBER 193
 Detector : 68627
 Background Analysis Date/Time : 20-SEP-2009 15:54:11
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.990	3298.419	3.000000	0.9000000	57.73503	95.00000
NP-237	4433.001	4901.628	20.00000	6.000000	22.36068	95.00000
CM-244	5534.240	5885.963	35.00000	10.50000	16.90309	95.00000

Instrument : CHAMBER 194
 Detector : 68635
 Background Analysis Date/Time : 20-SEP-2009 15:54:15
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.781	3297.998	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4434.565	4903.602	2.000000	0.6000000	70.71068	95.00000
CM-244	5531.095	5882.711	16.00000	4.800000	25.00000	95.00000

Instrument : CHAMBER 195
 Detector : 68636
 Background Analysis Date/Time : 20-SEP-2009 15:54:19
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.560	3297.508	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.548	4904.654	6.000000	1.800000	40.82483	95.00000
CM-244	5531.770	5882.945	25.00000	7.500000	20.00000	95.00000

Instrument : CHAMBER 196
 Detector : 68637
 Background Analysis Date/Time : 20-SEP-2009 15:54:23
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.197	3301.025	2.000000	0.6000000	70.71068	95.00000
NP-237	4436.299	4904.887	12.00000	3.600000	28.86751	95.00000
CM-244	5531.851	5883.206	21.00000	6.300000	21.82179	95.00000

Instrument : CHAMBER 197
 Detector : 78894
 Background Analysis Date/Time : 20-SEP-2009 15:54:27
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.248	3298.244	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4435.410	4906.453	2.000000	0.6000000	70.71068	95.00000
CM-244	5531.008	5883.783	22.00000	6.600000	21.32007	95.00000

Instrument : CHAMBER 198
 Detector : 78895
 Background Analysis Date/Time : 20-SEP-2009 15:54:30
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.256	3301.357	1.000000	0.3000000	100.0000	95.00000
NP-237	4435.341	4905.168	3.000000	0.9000000	57.73503	95.00000
CM-244	5533.514	5885.508	20.00000	6.000000	22.36068	95.00000

Instrument : CHAMBER 199
 Detector : 78896
 Background Analysis Date/Time : 20-SEP-2009 15:54:35
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.267	3300.107	3.000000	0.9000000	57.73503	95.00000
NP-237	4436.748	4902.339	6.000000	1.800000	40.82483	95.00000
CM-244	5531.913	5884.562	27.00000	8.100000	19.24501	95.00000

Instrument : CHAMBER 200
 Detector : 78900
 Background Analysis Date/Time : 20-SEP-2009 15:54:38
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.062	3301.136	2.000000	0.6000000	70.71068	95.00000
NP-237	4436.203	4901.740	14.00000	4.200000	26.72612	95.00000
CM-244	5531.761	5884.914	26.00000	7.800000	19.61161	95.00000

Instrument : CHAMBER 201
 Detector : 78902
 Background Analysis Date/Time : 20-SEP-2009 15:54:42
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.184	3302.217	1.000000	0.3000000	100.0000	95.00000
NP-237	4434.609	4905.994	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5531.184	5884.407	20.00000	6.000000	22.36068	95.00000

Instrument : CHAMBER 202
 Detector : 78903
 Background Analysis Date/Time : 20-SEP-2009 15:54:47
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.216	3297.484	1.000000	0.3000000	100.0000	95.00000
NP-237	4437.369	4902.276	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
CM-244	5530.984	5883.177	24.00000	7.200000	20.41241	95.00000

Instrument : CHAMBER 203
 Detector : 78905
 Background Analysis Date/Time : 20-SEP-2009 15:54:51
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.199	3298.236	9.000000	2.700000	33.33334	95.00000
NP-237	4432.988	4903.526	7.000000	2.100000	37.79645	95.00000
CM-244	5533.164	5886.048	26.00000	7.800000	19.61161	95.00000

Instrument : CHAMBER 204
 Detector : 78907
 Background Analysis Date/Time : 20-SEP-2009 15:54:55
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.792	3298.277	15.00000	4.500000	25.81989	95.00000
NP-237	4433.265	4903.277	16.00000	4.800000	25.00000	95.00000
CM-244	5531.668	5883.589	51.00000	15.30000	14.00280	95.00000

Instrument : CHAMBER 205
 Detector : 78908
 Background Analysis Date/Time : 20-SEP-2009 15:54:58
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.853	3298.183	1.000000	0.3000000	100.0000	95.00000
NP-237	4433.644	4904.311	4.000000	1.200000	50.00000	95.00000
CM-244	5533.979	5886.811	26.00000	7.800000	19.61161	95.00000

Instrument : CHAMBER 206
 Detector : 78909
 Background Analysis Date/Time : 20-SEP-2009 15:55:02
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.264	3297.560	2.000000	0.6000000	70.71068	95.00000
NP-237	4435.483	4905.550	2.000000	0.6000000	70.71068	95.00000
CM-244	5534.828	5887.642	15.00000	4.500000	25.81989	95.00000

Instrument : CHAMBER 207
 Detector : 78910
 Background Analysis Date/Time : 20-SEP-2009 15:55:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.540	3298.860	2.000000	0.6000000	70.71068	95.00000
NP-237	4436.642	4902.427	8.000000	2.400000	35.35534	95.00000
CM-244	5532.022	5884.565	36.00000	10.80000	16.66667	95.00000

Instrument : CHAMBER 208
 Detector : 78911
 Background Analysis Date/Time : 20-SEP-2009 15:55:11
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.900	3300.465	2.000000	0.6000000	70.71068	95.00000
NP-237	4437.256	4903.414	3.000000	0.9000000	57.73503	95.00000
CM-244	5534.200	5882.369	22.00000	6.600000	21.32007	95.00000

Subsection 3: Efficiency Calibration

Instrument : CHAMBER 161
 Detector : 70321
 Standard ID : AESS-001
 Standard Reference Date : 20-FEB-2008 09:54:53
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:18
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:45:33
 Average Efficiency : 0.3689128
 Average Efficiency Error : 1.0123267E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.6698	28-FEB-2010	2989.771	3300.133	21764.00	0.3527895	1.5079973E-02	62.09401
NP-237	171.0024	28-FEB-2010	4437.452	4905.776	19466.00	0.3793849	1.9163225E-02	75.59914
CM-244	158.1060	28-FEB-2010	5533.229	5885.267	17188.00	0.3849835	1.9471968E-02	61.24743

Instrument : CHAMBER 162
 Detector : 70323
 Standard ID : AESS-007
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:25
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:45:43
 Average Efficiency : 0.3711489
 Average Efficiency Error : 1.0169771E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.7342	28-FEB-2010	2992.239	3298.296	21845.00	0.3574707	1.5279390E-02	61.21131
NP-237	205.0260	28-FEB-2010	4436.702	4904.841	23392.00	0.3802952	1.9176660E-02	80.07285
CM-244	199.6806	28-FEB-2010	5531.500	5882.828	21627.00	0.3837951	1.9366477E-02	60.40187

Instrument : CHAMBER 163
 Detector : 70324
 Standard ID : AESS-002
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:32
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:46:06
 Average Efficiency : 0.3784813
 Average Efficiency Error : 1.0368052E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1144	28-FEB-2010	2988.643	3300.046	21830.00	0.3690017	1.5772363E-02	62.20918
NP-237	200.4990	28-FEB-2010	4435.946	4905.743	23254.00	0.3865025	1.9490723E-02	75.42545
CM-244	196.5558	28-FEB-2010	5535.155	5882.911	21361.00	0.3848922	1.9424047E-02	59.52460

Instrument : CHAMBER 164
 Detector : 70325
 Standard ID : AESS-008
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:39
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:46:16
 Average Efficiency : 0.3791597
 Average Efficiency Error : 1.0381414E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.0418	28-FEB-2010	2988.351	3300.390	22809.00	0.3744951	1.5998594E-02	58.40551
NP-237	209.2716	28-FEB-2010	4432.597	4902.599	23895.00	0.3805439	1.9185850E-02	71.09055
CM-244	199.6488	28-FEB-2010	5531.973	5884.930	21669.00	0.3846071	1.9407105E-02	56.87473

Instrument : CHAMBER 165
 Detector : 72544
 Standard ID : AESS-003
 Standard Reference Date : 15-FEB-2008 13:12:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:46
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:46:29
 Average Efficiency : 0.3786044
 Average Efficiency Error : 1.0371909E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.9740	28-FEB-2010	2991.177	3299.087	21994.00	0.3665624	1.5666667E-02	68.94492
NP-237	203.2080	28-FEB-2010	4432.981	4902.991	23569.00	0.3865909	1.9492906E-02	76.46336
CM-244	197.2236	28-FEB-2010	5531.772	5884.104	21676.00	0.3894331	1.9650551E-02	69.10842

Instrument : CHAMBER 166
 Detector : 74545
 Standard ID : AESS-009
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:52
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:47:27
 Average Efficiency : 0.3925645
 Average Efficiency Error : 1.0746635E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.3736	28-FEB-2010	2991.972	3298.535	23250.00	0.3867014	1.6516251E-02	56.08769
NP-237	204.0192	28-FEB-2010	4435.387	4905.732	24303.00	0.3970365	2.0014562E-02	79.13438
CM-244	197.2128	28-FEB-2010	5530.676	5884.311	22089.00	0.3967021	2.0013960E-02	55.09056

Instrument : CHAMBER 167
 Detector : 72546
 Standard ID : AESS-004
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 21-SEP-2009 09:28:59
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:48:04
 Average Efficiency : 0.3871779
 Average Efficiency Error : 1.0602054E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.1222	28-FEB-2010	2989.306	3300.867	22941.00	0.3765221	1.6084069E-02	55.09563
NP-237	204.2586	28-FEB-2010	4436.966	4901.435	24233.00	0.3953844	1.9931784E-02	76.26476
CM-244	198.8100	28-FEB-2010	5530.518	5883.394	22180.00	0.3953461	1.9944822E-02	56.09549

Instrument : CHAMBER 168
 Detector : 72547
 Standard ID : AESS-010
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:07
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:48:25
 Average Efficiency : 0.3895916
 Average Efficiency Error : 1.0669101E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.0008	28-FEB-2010	2989.229	3301.657	22631.00	0.3790159	1.6193239E-02	61.00068
NP-237	202.9926	28-FEB-2010	4434.347	4904.144	24065.00	0.3951014	1.9918641E-02	83.09320
CM-244	196.2330	28-FEB-2010	5532.888	5885.320	22172.00	0.4003809	2.0198891E-02	61.18747

Instrument : CHAMBER 169
 Detector : 72548
 Standard ID : AESS-005
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:13
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:48:47
 Average Efficiency : 0.3742271
 Average Efficiency Error : 1.0248713E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.7452	28-FEB-2010	2990.054	3301.559	22666.00	0.3638192	1.5543718E-02	59.25828
NP-237	209.5938	28-FEB-2010	4437.192	4906.601	23965.00	0.3810294	1.9209908E-02	71.80399
CM-244	202.7478	28-FEB-2010	5535.250	5882.471	21940.00	0.3834514	1.9346640E-02	60.12471

Instrument : CHAMBER 170
 Detector : 72549
 Standard ID : AESS-011
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:20
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:49:16
 Average Efficiency : 0.3642089
 Average Efficiency Error : 9.9735176E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	212.8284	28-FEB-2010	2991.361	3298.395	22497.00	0.3575987	1.5279310E-02	63.36363
NP-237	214.4868	28-FEB-2010	4436.739	4902.328	23611.00	0.3668730	1.8498441E-02	80.98635
CM-244	208.4184	28-FEB-2010	5533.108	5887.023	21846.00	0.3714186	1.8740255E-02	58.50939

Instrument : CHAMBER 171
 Detector : 78260
 Standard ID : AESS-006
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:26
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:49:40
 Average Efficiency : 0.3810605
 Average Efficiency Error : 1.0438851E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6952	28-FEB-2010	2991.303	3297.640	22193.00	0.3685752	1.5750948E-02	59.60153
NP-237	204.7038	28-FEB-2010	4432.543	4901.594	23828.00	0.3879591	1.9560140E-02	73.97815
CM-244	195.0060	28-FEB-2010	5535.033	5887.339	21671.00	0.3938129	1.9871602E-02	62.27898

Instrument : CHAMBER 172
 Detector : 78772
 Standard ID : AESS-012
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:32
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:49:54
 Average Efficiency : 0.3822589
 Average Efficiency Error : 1.0466043E-02
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.2200	28-FEB-2010	2990.091	3301.893	22979.00	0.3769604	1.6102478E-02	57.80247
NP-237	205.8930	28-FEB-2010	4433.700	4903.740	24203.00	0.3917651	1.9749530E-02	76.25694
CM-244	203.1954	28-FEB-2010	5533.343	5886.514	21835.00	0.3808052	1.9213919E-02	58.76520

Instrument : CHAMBER 173
 Detector : 74431
 Standard ID : AESS-013
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:38
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:04
 Average Efficiency : 0.2602993
 Average Efficiency Error : 7.1600322E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6544	28-FEB-2010	2990.339	3299.195	15911.00	0.2643020	1.1349737E-02	50.51283
NP-237	210.2526	28-FEB-2010	4435.469	4905.977	15987.00	0.2534239	1.2828780E-02	57.29033
CM-244	201.9108	28-FEB-2010	5534.997	5887.255	14946.00	0.2621880	1.3283902E-02	53.12511

Instrument : CHAMBER 174
 Detector : 74432
 Standard ID : AESS-019
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:43
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:13
 Average Efficiency : 0.2533270
 Average Efficiency Error : 6.9733807E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.6468	28-FEB-2010	2989.852	3301.015	14930.00	0.2467540	1.0608066E-02	48.02879
NP-237	202.9140	28-FEB-2010	4435.608	4905.341	15850.00	0.2603388	1.3180215E-02	57.62176
CM-244	199.3140	28-FEB-2010	5531.406	5886.389	14432.00	0.2563750	1.2995369E-02	54.02073

Instrument : CHAMBER 175
 Detector : 74433
 Standard ID : AESS-014
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:50
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:24
 Average Efficiency : 0.2543943
 Average Efficiency Error : 6.9960668E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	214.7088	28-FEB-2010	2989.886	3298.444	16030.00	0.2525296	1.0842831E-02	50.61414
NP-237	211.7160	28-FEB-2010	4434.203	4904.756	16439.00	0.2587745	1.3095257E-02	57.23130
CM-244	207.3882	28-FEB-2010	5534.062	5886.590	14808.00	0.2528055	1.2810053E-02	51.72563

Instrument : CHAMBER 176
 Detector : 74434
 Standard ID : AESS-020
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 21-SEP-2009 09:29:58
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:36
 Average Efficiency : 0.2547762
 Average Efficiency Error : 7.0115663E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	205.5870	28-FEB-2010	2991.225	3302.172	15206.00	0.2502103	1.0753103E-02	46.19209
NP-237	203.4984	28-FEB-2010	4432.630	4903.602	15838.00	0.2594141	1.3133497E-02	58.51922
CM-244	197.1096	28-FEB-2010	5532.053	5883.416	14295.00	0.2569134	1.3024328E-02	51.87393

Instrument : CHAMBER 177
 Detector : 74435
 Standard ID : AESS-015
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:03
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:46
 Average Efficiency : 0.2659749
 Average Efficiency Error : 7.3150843E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0270	28-FEB-2010	2989.707	3298.313	15952.00	0.2645041	1.1357911E-02	48.05111
NP-237	200.6460	28-FEB-2010	4434.012	4904.435	16053.00	0.2666638	1.3498317E-02	54.07773
CM-244	195.9270	28-FEB-2010	5533.475	5885.809	14787.00	0.2673737	1.3548458E-02	55.83525

Instrument : CHAMBER 178
 Detector : 74436
 Standard ID : AESS-021
 Standard Reference Date : 19-FEB-2008 15:31:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:10
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:50:57
 Average Efficiency : 0.2584701
 Average Efficiency Error : 7.1088150E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.3608	28-FEB-2010	2991.348	3300.873	15813.00	0.2566991	1.1024418E-02	46.60859
NP-237	210.1548	28-FEB-2010	4432.820	4902.942	16293.00	0.2583858	1.3076977E-02	58.74612
CM-244	200.7390	28-FEB-2010	5530.837	5887.508	14803.00	0.2611073	1.3230741E-02	51.69608

Instrument : CHAMBER 179
 Detector : 74437
 Standard ID : AESS-016
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:16
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:51:07
 Average Efficiency : 0.2656665
 Average Efficiency Error : 7.3066968E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0534	28-FEB-2010	2992.396	3300.692	16018.00	0.2655541	1.1402219E-02	48.47999
NP-237	199.3962	28-FEB-2010	4435.850	4906.313	16096.00	0.2690641	1.3619361E-02	58.18980
CM-244	198.6402	28-FEB-2010	5535.639	5882.885	14727.00	0.2625763	1.3306193E-02	54.75912

Instrument : CHAMBER 180
 Detector : 74438
 Standard ID : AESS-022
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:22
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:51:16
 Average Efficiency : 0.2482043
 Average Efficiency Error : 6.8309689E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	209.6724	28-FEB-2010	2988.663	3299.349	15136.00	0.2442104	1.0496107E-02	47.14516
NP-237	206.8830	28-FEB-2010	4433.569	4903.757	15632.00	0.2518027	1.2750288E-02	52.81374
CM-244	203.0208	28-FEB-2010	5530.967	5886.867	14358.00	0.2504804	1.2697529E-02	50.18464

Instrument : CHAMBER 181
 Detector : 74439
 Standard ID : AESS-017
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:28
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:51:26
 Average Efficiency : 0.2568994
 Average Efficiency Error : 7.0653898E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.0798	28-FEB-2010	2988.239	3302.087	16106.00	0.2593535	1.1134949E-02	50.88416
NP-237	208.5846	28-FEB-2010	4432.597	4902.658	16106.00	0.2573713	1.3027404E-02	57.22441
CM-244	205.5828	28-FEB-2010	5530.942	5882.719	14695.00	0.2531832	1.2830525E-02	53.69027

Instrument : CHAMBER 182
 Detector : 74440
 Standard ID : AESS-023
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:34
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:51:42
 Average Efficiency : 0.2555217
 Average Efficiency Error : 7.0314407E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	207.4764	28-FEB-2010	2990.945	3300.794	15263.00	0.2488660	1.0694612E-02	45.64035
NP-237	207.4998	28-FEB-2010	4432.572	4902.020	16228.00	0.2606671	1.3193036E-02	52.09262
CM-244	199.8804	28-FEB-2010	5533.775	5884.077	14703.00	0.2605115	1.3201850E-02	48.97062

Instrument : CHAMBER 183
 Detector : 74441
 Standard ID : AESS-018
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:39
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:51:54
 Average Efficiency : 0.2611987
 Average Efficiency Error : 7.1849022E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.1856	28-FEB-2010	2990.798	3299.272	15703.00	0.2627467	1.1285488E-02	47.53299
NP-237	208.8990	28-FEB-2010	4434.624	4904.963	16100.00	0.2568786	1.3002539E-02	53.88460
CM-244	198.1458	28-FEB-2010	5533.945	5886.272	14750.00	0.2635892	1.3357328E-02	53.93570

Instrument : CHAMBER 184
 Detector : 74442
 Standard ID : AESS-024
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:45
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:52:17
 Average Efficiency : 0.2584583
 Average Efficiency Error : 7.1114316E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.5218	28-FEB-2010	2988.768	3299.551	15277.00	0.2539344	1.0912240E-02	50.31911
NP-237	205.6662	28-FEB-2010	4434.041	4904.303	16050.00	0.2601255	1.3167357E-02	58.63404
CM-244	198.3060	28-FEB-2010	5531.580	5887.500	14754.00	0.2635180	1.3353555E-02	51.04471

Instrument : CHAMBER 185
 Detector : 68615
 Standard ID : AESS-025
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:51
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:52:26
 Average Efficiency : 0.2578048
 Average Efficiency Error : 7.1078530E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.5670	28-FEB-2010	2988.255	3299.191	14889.00	0.2575537	1.1072870E-02	57.86859
NP-237	167.9916	28-FEB-2010	4436.568	4904.026	13054.00	0.2590211	1.3147981E-02	60.38557
CM-244	157.2432	28-FEB-2010	5534.840	5885.460	11412.00	0.2569523	1.3071318E-02	57.79462

Instrument : CHAMBER 186
 Detector : 68616
 Standard ID : AESS-031
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:30:57
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:52:35
 Average Efficiency : 0.2488432
 Average Efficiency Error : 6.8683540E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.6650	28-FEB-2010	2991.448	3298.893	14023.00	0.2449313	1.0542010E-02	55.63848
NP-237	162.9186	28-FEB-2010	4434.968	4903.217	12465.00	0.2550169	1.2953850E-02	61.88278
CM-244	153.1968	28-FEB-2010	5534.439	5884.968	10759.00	0.2485880	1.2658793E-02	53.78214

Instrument : CHAMBER 187
 Detector : 68620
 Standard ID : AESS-026
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:03
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:52:45
 Average Efficiency : 0.2500139
 Average Efficiency Error : 7.3307389E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.5072	28-FEB-2010	2991.069	3299.571	14686.00	0.2490046	1.2619531E-02	51.85893
NP-237	168.0294	28-FEB-2010	4436.508	4902.892	12870.00	0.2552532	1.2959577E-02	54.96236
CM-244	160.5822	28-FEB-2010	5534.129	5882.618	11163.00	0.2461146	1.2524742E-02	53.45123

Instrument : CHAMBER 188
 Detector : 68621
 Standard ID : AESS-032
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:08
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:57:16
 Average Efficiency : 0.2573678
 Average Efficiency Error : 7.0972578E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.2364	28-FEB-2010	2991.307	3299.196	14948.00	0.2589918	1.1133890E-02	51.99499
NP-237	165.9822	28-FEB-2010	4433.812	4904.473	12790.00	0.2568368	1.3041135E-02	63.01558
CM-244	153.7938	28-FEB-2010	5534.433	5887.575	11106.00	0.2556783	1.3012402E-02	52.96853

Instrument : CHAMBER 189
 Detector : 68622
 Standard ID : AESS-027
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:15
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:03
 Average Efficiency : 0.2613129
 Average Efficiency Error : 7.6623494E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.4238	28-FEB-2010	2989.567	3302.212	14738.00	0.2577560	1.3062426E-02	55.08699
NP-237	161.6154	28-FEB-2010	4433.165	4906.352	12695.00	0.2618049	1.3294927E-02	59.92243
CM-244	148.1754	28-FEB-2010	5531.737	5887.138	11072.00	0.2645886	1.3466716E-02	57.86366

Instrument : CHAMBER 190
 Detector : 68623
 Standard ID : AESS-033
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:22
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:12
 Average Efficiency : 0.2619864
 Average Efficiency Error : 7.2268778E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.4158	28-FEB-2010	2990.470	3297.949	14602.00	0.2566898	1.1039688E-02	51.16143
NP-237	161.7816	28-FEB-2010	4434.559	4903.208	12864.00	0.2647705	1.3443264E-02	59.23622
CM-244	147.2670	28-FEB-2010	5535.128	5886.122	11129.00	0.2671734	1.3597734E-02	49.90292

Instrument : CHAMBER 191
 Detector : 68624
 Standard ID : AESS-028
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:28
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:21
 Average Efficiency : 0.2625601
 Average Efficiency Error : 7.6934313E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.6542	28-FEB-2010	2991.297	3300.325	15252.00	0.2584319	1.3090833E-02	50.79485
NP-237	168.1992	28-FEB-2010	4434.026	4906.466	13308.00	0.2637113	1.3382300E-02	58.03377
CM-244	156.7614	28-FEB-2010	5533.499	5882.588	11769.00	0.2657853	1.3513734E-02	53.41747

Instrument : CHAMBER 192
 Detector : 74430
 Standard ID : AESS-034
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:34
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:32
 Average Efficiency : 0.2544576
 Average Efficiency Error : 7.0170104E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.5488	28-FEB-2010	2990.254	3299.423	14893.00	0.2511986	1.0799594E-02	50.05982
NP-237	167.2962	28-FEB-2010	4433.037	4905.173	12941.00	0.2578104	1.3088287E-02	62.20525
CM-244	154.4388	28-FEB-2010	5531.571	5885.579	11163.00	0.2558767	1.3021424E-02	54.21256

Instrument : CHAMBER 193
 Detector : 68627
 Standard ID : AESS-029
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:40
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:41
 Average Efficiency : 0.2615199
 Average Efficiency Error : 7.6632542E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.5742	28-FEB-2010	2991.990	3298.419	15396.00	0.2583720	1.3086254E-02	50.38469
NP-237	169.7700	28-FEB-2010	4433.001	4901.628	13286.00	0.2607451	1.3232258E-02	58.19065
CM-244	154.8234	28-FEB-2010	5534.240	5885.963	11618.00	0.2656835	1.3511403E-02	53.47323

Instrument : CHAMBER 194
 Detector : 68635
 Standard ID : AESS-035
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:45
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:50
 Average Efficiency : 0.2542233
 Average Efficiency Error : 7.0097935E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.6666	28-FEB-2010	2990.781	3297.998	14819.00	0.2523236	1.0848935E-02	51.65903
NP-237	168.2934	28-FEB-2010	4434.565	4903.602	13013.00	0.2577325	1.3083202E-02	59.92809
CM-244	158.8128	28-FEB-2010	5531.095	5882.711	11369.00	0.2534982	1.2896180E-02	53.05344

Instrument : CHAMBER 195
 Detector : 68636
 Standard ID : AESS-030
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:51
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:53:59
 Average Efficiency : 0.2554399
 Average Efficiency Error : 7.4881674E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.9792	28-FEB-2010	2989.560	3297.508	14812.00	0.2518228	1.2760897E-02	51.28571
NP-237	166.3758	28-FEB-2010	4435.548	4904.654	12878.00	0.2579744	1.3097576E-02	59.53444
CM-244	157.1856	28-FEB-2010	5531.770	5882.945	11394.00	0.2567084	1.3059122E-02	52.18182

Instrument : CHAMBER 196
 Detector : 68637
 Standard ID : AESS-036
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 21-SEP-2009 09:31:58
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:54:08
 Average Efficiency : 0.2560611
 Average Efficiency Error : 7.0601865E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.3204	28-FEB-2010	2989.197	3301.025	14971.00	0.2515414	1.0813317E-02	54.46194
NP-237	167.4312	28-FEB-2010	4436.299	4904.887	13068.00	0.2600951	1.3202412E-02	58.47227
CM-244	156.4188	28-FEB-2010	5531.851	5883.206	11431.00	0.2587482	1.3162114E-02	55.12206

Instrument : CHAMBER 197
 Detector : 78894
 Standard ID : AESS-037
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:04
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:42:21
 Average Efficiency : 0.2524827
 Average Efficiency Error : 6.9639706E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7372	28-FEB-2010	2989.248	3298.244	14631.00	0.2502923	1.0764122E-02	53.79660
NP-237	167.1294	28-FEB-2010	4435.410	4906.453	12637.00	0.2520285	1.2799331E-02	65.84109
CM-244	154.7664	28-FEB-2010	5531.008	5883.783	11198.00	0.2561660	1.3035372E-02	58.58810

Instrument : CHAMBER 198
 Detector : 78895
 Standard ID : AESS-043
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:10
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:54:28
 Average Efficiency : 0.2546443
 Average Efficiency Error : 7.0217522E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7708	28-FEB-2010	2988.256	3301.357	14781.00	0.2528079	1.0870277E-02	53.58070
NP-237	168.7422	28-FEB-2010	4435.341	4905.168	12907.00	0.2549473	1.2943417E-02	60.79170
CM-244	156.3252	28-FEB-2010	5533.514	5885.508	11347.00	0.2569917	1.3074390E-02	55.00752

Instrument : CHAMBER 199
 Detector : 78896
 Standard ID : AESS-038
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:15
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:54:37
 Average Efficiency : 0.2501853
 Average Efficiency Error : 6.8995738E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1408	28-FEB-2010	2991.267	3300.107	14889.00	0.2516318	1.0818291E-02	52.50020
NP-237	170.0886	28-FEB-2010	4436.748	4902.339	12711.00	0.2490705	1.2648016E-02	63.29102
CM-244	157.7460	28-FEB-2010	5531.913	5884.562	11110.00	0.2493175	1.2688680E-02	53.66205

Instrument : CHAMBER 200
 Detector : 78900
 Standard ID : AESS-044
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:21
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:54:46
 Average Efficiency : 0.2682398
 Average Efficiency Error : 7.3923203E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4510	28-FEB-2010	2988.062	3301.136	15568.00	0.2708094	1.1633540E-02	50.91508
NP-237	166.6248	28-FEB-2010	4436.203	4901.740	13553.00	0.2710442	1.3750886E-02	57.22134
CM-244	155.8290	28-FEB-2010	5531.761	5884.914	11543.00	0.2622247	1.3336830E-02	45.01981

Instrument : CHAMBER 201
 Detector : 78902
 Standard ID : AESS-039
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:27
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:54:55
 Average Efficiency : 0.2589892
 Average Efficiency Error : 7.1445713E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.2418	28-FEB-2010	2988.184	3302.217	14648.00	0.2577410	1.1084234E-02	45.65341
NP-237	159.1506	28-FEB-2010	4434.609	4905.994	12631.00	0.2645504	1.3435334E-02	55.65960
CM-244	151.7142	28-FEB-2010	5531.184	5884.407	10948.00	0.2554961	1.3006385E-02	45.41114

Instrument : CHAMBER 202
 Detector : 78903
 Standard ID : AESS-045
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:32
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:05
 Average Efficiency : 0.2665268
 Average Efficiency Error : 7.3516225E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	186.9936	28-FEB-2010	2989.216	3297.484	14828.00	0.2682285	1.1532663E-02	43.97738
NP-237	160.8066	28-FEB-2010	4437.369	4902.276	12547.00	0.2600848	1.3209904E-02	52.01093
CM-244	145.8384	28-FEB-2010	5530.984	5883.177	11169.00	0.2711185	1.3796896E-02	50.67951

Instrument : CHAMBER 203
 Detector : 78905
 Standard ID : AESS-040
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:39
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:14
 Average Efficiency : 0.2582881
 Average Efficiency Error : 7.1221651E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4828	28-FEB-2010	2990.199	3298.236	14936.00	0.2597386	1.1166240E-02	50.45560
NP-237	166.8174	28-FEB-2010	4432.988	4903.526	12999.00	0.2597034	1.3183516E-02	56.72982
CM-244	155.0100	28-FEB-2010	5533.164	5886.048	11164.00	0.2549590	1.2974691E-02	53.05425

Instrument : CHAMBER 204
 Detector : 78907
 Standard ID : AESS-046
 Standard Reference Date : 19-FEB-2008 19:35:48
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:45
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:23
 Average Efficiency : 0.2496188
 Average Efficiency Error : 6.8885502E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.7474	28-FEB-2010	2989.792	3298.277	14212.00	0.2467715	1.0618629E-02	52.28694
NP-237	164.6658	28-FEB-2010	4433.265	4903.277	12386.00	0.2506330	1.2732573E-02	55.30292
CM-244	151.3824	28-FEB-2010	5531.668	5883.589	10818.00	0.2527654	1.2870559E-02	51.63226

Instrument : CHAMBER 205
 Detector : 78908
 Standard ID : AESS-041
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:51
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:32
 Average Efficiency : 0.2549397
 Average Efficiency Error : 7.0272260E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.9034	28-FEB-2010	2989.853	3298.183	15200.00	0.2521578	1.0836856E-02	49.40310
NP-237	171.2268	28-FEB-2010	4433.644	4904.311	13124.00	0.2554664	1.2966554E-02	56.83091
CM-244	159.5796	28-FEB-2010	5533.979	5886.811	11652.00	0.2584914	1.3144889E-02	54.55809

Instrument : CHAMBER 206
 Detector : 78909
 Standard ID : AESS-047
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:32:57
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:41
 Average Efficiency : 0.2541434
 Average Efficiency Error : 7.0085586E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.4804	28-FEB-2010	2990.264	3297.560	14794.00	0.2533972	1.0895449E-02	48.44042
NP-237	168.3948	28-FEB-2010	4435.483	4905.550	12839.00	0.2541331	1.2903095E-02	60.11407
CM-244	154.6032	28-FEB-2010	5534.828	5887.642	11143.00	0.2552143	1.2987950E-02	53.79968

Instrument : CHAMBER 207
 Detector : 78910
 Standard ID : AESS-042
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 21-SEP-2009 09:33:03
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:55:50
 Average Efficiency : 0.2573462
 Average Efficiency Error : 7.1005006E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	188.7090	28-FEB-2010	2989.540	3298.860	14353.00	0.2572728	1.1068305E-02	52.62569
NP-237	159.6558	28-FEB-2010	4436.642	4902.427	12327.00	0.2573162	1.3072978E-02	61.37923
CM-244	150.5208	28-FEB-2010	5532.022	5884.565	10951.00	0.2574795	1.3107520E-02	49.75304

Instrument : CHAMBER 208
 Detector : 78911
 Standard ID : AESS-048
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 21-SEP-2009 09:33:08
 Calibration Count Time : 300.0000
 Efficiency Calibration Date/Time : 21-SEP-2009 14:56:00
 Average Efficiency : 0.2510063
 Average Efficiency Error : 6.9273296E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	191.8350	28-FEB-2010	2991.900	3300.465	14140.00	0.2493222	1.0729297E-02	51.69543
NP-237	161.5530	28-FEB-2010	4437.256	4903.414	12240.00	0.2525304	1.2831211E-02	60.66938
CM-244	151.1856	28-FEB-2010	5534.200	5882.369	10757.00	0.2518900	1.2826865E-02	52.12144

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 160		
	Detector	:	76226		
	Calibration Date/Time	:	29-SEP-2009 07:10:00		
	Calibration Source Id	:	AESS-048		
Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy	
GD-148	6445-278	2/28/10	3183.000	3183.000	
NP-237	4341	2/28/10	4768.800	4768.800	
CM-244	4320A	2/28/10	5795.020	5795.020	

Energy/Channel Equation	:	see above
Energy Calibration Zero	:	2360.017
Energy Calibration Slope	:	4.989815
Energy Calibration Quadratic	:	2.8332110E-04
Energy Calibration Range	:	7767.000

Subsection 2: Background Calibration

Instrument : CHAMBER 160
Detector : 76226
Background Analysis Date/Time : 27-SEP-2009 18:44:20
Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.170	3297.924	4.000000	1.200000	50.00000	95.00000
NP-237	4432.583	4904.667	11.00000	3.300000	30.15113	95.00000
CM-244	5530.574	5884.099	6.000000	1.800000	40.82483	95.00000

Subsection 3: Efficiency Calibration

Instrument : CHAMBER 160
Detector : 76226
Standard ID : AESS-048
Standard Reference Date : 19-FEB-2008 00:32:27
Calibration Analysis Date/Time : 28-SEP-2009 12:47:27
Calibration Count Time : 300.0000
Efficiency Calibration Date/Time : 29-SEP-2009 07:10:00
Average Efficiency : 0.2444646
Average Efficiency Error : 6.7500472E-03
Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	191.8350	28-FEB-2010	2988.170	3297.924	13796.00	0.2432897	1.0474726E-02	45.84011
NP-237	161.5530	28-FEB-2010	4432.583	4904.667	11802.00	0.2434434	1.2376855E-02	60.53790
CM-244	151.1856	28-FEB-2010	5530.574	5884.099	10545.00	0.2472199	1.2593360E-02	51.03231

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 : 78788
 Calibration Date/Time : 6-OCT-2009 07:29:51
 Calibration Source Id : AESS-001

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3191.115
NP-237	4341	2/28/10	4768.800	4810.887
CM-244	4320A	2/28/10	5795.020	5833.201

Energy/Channel Equation : see above
 Energy Calibration Zero : 2494.949
 Energy Calibration Slope : 4.926322
 Energy Calibration Quadratic : 6.9237419E-04
 Energy Calibration Range : 8266.000

Instrument : CHAMBER 002
 Detector : 78266
 Calibration Date/Time : 6-OCT-2009 07:29:59
 Calibration Source Id : AESS-002

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3184.362
NP-237	4341	2/28/10	4768.800	4775.667
CM-244	4320A	2/28/10	5795.020	5814.376

Energy/Channel Equation : see above
 Energy Calibration Zero : 2451.222
 Energy Calibration Slope : 5.048168
 Energy Calibration Quadratic : 4.0239695E-04
 Energy Calibration Range : 8042.000

Instrument : CHAMBER 003
 Detector : 67617
 Calibration Date/Time : 6-OCT-2009 07:30:06
 Calibration Source Id : AESS-003

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3185.123
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5794.595

Energy/Channel Equation : see above
 Energy Calibration Zero : 2594.451
 Energy Calibration Slope : 5.544409
 Energy Calibration Quadratic : 3.9863368E-04
 Energy Calibration Range : 8690.000

Instrument : CHAMBER 004
 Detector : 64279
 Calibration Date/Time : 6-OCT-2009 07:30:14
 Calibration Source Id : AESS-004
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.337
 NP-237 4341 2/28/10 4768.800 4768.766
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2537.632
 Energy Calibration Slope : 5.123945
 Energy Calibration Quadratic : 3.3953955E-04
 Energy Calibration Range : 8141.000

Instrument : CHAMBER 005
 Detector : 67612
 Calibration Date/Time : 6-OCT-2009 07:30:22
 Calibration Source Id : AESS-005
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.737
 NP-237 4341 2/28/10 4768.800 4768.711
 CM-244 4320A 2/28/10 5795.020 5794.886
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2393.780
 Energy Calibration Slope : 4.993768
 Energy Calibration Quadratic : 3.3310769E-04
 Energy Calibration Range : 7857.000

Instrument : CHAMBER 006
 Detector : 67613
 Calibration Date/Time : 6-OCT-2009 07:30:30
 Calibration Source Id : AESS-006
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.801
 CM-244 4320A 2/28/10 5795.020 5794.796
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2373.272
 Energy Calibration Slope : 4.963299
 Energy Calibration Quadratic : 3.0817042E-04
 Energy Calibration Range : 7779.000

Instrument : CHAMBER 007
 Detector : 67607
 Calibration Date/Time : 6-OCT-2009 07:30:44
 Calibration Source Id : AESS-007

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3180.649
NP-237	4341	2/28/10	4768.800	4768.154
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2429.447
 Energy Calibration Slope : 5.132570
 Energy Calibration Quadratic : 3.1622002E-04
 Energy Calibration Range : 8017.000

Instrument : CHAMBER 008
 Detector : 78788
 Calibration Date/Time : 6-OCT-2009 07:30:59
 Calibration Source Id : AESS-008

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.630
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2371.041
 Energy Calibration Slope : 4.987834
 Energy Calibration Quadratic : 2.8972572E-04
 Energy Calibration Range : 7782.000

Instrument : CHAMBER 009
 Detector : 72528
 Calibration Date/Time : 6-OCT-2009 07:31:08
 Calibration Source Id : AESS-009

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.920
CM-244	4320A	2/28/10	5795.020	5795.109

Energy/Channel Equation : see above
 Energy Calibration Zero : 2372.286
 Energy Calibration Slope : 4.951155
 Energy Calibration Quadratic : 3.2705130E-04
 Energy Calibration Range : 7785.000

Instrument : CHAMBER 010
 Detector : 72529
 Calibration Date/Time : 6-OCT-2009 07:31:16
 Calibration Source Id : AESS-010
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.215
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2372.865
 Energy Calibration Slope : 4.958590
 Energy Calibration Quadratic : 2.7677300E-04
 Energy Calibration Range : 7741.000

Instrument : CHAMBER 011
 Detector : 72531
 Calibration Date/Time : 6-OCT-2009 07:31:24
 Calibration Source Id : AESS-011
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.001
 NP-237 4341 2/28/10 4768.800 4768.798
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2349.996
 Energy Calibration Slope : 5.000451
 Energy Calibration Quadratic : 3.0306034E-04
 Energy Calibration Range : 7788.000

Instrument : CHAMBER 012
 Detector : 67594
 Calibration Date/Time : 6-OCT-2009 07:31:31
 Calibration Source Id : AESS-012
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.350
 NP-237 4341 2/28/10 4768.800 4769.126
 CM-244 4320A 2/28/10 5795.020 5795.277
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2377.866
 Energy Calibration Slope : 4.952454
 Energy Calibration Quadratic : 2.8195331E-04
 Energy Calibration Range : 7745.000

Instrument : CHAMBER 013
 Detector : 78790
 Calibration Date/Time : 6-OCT-2009 07:31:39
 Calibration Source Id : AESS-013

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2358.748
 Energy Calibration Slope : 4.906792
 Energy Calibration Quadratic : 3.0364850E-04
 Energy Calibration Range : 7702.000

Instrument : CHAMBER 014
 Detector : 67616
 Calibration Date/Time : 6-OCT-2009 07:31:47
 Calibration Source Id : AESS-014

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.015
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.127

Energy/Channel Equation : see above
 Energy Calibration Zero : 2349.895
 Energy Calibration Slope : 4.951089
 Energy Calibration Quadratic : 3.2694533E-04
 Energy Calibration Range : 7763.000

Instrument : CHAMBER 015
 Detector : 61581
 Calibration Date/Time : 6-OCT-2009 07:32:05
 Calibration Source Id : AESS-015

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.330
NP-237	4341	2/28/10	4768.800	4769.738
CM-244	4320A	2/28/10	5795.020	5795.260

Energy/Channel Equation : see above
 Energy Calibration Zero : 2330.553
 Energy Calibration Slope : 4.907706
 Energy Calibration Quadratic : 2.7204648E-04
 Energy Calibration Range : 7641.000

Instrument : CHAMBER 016
 Detector : 78774
 Calibration Date/Time : 6-OCT-2009 07:32:13
 Calibration Source Id : AESS-016
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.851
 CM-244 4320A 2/28/10 5795.020 5795.196

 Energy/Channel Equation : see above
 Energy Calibration Zero : 2351.961
 Energy Calibration Slope : 4.895100
 Energy Calibration Quadratic : 3.0339885E-04
 Energy Calibration Range : 7683.000

Instrument : CHAMBER 017
 Detector : 78791
 Calibration Date/Time : 6-OCT-2009 07:32:21
 Calibration Source Id : AESS-017
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.800
 CM-244 4320A 2/28/10 5795.020 5795.020

 Energy/Channel Equation : see above
 Energy Calibration Zero : 2366.693
 Energy Calibration Slope : 4.965857
 Energy Calibration Quadratic : 3.0423133E-04
 Energy Calibration Range : 7771.000

Instrument : CHAMBER 018
 Detector : 78782
 Calibration Date/Time : 6-OCT-2009 07:32:30
 Calibration Source Id : AESS-018
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.021

 Energy/Channel Equation : see above
 Energy Calibration Zero : 2353.444
 Energy Calibration Slope : 4.965840
 Energy Calibration Quadratic : 3.1234659E-04
 Energy Calibration Range : 7766.000

Instrument : CHAMBER 019
 Detector : 78786
 Calibration Date/Time : 6-OCT-2009 07:32:38
 Calibration Source Id : AESS-019

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.407
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5794.577

Energy/Channel Equation : see above
 Energy Calibration Zero : 2344.952
 Energy Calibration Slope : 5.076295
 Energy Calibration Quadratic : 2.1271234E-04
 Energy Calibration Range : 7766.000

Instrument : CHAMBER 020
 Detector : 78787
 Calibration Date/Time : 6-OCT-2009 07:32:46
 Calibration Source Id : AESS-020

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.428
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2340.289
 Energy Calibration Slope : 4.979540
 Energy Calibration Quadratic : 2.9817302E-04
 Energy Calibration Range : 7752.000

Instrument : CHAMBER 021
 Detector : 67047
 Calibration Date/Time : 6-OCT-2009 07:32:53
 Calibration Source Id : AESS-021

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2274.903
 Energy Calibration Slope : 4.967343
 Energy Calibration Quadratic : 2.8605422E-04
 Energy Calibration Range : 7661.000

Instrument : CHAMBER 022
 Detector : 72530
 Calibration Date/Time : 6-OCT-2009 07:33:01
 Calibration Source Id : AESS-022

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.526
NP-237	4341	2/28/10	4768.800	4768.612
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2375.246
 Energy Calibration Slope : 4.989795
 Energy Calibration Quadratic : 2.6628541E-04
 Energy Calibration Range : 7764.000

Instrument : CHAMBER 023
 Detector : 78264
 Calibration Date/Time : 6-OCT-2009 07:33:09
 Calibration Source Id : AESS-023

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4769.391
CM-244	4320A	2/28/10	5795.020	5795.544

Energy/Channel Equation : see above
 Energy Calibration Zero : 2381.539
 Energy Calibration Slope : 4.989902
 Energy Calibration Quadratic : 2.9515647E-04
 Energy Calibration Range : 7801.000

Instrument : CHAMBER 024
 Detector : 76542
 Calibration Date/Time : 6-OCT-2009 07:33:17
 Calibration Source Id : AESS-024

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.799
CM-244	4320A	2/28/10	5795.020	5795.021

Energy/Channel Equation : see above
 Energy Calibration Zero : 2347.455
 Energy Calibration Slope : 4.979314
 Energy Calibration Quadratic : 2.5380100E-04
 Energy Calibration Range : 7712.000

Instrument : CHAMBER 025
 Detector : 45-149AA5
 Calibration Date/Time : 6-OCT-2009 07:33:25
 Calibration Source Id : AESS-025

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.347
NP-237	4341	2/28/10	4768.800	4768.152
CM-244	4320A	2/28/10	5795.020	5794.713

Energy/Channel Equation : see above
 Energy Calibration Zero : 2322.748
 Energy Calibration Slope : 4.869743
 Energy Calibration Quadratic : 3.0884167E-04
 Energy Calibration Range : 7633.000

Instrument : CHAMBER 026
 Detector : 78204
 Calibration Date/Time : 6-OCT-2009 07:33:33
 Calibration Source Id : AESS-026

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2358.710
 Energy Calibration Slope : 4.925373
 Energy Calibration Quadratic : 3.5054228E-04
 Energy Calibration Range : 7770.000

Instrument : CHAMBER 027
 Detector : 42484
 Calibration Date/Time : 6-OCT-2009 07:33:41
 Calibration Source Id : AESS-027

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2362.008
 Energy Calibration Slope : 4.972083
 Energy Calibration Quadratic : 3.1753408E-04
 Energy Calibration Range : 7786.000

Instrument : CHAMBER 028
 Detector : 78792
 Calibration Date/Time : 6-OCT-2009 07:33:49
 Calibration Source Id : AESS-028

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.773
CM-244	4320A	2/28/10	5795.020	5795.020

Energy/Channel Equation : see above
 Energy Calibration Zero : 2311.782
 Energy Calibration Slope : 4.951570
 Energy Calibration Quadratic : 3.3065694E-04
 Energy Calibration Range : 7729.000

Instrument : CHAMBER 029
 Detector : 33454
 Calibration Date/Time : 6-OCT-2009 07:33:57
 Calibration Source Id : AESS-029

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.714
CM-244	4320A	2/28/10	5795.020	5794.973

Energy/Channel Equation : see above
 Energy Calibration Zero : 2351.378
 Energy Calibration Slope : 4.883624
 Energy Calibration Quadratic : 3.0947028E-04
 Energy Calibration Range : 7677.000

Instrument : CHAMBER 030
 Detector : 33447
 Calibration Date/Time : 6-OCT-2009 07:34:05
 Calibration Source Id : AESS-030

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.487
NP-237	4341	2/28/10	4768.800	4768.571
CM-244	4320A	2/28/10	5795.020	5794.696

Energy/Channel Equation : see above
 Energy Calibration Zero : 2380.179
 Energy Calibration Slope : 4.949189
 Energy Calibration Quadratic : 3.2416798E-04
 Energy Calibration Range : 7788.000

Instrument : CHAMBER 031
 Detector : 67042
 Calibration Date/Time : 6-OCT-2009 07:34:14
 Calibration Source Id : AESS-031

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3178.485
NP-237	4341	2/28/10	4768.800	4763.577
CM-244	4320A	2/28/10	5795.020	5784.311

Energy/Channel Equation : see above
 Energy Calibration Zero : 2386.162
 Energy Calibration Slope : 4.992230
 Energy Calibration Quadratic : 3.1948058E-04
 Energy Calibration Range : 7833.000

Instrument : CHAMBER 032
 Detector : 67041
 Calibration Date/Time : 5-OCT-2009 12:57:42
 Calibration Source Id : AESS-032

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3249.733
NP-237	4341	2/28/10	4768.800	4694.923
CM-244	4320A	2/28/10	5795.020	5711.124

Energy/Channel Equation : see above
 Energy Calibration Zero : 2545.489
 Energy Calibration Slope : 5.772886
 Energy Calibration Quadratic : -1.6971683E-04
 Energy Calibration Range : 8279.000

Instrument : CHAMBER 033
 Detector : 78785
 Calibration Date/Time : 6-OCT-2009 07:34:25
 Calibration Source Id : AESS-033

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.497
NP-237	4341	2/28/10	4768.800	4768.585
CM-244	4320A	2/28/10	5795.020	5794.944

Energy/Channel Equation : see above
 Energy Calibration Zero : 2381.359
 Energy Calibration Slope : 4.947021
 Energy Calibration Quadratic : 3.3134225E-04
 Energy Calibration Range : 7795.000

Instrument : CHAMBER 034
 Detector : 61586
 Calibration Date/Time : 5-OCT-2009 12:58:01
 Calibration Source Id : AESS-034

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3065.840
NP-237	4341	2/28/10	4768.800	4856.741
CM-244	4320A	2/28/10	5795.020	5712.891

Energy/Channel Equation : see above
 Energy Calibration Zero : 2510.695
 Energy Calibration Slope : 6.785102
 Energy Calibration Quadratic : -2.1083013E-03
 Energy Calibration Range : 7248.000

Instrument : CHAMBER 035
 Detector : 78202
 Calibration Date/Time : 6-OCT-2009 07:34:40
 Calibration Source Id : AESS-035

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.483
NP-237	4341	2/28/10	4768.800	4768.621
CM-244	4320A	2/28/10	5795.020	5794.770

Energy/Channel Equation : see above
 Energy Calibration Zero : 2342.224
 Energy Calibration Slope : 4.946784
 Energy Calibration Quadratic : 3.4308483E-04
 Energy Calibration Range : 7767.000

Instrument : CHAMBER 036
 Detector : 78203
 Calibration Date/Time : 6-OCT-2009 07:34:48
 Calibration Source Id : AESS-036

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.258
NP-237	4341	2/28/10	4768.800	4768.727
CM-244	4320A	2/28/10	5795.020	5794.642

Energy/Channel Equation : see above
 Energy Calibration Zero : 2357.440
 Energy Calibration Slope : 4.922200
 Energy Calibration Quadratic : 3.4371525E-04
 Energy Calibration Range : 7758.000

Instrument : CHAMBER 037
 Detector : 45-149BB5
 Calibration Date/Time : 6-OCT-2009 07:34:56
 Calibration Source Id : AESS-037
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.527
 NP-237 4341 2/28/10 4768.800 4768.017
 CM-244 4320A 2/28/10 5795.020 5794.616
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2385.636
 Energy Calibration Slope : 4.924255
 Energy Calibration Quadratic : 2.8162368E-04
 Energy Calibration Range : 7723.000

Instrument : CHAMBER 038
 Detector : 72532
 Calibration Date/Time : 6-OCT-2009 07:35:05
 Calibration Source Id : AESS-038
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.767
 NP-237 4341 2/28/10 4768.800 4768.632
 CM-244 4320A 2/28/10 5795.020 5794.766
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2379.982
 Energy Calibration Slope : 4.937870
 Energy Calibration Quadratic : 3.2812863E-04
 Energy Calibration Range : 7780.000

Instrument : CHAMBER 039
 Detector : 45-149BB2
 Calibration Date/Time : 6-OCT-2009 07:35:14
 Calibration Source Id : AESS-039
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.115
 NP-237 4341 2/28/10 4768.800 4768.246
 CM-244 4320A 2/28/10 5795.020 5794.630
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2389.792
 Energy Calibration Slope : 4.909894
 Energy Calibration Quadratic : 3.1996722E-04
 Energy Calibration Range : 7753.000

Instrument : CHAMBER 040
 Detector : 78773
 Calibration Date/Time : 6-OCT-2009 07:35:30
 Calibration Source Id : AESS-040
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.559
 NP-237 4341 2/28/10 4768.800 4768.646
 CM-244 4320A 2/28/10 5795.020 5794.847
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2360.177
 Energy Calibration Slope : 4.882975
 Energy Calibration Quadratic : 3.4291152E-04
 Energy Calibration Range : 7720.000

Instrument : CHAMBER 041
 Detector : 78205
 Calibration Date/Time : 6-OCT-2009 07:35:39
 Calibration Source Id : AESS-041
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.828
 NP-237 4341 2/28/10 4768.800 4768.646
 CM-244 4320A 2/28/10 5795.020 5794.888
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2360.361
 Energy Calibration Slope : 4.946325
 Energy Calibration Quadratic : 3.4809459E-04
 Energy Calibration Range : 7790.000

Instrument : CHAMBER 042
 Detector : 78793
 Calibration Date/Time : 6-OCT-2009 07:35:48
 Calibration Source Id : AESS-042
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.747
 CM-244 4320A 2/28/10 5795.020 5795.021
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2379.531
 Energy Calibration Slope : 4.893367
 Energy Calibration Quadratic : 3.4989952E-04
 Energy Calibration Range : 7757.000

Instrument : CHAMBER 043
 Detector : 76543
 Calibration Date/Time : 6-OCT-2009 07:35:57
 Calibration Source Id : AESS-043

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.800
CM-244	4320A	2/28/10	5795.020	5794.779

Energy/Channel Equation : see above
 Energy Calibration Zero : 2371.808
 Energy Calibration Slope : 4.912579
 Energy Calibration Quadratic : 3.4951454E-04
 Energy Calibration Range : 7769.000

Instrument : CHAMBER 044
 Detector : 79459
 Calibration Date/Time : 6-OCT-2009 07:36:05
 Calibration Source Id : AESS-044

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3182.661
NP-237	4341	2/28/10	4768.800	4768.597
CM-244	4320A	2/28/10	5795.020	5794.998

Energy/Channel Equation : see above
 Energy Calibration Zero : 2361.626
 Energy Calibration Slope : 4.929942
 Energy Calibration Quadratic : 3.4448382E-04
 Energy Calibration Range : 7771.000

Instrument : CHAMBER 045
 Detector : 78783
 Calibration Date/Time : 6-OCT-2009 07:36:13
 Calibration Source Id : AESS-045

Cal. Isotopes	Source Id	Expiration Date	Standard Energy	Actual Energy
GD-148	6445-278	2/28/10	3183.000	3183.000
NP-237	4341	2/28/10	4768.800	4768.801
CM-244	4320A	2/28/10	5795.020	5795.019

Energy/Channel Equation : see above
 Energy Calibration Zero : 2364.945
 Energy Calibration Slope : 4.934100
 Energy Calibration Quadratic : 3.3029157E-04
 Energy Calibration Range : 7764.000

Instrument : CHAMBER 046
 Detector : 76544
 Calibration Date/Time : 6-OCT-2009 07:36:20
 Calibration Source Id : AESS-046
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.824
 NP-237 4341 2/28/10 4768.800 4768.715
 CM-244 4320A 2/28/10 5795.020 5794.886
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2362.032
 Energy Calibration Slope : 4.898512
 Energy Calibration Quadratic : 3.3288871E-04
 Energy Calibration Range : 7727.000

Instrument : CHAMBER 047
 Detector : 46-089B1
 Calibration Date/Time : 6-OCT-2009 07:36:28
 Calibration Source Id : AESS-047
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3182.590
 NP-237 4341 2/28/10 4768.800 4768.728
 CM-244 4320A 2/28/10 5795.020 5794.910
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2353.630
 Energy Calibration Slope : 4.972837
 Energy Calibration Quadratic : 3.0568099E-04
 Energy Calibration Range : 7766.000

Instrument : CHAMBER 048
 Detector : 42483
 Calibration Date/Time : 6-OCT-2009 07:36:36
 Calibration Source Id : AESS-048
 Cal. Isotopes Source Id Expiration Date Standard Energy Actual Energy
 GD-148 6445-278 2/28/10 3183.000 3183.000
 NP-237 4341 2/28/10 4768.800 4768.799
 CM-244 4320A 2/28/10 5795.020 5795.020
 Energy/Channel Equation : see above
 Energy Calibration Zero : 2369.578
 Energy Calibration Slope : 4.962992
 Energy Calibration Quadratic : 2.7933731E-04
 Energy Calibration Range : 7745.000

Subsection 2: Background Calibration

Instrument : CHAMBER 001
 Detector : 78788
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.441	3300.886	1.000000	0.2400001	100.0000	95.00000
NP-237	4434.241	4902.002	8.000000	1.920000	35.35534	95.00000
CM-244	5533.622	5884.936	11.00000	2.640001	30.15113	95.00000

Instrument : CHAMBER 002
 Detector : 78266
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.849	3300.306	3.000000	0.7200001	57.73503	95.00000
NP-237	4432.986	4901.899	8.000000	1.920000	35.35534	95.00000
CM-244	5531.074	5885.833	2.000000	0.4800001	70.71068	95.00000

Instrument : CHAMBER 003
 Detector : 67617
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.114	3299.375	3.000000	0.7200001	57.73503	95.00000
NP-237	4432.687	4905.323	10.00000	2.400001	31.62278	95.00000
CM-244	5531.736	5884.280	8.000000	1.920000	35.35534	95.00000

Instrument : CHAMBER 004
 Detector : 64279
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.168	3298.189	1.000000	0.2400001	100.0000	95.00000
NP-237	4436.994	4901.306	9.000000	2.160001	33.33334	95.00000
CM-244	5535.543	5883.828	5.000000	1.200000	44.72136	95.00000

Instrument : CHAMBER 005
 Detector : 67612
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.683	3298.337	7.000000	1.680000	37.79645	95.00000
NP-237	4434.065	4904.748	8.000000	1.920000	35.35534	95.00000
CM-244	5531.539	5883.696	3.000000	0.7200001	57.73503	95.00000

Instrument : CHAMBER 006
 Detector : 67613
 Background Analysis Date/Time : 4-OCT-2009 12:27:05
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.420	3302.030	1.000000	0.2400001	100.0000	95.00000
NP-237	4433.957	4905.615	11.00000	2.640001	30.15113	95.00000
CM-244	5531.576	5885.432	12.00000	2.880001	28.86751	95.00000

Instrument : CHAMBER 007
 Detector : 67607
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.453	3300.644	2.000000	0.4800001	70.71068	95.00000
NP-237	4436.233	4906.179	16.00000	3.840001	25.00000	95.00000
CM-244	5534.716	5882.592	17.00000	4.080001	24.25356	95.00000

Instrument : CHAMBER 008
 Detector : 78788
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.927	3298.611	4.000000	0.9600002	50.00000	95.00000
NP-237	4433.414	4905.734	3.000000	0.7200001	57.73503	95.00000
CM-244	5532.110	5885.974	8.000000	1.920000	35.35534	95.00000

Instrument : CHAMBER 009
 Detector : 72528
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.258	3299.443	1.000000	0.2400001	100.0000	95.00000
NP-237	4436.364	4903.243	6.000000	1.440000	40.82483	95.00000
CM-244	5535.592	5884.904	13.00000	3.120001	27.73501	95.00000

Instrument : CHAMBER 010
 Detector : 72529
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.986	3299.677	4.000000	0.9600002	50.00000	95.00000
NP-237	4436.858	4905.650	6.000000	1.440000	40.82483	95.00000
CM-244	5532.380	5883.357	12.00000	2.880001	28.86751	95.00000

Instrument : CHAMBER 011
 Detector : 72531
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.941	3300.792	4.000000	0.9600002	50.00000	95.00000
NP-237	4435.381	4904.777	5.000000	1.200000	44.72136	95.00000
CM-244	5534.525	5885.025	14.00000	3.360001	26.72612	95.00000

Instrument : CHAMBER 012
 Detector : 67594
 Background Analysis Date/Time : 4-OCT-2009 12:27:06
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.284	3298.664	6.000000	1.440000	40.82483	95.00000
NP-237	4435.039	4903.648	10.00000	2.400001	31.62278	95.00000
CM-244	5535.566	5886.583	15.00000	3.600001	25.81989	95.00000

Instrument : CHAMBER 013
 Detector : 78790
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.792	3302.000	2.000000	0.4799997	70.71068	95.00000
NP-237	4437.046	4903.690	5.000000	1.199999	44.72136	95.00000
CM-244	5533.535	5883.676	16.00000	3.839998	25.00000	95.00000

Instrument : CHAMBER 014
 Detector : 67616
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.991	3302.405	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4434.801	4901.898	3.000000	0.7199996	57.73503	95.00000
CM-244	5534.536	5884.005	16.00000	3.839998	25.00000	95.00000

Instrument : CHAMBER 015
 Detector : 61581
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.090	3297.900	5.000000	1.199999	44.72136	95.00000
NP-237	4434.643	4904.243	4.000000	0.9599994	50.00000	95.00000
CM-244	5530.383	5883.387	22.00000	5.279996	21.32007	95.00000

Instrument : CHAMBER 016
 Detector : 78774
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.478	3297.993	3.000000	0.7199996	57.73503	95.00000
NP-237	4435.680	4906.563	4.000000	0.9599994	50.00000	95.00000
CM-244	5535.188	5884.657	3.000000	0.7199996	57.73503	95.00000

Instrument : CHAMBER 017
 Detector : 78791
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.179	3300.868	2.000000	0.4799997	70.71068	95.00000
NP-237	4432.980	4904.604	5.000000	1.199999	44.72136	95.00000
CM-244	5530.423	5884.153	5.000000	1.199999	44.72136	95.00000

Instrument : CHAMBER 018
 Detector : 78782
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.144	3298.062	0.000000E+00	0.000000E+00	0.000000E+00	95.00000
NP-237	4436.722	4903.896	7.000000	1.679999	37.79645	95.00000
CM-244	5530.923	5885.427	2.000000	0.4799997	70.71068	95.00000

Instrument : CHAMBER 019
 Detector : 78786
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.942	3301.658	2.000000	0.4799997	70.71068	95.00000
NP-237	4435.742	4904.552	7.000000	1.679999	37.79645	95.00000
CM-244	5531.315	5884.461	9.000000	2.159998	33.33334	95.00000

Instrument : CHAMBER 020
 Detector : 78787
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.612	3302.259	3.000000	0.7199995	57.73503	95.00000
NP-237	4437.248	4904.603	18.00000	4.319997	23.57022	95.00000
CM-244	5531.524	5885.796	9.000000	2.159998	33.33334	95.00000

Instrument : CHAMBER 021
 Detector : 67047
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.083	3300.146	3.000000	0.7199995	57.73503	95.00000
NP-237	4432.482	4903.692	11.00000	2.639998	30.15113	95.00000
CM-244	5533.850	5886.843	27.00000	6.479995	19.24501	95.00000

Instrument : CHAMBER 022
 Detector : 72530
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2987.964	3302.384	2.000000	0.4799997	70.71068	95.00000
NP-237	4434.585	4905.188	4.000000	0.9599993	50.00000	95.00000
CM-244	5534.052	5886.085	13.00000	3.119998	27.73501	95.00000

Instrument : CHAMBER 023
 Detector : 78264
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.638	3299.478	1.000000	0.2399998	100.0000	95.00000
NP-237	4435.178	4902.738	5.000000	1.199999	44.72136	95.00000
CM-244	5535.207	5884.203	9.000000	2.159998	33.33334	95.00000

Instrument : CHAMBER 024
 Detector : 76542
 Background Analysis Date/Time : 4-OCT-2009 12:27:07
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.966	3297.612	2.000000	0.4799997	70.71068	95.00000
NP-237	4436.826	4905.796	10.00000	2.399998	31.62278	95.00000
CM-244	5532.191	5882.702	15.00000	3.599998	25.81989	95.00000

Instrument : CHAMBER 025
 Detector : 45-149AA5
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.746	3299.065	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.780	4902.204	14.00000	3.359998	26.72612	95.00000
CM-244	5534.306	5882.901	126.0000	30.23998	8.908708	95.00000

Instrument : CHAMBER 026
 Detector : 78204
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.886	3302.127	3.000000	0.7199996	57.73503	95.00000
NP-237	4437.039	4903.756	11.00000	2.639998	30.15113	95.00000
CM-244	5531.113	5886.264	100.0000	23.99998	10.00000	95.00000

Instrument : CHAMBER 027
 Detector : 42484
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.480	3297.801	3.000000	0.7199996	57.73503	95.00000
NP-237	4433.015	4906.280	9.000000	2.159999	33.33334	95.00000
CM-244	5534.576	5884.449	114.0000	27.35998	9.365858	95.00000

Instrument : CHAMBER 028
 Detector : 78792
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.311	3300.074	1.000000	0.2399998	100.0000	95.00000
NP-237	4434.084	4901.937	2.000000	0.4799997	70.71068	95.00000
CM-244	5535.676	5885.791	98.00000	23.51999	10.10153	95.00000

Instrument : CHAMBER 029
 Detector : 33454
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.479	3300.442	1.000000	0.2399998	100.0000	95.00000
NP-237	4436.521	4901.727	4.000000	0.9599994	50.00000	95.00000
CM-244	5535.072	5884.352	103.0000	24.71998	9.853293	95.00000

Instrument : CHAMBER 030
 Detector : 33447
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.805	3301.805	1.000000	0.2399998	100.0000	95.00000
NP-237	4432.561	4904.188	11.00000	2.639998	30.15113	95.00000
CM-244	5530.498	5884.744	92.00000	22.07999	10.42572	95.00000

Instrument : CHAMBER 031
 Detector : 67042
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.831	3300.223	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.171	4903.758	10.00000	2.400000	31.62278	95.00000
CM-244	5534.159	5885.214	82.00000	19.68000	11.04315	95.00000

Instrument : CHAMBER 032
 Detector : 67041
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.995	3298.824	4.000000	0.9600002	50.00000	95.00000
NP-237	4437.720	4906.375	20.00000	4.800001	22.36068	95.00000
CM-244	5535.070	5886.840	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 033
 Detector : 78785
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.828	3297.761	1.000000	0.2400000	100.0000	95.00000
NP-237	4434.037	4906.047	6.000000	1.440000	40.82483	95.00000
CM-244	5533.039	5882.356	81.00000	19.44000	11.11111	95.00000

Instrument : CHAMBER 034
 Detector : 61586
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.293	3300.824	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000
NP-237	4433.347	4902.684	39.00000	9.360002	16.01282	95.00000
CM-244	5532.745	5886.121	0.0000000E+00	0.0000000E+00	0.0000000E+00	95.00000

Instrument : CHAMBER 035
 Detector : 78202
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.104	3299.576	3.000000	0.7200001	57.73503	95.00000
NP-237	4433.307	4901.387	22.00000	5.280001	21.32007	95.00000
CM-244	5530.369	5886.338	100.0000	24.00000	10.00000	95.00000

Instrument : CHAMBER 036
 Detector : 78203
 Background Analysis Date/Time : 4-OCT-2009 12:27:09
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.103	3300.014	5.000000	1.200000	44.72136	95.00000
NP-237	4433.320	4904.469	13.00000	3.120001	27.73501	95.00000
CM-244	5530.632	5885.034	110.0000	26.40000	9.534626	95.00000

Instrument : CHAMBER 037
 Detector : 45-149BB5
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.587	3301.234	2.000000	0.4799997	70.71068	95.00000
NP-237	4436.459	4902.555	17.000000	4.079997	24.25356	95.00000
CM-244	5531.113	5885.586	108.00000	25.91998	9.622504	95.00000

Instrument : CHAMBER 038
 Detector : 72532
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2992.305	3299.659	2.000000	0.4799997	70.71068	95.00000
NP-237	4433.641	4904.628	9.000000	2.159998	33.33334	95.00000
CM-244	5535.538	5884.077	99.00000	23.75998	10.05038	95.00000

Instrument : CHAMBER 039
 Detector : 45-149BB2
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.574	3299.018	6.000000	1.439999	40.82483	95.00000
NP-237	4435.951	4903.816	10.00000	2.399998	31.62278	95.00000
CM-244	5530.396	5887.164	114.0000	27.35998	9.365858	95.00000

Instrument : CHAMBER 040
 Detector : 78773
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.816	3300.322	4.000000	0.9599993	50.00000	95.00000
NP-237	4435.336	4903.074	12.00000	2.879998	28.86751	95.00000
CM-244	5535.365	5887.334	91.00000	21.83998	10.48285	95.00000

Instrument : CHAMBER 041
 Detector : 78205
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.124	3297.496	2.000000	0.4799997	70.71068	95.00000
NP-237	4436.407	4904.667	7.000000	1.679999	37.79645	95.00000
CM-244	5534.009	5884.821	95.00000	22.79998	10.25978	95.00000

Instrument : CHAMBER 042
 Detector : 78793
 Background Analysis Date/Time : 4-OCT-2009 12:27:10
 Background Count Time : 60000.00

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.688	3301.802	3.000000	0.7199995	57.73503	95.00000
NP-237	4434.270	4903.204	11.00000	2.639998	30.15113	95.00000
CM-244	5531.941	5884.925	95.00000	22.79998	10.25978	95.00000

Instrument : CHAMBER 043
 Detector : 76543
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.342	3297.639	2.000000	0.4800001	70.71068	95.00000
NP-237	4434.322	4904.954	5.000000	1.200000	44.72136	95.00000
CM-244	5530.582	5884.754	83.00000	19.92000	10.97643	95.00000

Instrument : CHAMBER 044
 Detector : 79459
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2988.267	3300.630	4.000000	0.9600002	50.00000	95.00000
NP-237	4435.598	4902.170	15.00000	3.600001	25.81989	95.00000
CM-244	5534.541	5884.074	72.00000	17.28000	11.78511	95.00000

Instrument : CHAMBER 045
 Detector : 78783
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2991.885	3299.172	2.000000	0.4800001	70.71068	95.00000
NP-237	4433.040	4904.041	15.000000	3.600001	25.81989	95.00000
CM-244	5535.023	5883.628	65.000000	15.600000	12.40347	95.00000

Instrument : CHAMBER 046
 Detector : 76544
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.512	3299.742	7.000000	1.680000	37.79645	95.00000
NP-237	4436.725	4904.975	9.000000	2.160001	33.33334	95.00000
CM-244	5532.384	5884.423	62.000000	14.880000	12.70001	95.00000

Instrument : CHAMBER 047
 Detector : 46-089B1
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2990.110	3299.327	4.000000	0.9600002	50.00000	95.00000
NP-237	4433.432	4905.913	14.000000	3.360001	26.72612	95.00000
CM-244	5532.890	5887.284	84.000000	20.160000	10.91089	95.00000

Instrument : CHAMBER 048
 Detector : 42483
 Background Analysis Date/Time : 4-OCT-2009 12:27:11
 Background Count Time : 59999.99

Cal. Isotopes	Start Energy	End Energy	Counts in 1000 min	Counts during Cal	% Error	Confidence
GD-148	2989.285	3302.359	4.000000	0.9600002	50.00000	95.00000
NP-237	4435.788	4905.185	14.000000	3.360001	26.72612	95.00000
CM-244	5532.778	5884.266	43.000000	10.320000	15.24986	95.00000

Subsection 3: Efficiency Calibration

Instrument : CHAMBER 001
 Detector : 78788
 Standard ID : AESS-001
 Standard Reference Date : 20-FEB-2008 09:54:53
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:29:51
 Average Efficiency : 0.1170641
 Average Efficiency Error : 3.9776261E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.6698	28-FEB-2010	2989.441	3300.886	15102.00	0.3061090	1.3157059E-02	61.46019
NP-237	171.0024	28-FEB-2010	4434.241	4902.002	12075.00	0.2941744	1.4950445E-02	67.35207
CM-244	158.1060	28-FEB-2010	5533.622	5884.936	2908.000	8.1477851E-02	2.3455921E-03	0.0000000E+00

Instrument : CHAMBER 002
 Detector : 78266
 Standard ID : AESS-002
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:29:59
 Average Efficiency : 0.3076868
 Average Efficiency Error : 8.4732752E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1144	28-FEB-2010	2990.849	3300.306	14496.00	0.3063846	1.3178788E-02	51.06155
NP-237	200.4990	28-FEB-2010	4432.986	4901.899	14871.00	0.3090017	1.5656555E-02	68.37519
CM-244	196.5558	28-FEB-2010	5531.074	5885.833	13662.00	0.3082083	1.5634416E-02	56.27949

Instrument : CHAMBER 003
 Detector : 67617
 Standard ID : AESS-003
 Standard Reference Date : 15-FEB-2008 13:12:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:06
 Average Efficiency : 0.2978793
 Average Efficiency Error : 8.2169715E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.9740	28-FEB-2010	2990.114	3299.375	15107.00	0.3148319	1.3531940E-02	61.56522
NP-237	203.2080	28-FEB-2010	4432.687	4905.323	14701.00	0.3013868	1.5273048E-02	71.07141
CM-244	197.2236	28-FEB-2010	5531.736	5884.280	12300.00	0.2766226	1.4054317E-02	62.68796

Instrument : CHAMBER 004
 Detector : 64279
 Standard ID : AESS-004
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:14
 Average Efficiency : 0.3330874
 Average Efficiency Error : 9.1611817E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.1222	28-FEB-2010	2991.168	3298.189	15835.00	0.3249832	1.3956737E-02	53.14224
NP-237	204.2586	28-FEB-2010	4436.994	4901.306	16601.00	0.3385996	1.7132787E-02	66.35686
CM-244	198.8100	28-FEB-2010	5535.543	5883.828	15230.00	0.3398514	1.7214326E-02	54.23206

Instrument : CHAMBER 005
 Detector : 67612
 Standard ID : AESS-005
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:22
 Average Efficiency : 0.3013134
 Average Efficiency Error : 8.2950471E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.7452	28-FEB-2010	2987.683	3298.337	14884.00	0.2987357	1.2843589E-02	51.38546
NP-237	209.5938	28-FEB-2010	4434.065	4904.748	15311.00	0.3043405	1.5414570E-02	62.09734
CM-244	202.7478	28-FEB-2010	5531.539	5883.696	13801.00	0.3019906	1.5316823E-02	51.74085

Instrument : CHAMBER 006
 Detector : 67613
 Standard ID : AESS-006
 Standard Reference Date : 14-FEB-2008 09:35:18
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:14
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:30
 Average Efficiency : 0.3128007
 Average Efficiency Error : 8.6130099E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6952	28-FEB-2010	2988.420	3302.030	14687.00	0.3050137	1.3116646E-02	53.96157
NP-237	204.7038	28-FEB-2010	4433.957	4905.615	15465.00	0.3147306	1.5938818E-02	69.02951
CM-244	195.0060	28-FEB-2010	5531.576	5885.432	14195.00	0.3228947	1.6370744E-02	57.32907

Instrument : CHAMBER 007
 Detector : 67607
 Standard ID : AESS-007
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:44
 Average Efficiency : 0.2955749
 Average Efficiency Error : 8.1434380E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.7342	28-FEB-2010	2987.453	3300.644	14117.00	0.2888602	1.2431225E-02	50.32896
NP-237	205.0260	28-FEB-2010	4436.233	4906.179	14776.00	0.3002093	1.5212398E-02	59.19152
CM-244	199.6806	28-FEB-2010	5534.716	5882.592	13553.00	0.3010390	1.5272615E-02	52.85068

Instrument : CHAMBER 008
 Detector : 78788
 Standard ID : AESS-008
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:30:59
 Average Efficiency : 0.3210347
 Average Efficiency Error : 8.8313380E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.0418	28-FEB-2010	2988.927	3298.611	15677.00	0.3218499	1.3824582E-02	47.50993
NP-237	209.2716	28-FEB-2010	4433.414	4905.734	15957.00	0.3176950	1.6082633E-02	61.53691
CM-244	199.6488	28-FEB-2010	5532.110	5885.974	14553.00	0.3233571	1.6388621E-02	51.82884

Instrument : CHAMBER 009
 Detector : 72528
 Standard ID : AESS-009
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:08
 Average Efficiency : 0.3396772
 Average Efficiency Error : 9.3389135E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.3736	28-FEB-2010	2991.258	3299.443	16227.00	0.3374861	1.4487664E-02	44.72154
NP-237	204.0192	28-FEB-2010	4436.364	4903.243	16817.00	0.3434230	1.7374199E-02	63.92683
CM-244	197.2128	28-FEB-2010	5535.592	5884.904	15084.00	0.3390961	1.7178258E-02	51.67406

Instrument : CHAMBER 010
 Detector : 72529
 Standard ID : AESS-010
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:16
 Average Efficiency : 0.3096452
 Average Efficiency Error : 8.5257888E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.0008	28-FEB-2010	2991.986	3299.677	14638.00	0.3065297	1.3182675E-02	47.56829
NP-237	202.9926	28-FEB-2010	4436.858	4905.650	15178.00	0.3115173	1.5779816E-02	55.62252
CM-244	196.2330	28-FEB-2010	5532.380	5883.357	13814.00	0.3122560	1.5837347E-02	50.91301

Instrument : CHAMBER 011
 Detector : 72531
 Standard ID : AESS-011
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:24
 Average Efficiency : 0.2944759
 Average Efficiency Error : 8.1076277E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	212.8284	28-FEB-2010	2989.941	3300.792	14675.00	0.2916705	1.2543053E-02	45.84192
NP-237	214.4868	28-FEB-2010	4435.381	4904.777	15380.00	0.2987521	1.5130637E-02	61.26926
CM-244	208.4184	28-FEB-2010	5534.525	5885.025	13828.00	0.2942874	1.4925800E-02	50.20320

Instrument : CHAMBER 012
 Detector : 67594
 Standard ID : AESS-012
 Standard Reference Date : 14-FEB-2008 13:39:25
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:17
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:31
 Average Efficiency : 0.2993155
 Average Efficiency Error : 8.2423287E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	206.2200	28-FEB-2010	2991.284	3298.664	14664.00	0.3007817	1.2935068E-02	50.95671
NP-237	205.8930	28-FEB-2010	4435.039	4903.648	14736.00	0.2981648	1.5109295E-02	64.69898
CM-244	203.1954	28-FEB-2010	5535.566	5886.583	13673.00	0.2984623	1.5139968E-02	53.22255

Instrument : CHAMBER 013
 Detector : 78790
 Standard ID : AESS-013
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:39
 Average Efficiency : 0.3402545
 Average Efficiency Error : 9.3525015E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.6544	28-FEB-2010	2991.792	3302.000	16395.00	0.3405460	1.4616546E-02	48.69087
NP-237	210.2526	28-FEB-2010	4437.046	4903.690	17018.00	0.3372298	1.7058531E-02	69.07110
CM-244	201.9108	28-FEB-2010	5533.535	5883.676	15613.00	0.3429781	1.7367329E-02	52.85673

Instrument : CHAMBER 014
 Detector : 67616
 Standard ID : AESS-014
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:31:47
 Average Efficiency : 0.3154615
 Average Efficiency Error : 8.6780824E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	214.7088	28-FEB-2010	2988.991	3302.405	15631.00	0.3079327	1.3227411E-02	51.00696
NP-237	211.7160	28-FEB-2010	4434.801	4901.898	16325.00	0.3212697	1.6259110E-02	66.04585
CM-244	207.3882	28-FEB-2010	5534.536	5884.005	15018.00	0.3210322	1.6264105E-02	55.65382

Instrument : CHAMBER 015
 Detector : 61581
 Standard ID : AESS-015
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:05
 Average Efficiency : 0.3239309
 Average Efficiency Error : 8.9143794E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0270	28-FEB-2010	2988.090	3297.900	15299.00	0.3171847	1.3630020E-02	55.09682
NP-237	200.6460	28-FEB-2010	4434.643	4904.243	16005.00	0.3323445	1.6823623E-02	72.65751
CM-244	195.9270	28-FEB-2010	5530.383	5883.387	14390.00	0.3257269	1.6511347E-02	59.39601

Instrument : CHAMBER 016
 Detector : 78774
 Standard ID : AESS-016
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:13
 Average Efficiency : 0.3348206
 Average Efficiency Error : 9.2087686E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.0534	28-FEB-2010	2988.478	3297.993	15871.00	0.3290119	1.4129218E-02	47.19107
NP-237	199.3962	28-FEB-2010	4435.680	4906.563	16392.00	0.3425145	1.7333448E-02	68.63850
CM-244	198.6402	28-FEB-2010	5535.188	5884.657	15037.00	0.3358302	1.7013419E-02	50.23811

Instrument : CHAMBER 017
 Detector : 78791
 Standard ID : AESS-017
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:21
 Average Efficiency : 0.2974587
 Average Efficiency Error : 8.1904847E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	210.0798	28-FEB-2010	2992.179	3300.868	14719.00	0.2963764	1.2744716E-02	46.79632
NP-237	208.5846	28-FEB-2010	4432.980	4904.604	15110.00	0.3018124	1.5289096E-02	64.17606
CM-244	205.5828	28-FEB-2010	5530.423	5884.153	13661.00	0.2947841	1.4953489E-02	50.85275

Instrument : CHAMBER 018
 Detector : 78782
 Standard ID : AESS-018
 Standard Reference Date : 14-FEB-2008 17:45:04
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:19
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:30
 Average Efficiency : 0.3232387
 Average Efficiency Error : 8.8925390E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	202.1856	28-FEB-2010	2989.144	3298.062	15553.00	0.3254129	1.3979518E-02	44.73234
NP-237	208.8990	28-FEB-2010	4436.722	4903.896	16034.00	0.3197786	1.6187187E-02	61.57305
CM-244	198.1458	28-FEB-2010	5530.923	5885.427	14462.00	0.3237990	1.6412353E-02	48.65820

Instrument : CHAMBER 019
 Detector : 78786
 Standard ID : AESS-019
 Standard Reference Date : 19-FEB-2008 11:05:22
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:38
 Average Efficiency : 0.2919804
 Average Efficiency Error : 8.0469577E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	204.6468	28-FEB-2010	2987.942	3301.658	13855.00	0.2863555	1.2327870E-02	46.10098
NP-237	202.9140	28-FEB-2010	4435.742	4904.552	14627.00	0.3003190	1.5219935E-02	61.83296
CM-244	199.3140	28-FEB-2010	5531.315	5884.461	13136.00	0.2922035	1.4831048E-02	56.75883

Instrument : CHAMBER 020
 Detector : 78787
 Standard ID : AESS-020
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:46
 Average Efficiency : 0.3461189
 Average Efficiency Error : 9.5147844E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	205.5870	28-FEB-2010	2987.612	3302.259	16442.00	0.3383054	1.4519696E-02	48.46275
NP-237	203.4984	28-FEB-2010	4437.248	4904.603	17255.00	0.3532113	1.7864209E-02	69.81705
CM-244	197.1096	28-FEB-2010	5531.524	5885.796	15588.00	0.3508011	1.7763764E-02	55.01109

Instrument : CHAMBER 021
 Detector : 67047
 Standard ID : AESS-021
 Standard Reference Date : 19-FEB-2008 15:31:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:32:53
 Average Efficiency : 0.3036543
 Average Efficiency Error : 8.3605787E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	208.3608	28-FEB-2010	2991.083	3300.146	14662.00	0.2976273	1.2799400E-02	53.30055
NP-237	210.1548	28-FEB-2010	4432.482	4903.692	15497.00	0.3072018	1.5557135E-02	62.81018
CM-244	200.7390	28-FEB-2010	5533.850	5886.843	13999.00	0.3090917	1.5674066E-02	53.79641

Instrument : CHAMBER 022
 Detector : 72530
 Standard ID : AESS-022
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:01
 Average Efficiency : 0.3151155
 Average Efficiency Error : 8.6721405E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	209.6724	28-FEB-2010	2987.964	3302.384	15259.00	0.3078506	1.3229508E-02	51.15461
NP-237	206.8830	28-FEB-2010	4434.585	4905.188	16173.00	0.3257087	1.6485624E-02	62.30558
CM-244	203.0208	28-FEB-2010	5534.052	5886.085	14453.00	0.3157637	1.6005291E-02	52.81313

Instrument : CHAMBER 023
 Detector : 78264
 Standard ID : AESS-023
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:09
 Average Efficiency : 0.3294301
 Average Efficiency Error : 9.0611009E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	207.4764	28-FEB-2010	2989.638	3299.478	15787.00	0.3218794	1.3824158E-02	49.26515
NP-237	207.4998	28-FEB-2010	4435.178	4902.738	16470.00	0.3306996	1.6734598E-02	63.46927
CM-244	199.8804	28-FEB-2010	5535.207	5884.203	15311.00	0.3397900	1.7210081E-02	51.23116

Instrument : CHAMBER 024
 Detector : 76542
 Standard ID : AESS-024
 Standard Reference Date : 14-FEB-2008 21:55:55
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:21
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:17
 Average Efficiency : 0.3265466
 Average Efficiency Error : 8.9866361E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.5218	28-FEB-2010	2988.966	3297.612	15184.00	0.3155952	1.3563512E-02	53.26322
NP-237	205.6662	28-FEB-2010	4436.826	4905.796	16470.00	0.3336236	1.6882595E-02	64.50421
CM-244	198.3060	28-FEB-2010	5532.191	5882.702	15051.00	0.3366388	1.7054273E-02	54.72839

Instrument : CHAMBER 025
 Detector : 45-149AA5
 Standard ID : AESS-025
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:25
 Average Efficiency : 0.3275933
 Average Efficiency Error : 9.0299817E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.5670	28-FEB-2010	2990.746	3299.065	15305.00	0.3310509	1.4225741E-02	57.64912
NP-237	167.9916	28-FEB-2010	4432.780	4902.204	13189.00	0.3270416	1.6598335E-02	67.26674
CM-244	157.2432	28-FEB-2010	5534.306	5882.901	11497.00	0.3235089	1.6456075E-02	59.53814

Instrument : CHAMBER 026
 Detector : 78204
 Standard ID : AESS-026
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:33
 Average Efficiency : 0.3117441
 Average Efficiency Error : 9.1406014E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.5072	28-FEB-2010	2989.886	3302.127	14629.00	0.3101691	1.5720192E-02	50.46342
NP-237	168.0294	28-FEB-2010	4437.039	4903.756	12744.00	0.3159511	1.6043676E-02	62.50089
CM-244	160.5822	28-FEB-2010	5531.113	5886.264	11219.00	0.3092745	1.5738295E-02	52.20251

Instrument : CHAMBER 027
 Detector : 42484
 Standard ID : AESS-027
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:41
 Average Efficiency : 0.3377378
 Average Efficiency Error : 9.8986309E-03
 Confidence : 95.00000

Cal. Isteps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.4238	28-FEB-2010	2988.480	3297.801	15205.00	0.3325215	1.6844572E-02	45.70711
NP-237	161.6154	28-FEB-2010	4433.015	4906.280	13169.00	0.3394597	1.7228922E-02	62.64782
CM-244	148.1754	28-FEB-2010	5534.576	5884.449	11435.00	0.3415364	1.7374527E-02	49.08809

Instrument : CHAMBER 028
 Detector : 78792
 Standard ID : AESS-028
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:49
 Average Efficiency : 0.2998267
 Average Efficiency Error : 8.7975496E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	199.6542	28-FEB-2010	2991.311	3300.074	14132.00	0.2994205	1.5182513E-02	43.09942
NP-237	168.1992	28-FEB-2010	4434.084	4901.937	12215.00	0.3025812	1.5374796E-02	56.18161
CM-244	156.7614	28-FEB-2010	5535.676	5885.791	10538.00	0.2975542	1.5158846E-02	48.81636

Instrument : CHAMBER 029
 Detector : 33454
 Standard ID : AESS-029
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:33:57
 Average Efficiency : 0.3147998
 Average Efficiency Error : 9.2300801E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.5742	28-FEB-2010	2991.479	3300.442	14764.00	0.3098317	1.5701165E-02	55.43900
NP-237	169.7700	28-FEB-2010	4436.521	4901.727	12812.00	0.3144220	1.5964665E-02	72.65047
CM-244	154.8234	28-FEB-2010	5535.072	5884.352	11212.00	0.3205570	1.6312657E-02	62.69990

Instrument : CHAMBER 030
 Detector : 33447
 Standard ID : AESS-030
 Standard Reference Date : 15-FEB-2008 09:06:52
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:24
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:05
 Average Efficiency : 0.3252787
 Average Efficiency Error : 9.5355082E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.9792	28-FEB-2010	2988.805	3301.805	14768.00	0.3139574	1.5910186E-02	59.95137
NP-237	166.3758	28-FEB-2010	4432.561	4904.188	13305.00	0.3331409	1.6905690E-02	72.98332
CM-244	157.1856	28-FEB-2010	5530.498	5884.744	11719.00	0.3301300	1.6787019E-02	60.55718

Instrument : CHAMBER 031
 Detector : 67042
 Standard ID : AESS-031
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:14
 Average Efficiency : 0.3165053
 Average Efficiency Error : 8.7338677E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	193.6650	28-FEB-2010	2989.831	3300.223	14524.00	0.3172176	1.3644255E-02	86.51537
NP-237	162.9186	28-FEB-2010	4434.171	4903.758	12697.00	0.3246664	1.6487148E-02	124.4390
CM-244	153.1968	28-FEB-2010	5534.159	5885.214	10665.00	0.3081662	1.5695792E-02	83.37914

Instrument : CHAMBER 032
 Detector : 67041
 Standard ID : AESS-032
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 5-OCT-2009 12:57:42
 Average Efficiency : 0.3013491
 Average Efficiency Error : 8.3197737E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	195.2364	28-FEB-2010	2988.995	3298.824	7474.000	0.3038873	1.3079208E-02	0.0000000E+00
NP-237	165.9822	28-FEB-2010	4437.720	4906.375	2.000000	0.3021212	1.5355161E-02	265.5527
CM-244	153.7938	28-FEB-2010	5535.070	5886.840	0.0000000E+00	0.2971950	1.5144484E-02	0.0000000E+00

Instrument : CHAMBER 033
 Detector : 78785
 Standard ID : AESS-033
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:25
 Average Efficiency : 0.3128877
 Average Efficiency Error : 8.6370576E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.4158	28-FEB-2010	2989.828	3297.761	14059.00	0.3090549	1.3301339E-02	52.12262
NP-237	161.7816	28-FEB-2010	4434.037	4906.047	12256.00	0.3156150	1.6036268E-02	59.37875
CM-244	147.2670	28-FEB-2010	5533.039	5882.356	10505.00	0.3157493	1.6086496E-02	51.20487

Instrument : CHAMBER 034
 Detector : 61586
 Standard ID : AESS-034
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 5-OCT-2009 12:58:01
 Average Efficiency : 0.2220411
 Average Efficiency Error : 6.4285840E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.5488	28-FEB-2010	2988.293	3300.824	11391.00	0.2895562	1.2467581E-02	89.70998
NP-237	167.2962	28-FEB-2010	4433.347	4902.684	1.000000	0.3134575	1.5920211E-02	6.785102
CM-244	154.4388	28-FEB-2010	5532.745	5886.121	0.0000000E+00	0.1645078	8.5068326E-03	0.0000000E+00

Instrument : CHAMBER 035
 Detector : 78202
 Standard ID : AESS-035
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:40
 Average Efficiency : 0.3042172
 Average Efficiency Error : 8.3945282E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	198.6666	28-FEB-2010	2991.104	3299.576	14244.00	0.3032596	1.3048678E-02	49.52762
NP-237	168.2934	28-FEB-2010	4433.307	4901.387	12373.00	0.3062045	1.5555969E-02	61.22158
CM-244	158.8128	28-FEB-2010	5530.369	5886.338	10896.00	0.3035987	1.5457427E-02	58.22495

Instrument : CHAMBER 036
 Detector : 78203
 Standard ID : AESS-036
 Standard Reference Date : 18-FEB-2008 11:28:15
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:26
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:48
 Average Efficiency : 0.3253655
 Average Efficiency Error : 8.9688124E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	201.3204	28-FEB-2010	2988.103	3300.014	15239.00	0.3201576	1.3758717E-02	56.44998
NP-237	167.4312	28-FEB-2010	4433.320	4904.469	13097.00	0.3258525	1.6539684E-02	72.79517
CM-244	156.4188	28-FEB-2010	5530.632	5885.034	11762.00	0.3327303	1.6918454E-02	53.84407

Instrument : CHAMBER 037
 Detector : 45-149BB5
 Standard ID : AESS-037
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:34:56
 Average Efficiency : 0.3567447
 Average Efficiency Error : 9.8222708E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7372	28-FEB-2010	2990.587	3301.234	16270.00	0.3480281	1.4939565E-02	72.94692
NP-237	167.1294	28-FEB-2010	4436.459	4902.555	14545.00	0.3625170	1.8373555E-02	81.14367
CM-244	154.7664	28-FEB-2010	5531.113	5885.586	12738.00	0.3642576	1.8497935E-02	70.65152

Instrument : CHAMBER 038
 Detector : 72532
 Standard ID : AESS-038
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:05
 Average Efficiency : 0.3441179
 Average Efficiency Error : 9.4756875E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	200.1408	28-FEB-2010	2992.305	3299.659	16131.00	0.3409107	1.4636146E-02	59.05025
NP-237	170.0886	28-FEB-2010	4433.641	4904.628	14132.00	0.3461397	1.7550293E-02	64.09210
CM-244	157.7460	28-FEB-2010	5535.538	5884.077	12357.00	0.3467269	1.7615909E-02	57.18062

Instrument : CHAMBER 039
 Detector : 45-149BB2
 Standard ID : AESS-039
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:14
 Average Efficiency : 0.3544333
 Average Efficiency Error : 9.7644692E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	192.2418	28-FEB-2010	2988.574	3299.018	15783.00	0.3472402	1.4913449E-02	62.39804
NP-237	159.1506	28-FEB-2010	4435.951	4903.816	13978.00	0.3658909	1.8554559E-02	71.68822
CM-244	151.7142	28-FEB-2010	5530.396	5887.164	12142.00	0.3541290	1.7997203E-02	73.21387

Instrument : CHAMBER 040
 Detector : 78773
 Standard ID : AESS-040
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:30
 Average Efficiency : 0.3195167
 Average Efficiency Error : 8.8120243E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4828	28-FEB-2010	2990.816	3300.322	14717.00	0.3200646	1.3763377E-02	48.66933
NP-237	166.8174	28-FEB-2010	4435.336	4903.074	12848.00	0.3208383	1.6289845E-02	67.76543
CM-244	155.0100	28-FEB-2010	5535.365	5887.334	11118.00	0.3174615	1.6157331E-02	51.18541

Instrument : CHAMBER 041
 Detector : 78205
 Standard ID : AESS-041
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:39
 Average Efficiency : 0.3288728
 Average Efficiency Error : 9.0603521E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	203.9034	28-FEB-2010	2989.124	3297.496	15761.00	0.3269444	1.4042080E-02	47.53713
NP-237	171.2268	28-FEB-2010	4436.407	4904.667	13629.00	0.3316104	1.6822139E-02	66.71667
CM-244	159.5796	28-FEB-2010	5534.009	5884.821	11858.00	0.3289023	1.6721375E-02	49.54688

Instrument : CHAMBER 042
 Detector : 78793
 Standard ID : AESS-042
 Standard Reference Date : 18-FEB-2008 15:31:47
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:29
 Calibration Count Time : 239.9998
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:48
 Average Efficiency : 0.3337009
 Average Efficiency Error : 9.2022466E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	188.7090	28-FEB-2010	2991.688	3301.802	14699.00	0.3294593	1.4167678E-02	48.24435
NP-237	159.6558	28-FEB-2010	4434.270	4903.204	12831.00	0.3347926	1.6998671E-02	59.09972
CM-244	150.5208	28-FEB-2010	5531.941	5884.925	11524.00	0.3388561	1.7235642E-02	51.74503

Instrument : CHAMBER 043
 Detector : 76543
 Standard ID : AESS-043
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:35:57
 Average Efficiency : 0.3418410
 Average Efficiency Error : 9.4167739E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.7708	28-FEB-2010	2991.342	3297.639	15680.00	0.3353467	1.4404230E-02	54.31265
NP-237	168.7422	28-FEB-2010	4434.322	4904.954	14182.00	0.3501596	1.7753214E-02	67.72367
CM-244	156.3252	28-FEB-2010	5530.582	5884.754	12123.00	0.3433350	1.7448707E-02	56.73003

Instrument : CHAMBER 044
 Detector : 79459
 Standard ID : AESS-044
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:36:05
 Average Efficiency : 0.3497279
 Average Efficiency Error : 9.6306484E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.4510	28-FEB-2010	2988.267	3300.630	16147.00	0.3512200	1.5078514E-02	47.50124
NP-237	166.6248	28-FEB-2010	4435.598	4902.170	13952.00	0.3487979	1.7688267E-02	63.48624
CM-244	155.8290	28-FEB-2010	5534.541	5884.074	12267.00	0.3486014	1.7712867E-02	53.61492

Instrument : CHAMBER 045
 Detector : 78783
 Standard ID : AESS-045
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:36:13
 Average Efficiency : 0.3405233
 Average Efficiency Error : 9.3887197E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	186.9936	28-FEB-2010	2991.885	3299.172	15056.00	0.3405590	1.4638593E-02	42.74657
NP-237	160.8066	28-FEB-2010	4433.040	4904.041	12962.00	0.3357659	1.7045524E-02	58.07777
CM-244	145.8384	28-FEB-2010	5535.023	5883.628	11379.00	0.3455315	1.7578544E-02	44.01299

Instrument : CHAMBER 046
 Detector : 76544
 Standard ID : AESS-046
 Standard Reference Date : 19-FEB-2008 19:35:48
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:36:20
 Average Efficiency : 0.3396066
 Average Efficiency Error : 9.3588978E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	194.7474	28-FEB-2010	2989.512	3299.742	15390.00	0.3342214	1.4360611E-02	48.90350
NP-237	164.6658	28-FEB-2010	4436.725	4904.975	13538.00	0.3425081	1.7376650E-02	72.80901
CM-244	151.3824	28-FEB-2010	5532.384	5884.423	11782.00	0.3446751	1.7524688E-02	50.87139

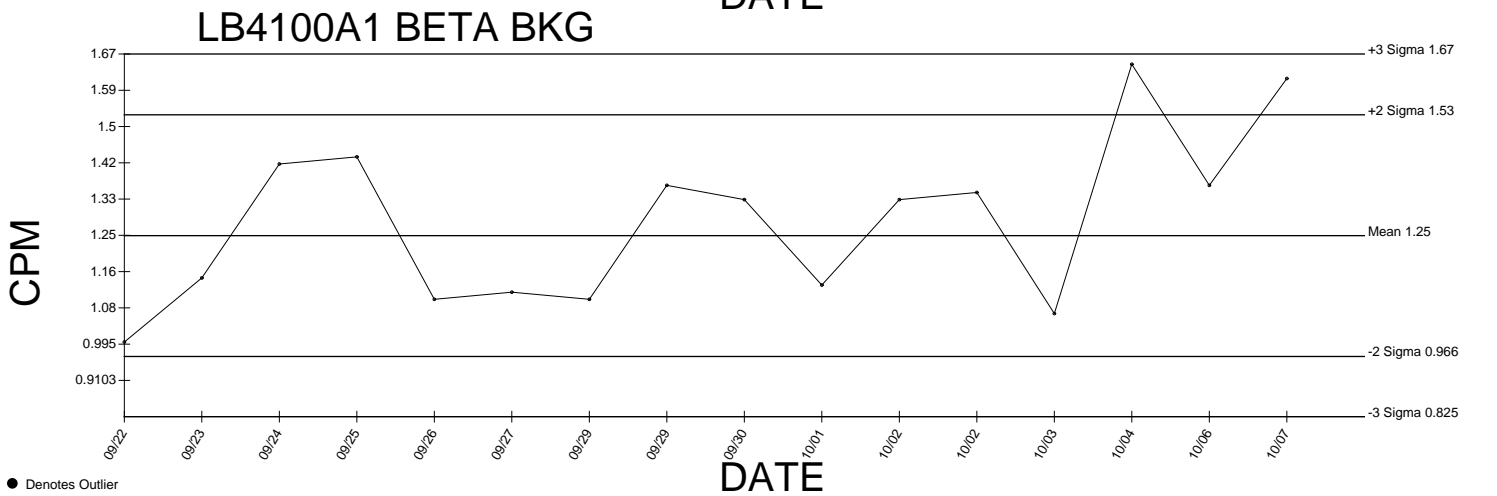
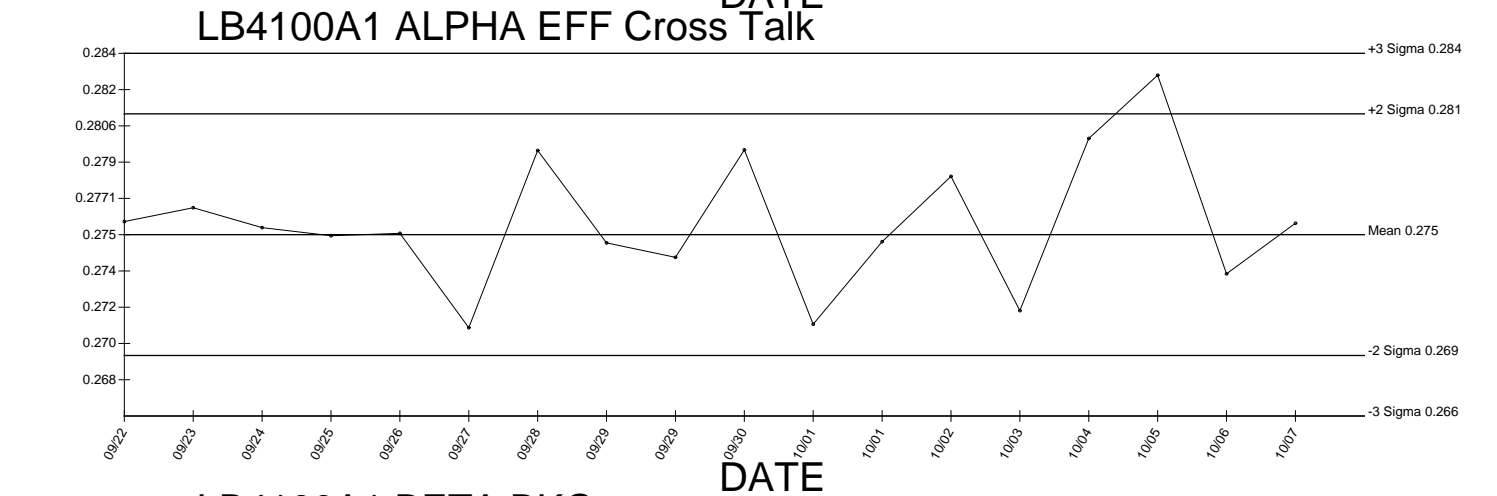
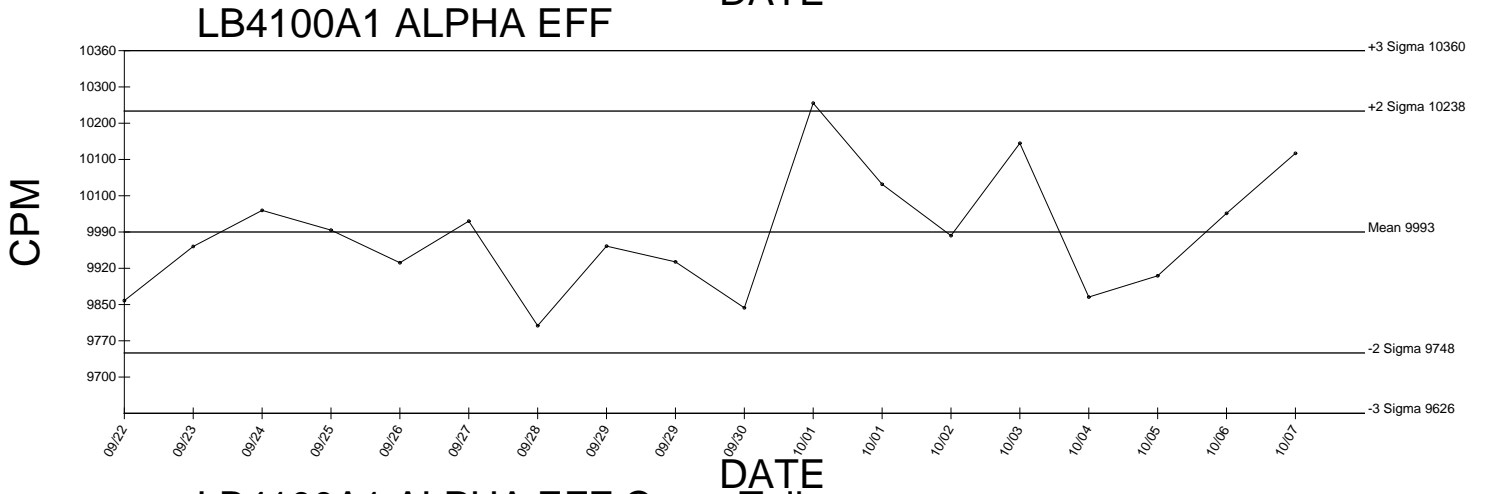
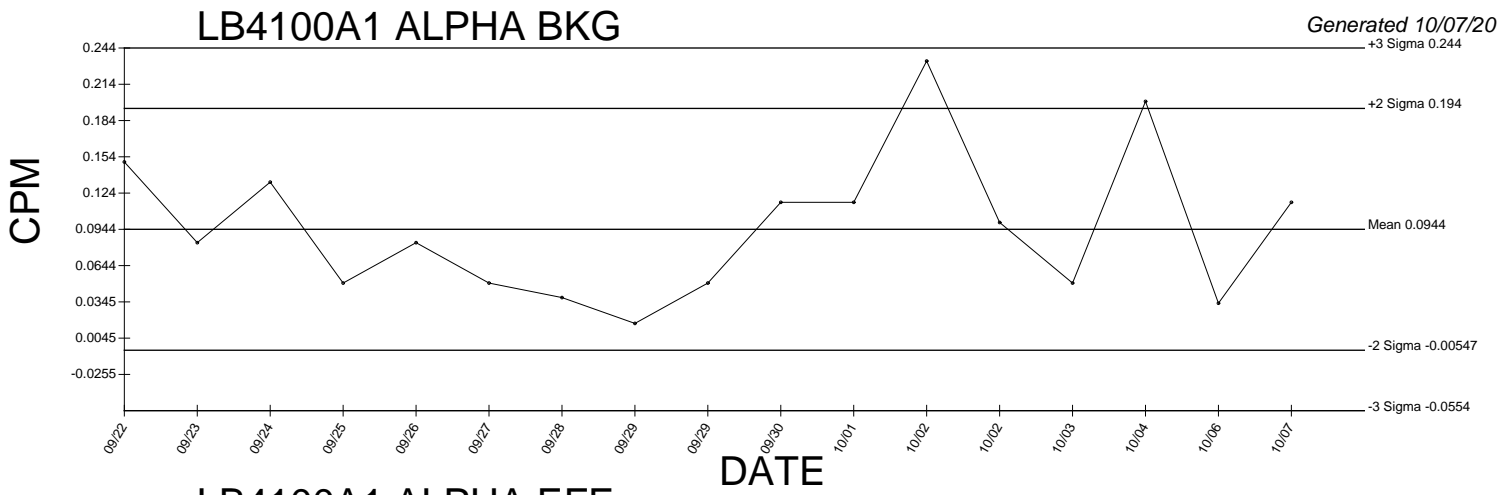
Instrument : CHAMBER 047
 Detector : 46-089B1
 Standard ID : AESS-047
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:36:28
 Average Efficiency : 0.3425100
 Average Efficiency Error : 9.4339019E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	197.4804	28-FEB-2010	2990.110	3299.327	16029.00	0.3433048	1.4740521E-02	55.95443
NP-237	168.3948	28-FEB-2010	4433.432	4905.913	13798.00	0.3413330	1.7312385E-02	72.11221
CM-244	154.6032	28-FEB-2010	5532.890	5887.284	11964.00	0.3425916	1.7414661E-02	59.97544

Instrument : CHAMBER 048
 Detector : 42483
 Standard ID : AESS-048
 Standard Reference Date : 19-FEB-2008 00:32:27
 Calibration Analysis Date/Time : 5-OCT-2009 13:55:31
 Calibration Count Time : 240.0000
 Efficiency Calibration Date/Time : 6-OCT-2009 07:36:36
 Average Efficiency : 0.3160317
 Average Efficiency Error : 8.7210629E-03
 Confidence : 95.00000

Cal. Istps	DPM	Exp. Date	Start Engy	End Engy	Counts	EFF.	EFF Err	Resolution
GD-148	191.8350	28-FEB-2010	2989.285	3302.359	14301.00	0.3153065	1.3566012E-02	58.11379
NP-237	161.5530	28-FEB-2010	4435.788	4905.185	12134.00	0.3128656	1.5899187E-02	65.94836
CM-244	151.1856	28-FEB-2010	5532.778	5884.266	10934.00	0.3204127	1.6311672E-02	55.35687

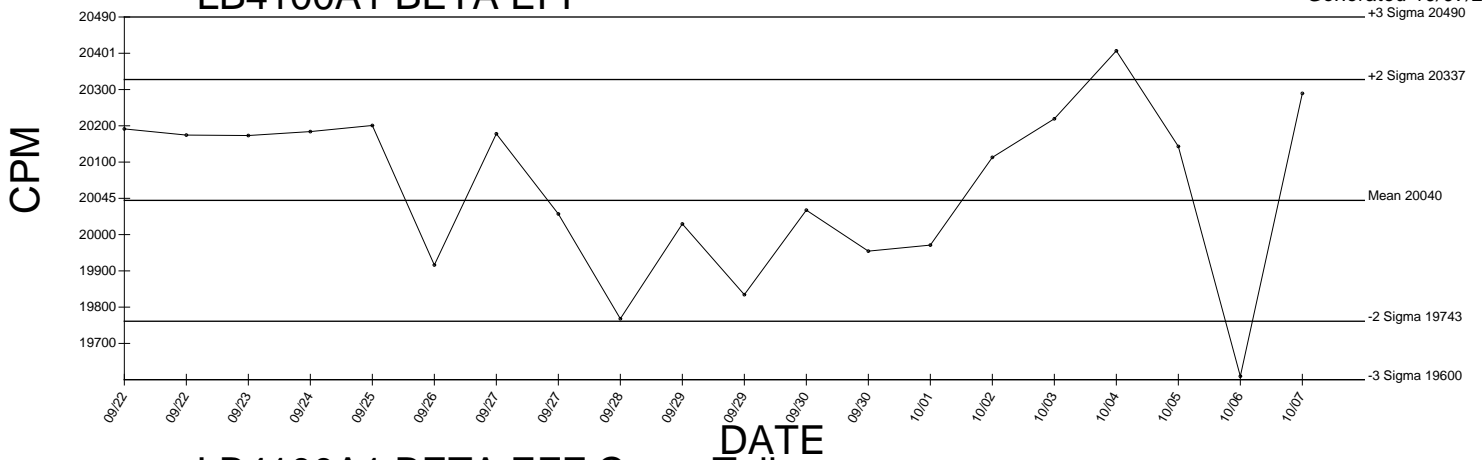
BACKGROUND AND EFFICIENCY DATA



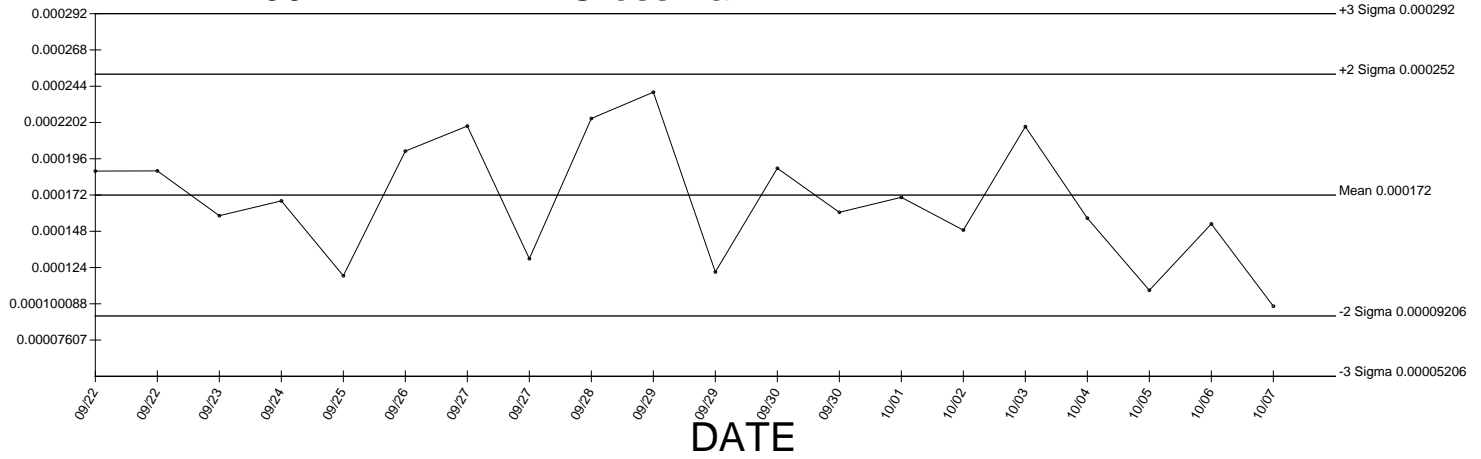
● Denotes Outlier

LB4100A1 BETA EFF

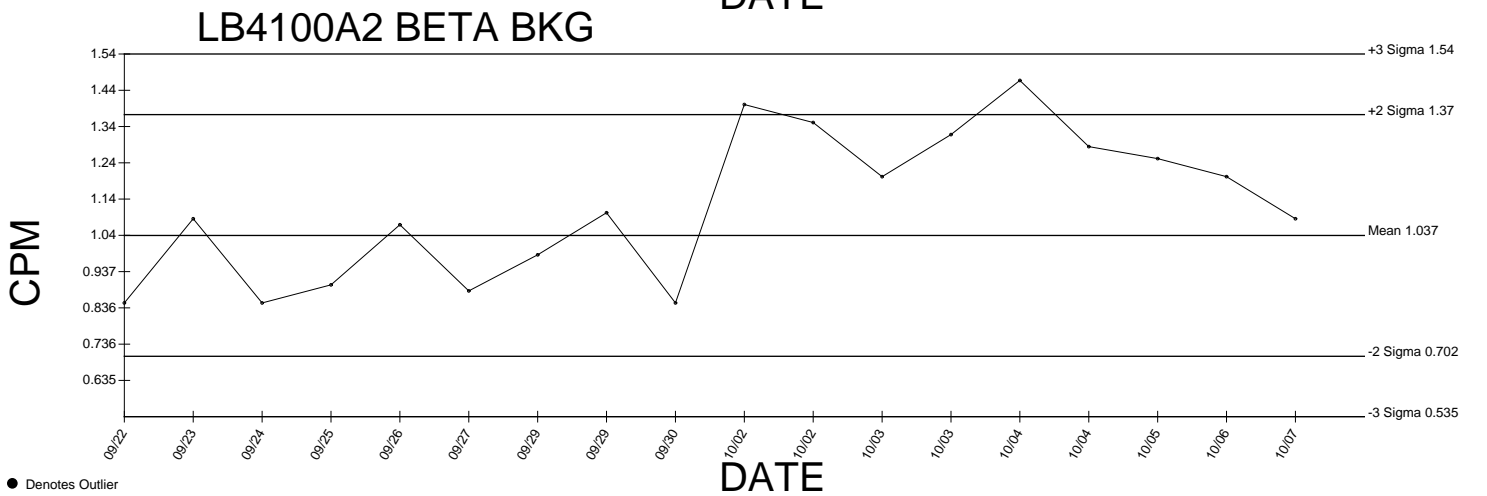
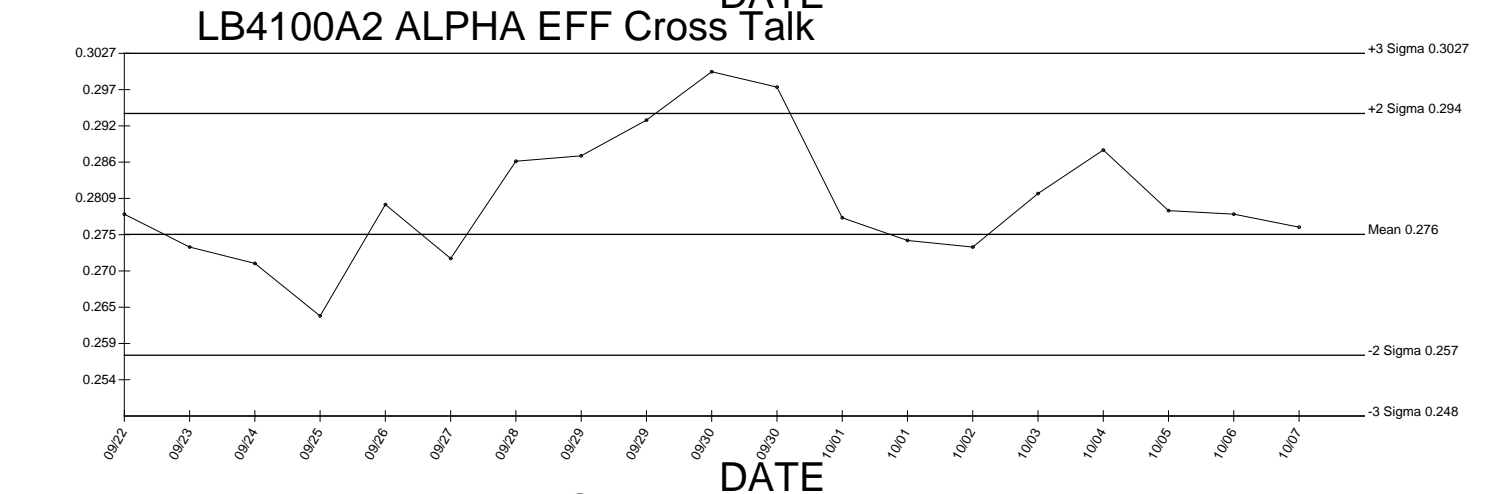
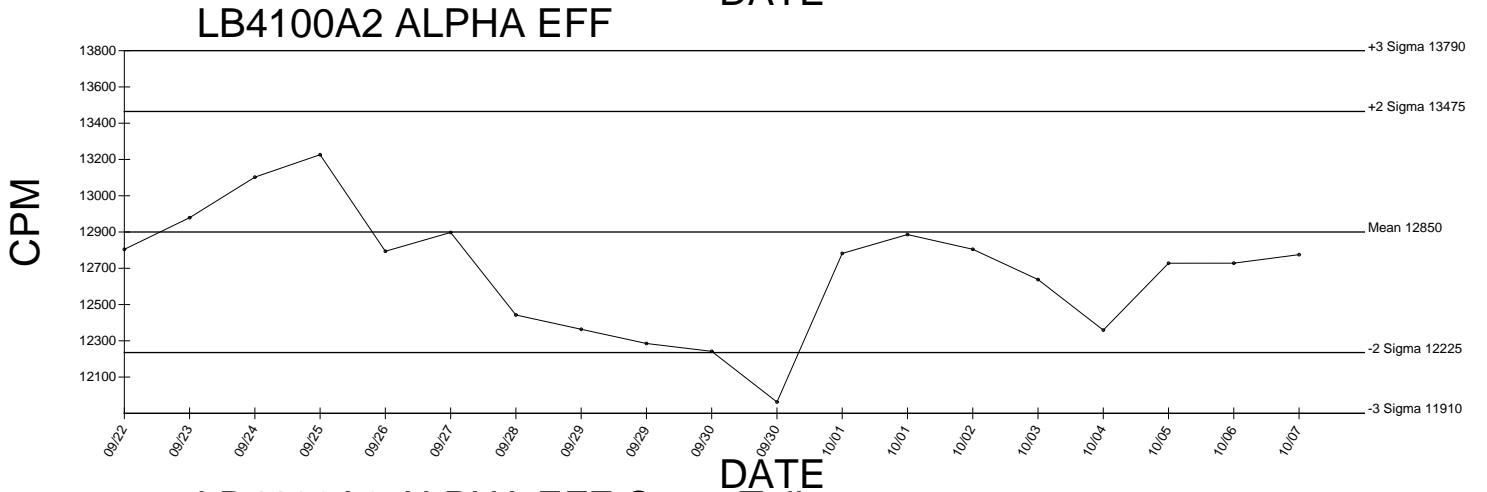
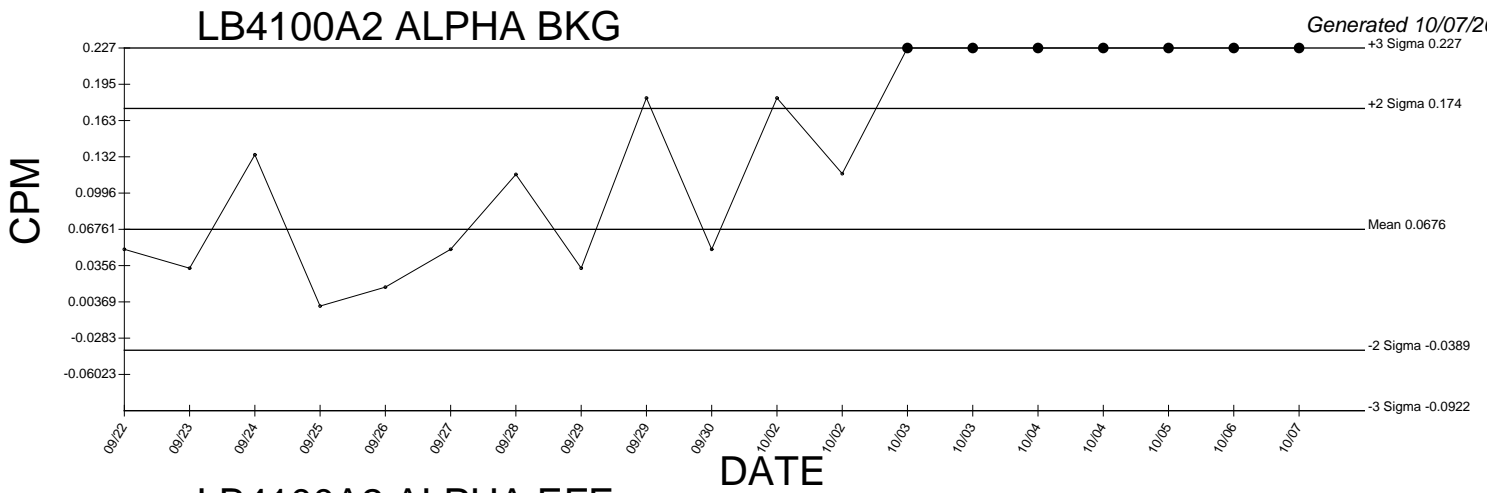
Generated 10/07/2009



LB4100A1 BETA EFF Cross Talk



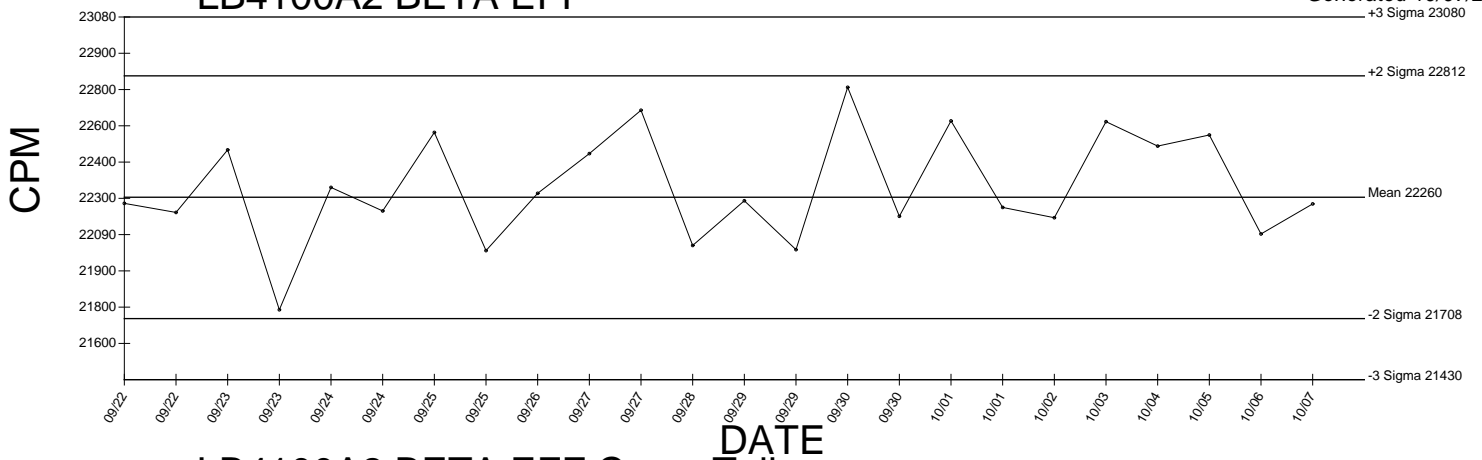
● Denotes Outlier



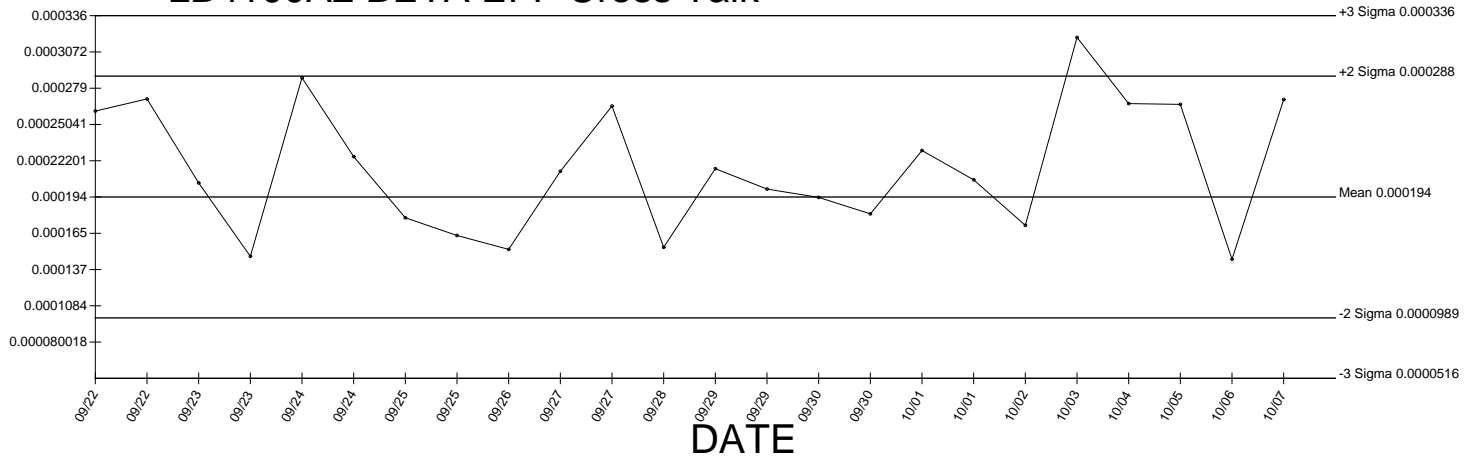
● Denotes Outlier

LB4100A2 BETA EFF

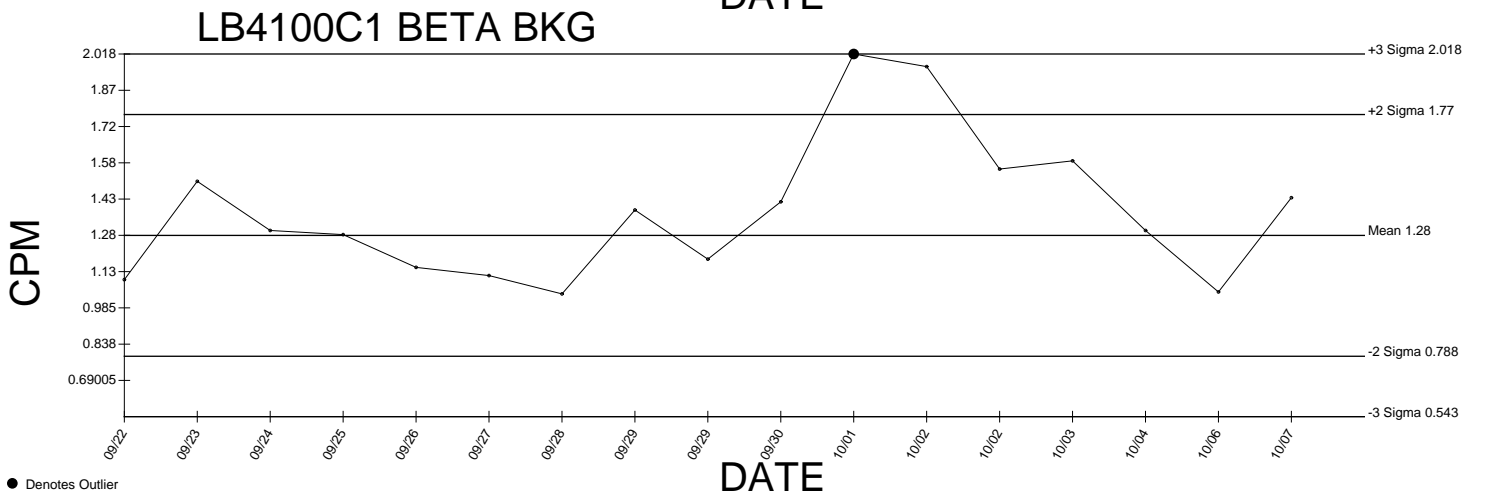
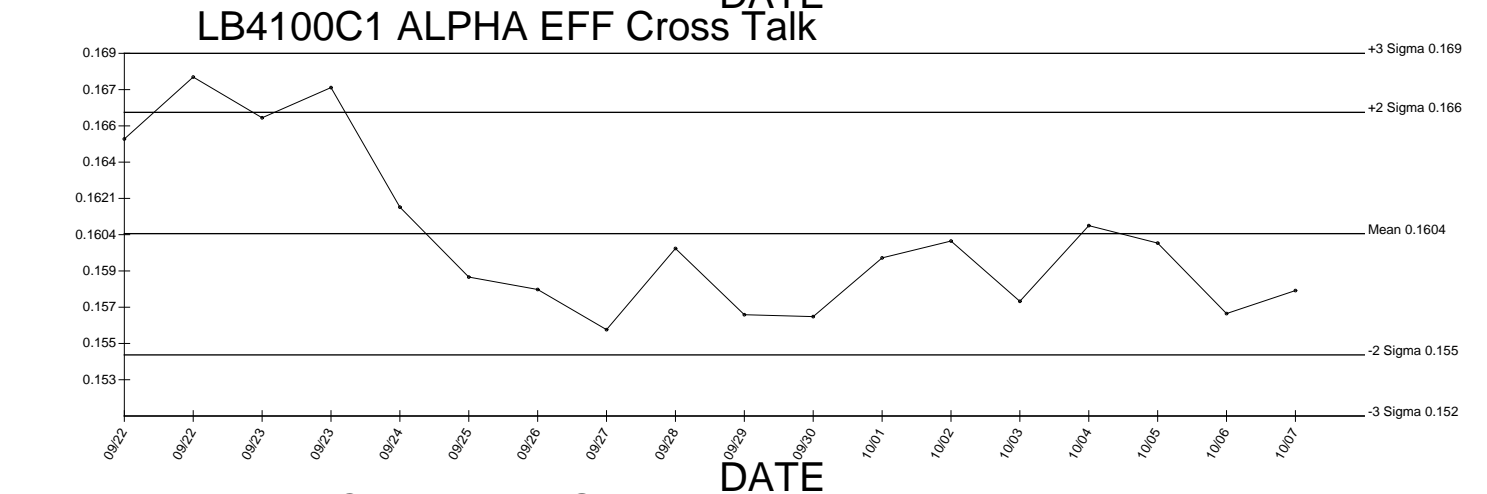
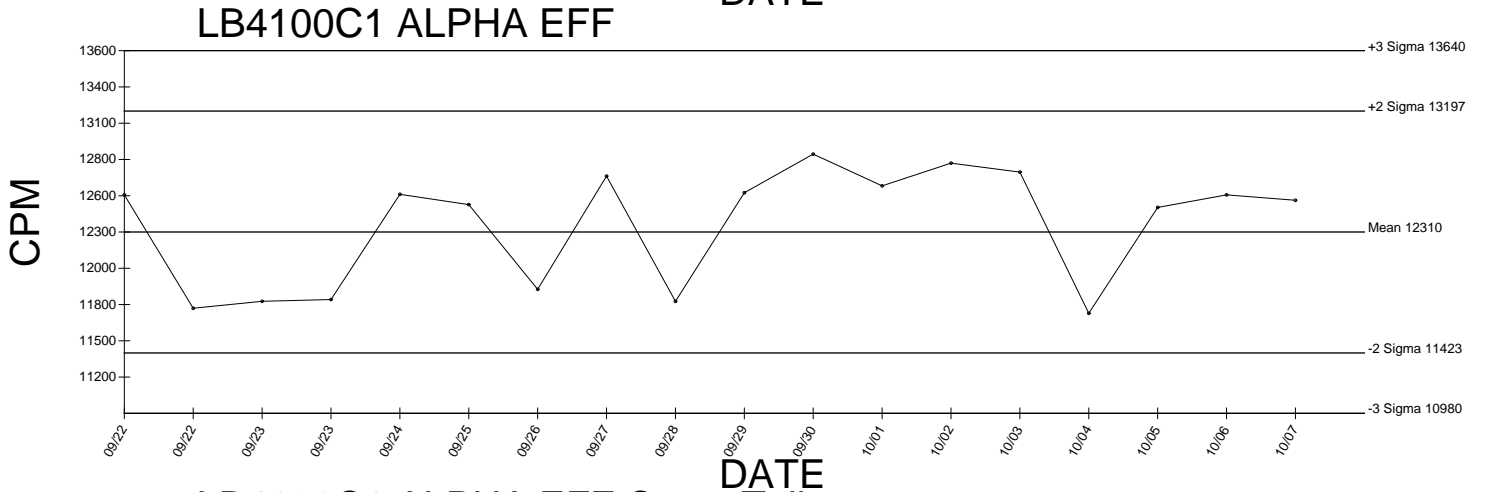
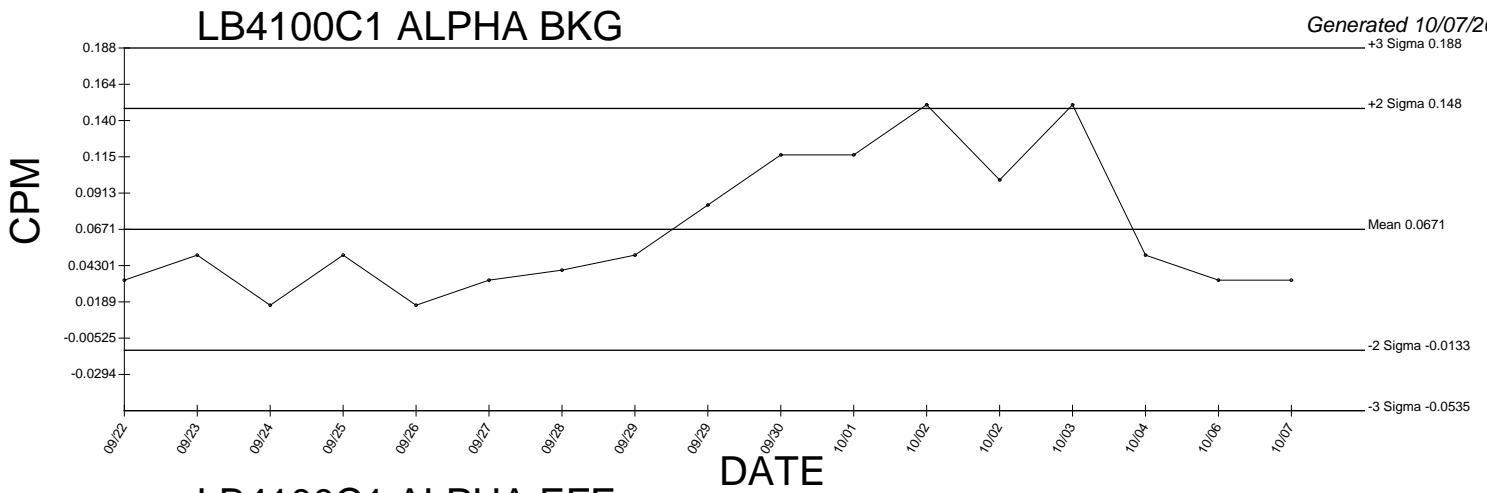
Generated 10/07/2009



LB4100A2 BETA EFF Cross Talk



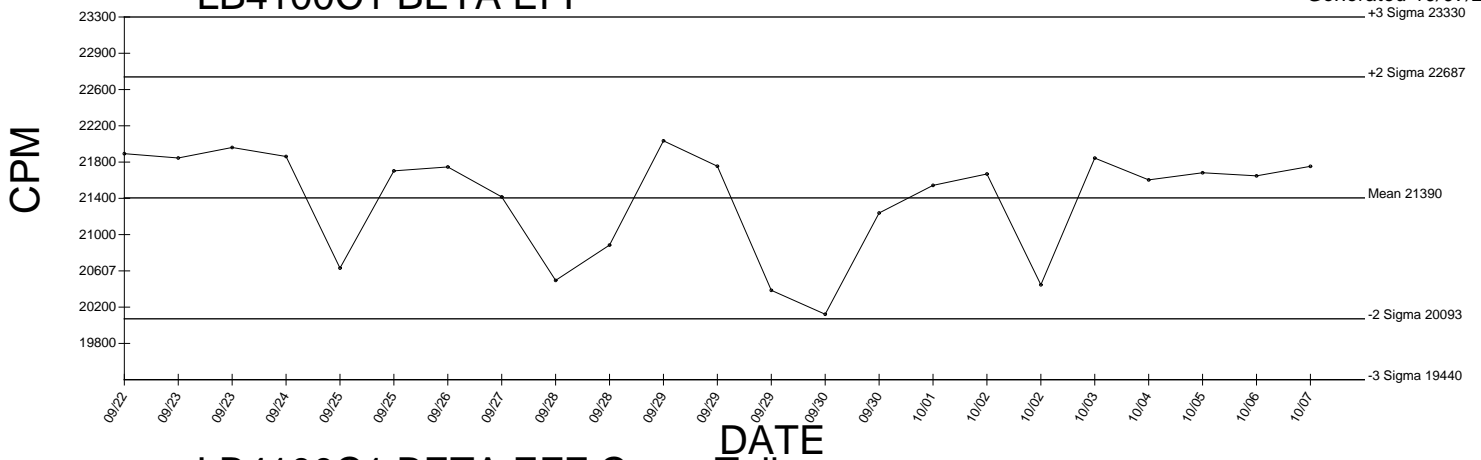
● Denotes Outlier



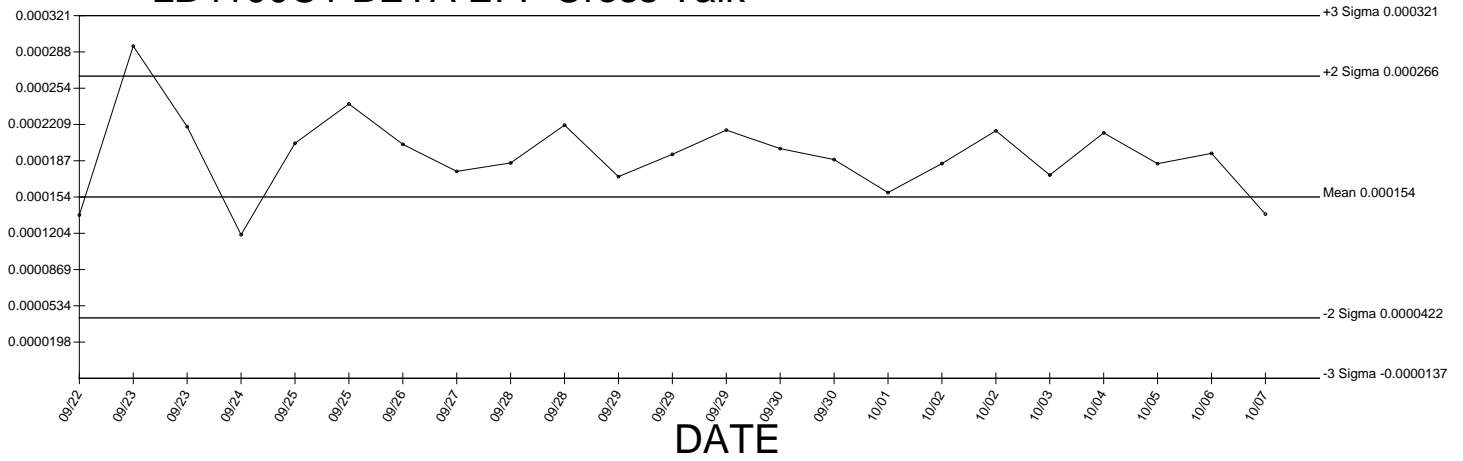
● Denotes Outlier

LB4100C1 BETA EFF

Generated 10/07/2009



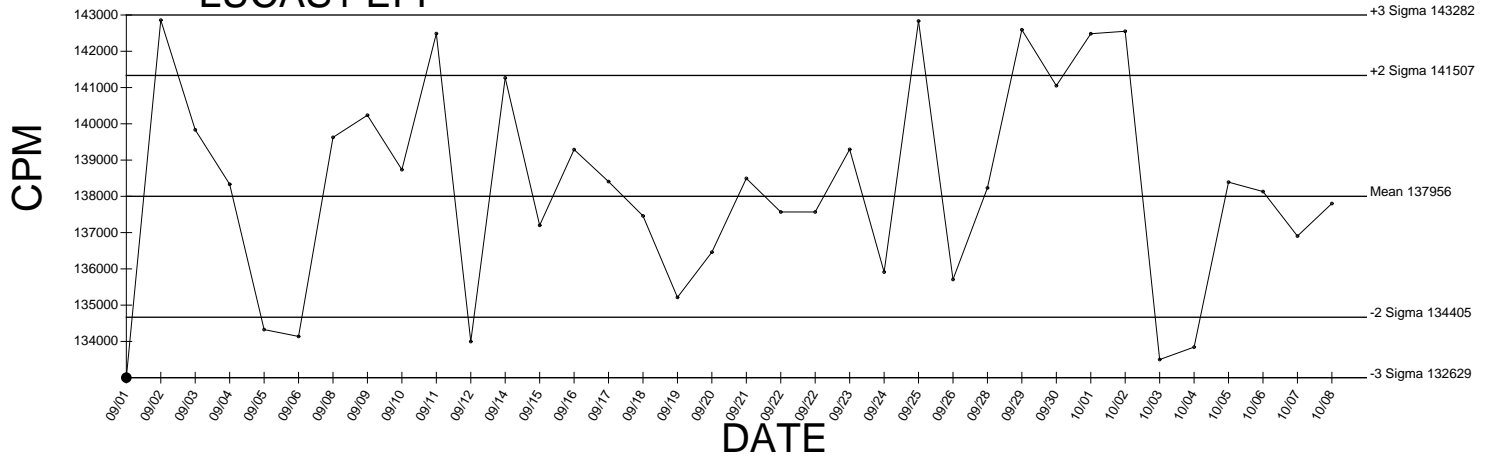
LB4100C1 BETA EFF Cross Talk



● Denotes Outlier

LUCAS1 EFF

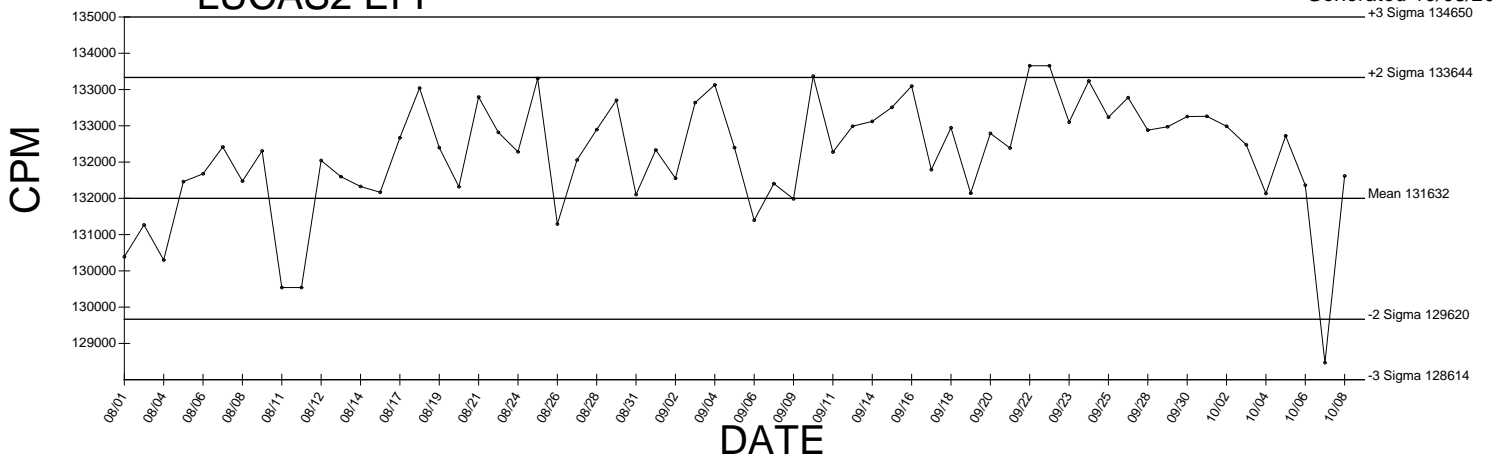
Generated 10/08/2009



● Denotes Outlier

LUCAS2 EFF

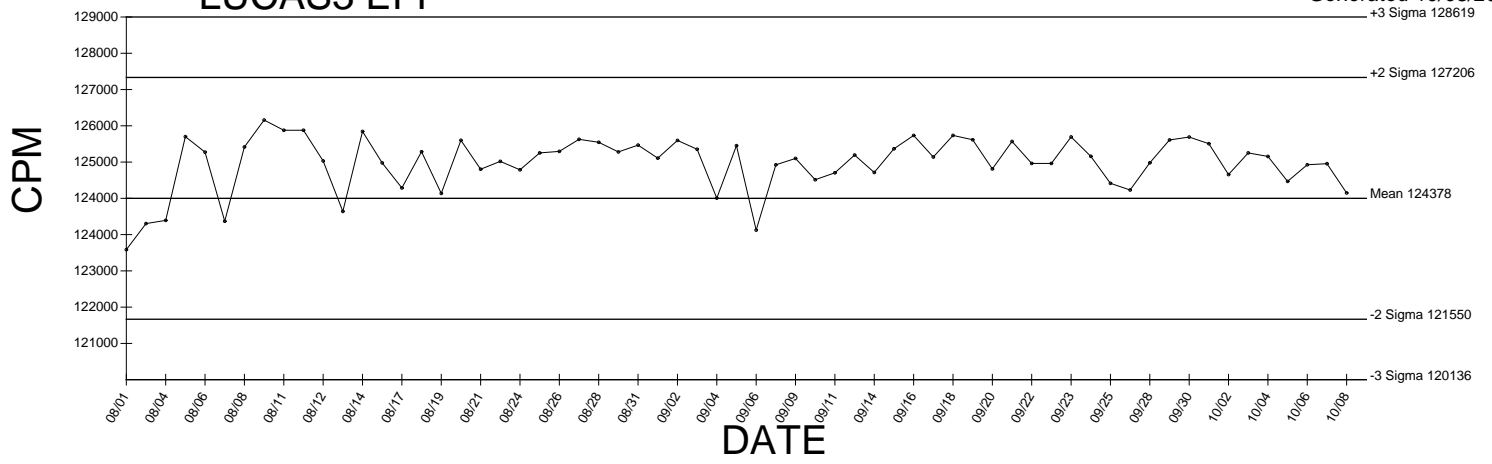
Generated 10/08/2009



● Denotes Outlier

LUCAS3 EFF

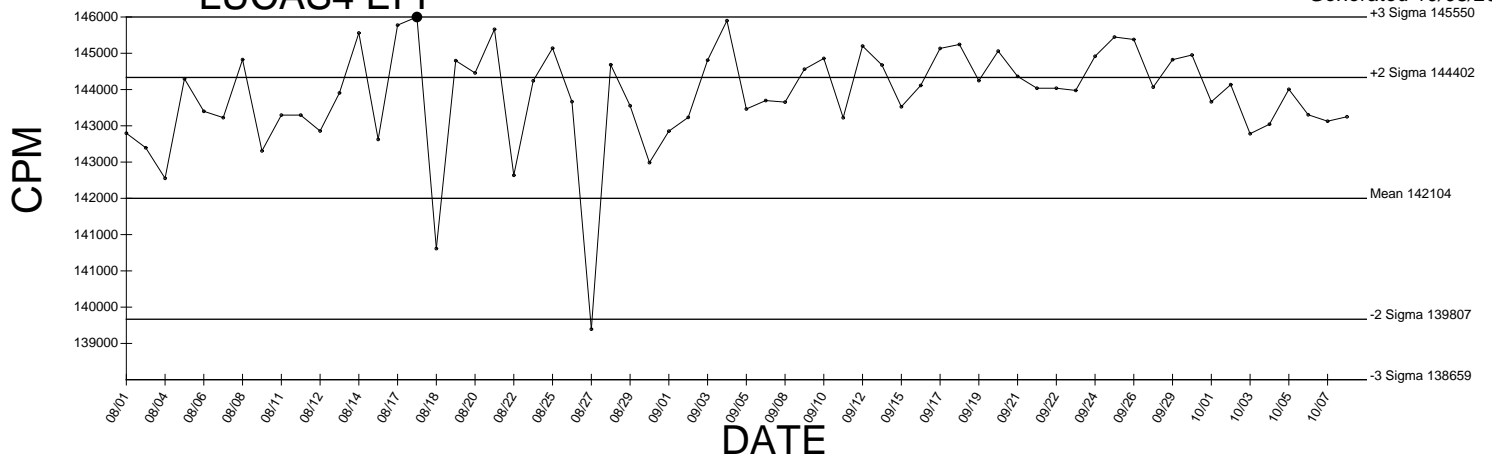
Generated 10/08/2009



● Denotes Outlier

LUCAS4 EFF

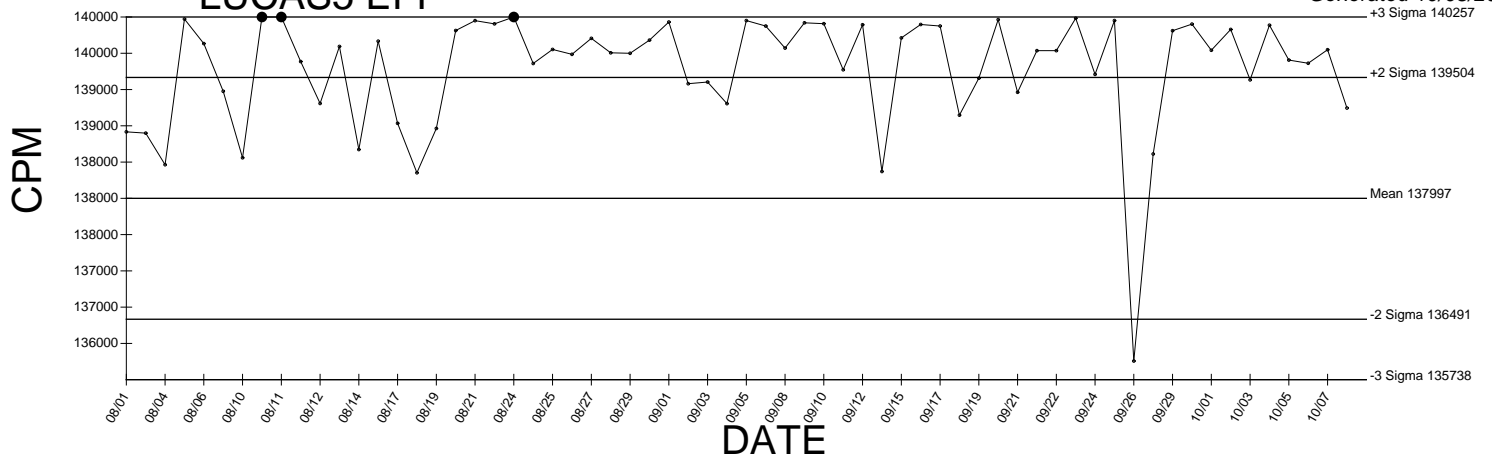
Generated 10/08/2009



● Denotes Outlier

LUCAS5 EFF

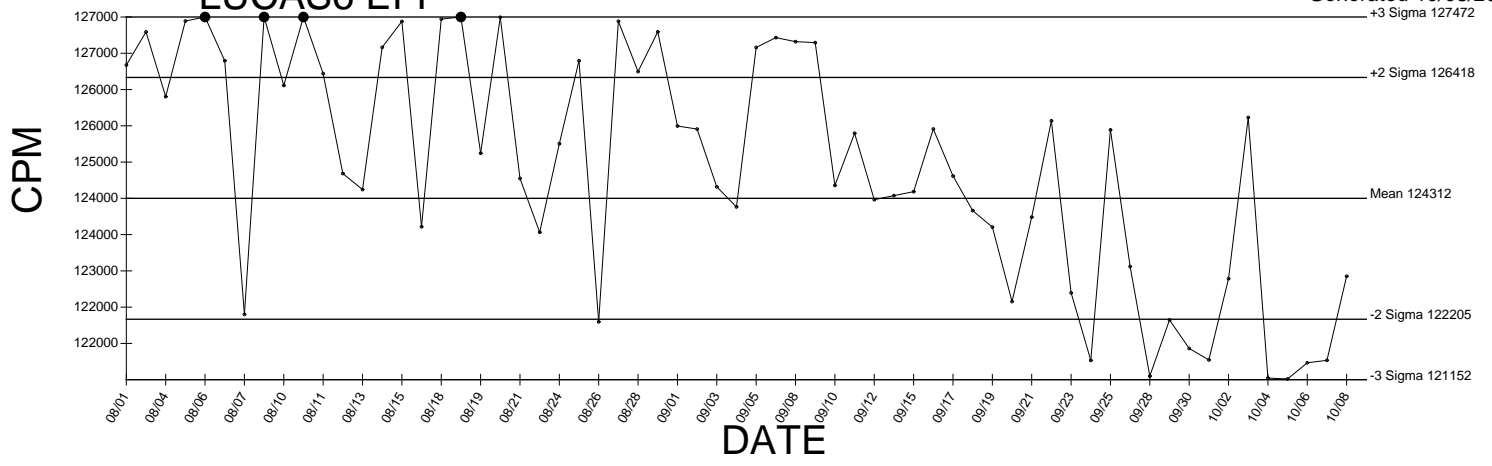
Generated 10/08/2009



● Denotes Outlier

LUCAS6 EFF

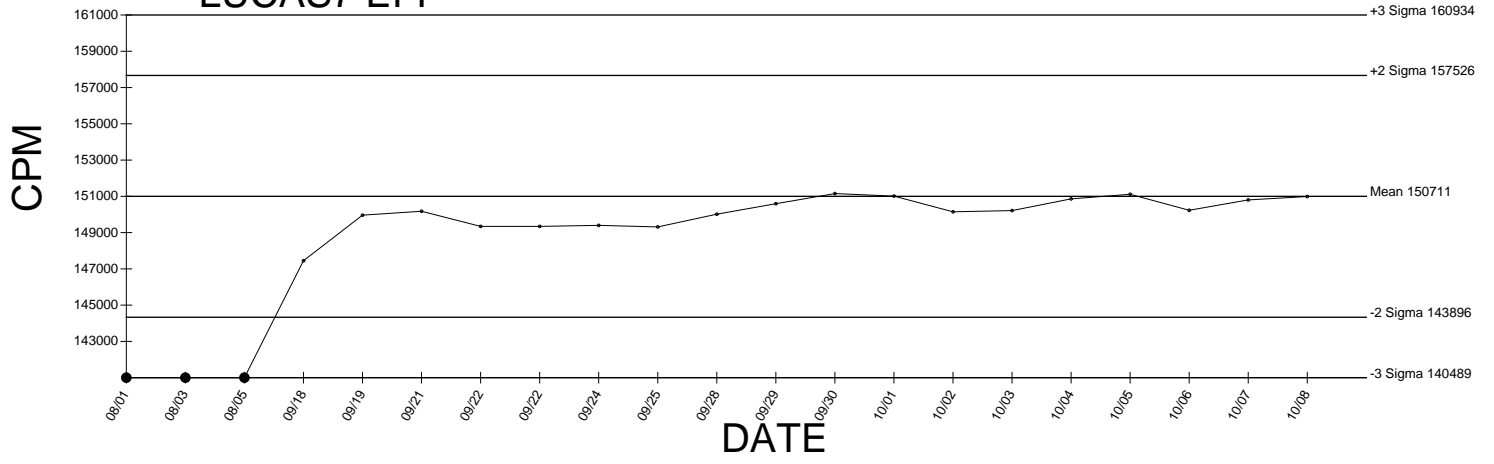
Generated 10/08/2009



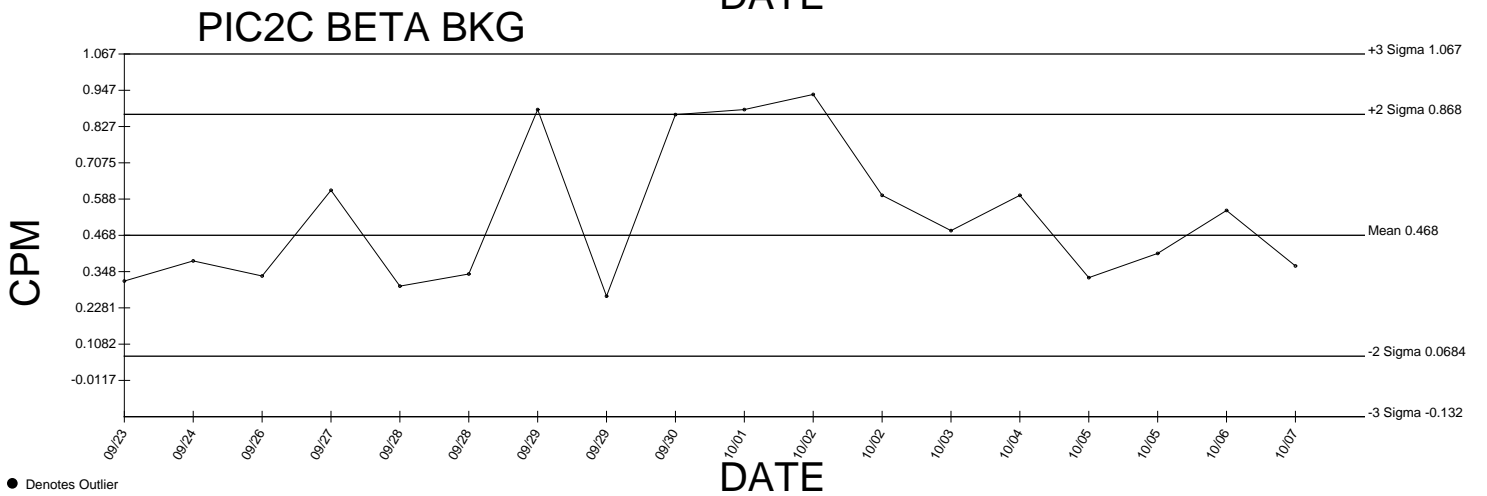
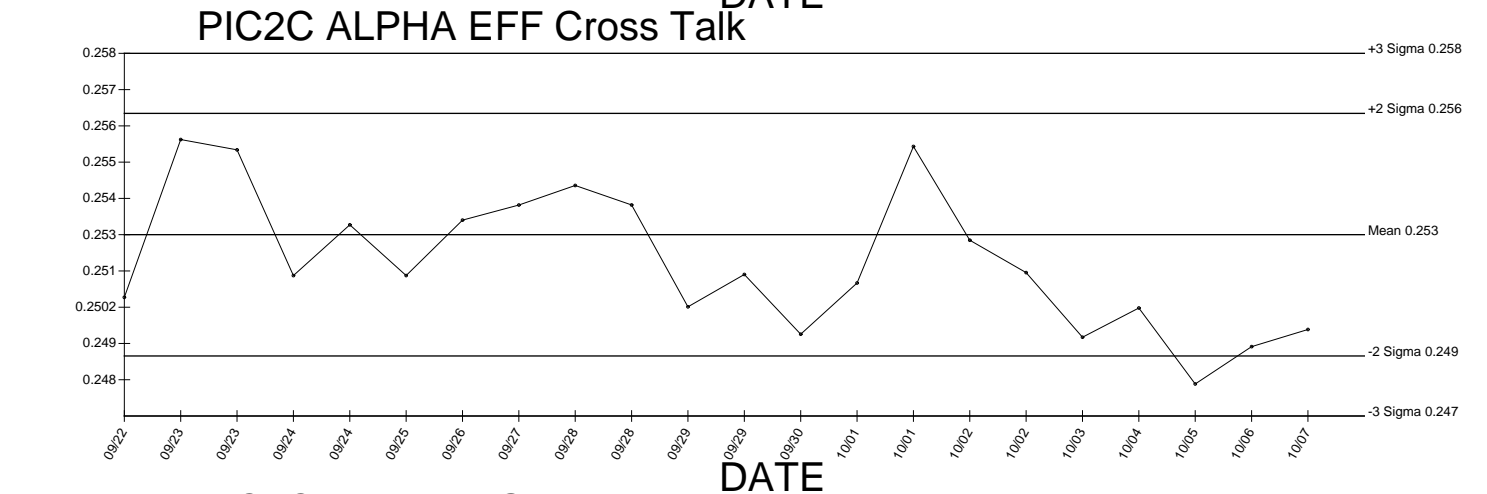
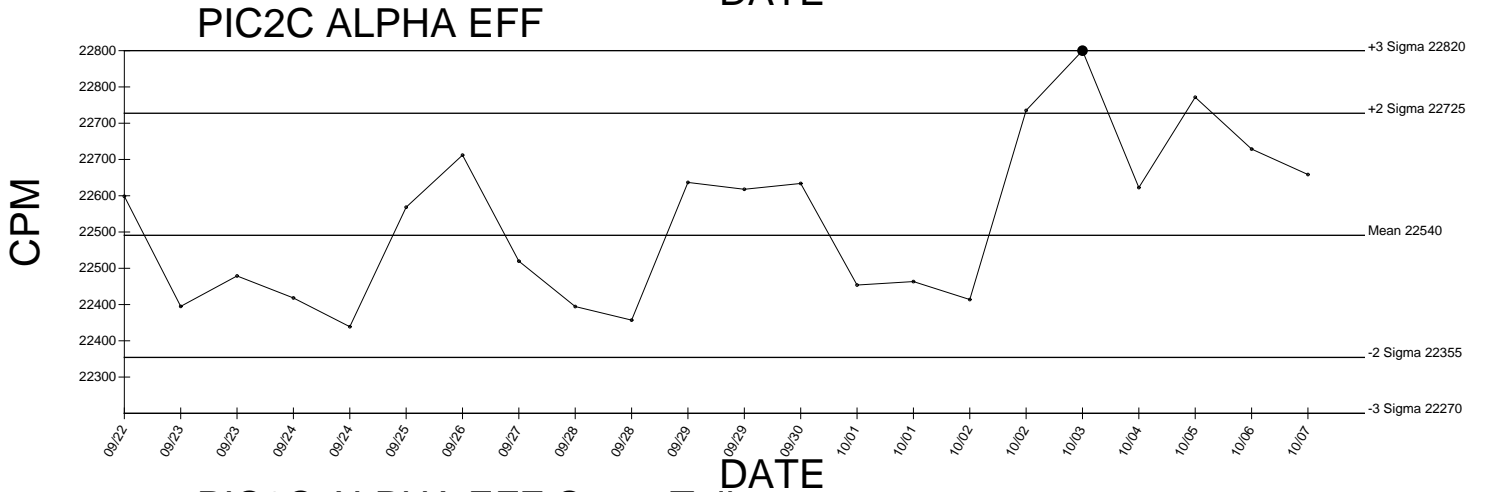
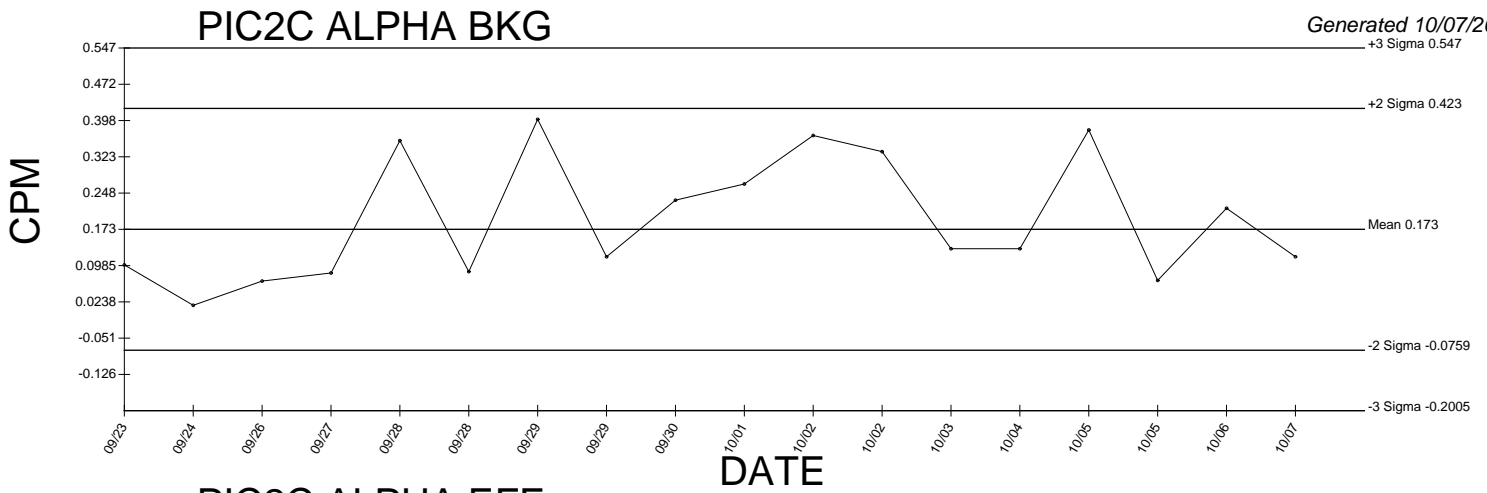
● Denotes Outlier

LUCAS7 EFF

Generated 10/08/2009



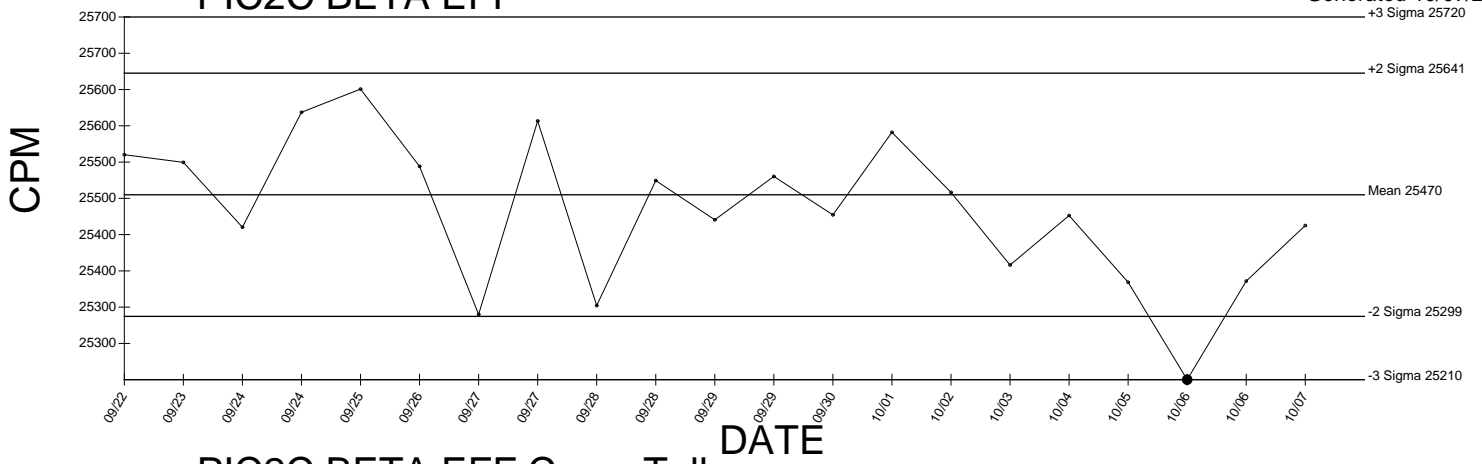
● Denotes Outlier



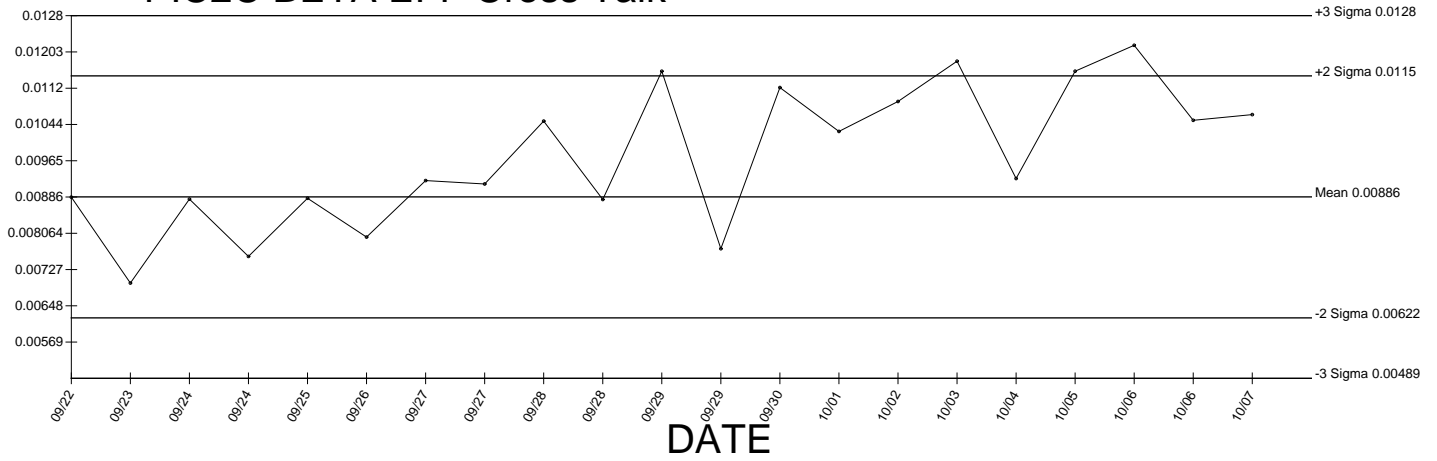
● Denotes Outlier

PIC2C BETA EFF

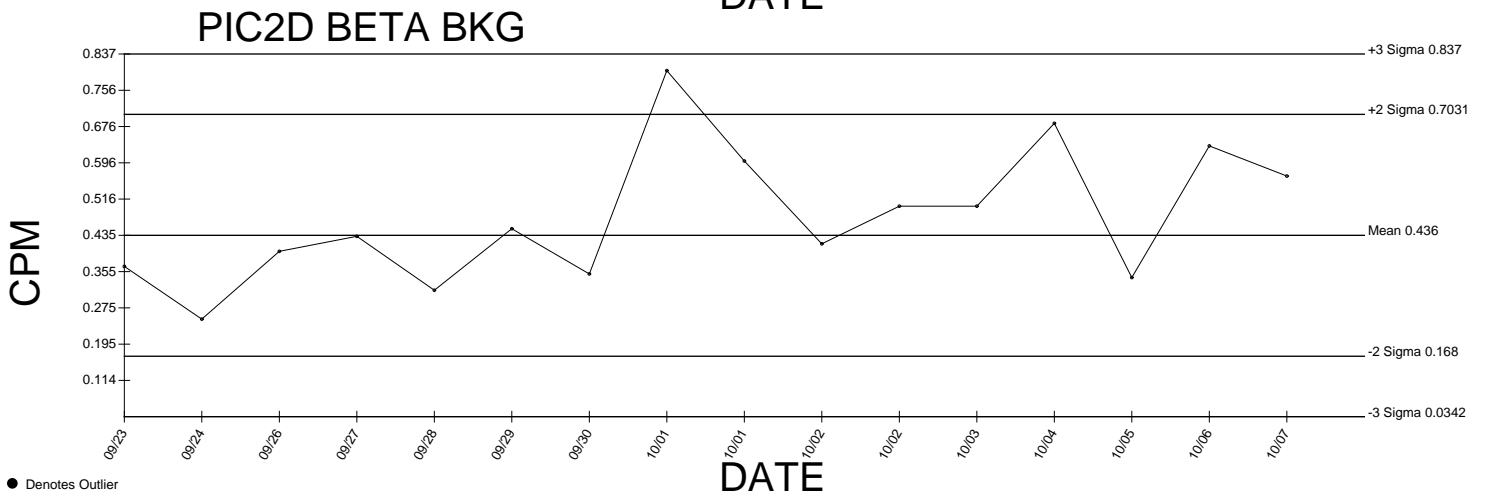
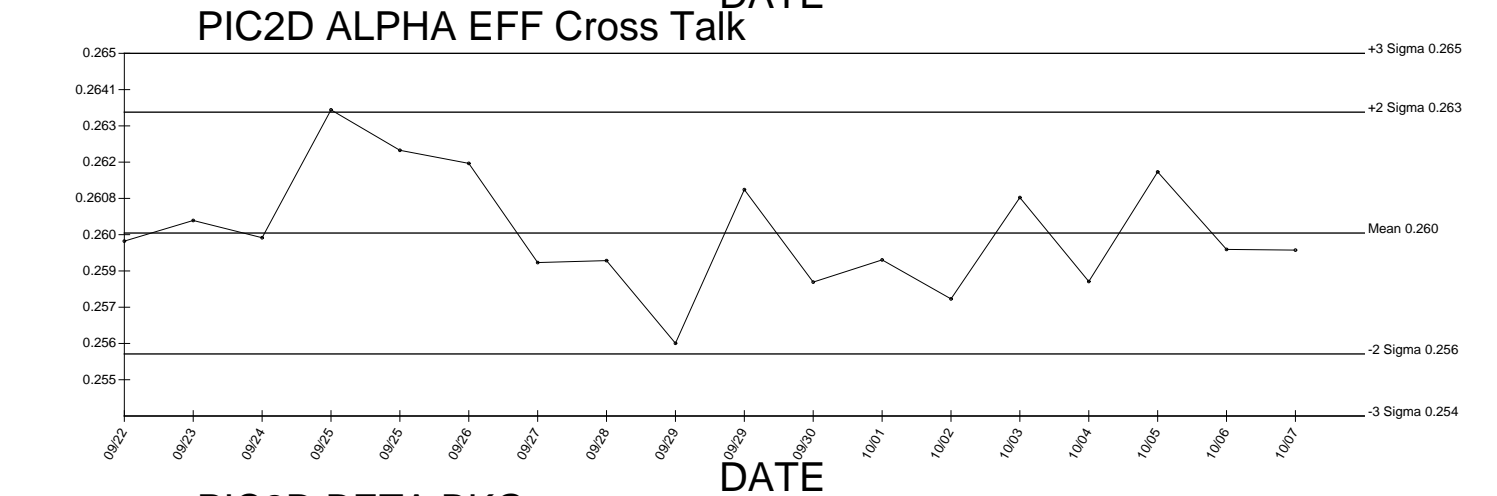
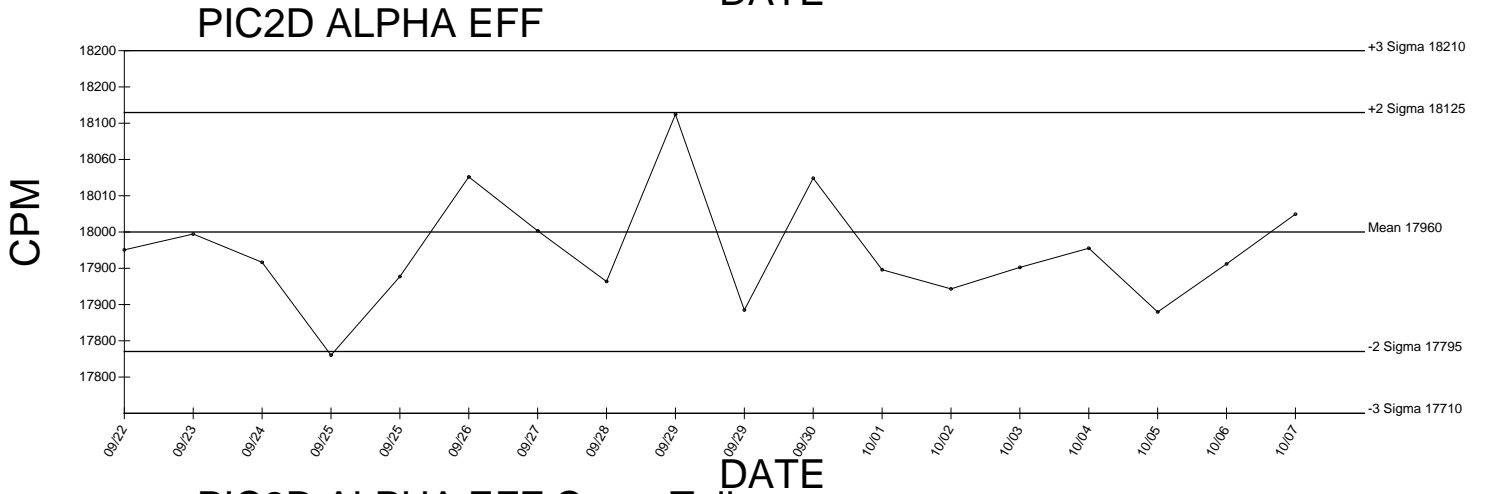
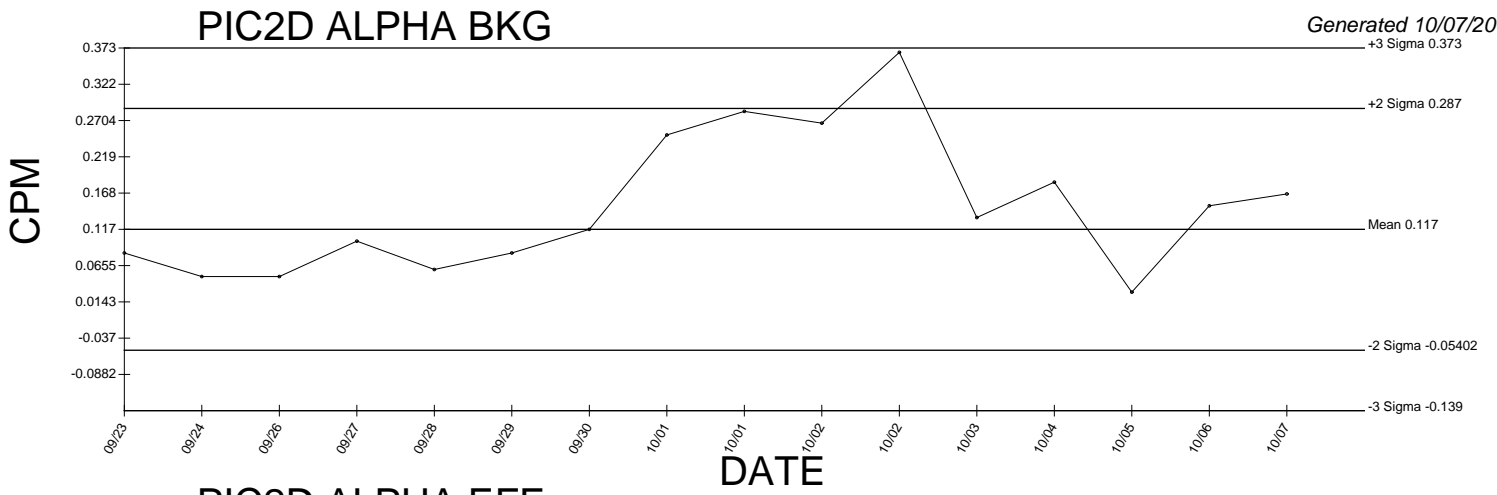
Generated 10/07/2009



PIC2C BETA EFF Cross Talk



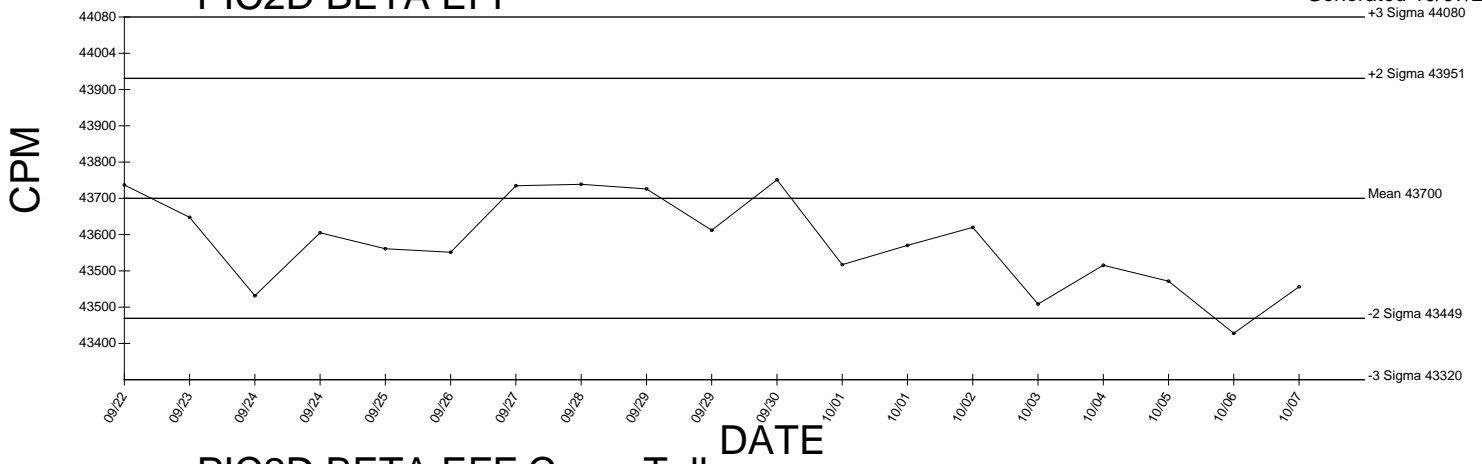
● Denotes Outlier



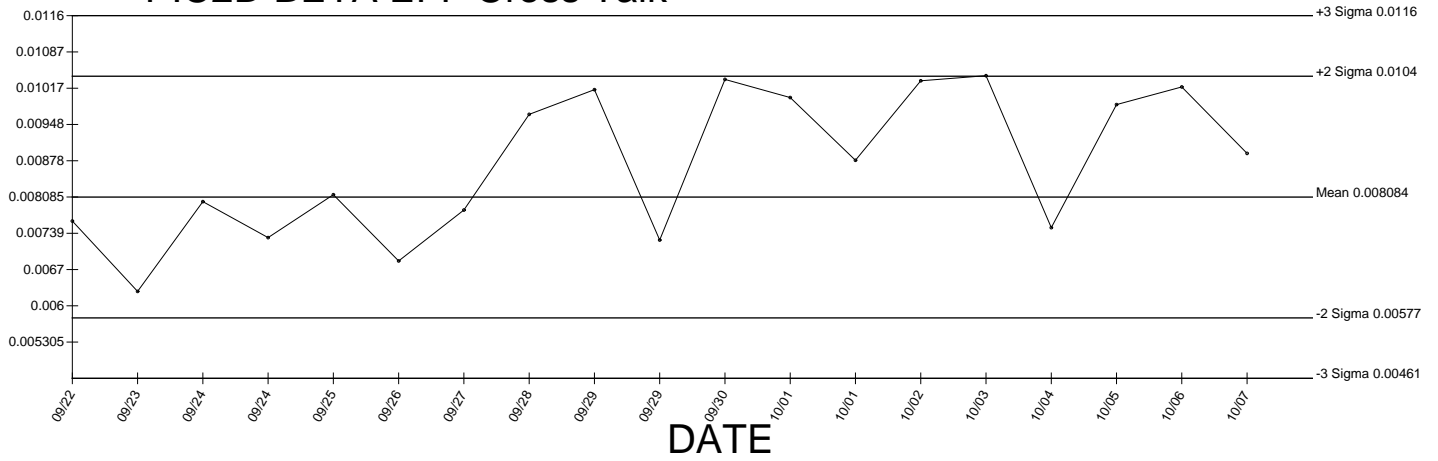
● Denotes Outlier

PIC2D BETA EFF

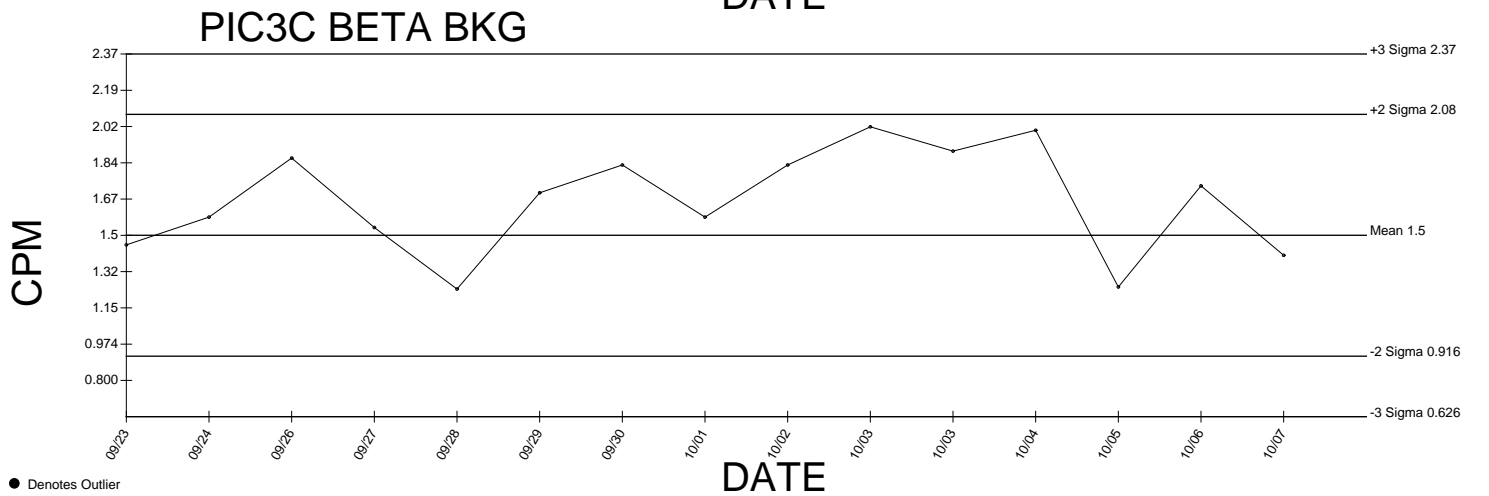
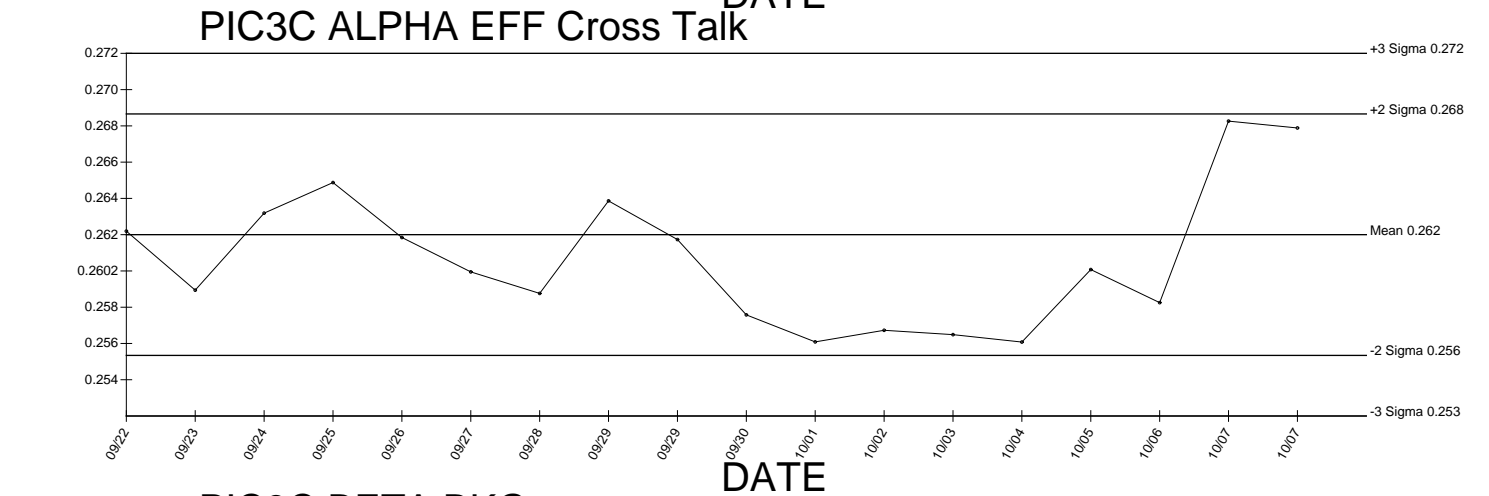
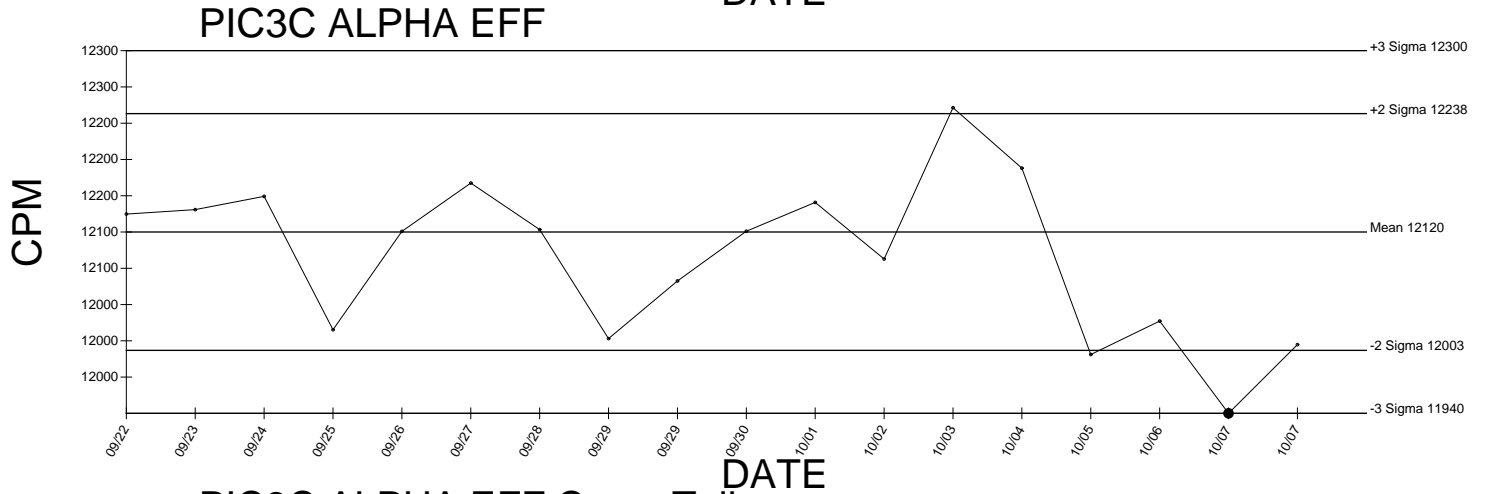
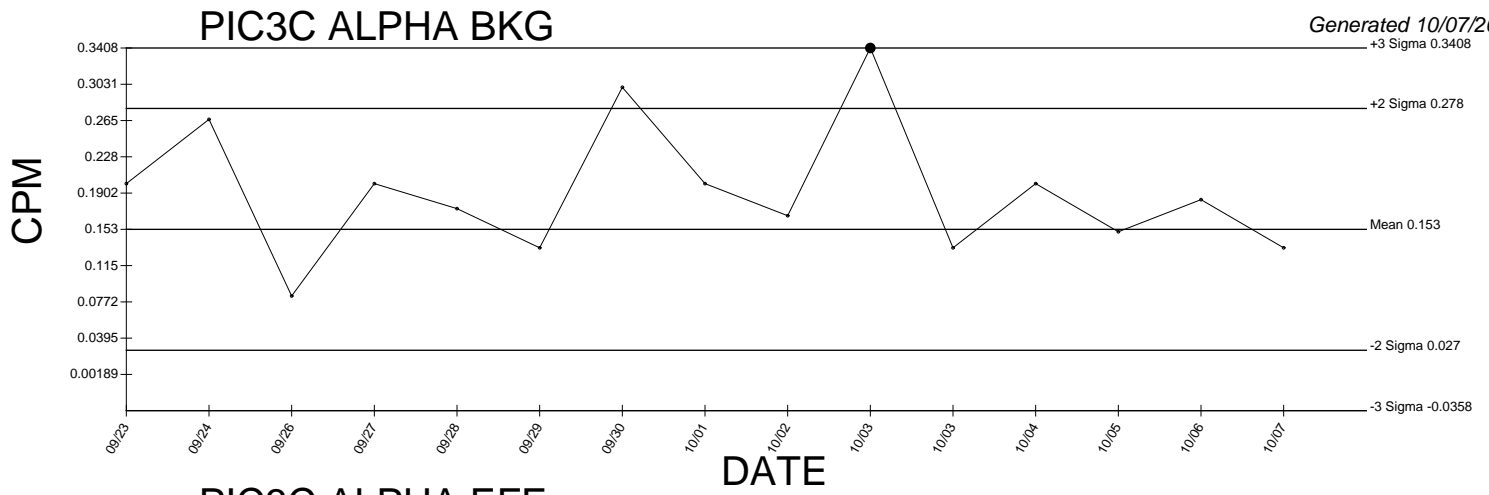
Generated 10/07/2009



PIC2D BETA EFF Cross Talk



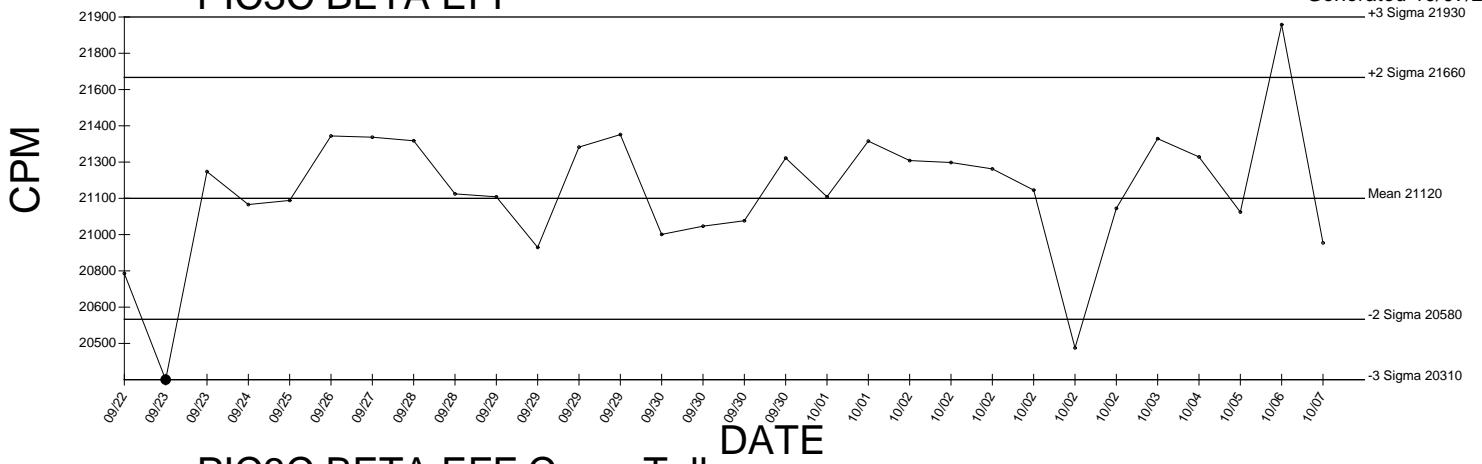
● Denotes Outlier



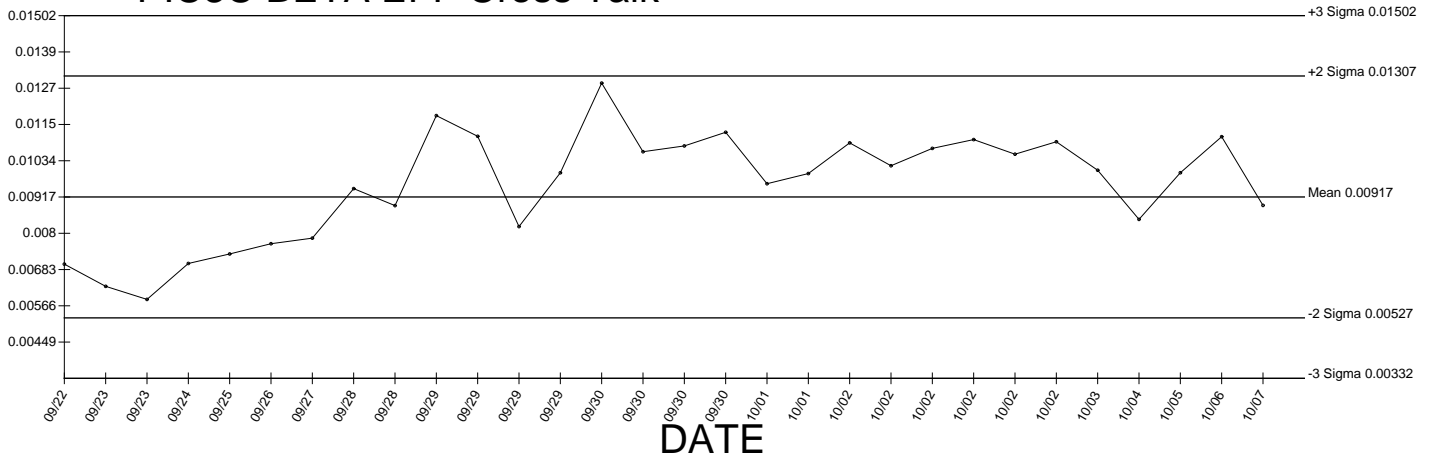
● Denotes Outlier

PIC3C BETA EFF

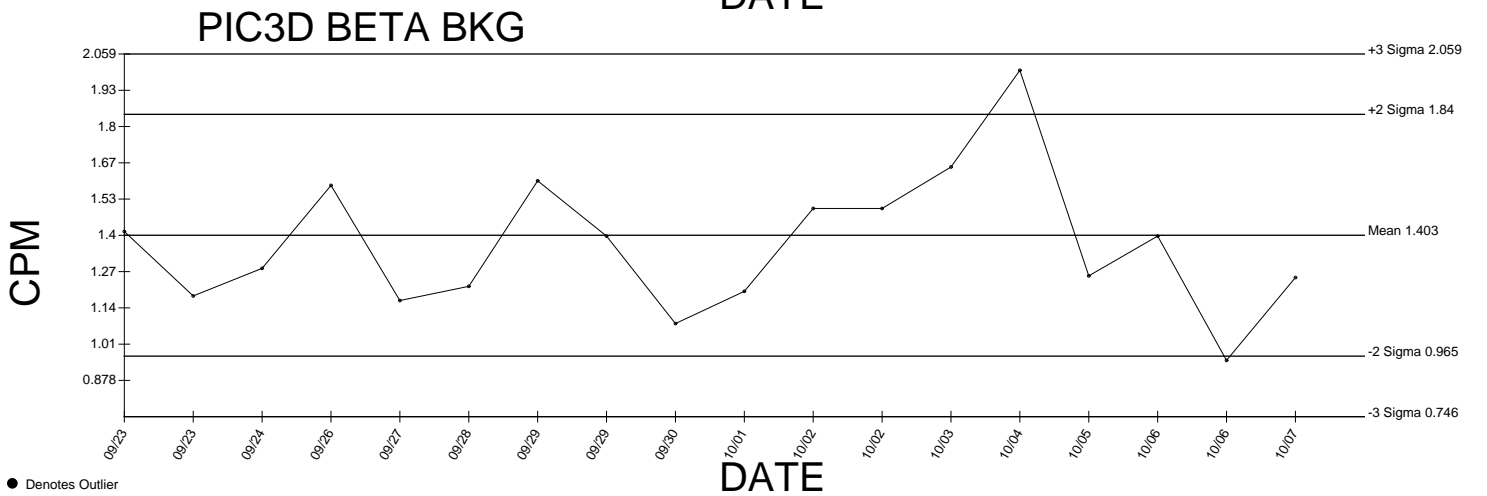
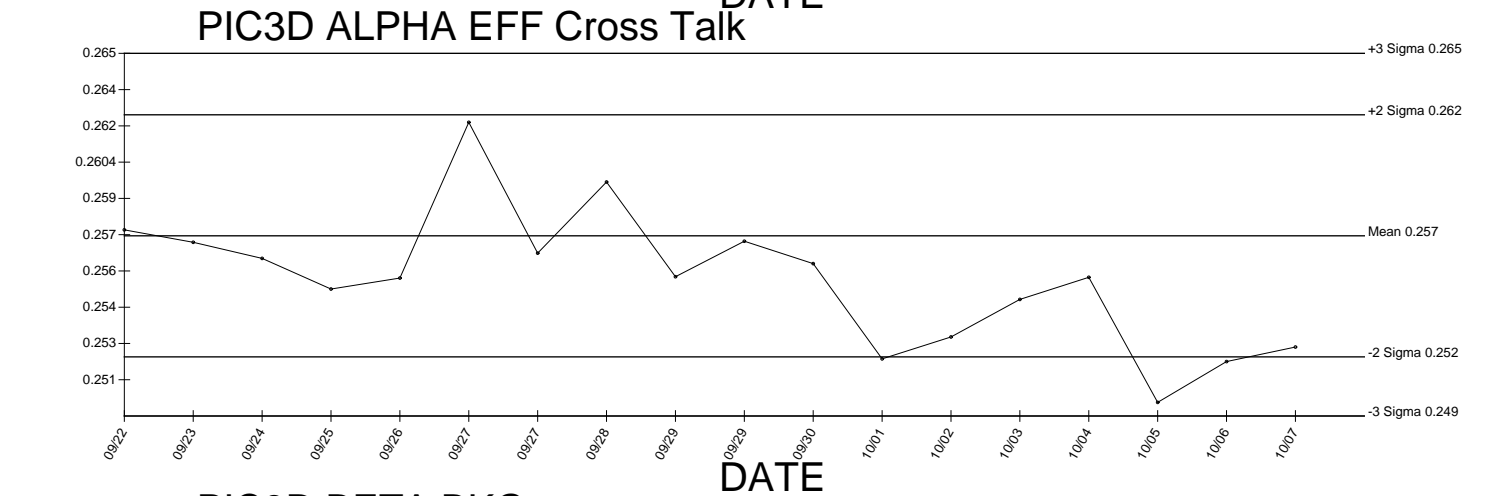
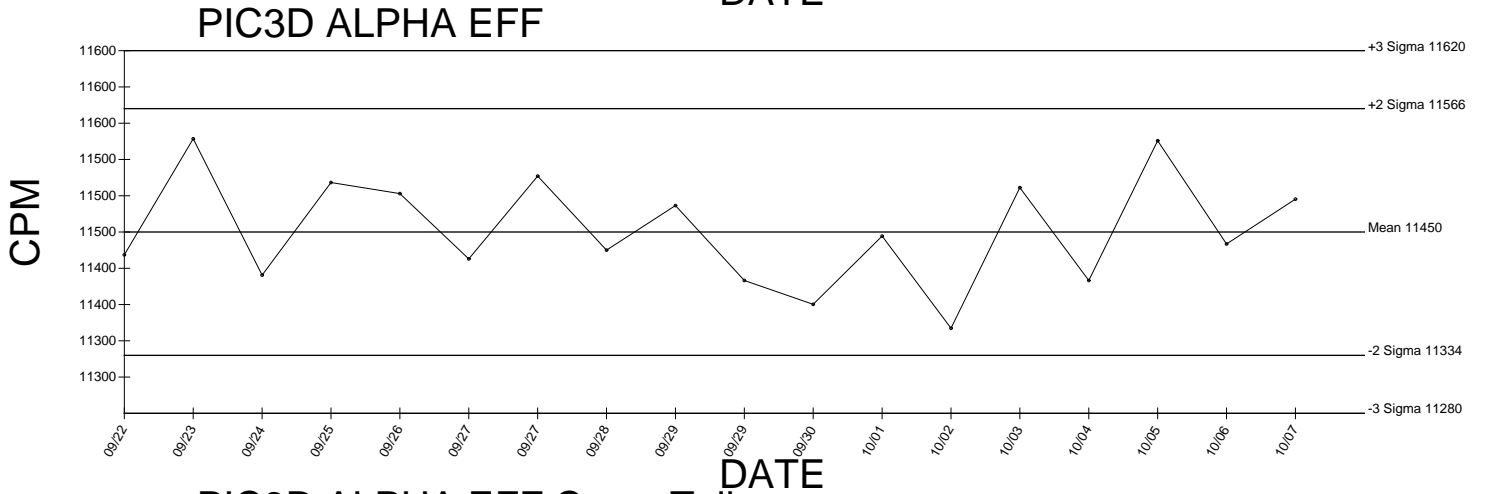
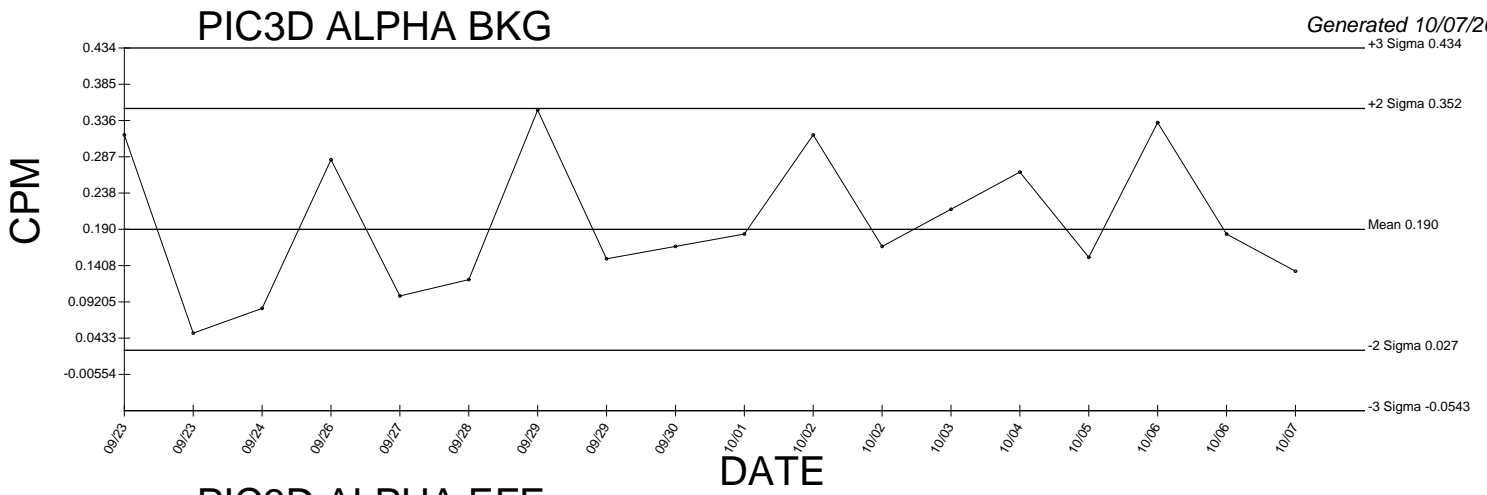
Generated 10/07/2009



PIC3C BETA EFF Cross Talk



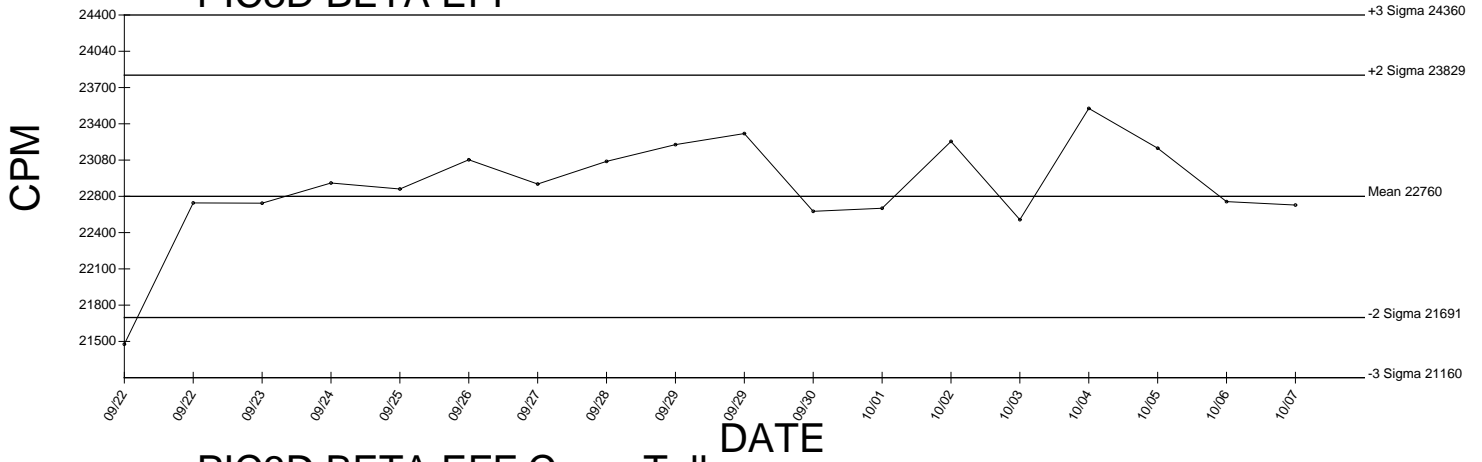
● Denotes Outlier



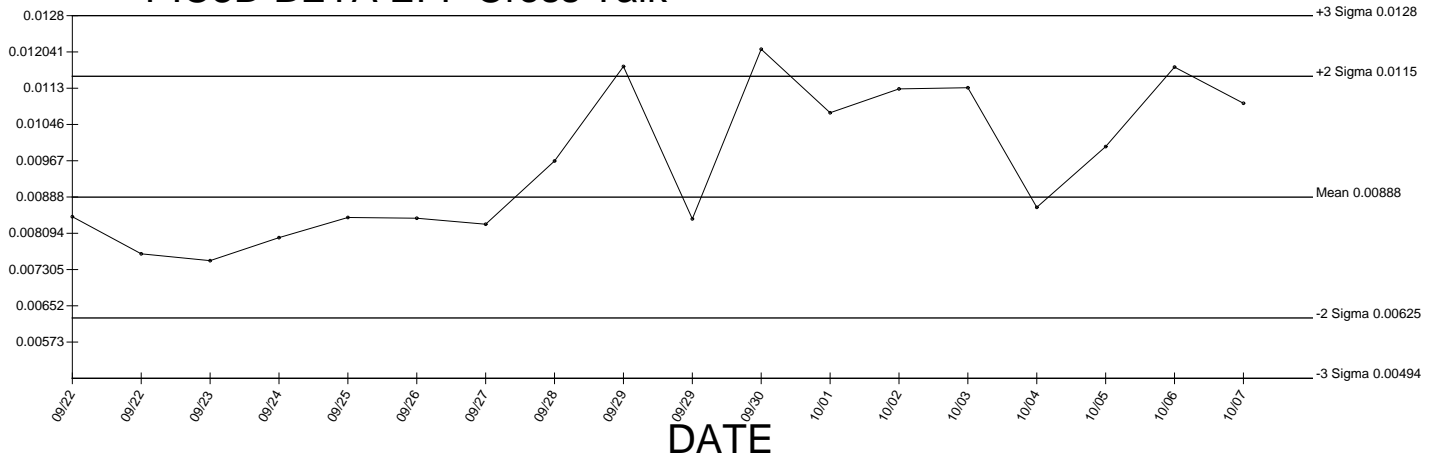
● Denotes Outlier

PIC3D BETA EFF

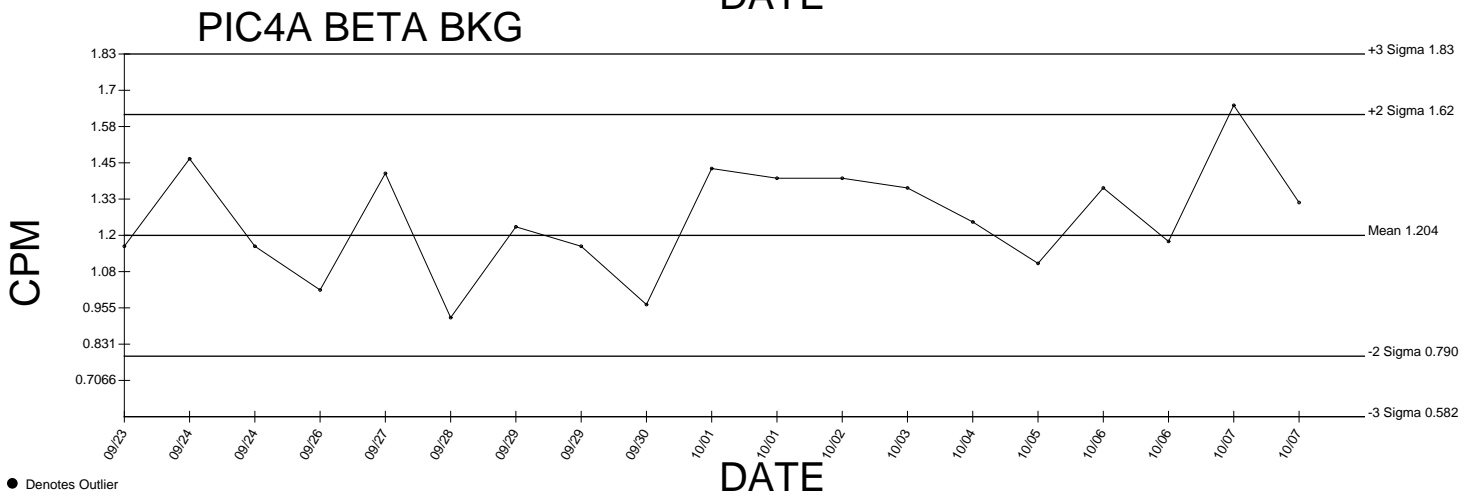
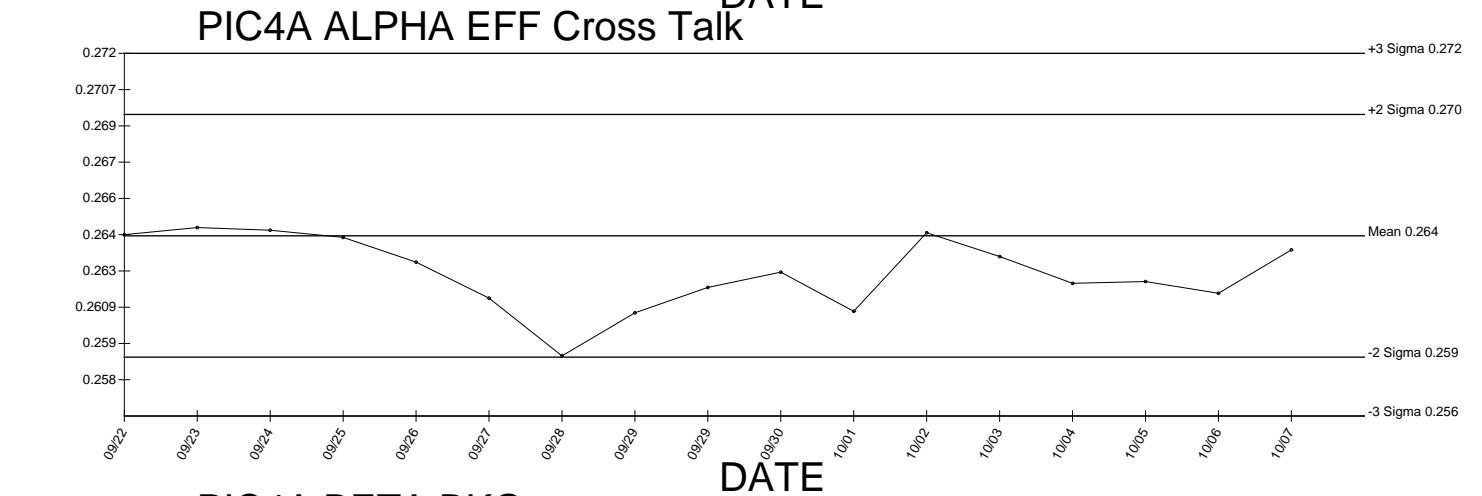
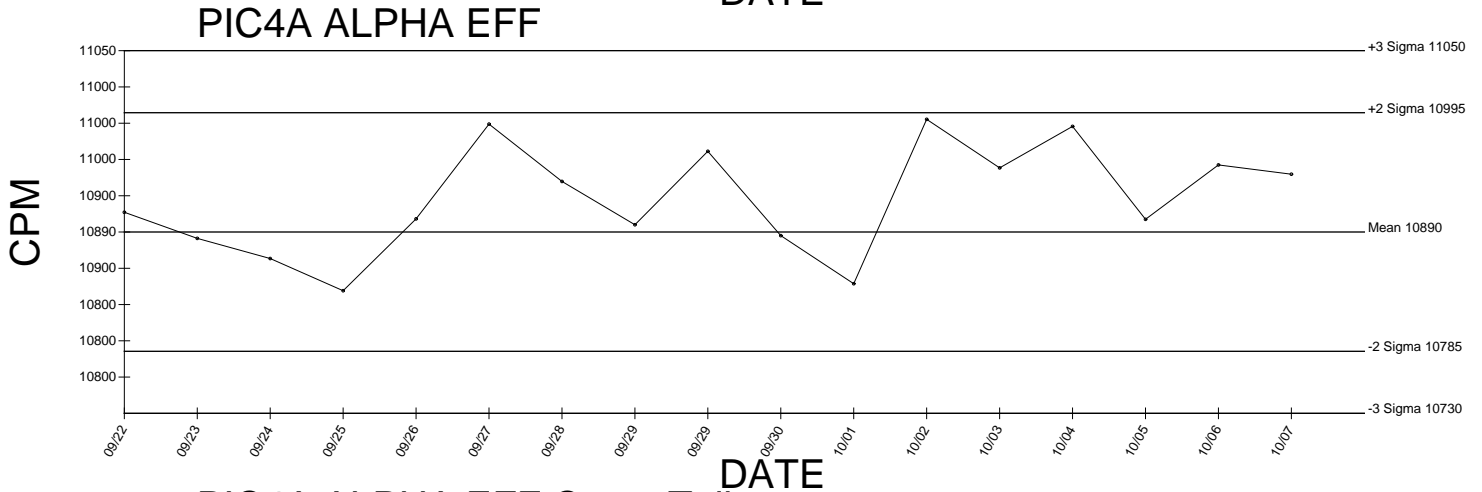
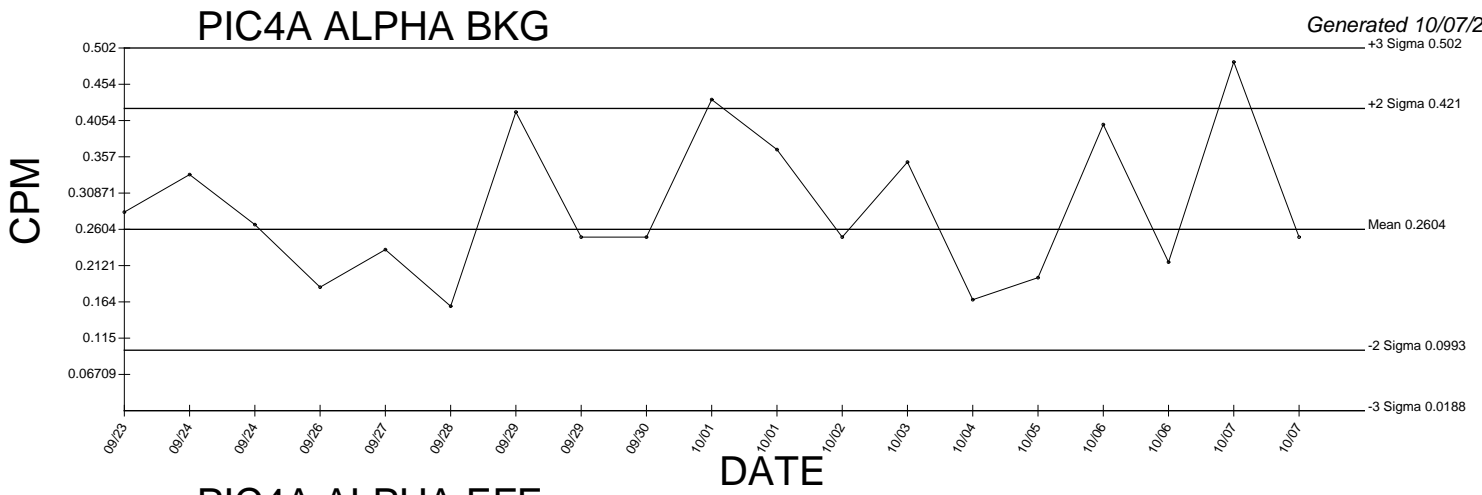
Generated 10/07/2009



PIC3D BETA EFF Cross Talk

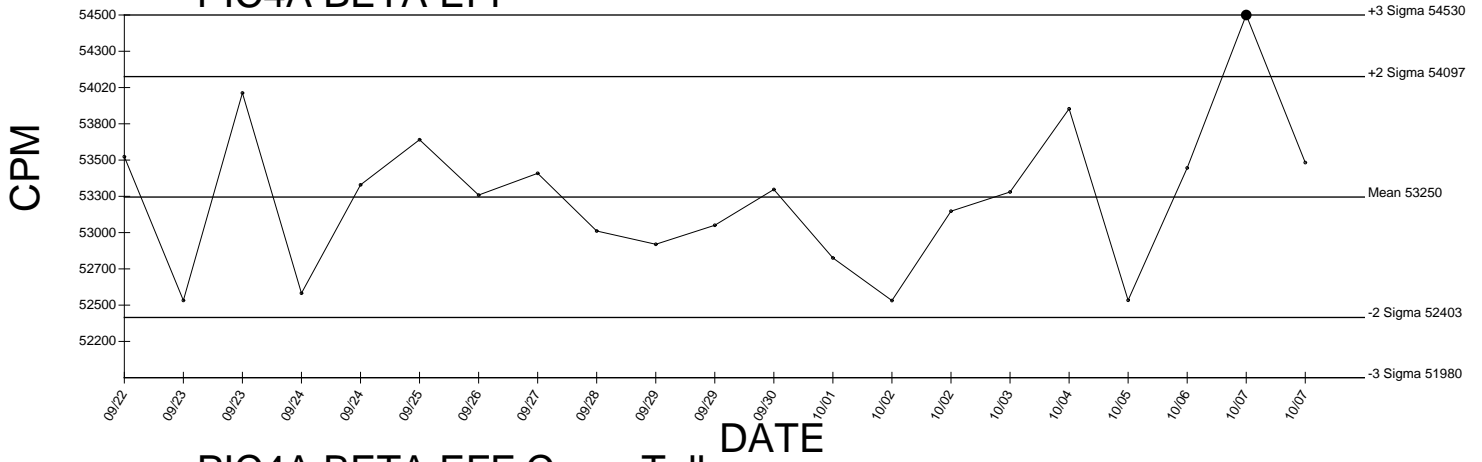


● Denotes Outlier

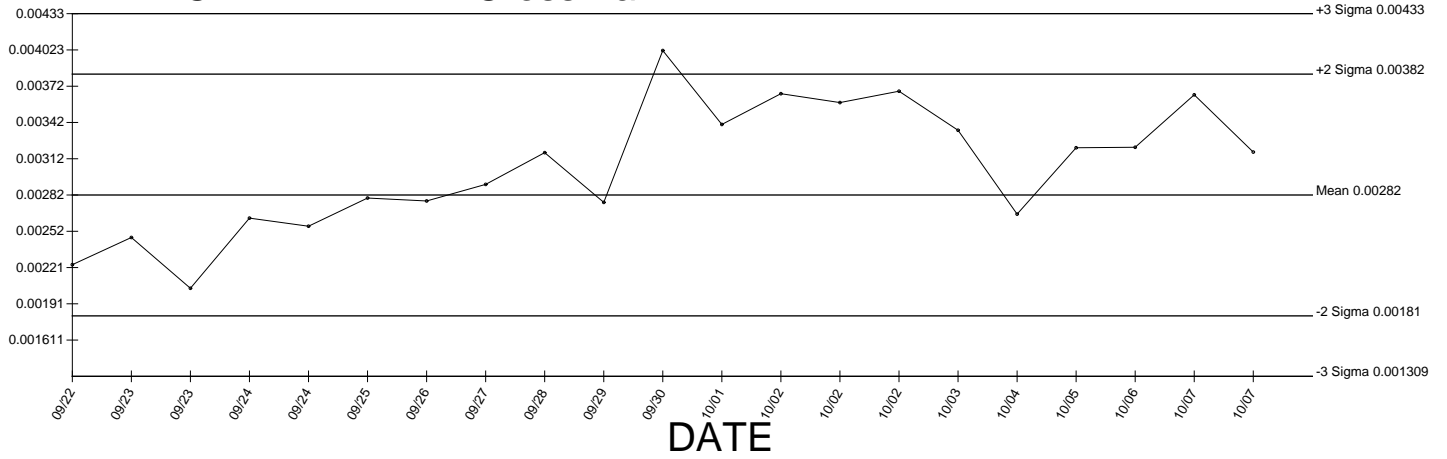


● Denotes Outlier

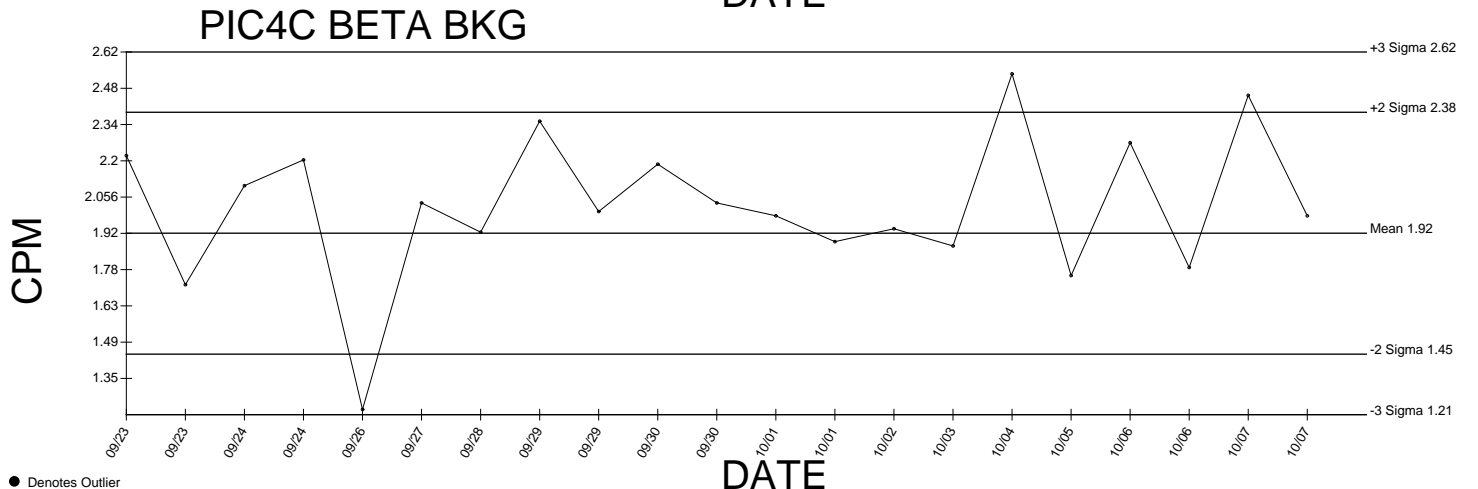
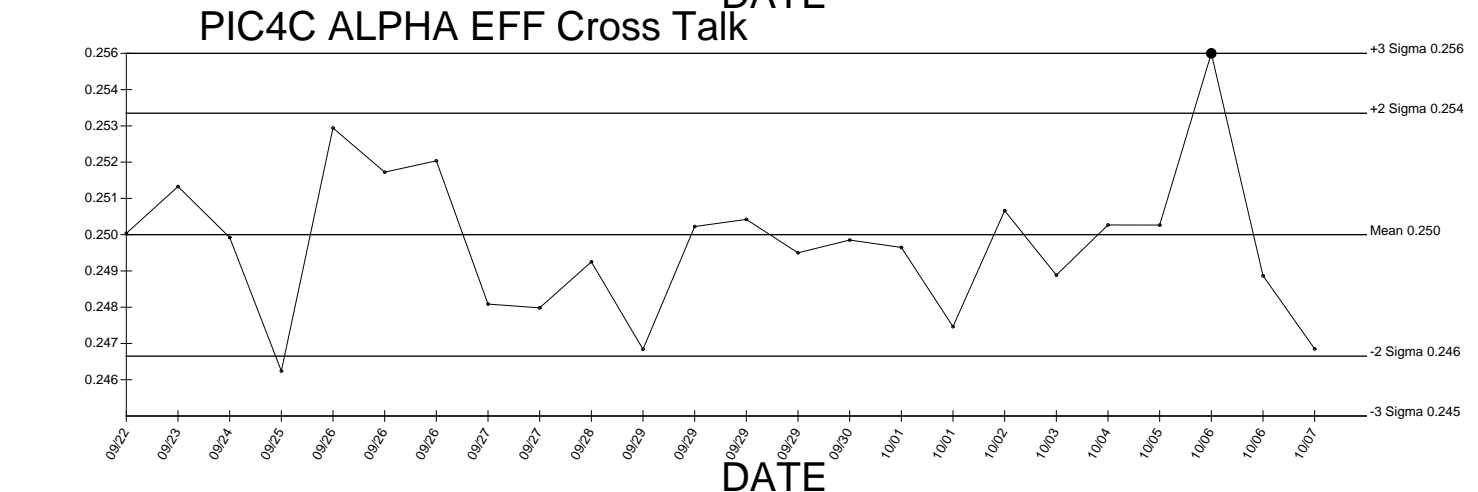
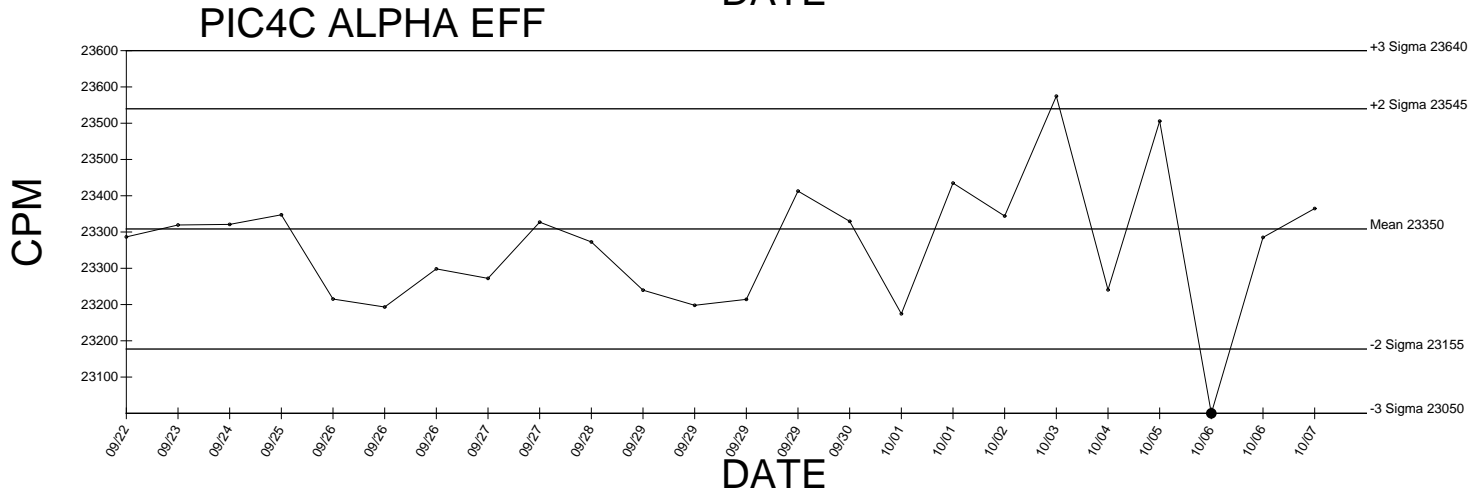
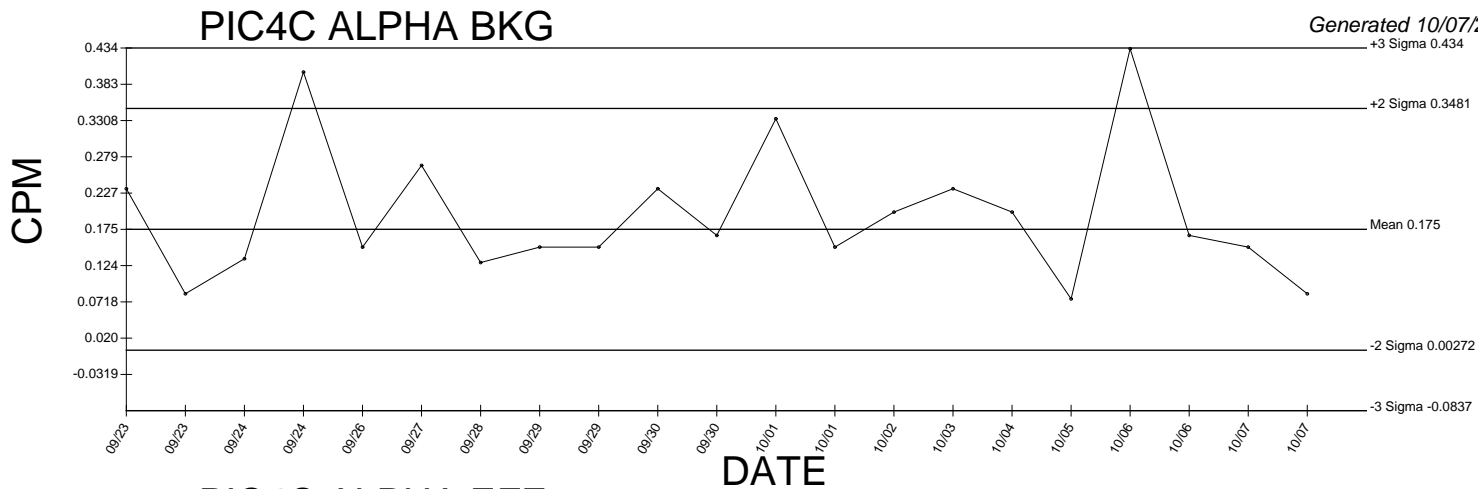
PIC4A BETA EFF



PIC4A BETA EFF Cross Talk



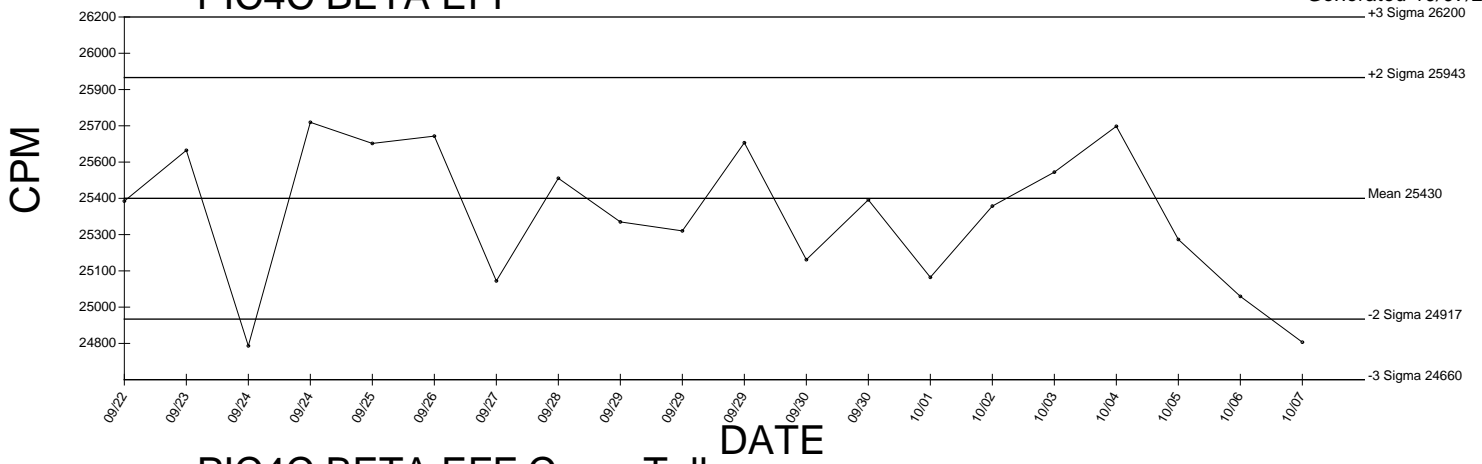
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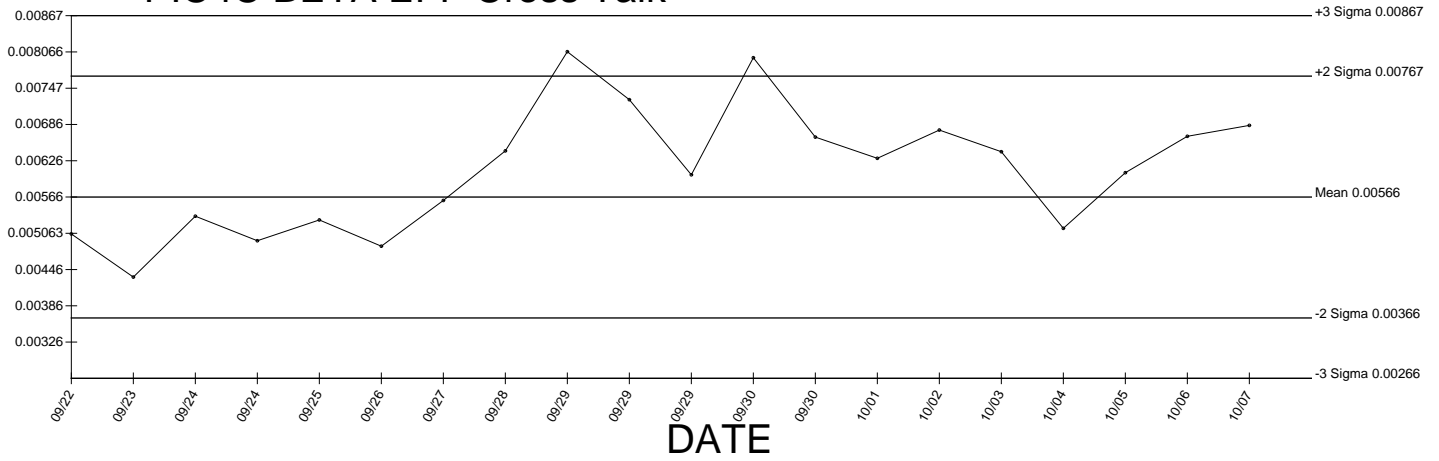
● Denotes Outlier

PIC4C BETA EFF

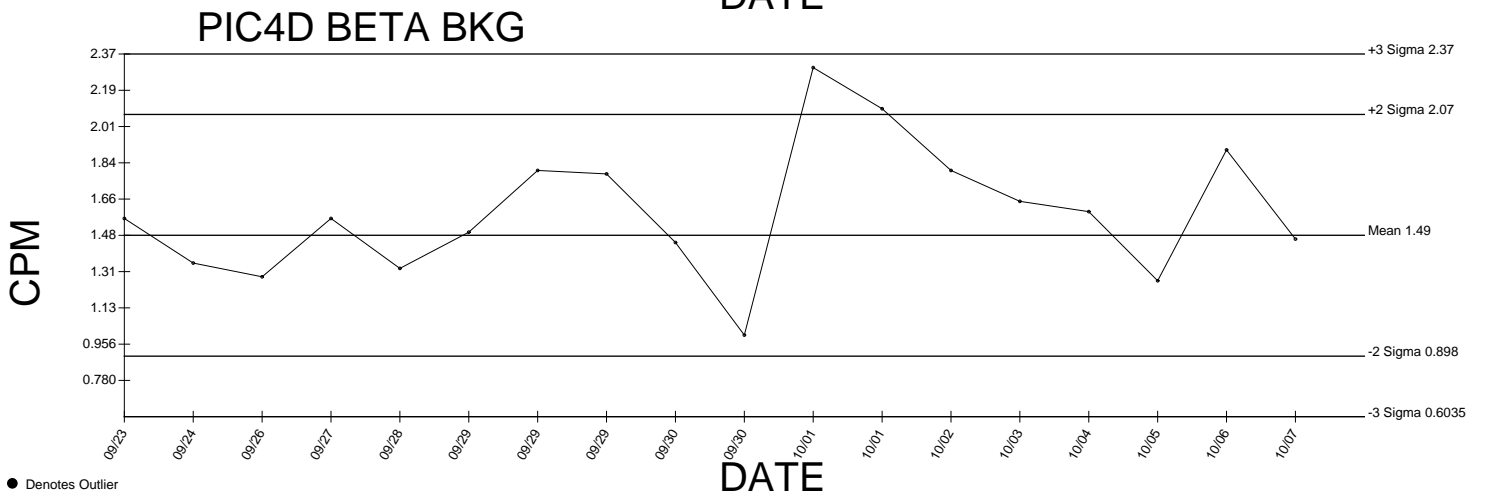
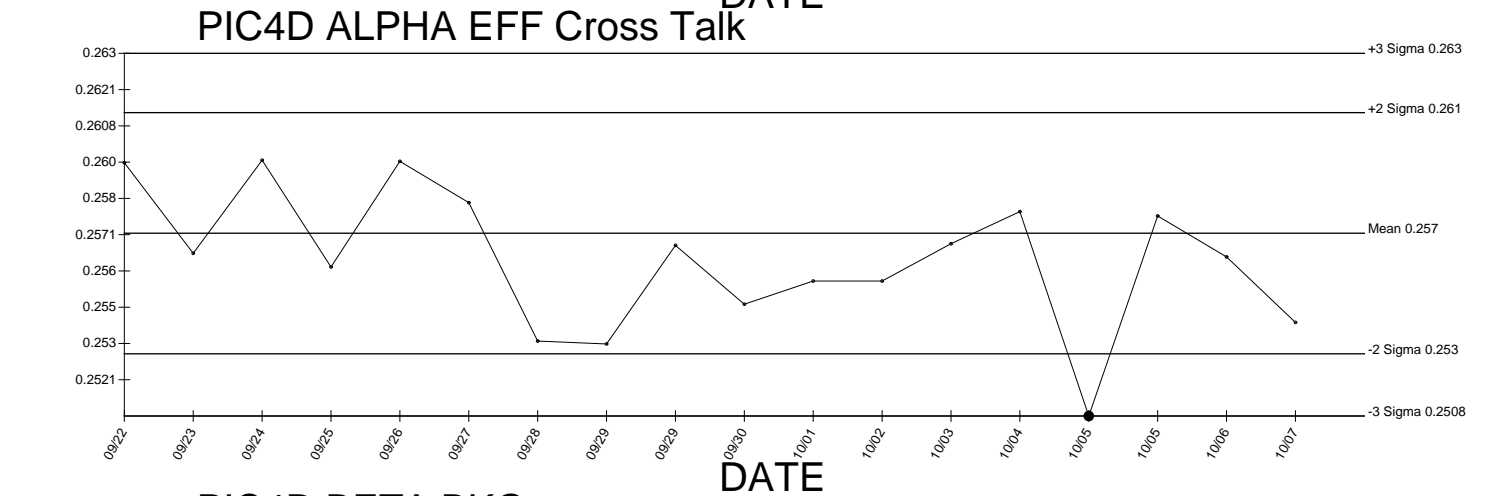
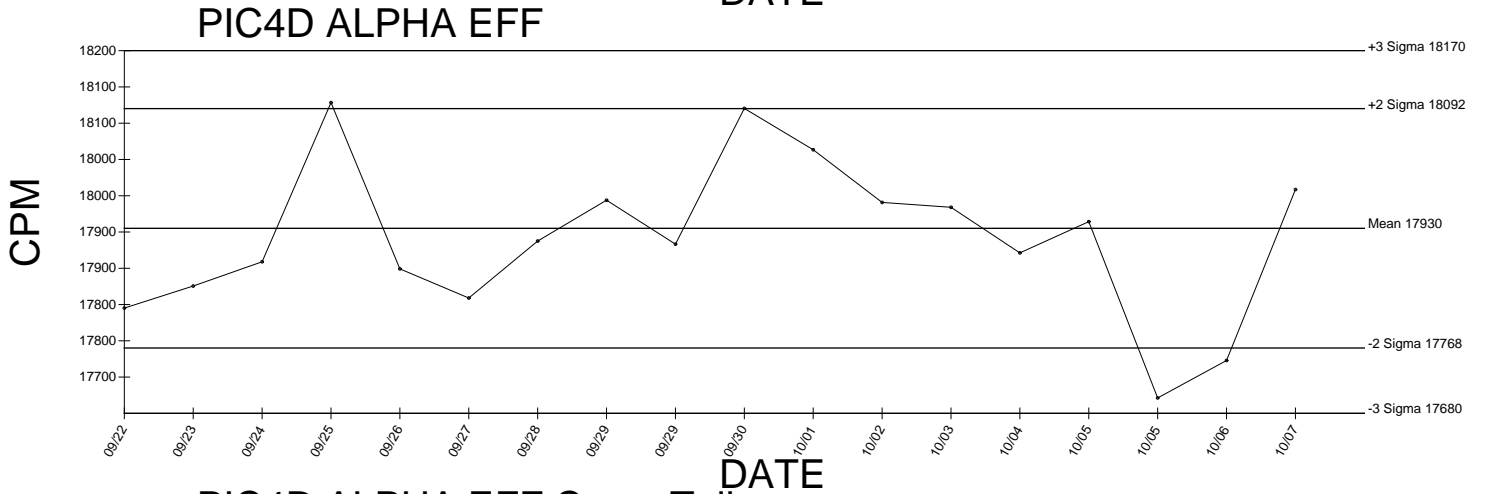
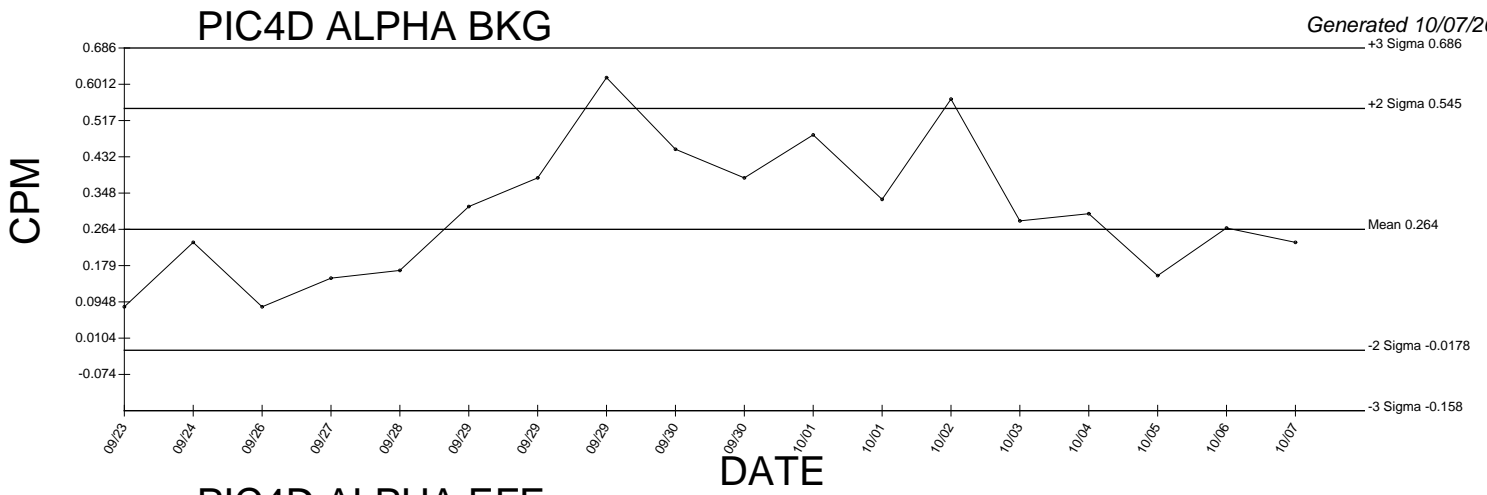
Generated 10/07/2009



PIC4C BETA EFF Cross Talk



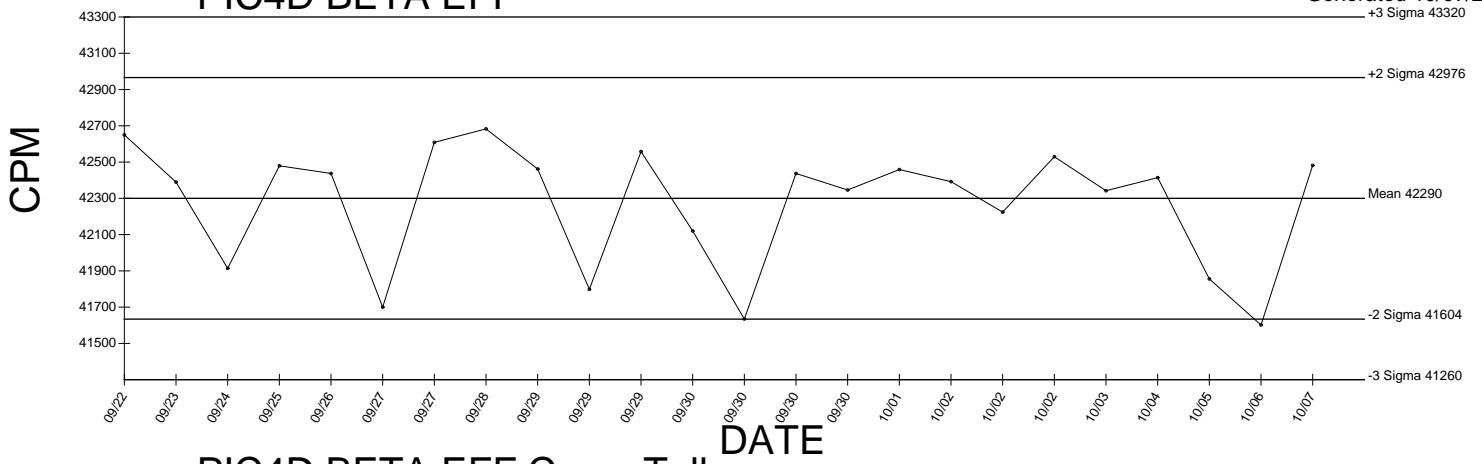
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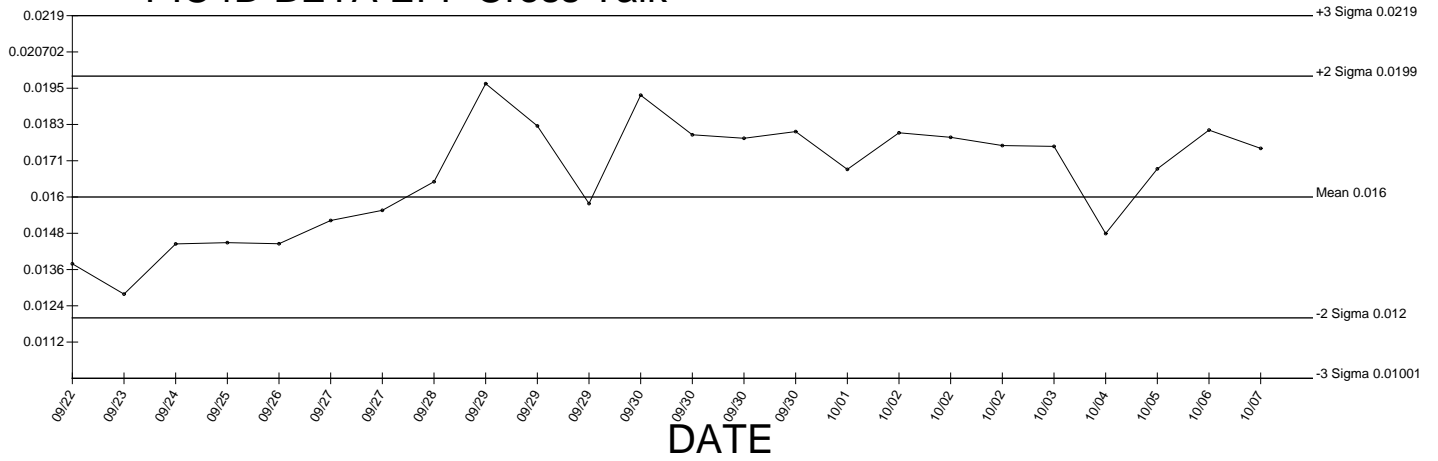
● Denotes Outlier

PIC4D BETA EFF

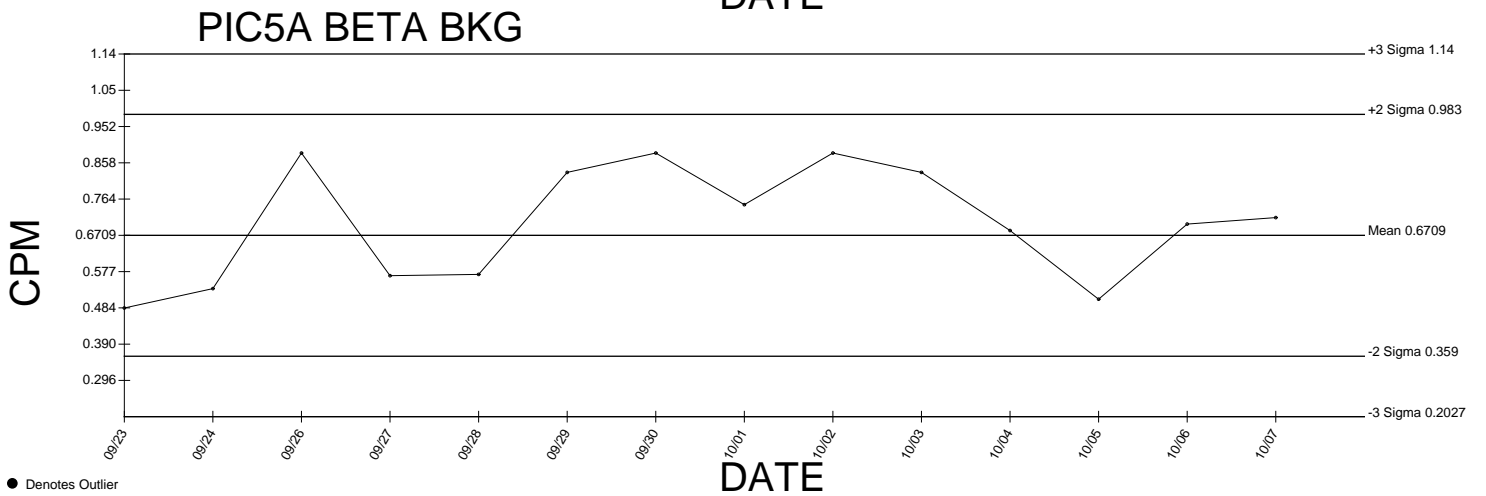
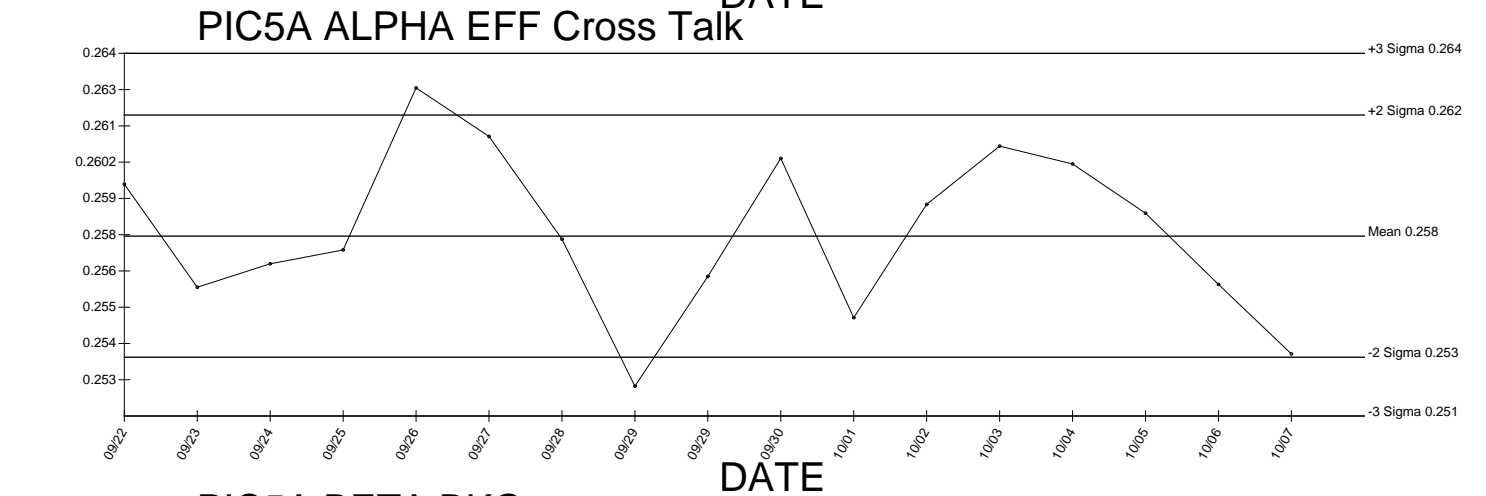
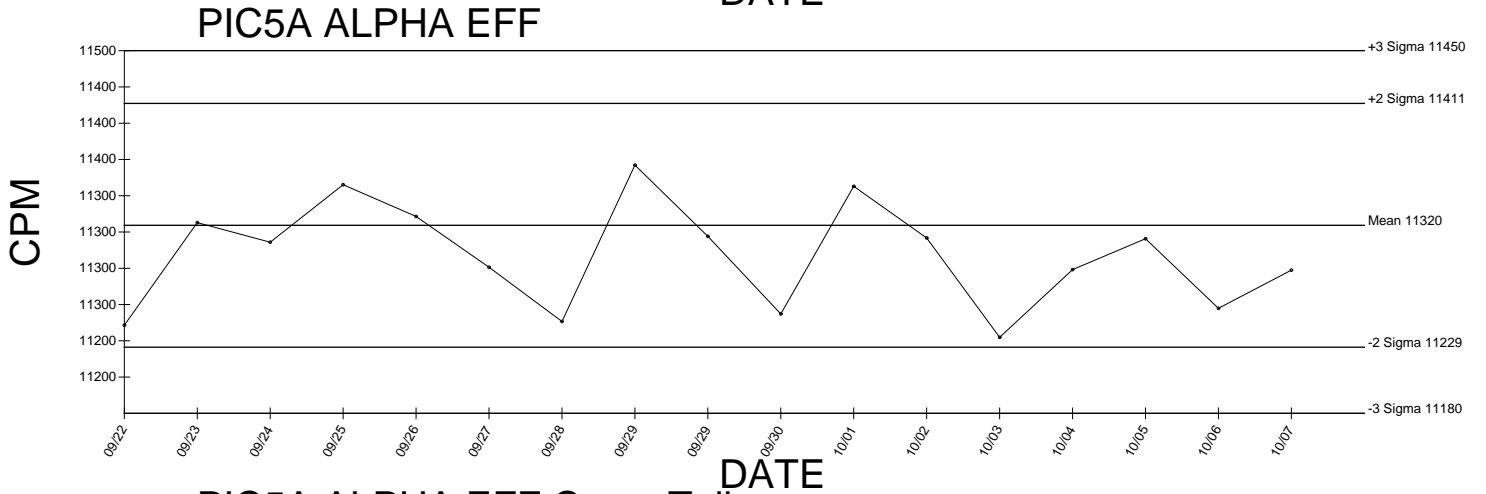
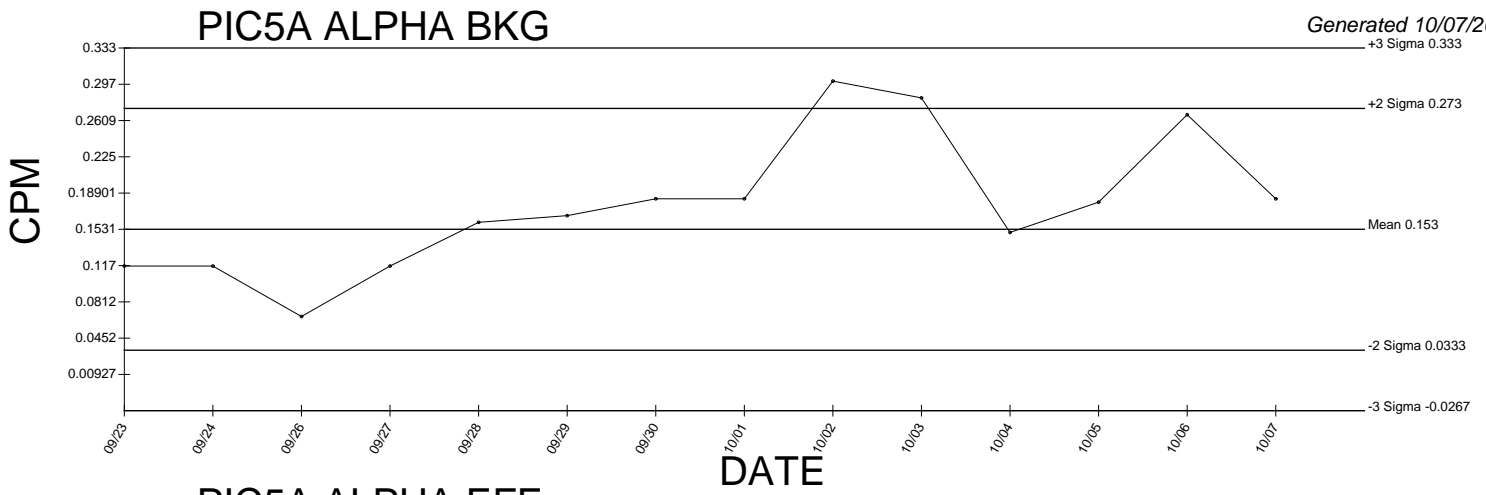
Generated 10/07/2009



PIC4D BETA EFF Cross Talk



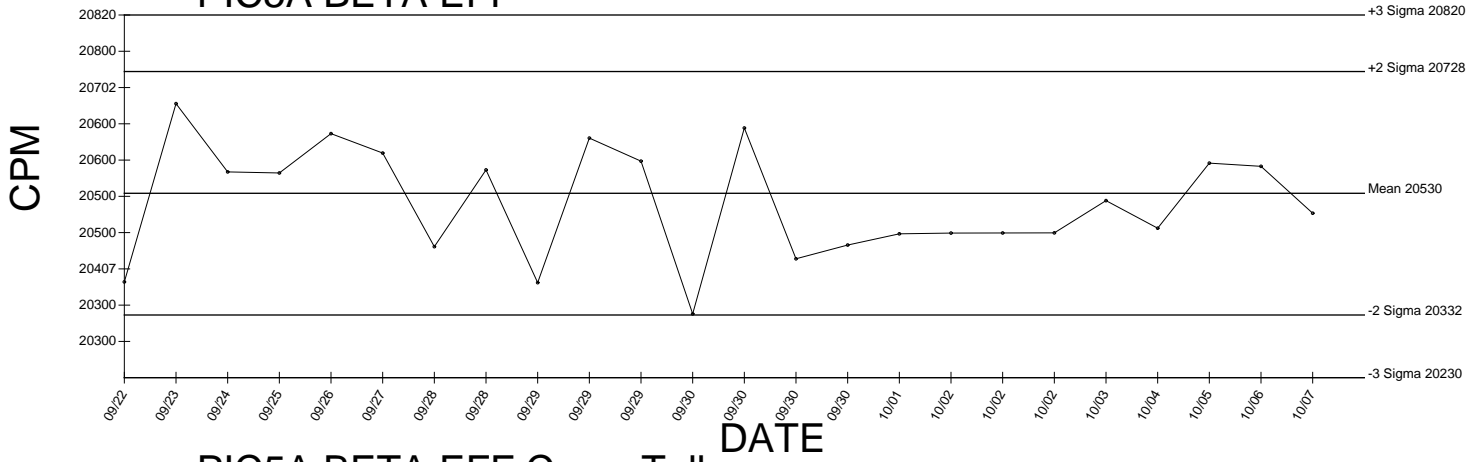
● Denotes Outlier



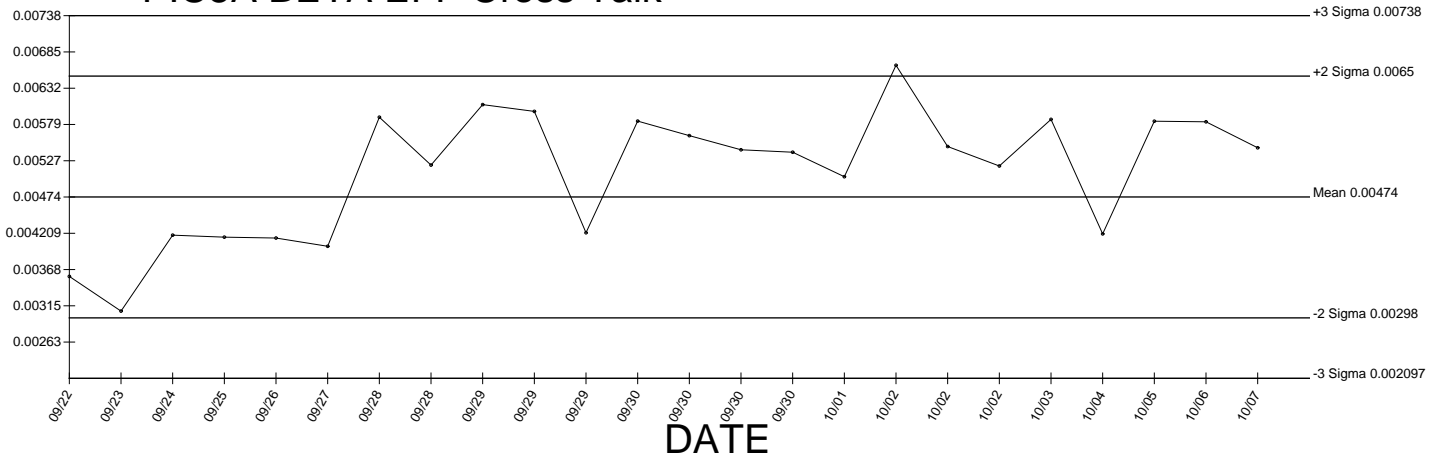
● Denotes Outlier

PIC5A BETA EFF

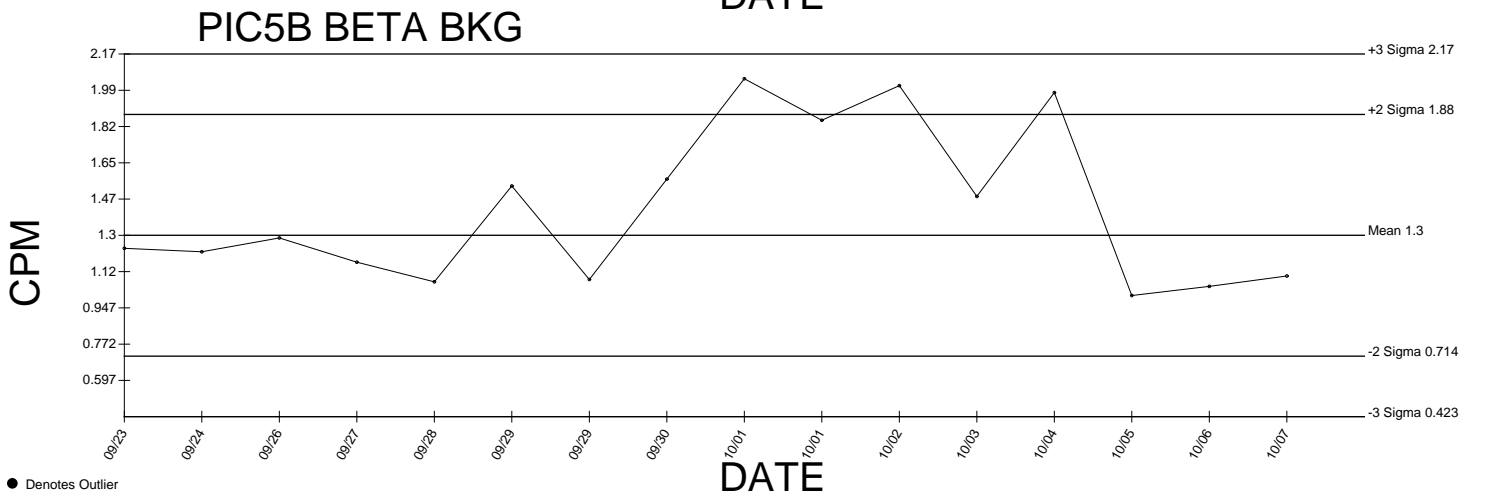
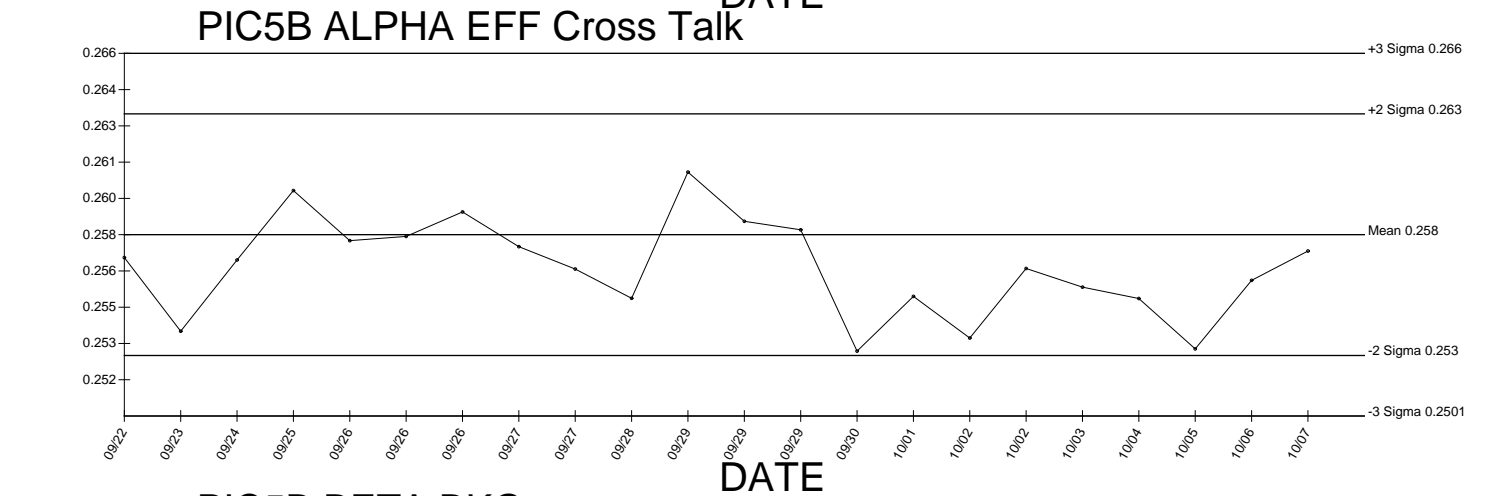
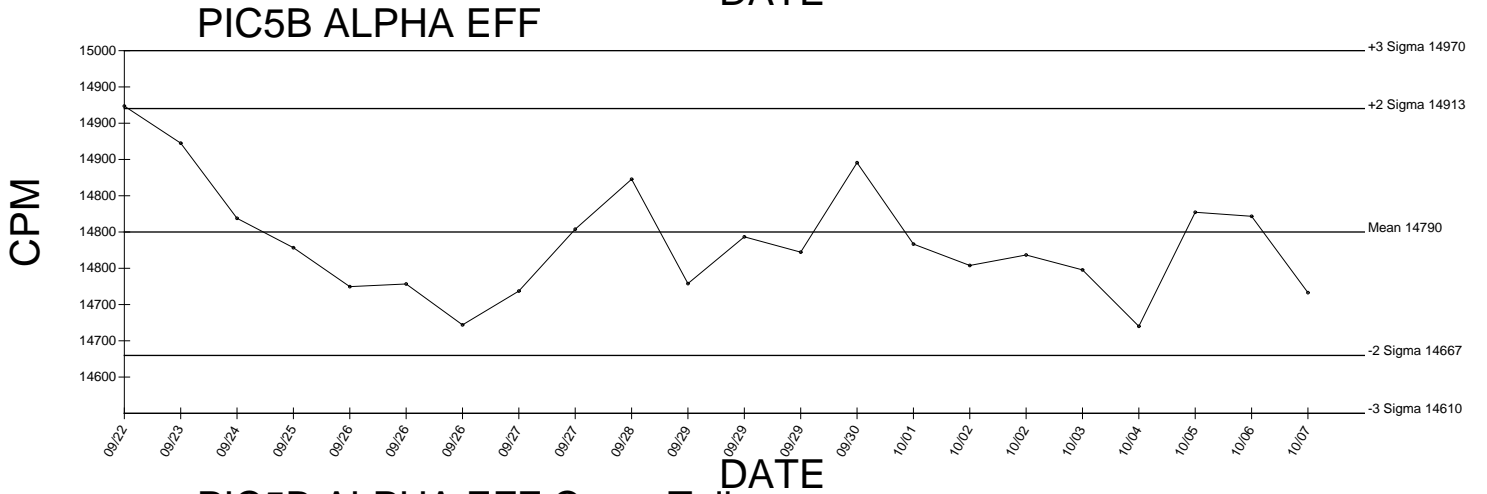
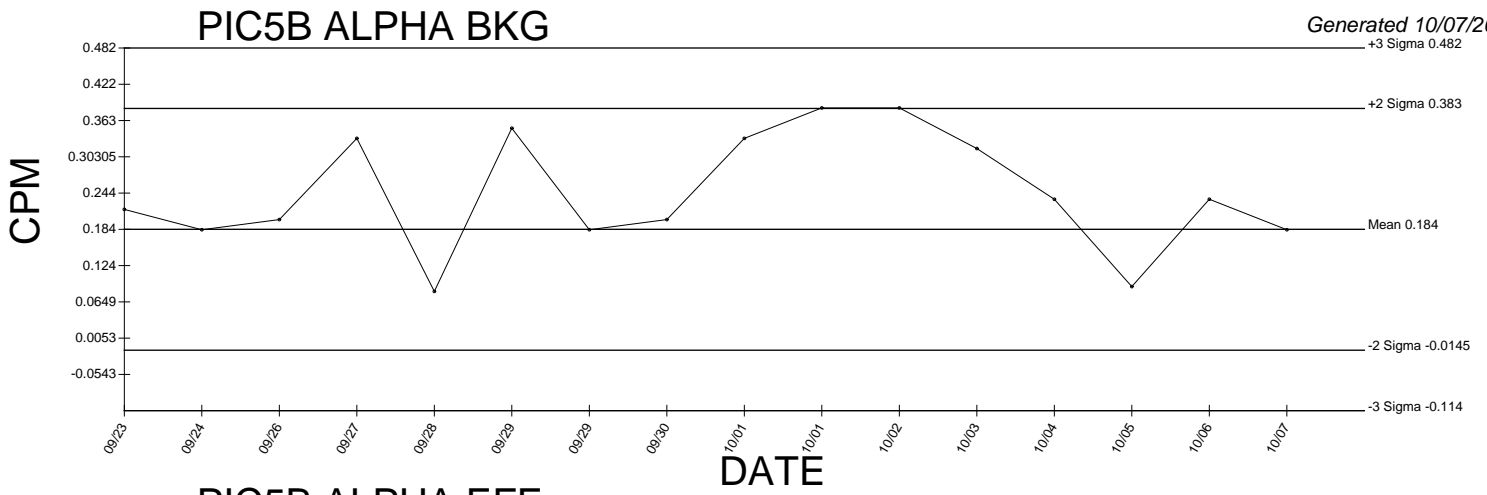
Generated 10/07/2009



PIC5A BETA EFF Cross Talk



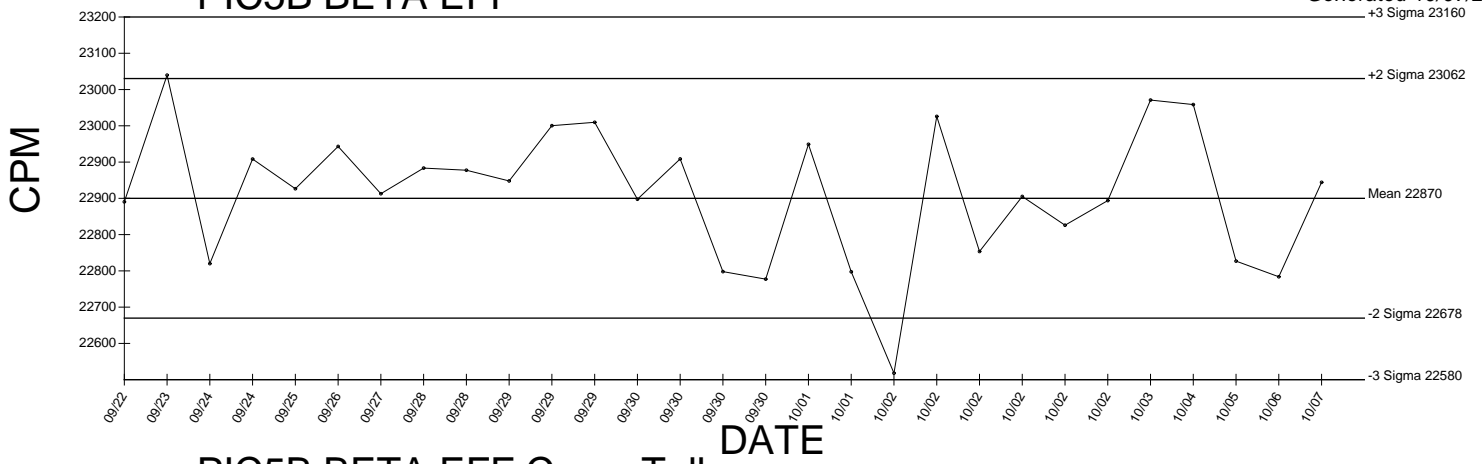
● Denotes Outlier



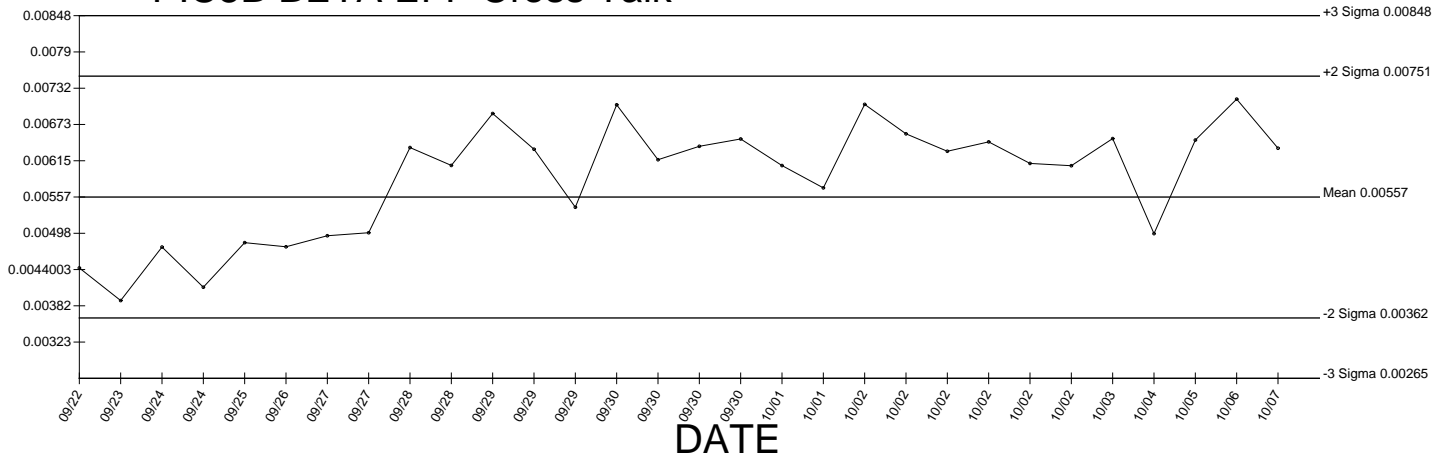
● Denotes Outlier

PIC5B BETA EFF

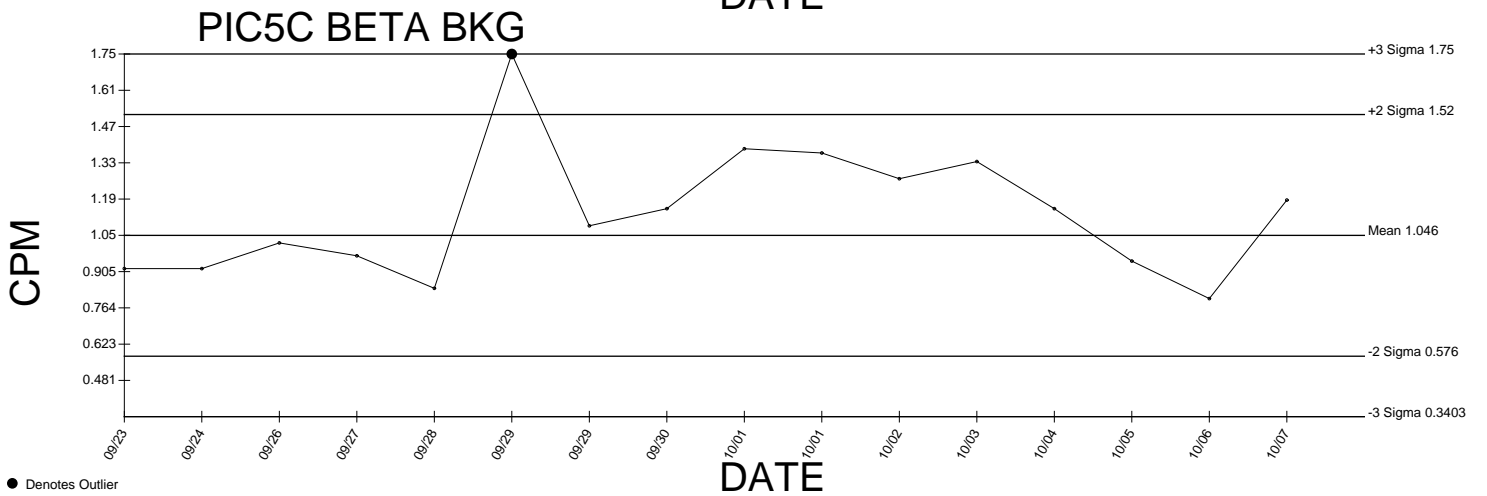
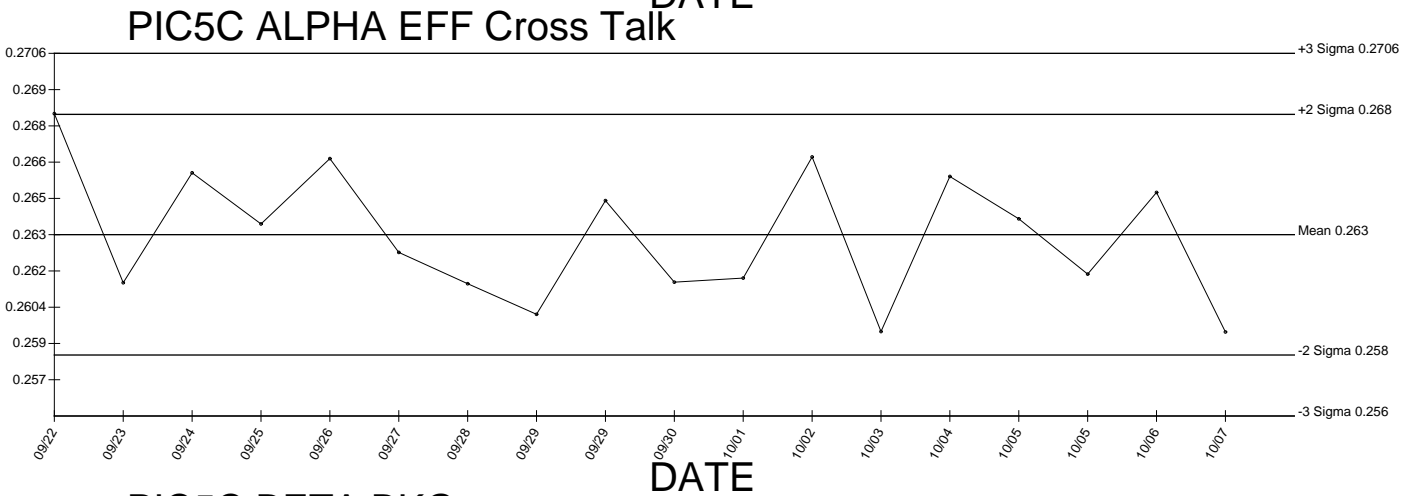
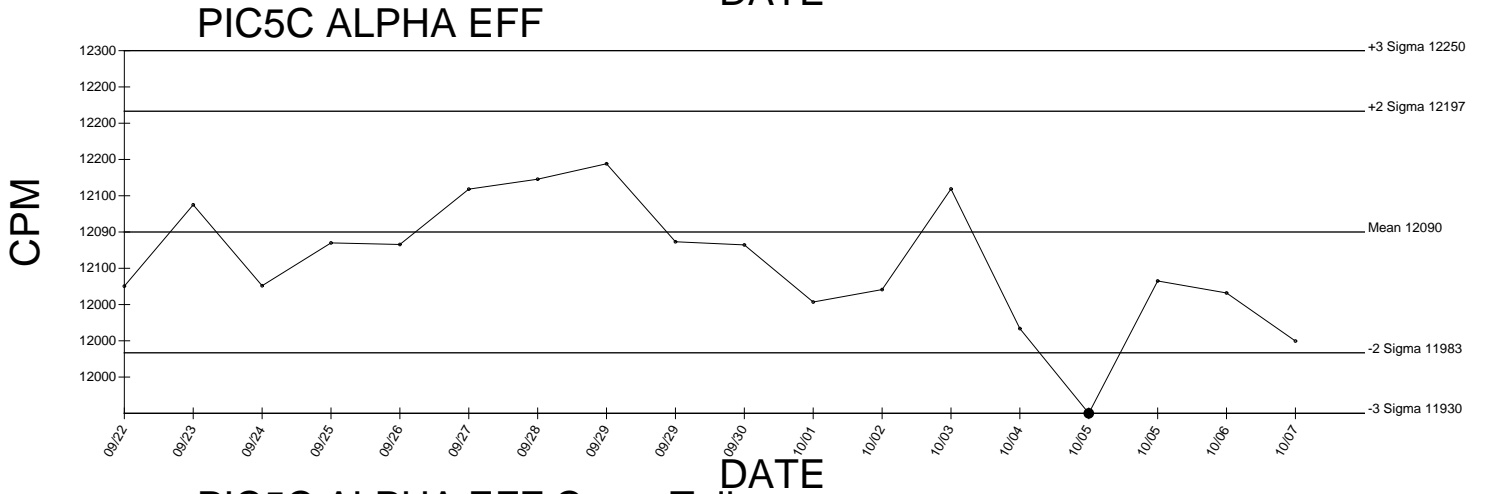
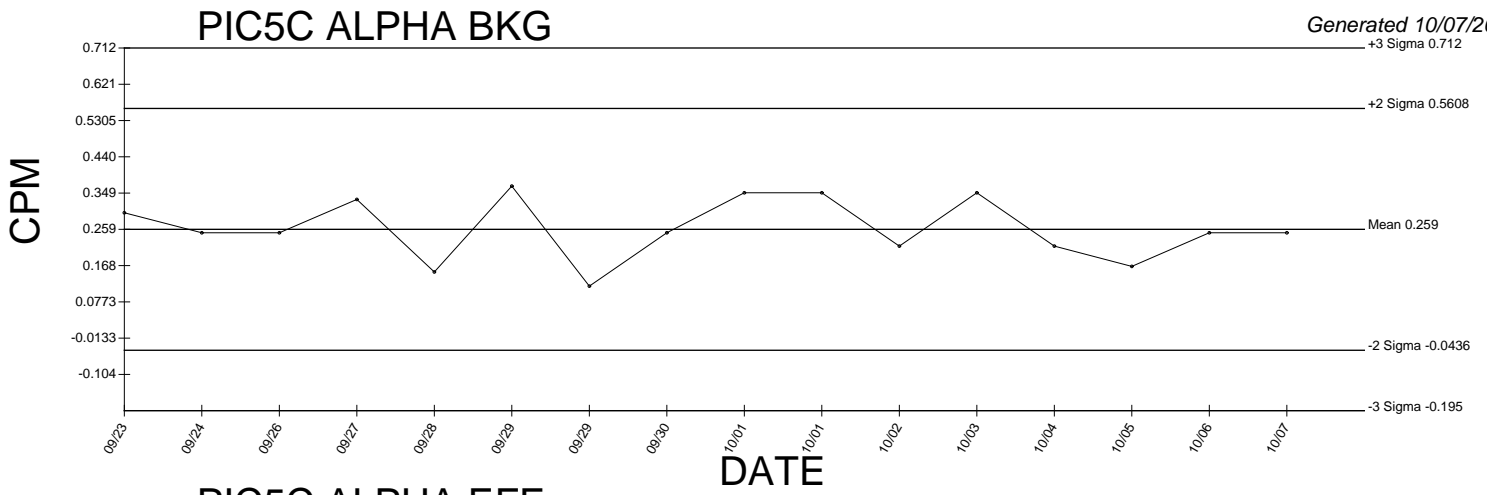
Generated 10/07/2009



PIC5B BETA EFF Cross Talk



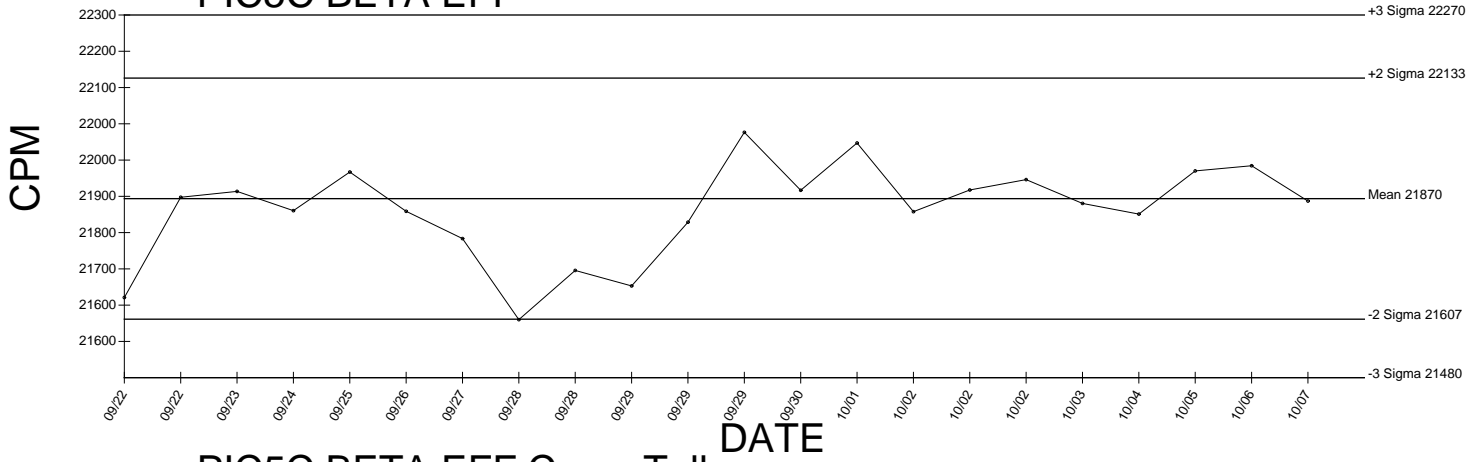
● Denotes Outlier



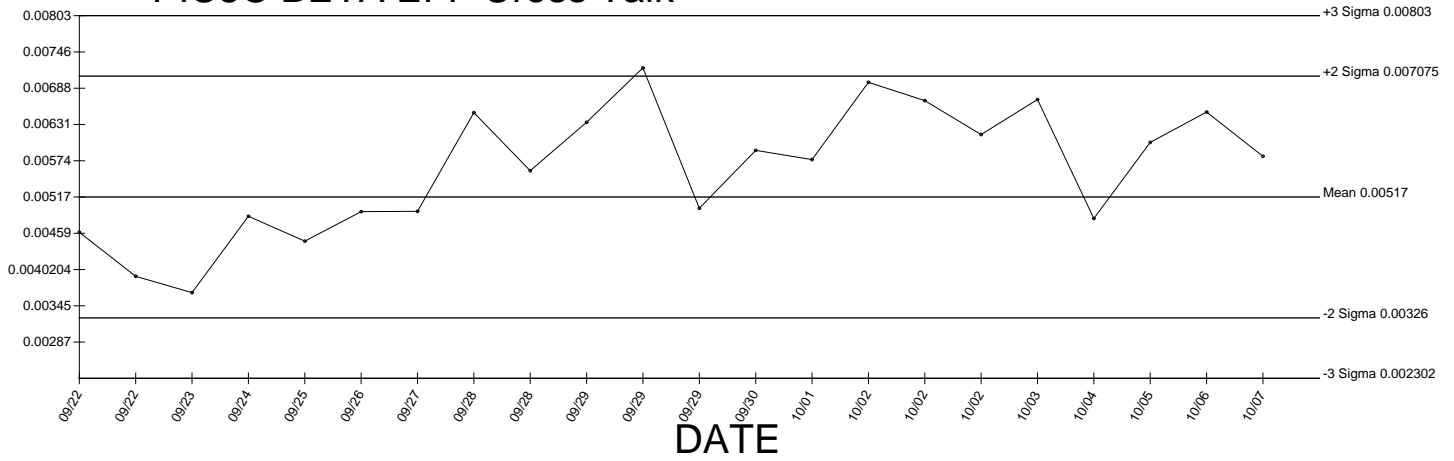
● Denotes Outlier

PIC5C BETA EFF

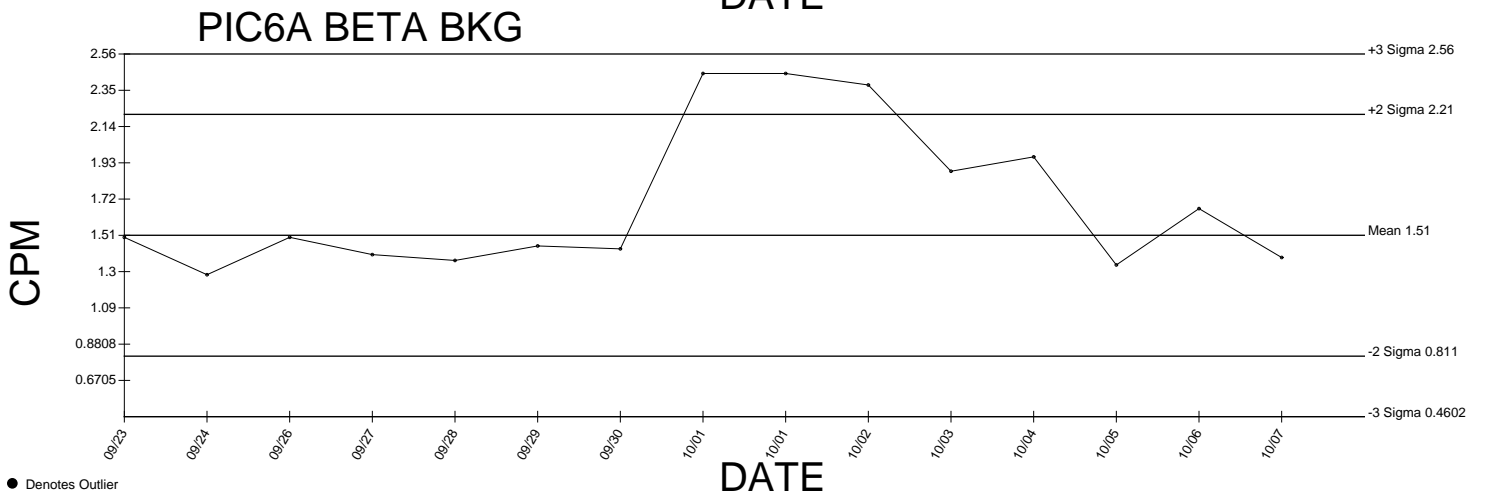
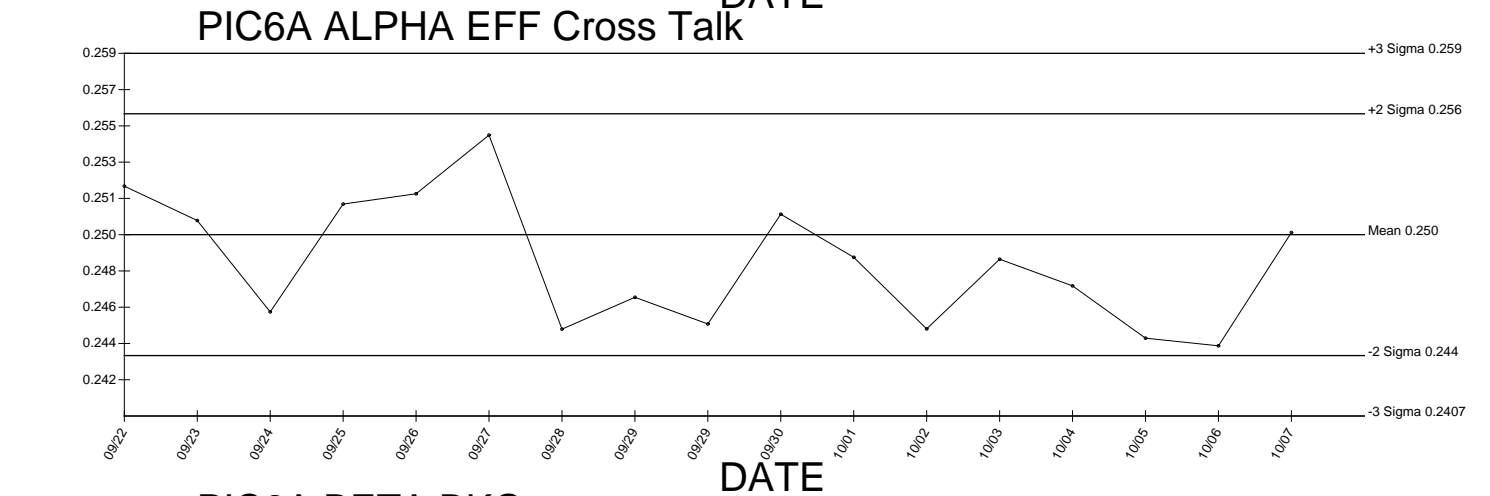
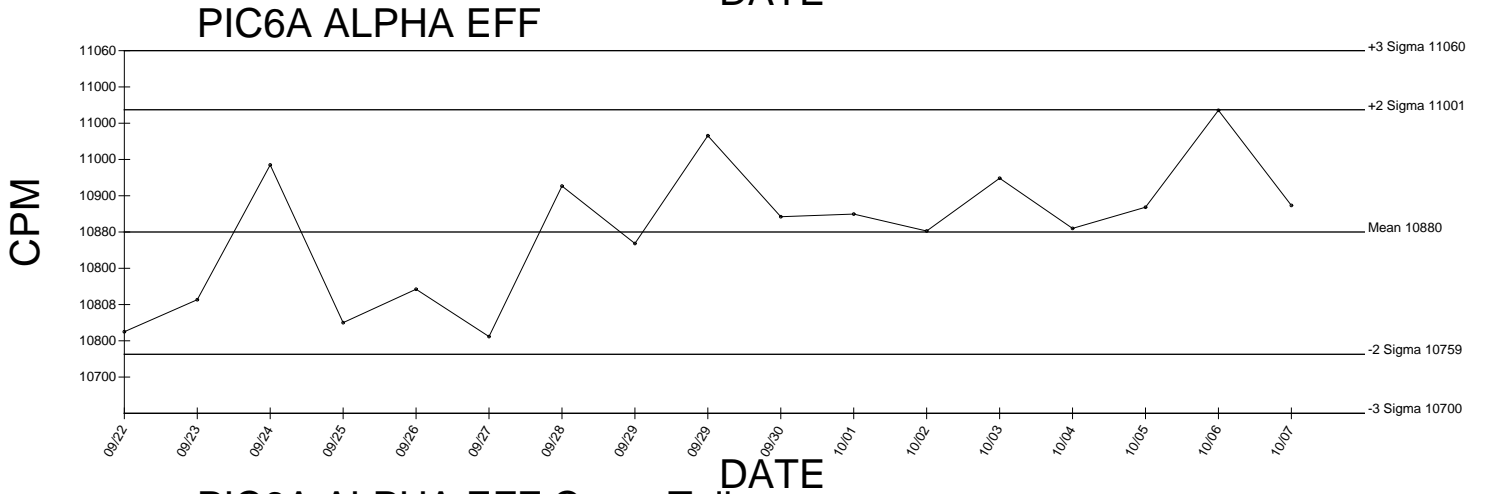
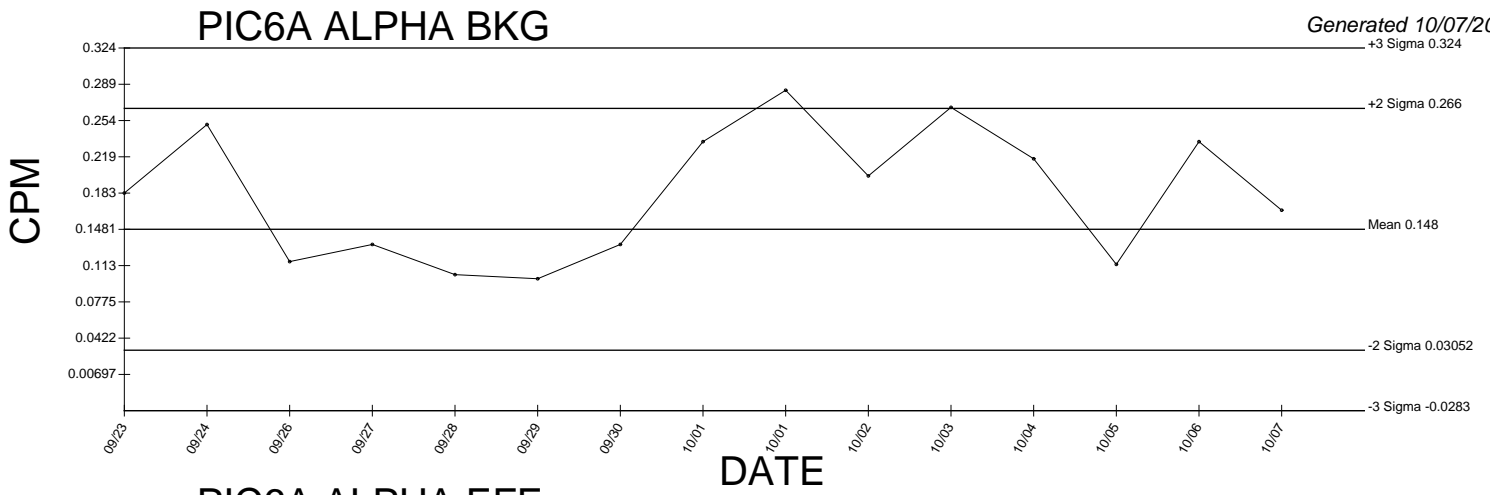
Generated 10/07/2009



PIC5C BETA EFF Cross Talk



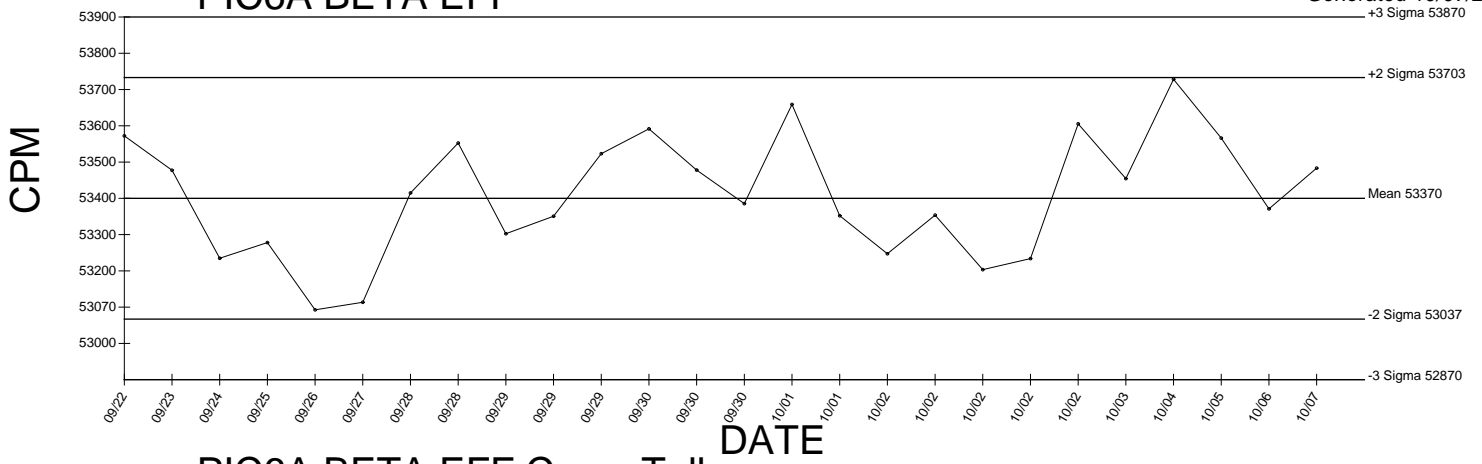
● Denotes Outlier



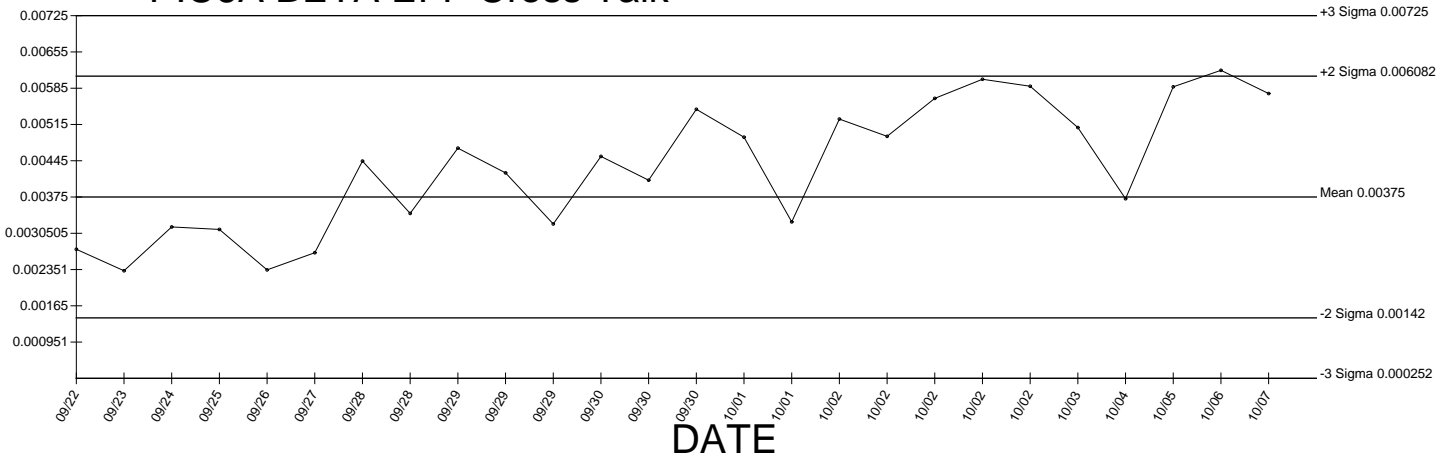
● Denotes Outlier

PIC6A BETA EFF

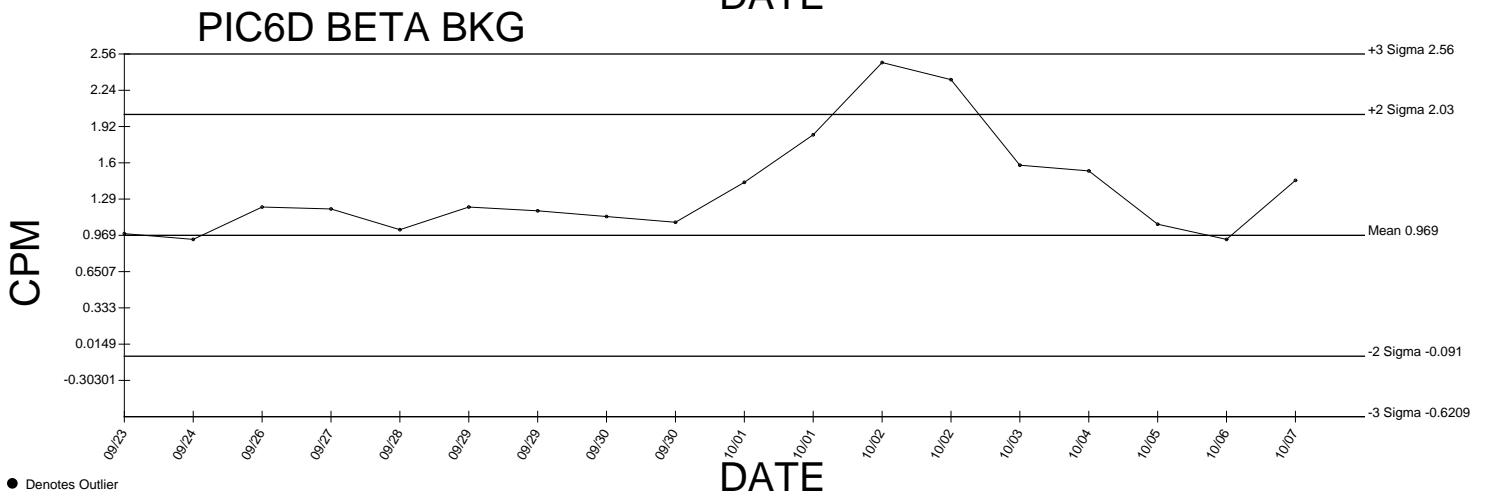
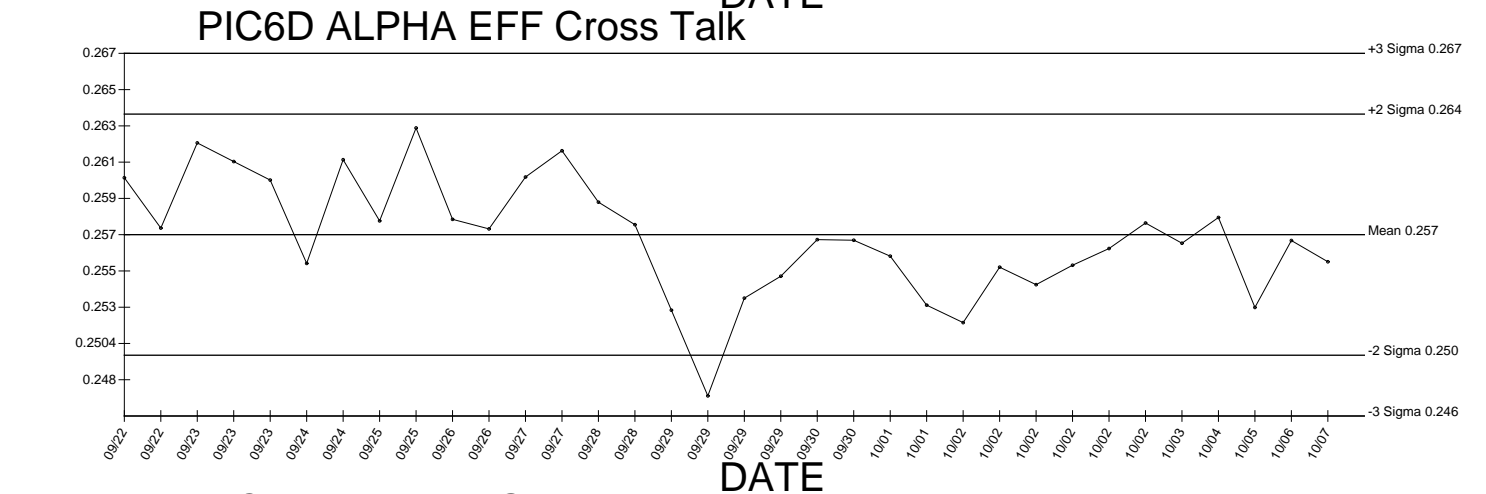
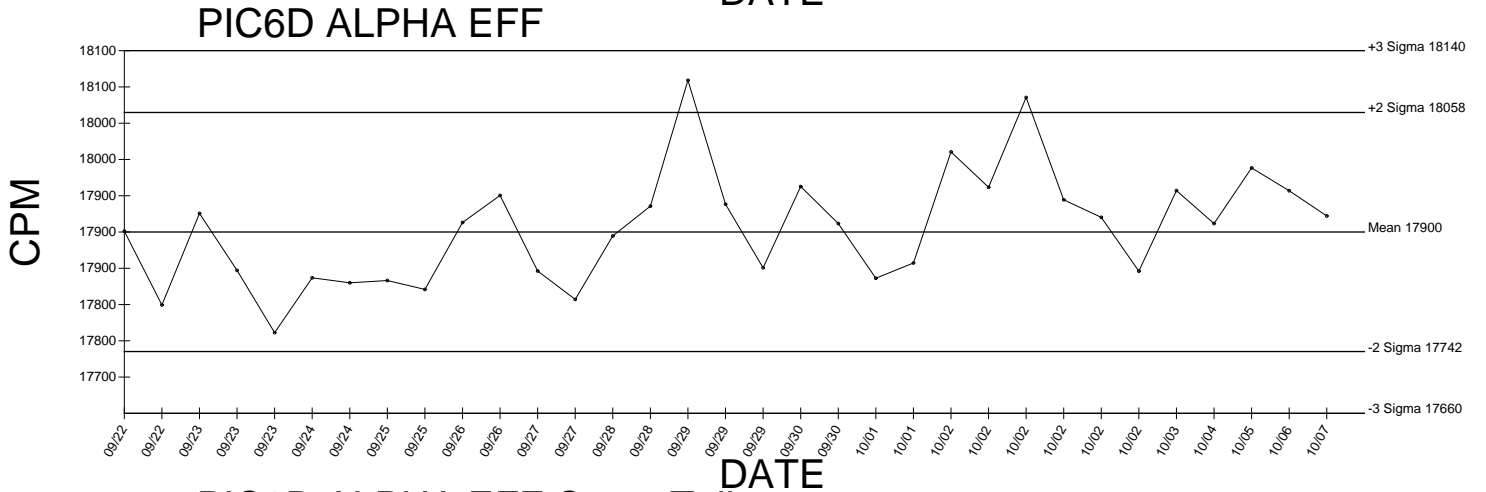
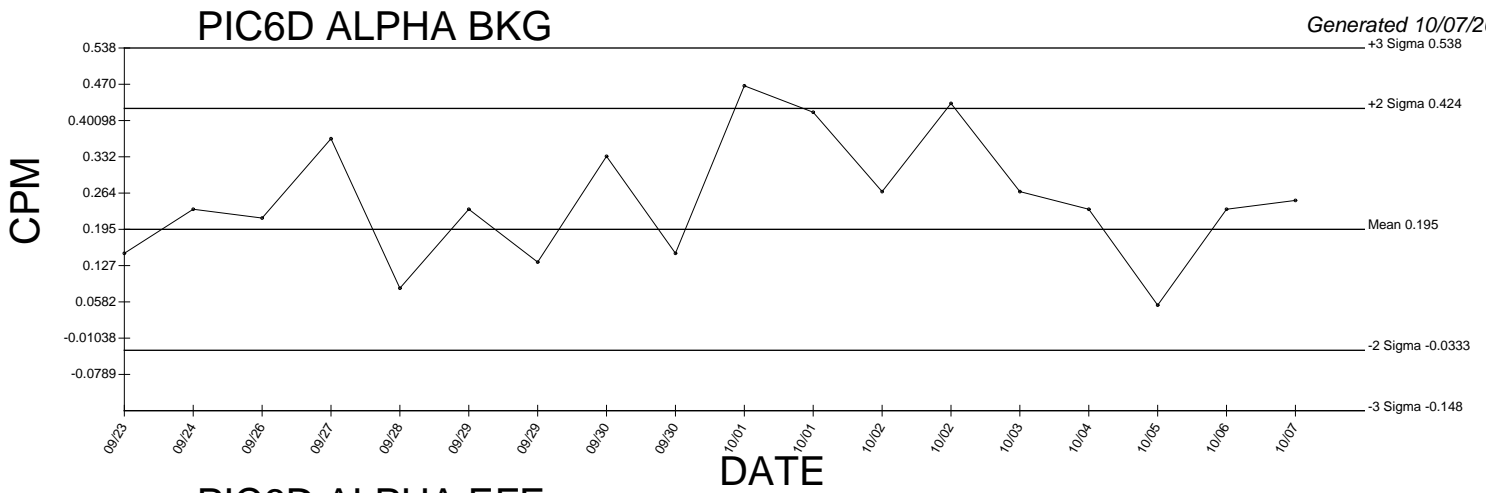
Generated 10/07/2009



PIC6A BETA EFF Cross Talk



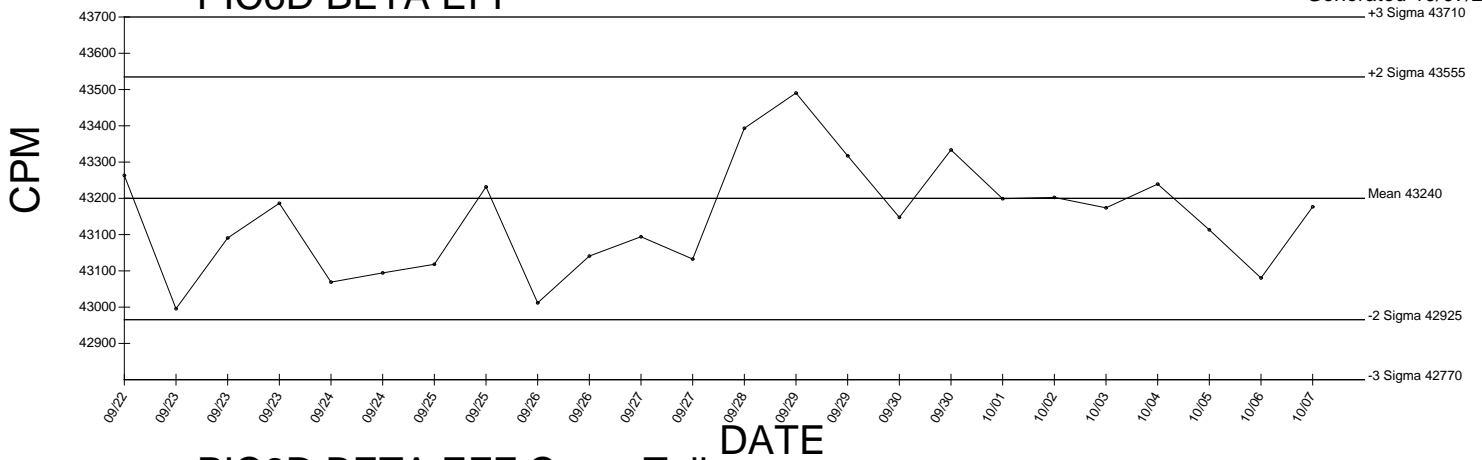
● Denotes Outlier



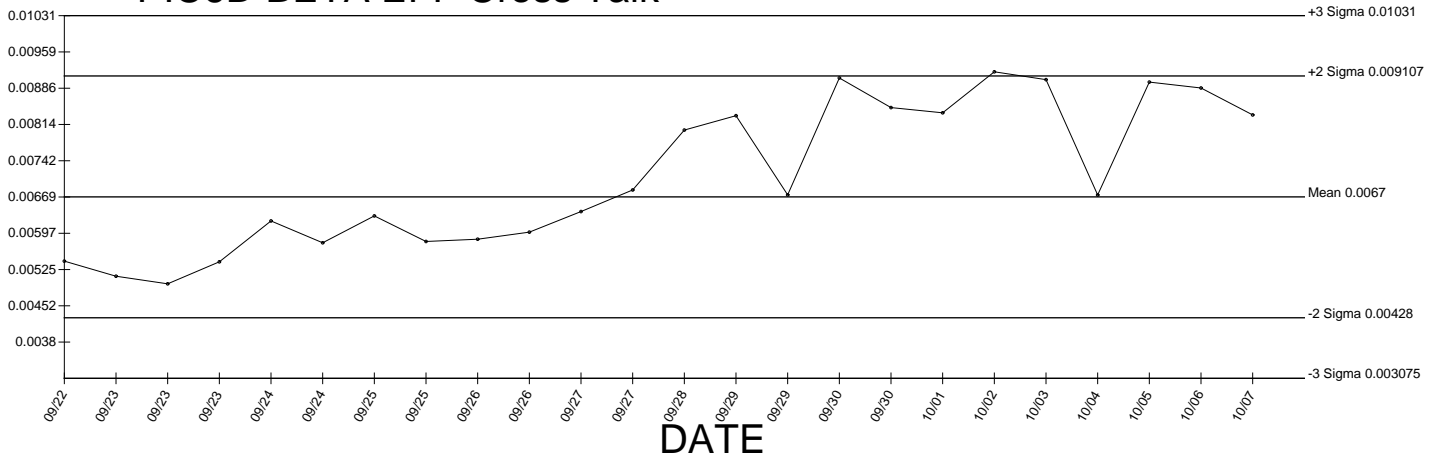
● Denotes Outlier

PIC6D BETA EFF

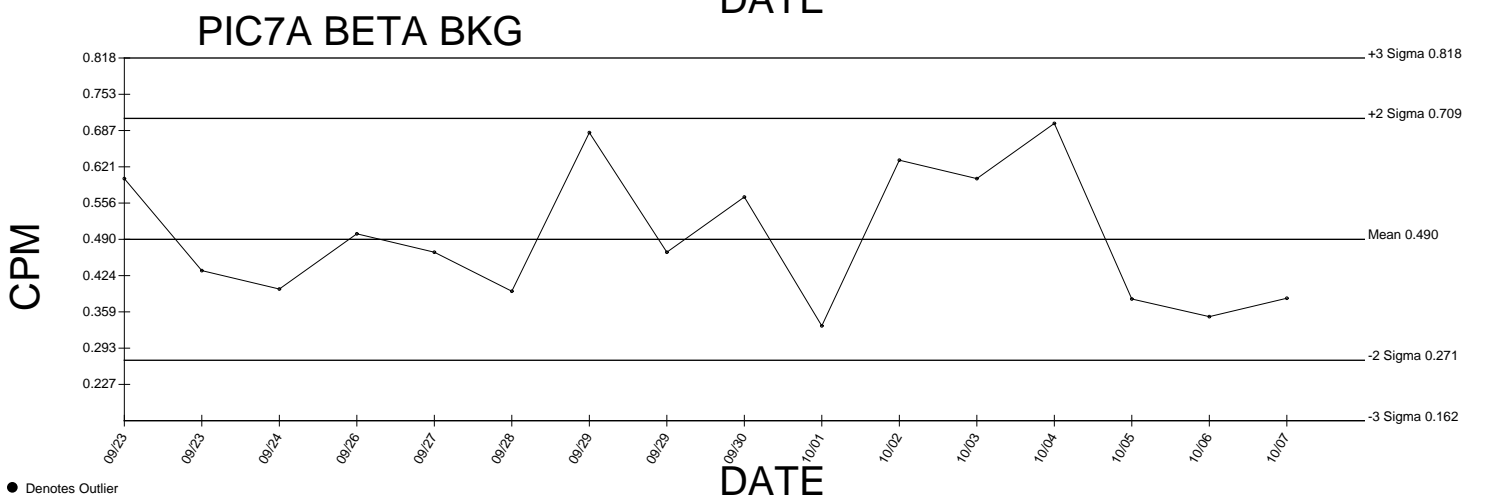
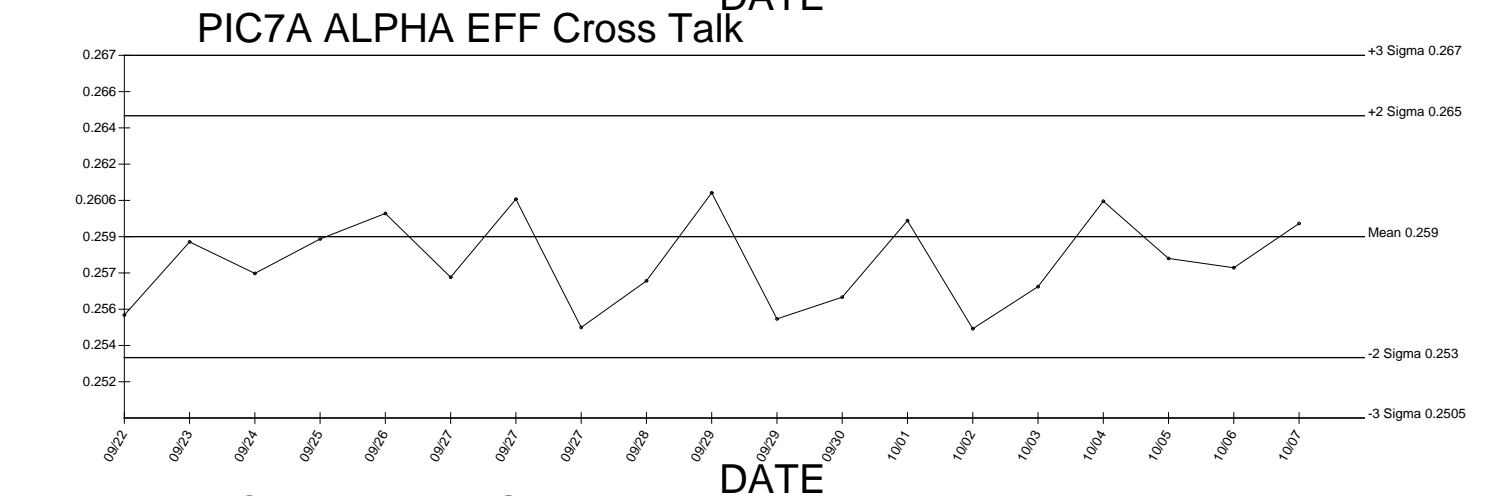
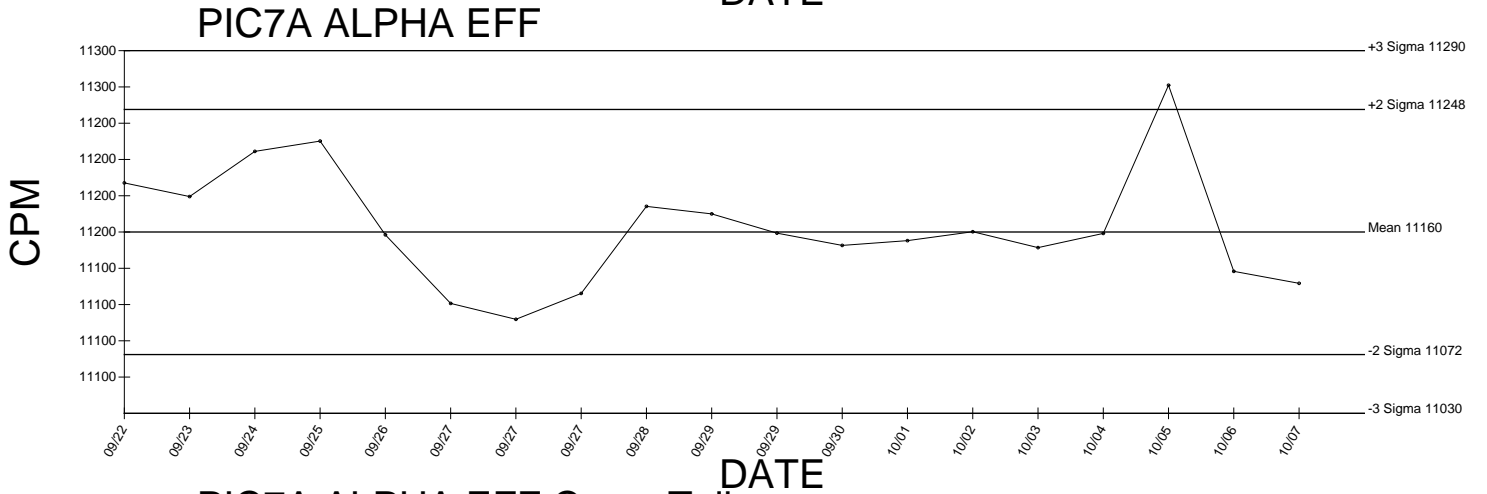
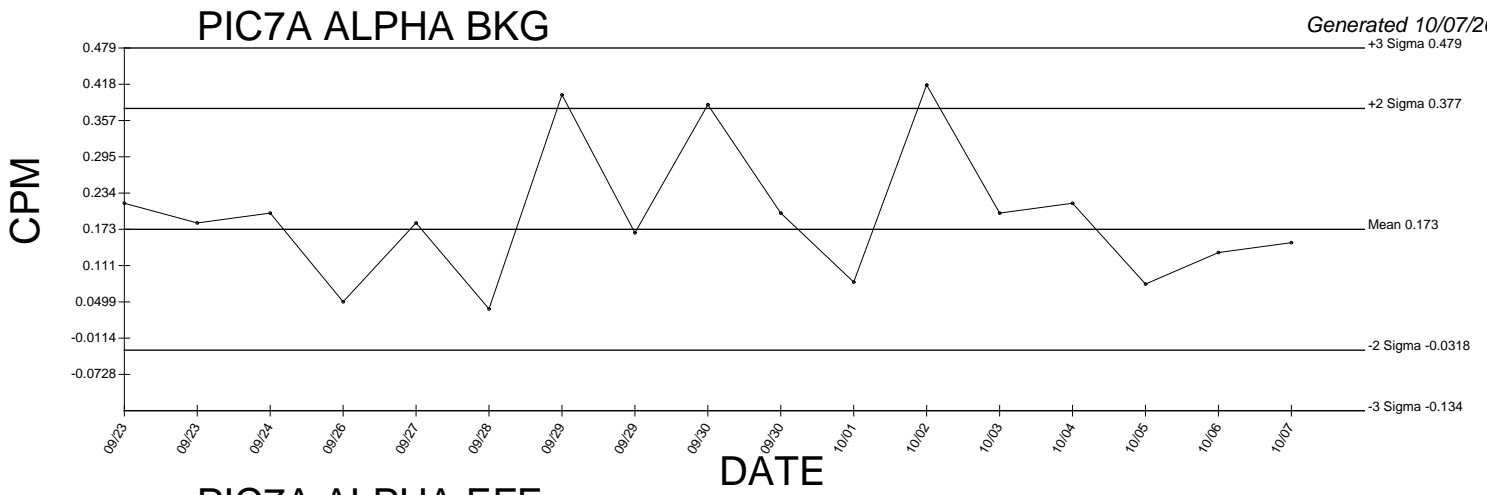
Generated 10/07/2009



PIC6D BETA EFF Cross Talk



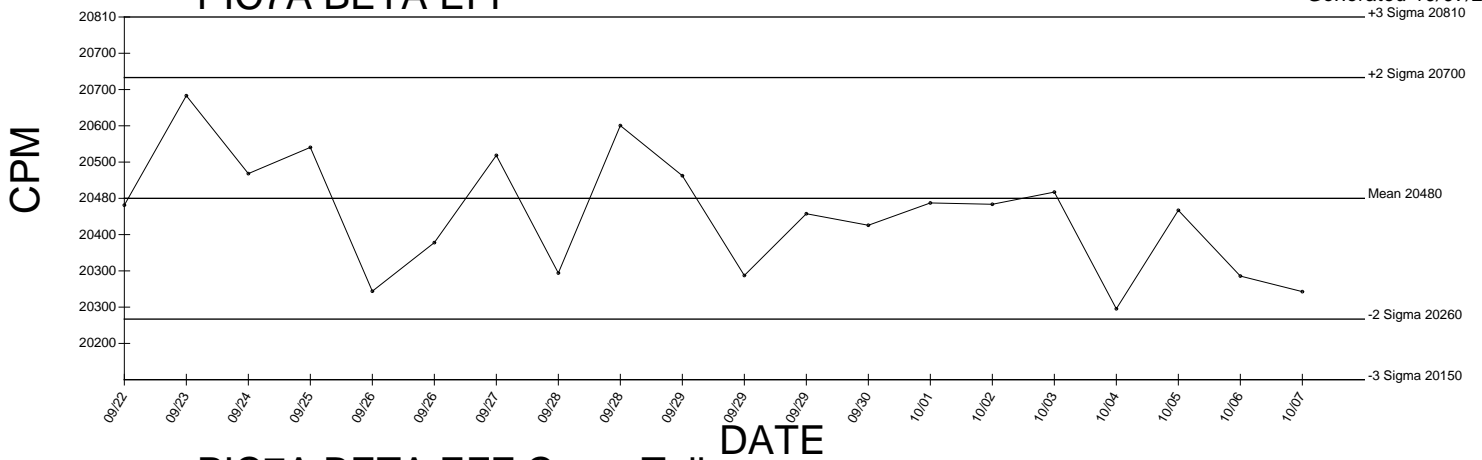
● Denotes Outlier



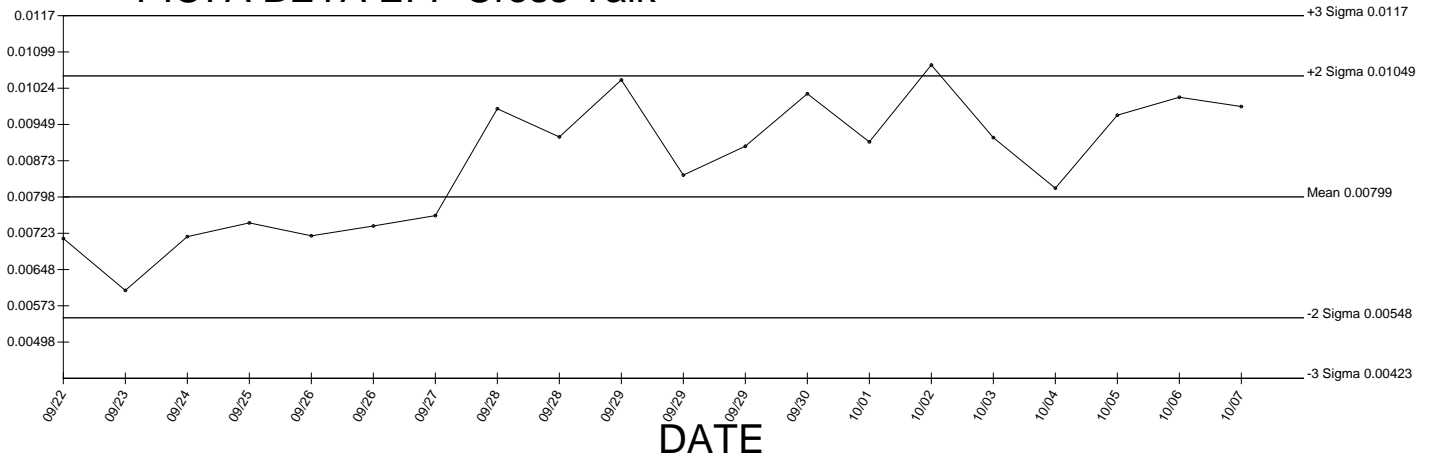
● Denotes Outlier

PIC7A BETA EFF

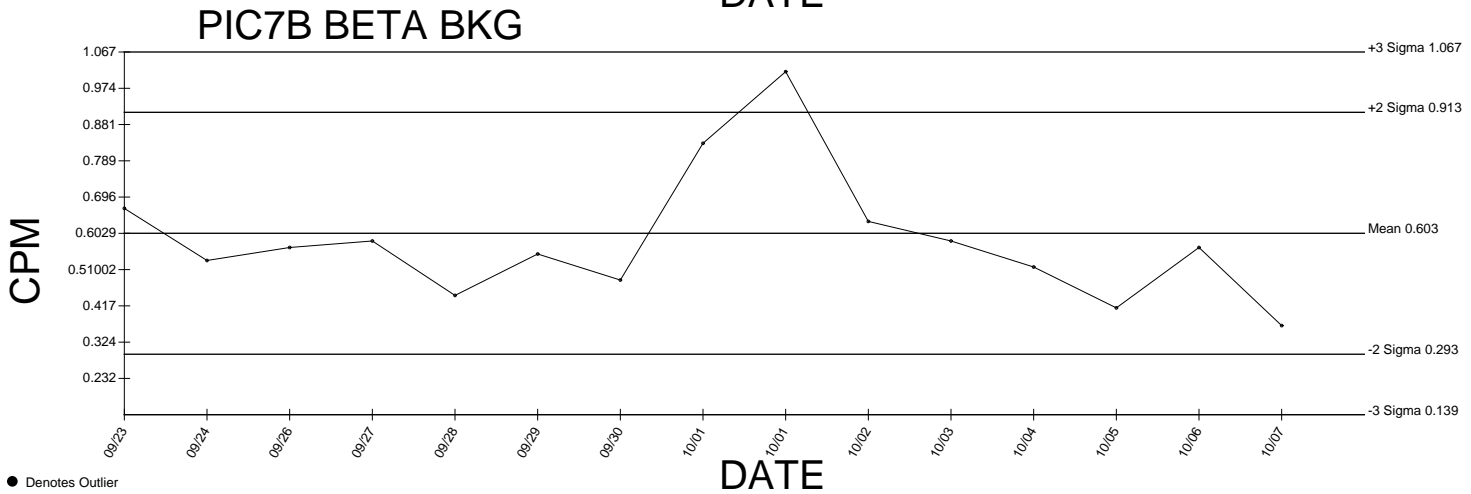
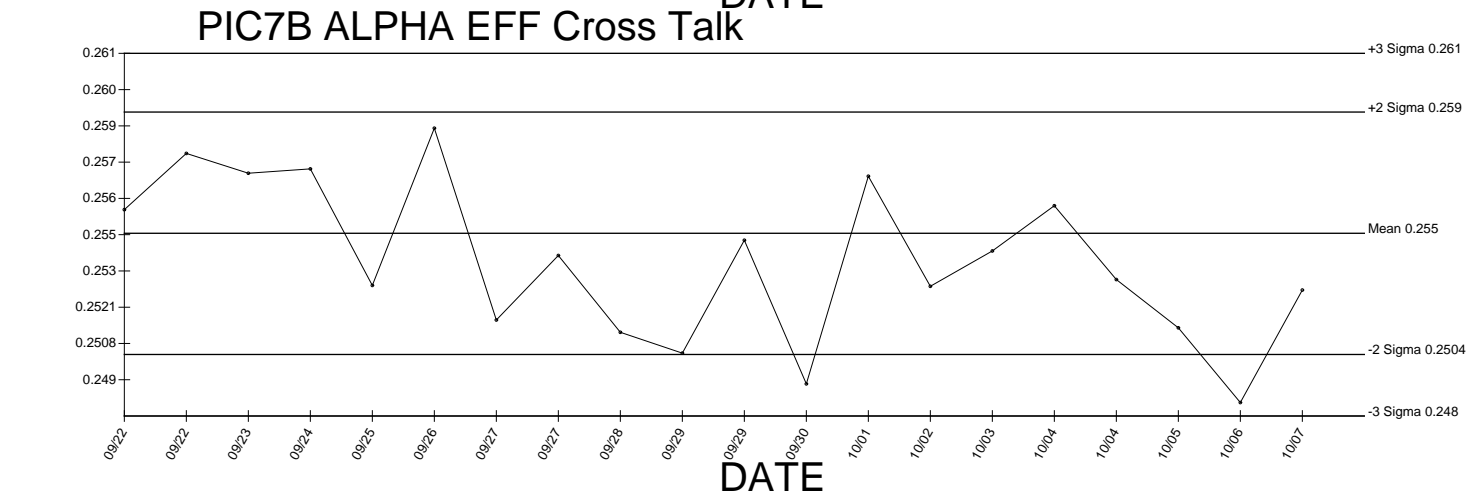
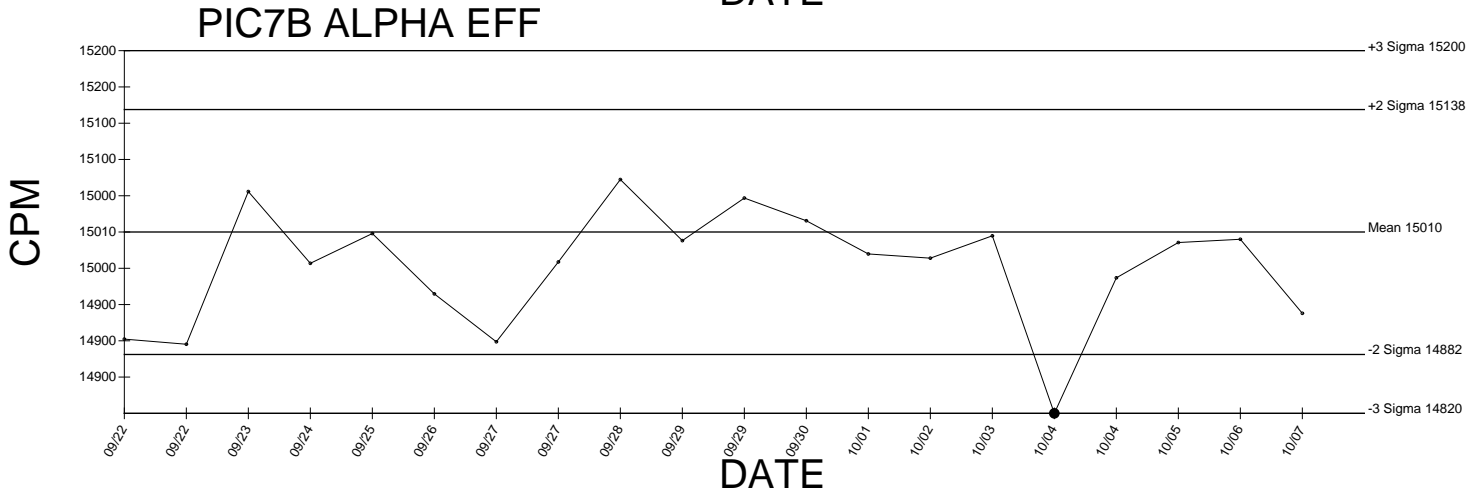
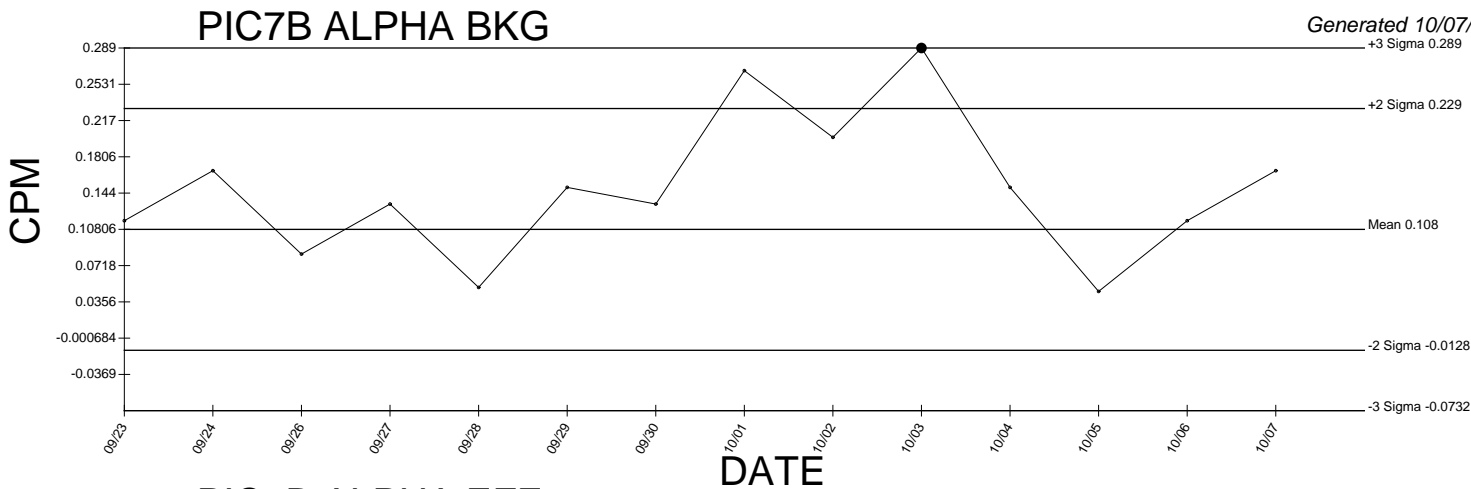
Generated 10/07/2009



PIC7A BETA EFF Cross Talk



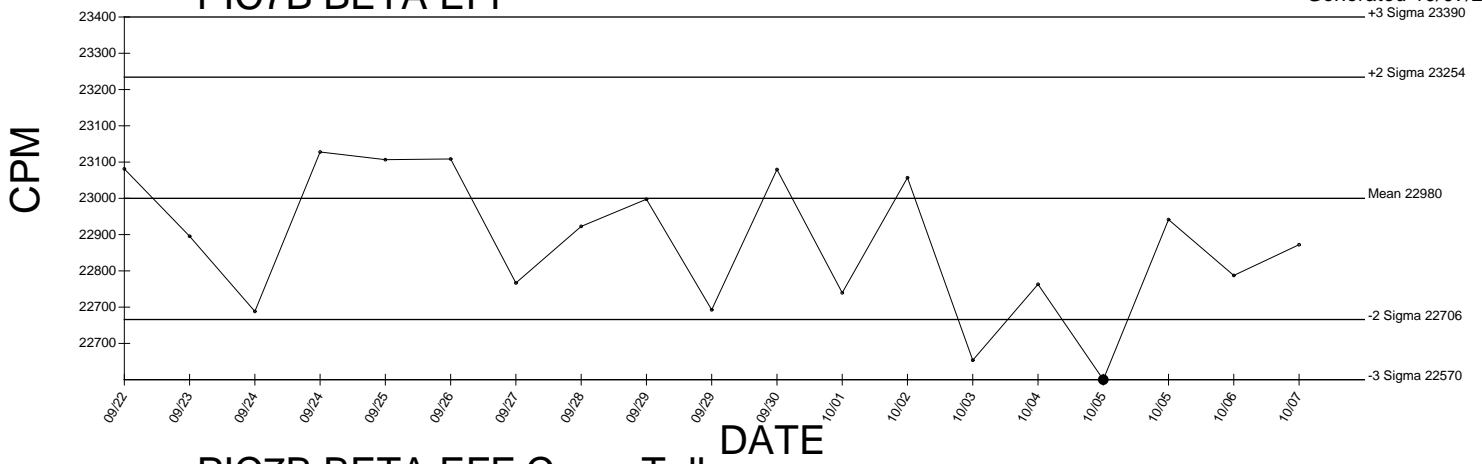
● Denotes Outlier



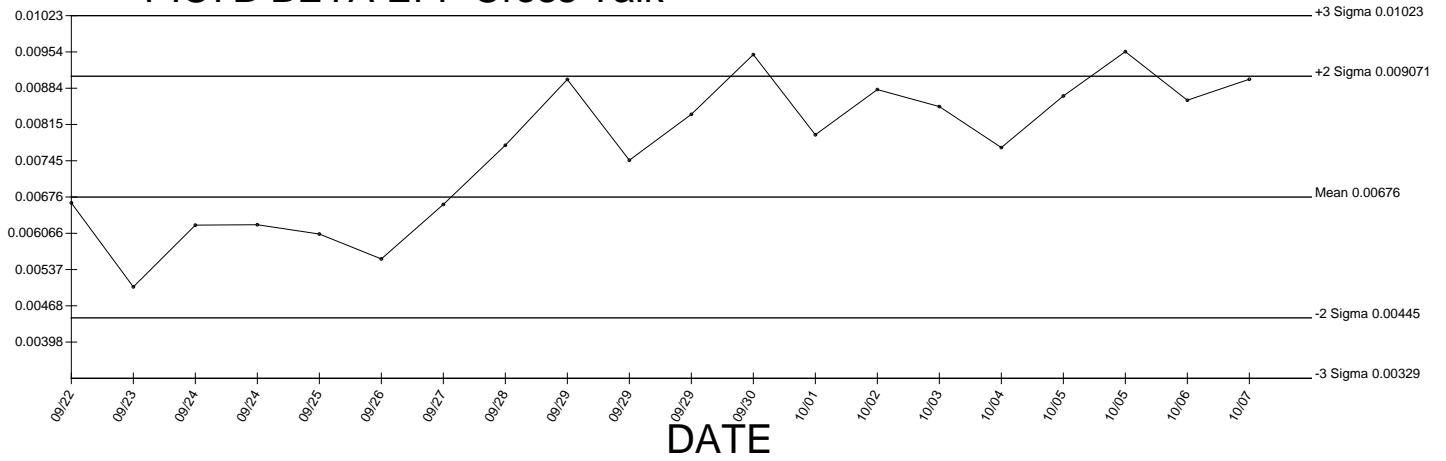
● Denotes Outlier

PIC7B BETA EFF

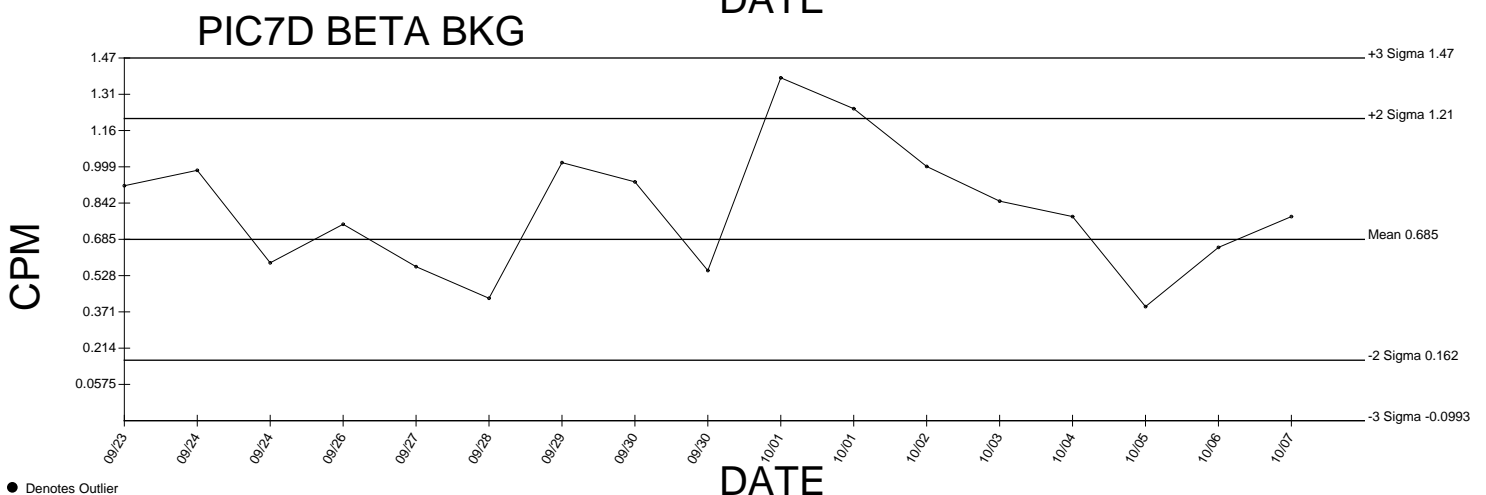
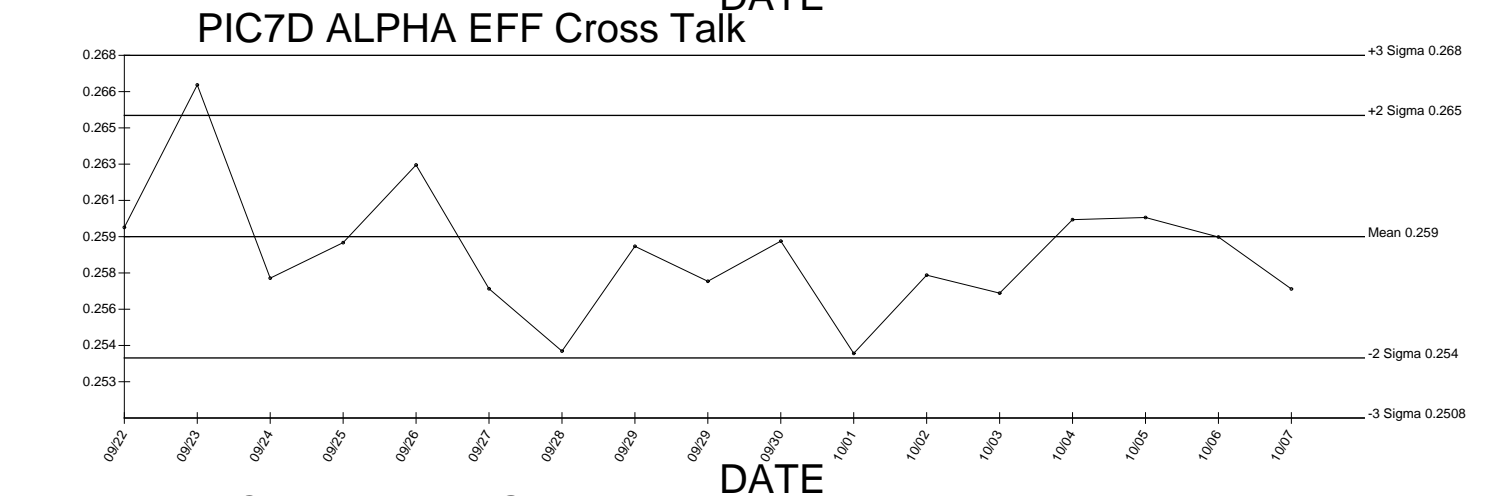
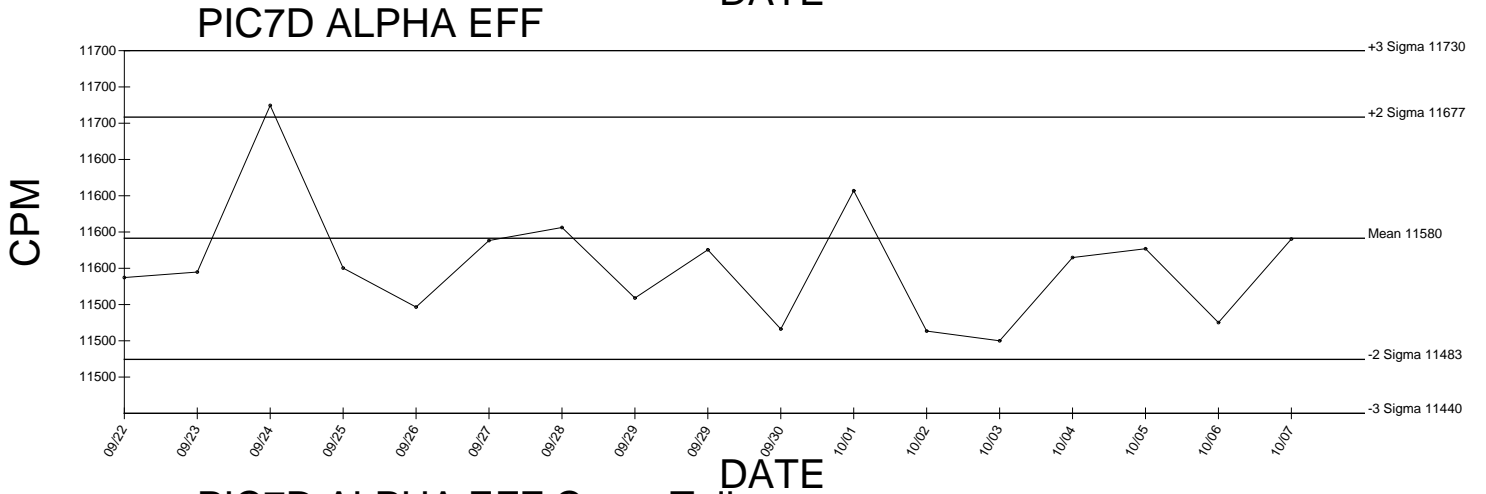
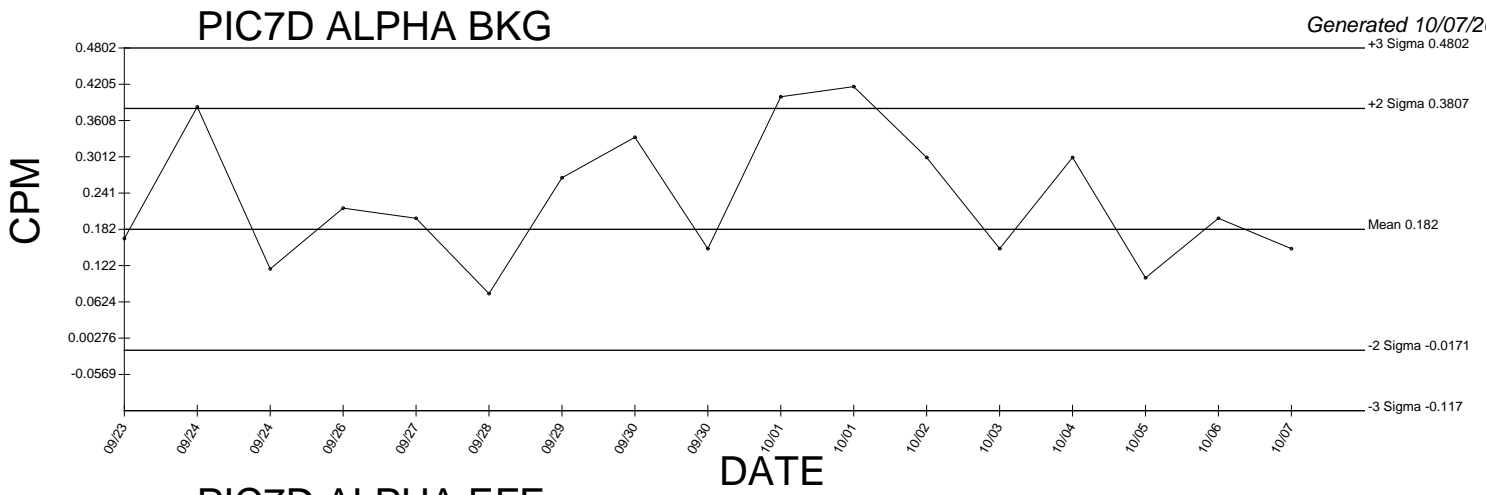
Generated 10/07/2009



PIC7B BETA EFF Cross Talk



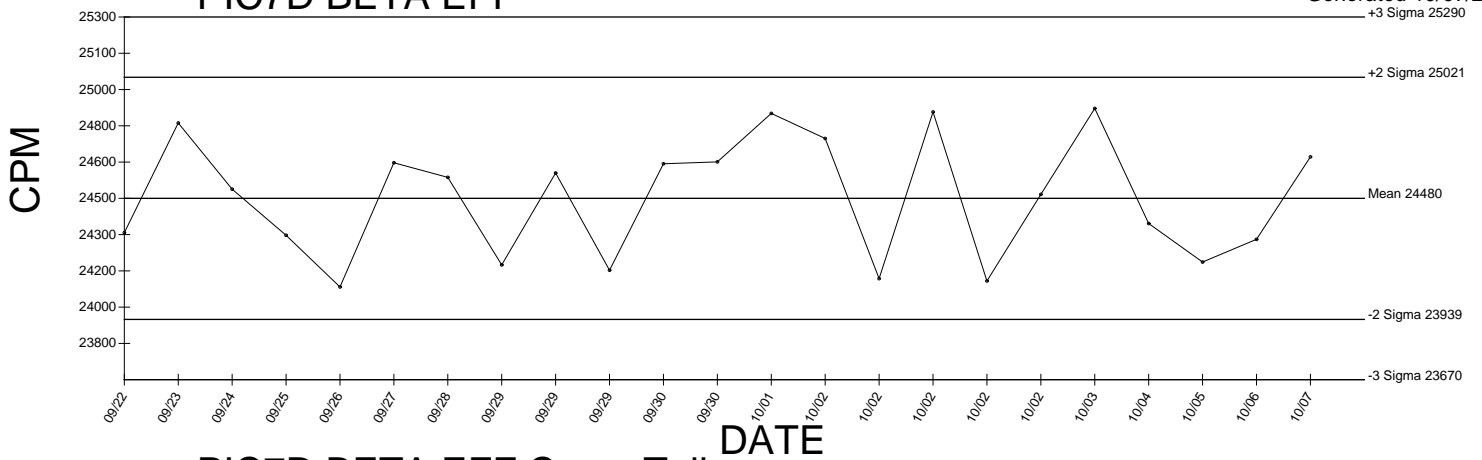
● Denotes Outlier



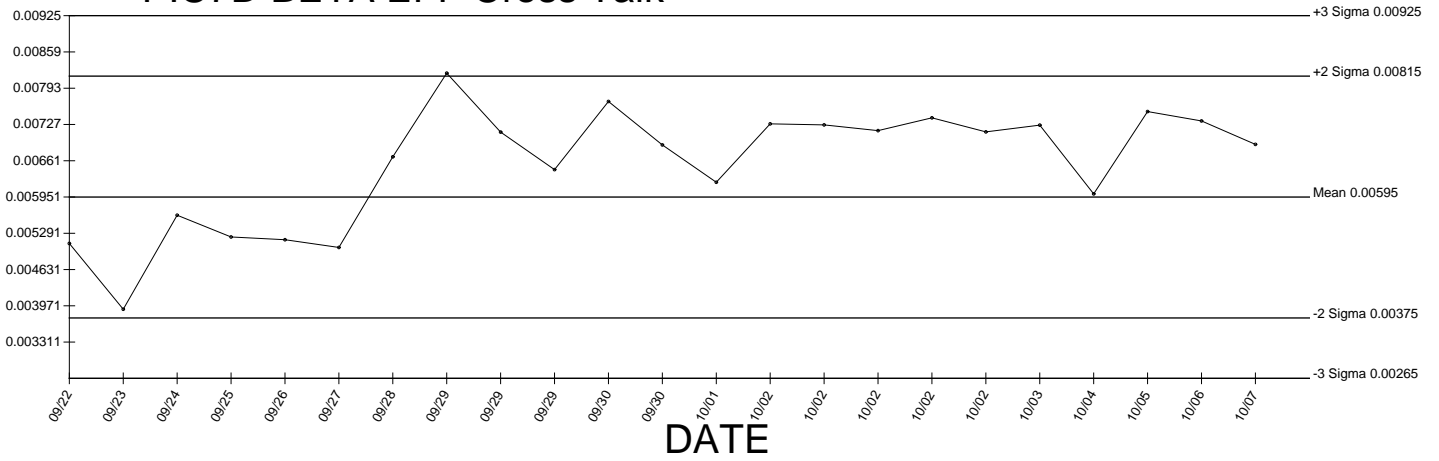
● Denotes Outlier

PIC7D BETA EFF

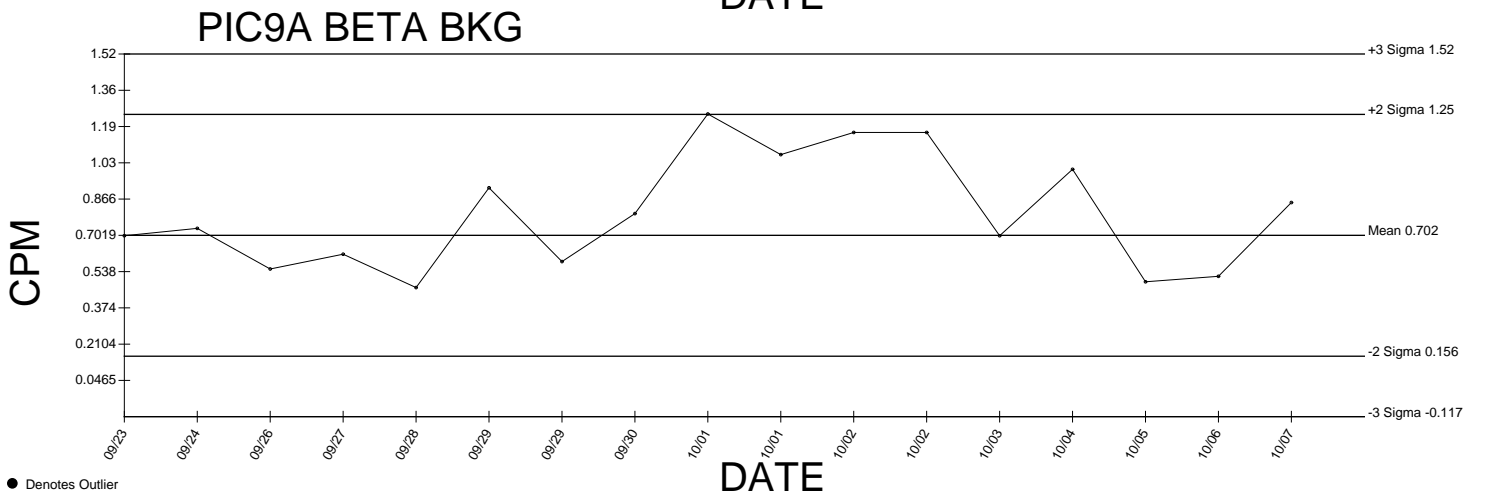
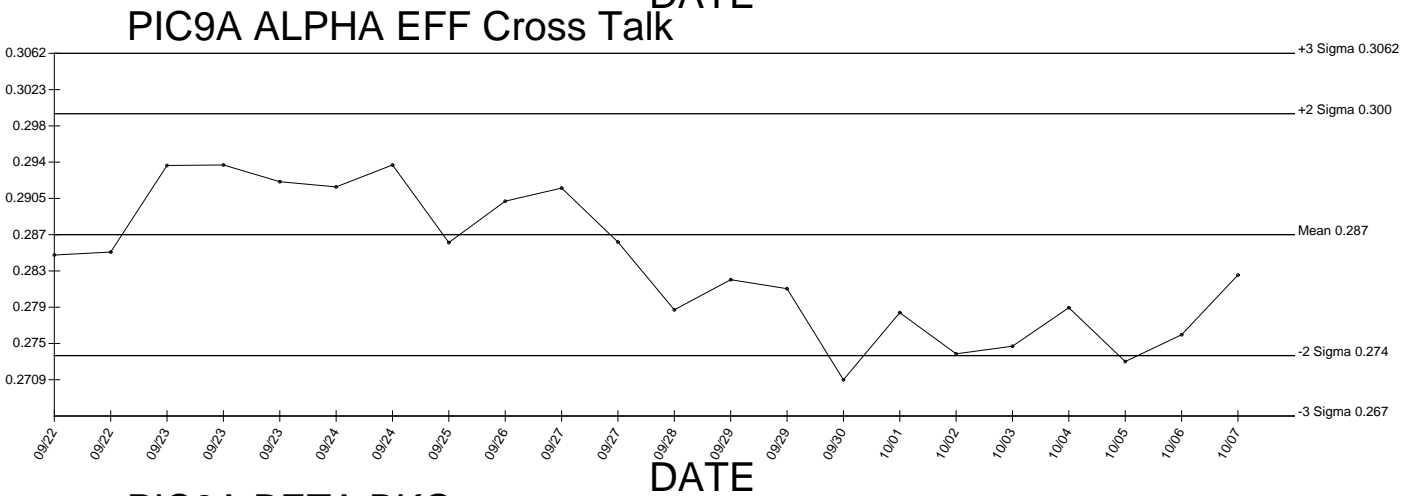
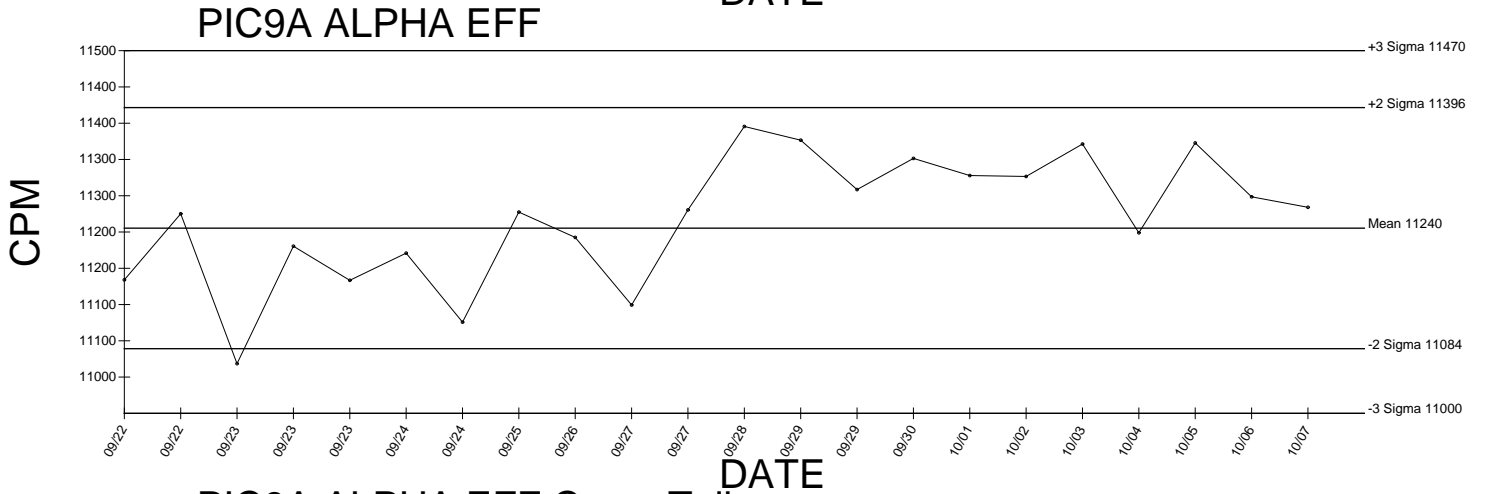
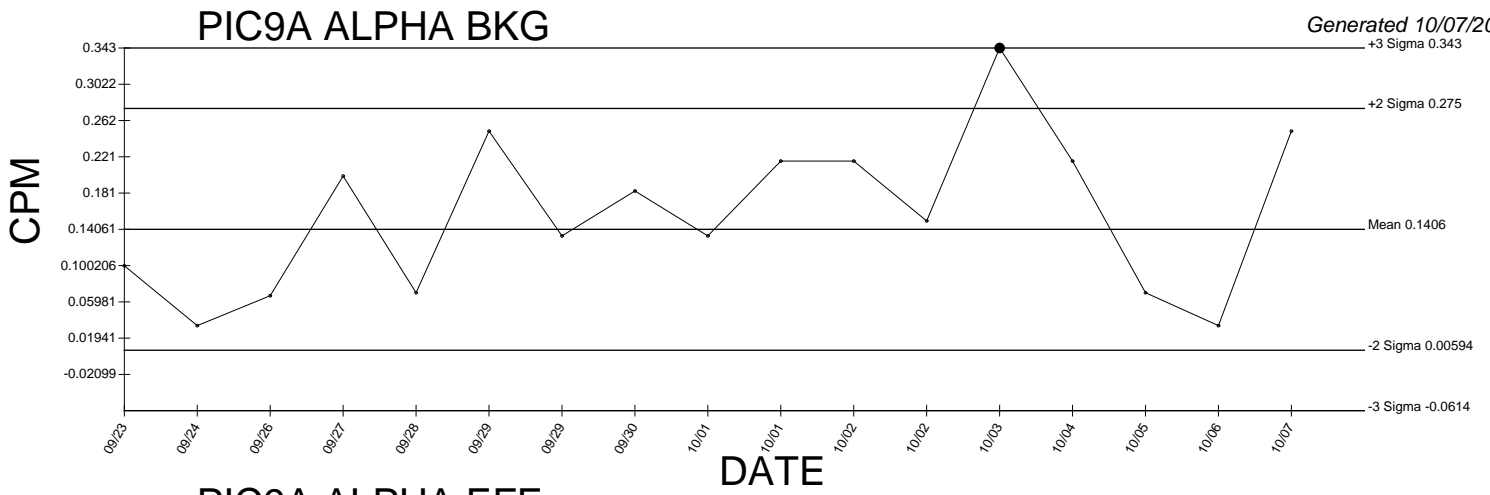
Generated 10/07/2009



PIC7D BETA EFF Cross Talk



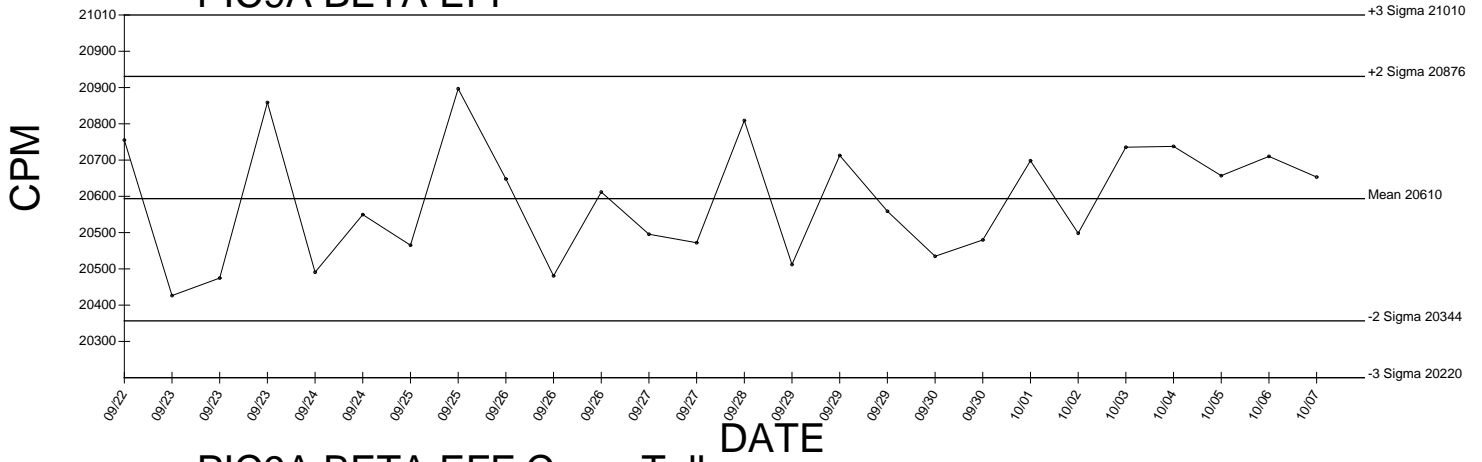
● Denotes Outlier



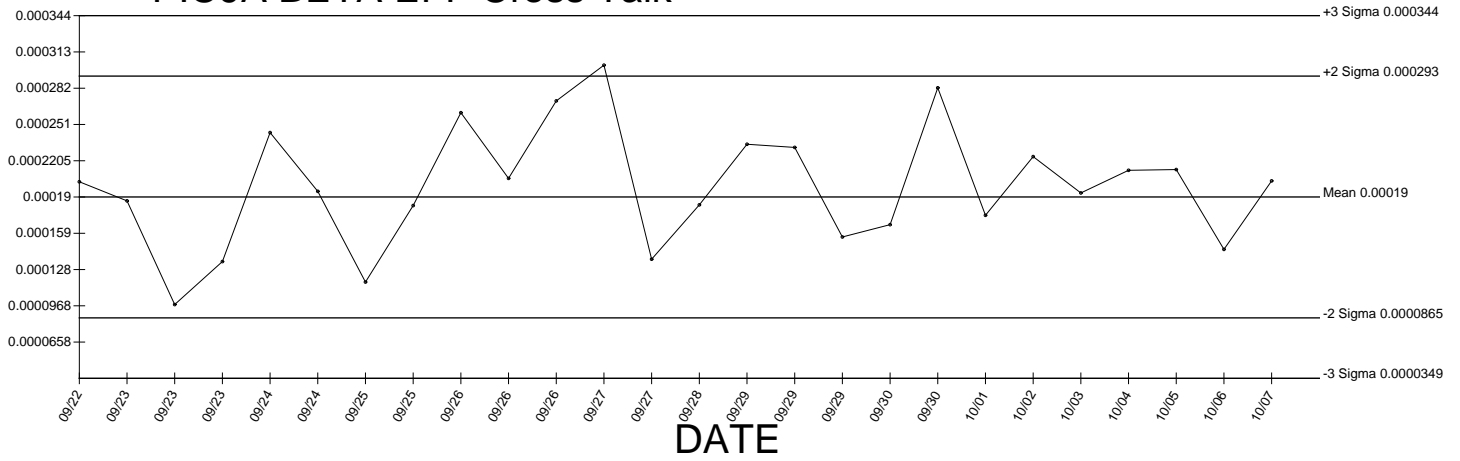
● Denotes Outlier

PIC9A BETA EFF

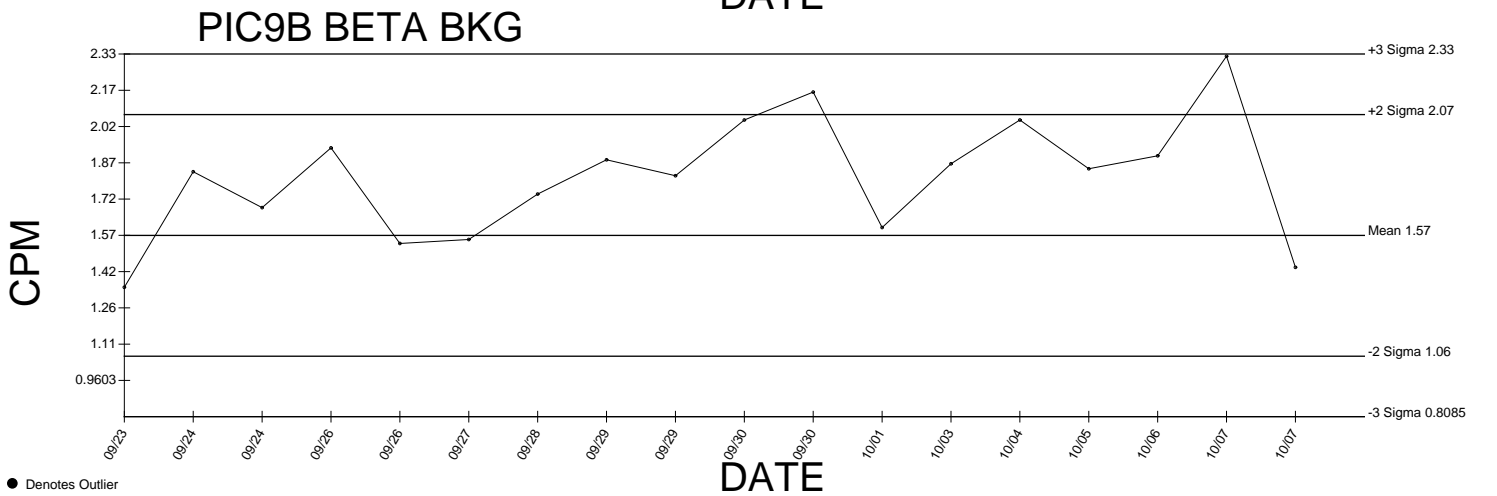
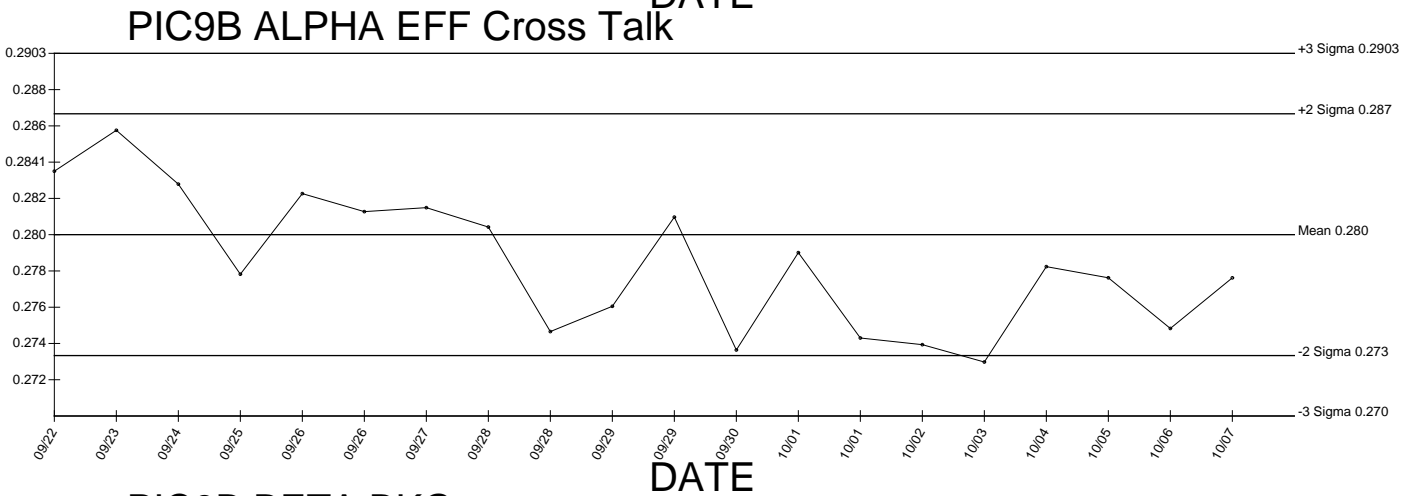
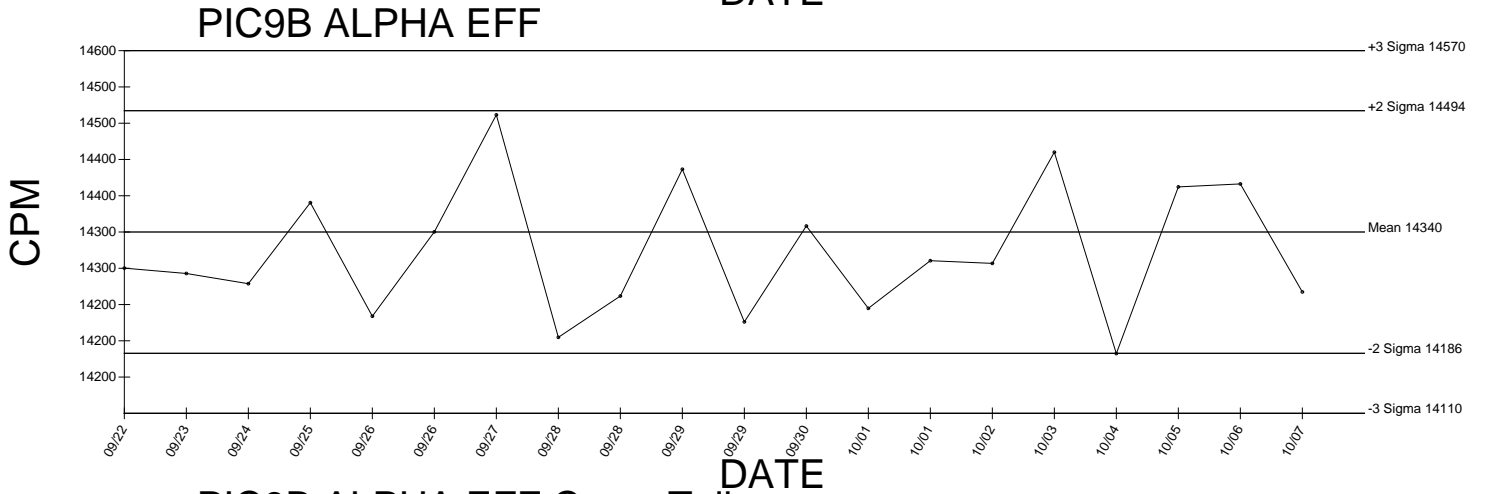
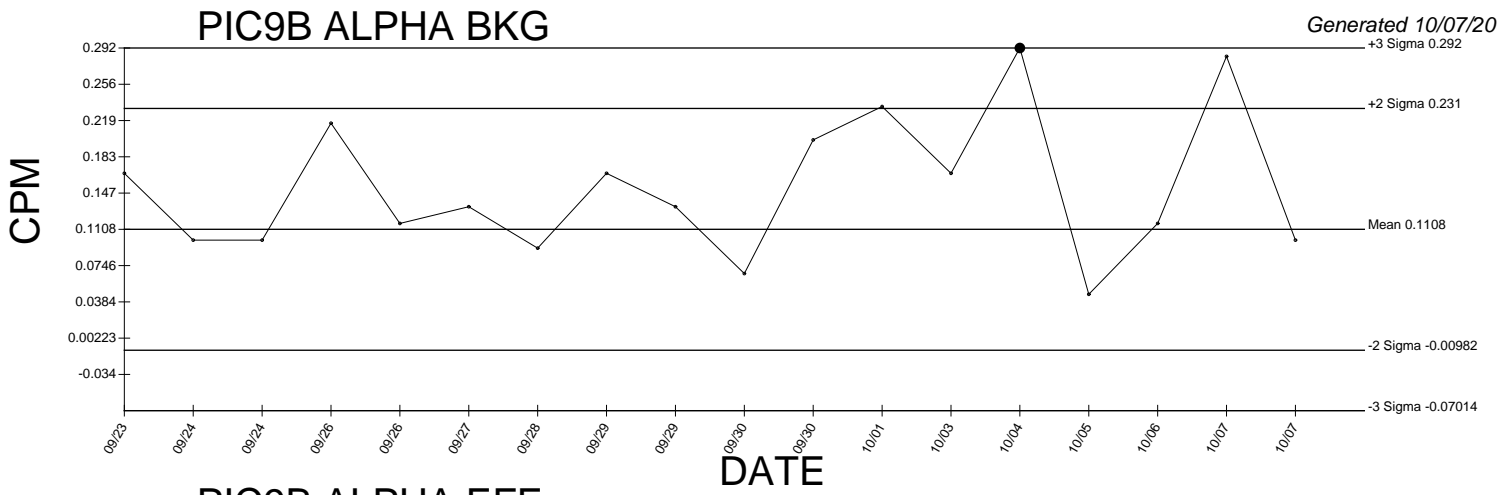
Generated 10/07/2009



PIC9A BETA EFF Cross Talk



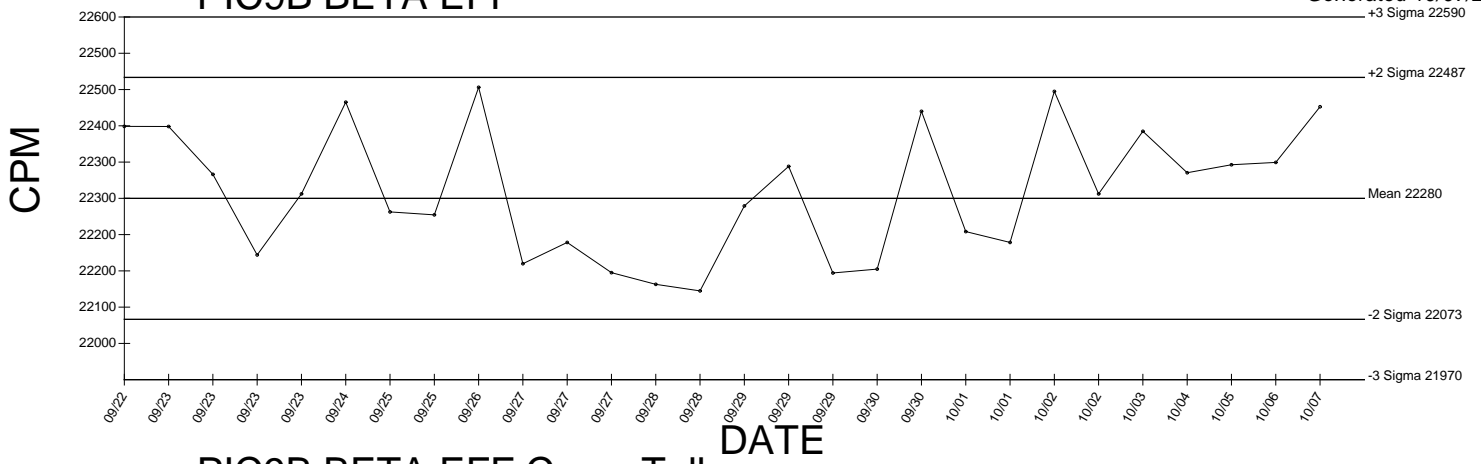
● Denotes Outlier



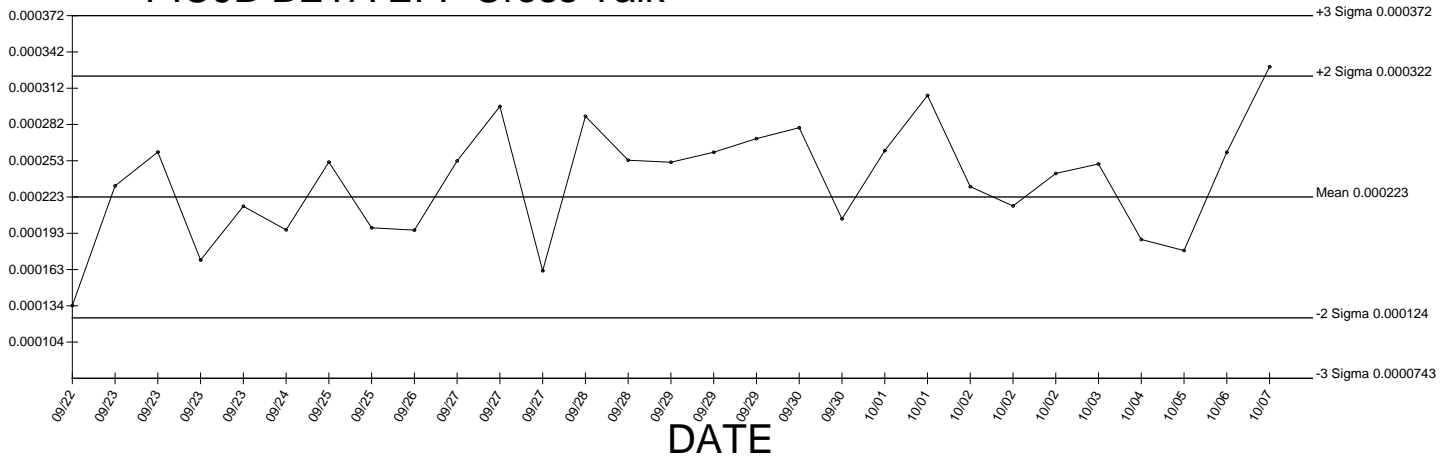
● Denotes Outlier

PIC9B BETA EFF

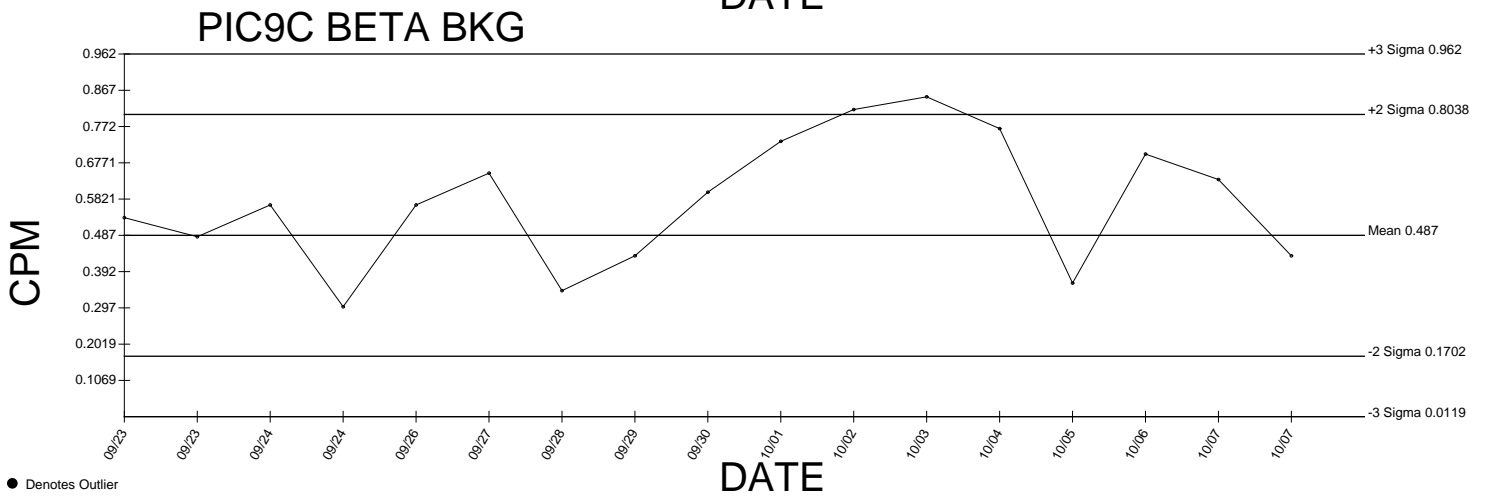
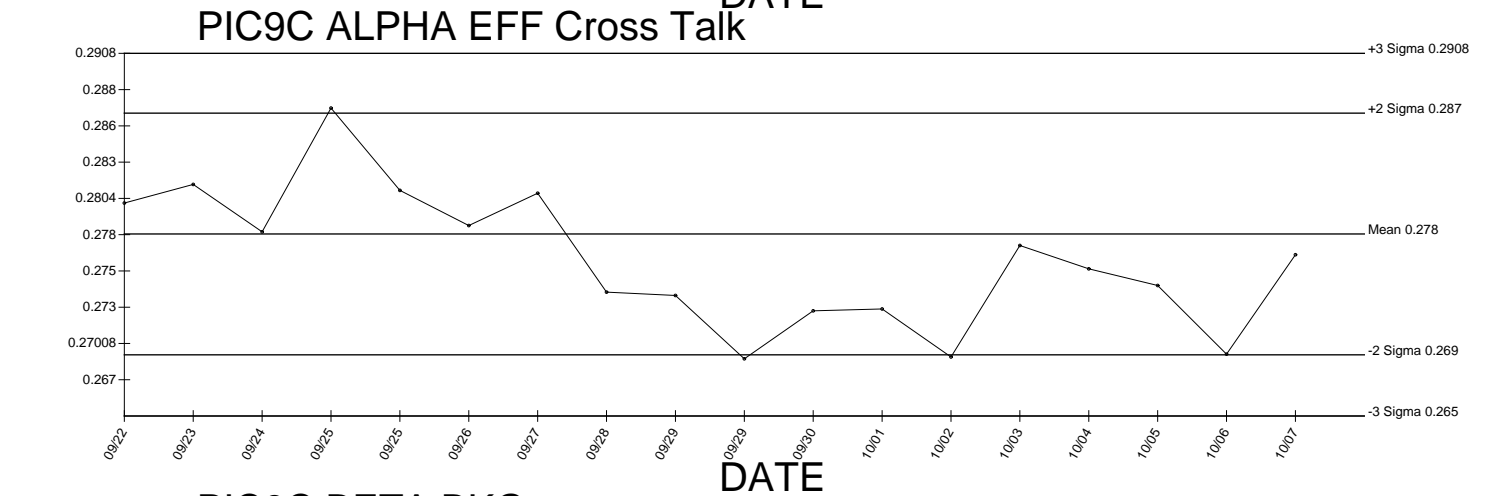
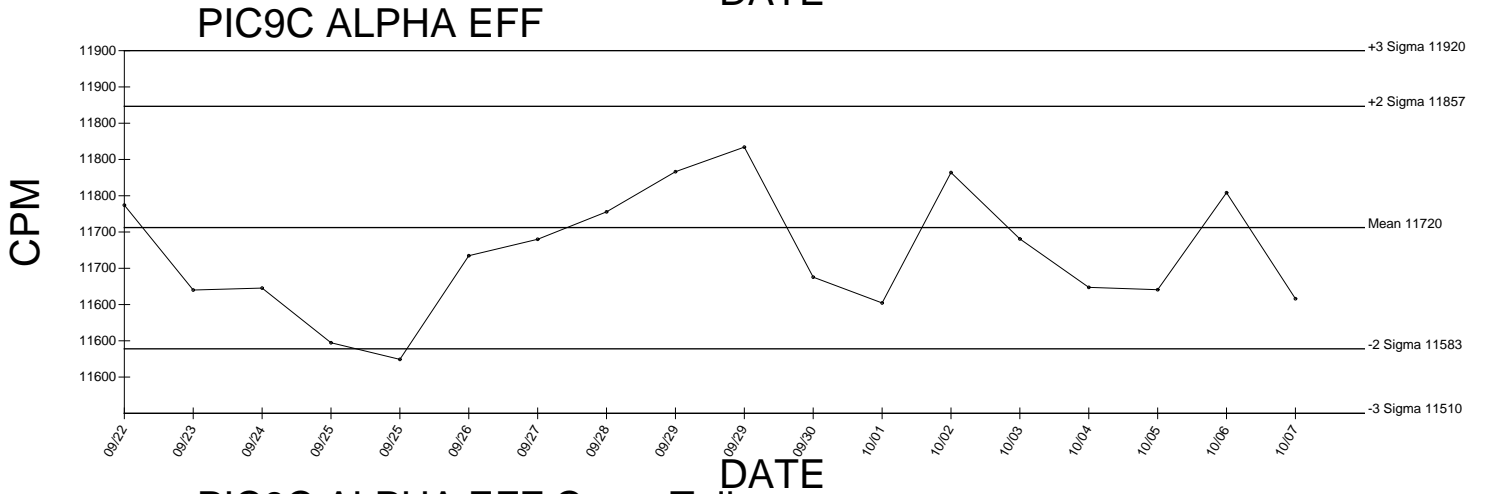
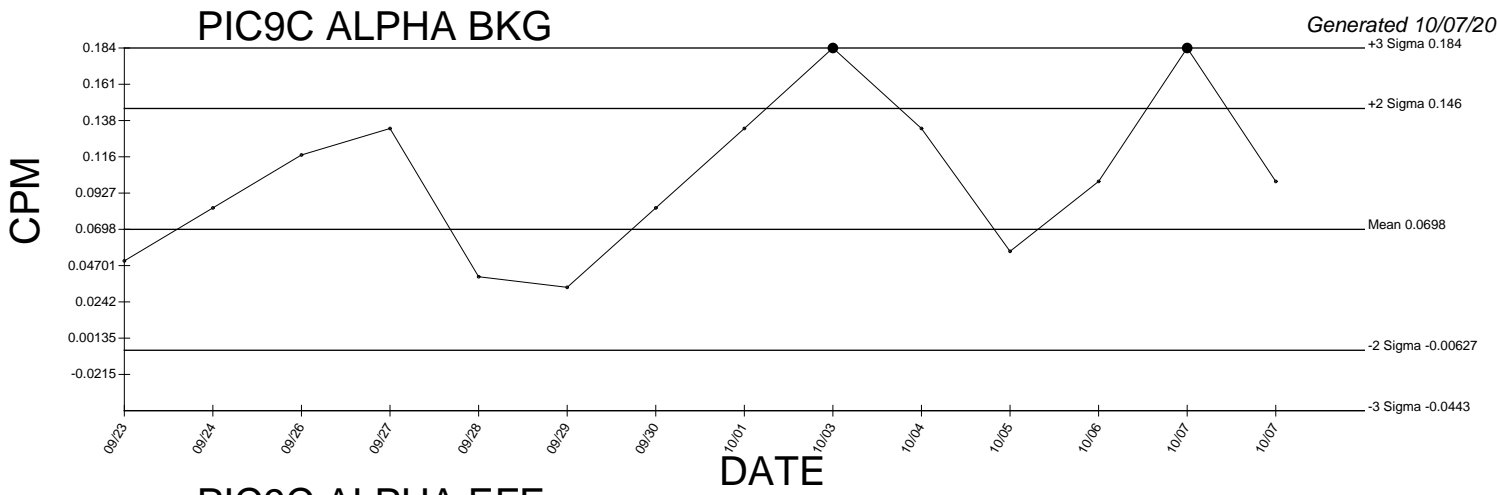
Generated 10/07/2009



PIC9B BETA EFF Cross Talk



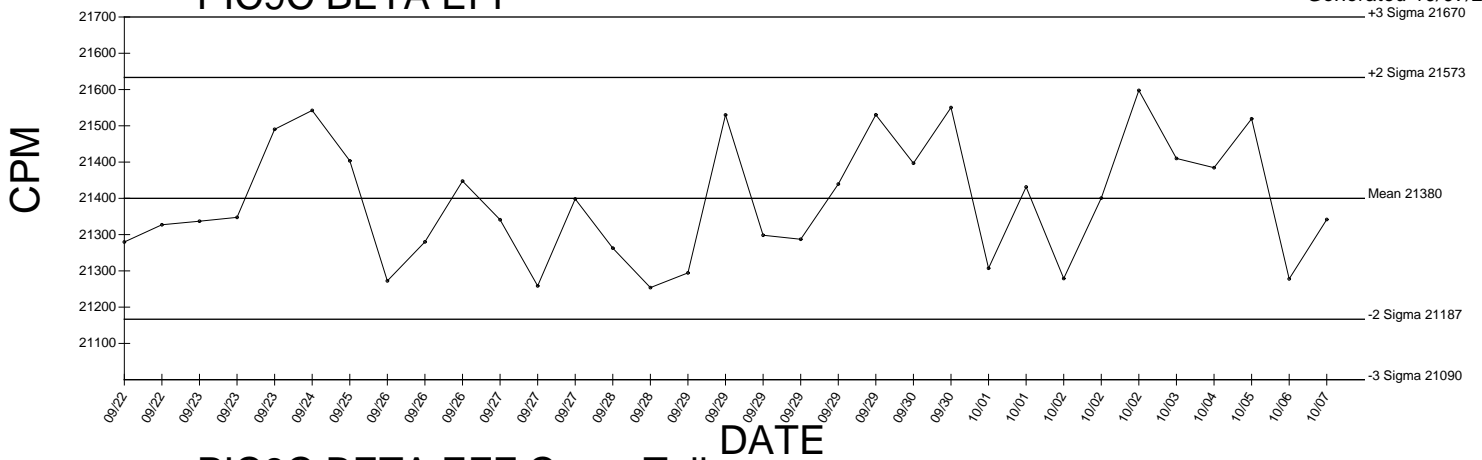
● Denotes Outlier



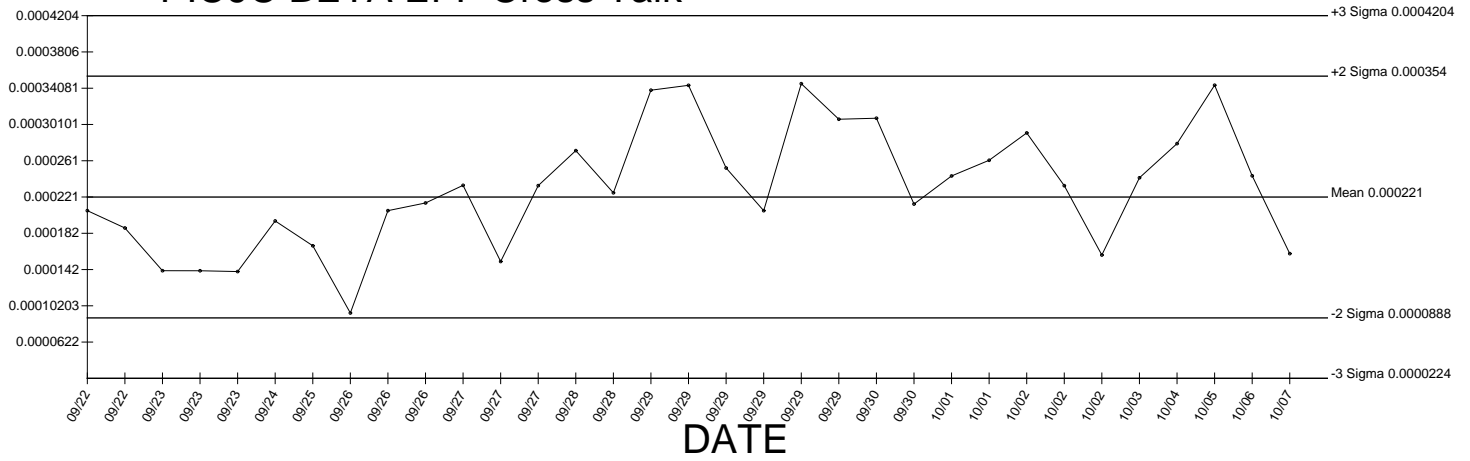
● Denotes Outlier

PIC9C BETA EFF

Generated 10/07/2009

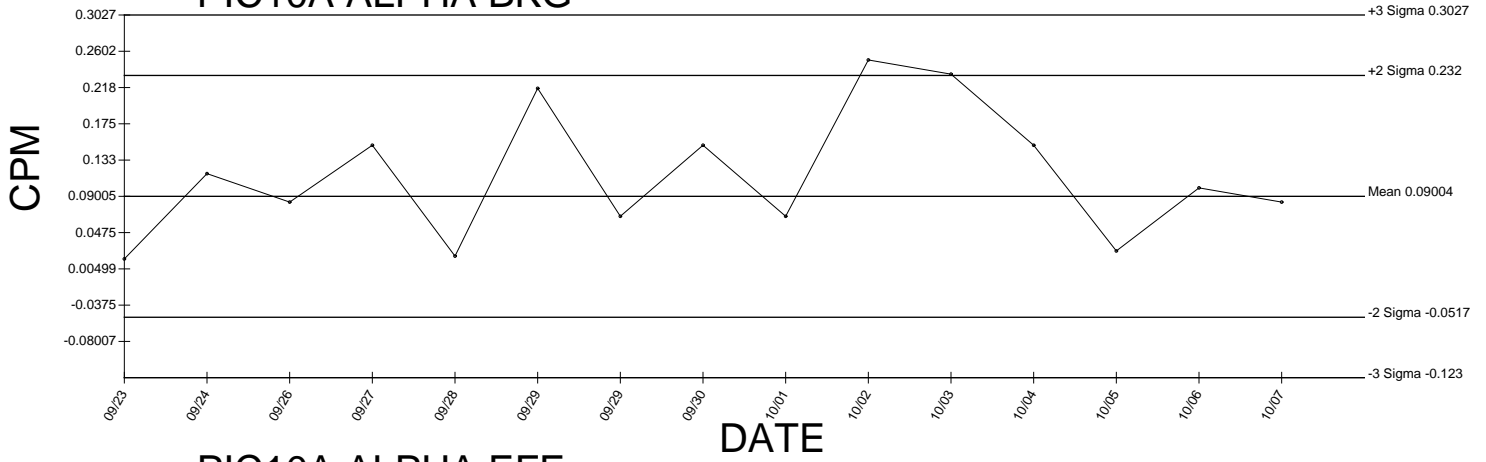


PIC9C BETA EFF Cross Talk

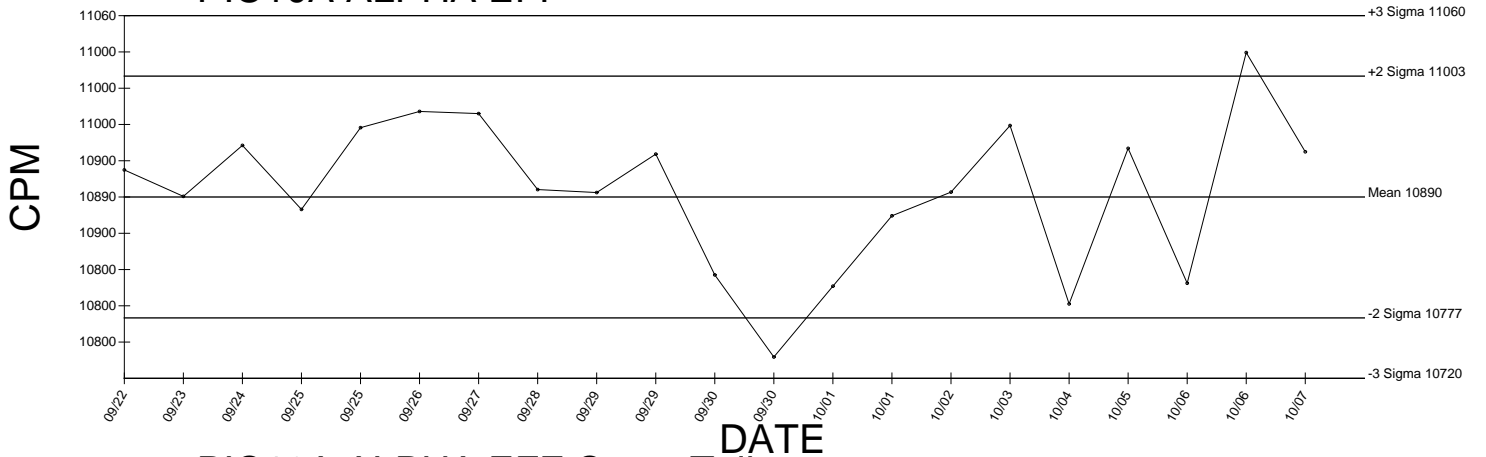


● Denotes Outlier

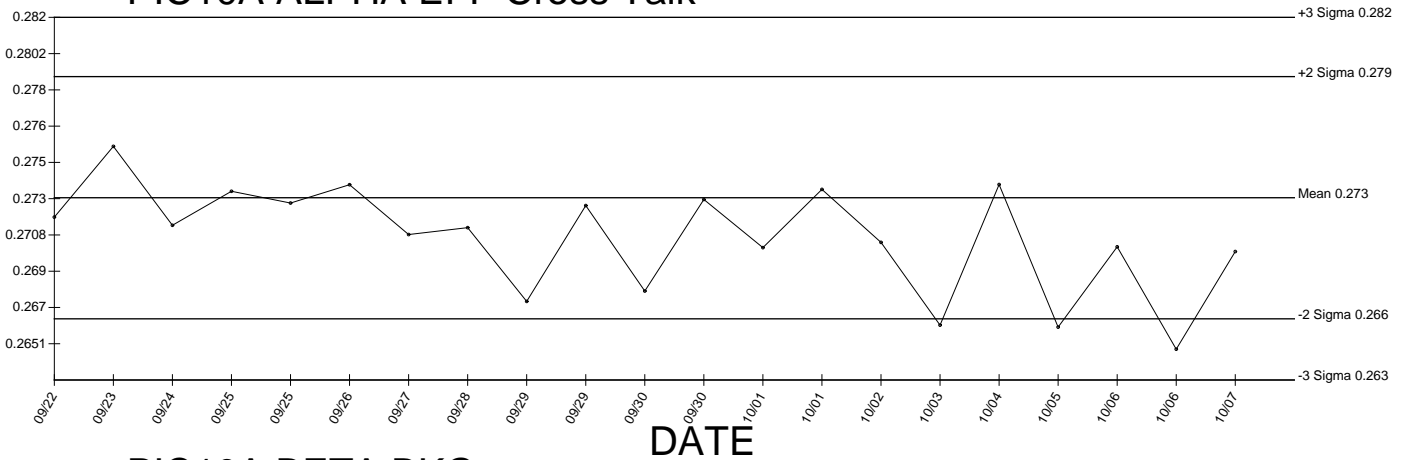
PIC10A ALPHA BKG



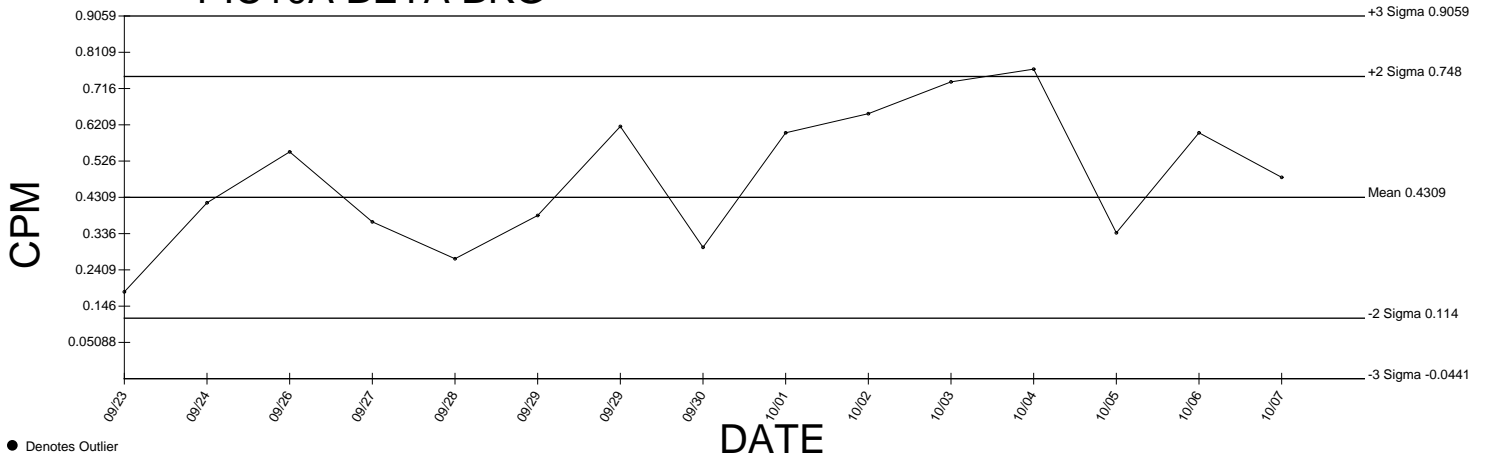
PIC10A ALPHA EFF



PIC10A ALPHA EFF Cross Talk



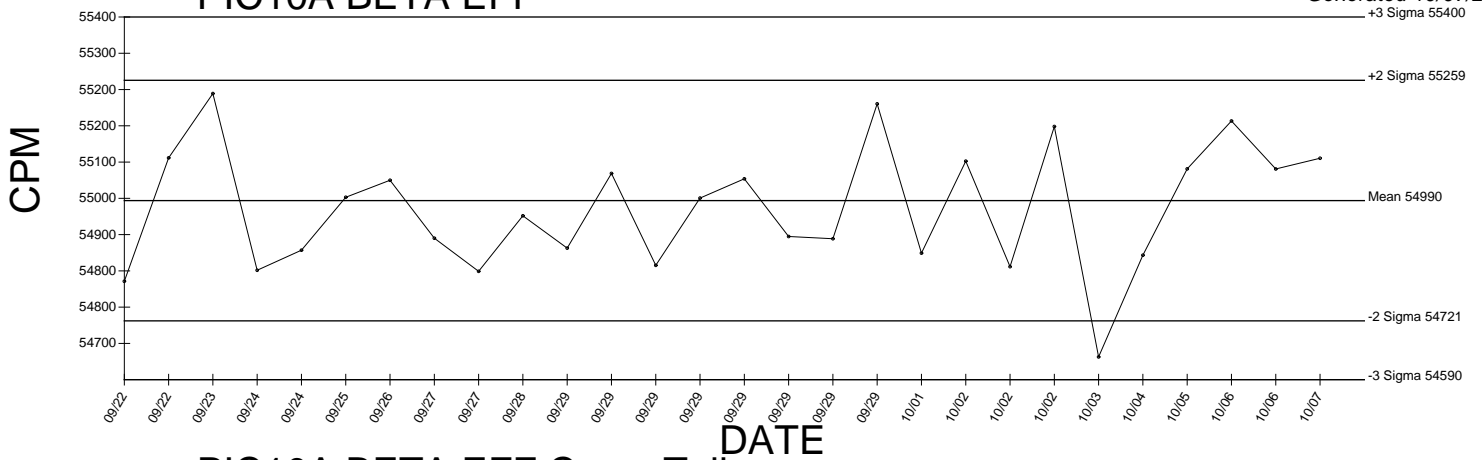
PIC10A BETA BKG



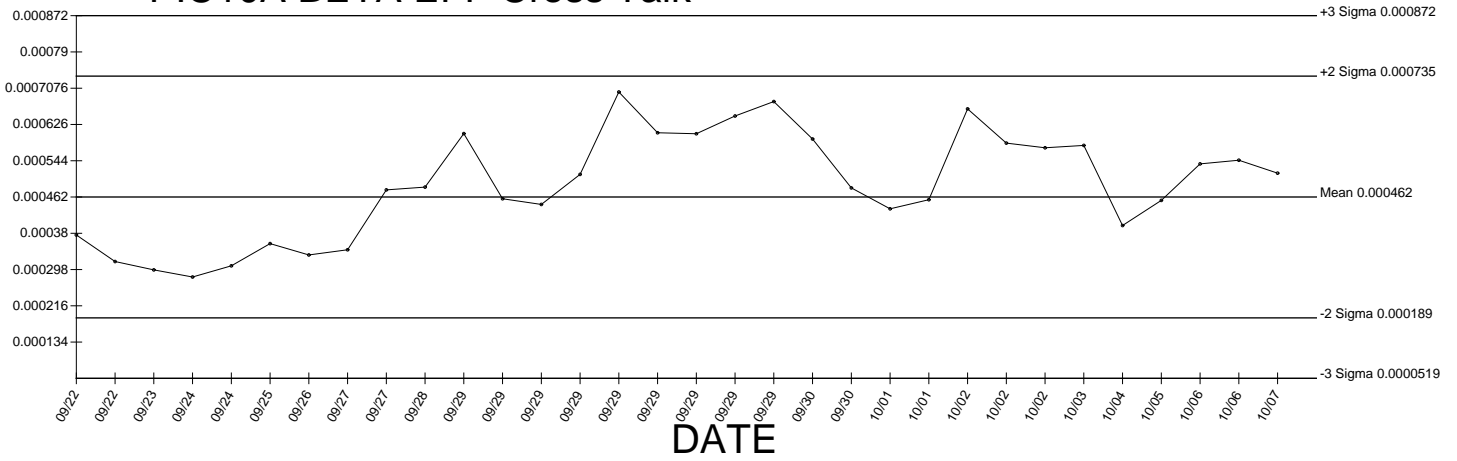
● Denotes Outlier

PIC10A BETA EFF

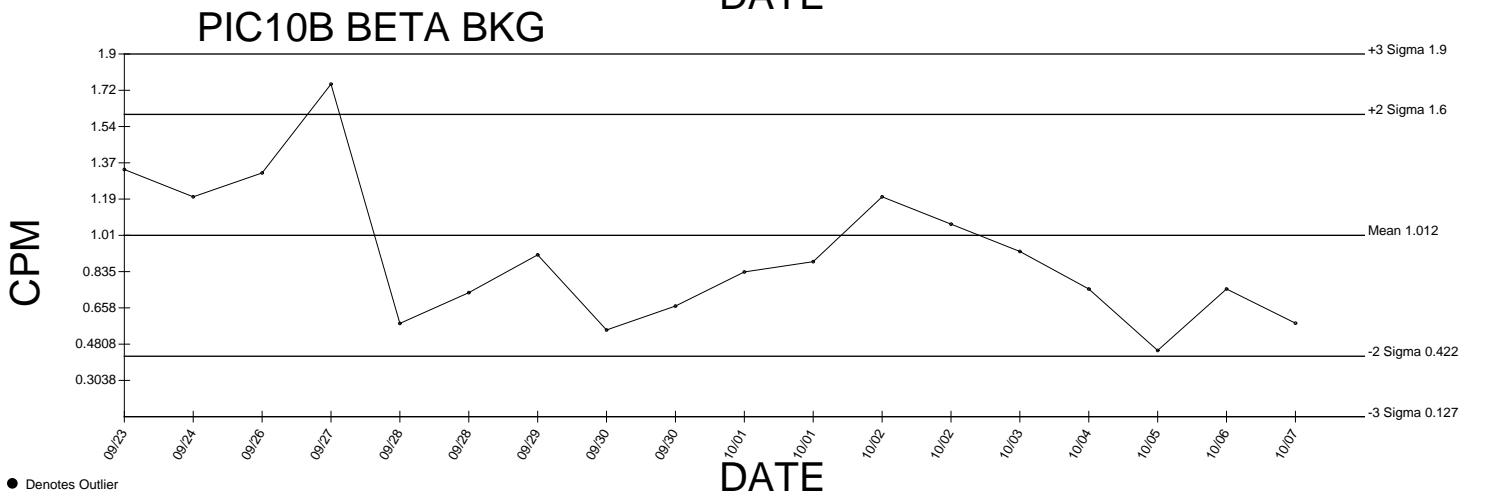
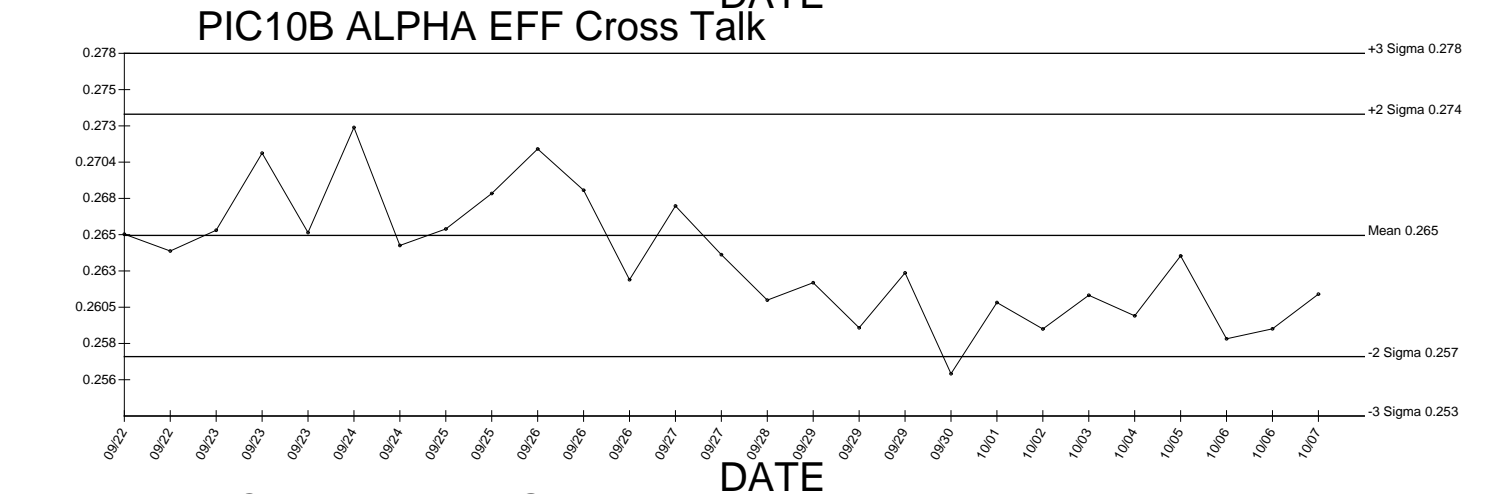
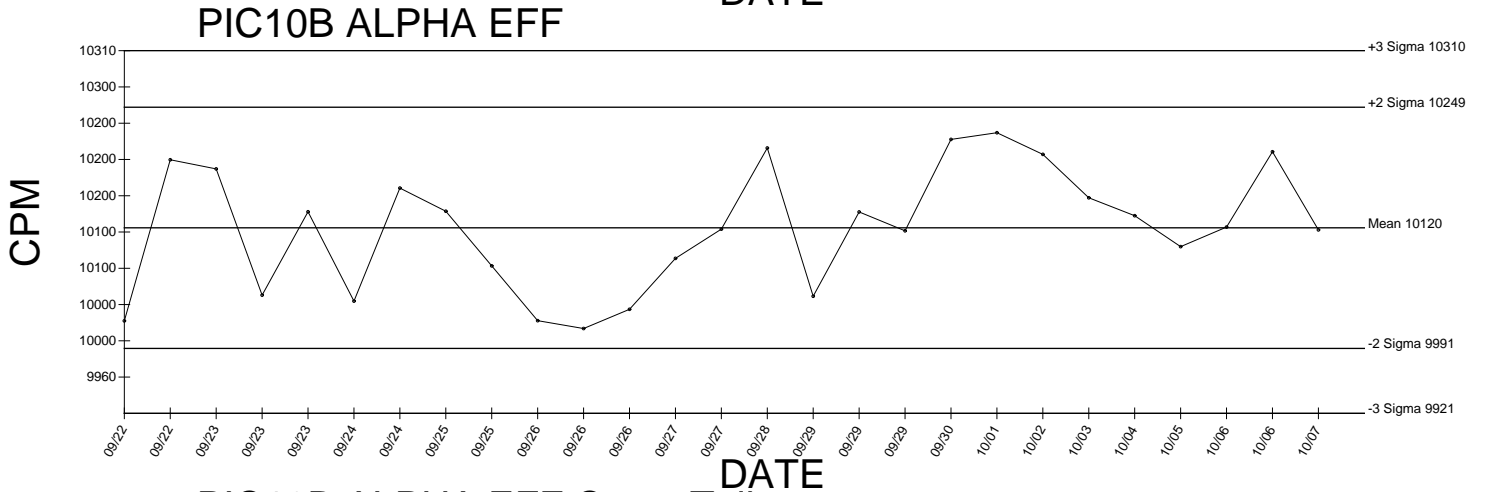
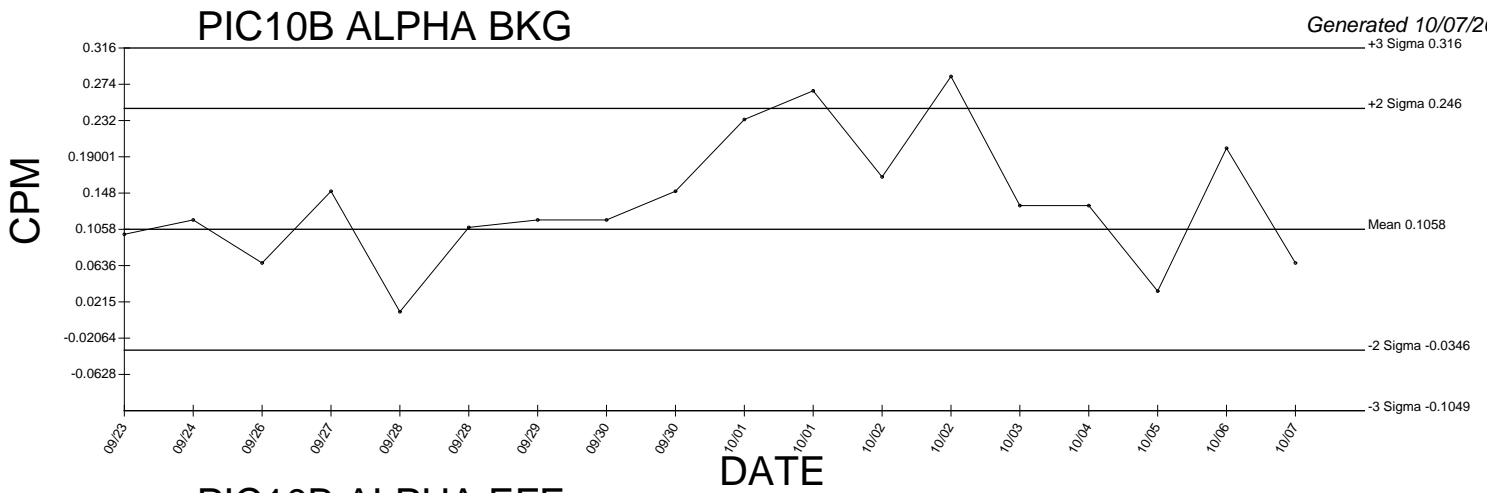
Generated 10/07/2009



PIC10A BETA EFF Cross Talk



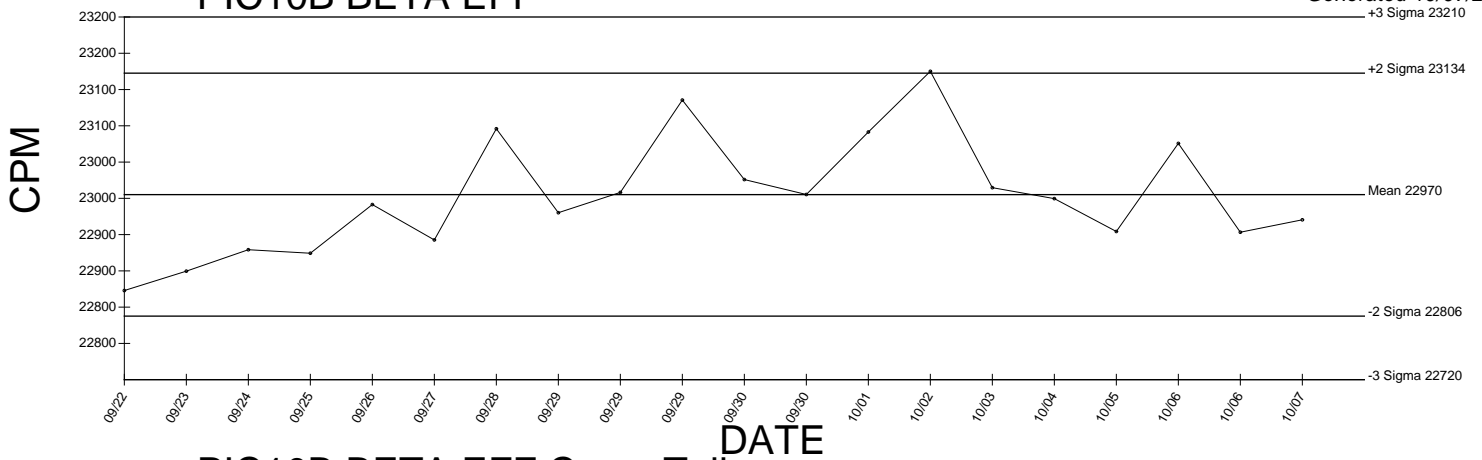
● Denotes Outlier



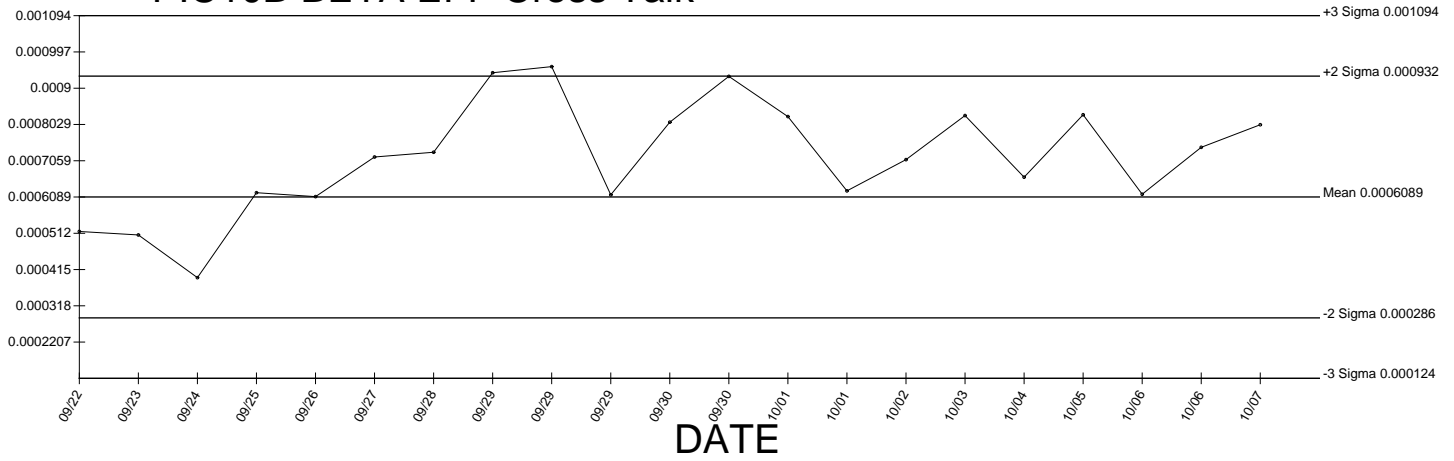
● Denotes Outlier

PIC10B BETA EFF

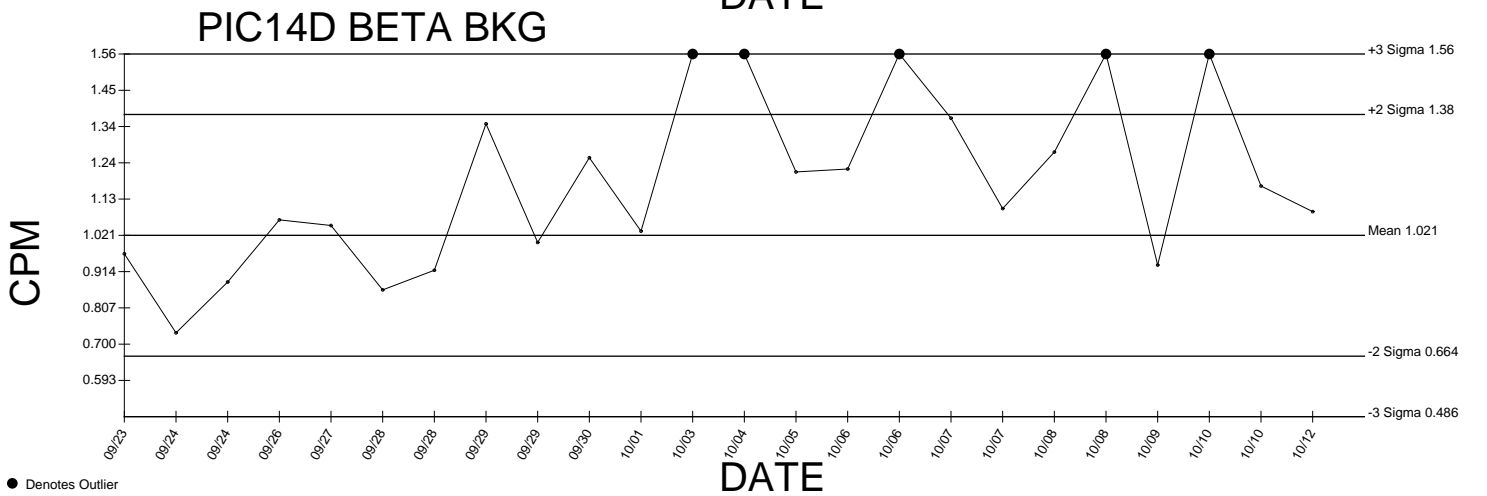
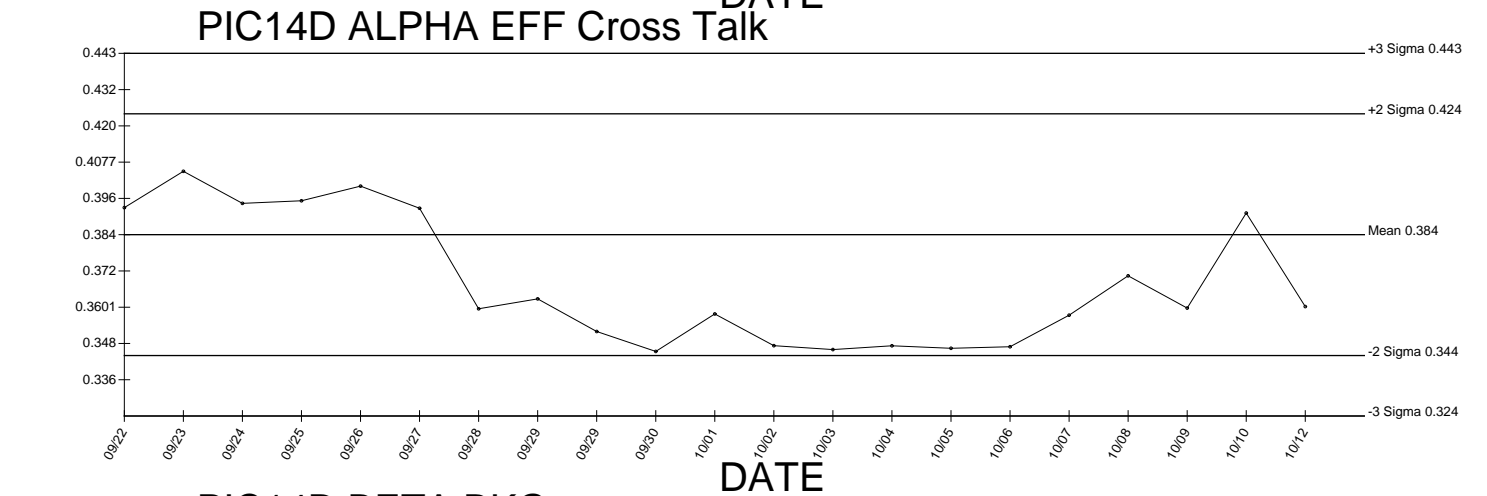
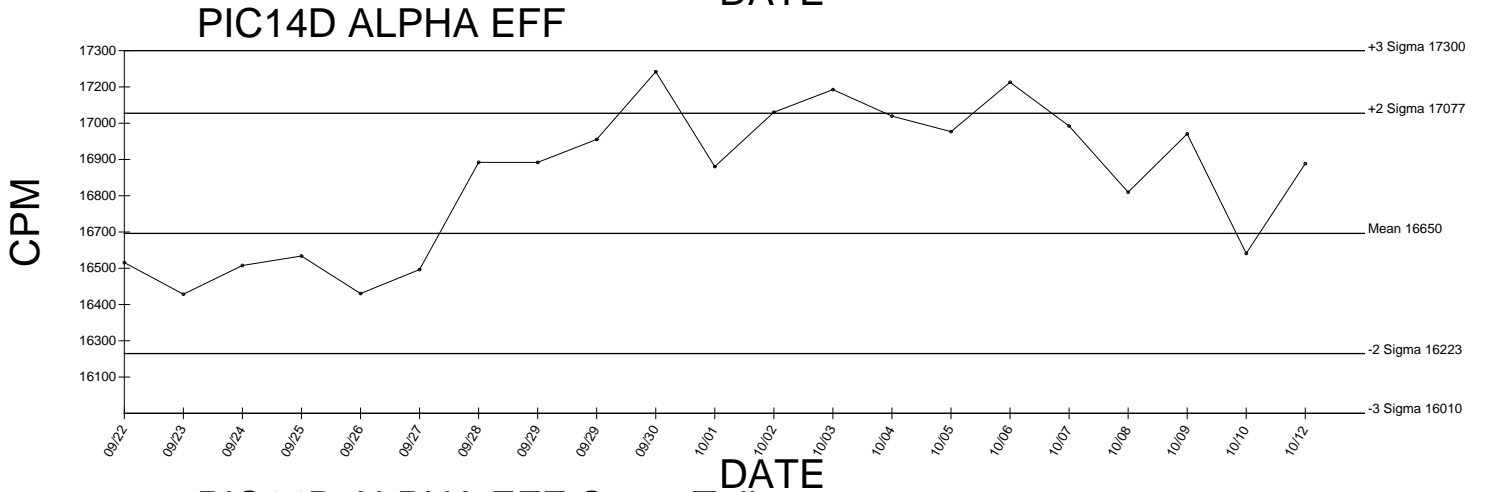
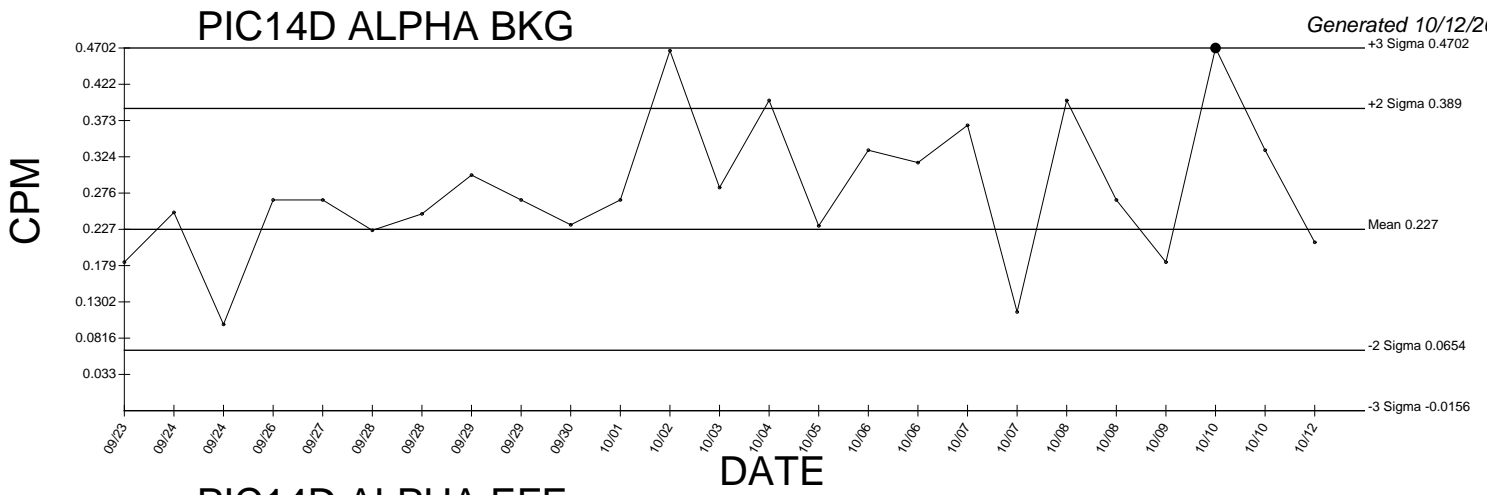
Generated 10/07/2009



PIC10B BETA EFF Cross Talk



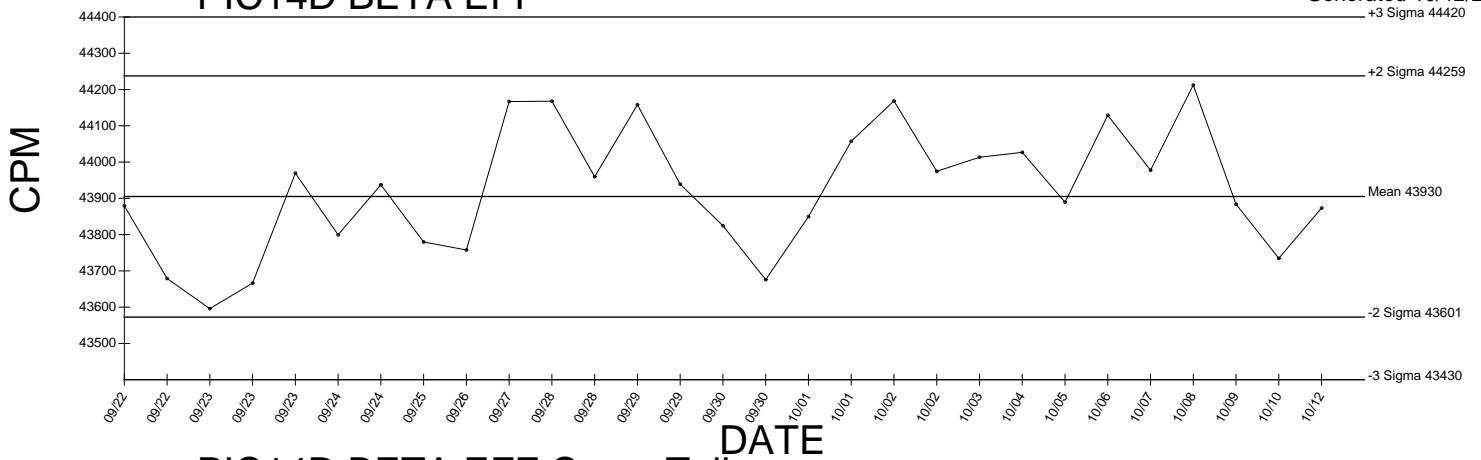
● Denotes Outlier



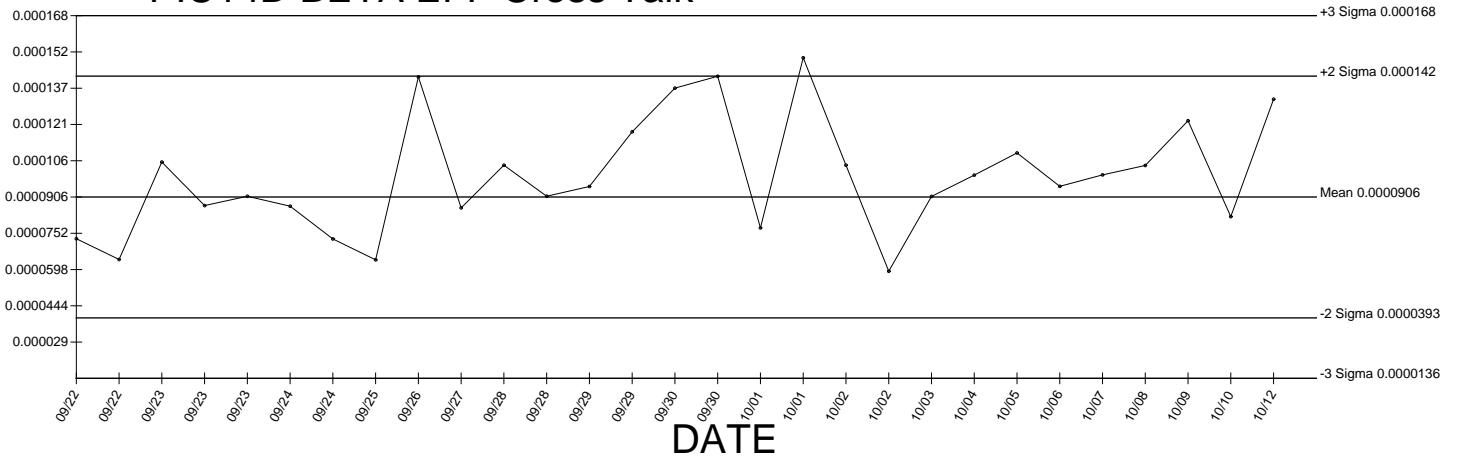
● Denotes Outlier

PIC14D BETA EFF

Generated 10/12/2009

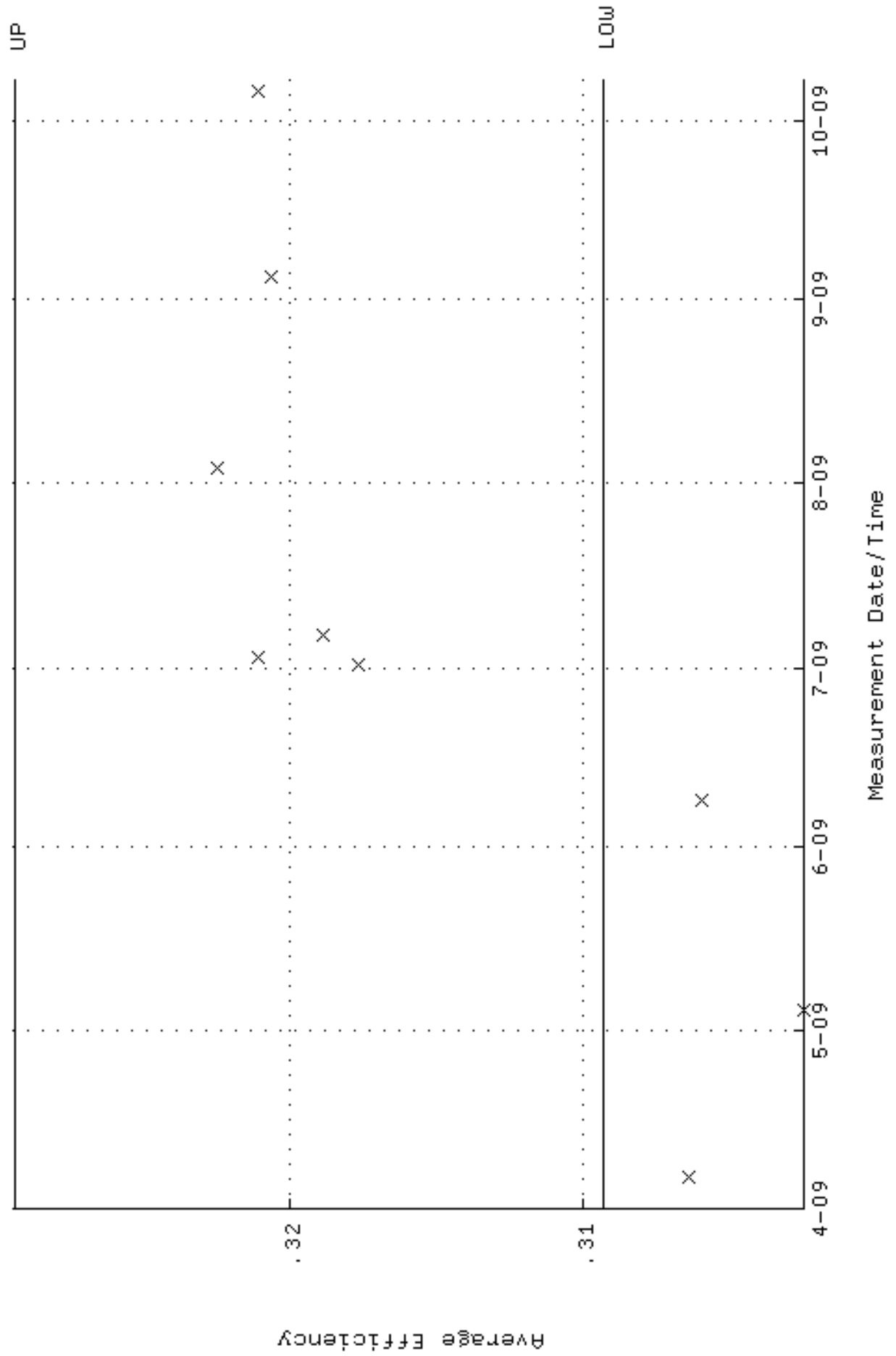


PIC14D BETA EFF Cross Talk

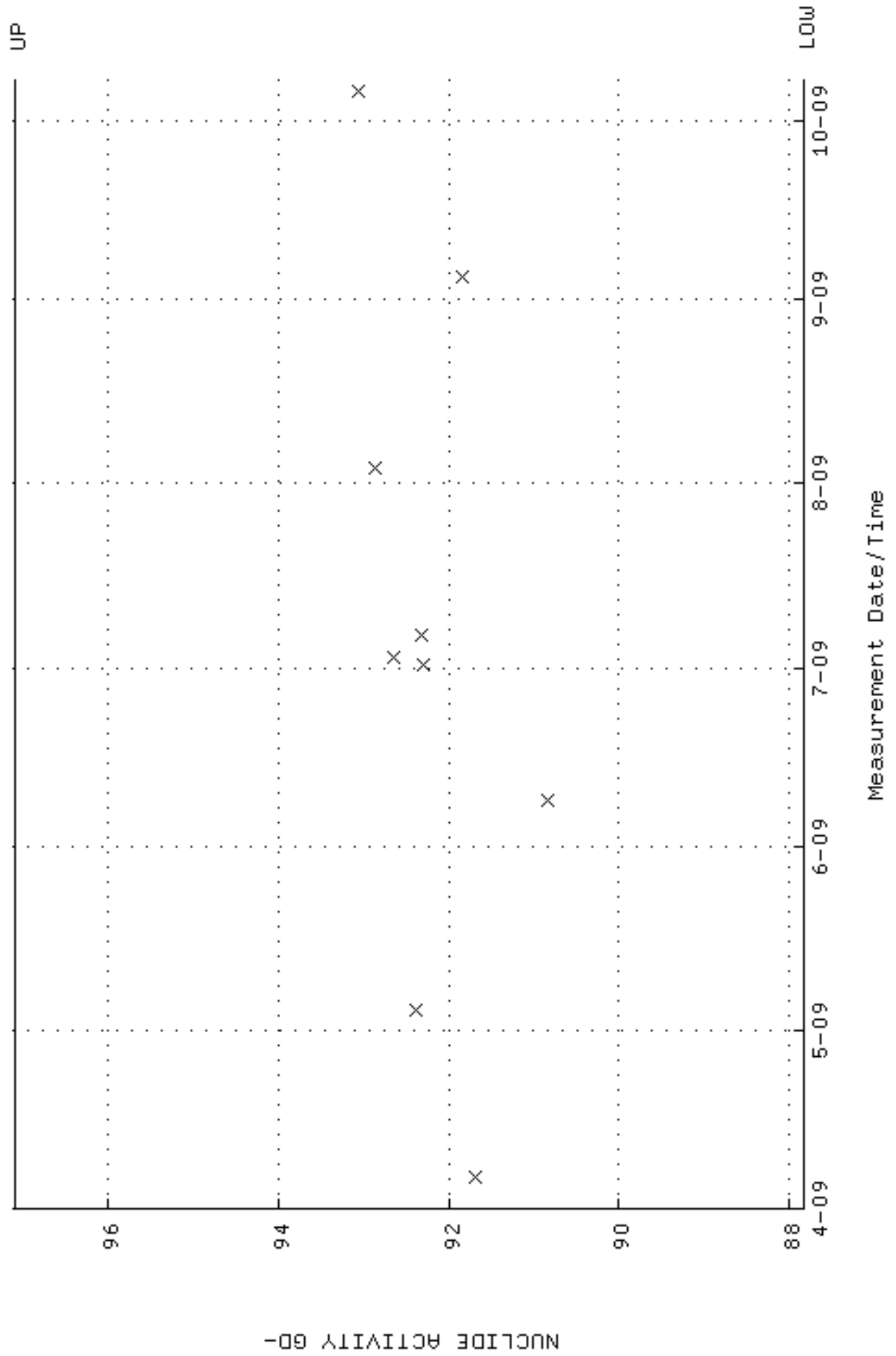


● Denotes Outlier

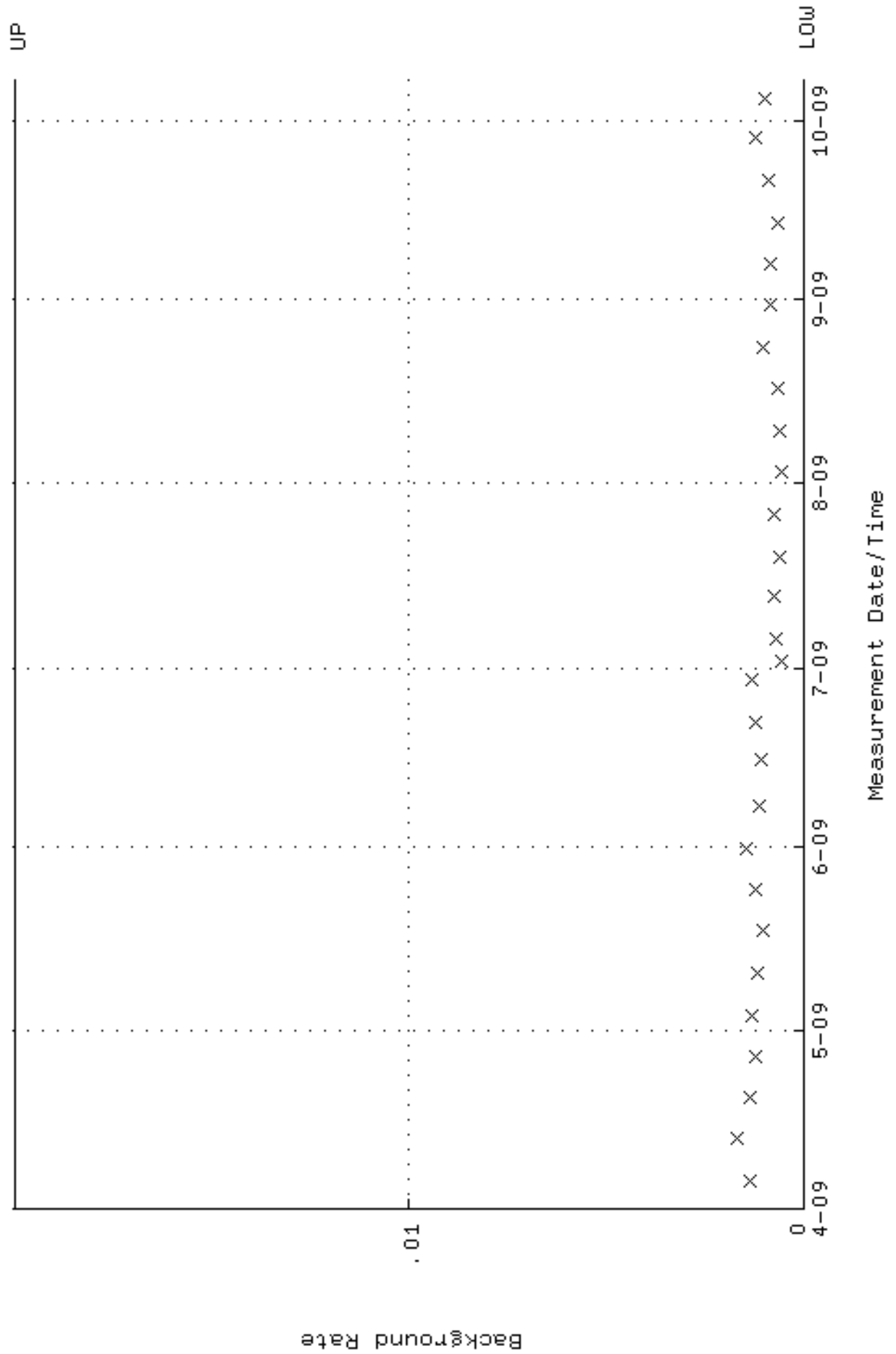
QA filename : DKA100:[ENV_ALPHA.QA.W]W008.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.309318 through 0.329318



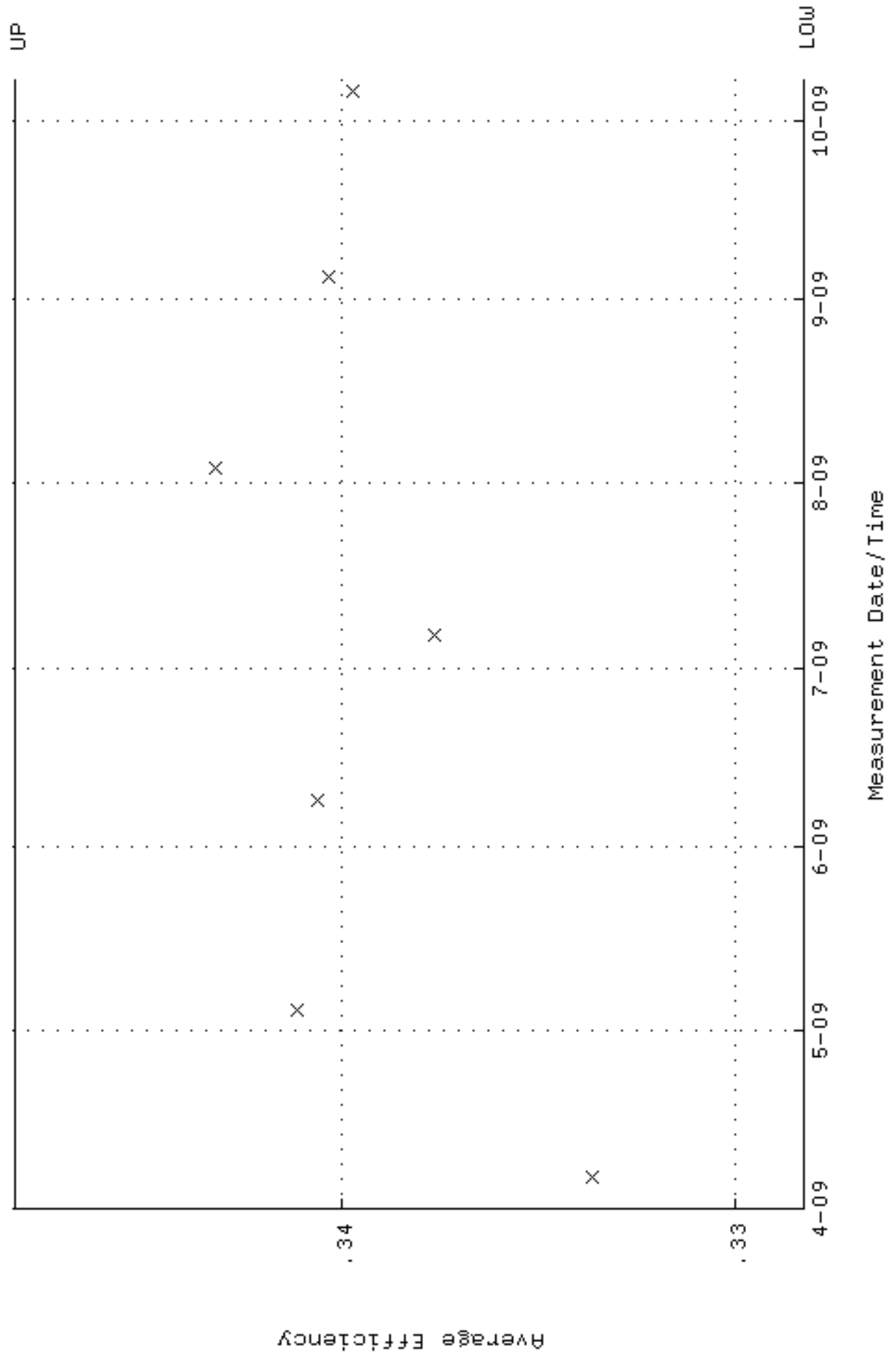
QA filename : DKA100:[ENV_ALPHA.QA.W]W008.QAF;4
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 87.8346 through 97.0804



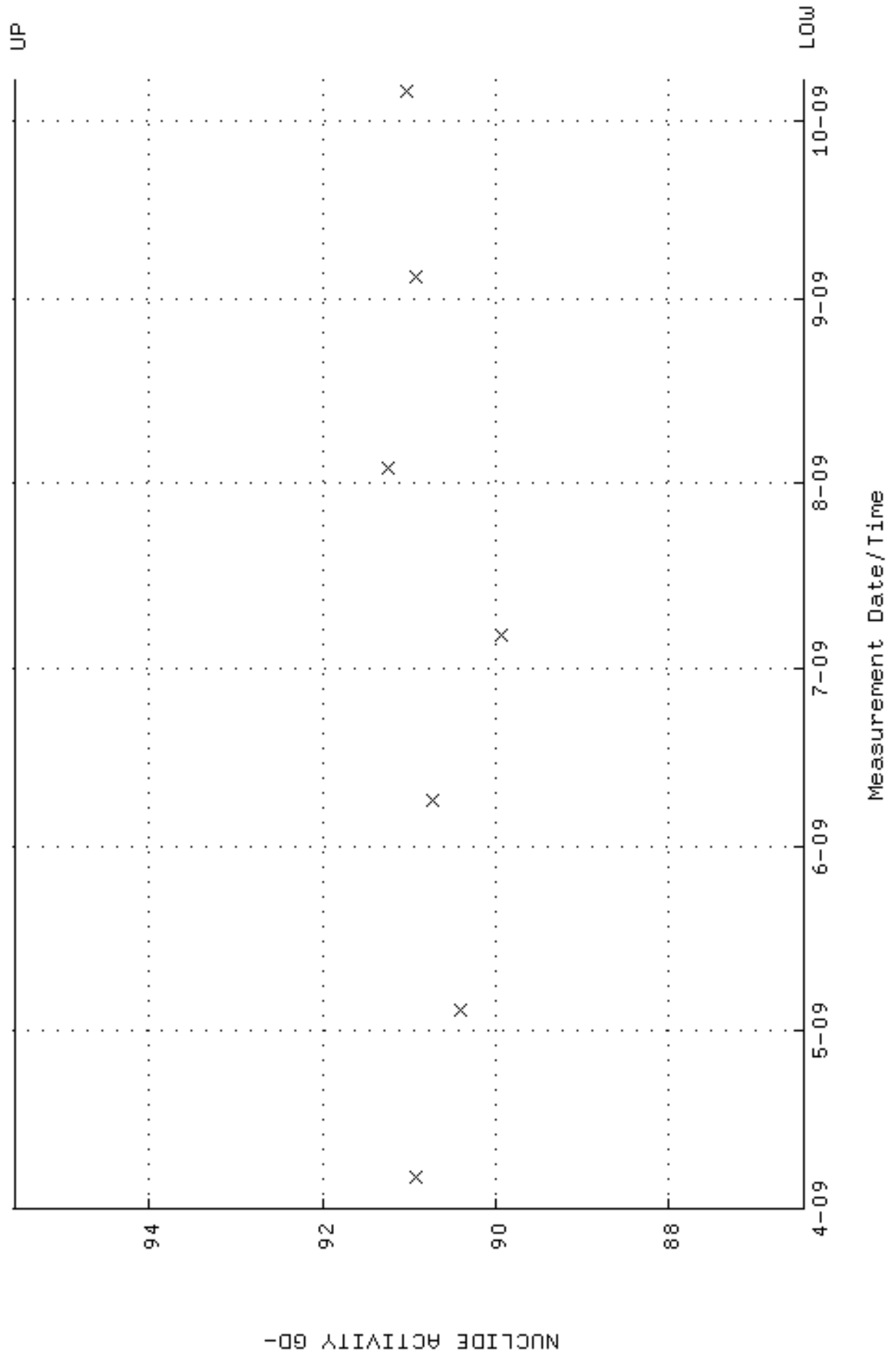
QA filename : DKA100:[ENV_ALPHA.QA.B]B008.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



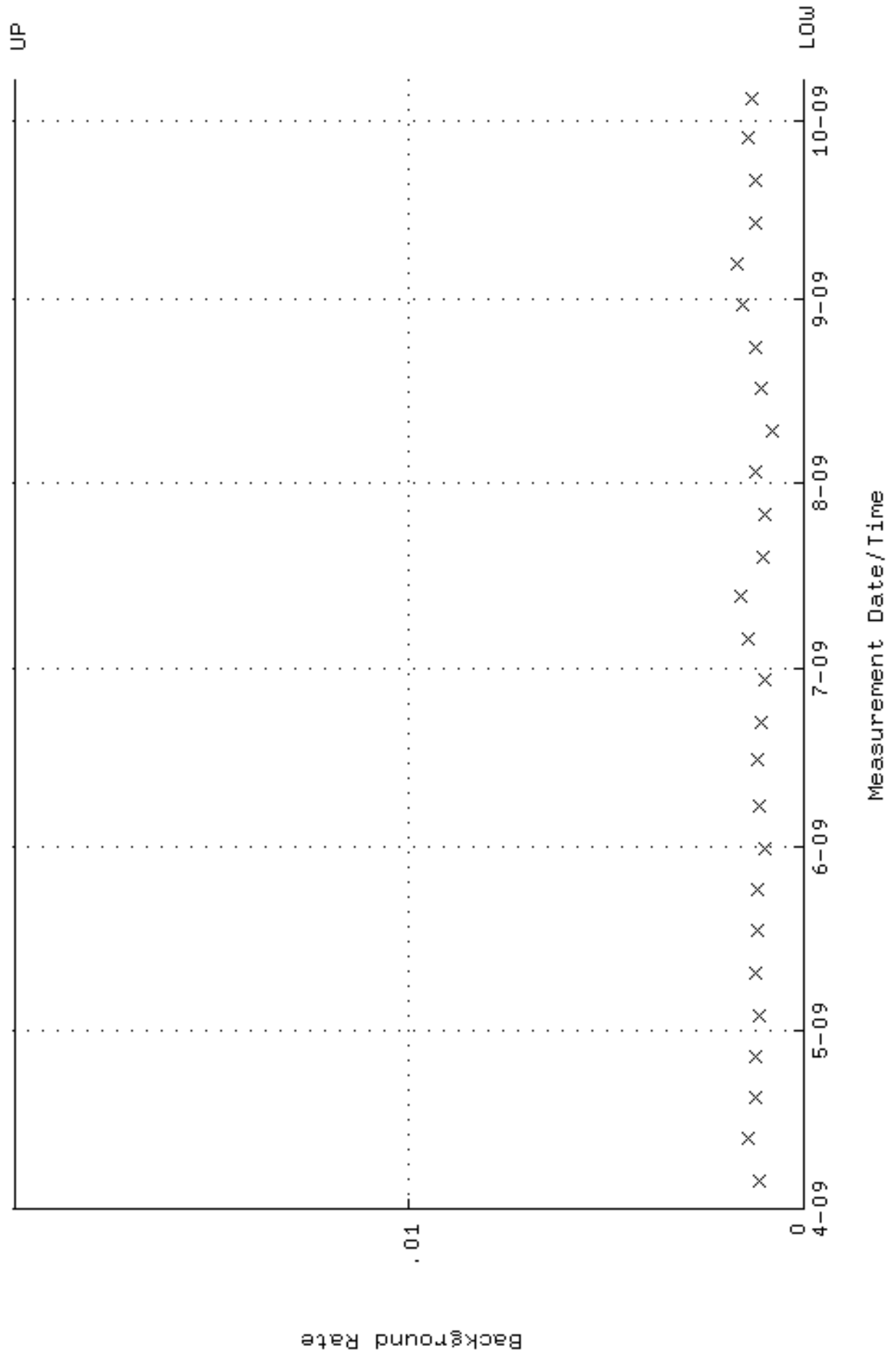
QA filename : DKA100:[ENV_ALPHA.QA.W]W009.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.328261 through 0.348261



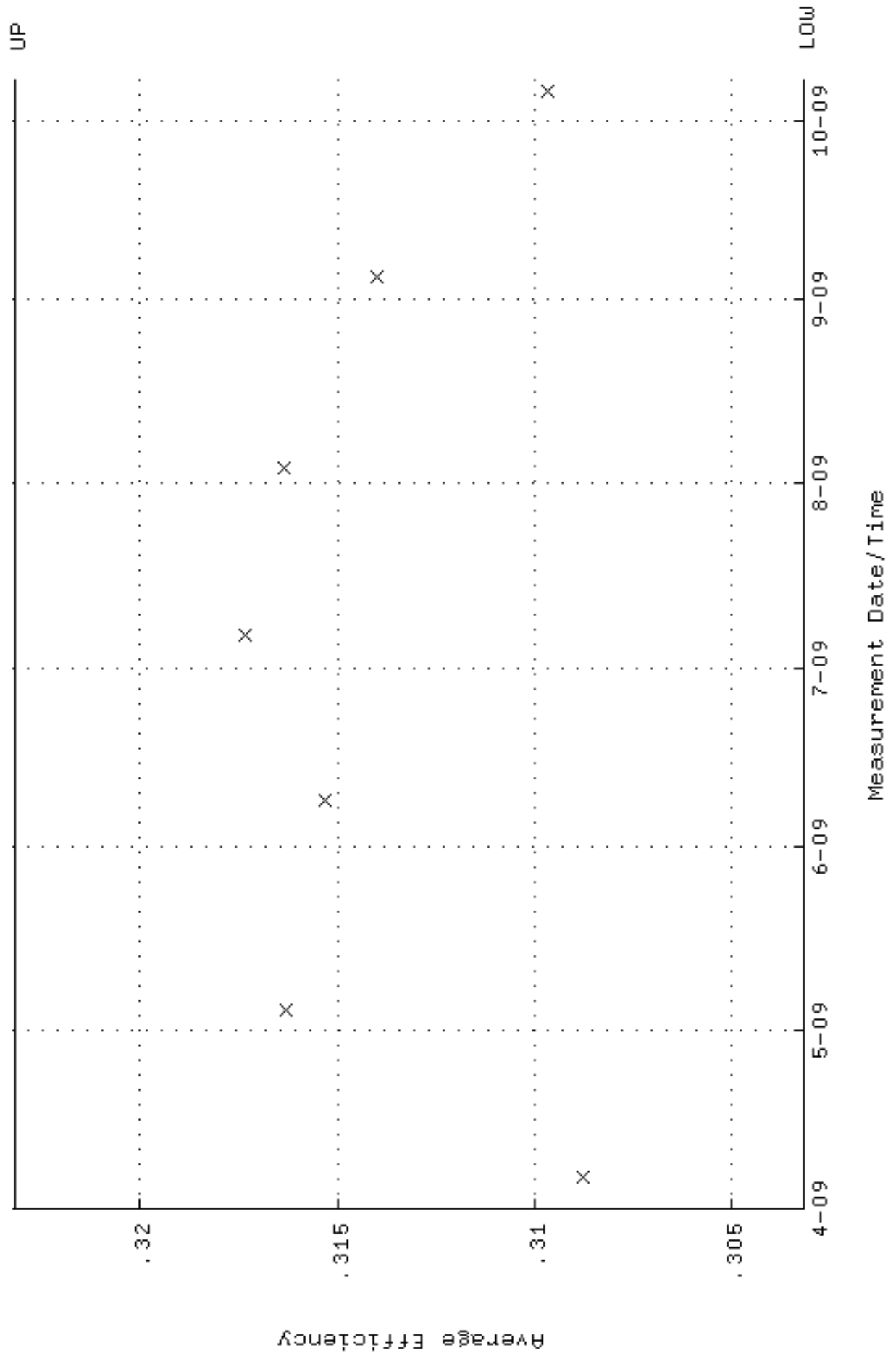
QA filename : DKA100:[ENV_ALPHA.QA.W]W009.QAF;3
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 86.4475 through 95.5473



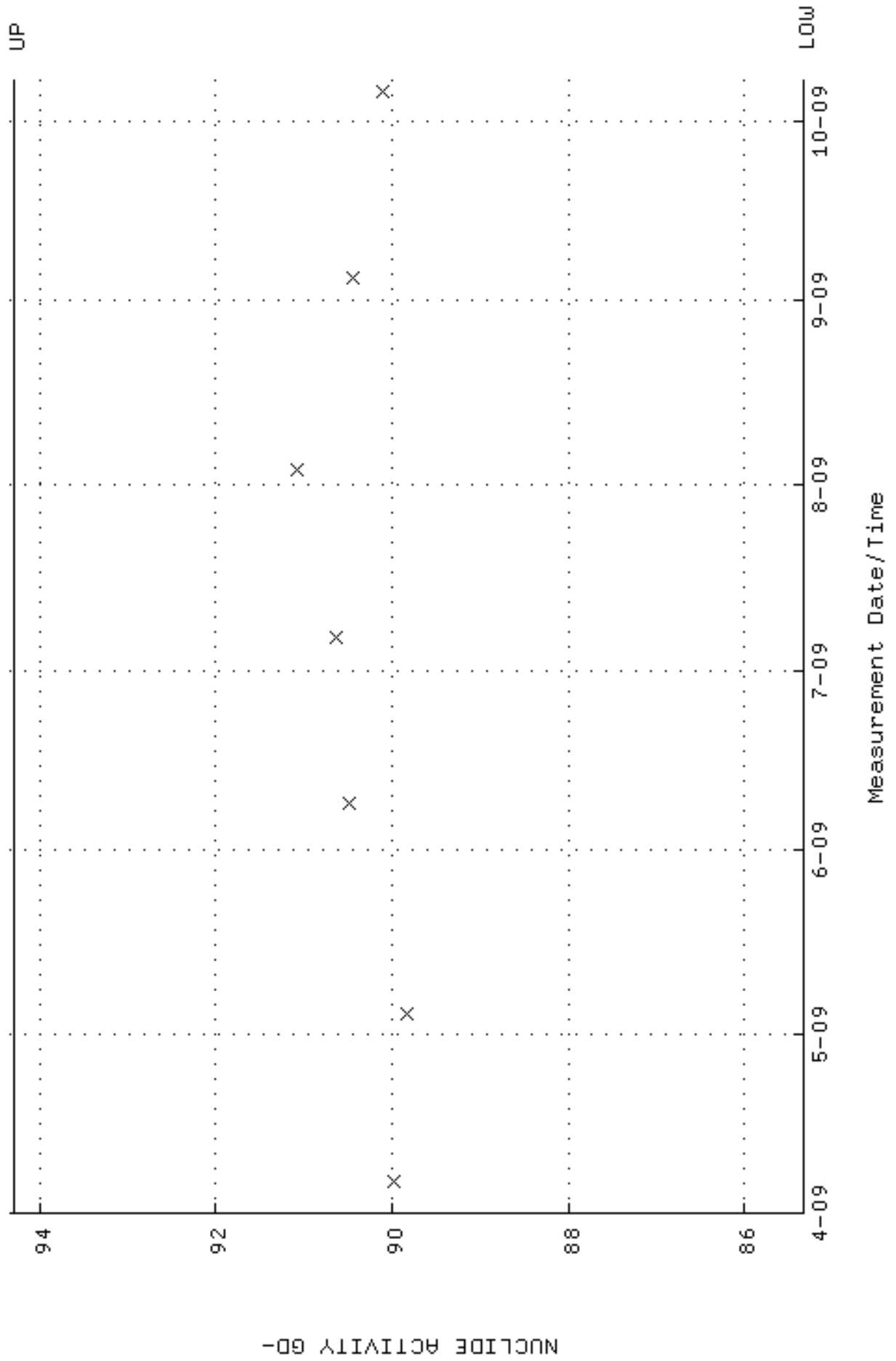
QA filename : DKA100:[ENV_ALPHA.QA.B]B009.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



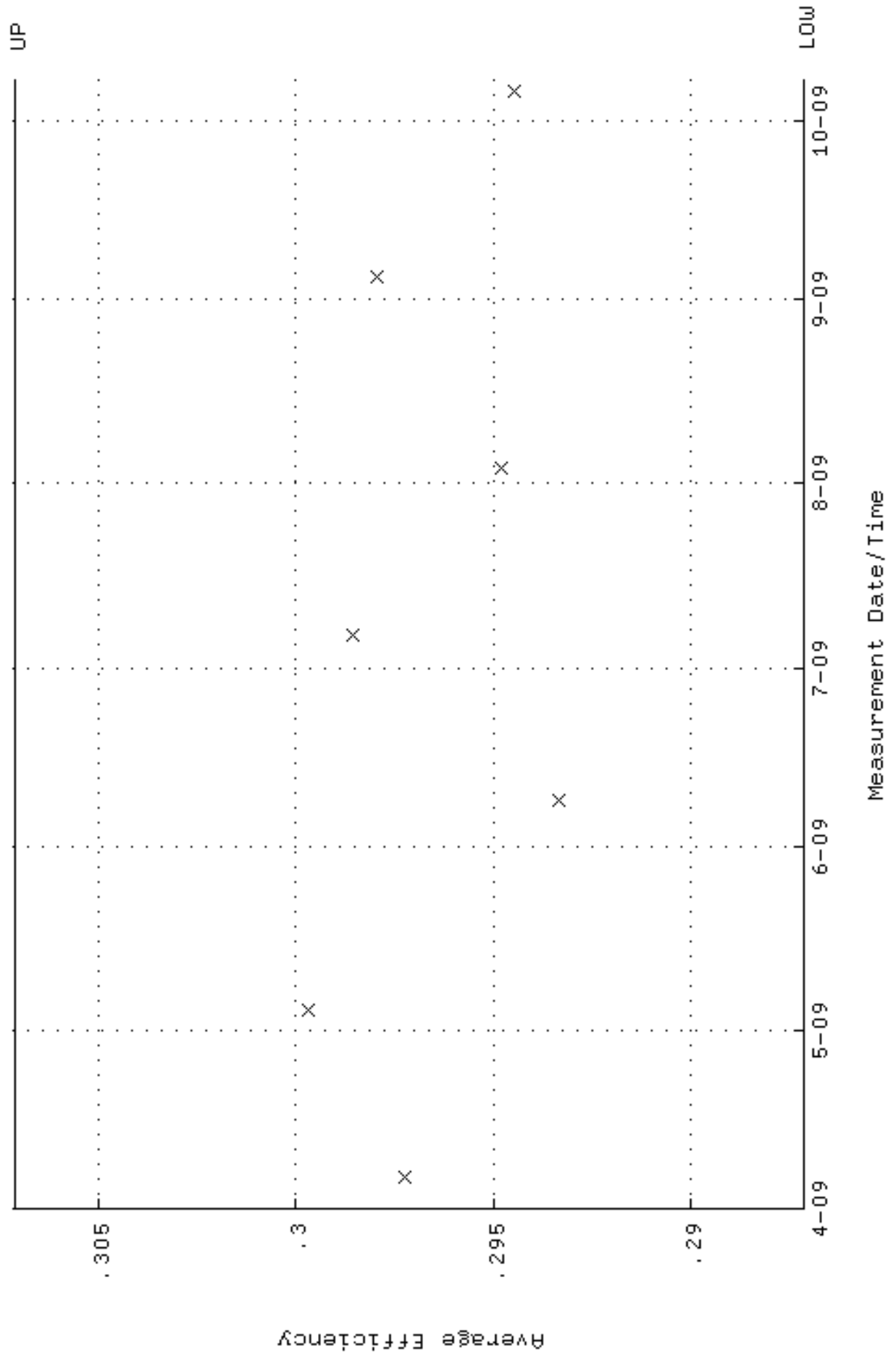
QA filename : DKA100:[ENV_ALPHA.QA.W]W010.QAF;5
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.303169 through 0.323169



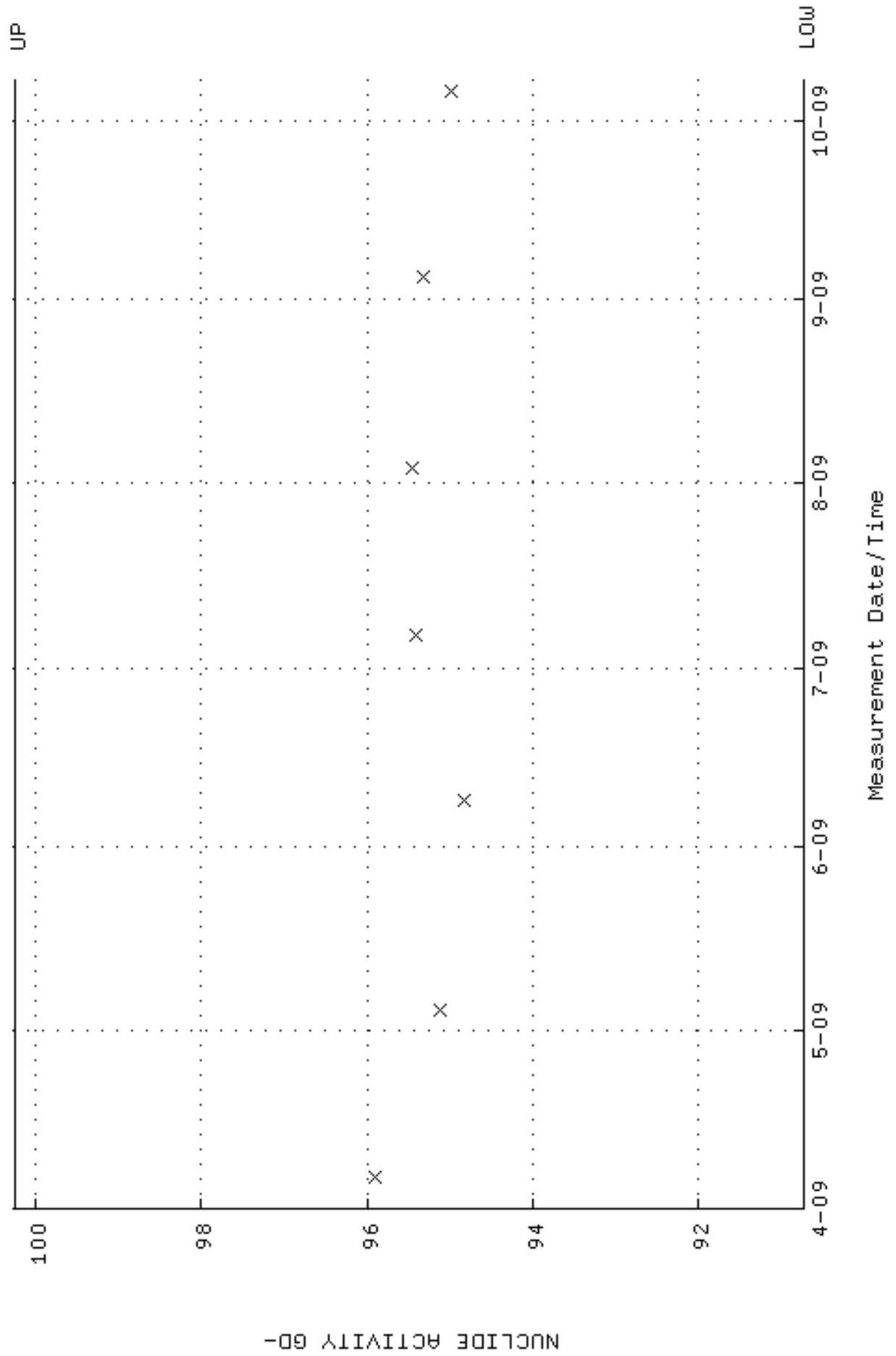
QA filename : DKA100:[ENV_ALPHA.QA.W]W010.QAF;5
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 85.3273 through 94.3091



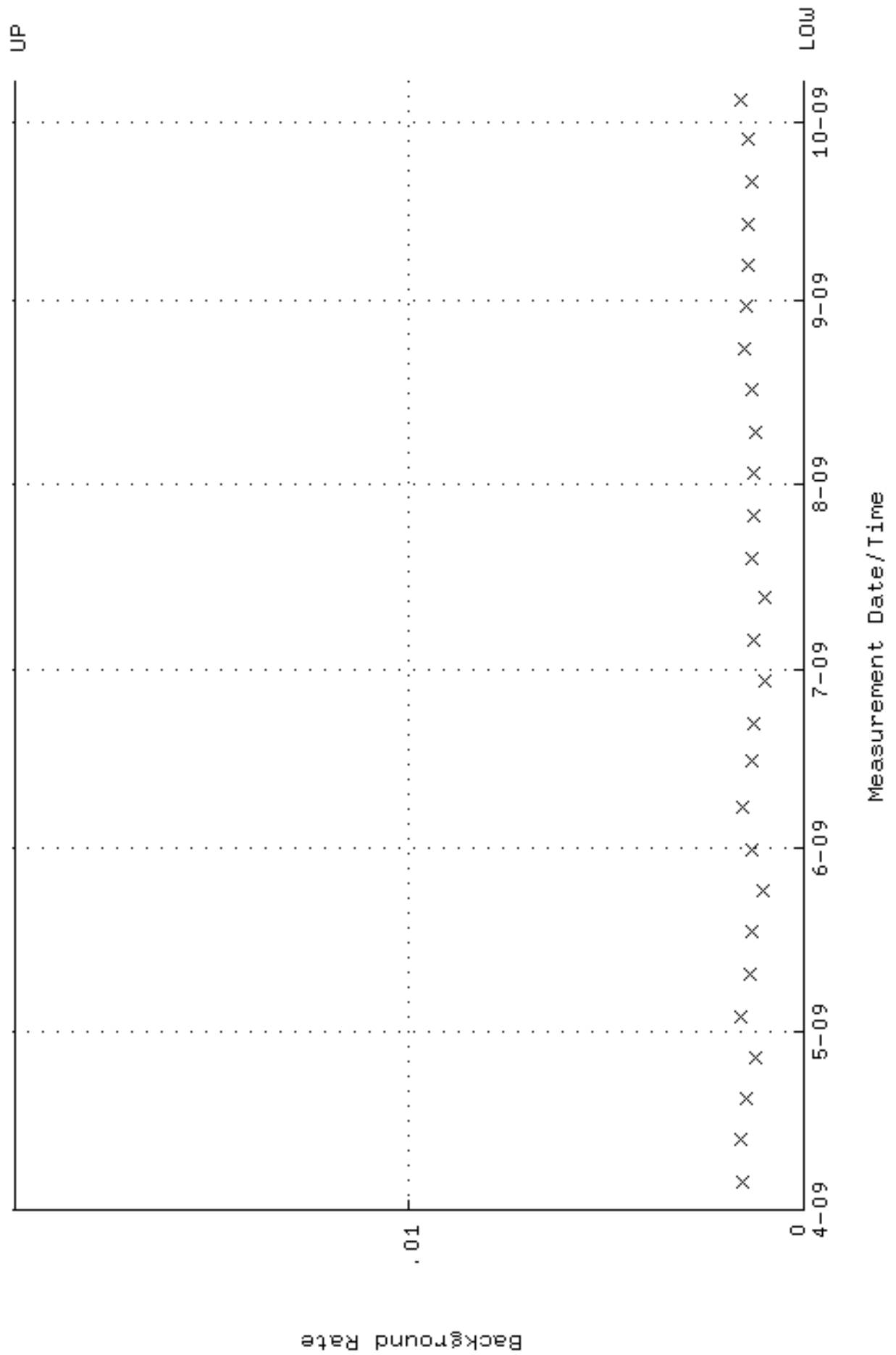
QA filename : DKA100:[ENV_ALPHA.QA.W]W011.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.287129 through 0.307129



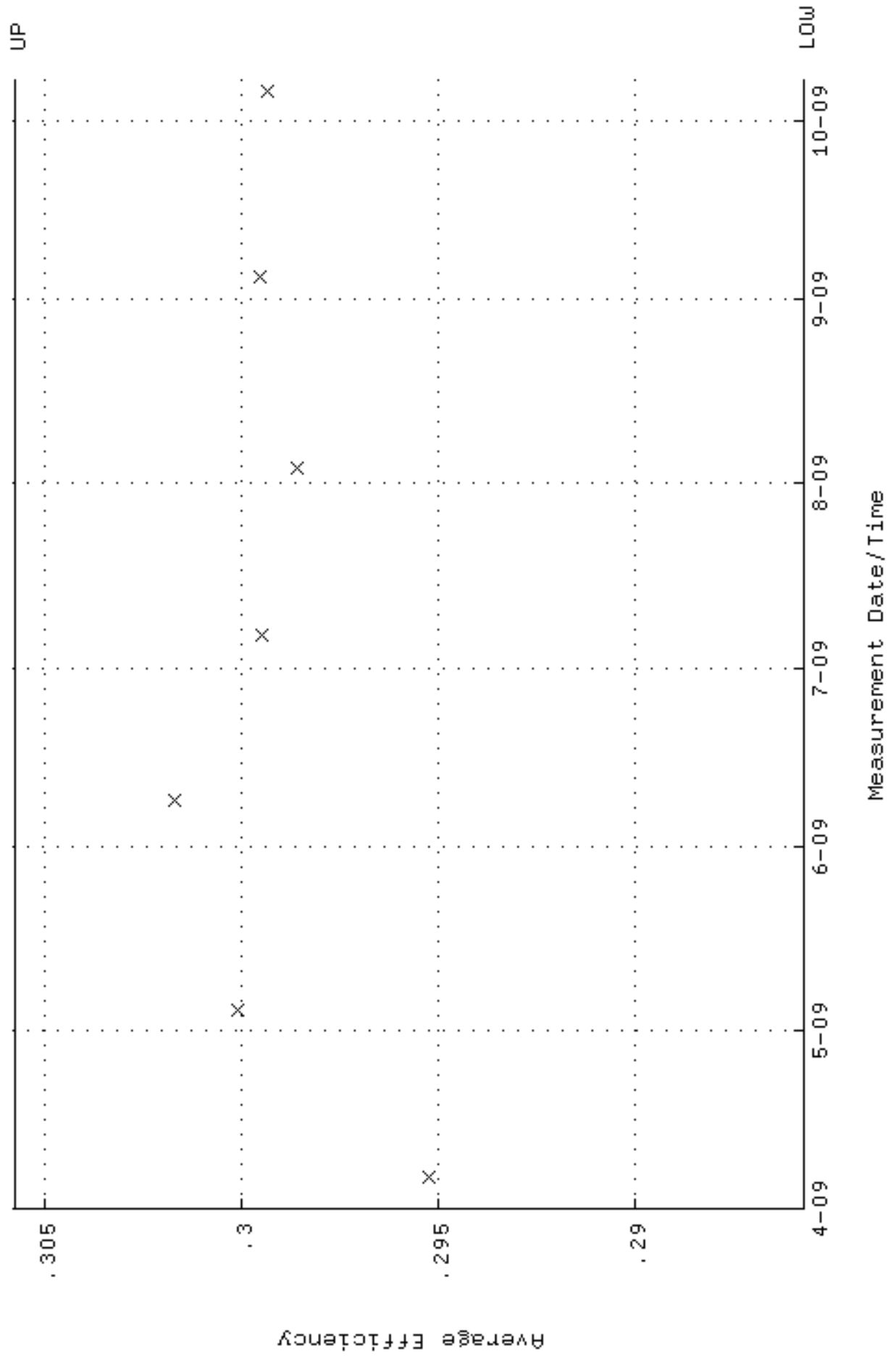
QA filename : DKA100:[ENV_ALPHA.QA.W]W011.QAF;4
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 90.7092 through 100.258



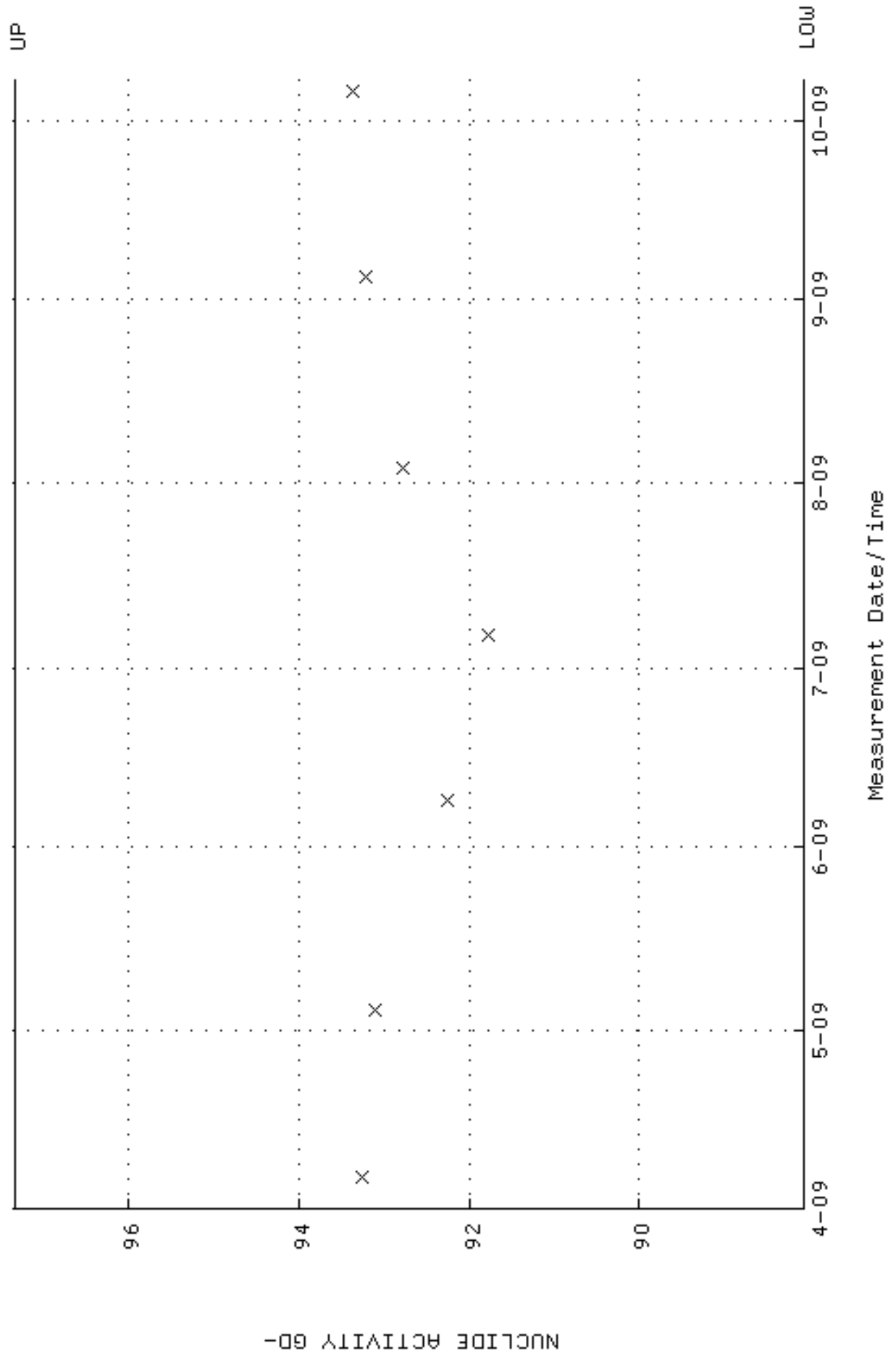
QA filename : DKA100:[ENV_ALPHA.QA.B]B011.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



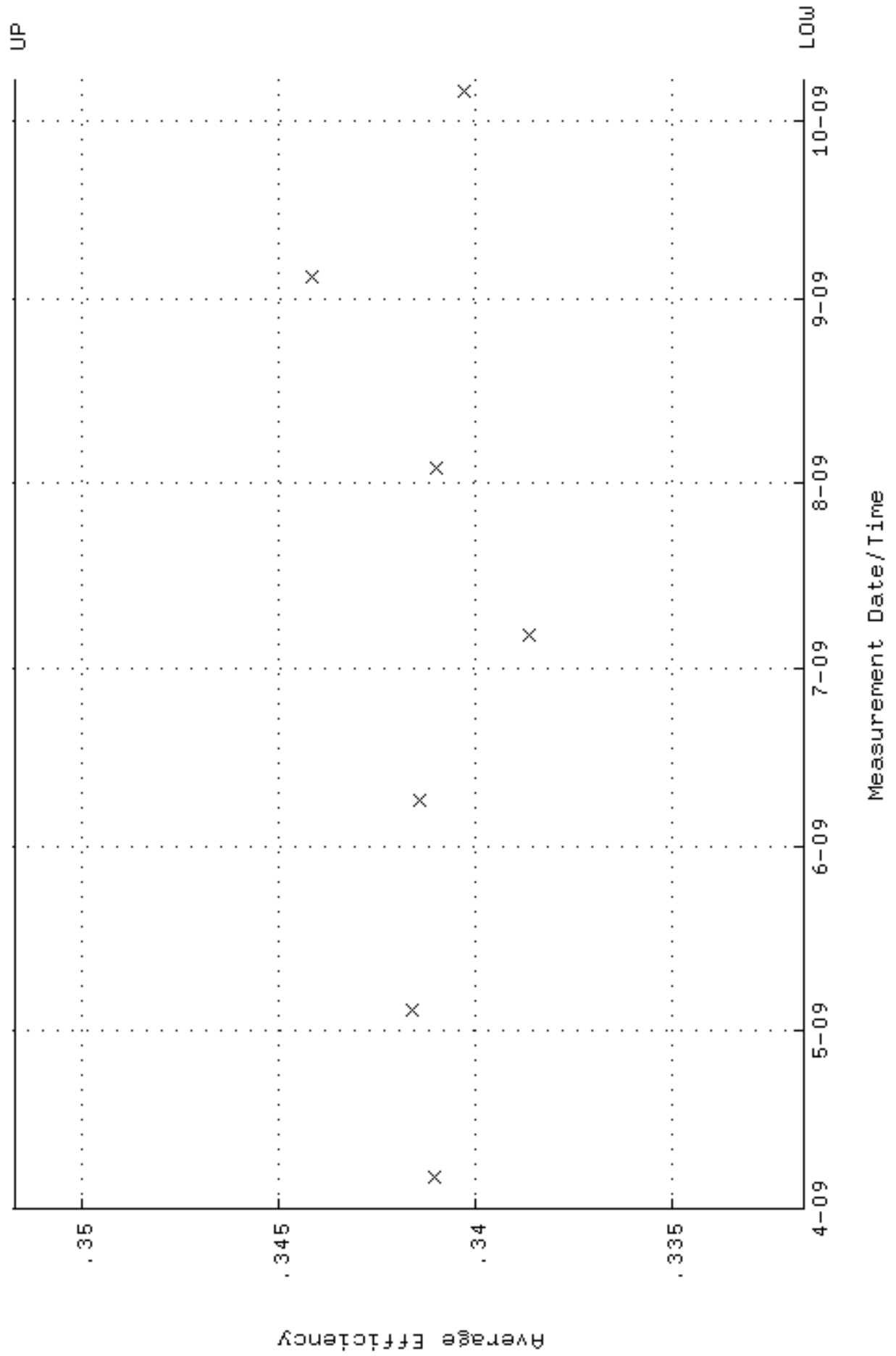
QA filename : DKA100:[ENV_ALPHA.QA.W]W012.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.285730 through 0.305730



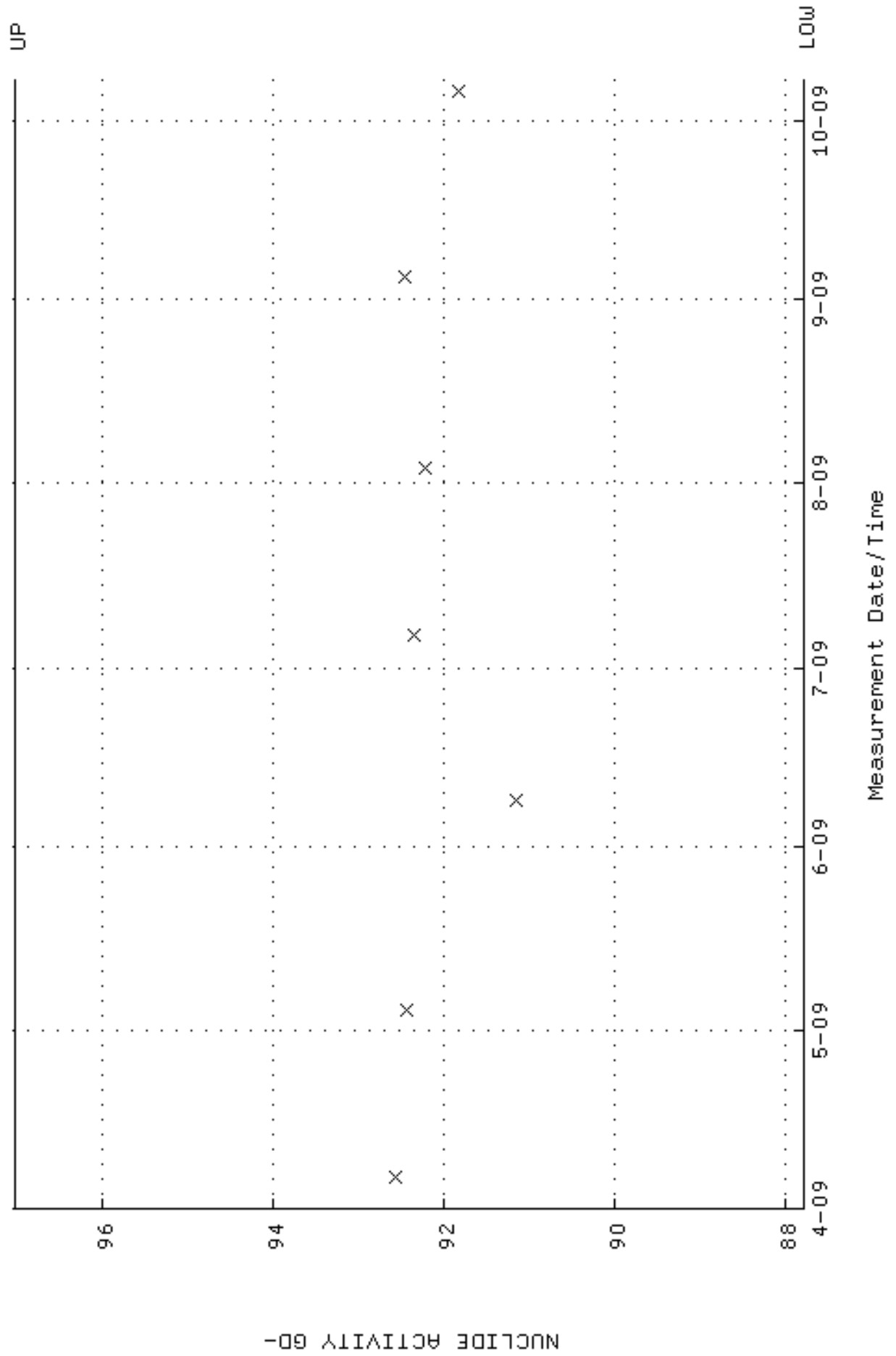
QA filename : DKA100:[ENV_ALPHA.QA.W]w012.QAF;4
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:01 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 88.0678 through 97.3382



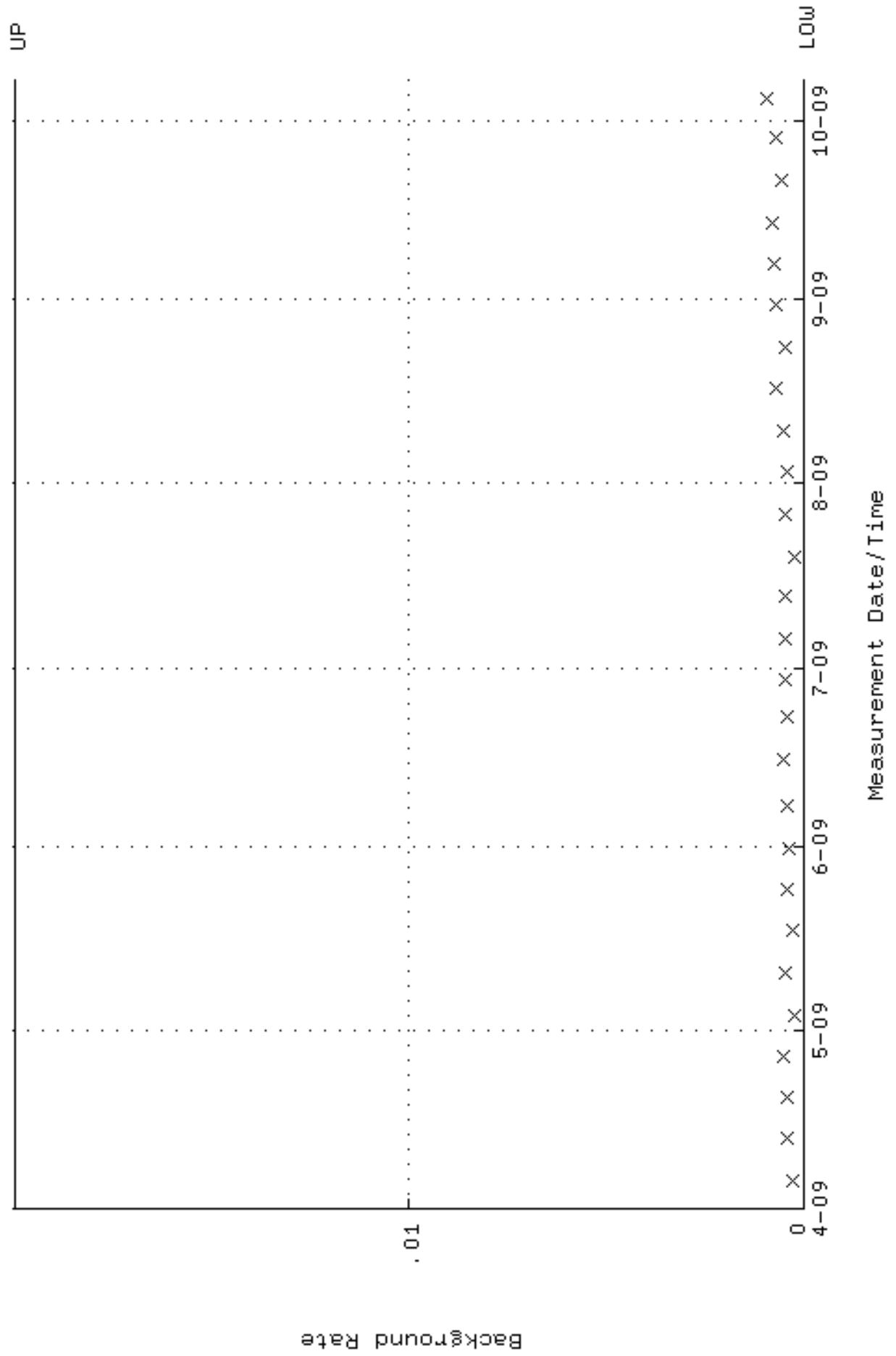
QA filename : DKA100:[ENV_ALPHA.QA.W]W013.QAF;2
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.331676 through 0.351676



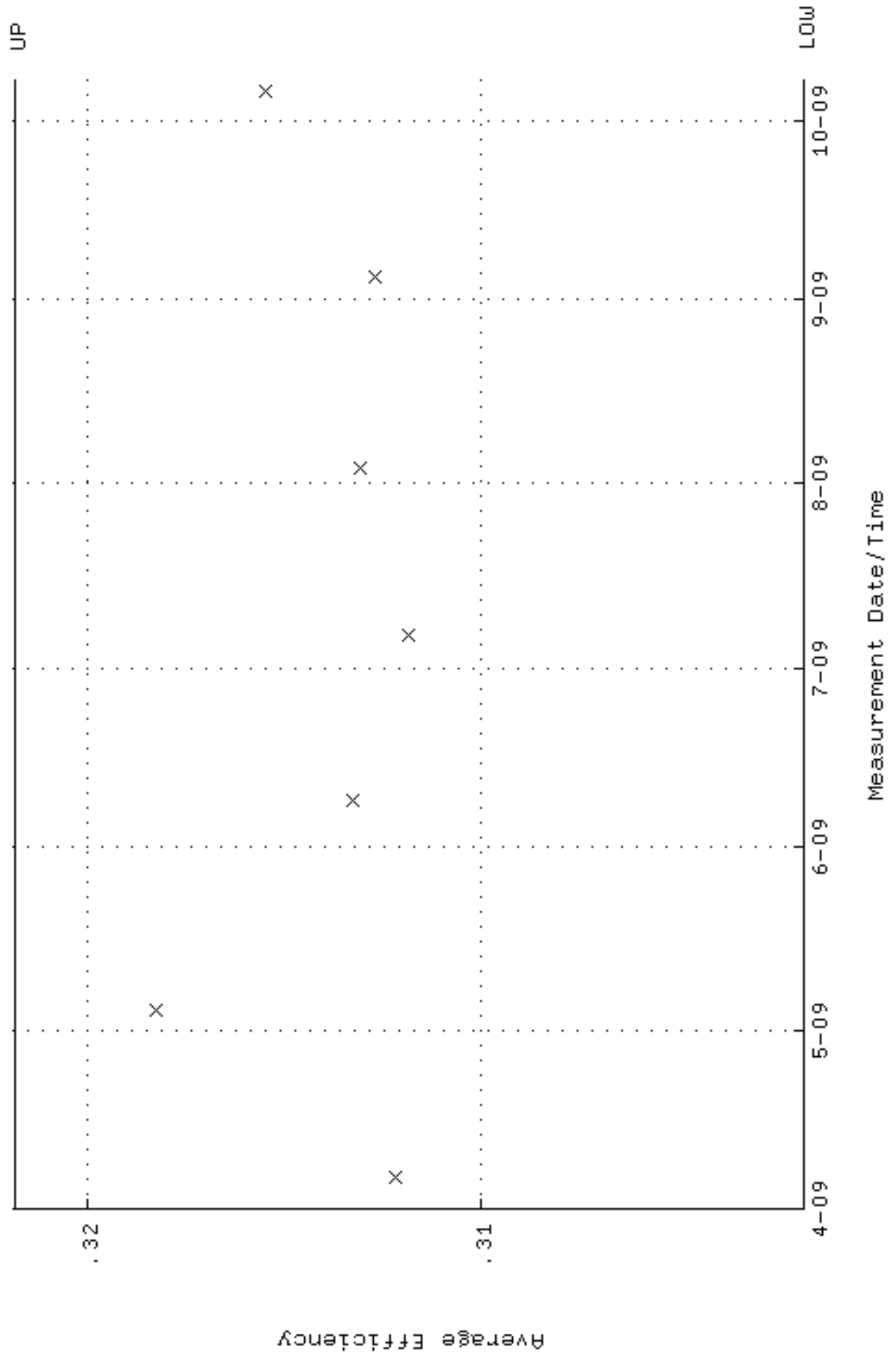
QA filename : DKA100:[ENV_ALPHA.QA.W]W013.QAF;2
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 87.7736 through 97.0130



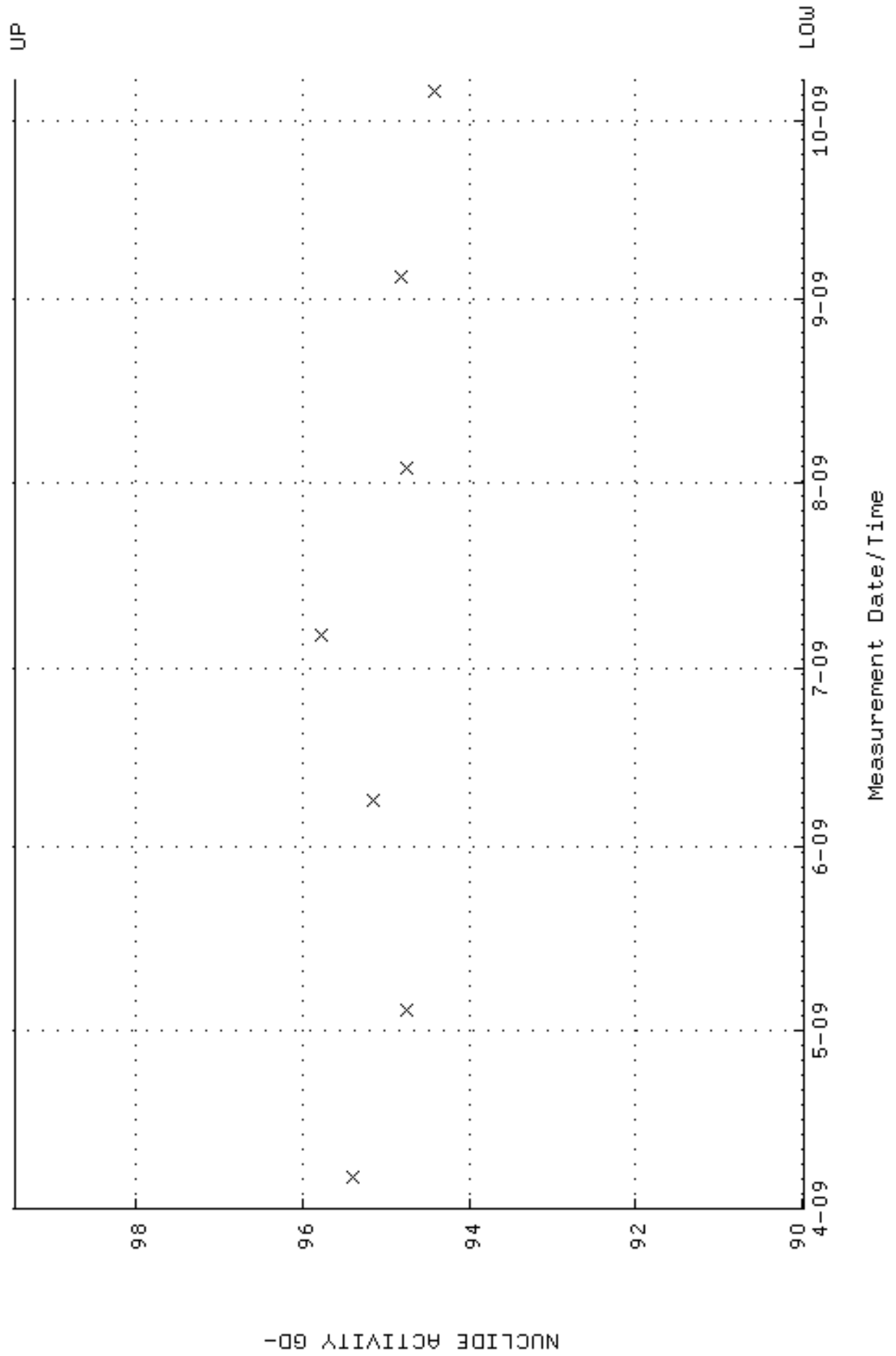
QA filename : DKA100:[ENV_ALPHA.QA.B]B013.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



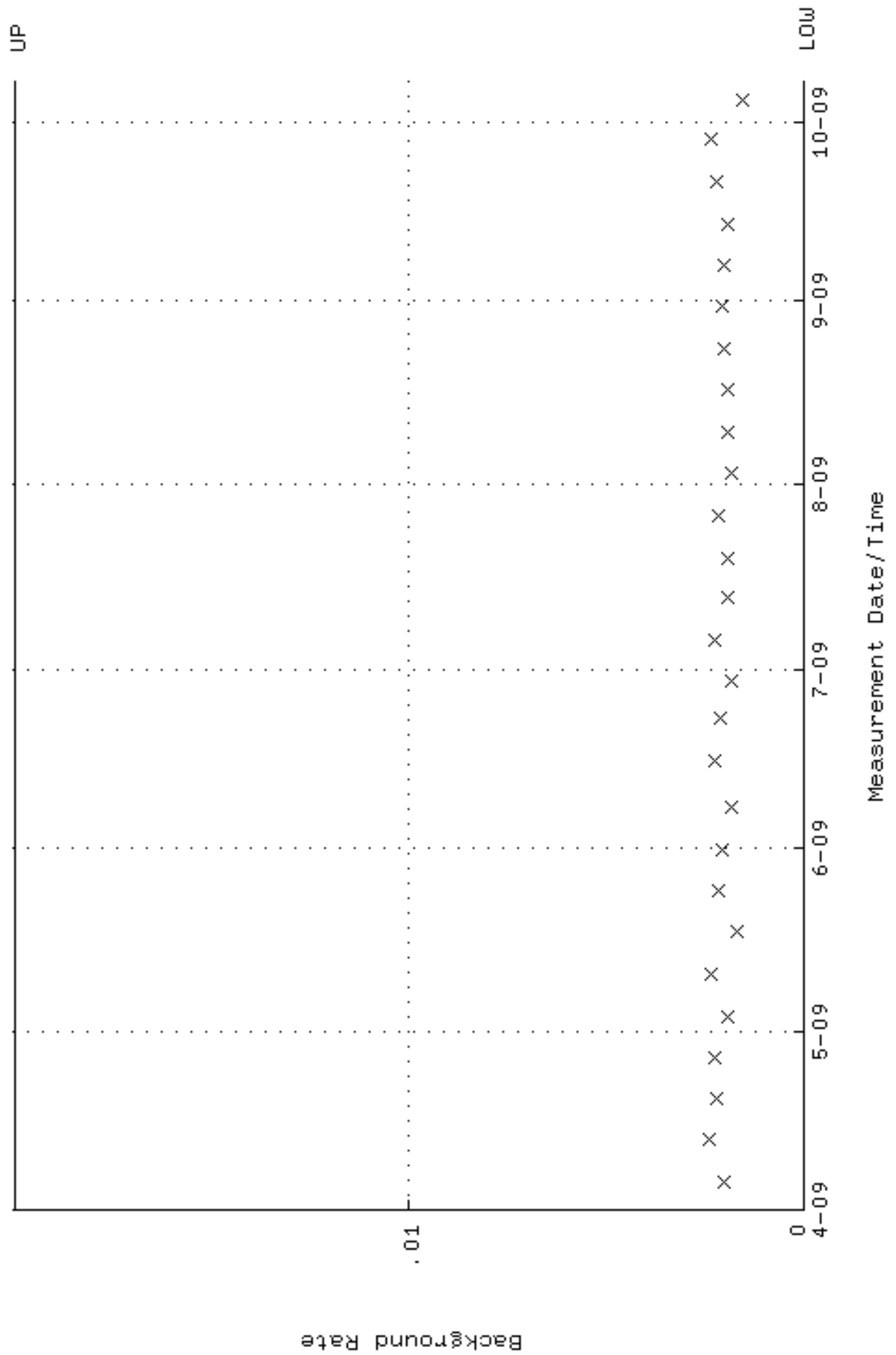
QA filename : DKA100:[ENV_ALPHA.QA.W]W014.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.301834 through 0.321834



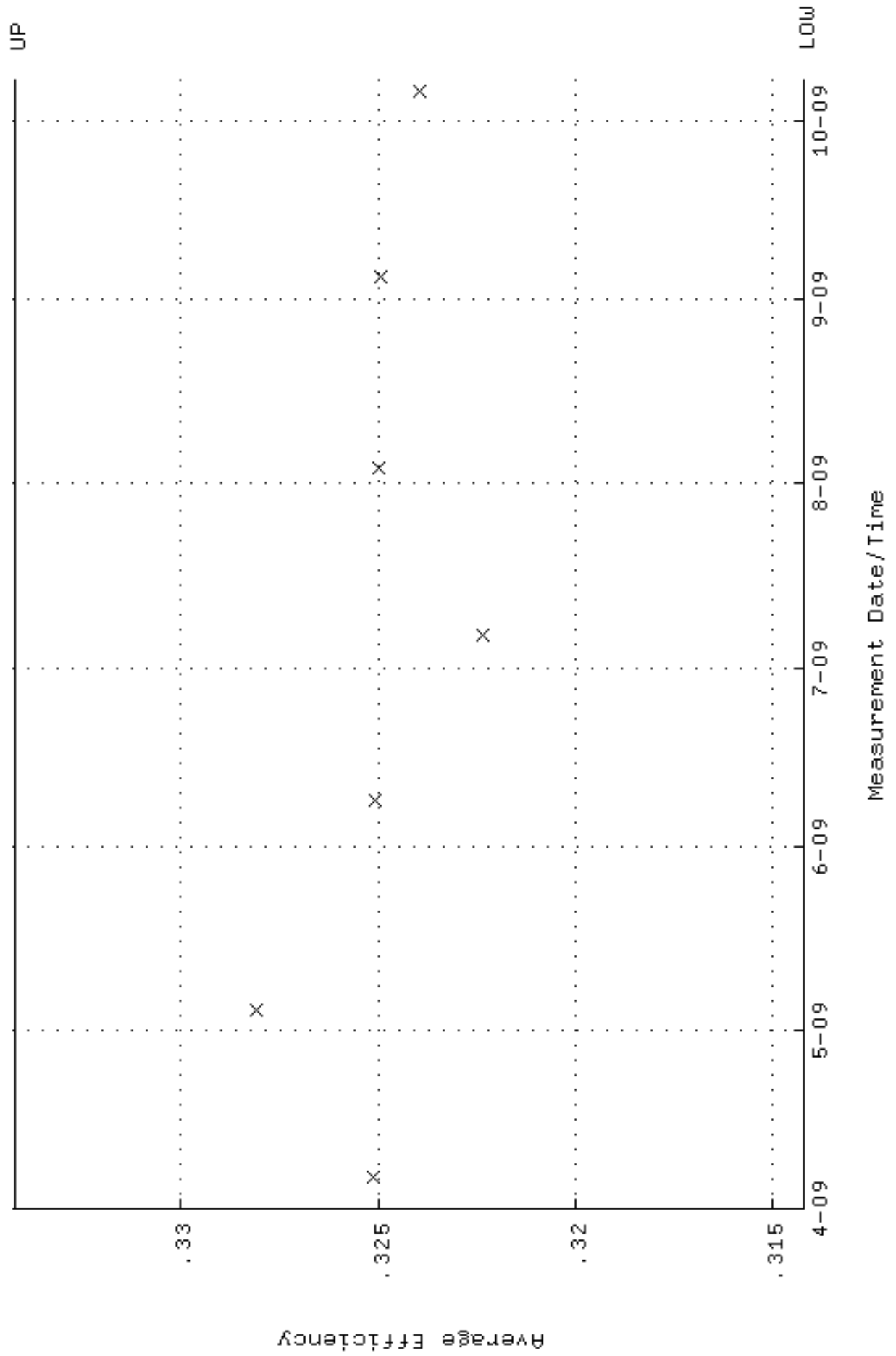
QA filename : DKA100:[ENV_ALPHA.QA.W]W014.QAF;4
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 89.9790 through 99.4504



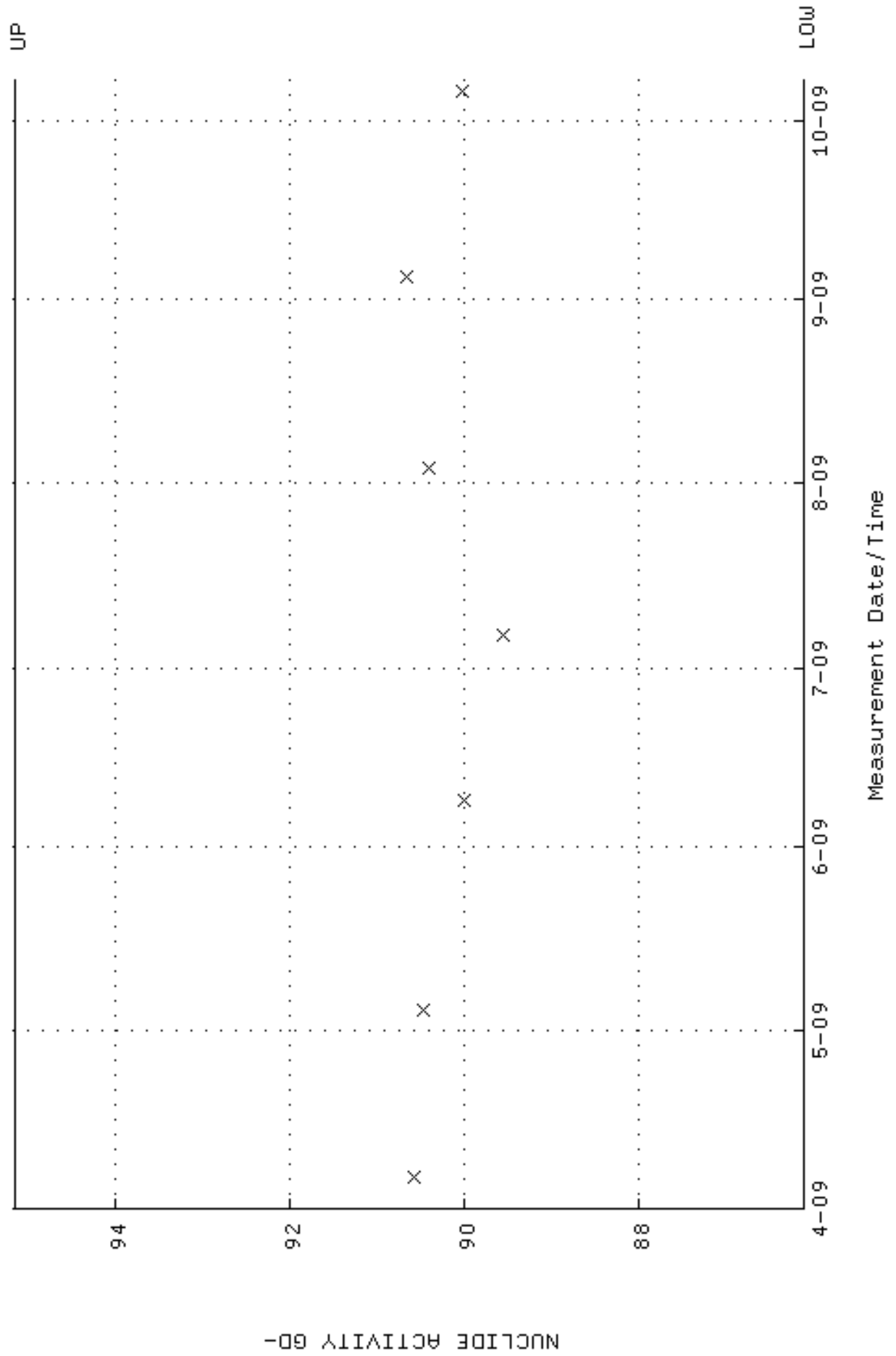
QA filename : DKA100:[ENV_ALPHA.QA.B]B014.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



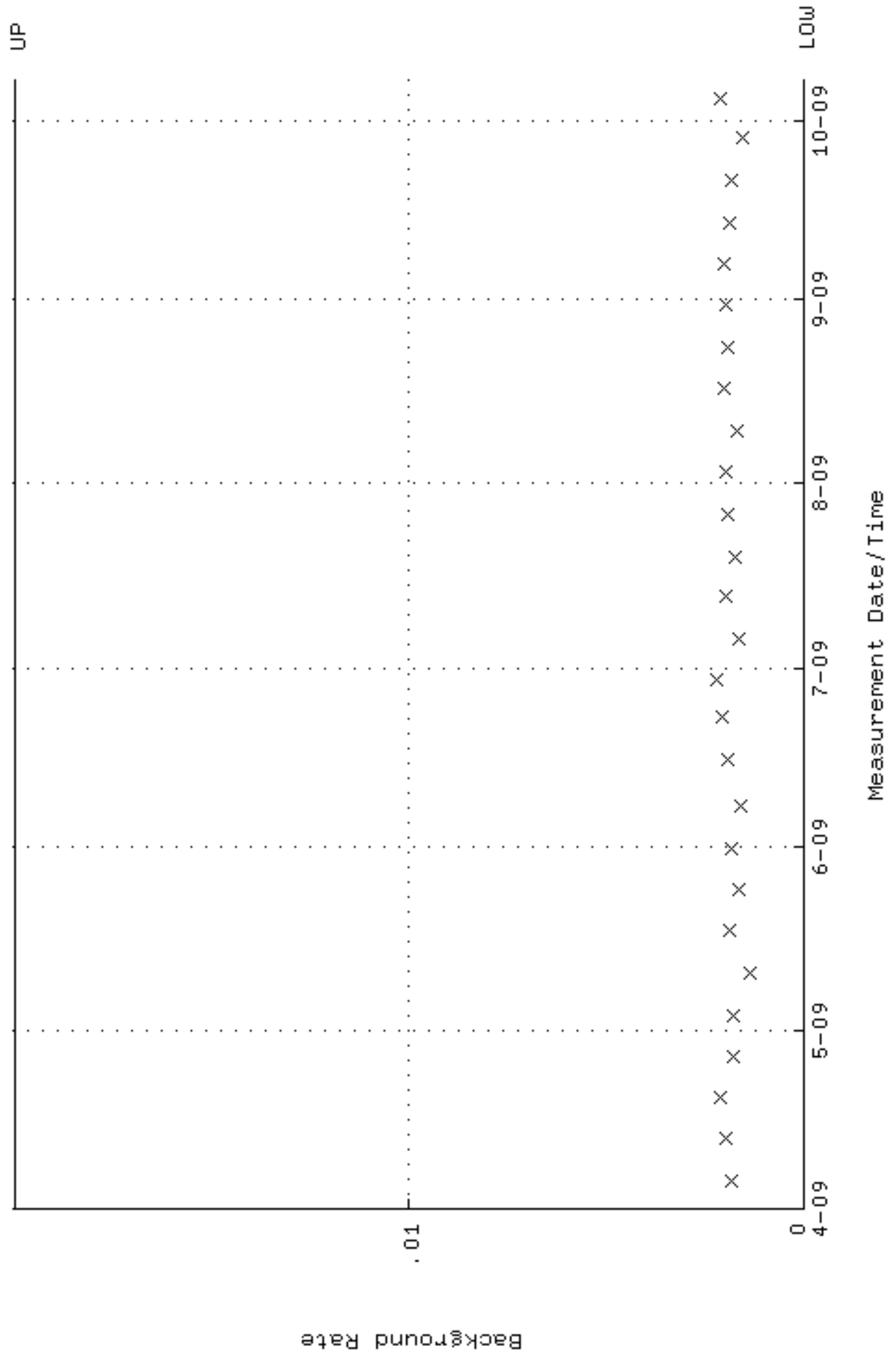
QA filename : DKA100:[ENV_ALPHA.QA.W]W015.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.314211 through 0.334211



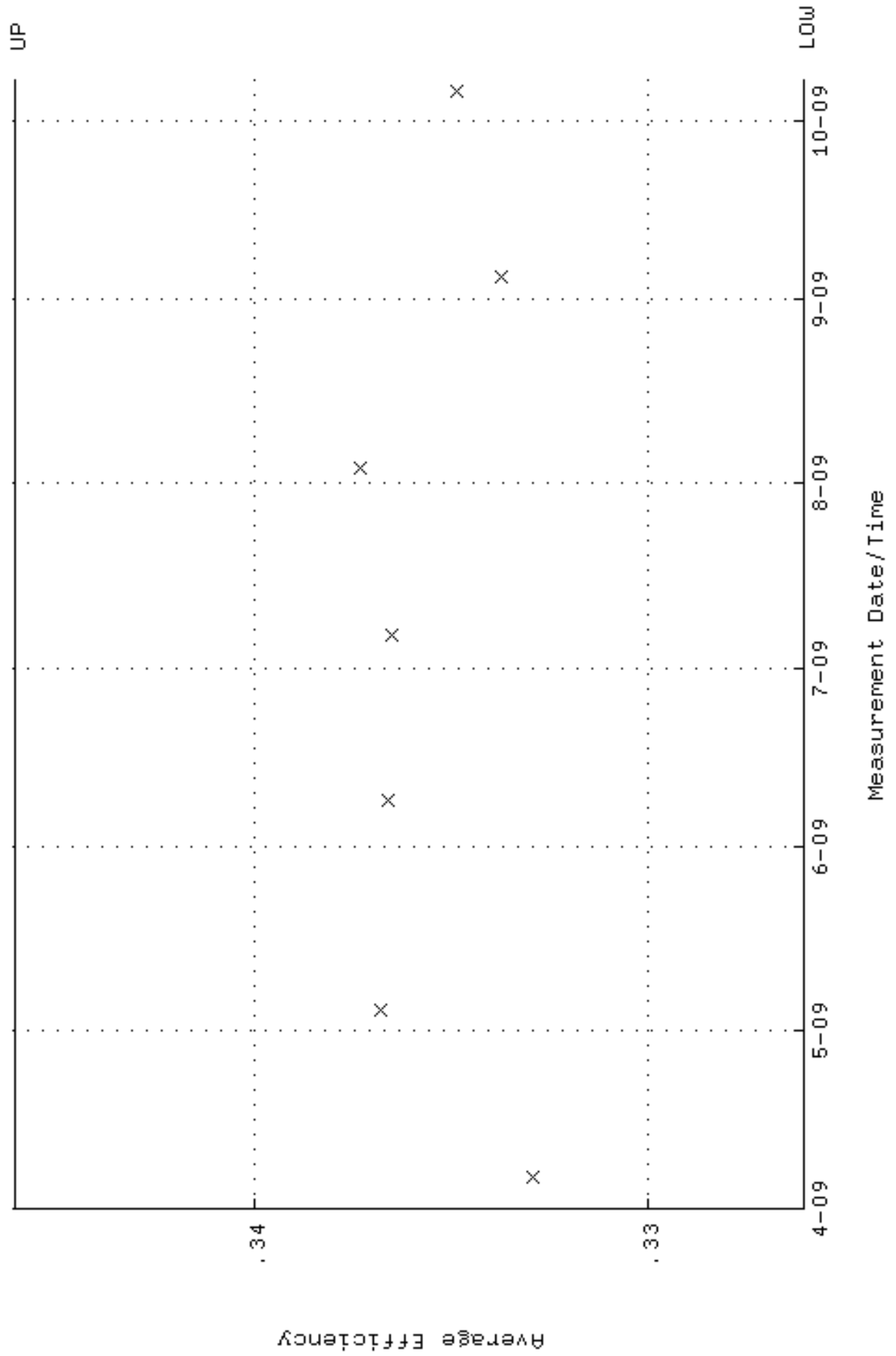
QA filename : DKA100:[ENV_ALPHA.QA.W]W015.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 86.0931 through 95.1555



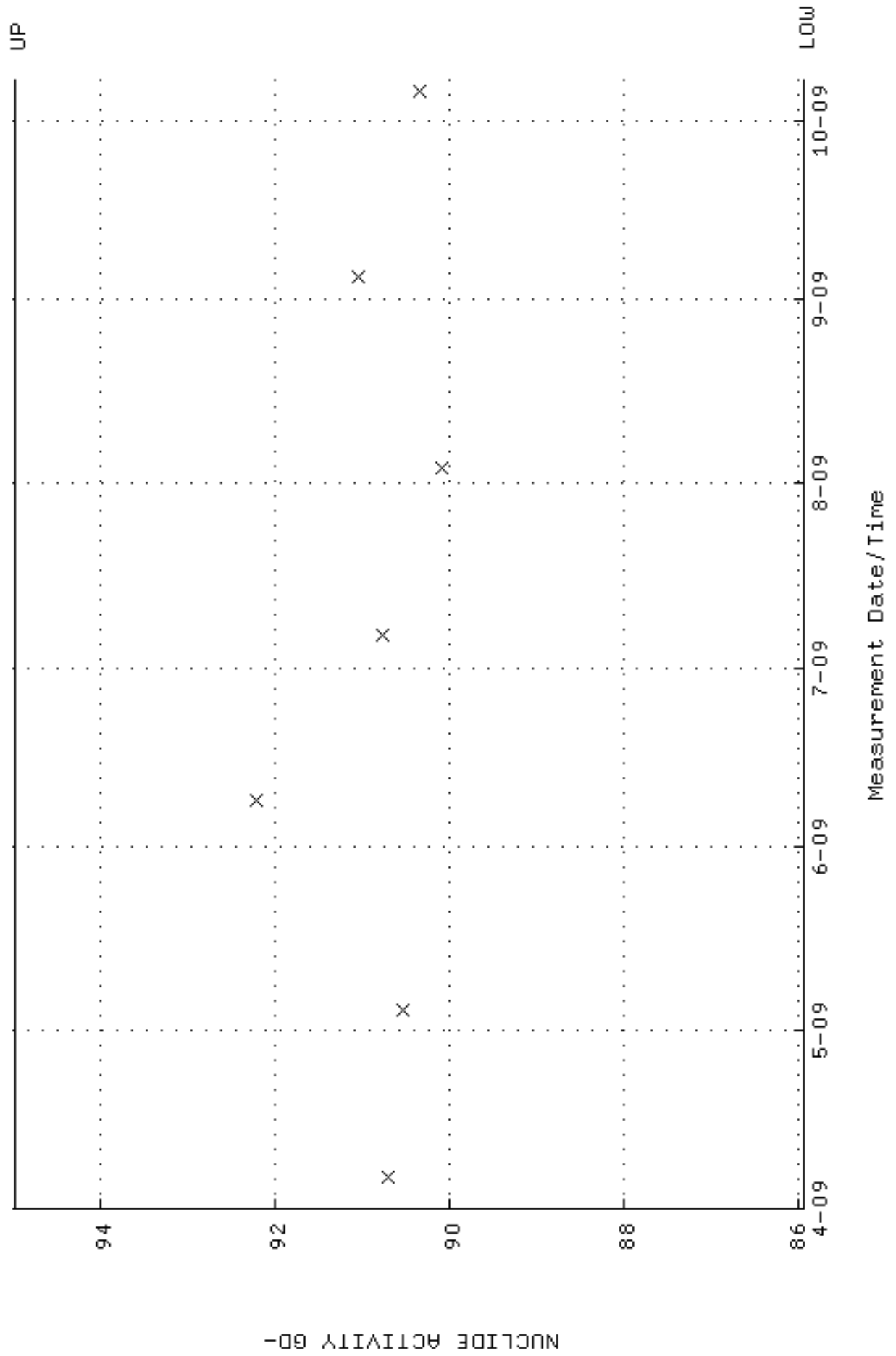
QA filename : DKA100:[ENV_ALPHA.QA.B]B015.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



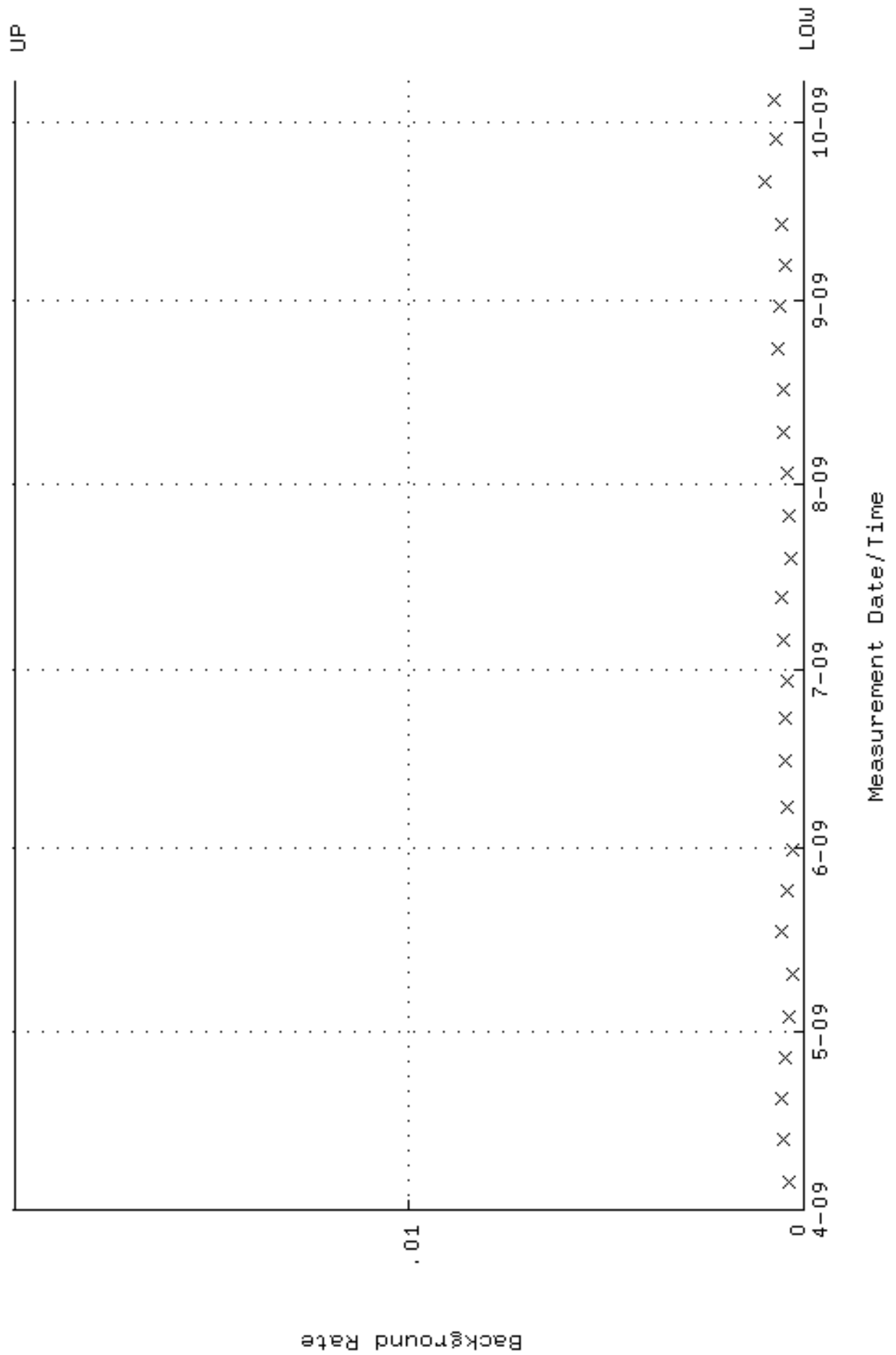
QA filename : DKA100:[ENV_ALPHA.QA.W]W016.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.326058 through 0.346058



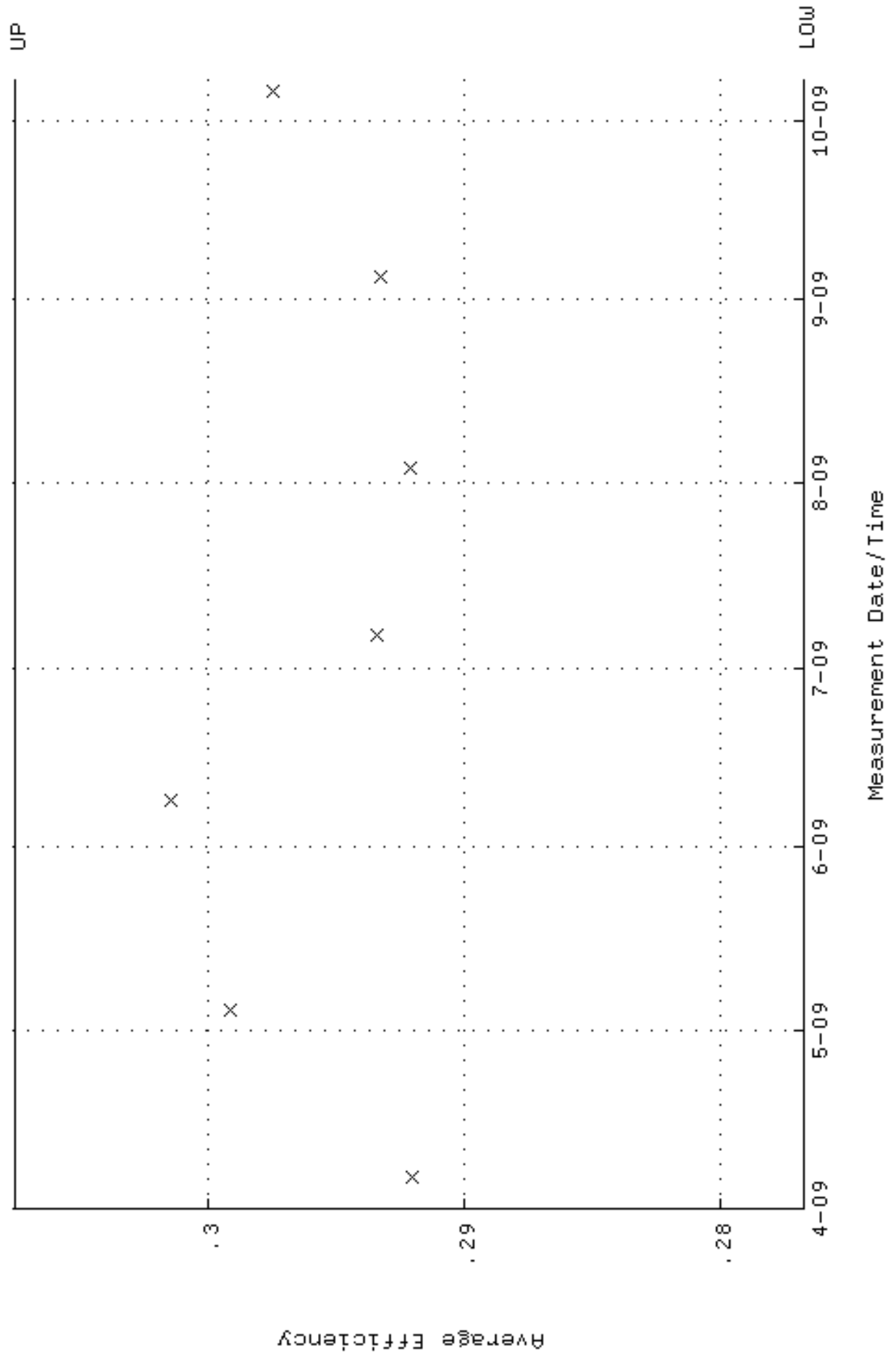
QA filename : DKA100:[ENV_ALPHA.QA.W]W016.QAF;3
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 85.9280 through 94.9730



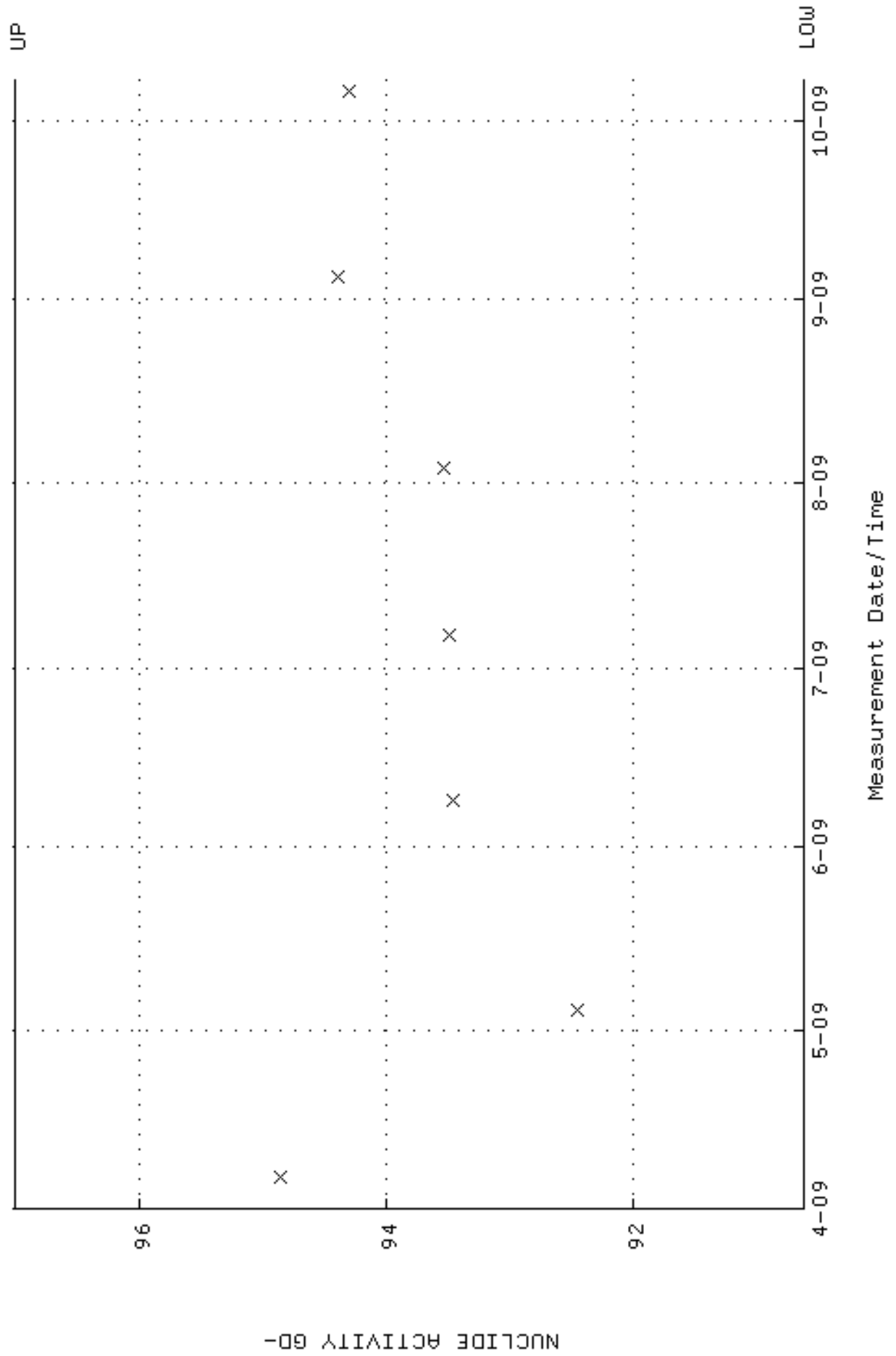
QA filename : DKA100:[ENV_ALPHA.QA.B]B016.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



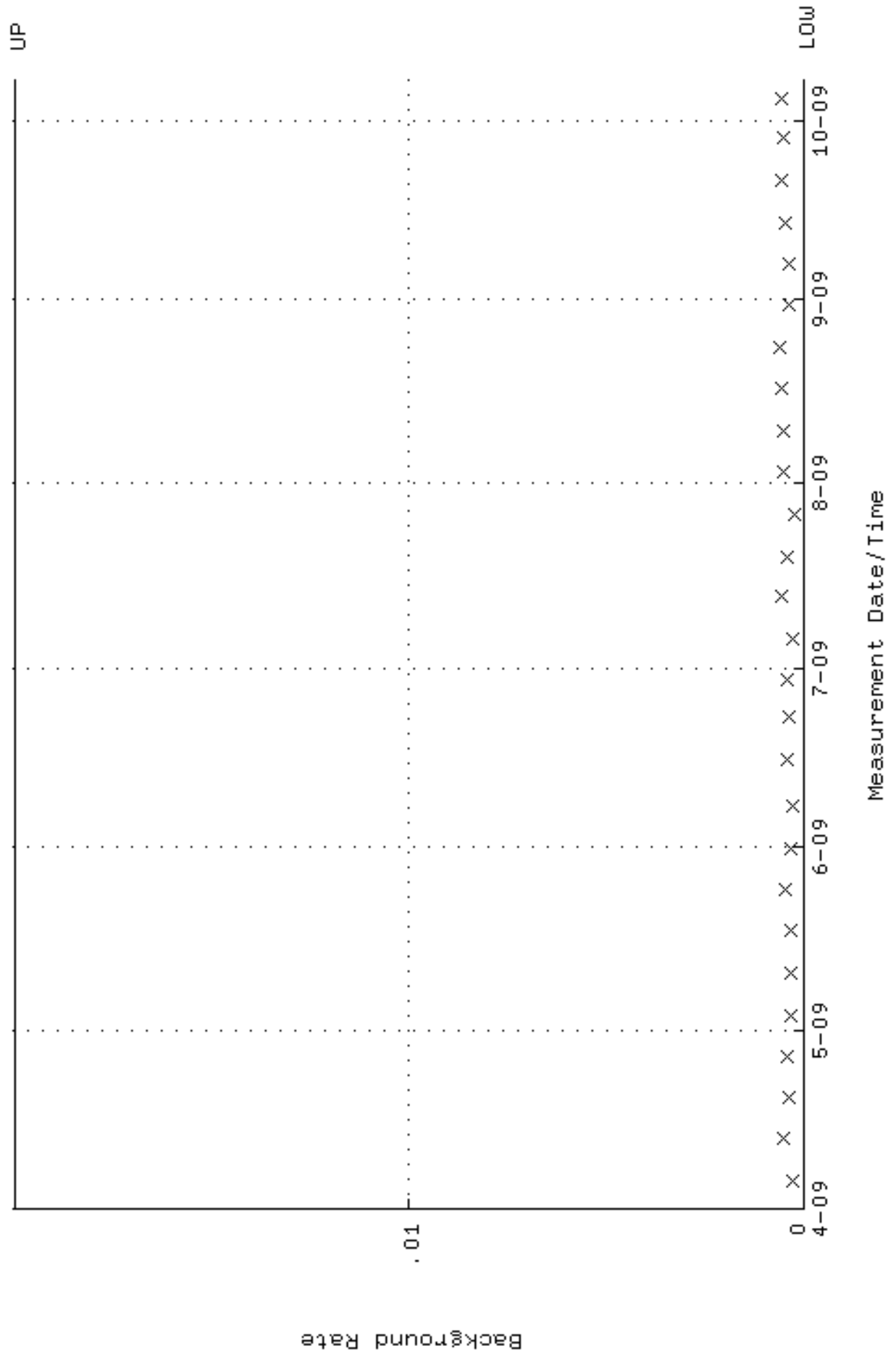
QA filename : DKA100:[ENV_ALPHA.QA.W]W017.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.276771 through 0.307557



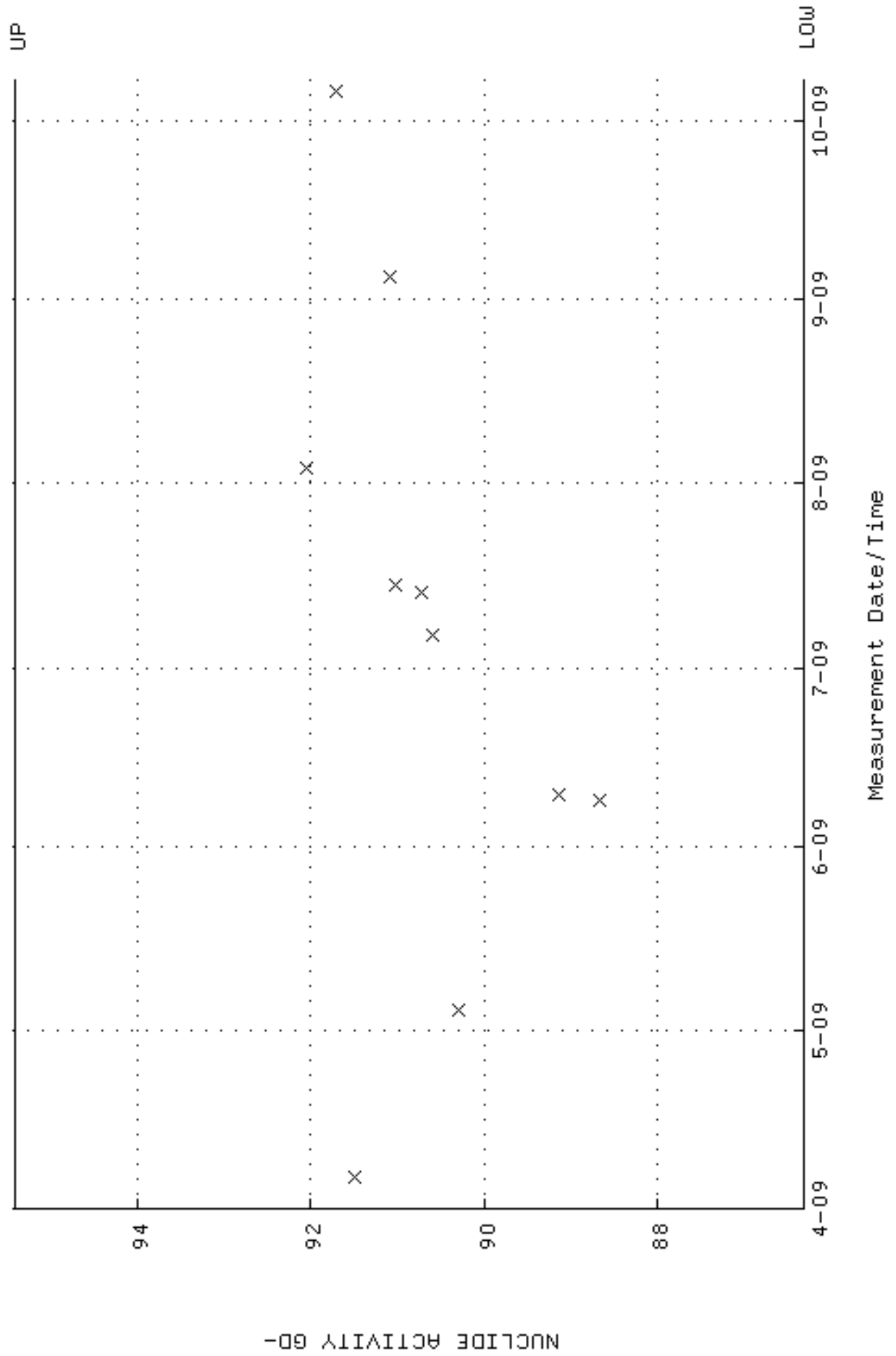
QA filename : DKA100:[ENV_ALPHA.QA.W]W017.QAF;4
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 90.6063 through 97.0149



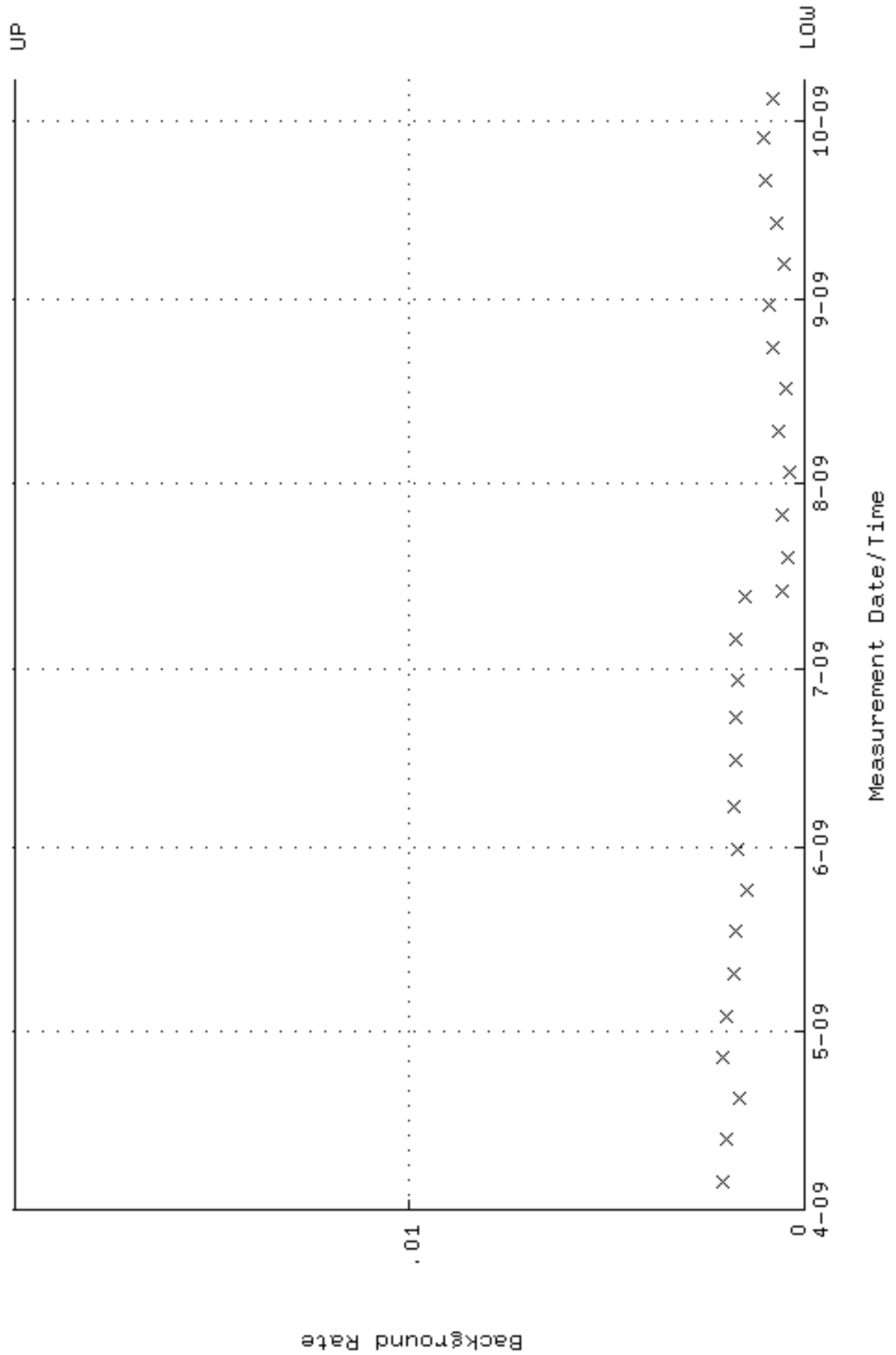
QA filename : DKA100:[ENV_ALPHA.QA.B]B017.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



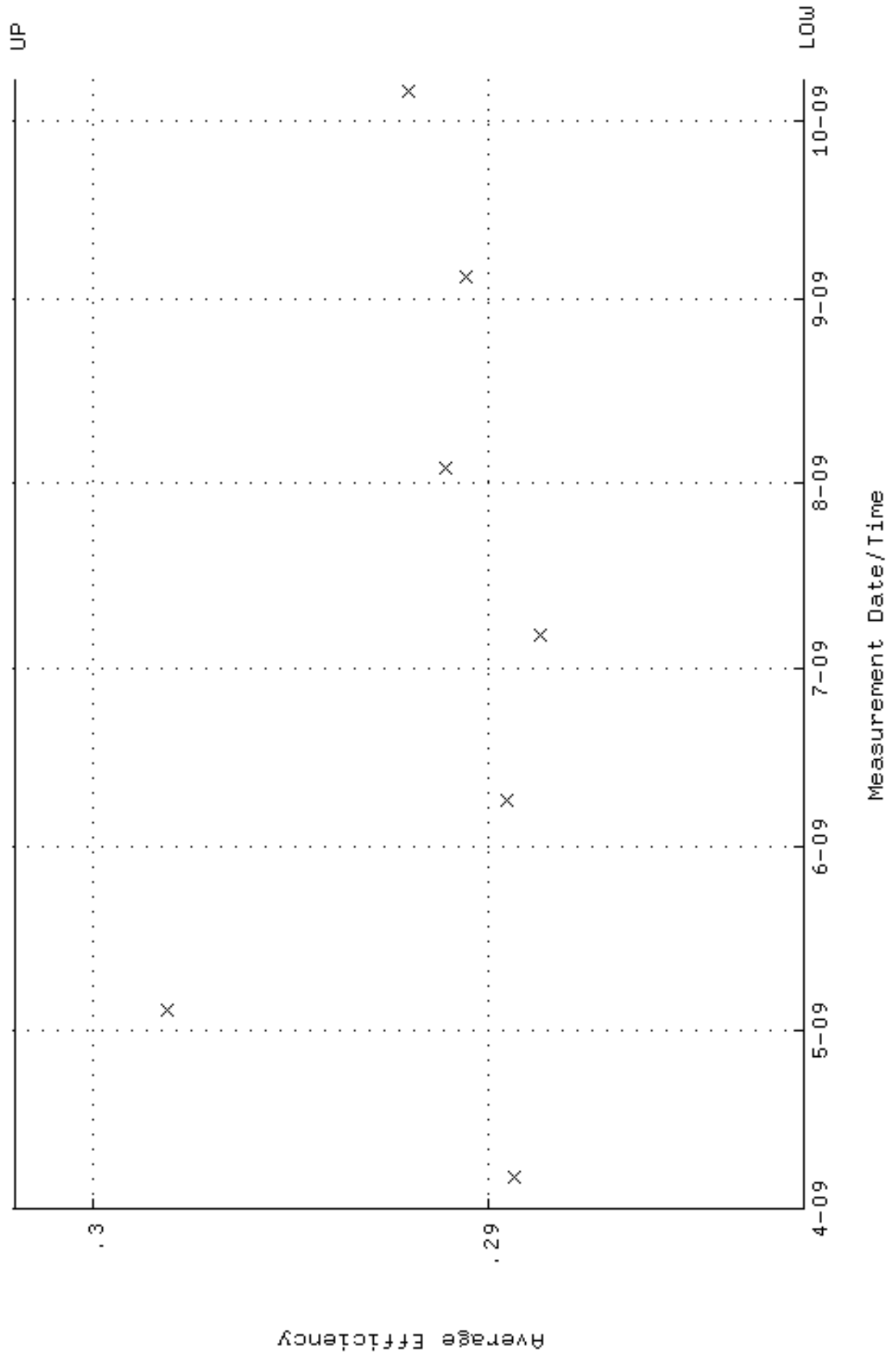
QA filename : DKA100:[ENV_ALPHA.QA.W]W018.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:02 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 86.3167 through 95.4027



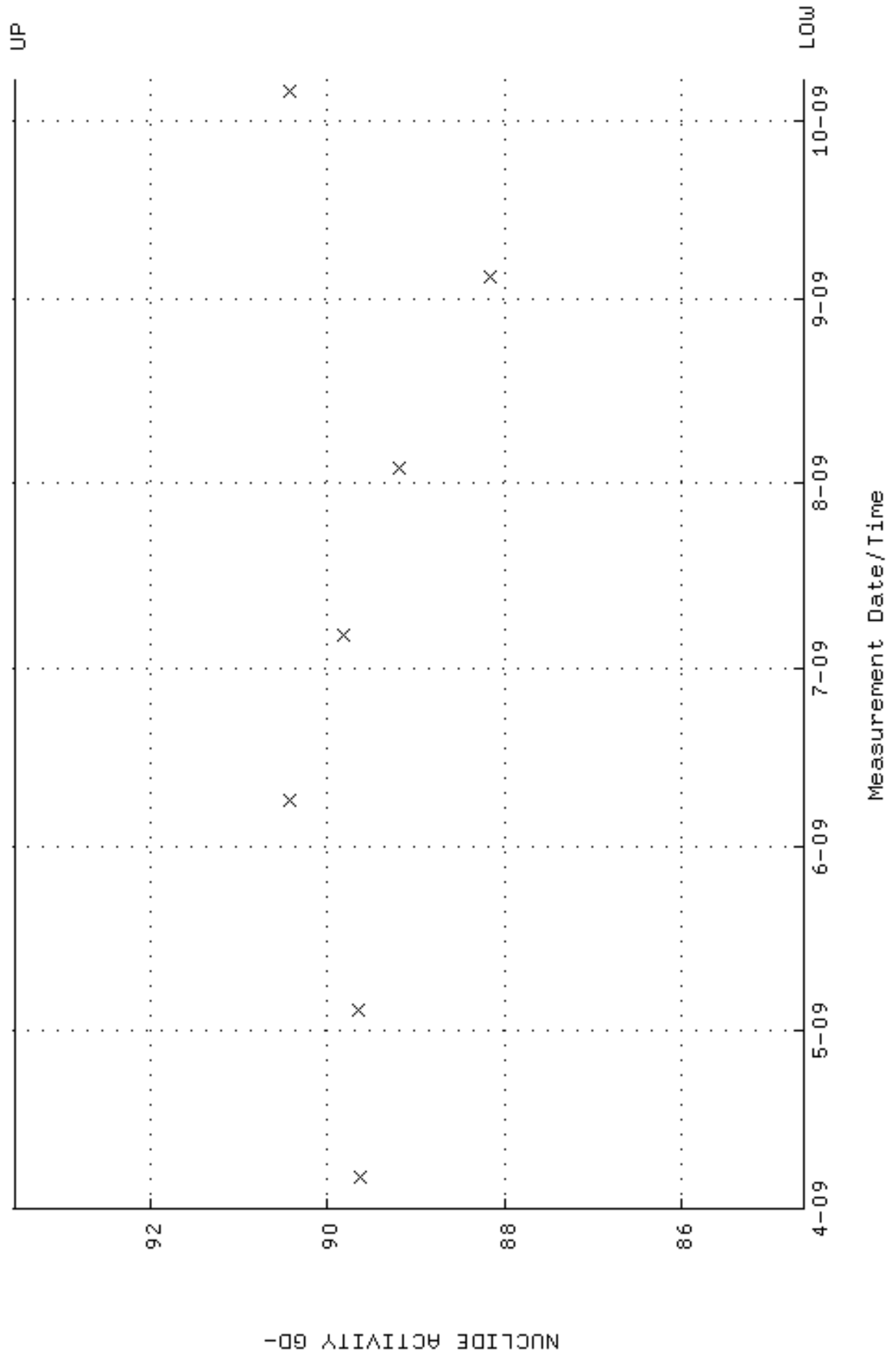
QA filename : DKA100:[ENV_ALPHA.QA.B]B018.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:09 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



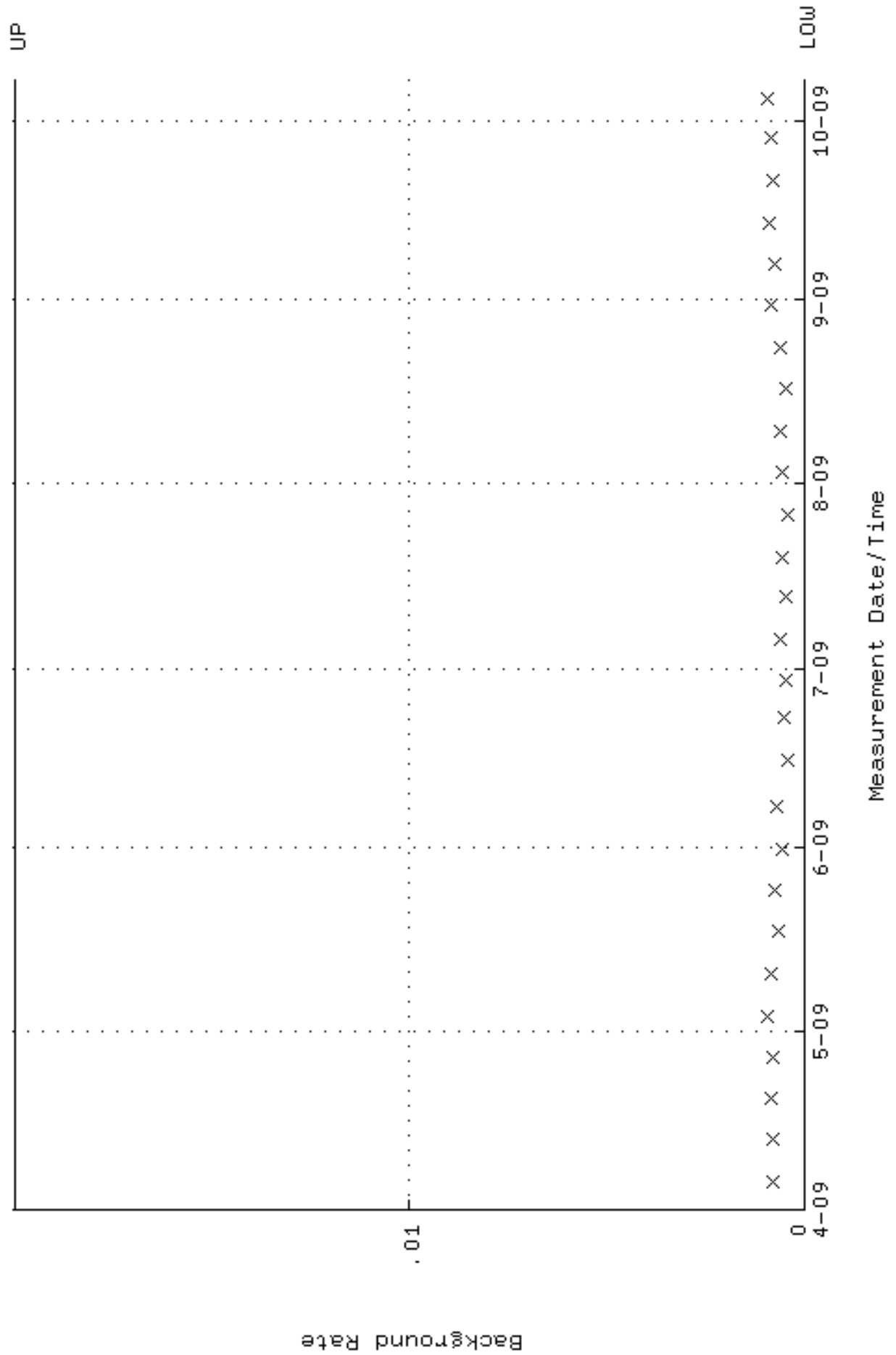
QA filename : DKA100:[ENV_ALPHA.QA.W]W019.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:03 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.281988 through 0.301988



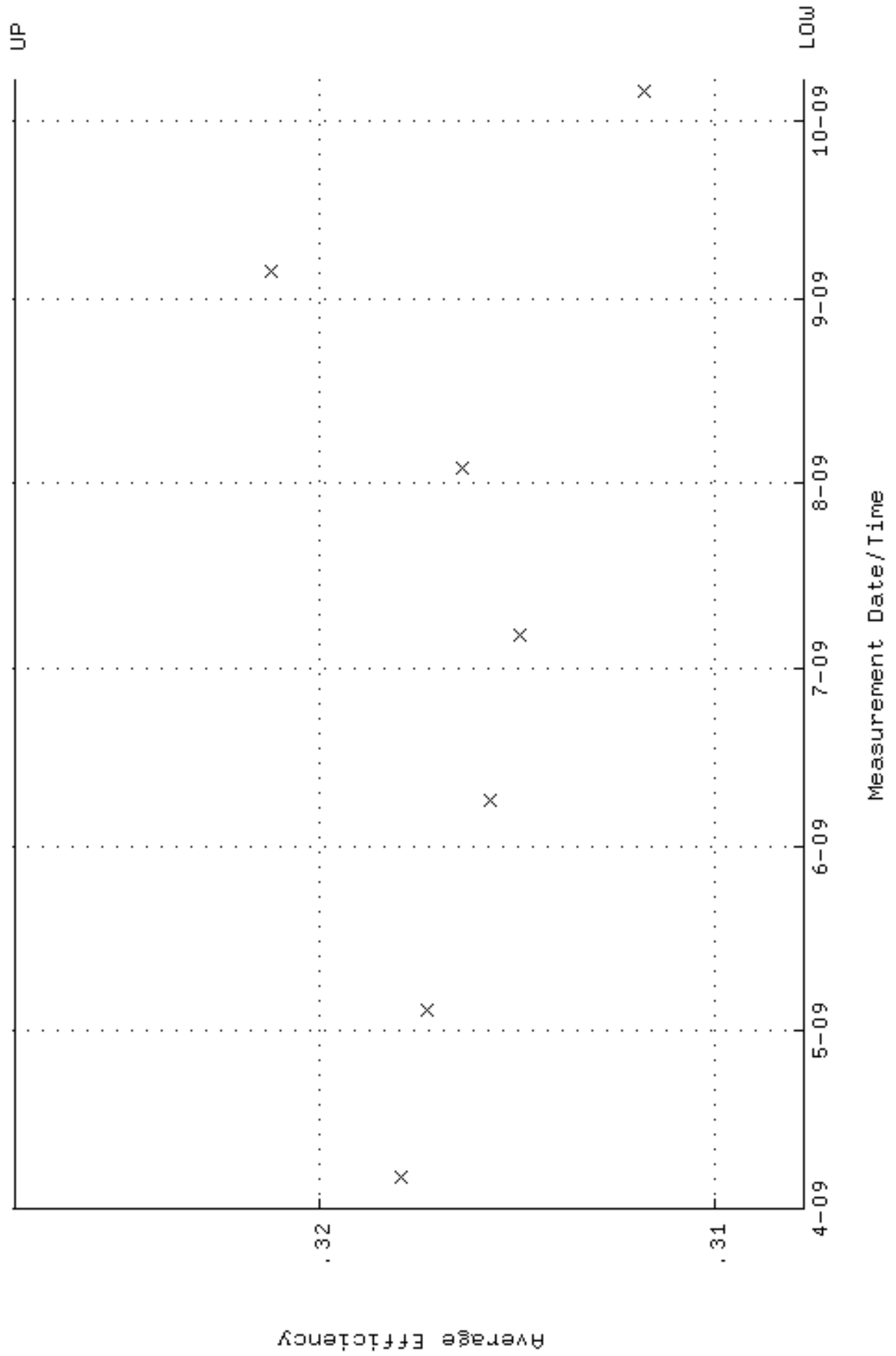
QA filename : DKA100:[ENV_ALPHA.QA.W]w019.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:03 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 84.6167 through 93.5237



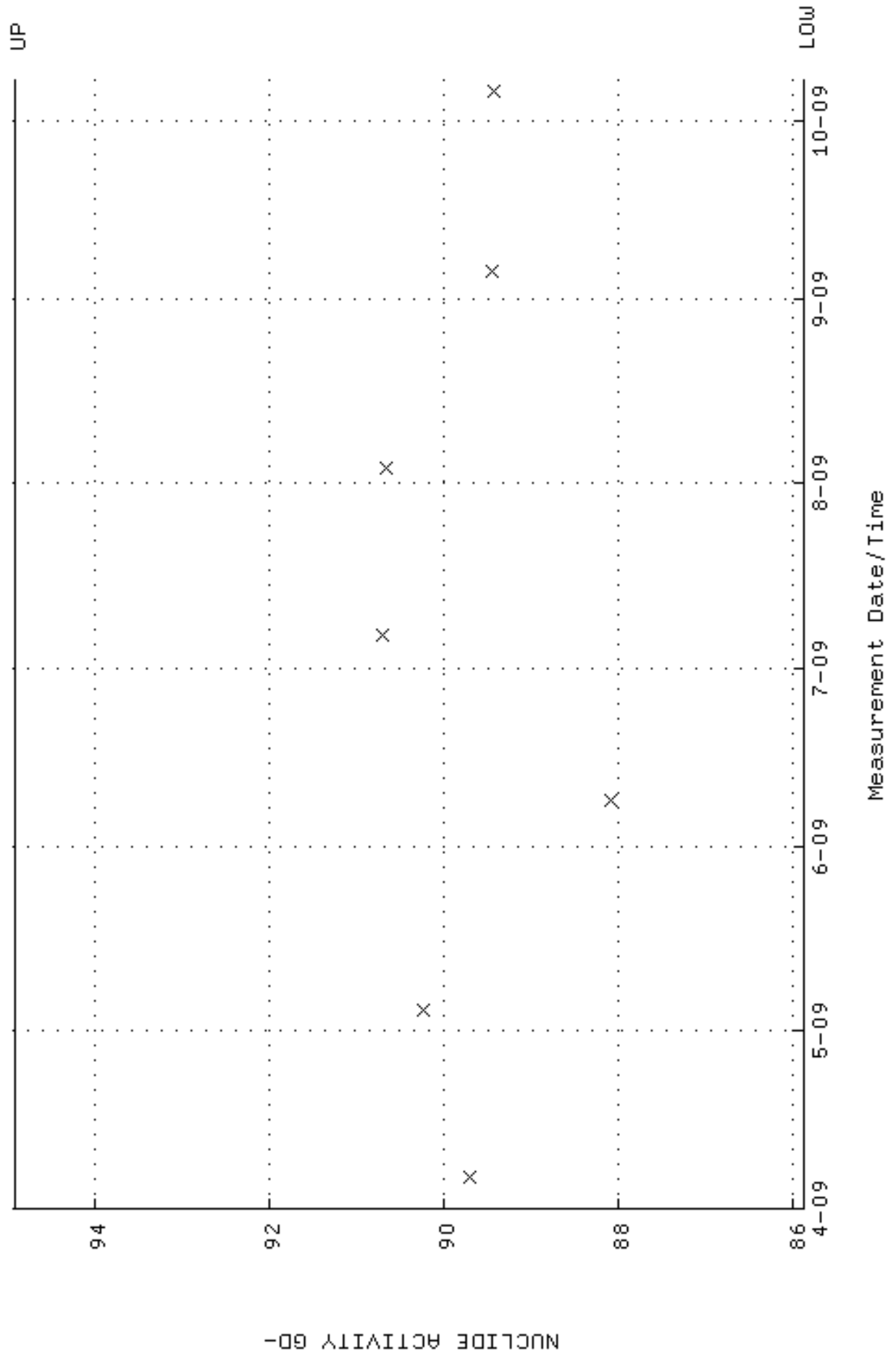
QA filename : DKA100:[ENV_ALPHA.QA.B]B019.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:10 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



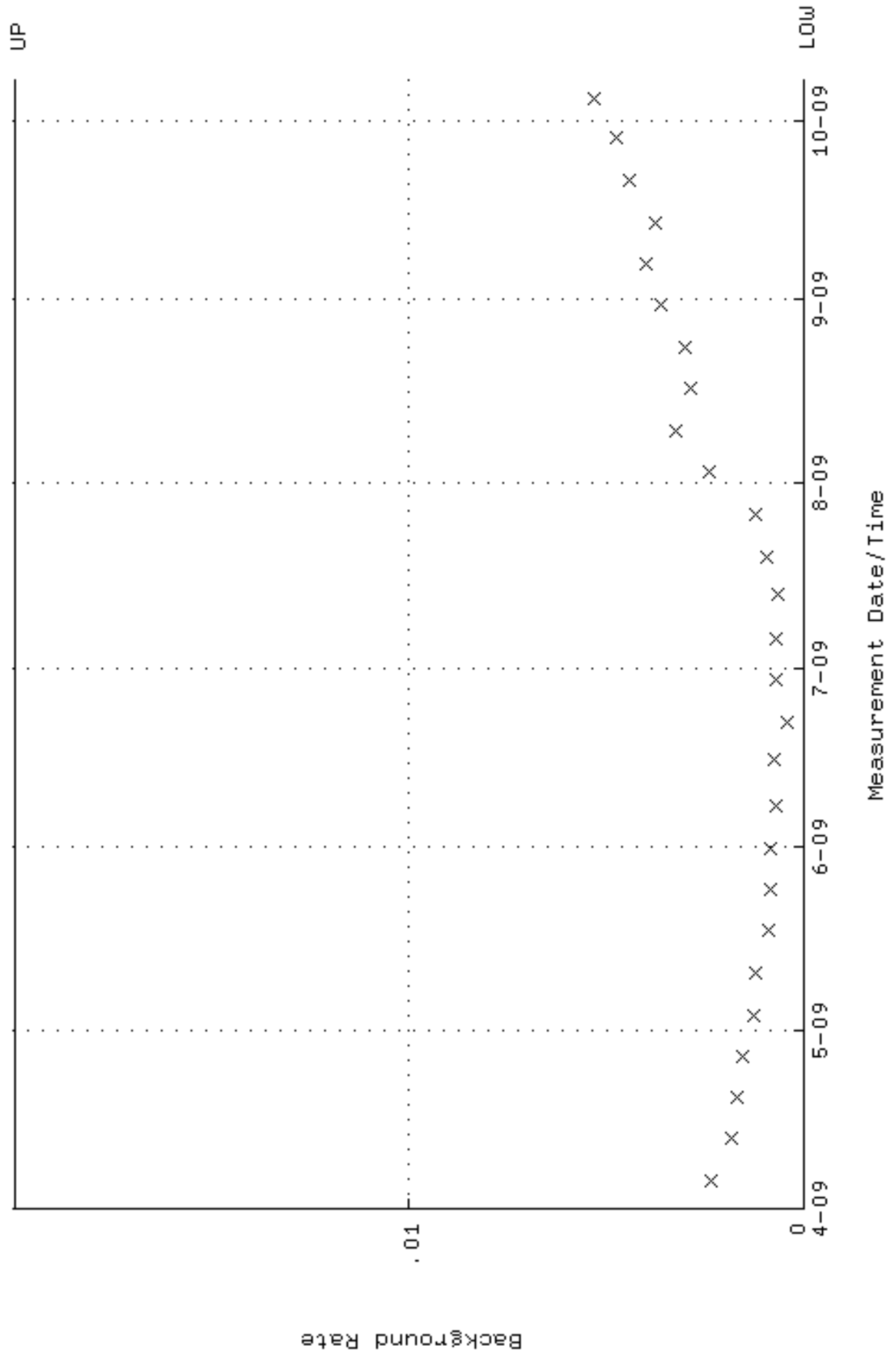
QA filename : DKA100:[ENV_ALPHA.QA.W]W026.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.307728 through 0.327728



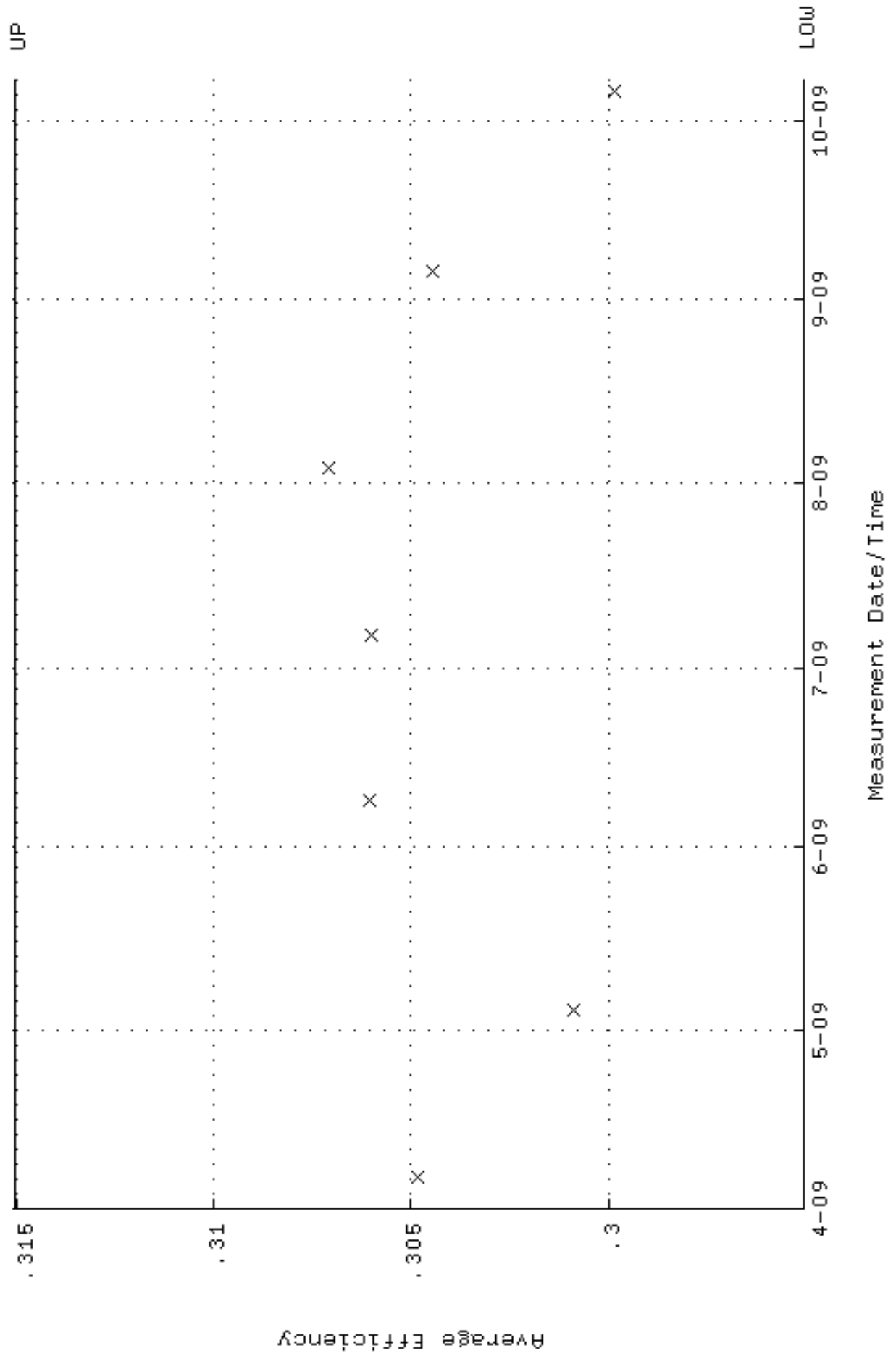
QA filename : DKA100:[ENV_ALPHA.QA.W]W026.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 85.8763 through 94.9159



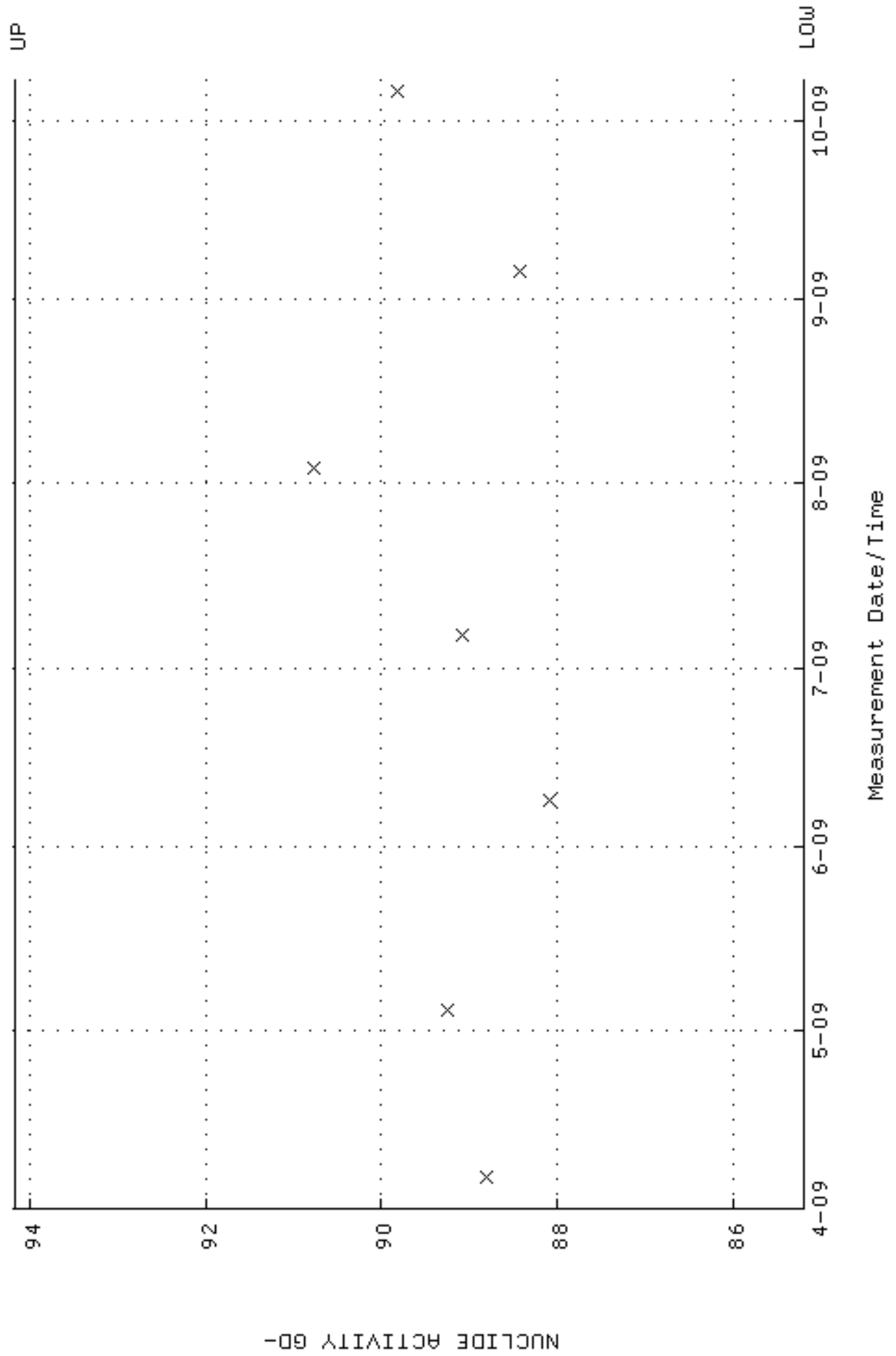
QA filename : DKA100:[ENV_ALPHA.QA.B]B026.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



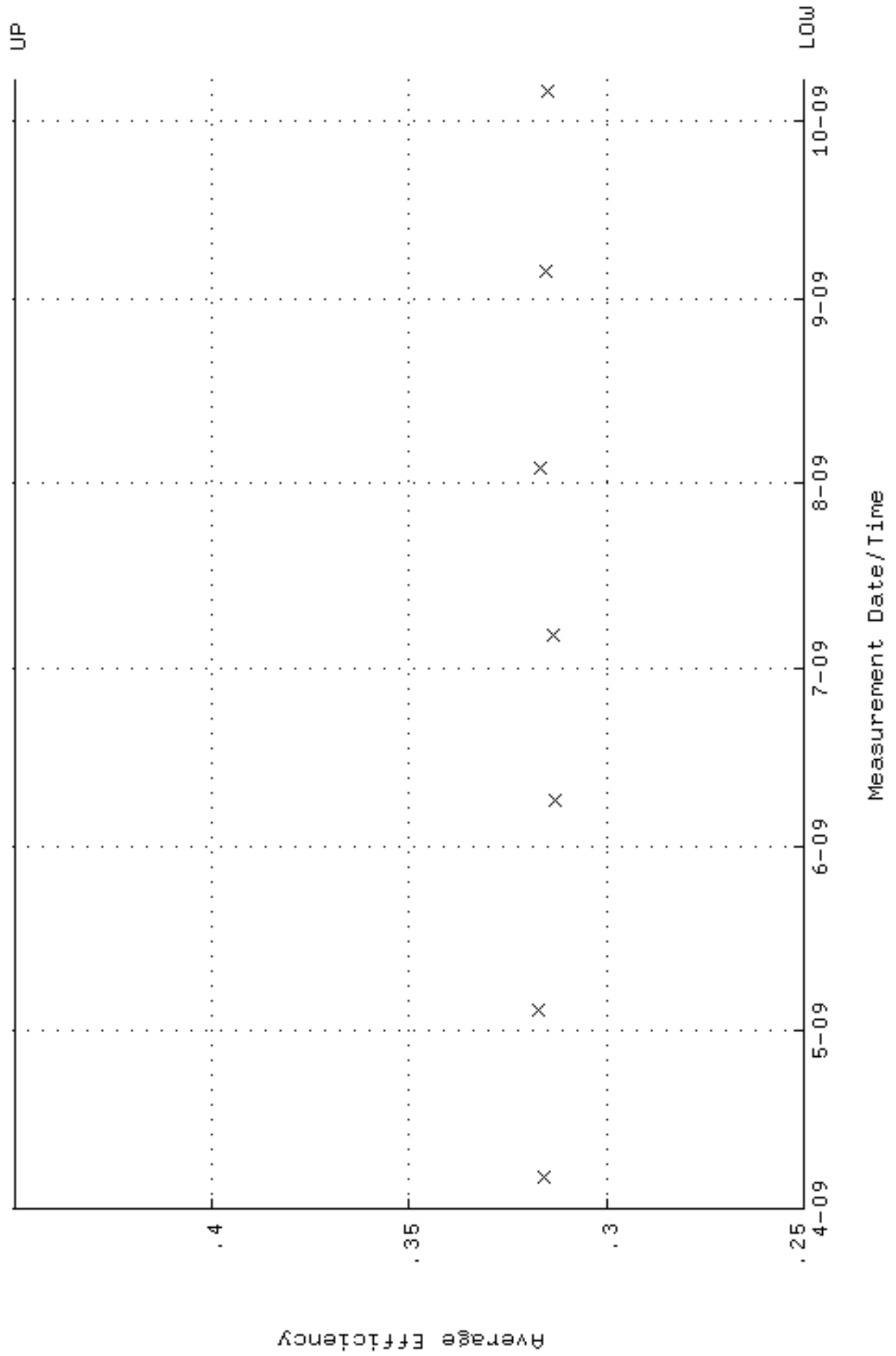
QA filename : DKA100:[ENV_ALPHA.QA.W]W028.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.295040 through 0.315040



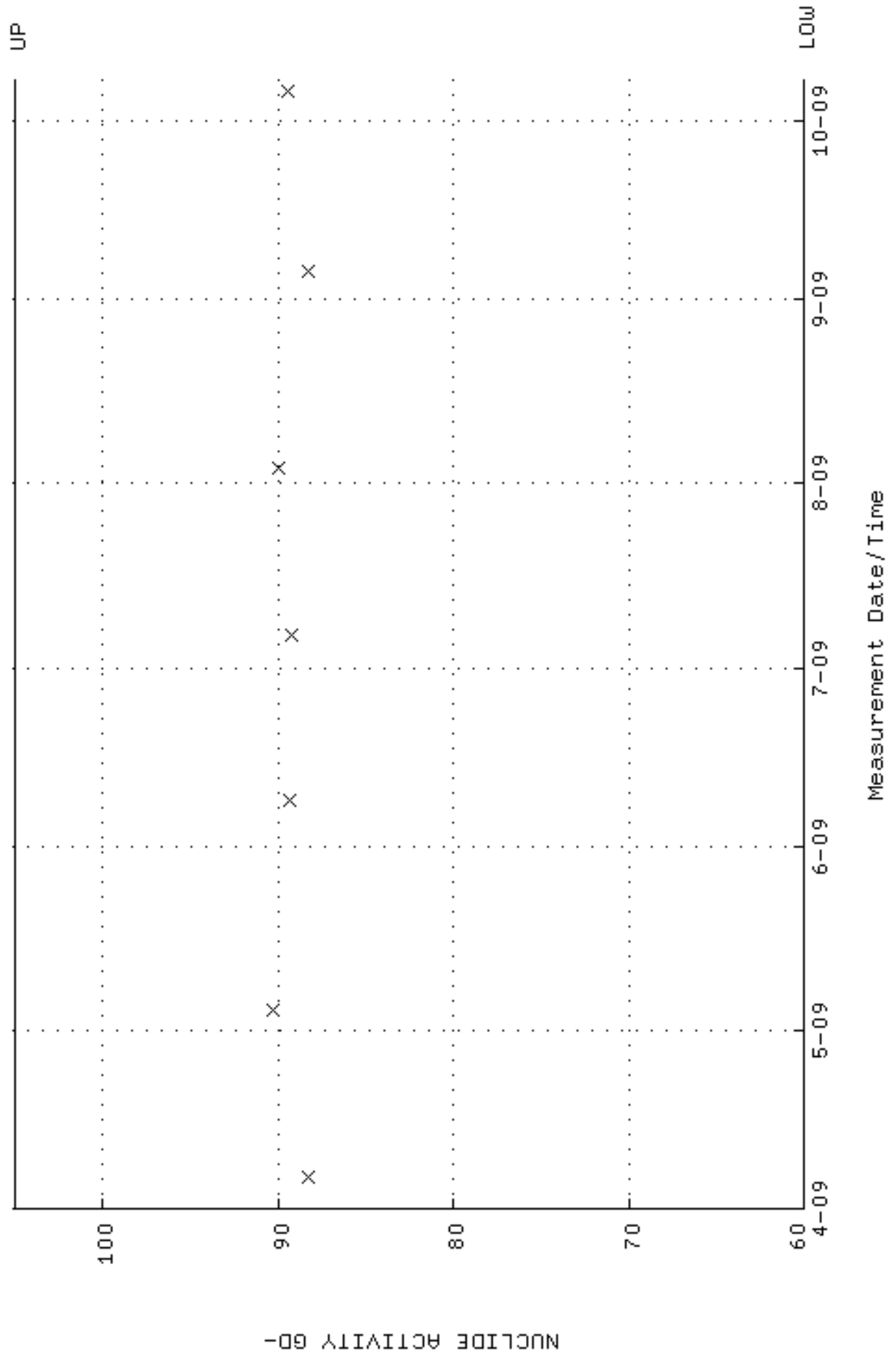
QA filename : DKA100:[ENV_ALPHA.QA.W]W028.QAF;4
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 85.1965 through 94.1645



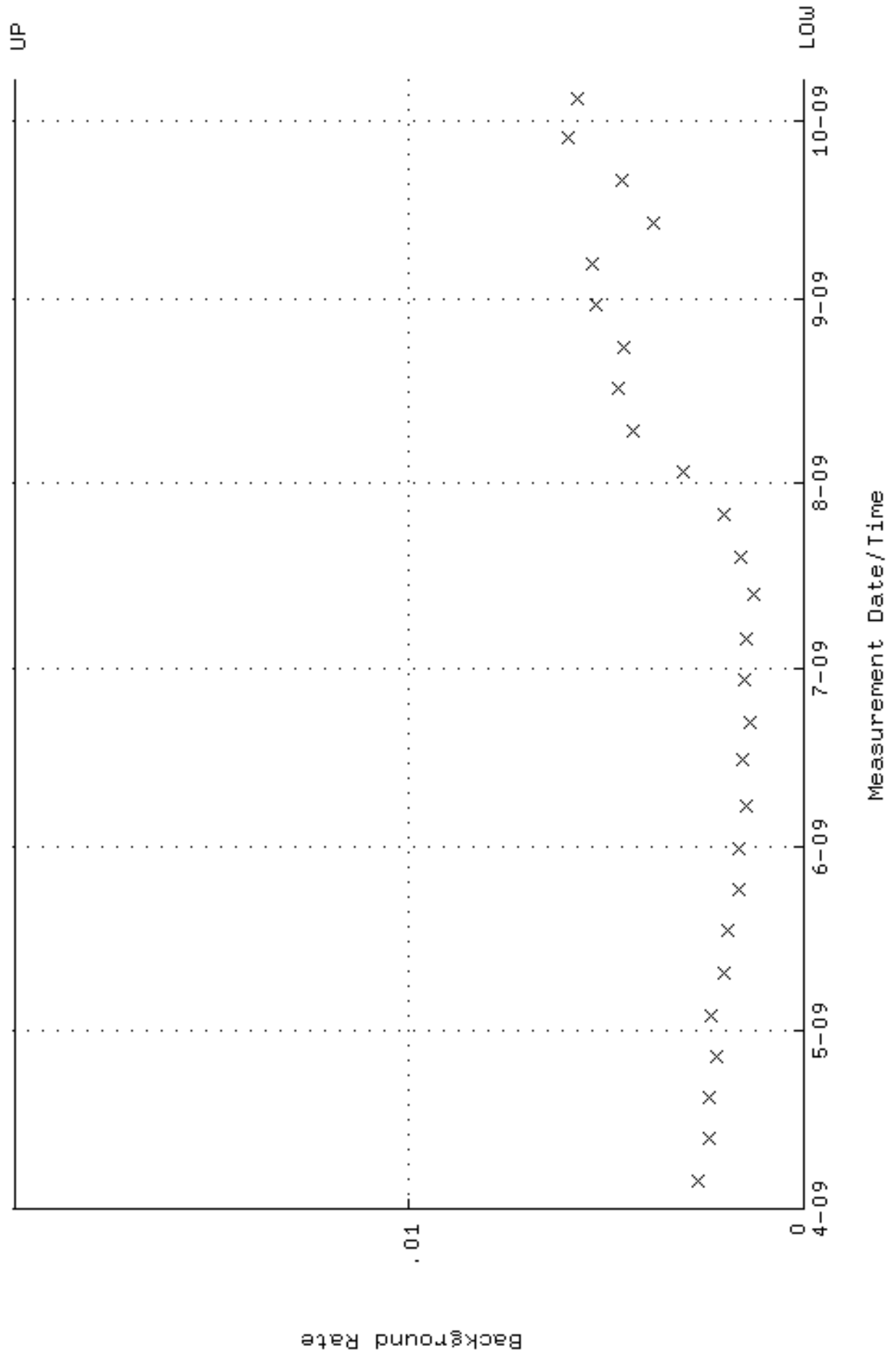
QA filename : DKA100:[ENV_ALPHA.QA.W]W029.QAF;6
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.250000 through 0.450000



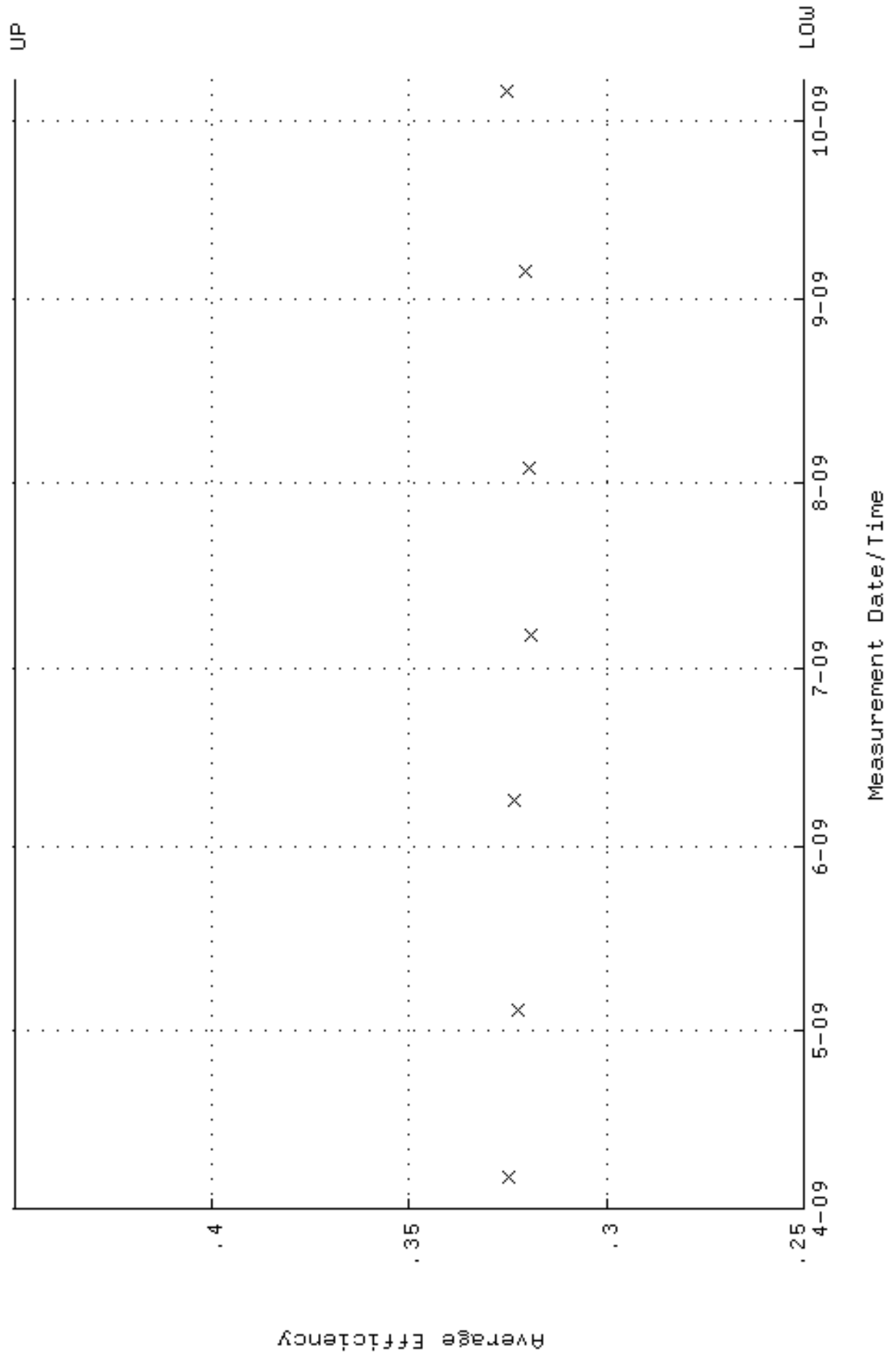
QA filename : DKA100:[ENV_ALPHA.QA.W]W029.QAF;6
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 60.0000 through 105.0000



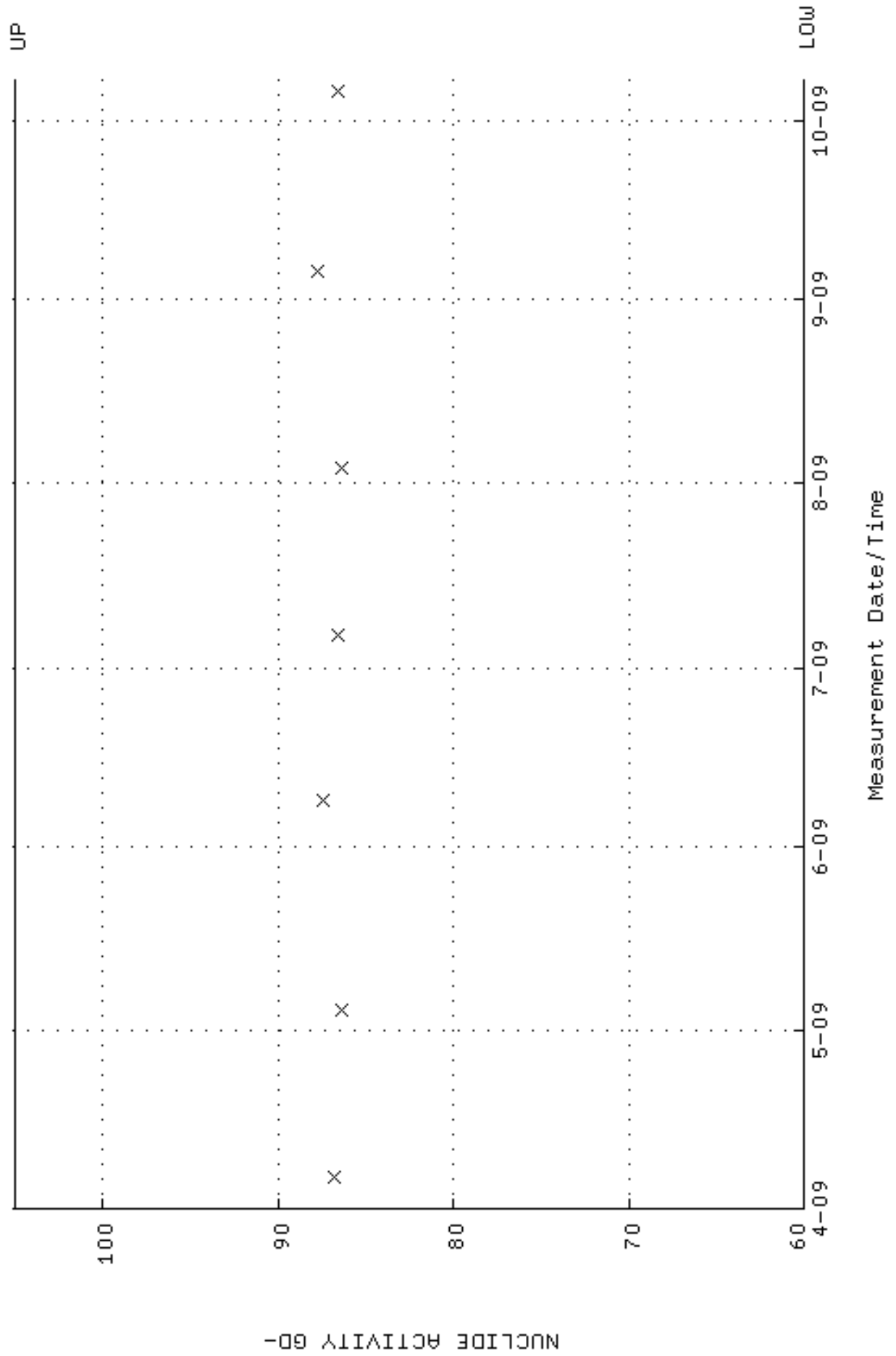
QA filename : DKA100:[ENV_ALPHA.QA.B]B029.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



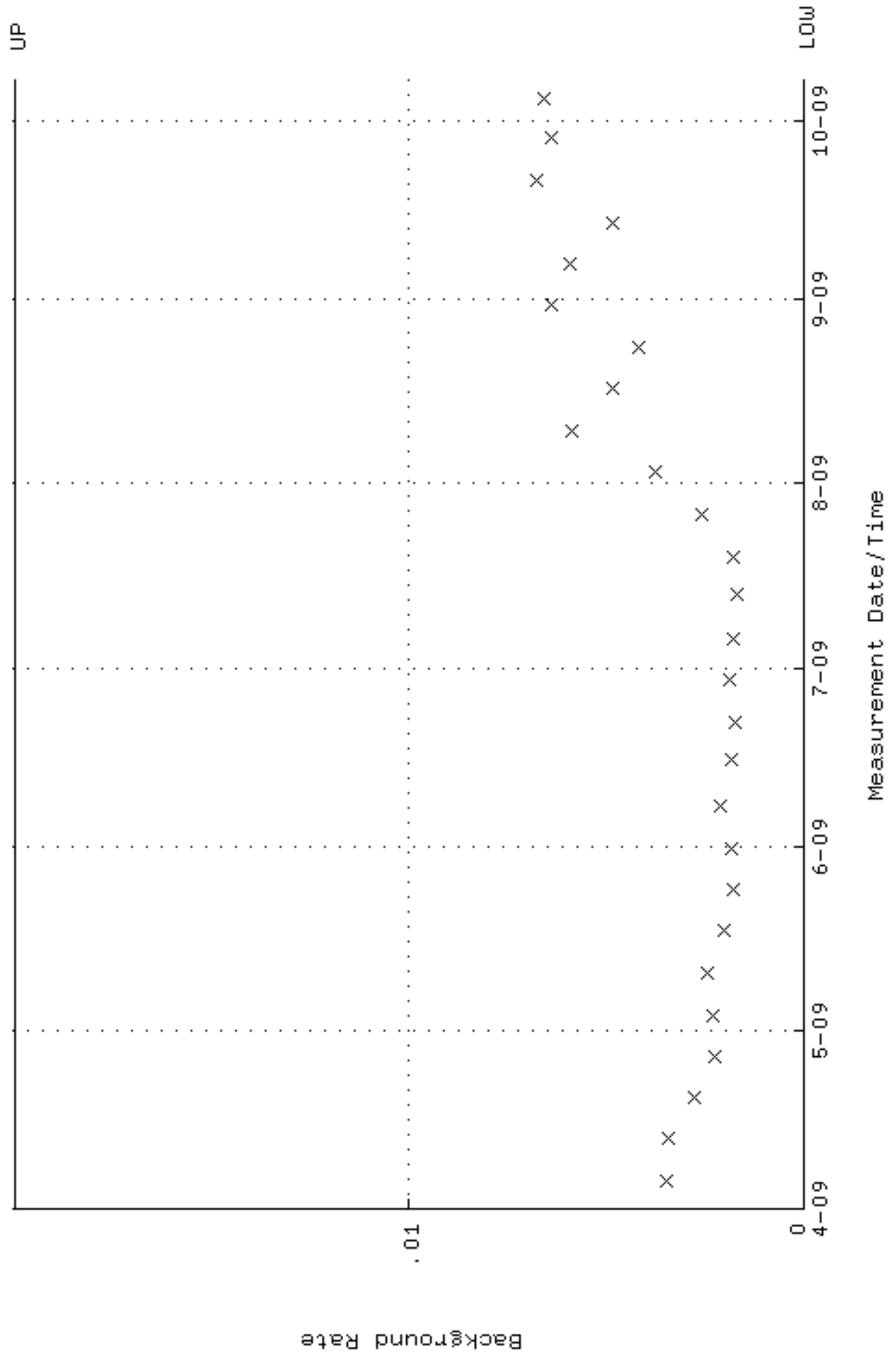
QA filename : DKA100:[ENV_ALPHA.QA.W]W030.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.250000 through 0.450000



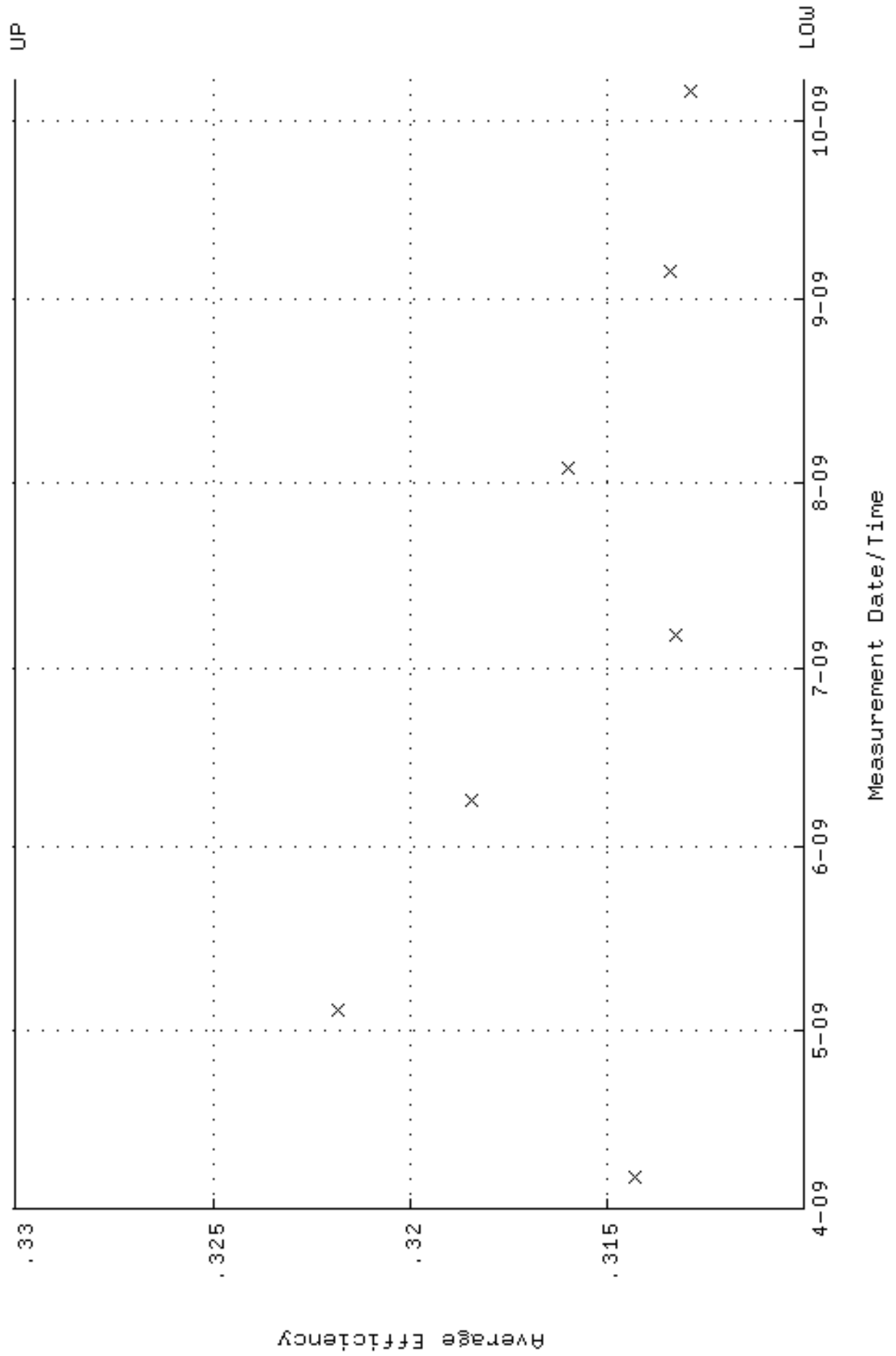
QA filename : DKA100:[ENV_ALPHA.QA.W]W030.QAF;3
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:04 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 60.0000 through 105.0000



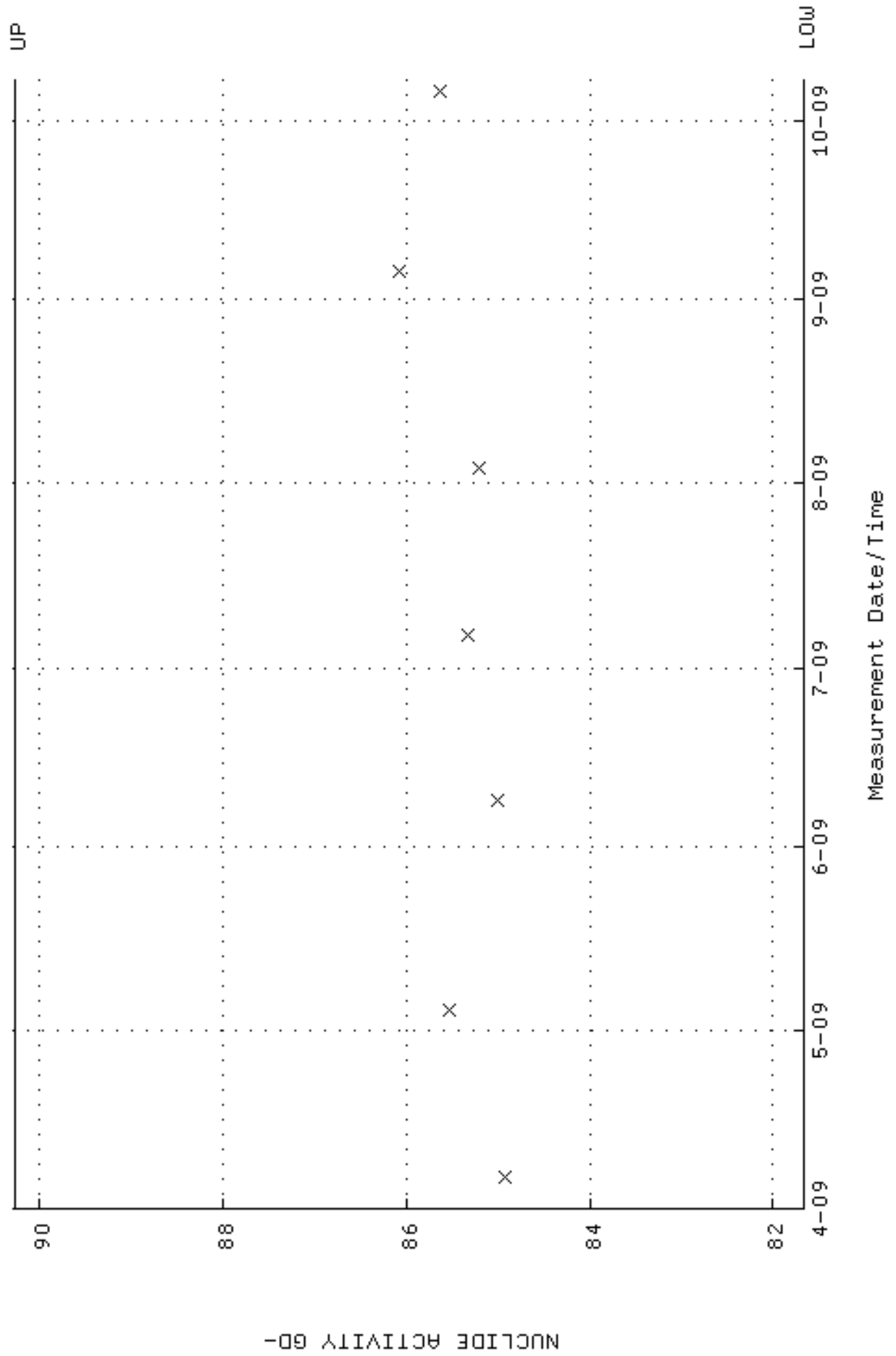
QA filename : DKA100:[ENV_ALPHA.QA.B]B030.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



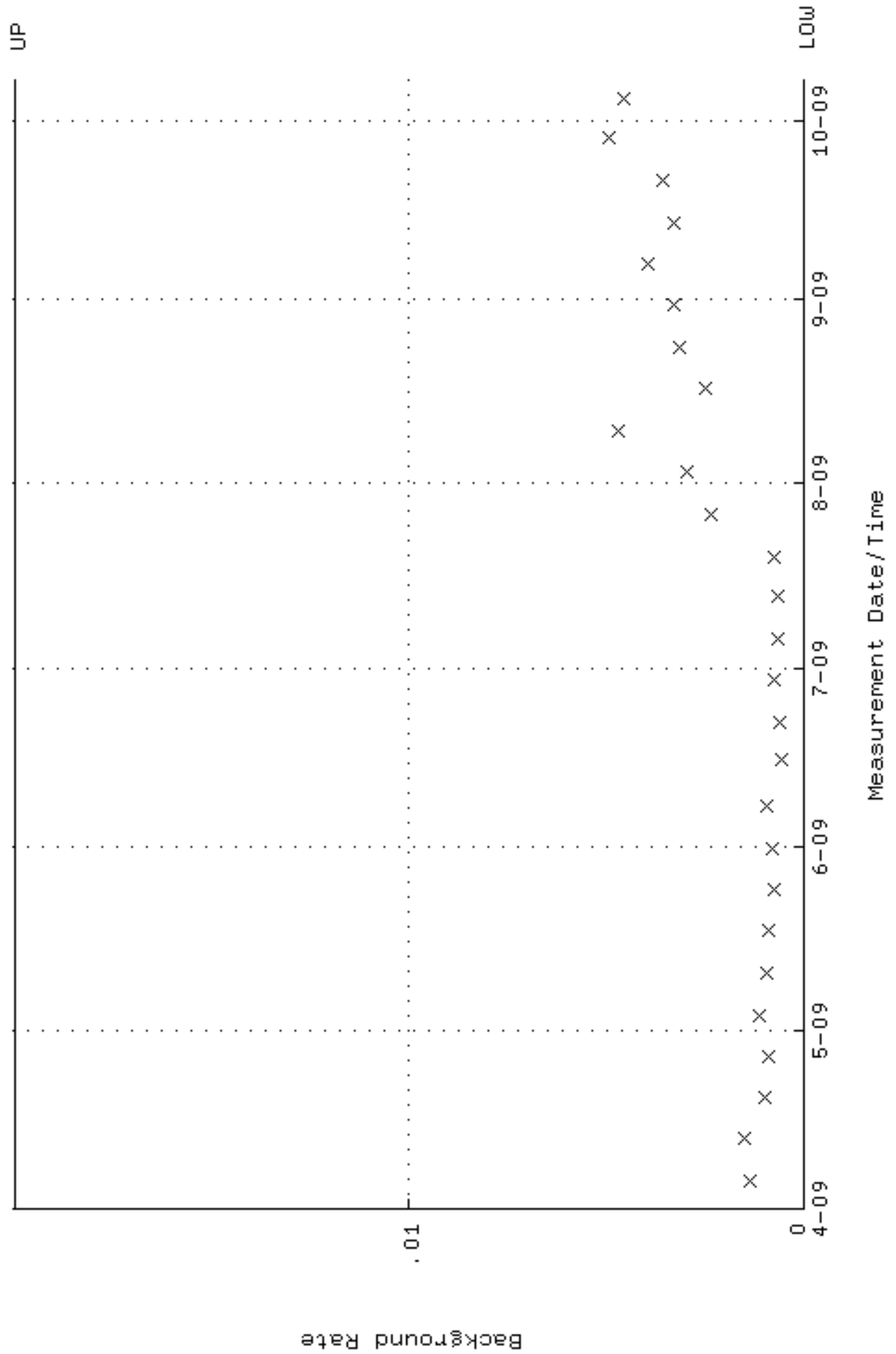
QA filename : DKA100:[ENV_ALPHA.QA.W]W033.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.310023 through 0.330023



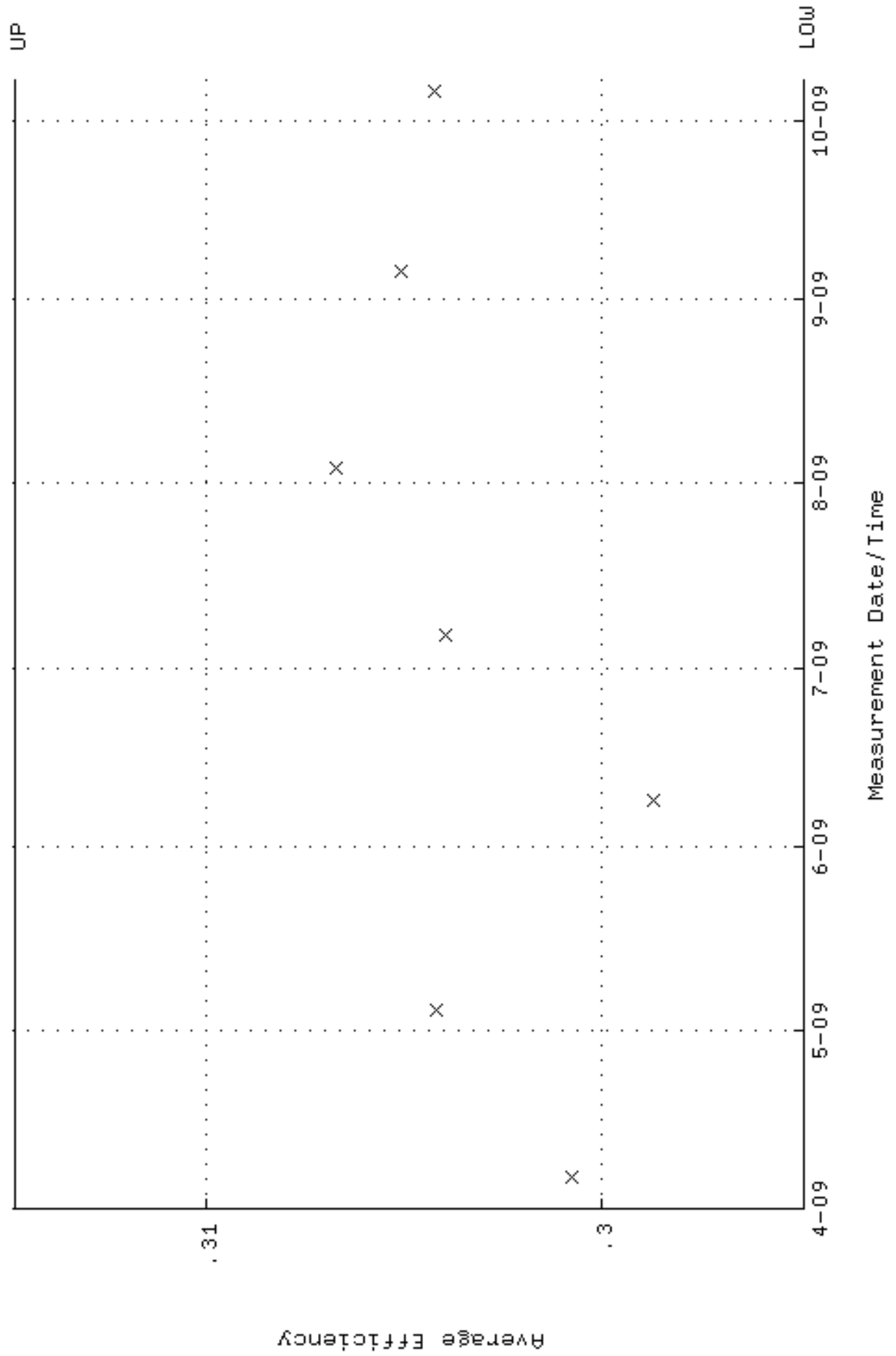
QA filename : DKA100:[ENV_ALPHA.QA.W]W033.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 81.6649 through 90.2613



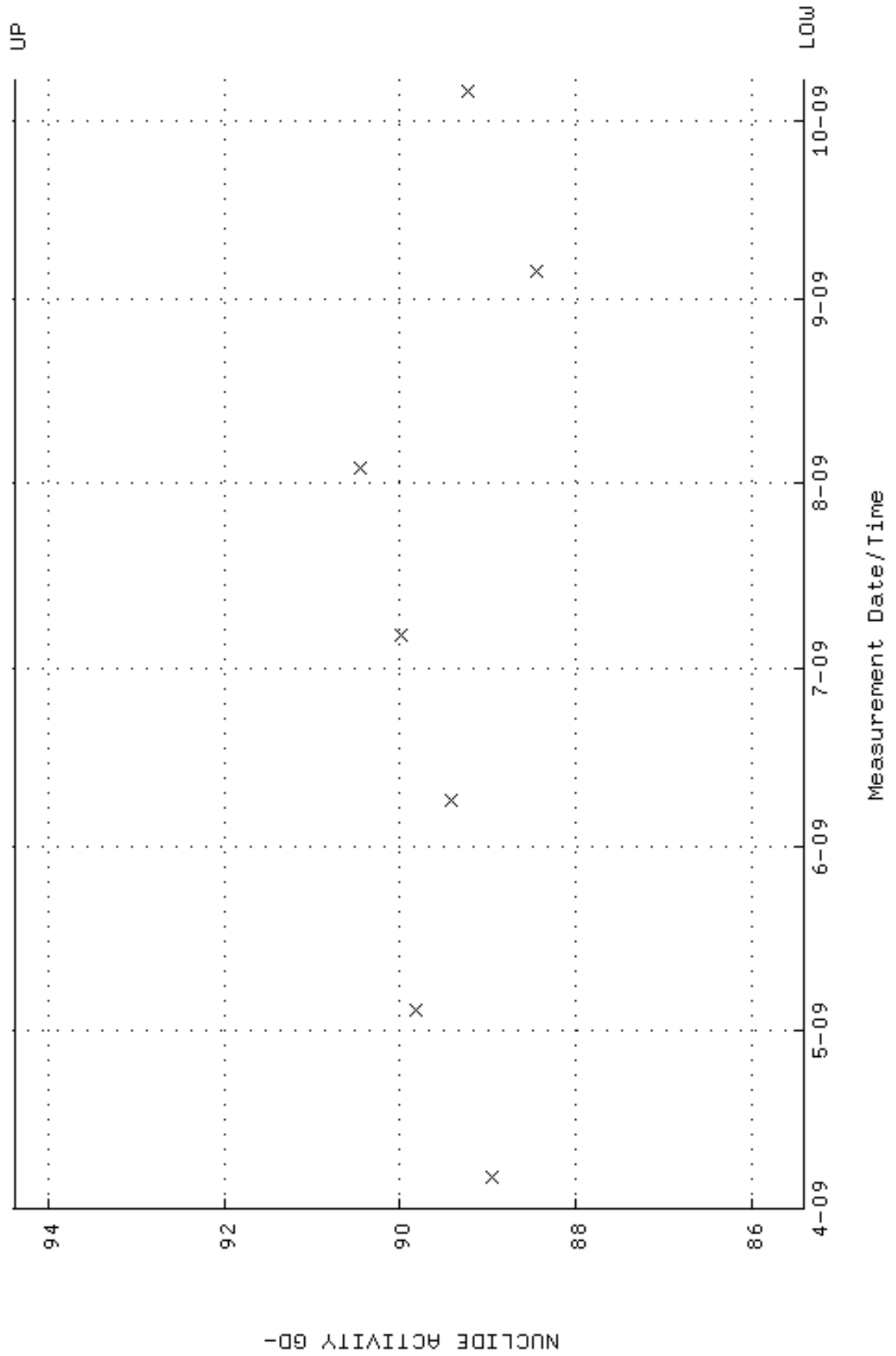
QA filename : DKA100:[ENV_ALPHA.QA.B]B033.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



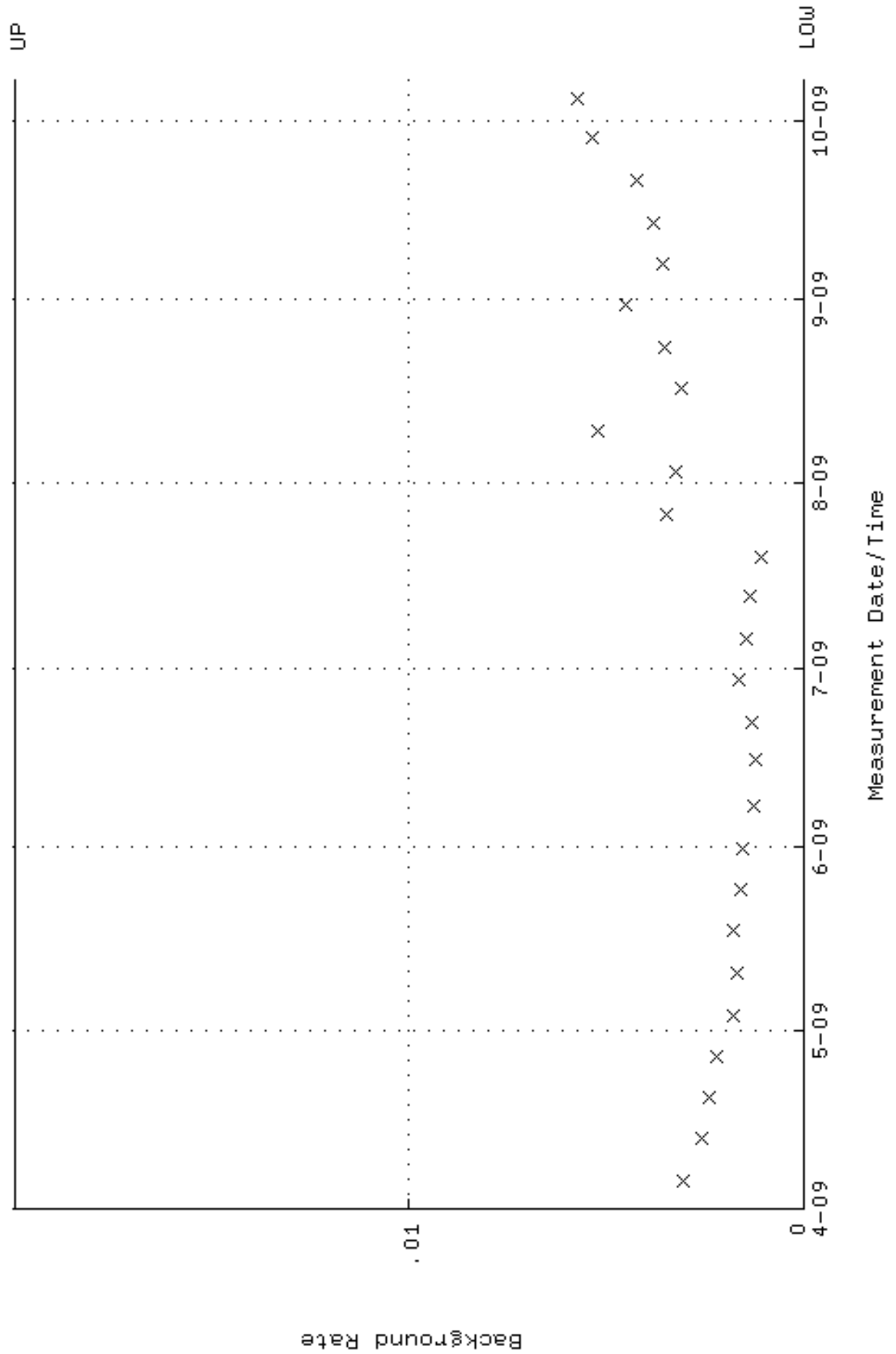
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.294859 through 0.314859



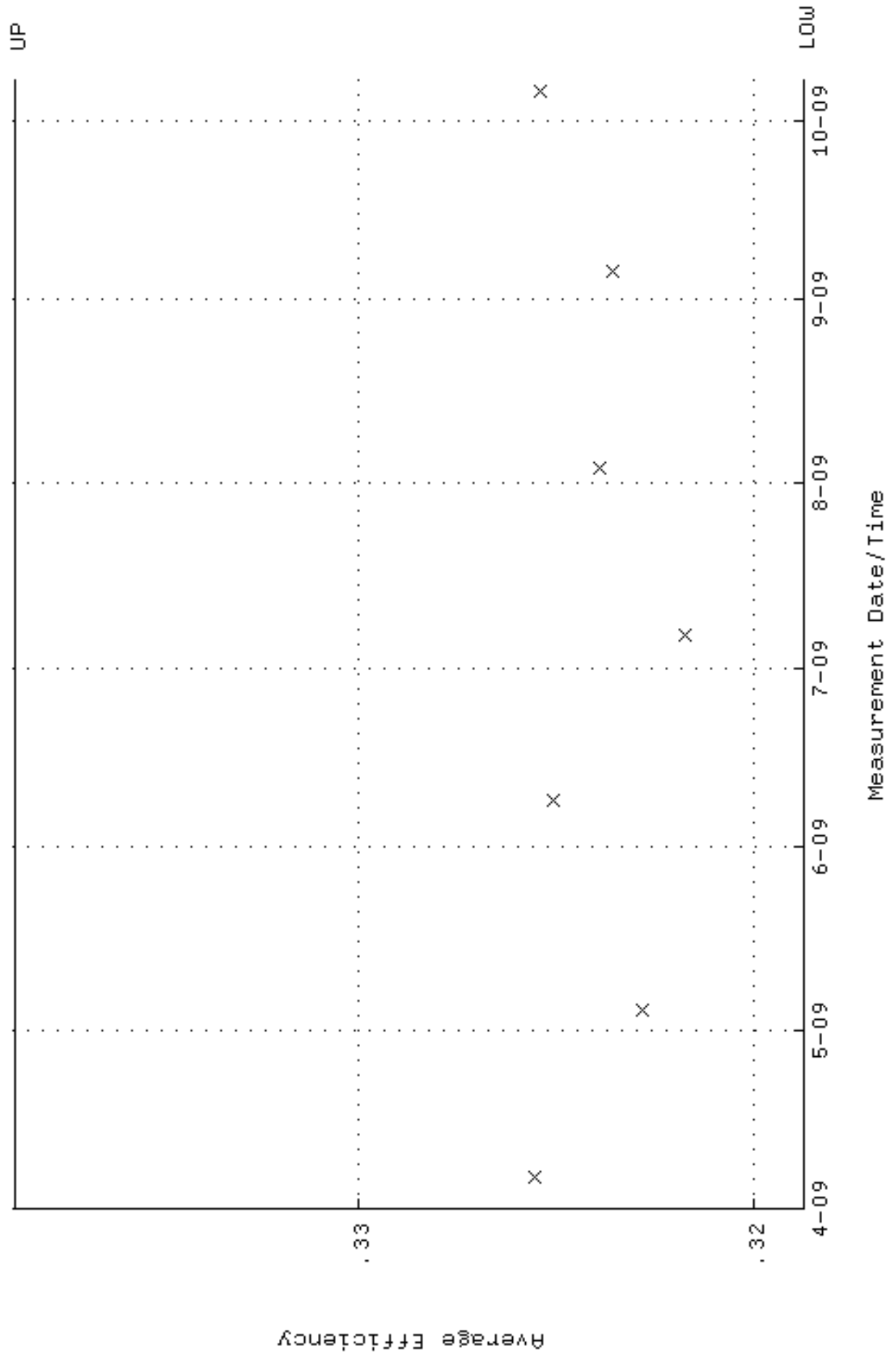
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 85.3984 through 94.3878



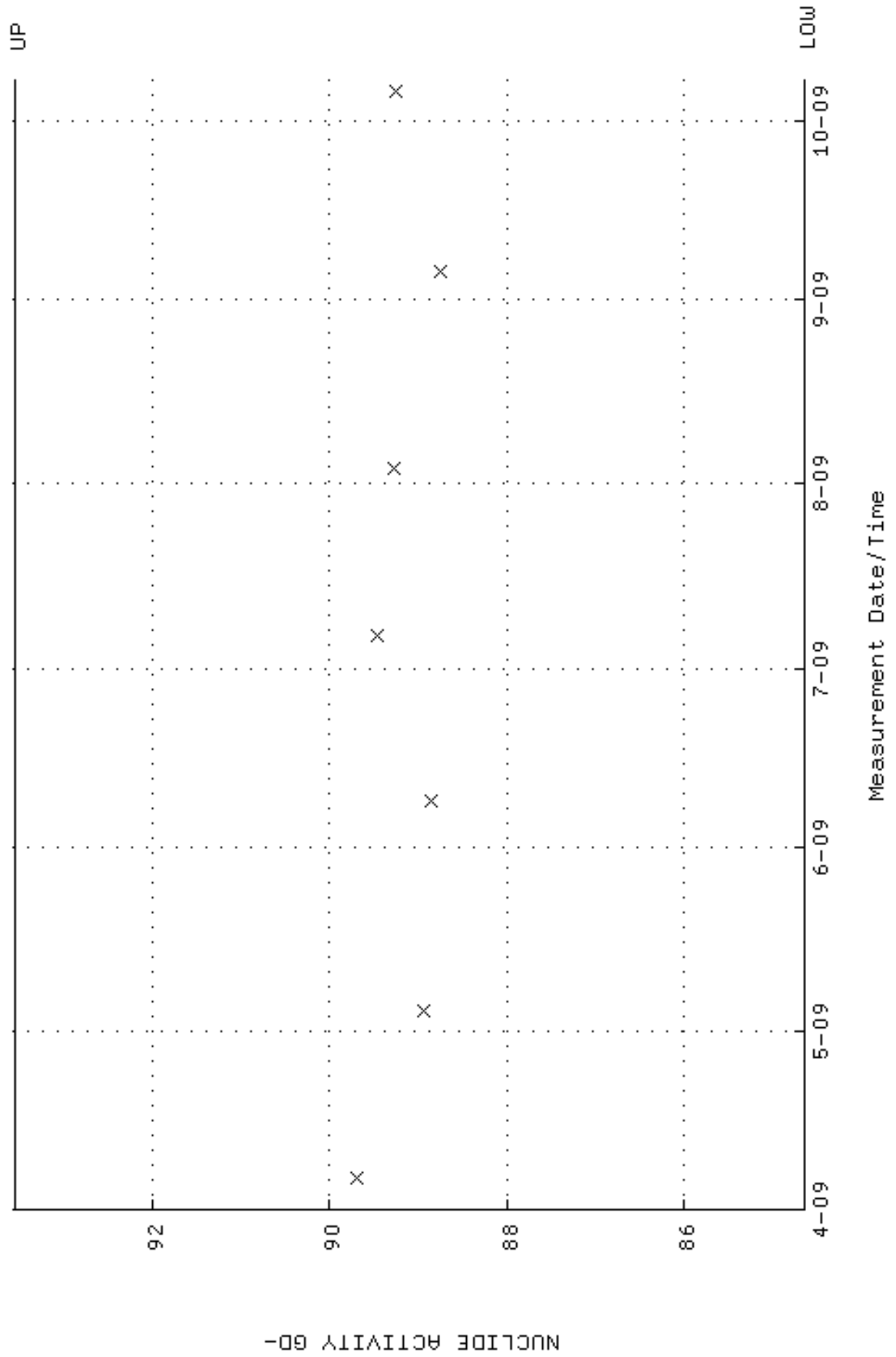
QA filename : DKA100:[ENV_ALPHA.QA.B]B035.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



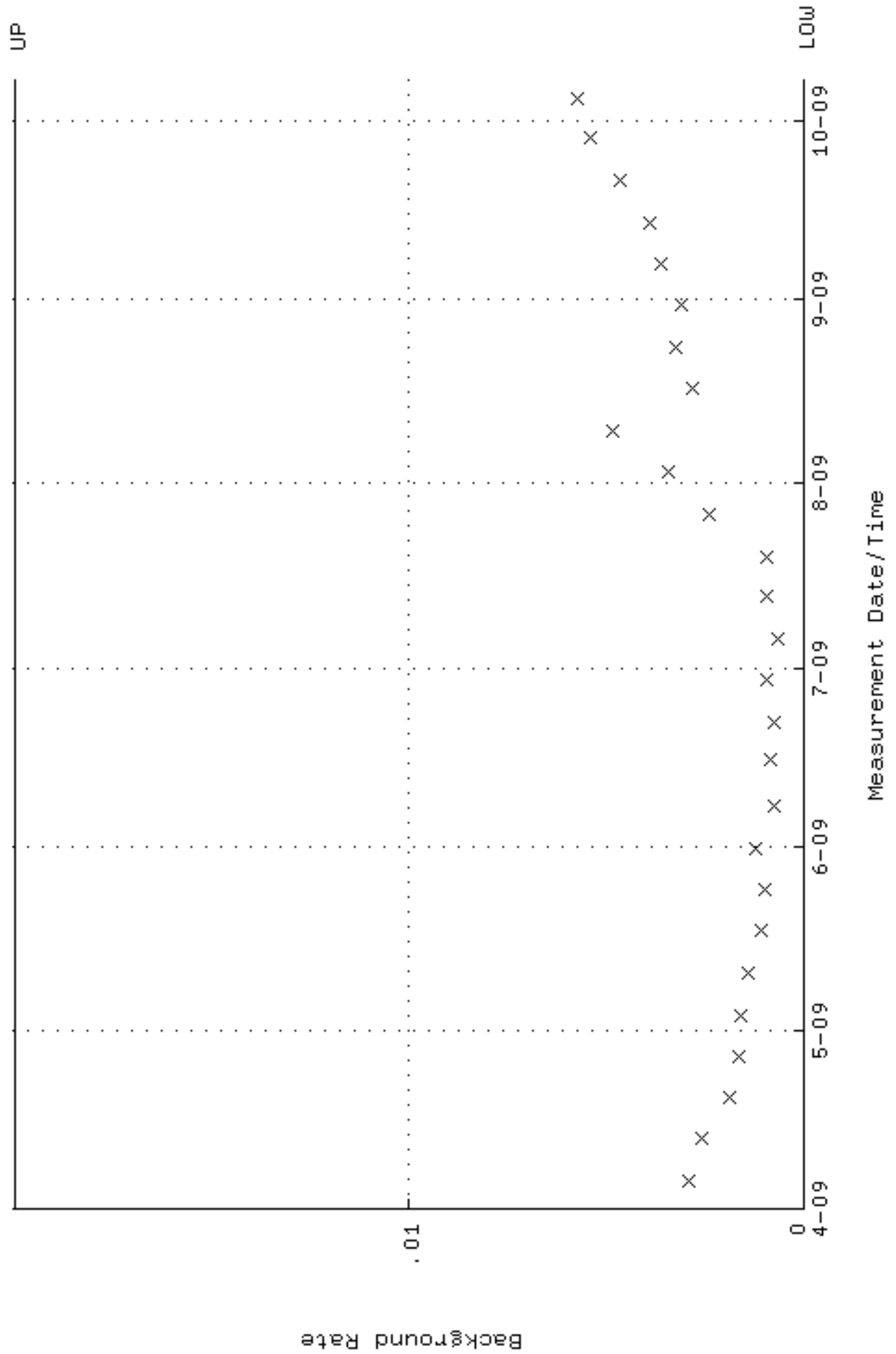
QA filename : DKA100:[ENV_ALPHA.QA.W]W036.QAF;2
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.318717 through 0.338717



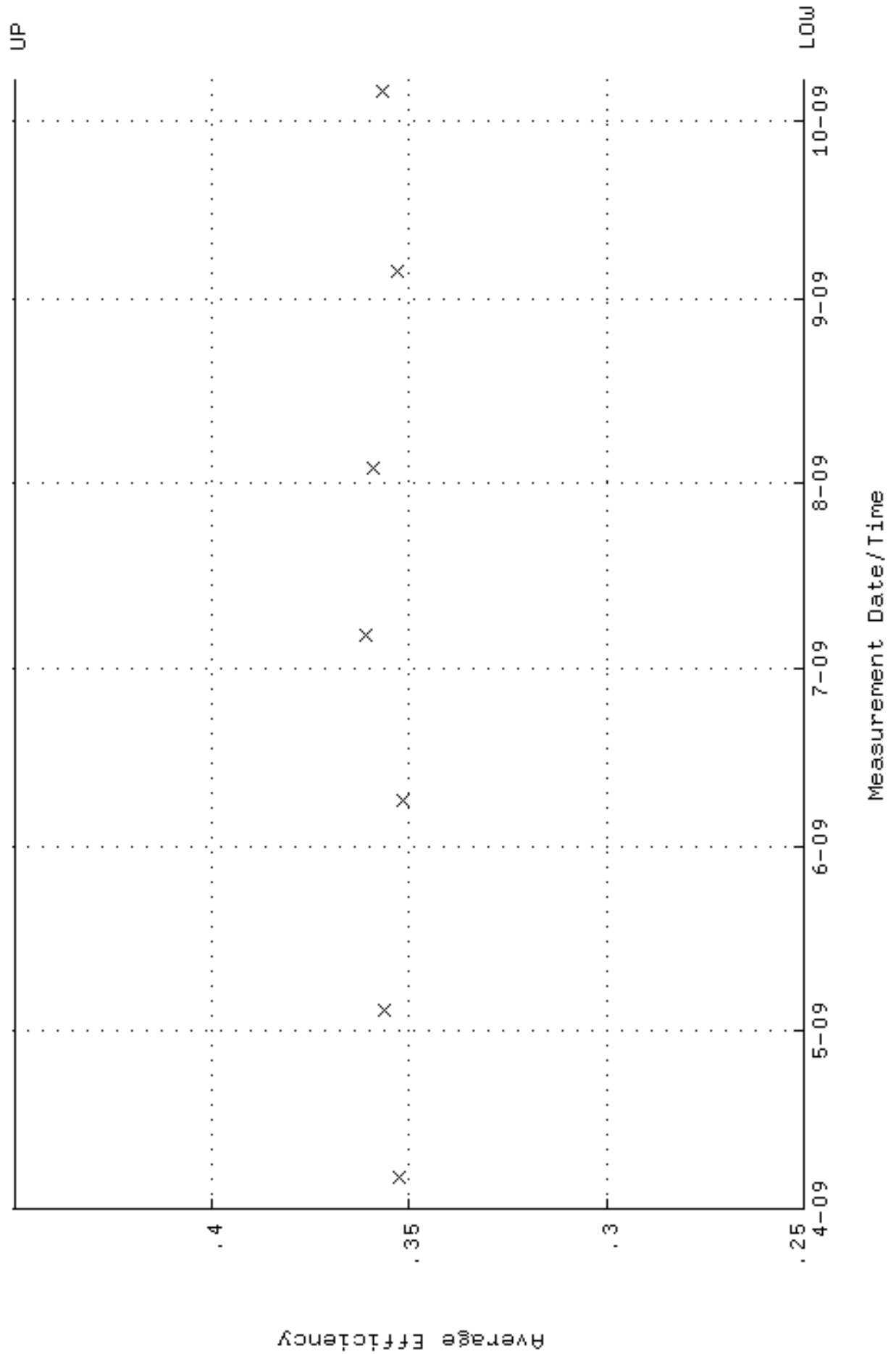
QA filename : DKA100:[ENV_ALPHA.QA.W]w036.QAF;2
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:05 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 84.6422 through 93.5518



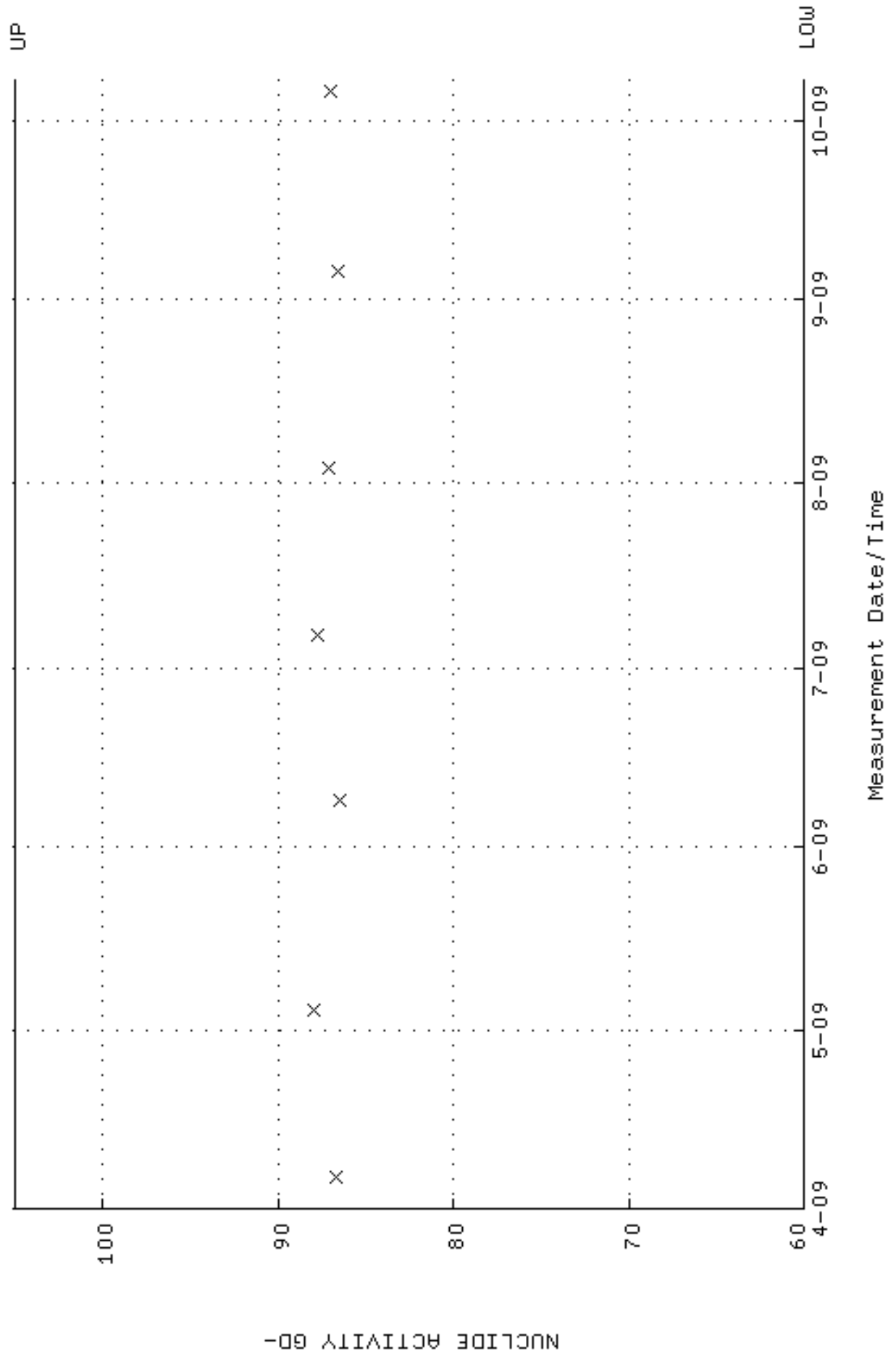
QA filename : DKA100:[ENV_ALPHA.QA.B]B036.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:12 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



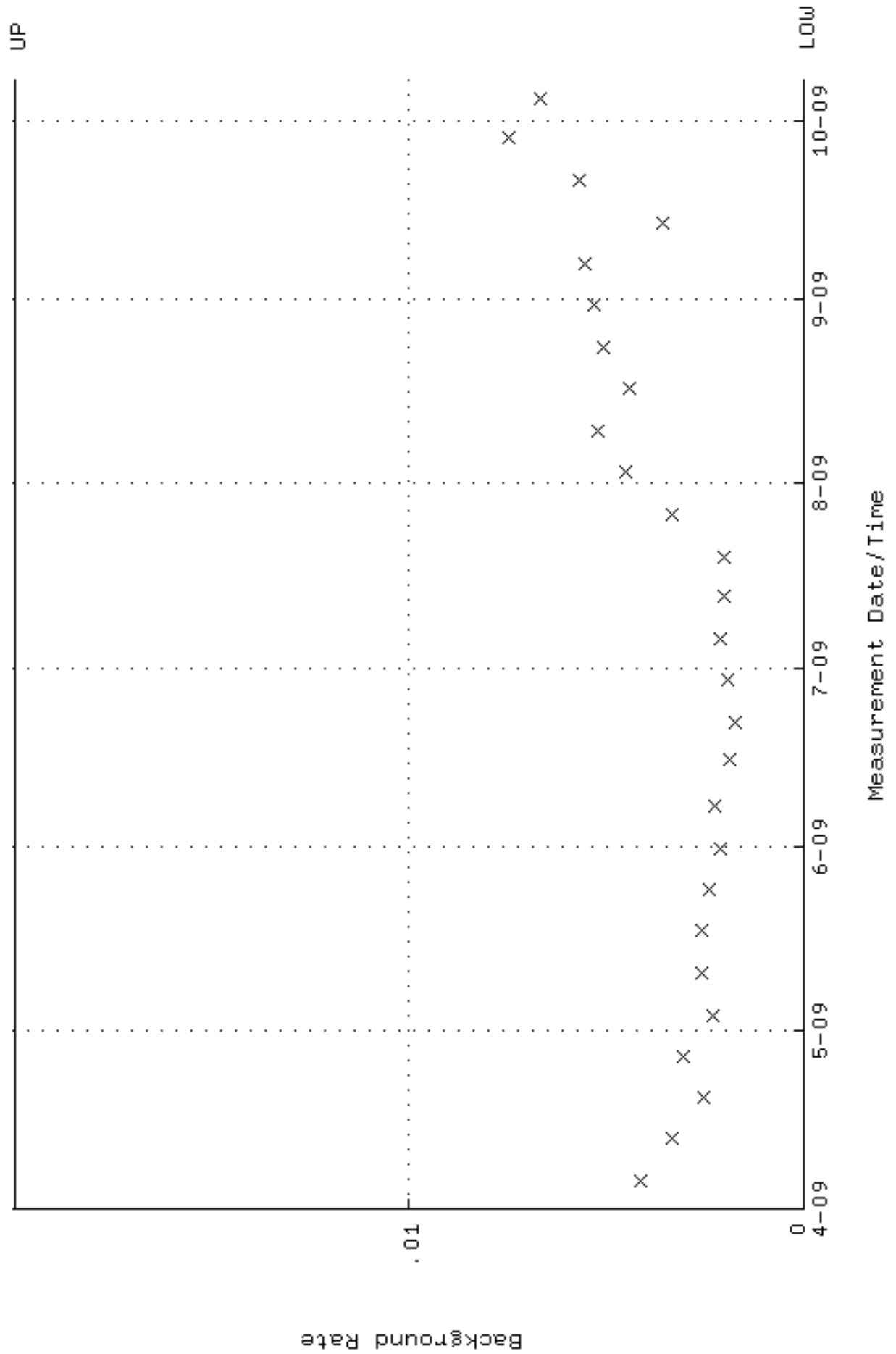
QA filename : DKA100:[ENV_ALPHA.QA.W]W037.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.250000 through 0.450000



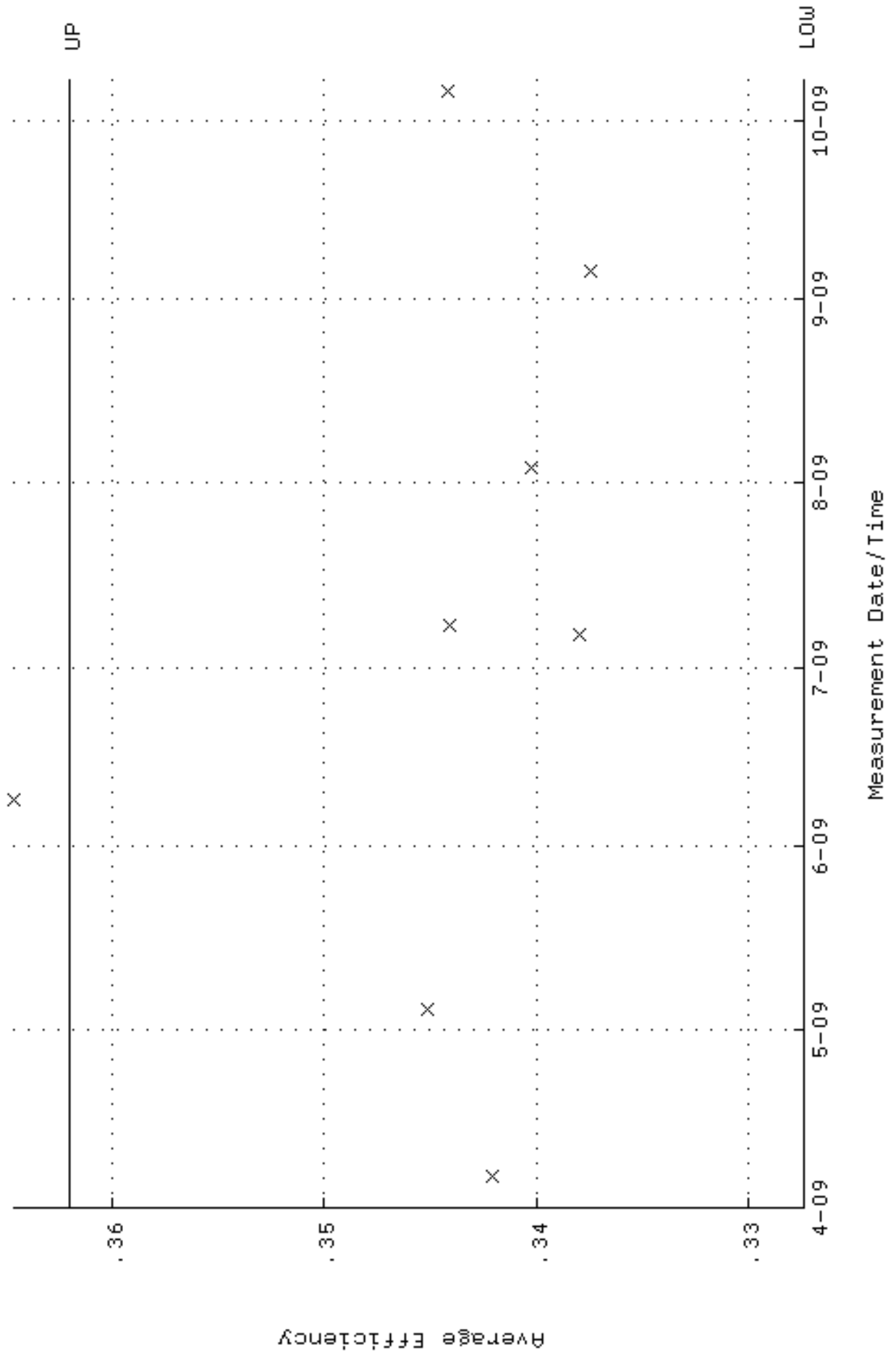
QA filename : DKA100:[ENV_ALPHA.QA.W]W037.QAF;4
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 60.0000 through 105.0000



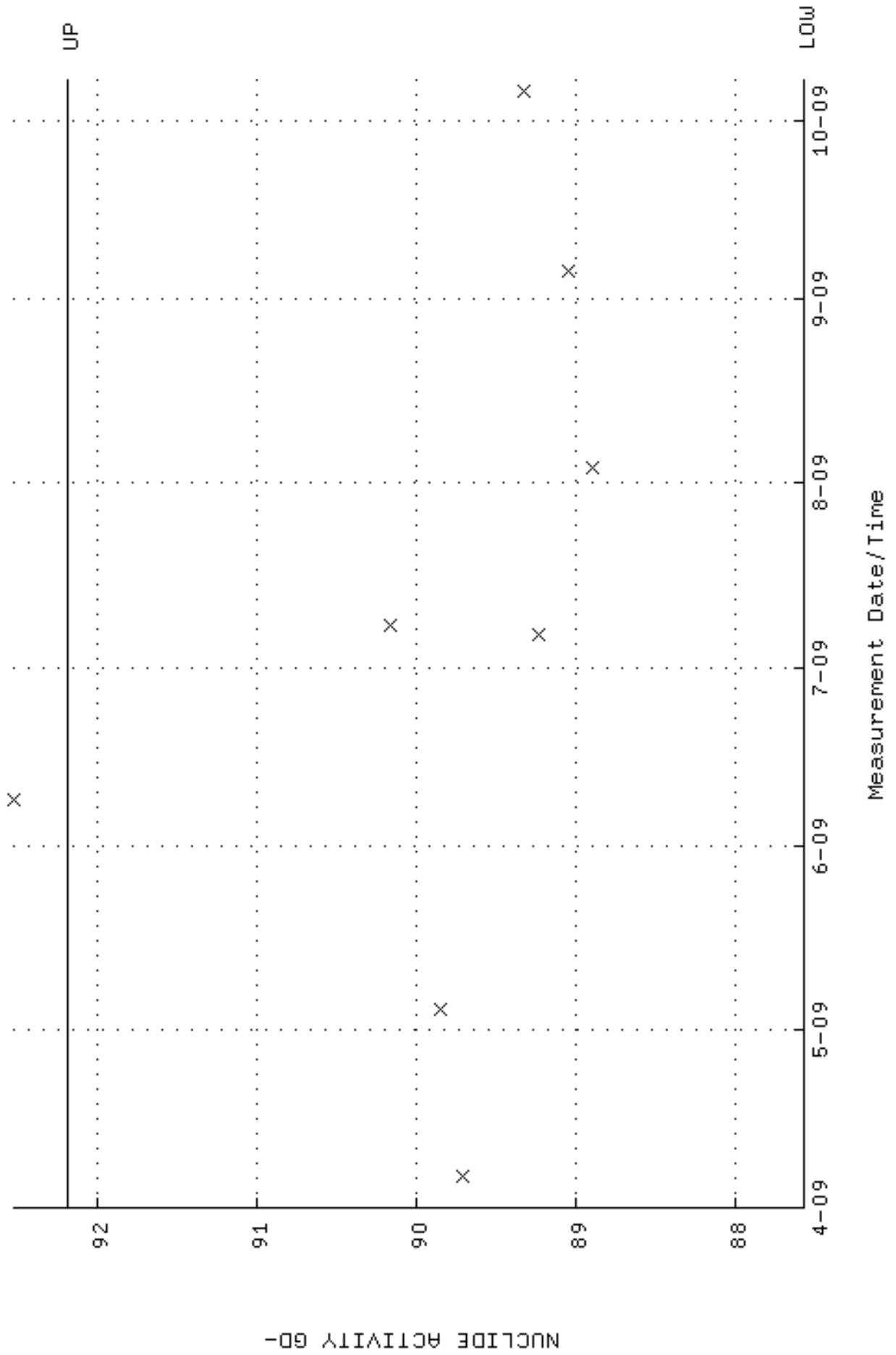
QA filename : DKA100:[ENV_ALPHA.QA.B]B037.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:13 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



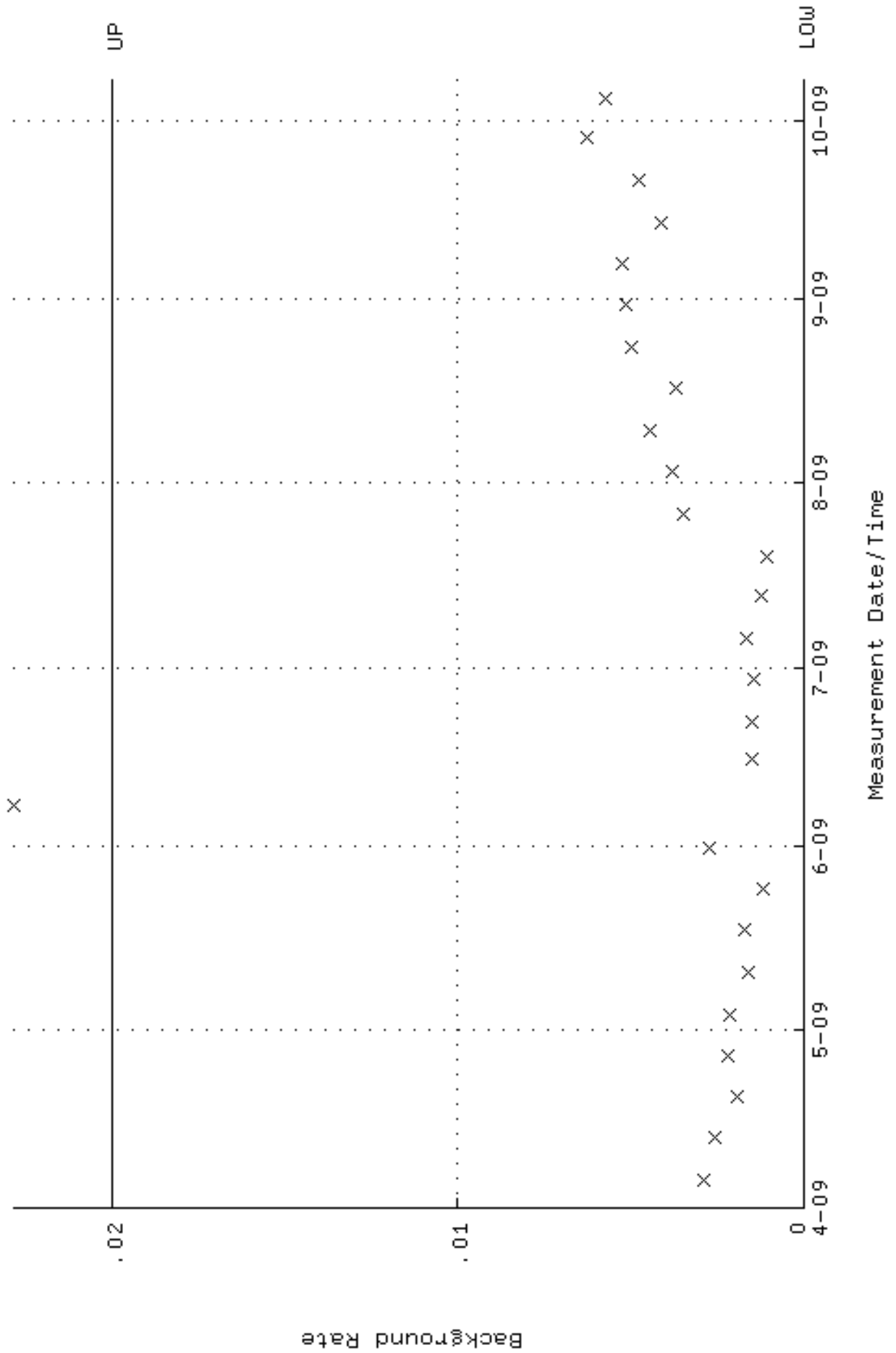
QA filename : DKA100:[ENV_ALPHA.QA.W]W038.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.327380 through 0.362086



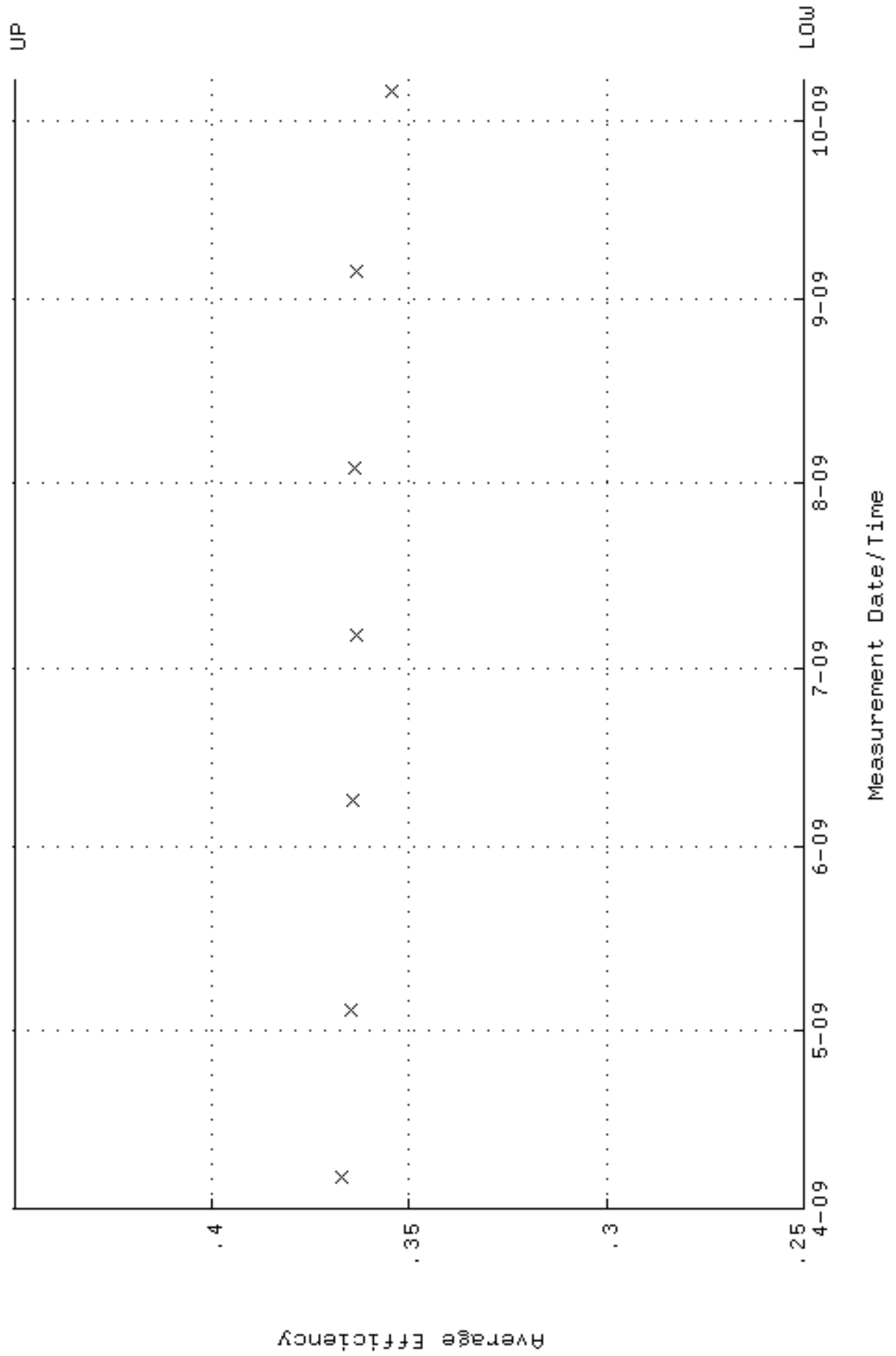
QA filename : DKA100:[ENV_ALPHA.QA.W]W038.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 87.5715 through 92.1899



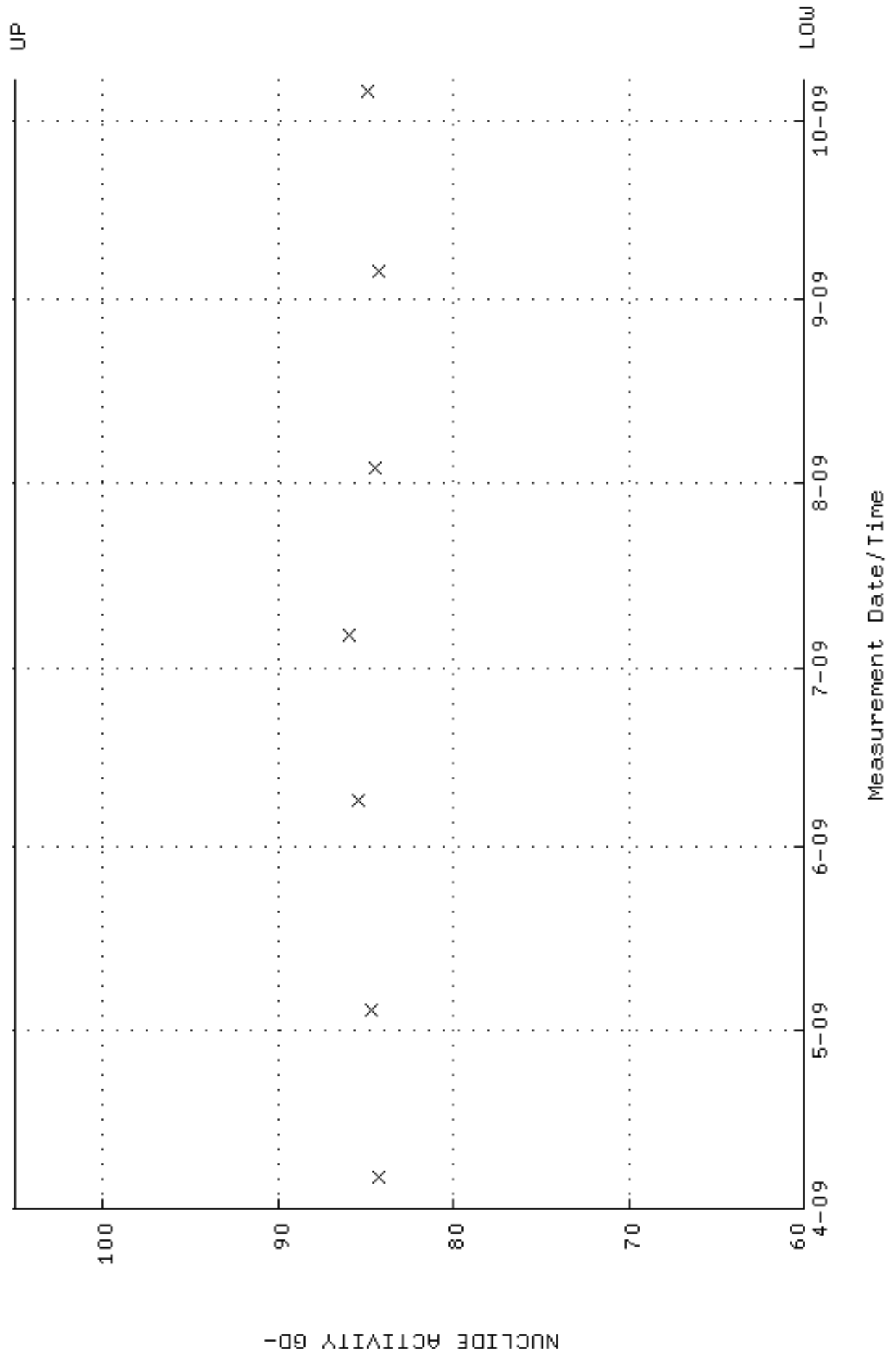
QA filename : DKA100:[ENV_ALPHA.QA.B]B038.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:13 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



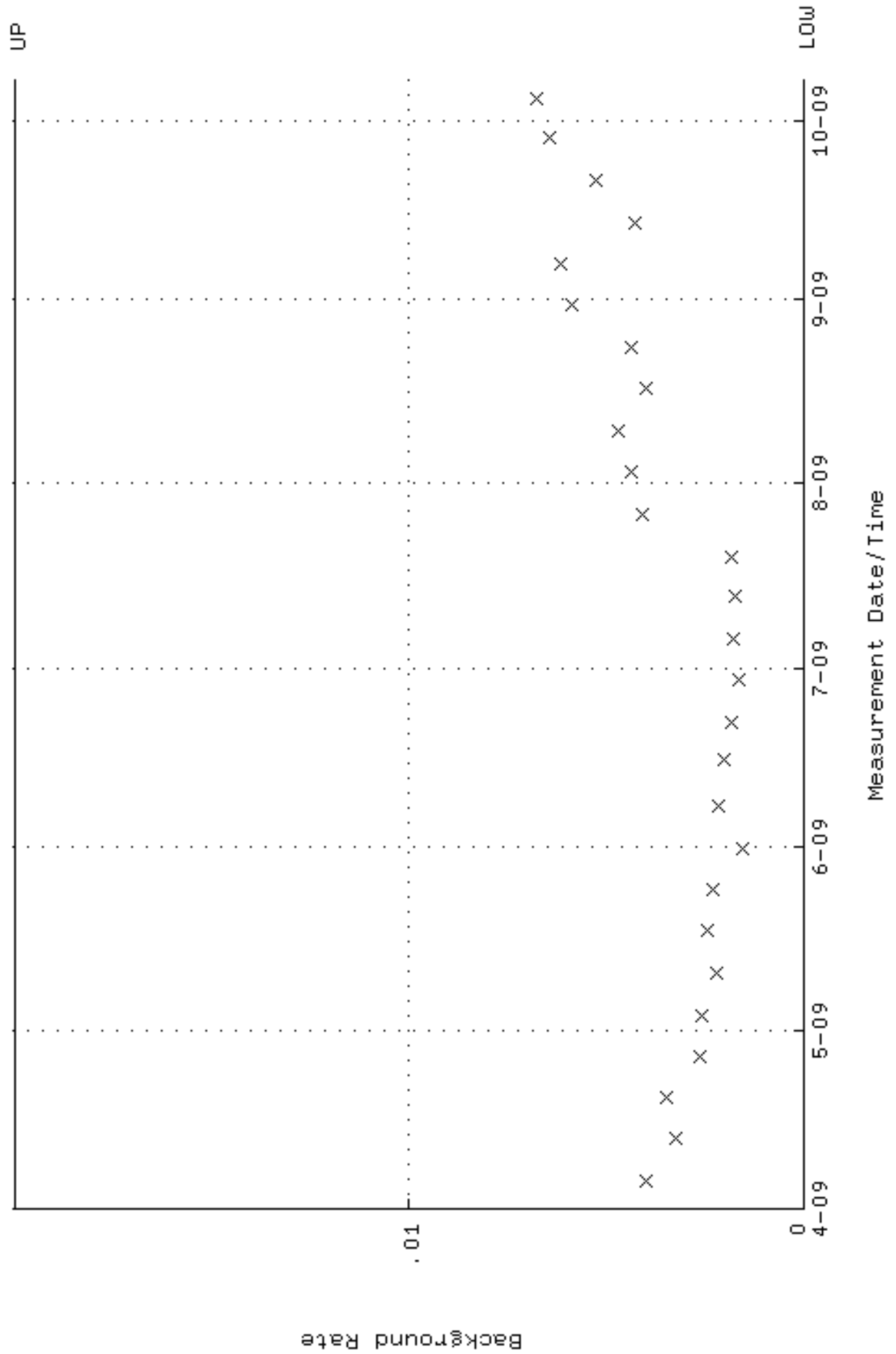
QA filename : DKA100:[ENV_ALPHA.QA.W]W039.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.250000 through 0.450000



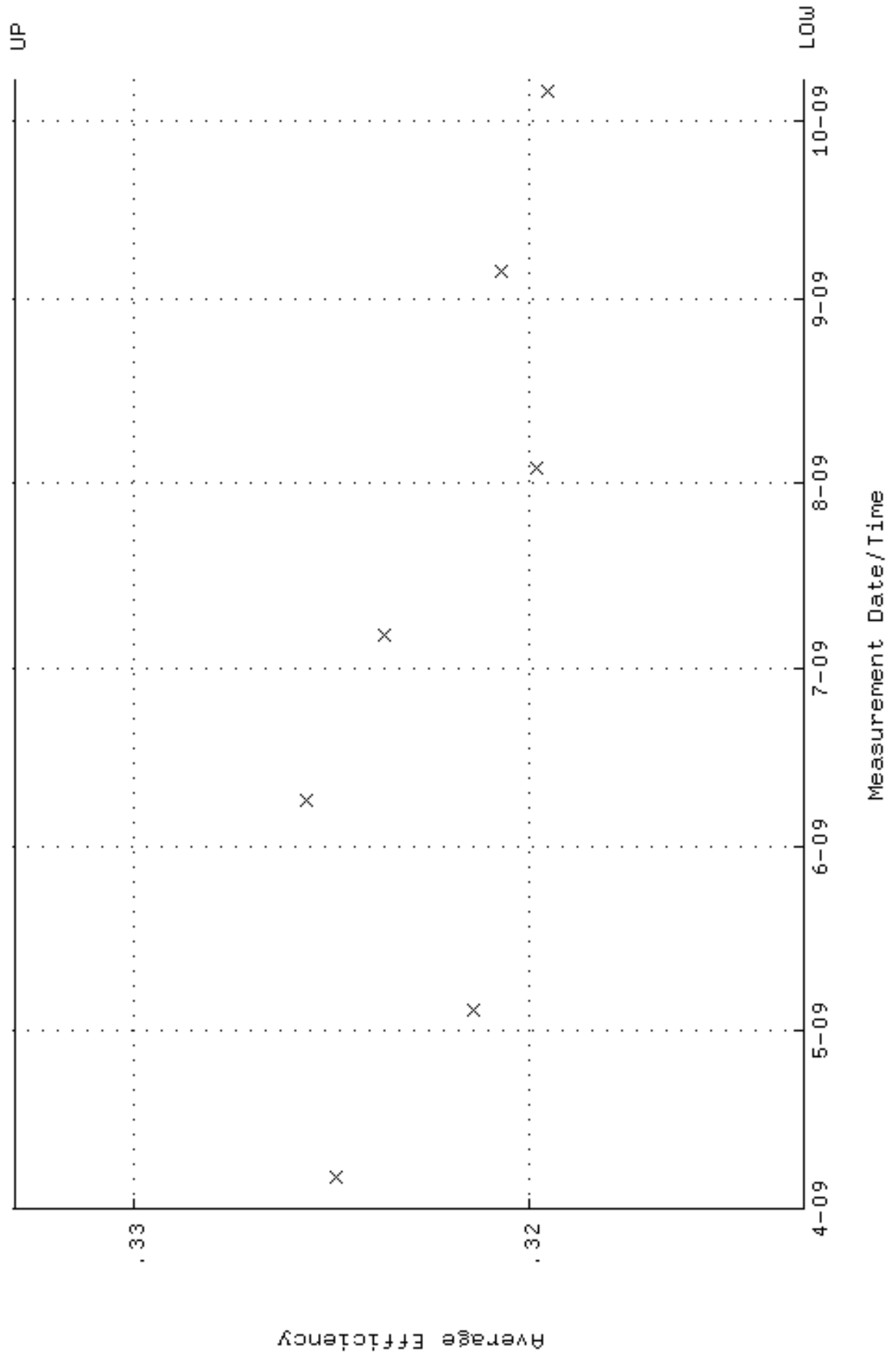
QA filename : DKA100:[ENV_ALPHA.QA.W]W039.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 60.0000 through 105.0000



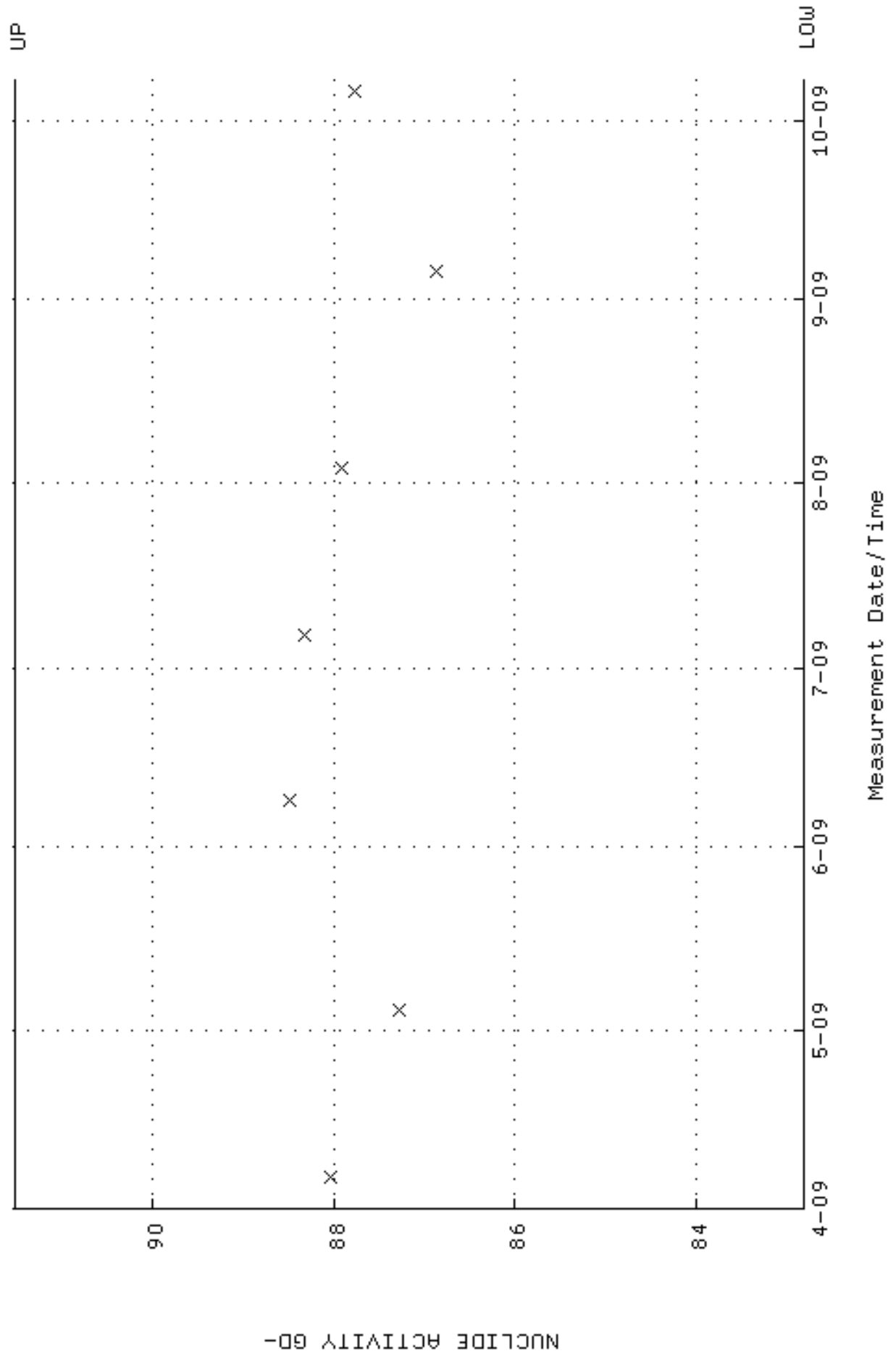
QA filename : DKA100:[ENV_ALPHA.QA.B]B039.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:13 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



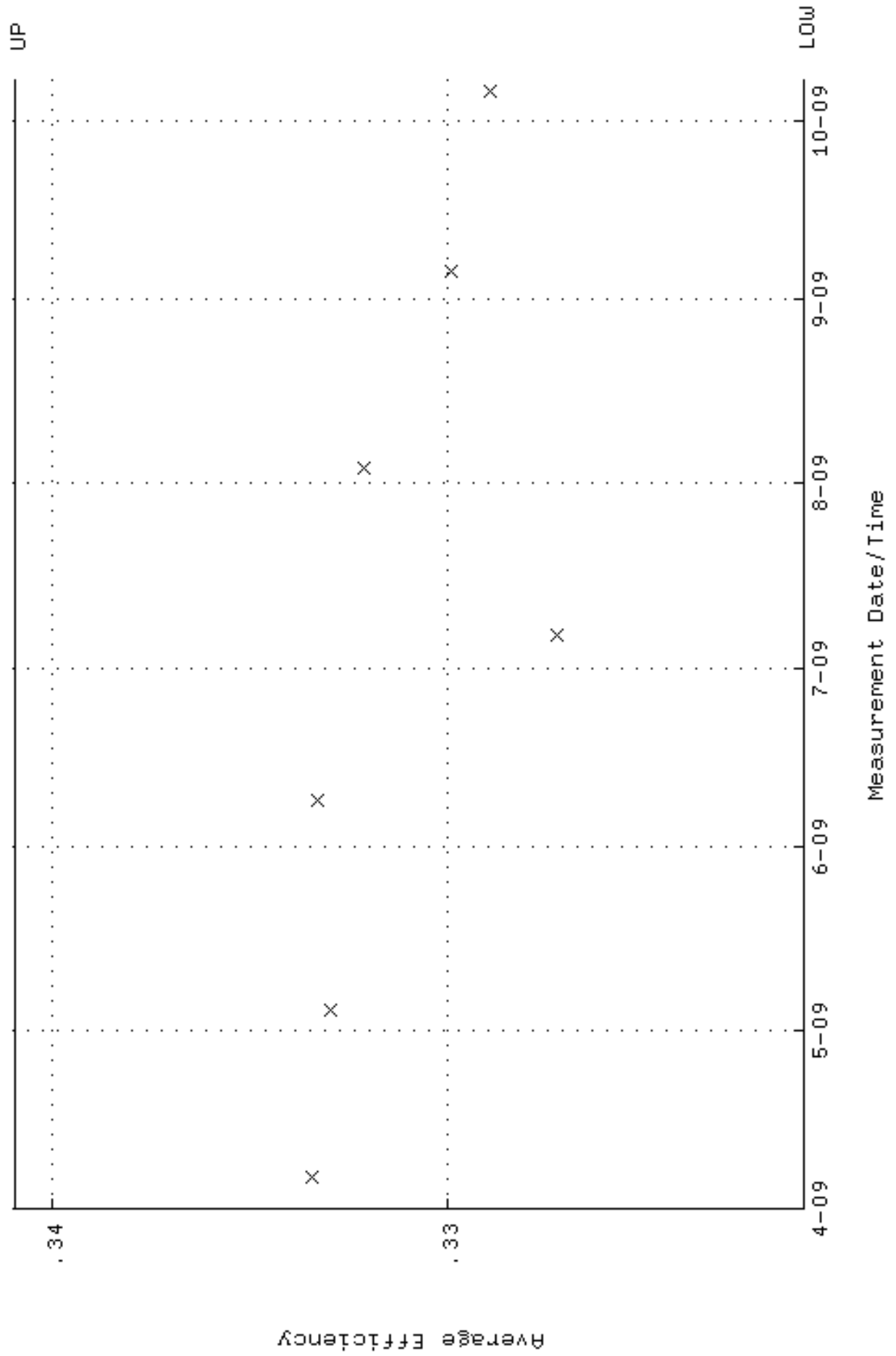
QA filename : DKA100:[ENV_ALPHA.QA.W]W040.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.313016 through 0.333016



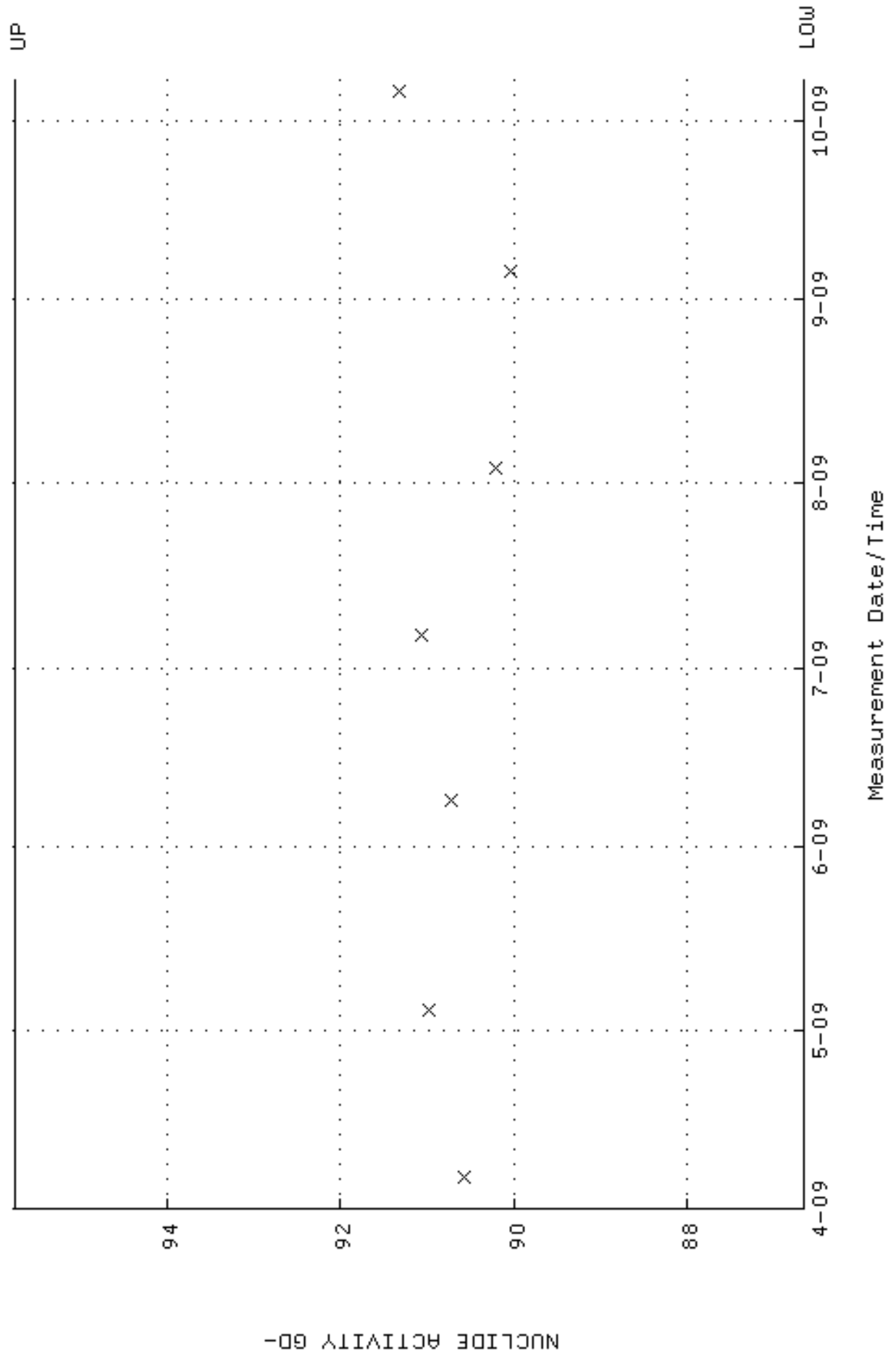
QA filename : DKA100:[ENV_ALPHA.QA.W]W040.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 82.8065 through 91.5229



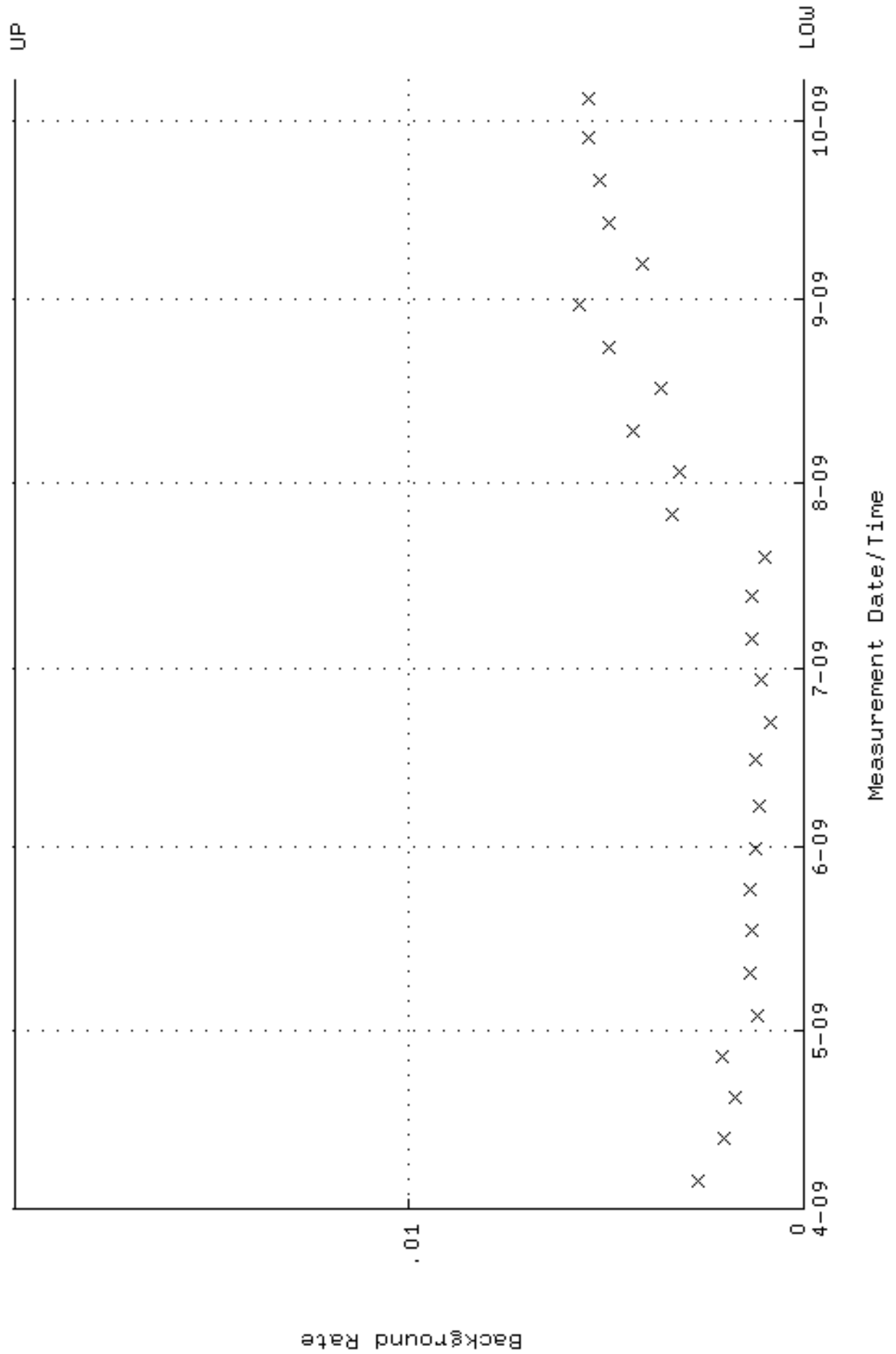
QA filename : DKA100:[ENV_ALPHA.QA.W]W041.QAF;5
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.320943 through 0.340943



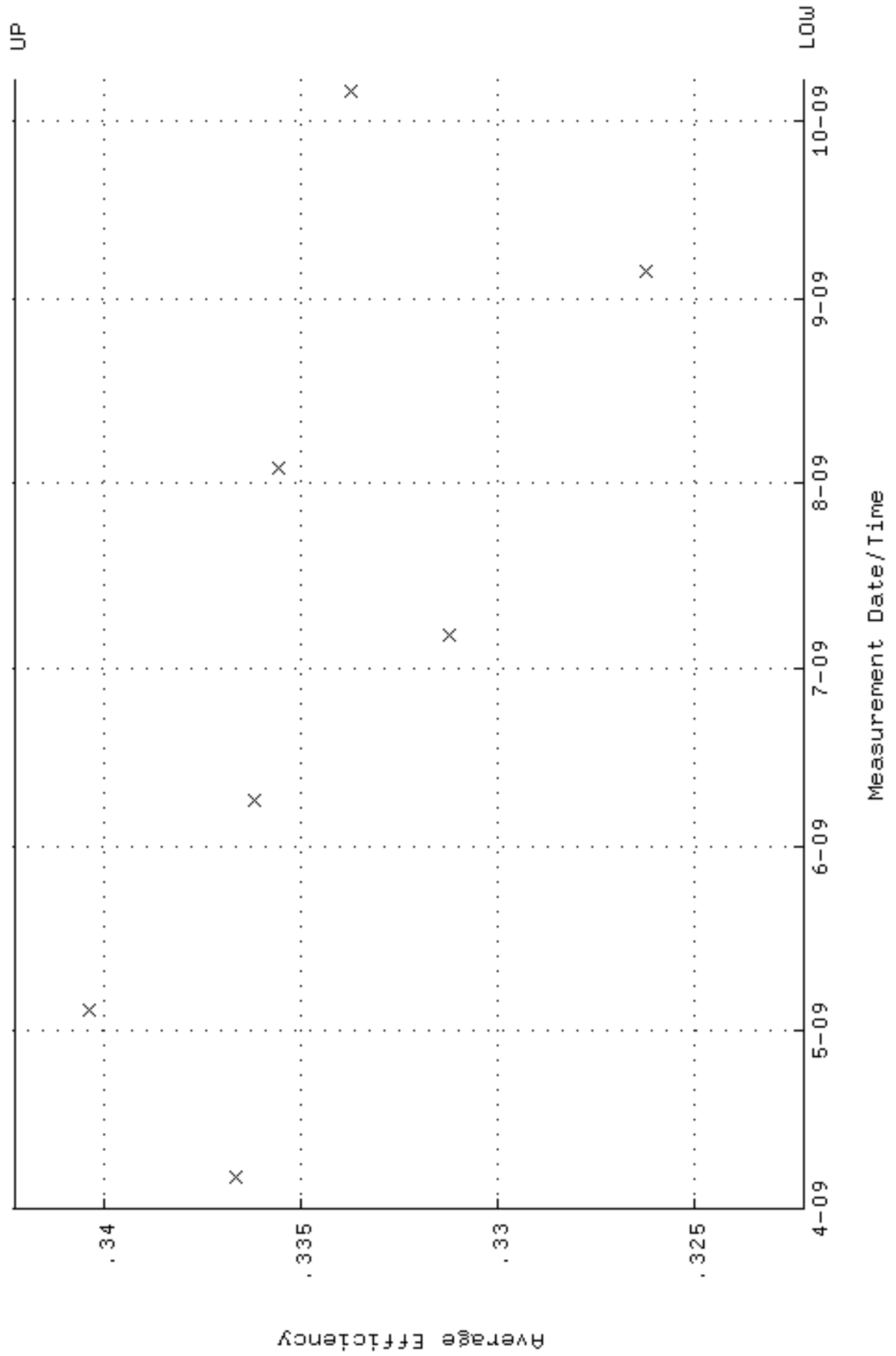
QA filename : DKA100:[ENV_ALPHA.QA.W]W041.QAF;5
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 86.6435 through 95.7639



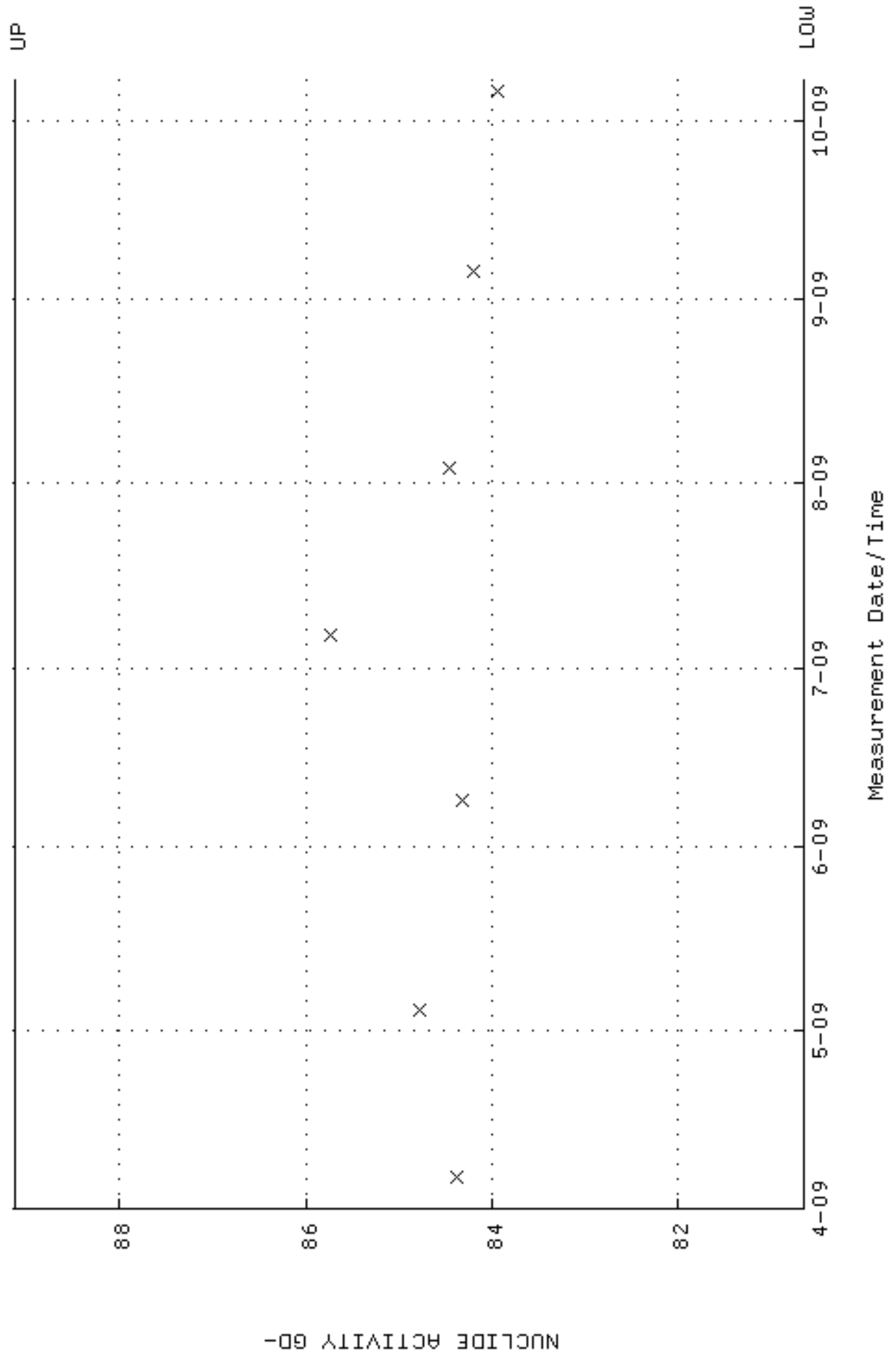
QA filename : DKA100:[ENV_ALPHA.QA.B]B041.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:13 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



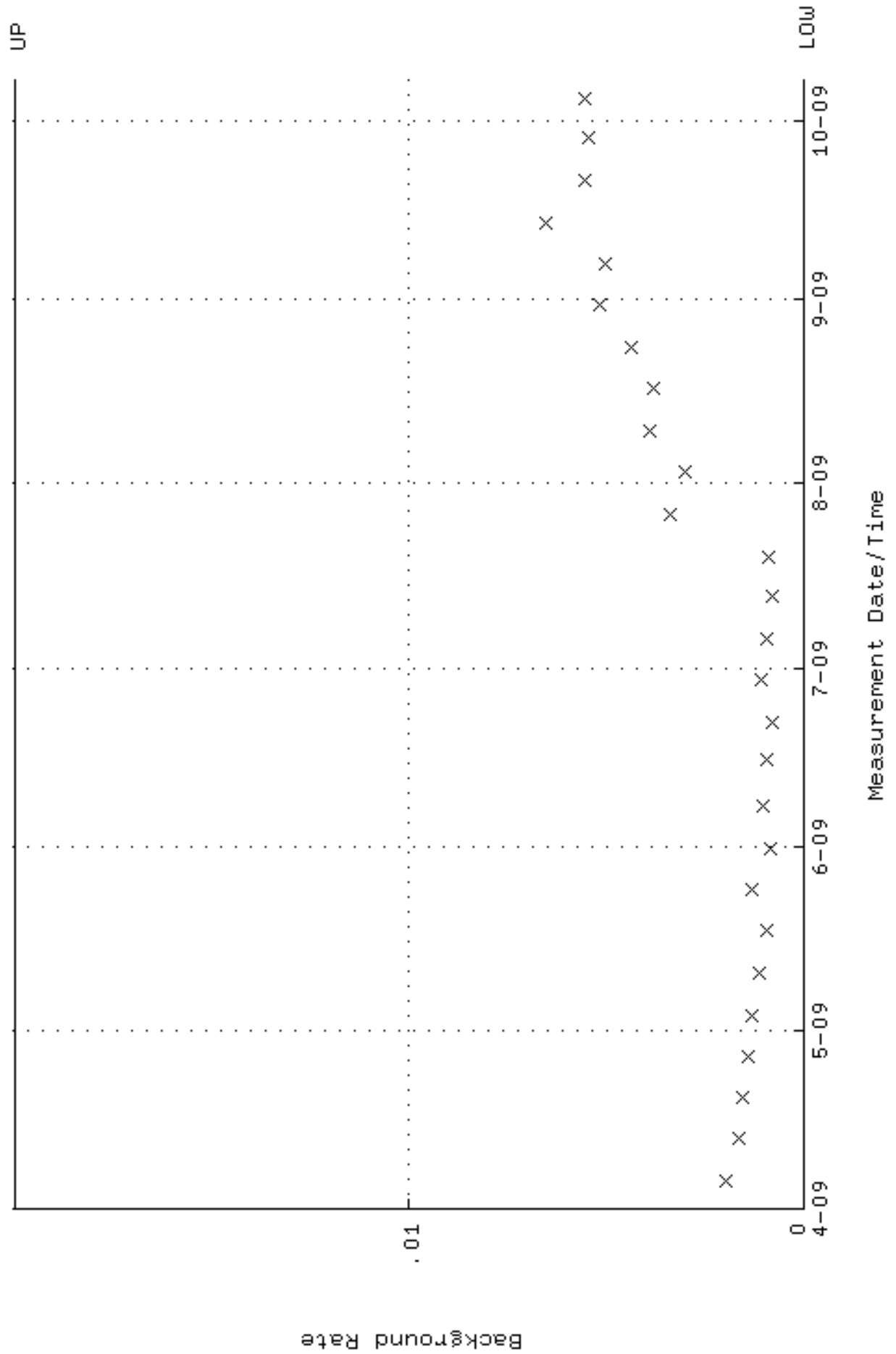
QA filename : DKA100:[ENV_ALPHA.QA.W]W042.QAF;3
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.322243 through 0.342243



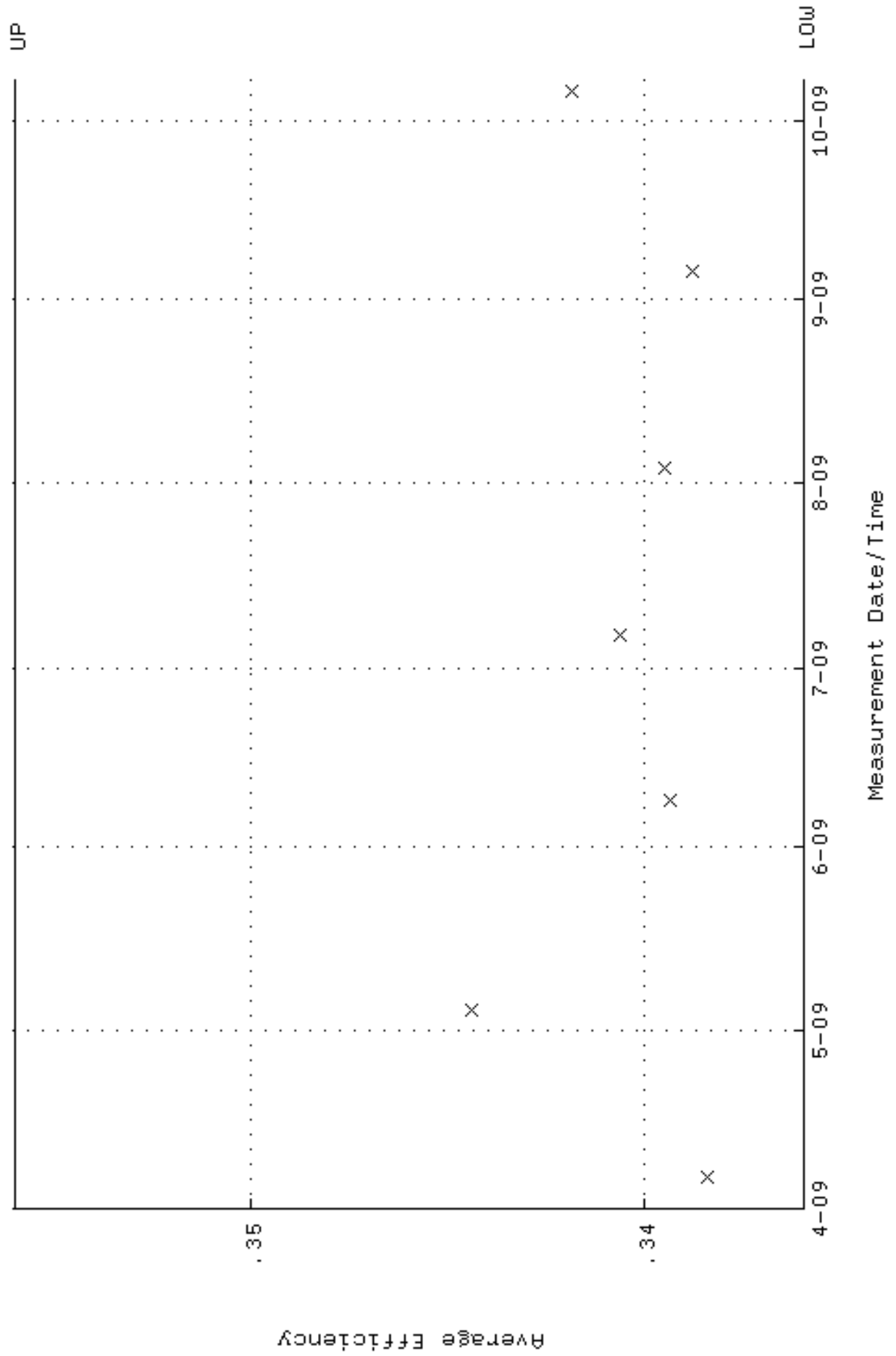
QA filename : DKA100:[ENV_ALPHA.QA.W]w042.QAF;3
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:06 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 80.6389 through 89.1273



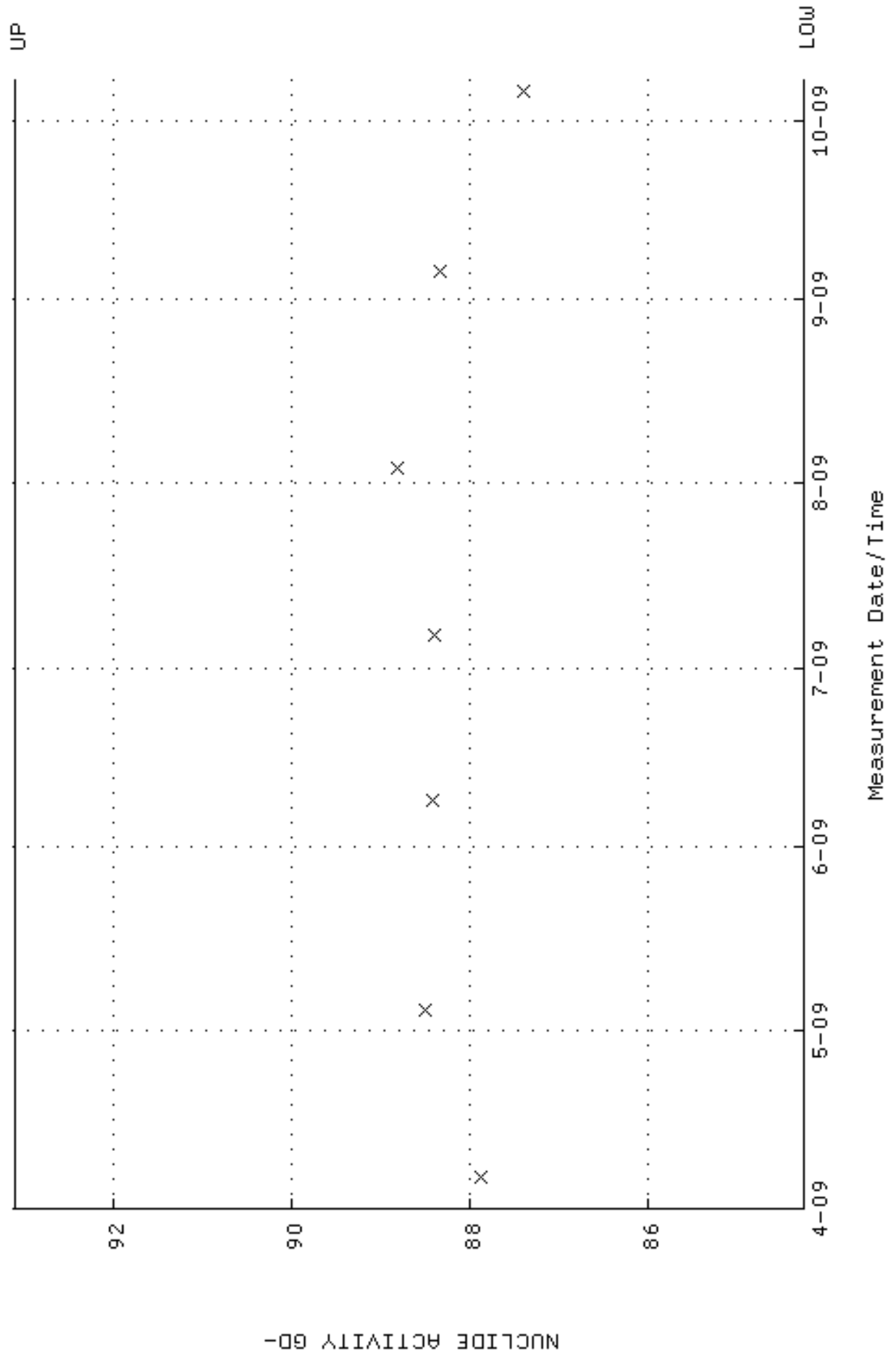
QA filename : DKA100:[ENV_ALPHA.QA.B]B042.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:13 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



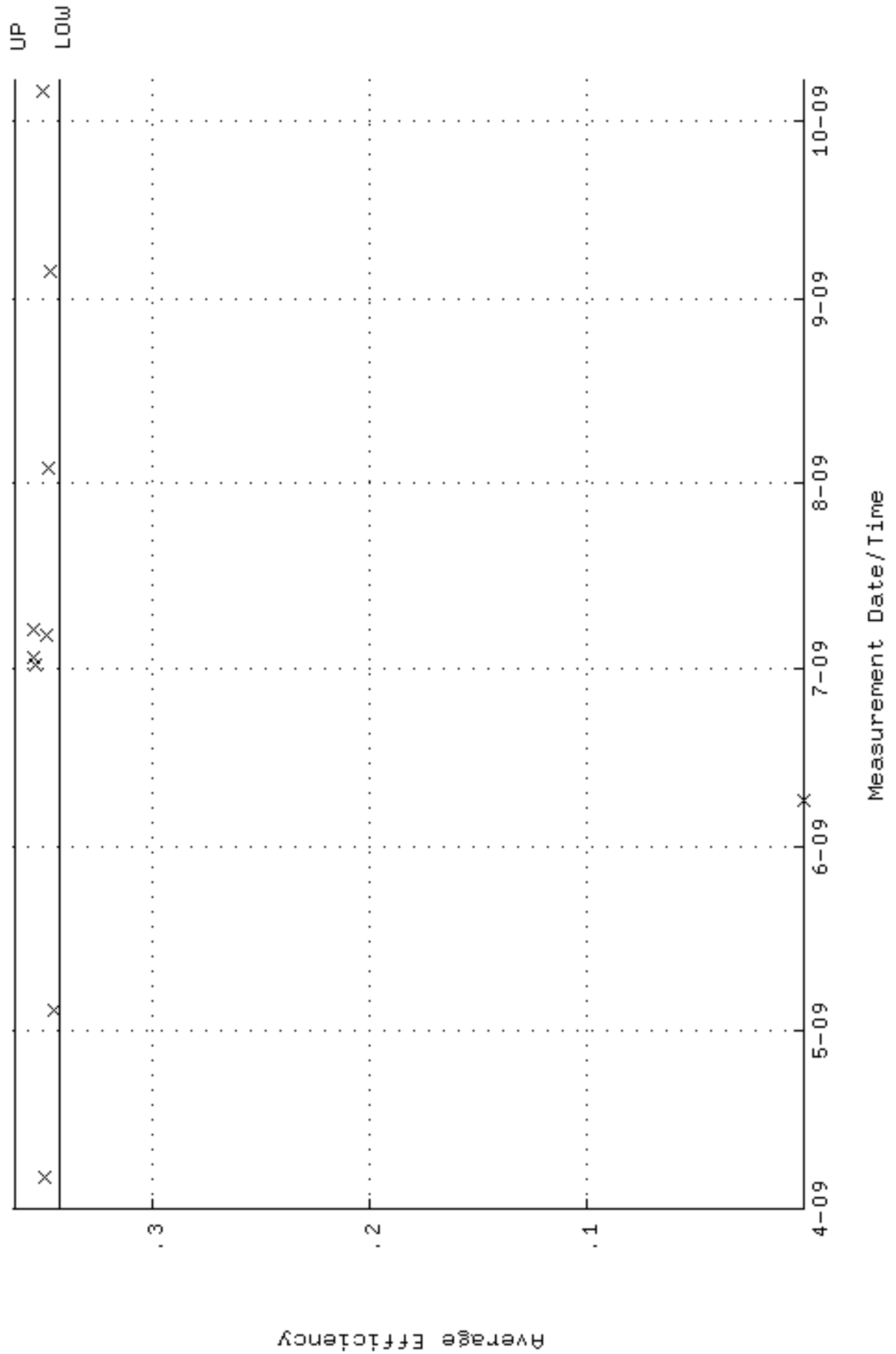
QA filename : DKA100:[ENV_ALPHA.QA.W]W043.QAF;102
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.335973 through 0.355973



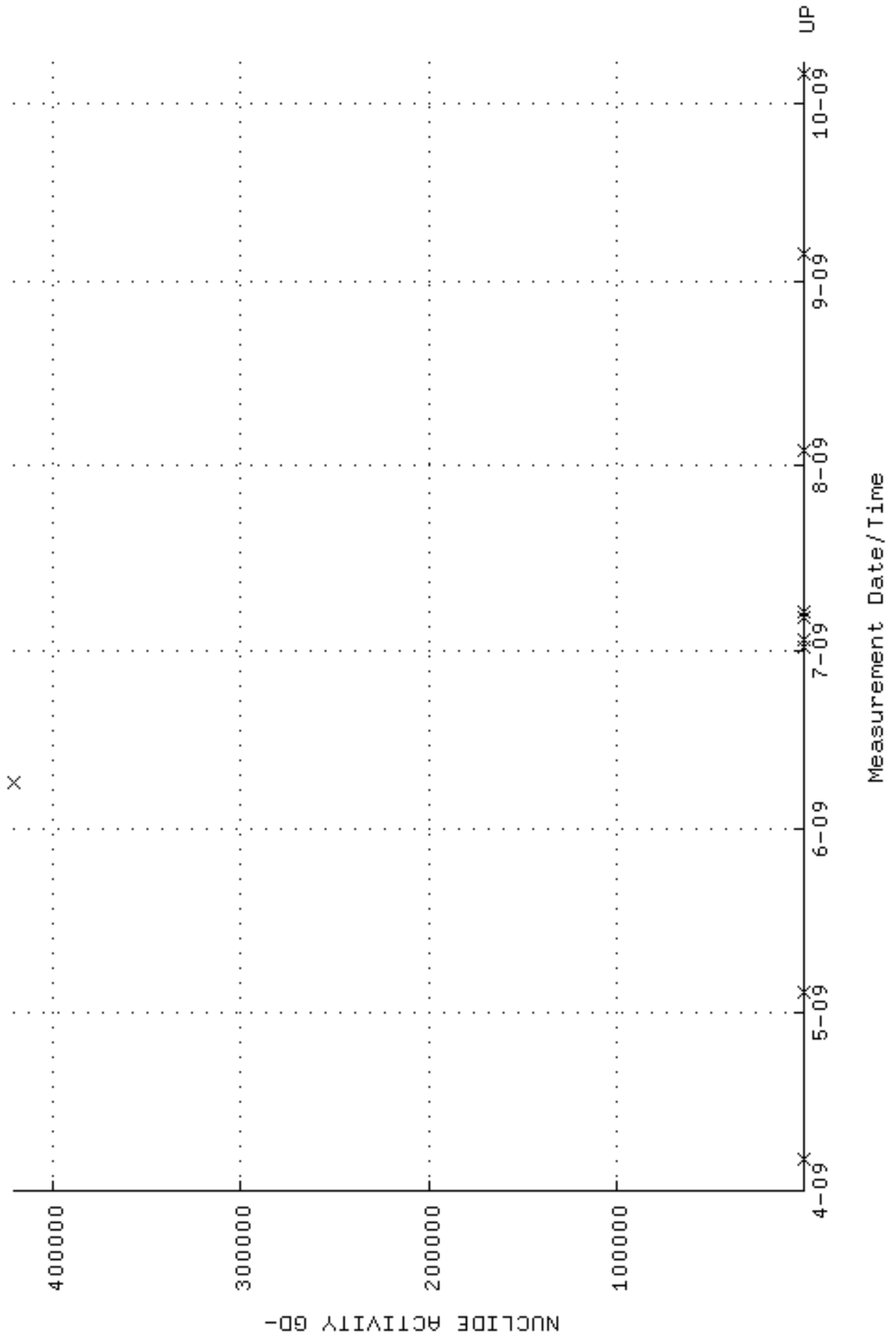
QA filename : DKA100:[ENV_ALPHA.QA.W]W043.QAF;102
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 84.2440 through 93.1118



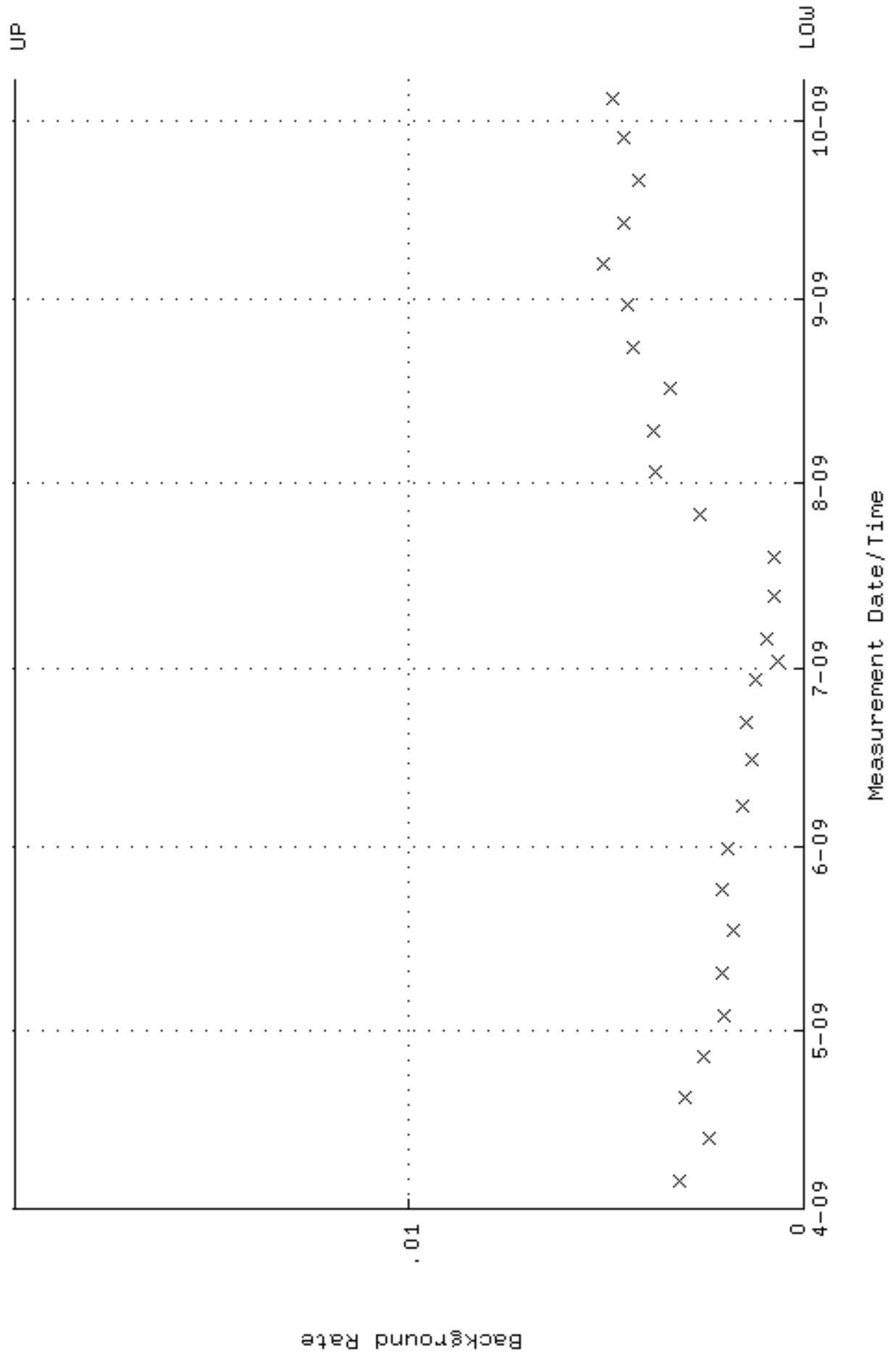
QA filename : DKA100:[ENV_ALPHA.QA.W]W044.QAF;5
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.343380 through 0.363380



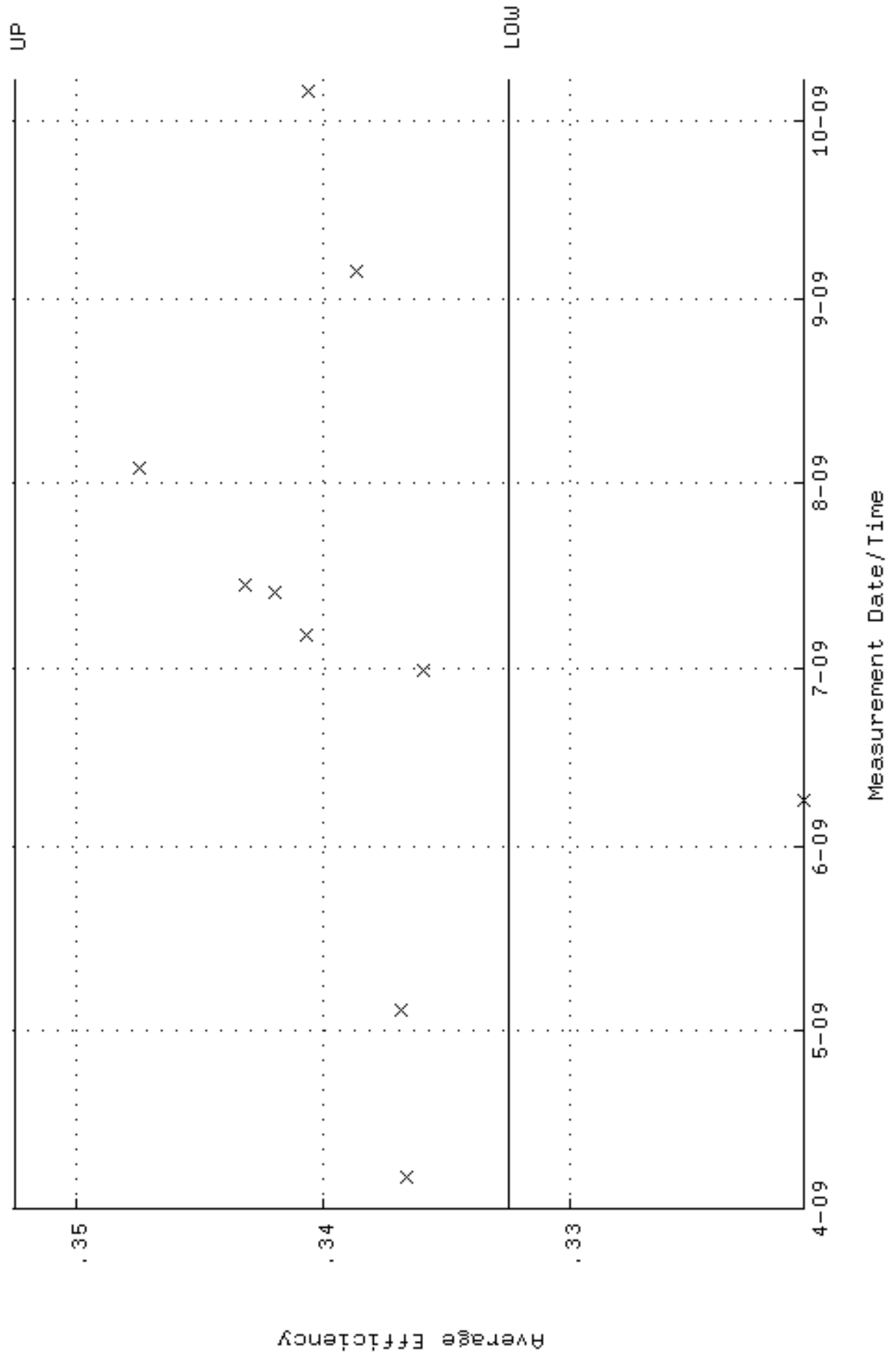
QA filename : DKA100:[ENV_ALPHA.QA.W]W044.QAF;5
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 83.4041 through 92.1835



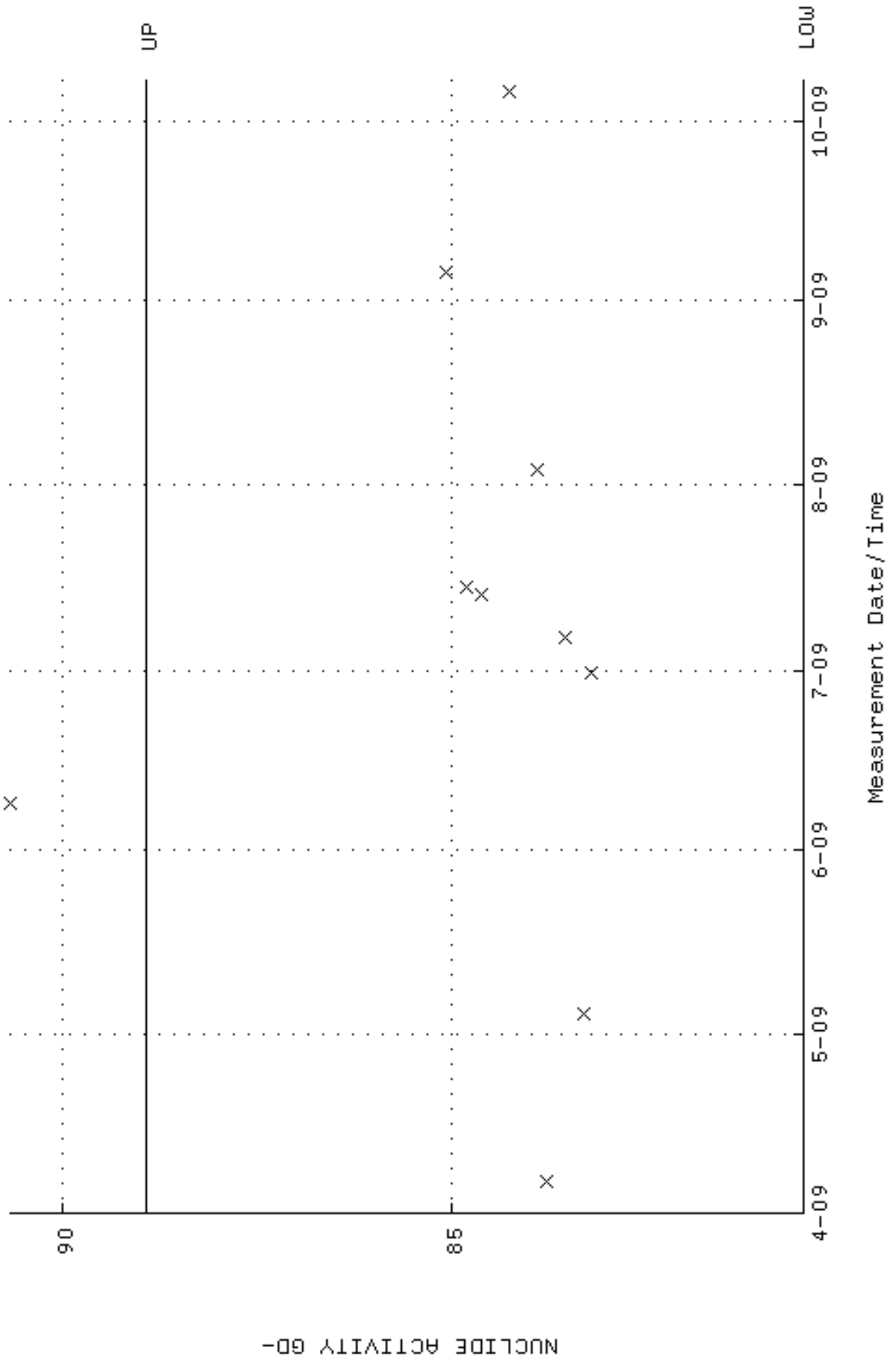
QA filename : DKA100:[ENV_ALPHA.QA.B]B044.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:15 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



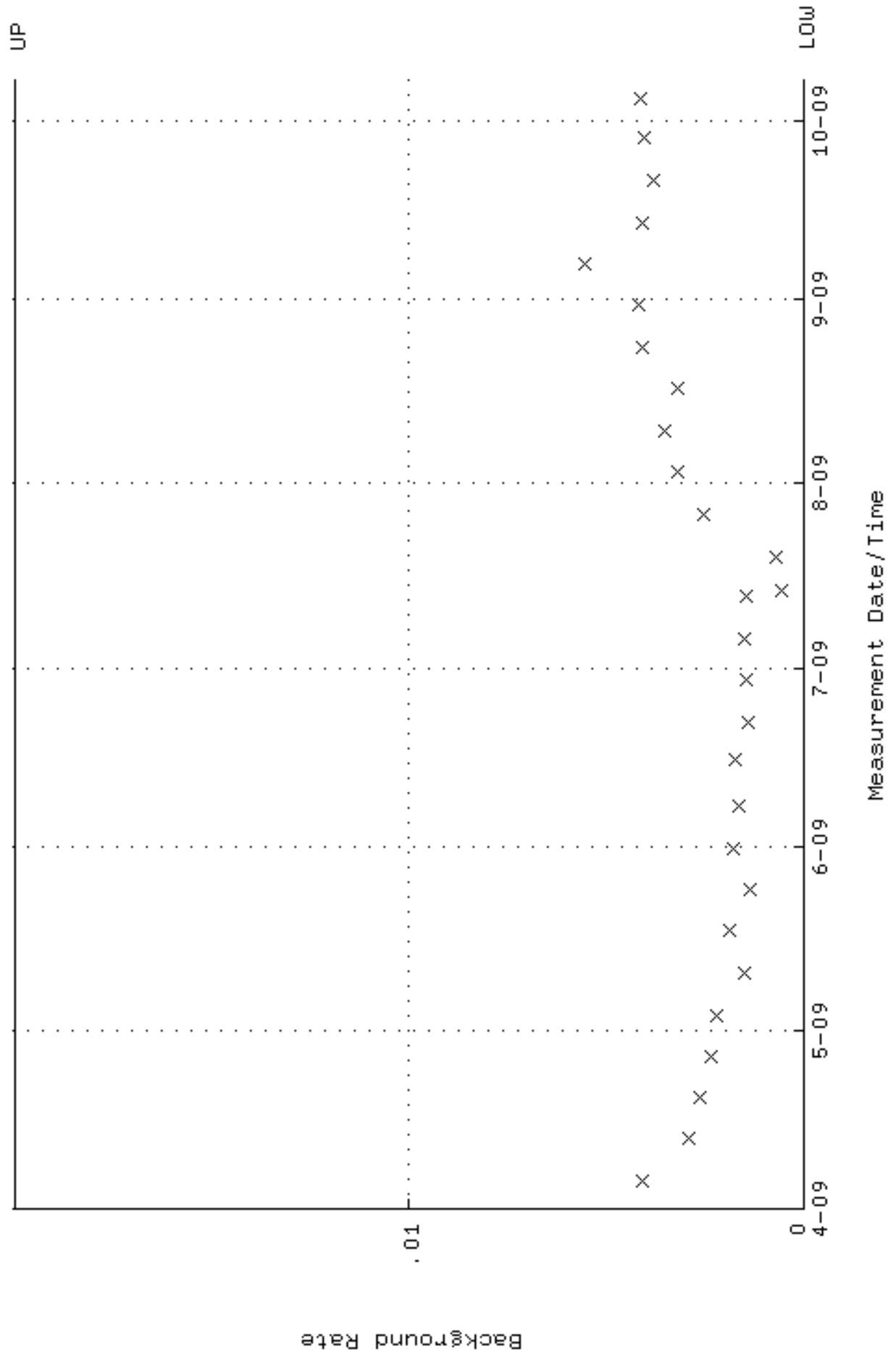
QA filename : DKA100:[ENV_ALPHA.QA.W]W045.QAF;5
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.332472 through 0.352472



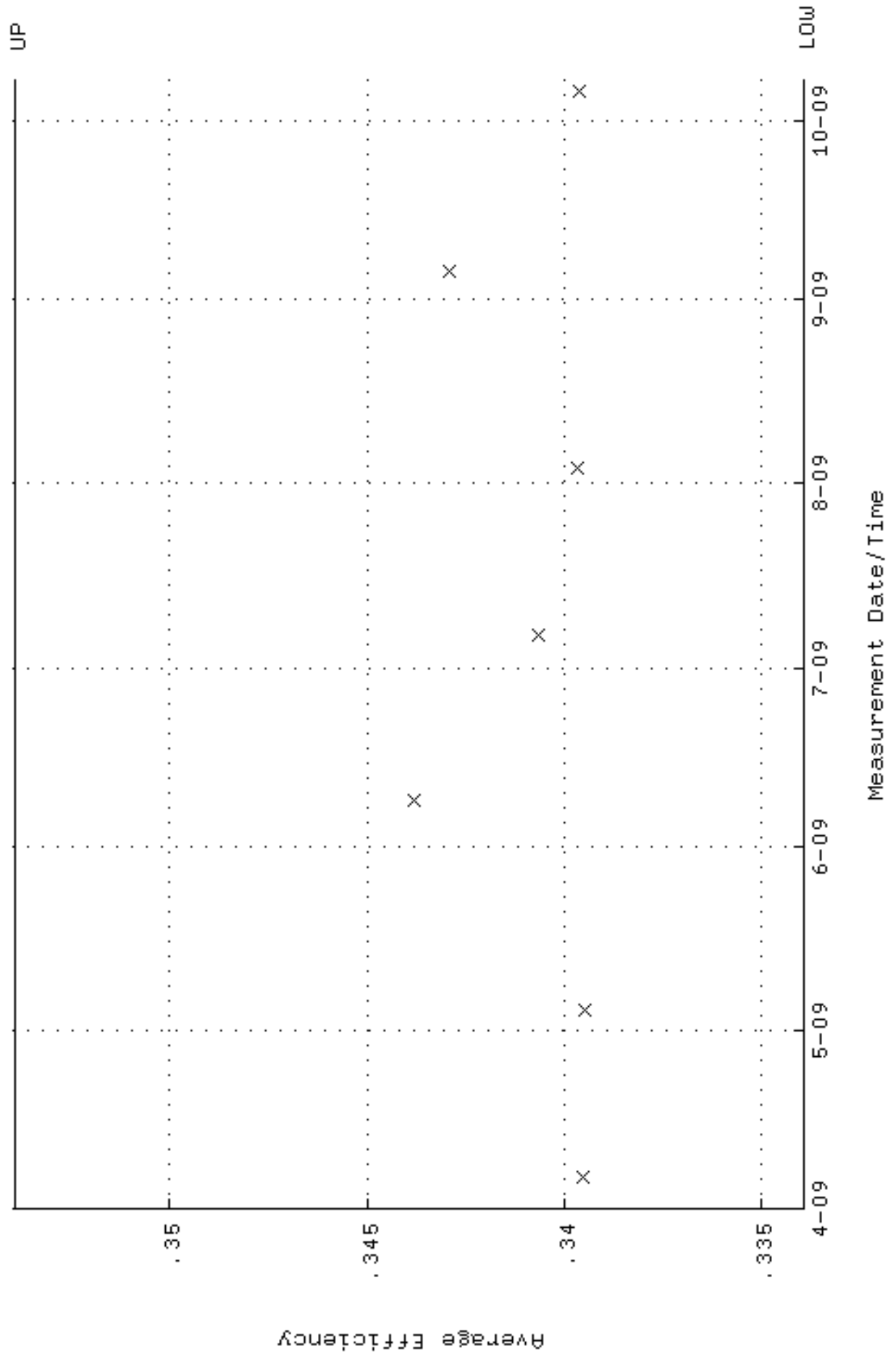
QA filename : DKA100:[ENV_ALPHA.QA.W]W045.QAF;5
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 80.4622 through 88.9320



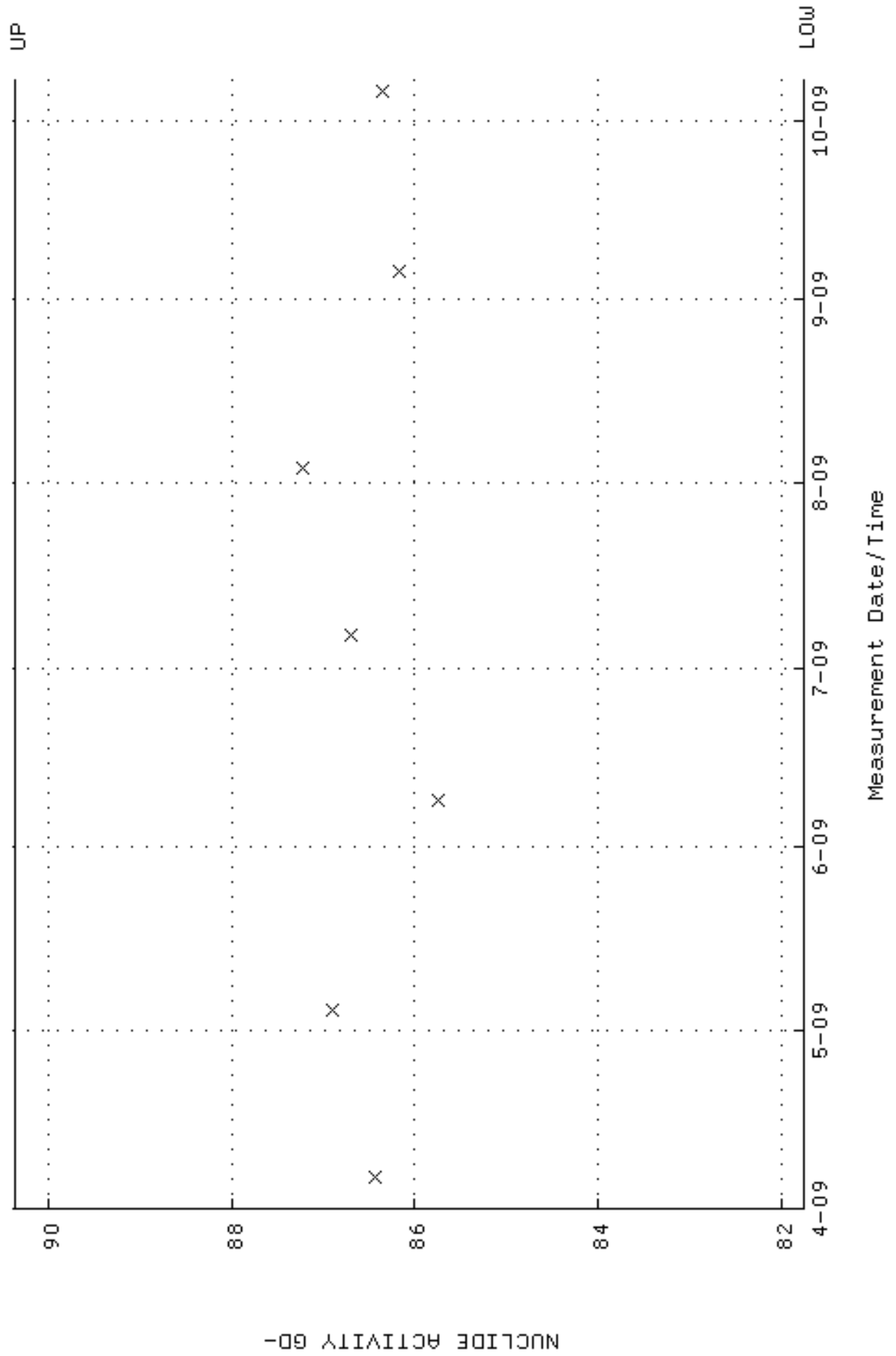
QA filename : DKA100:[ENV_ALPHA.QA.B]B045.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:15 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



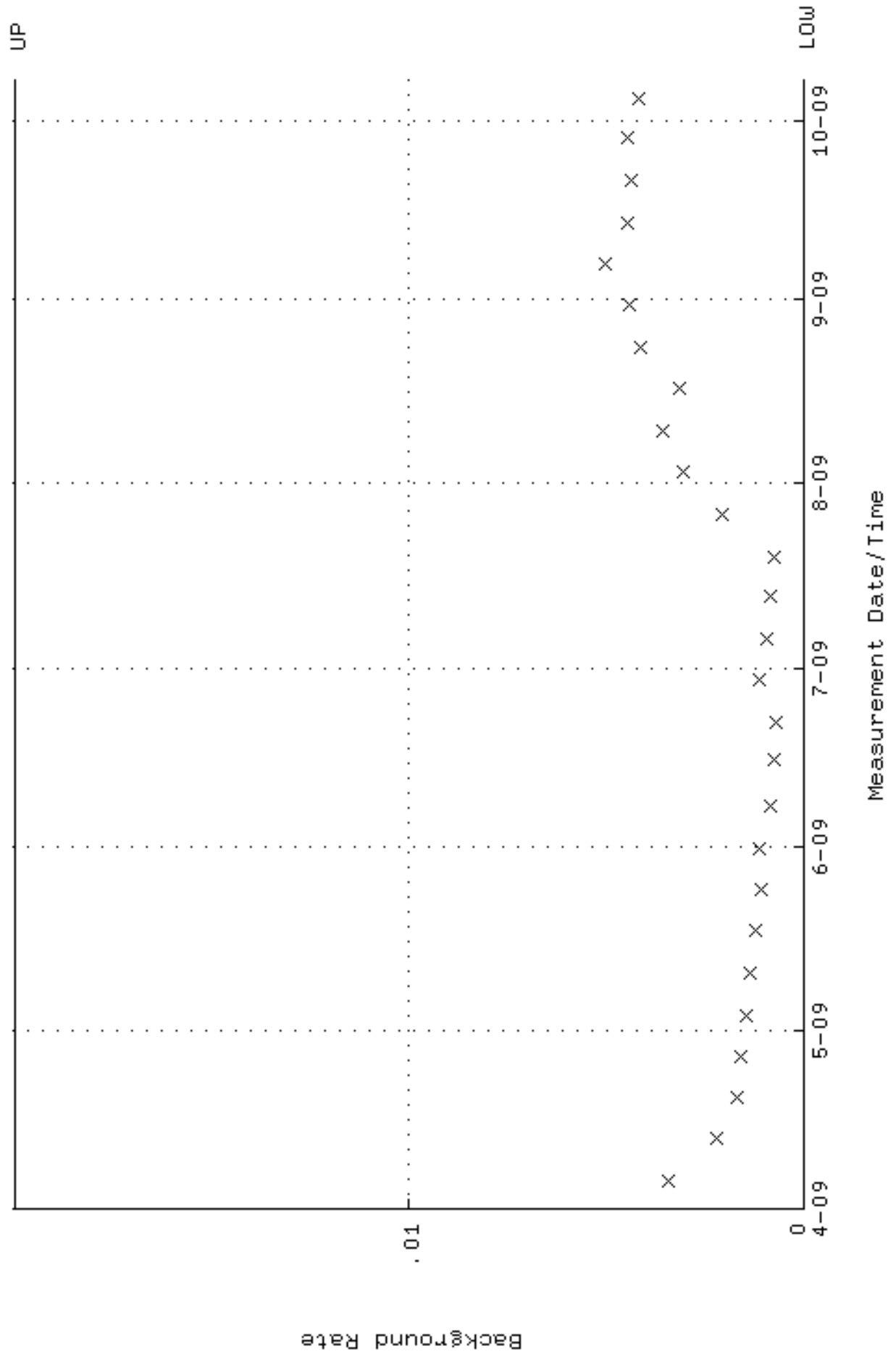
QA filename : DKA100:[ENV_ALPHA.QA.W]W046.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.333927 through 0.353927



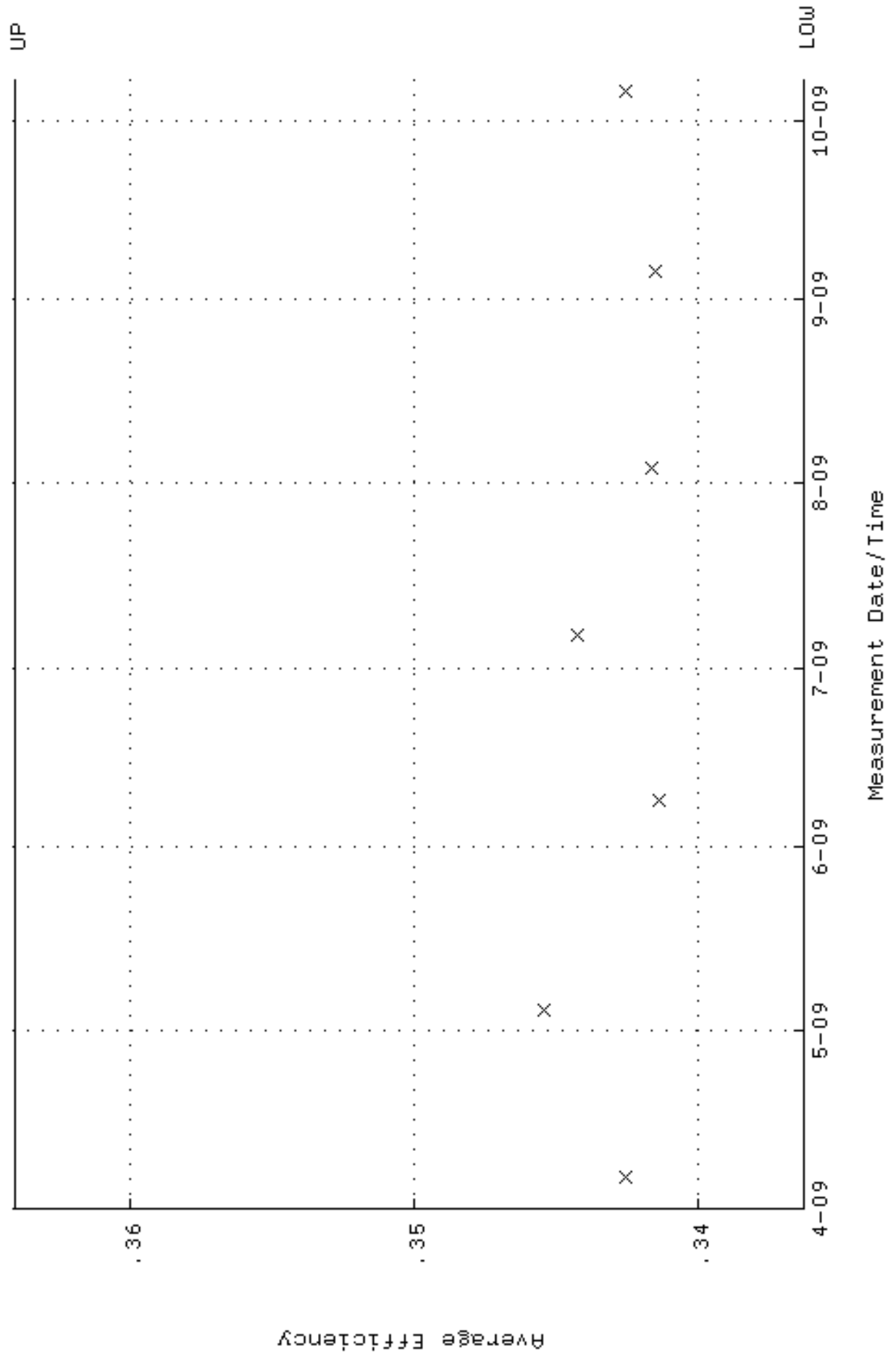
QA filename : DKA100:[ENV_ALPHA.QA.W]W046.QAF;4
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
Lower/Upper Lmts: 81.7568 through 90.3628



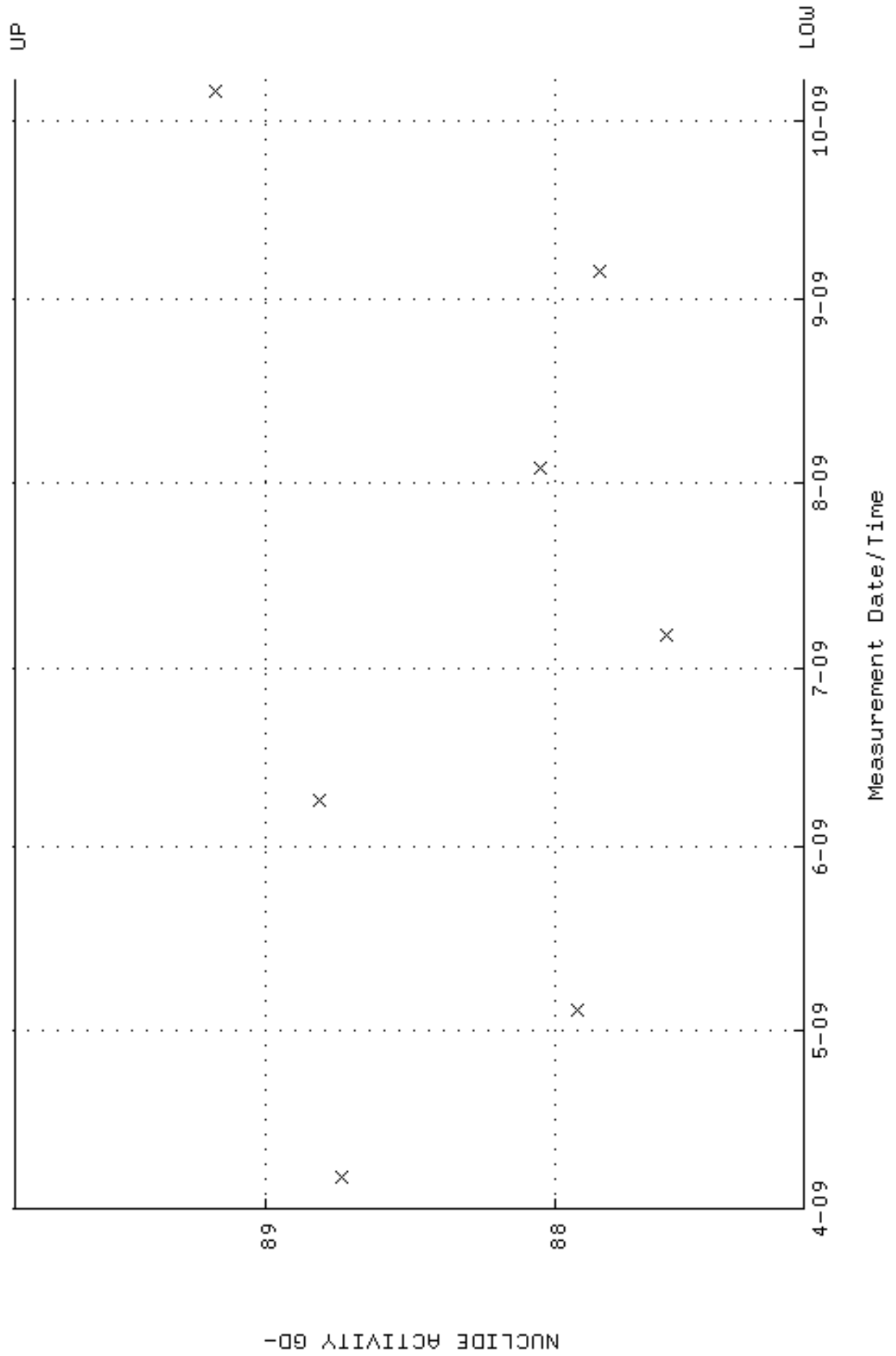
QA filename : DKA100:[ENV_ALPHA.QA.B]B046.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:15 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



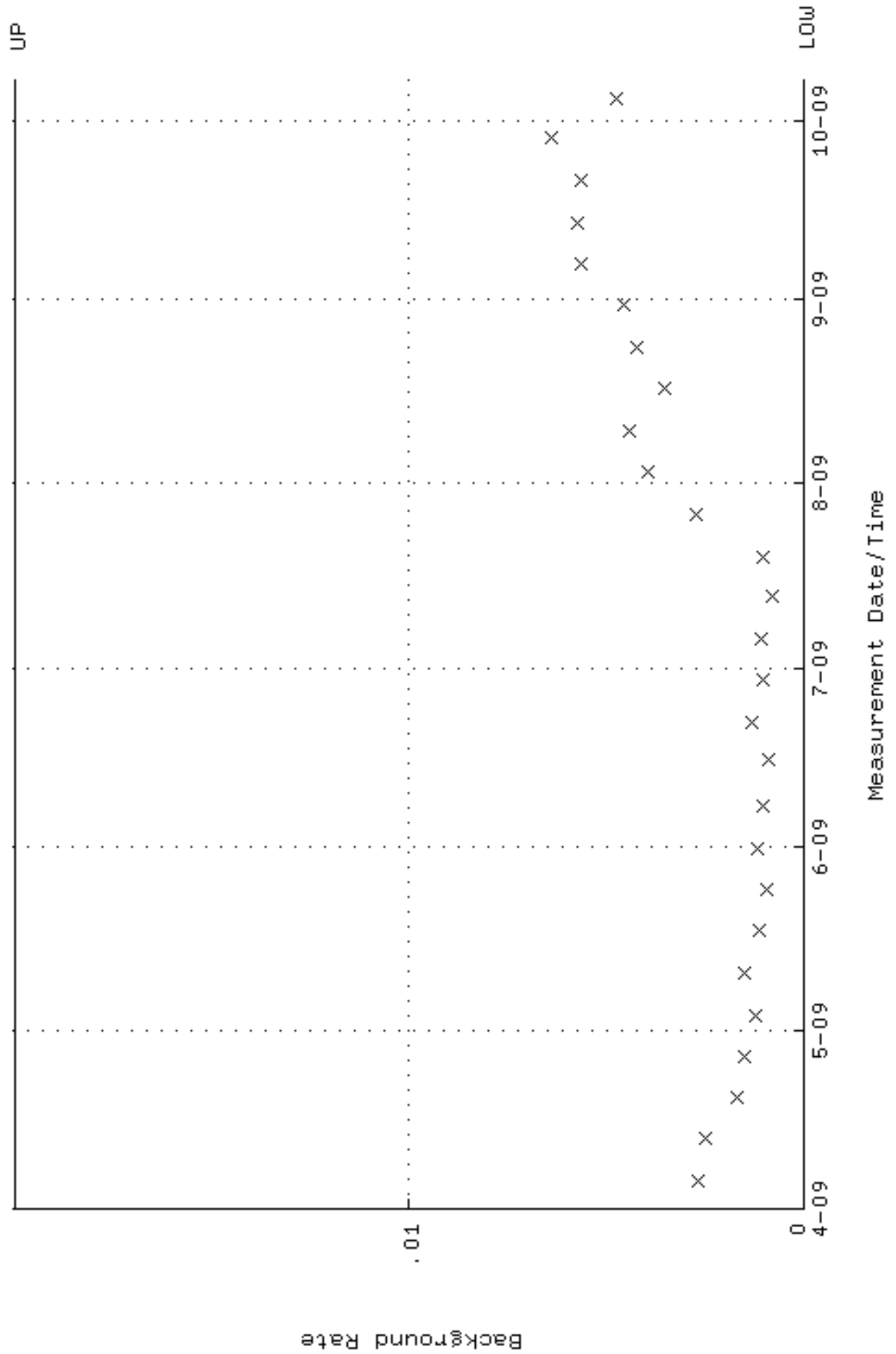
QA filename : DKA100:[ENV_ALPHA.QA.W]W047.QAF;5
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.336276 through 0.364038



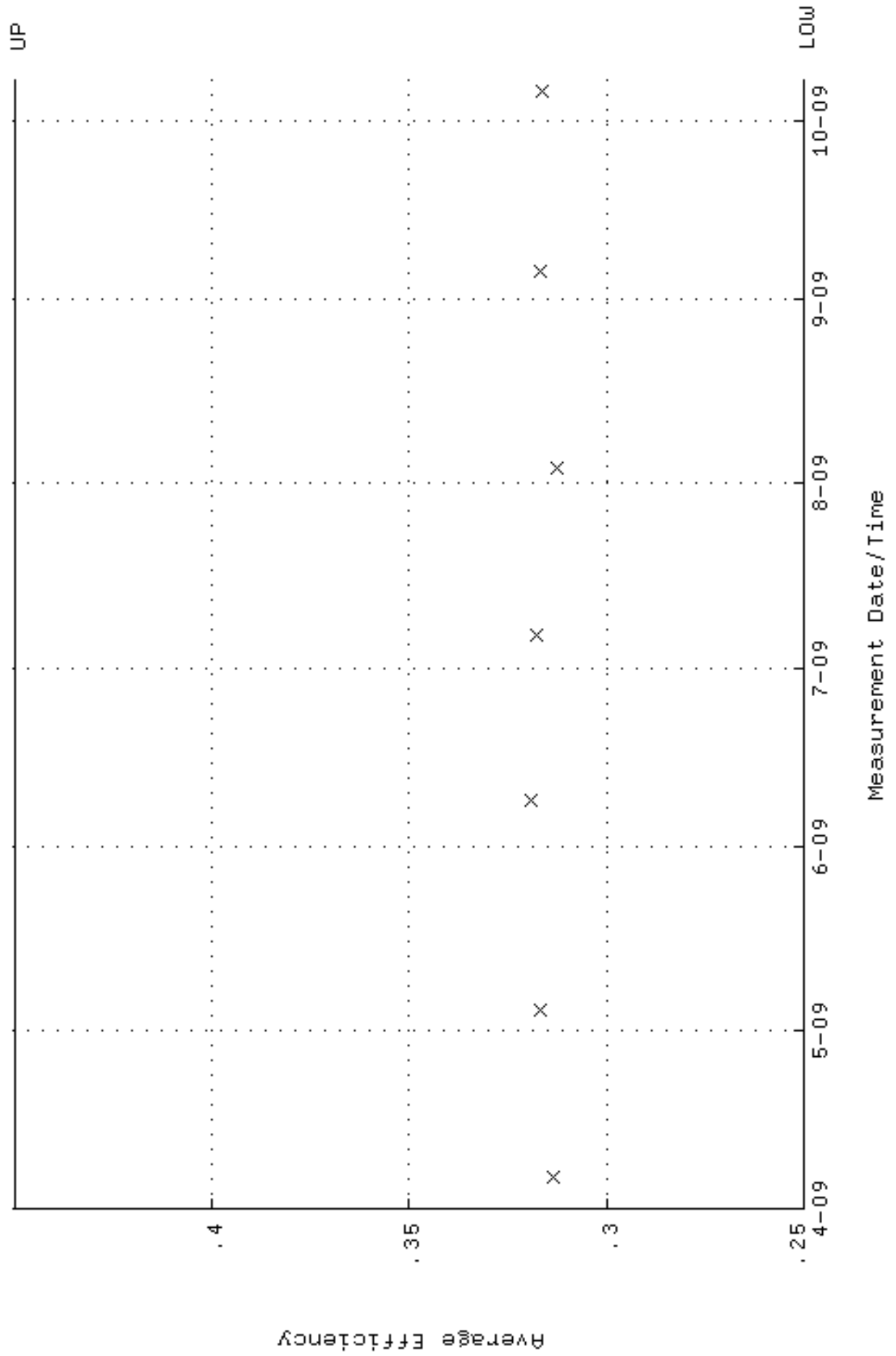
QA filename : DKA100:[ENV_ALPHA.QA.W]W047.QAF;5
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 87.1403 through 89.8631



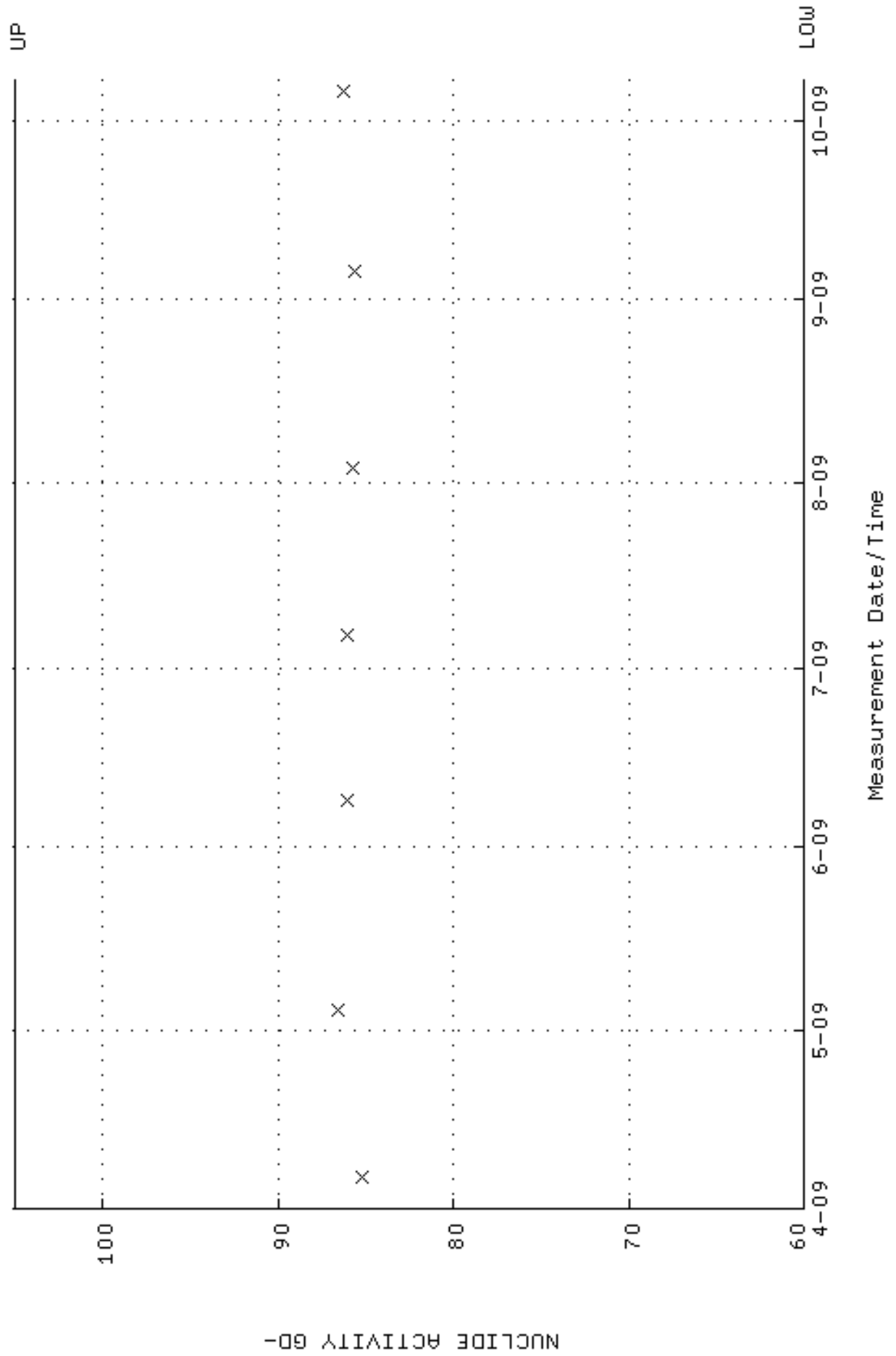
QA filename : DKA100:[ENV_ALPHA.QA.B]B047.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:15 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



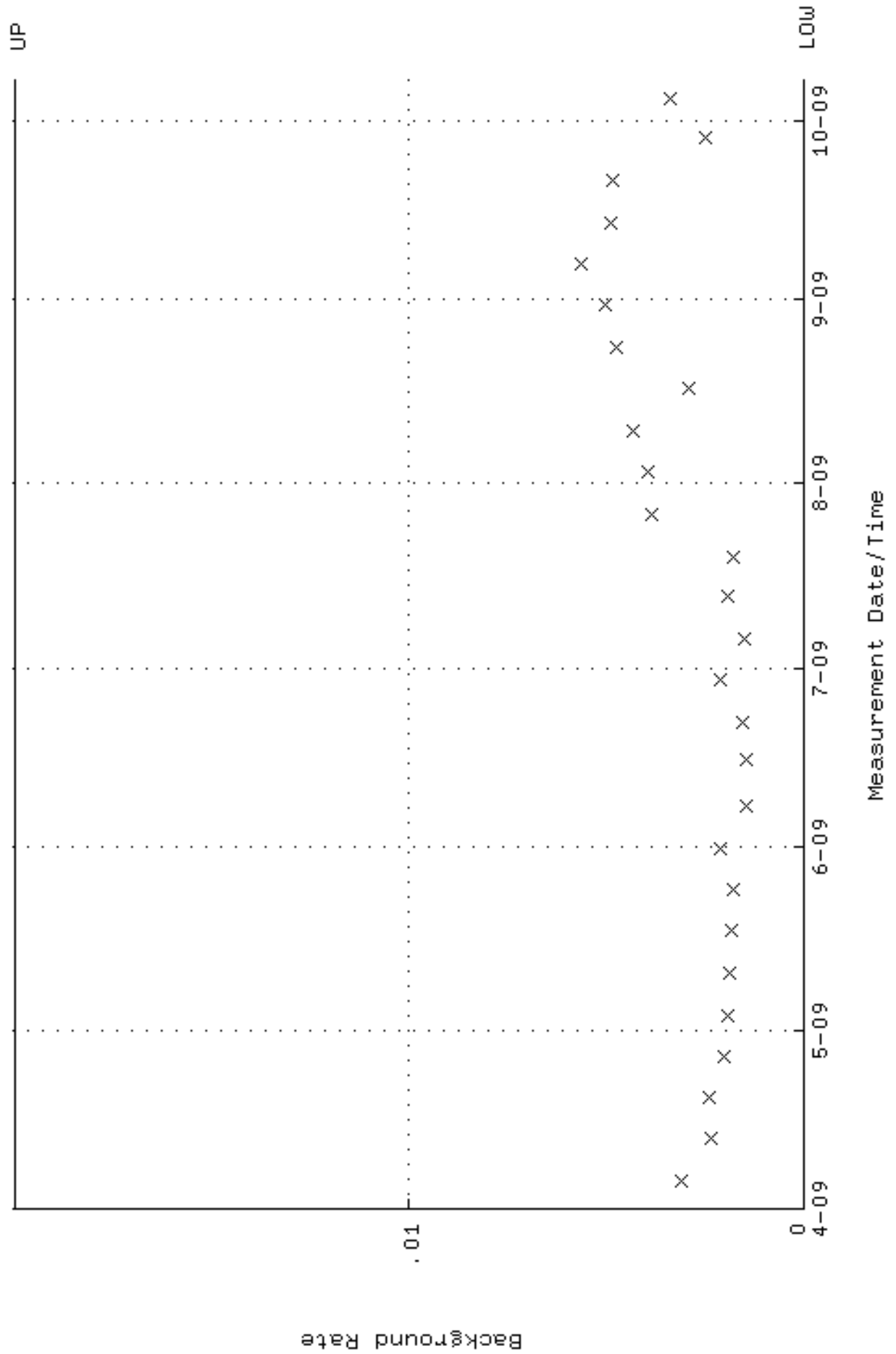
QA filename : DKA100:[ENV_ALPHA.QA.W]W048.QAF;6
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.250000 through 0.450000



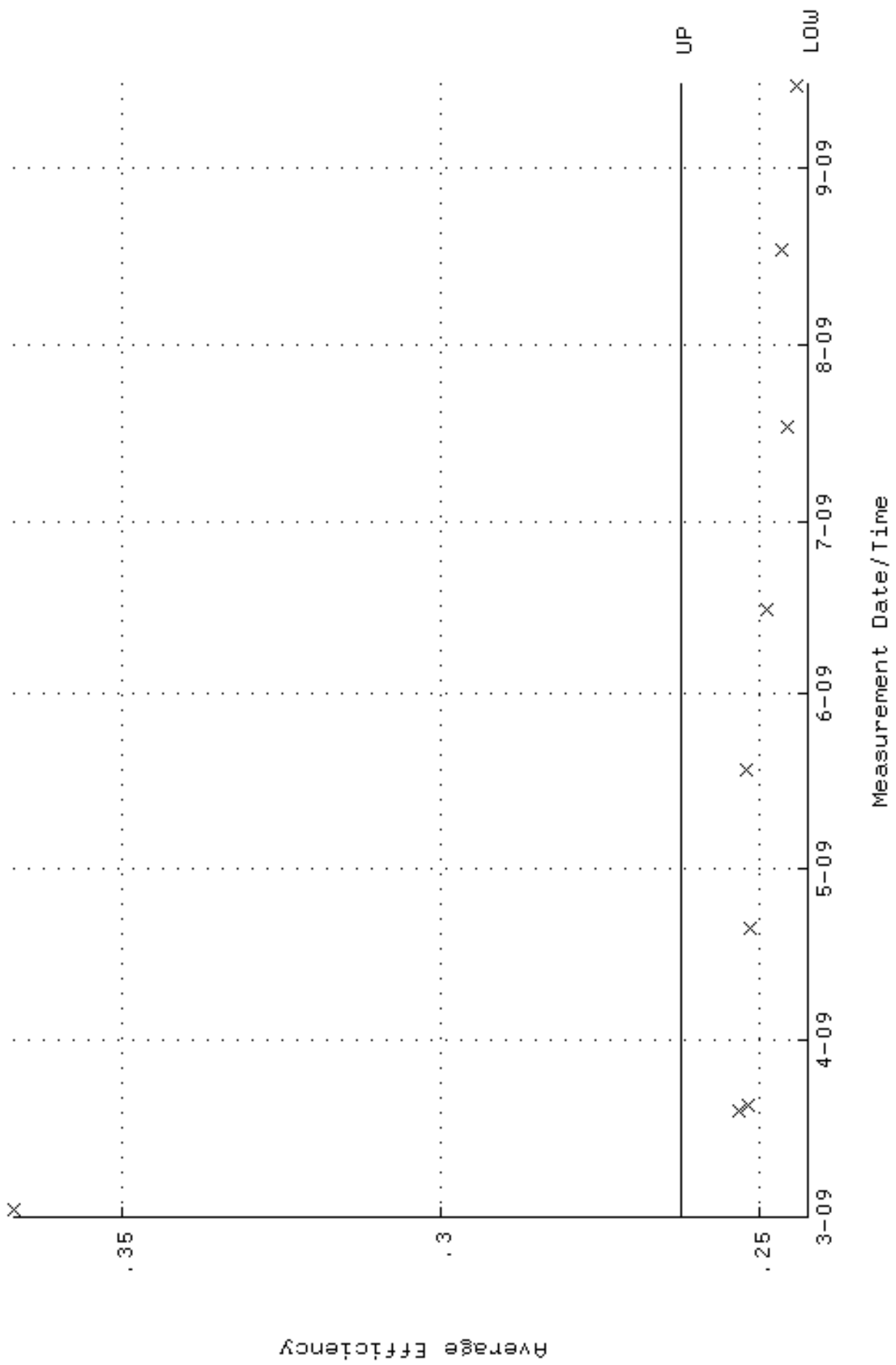
QA filename : DKA100:[ENV_ALPHA.QA.W]W048.QAF;6
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-APR-2009 08:44:08 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 60.0000 through 105.0000



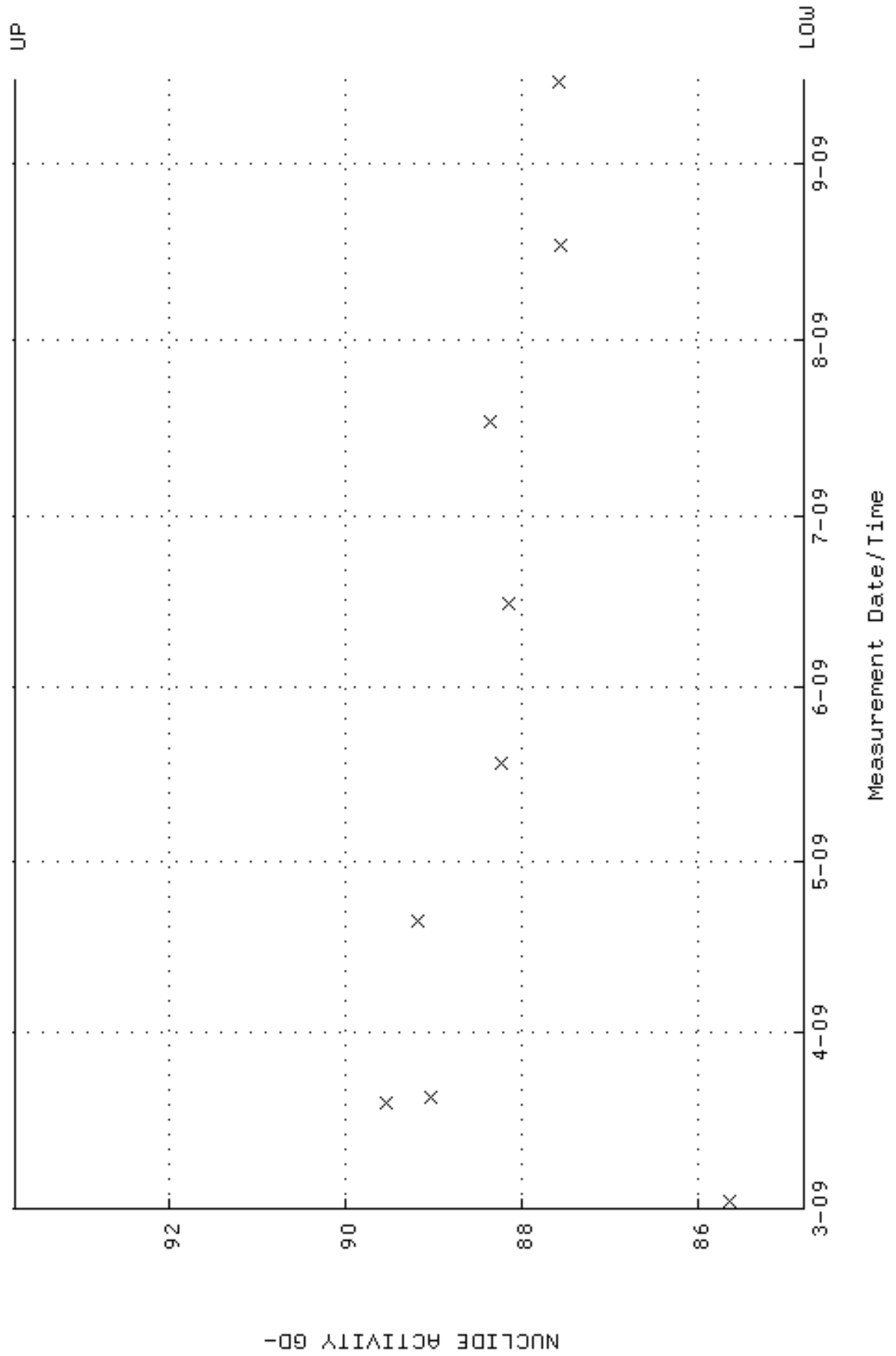
QA filename : DKA100:[ENV_ALPHA.QA.B]B048.QAF;2
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 5-APR-2009 15:33:15 through 7-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



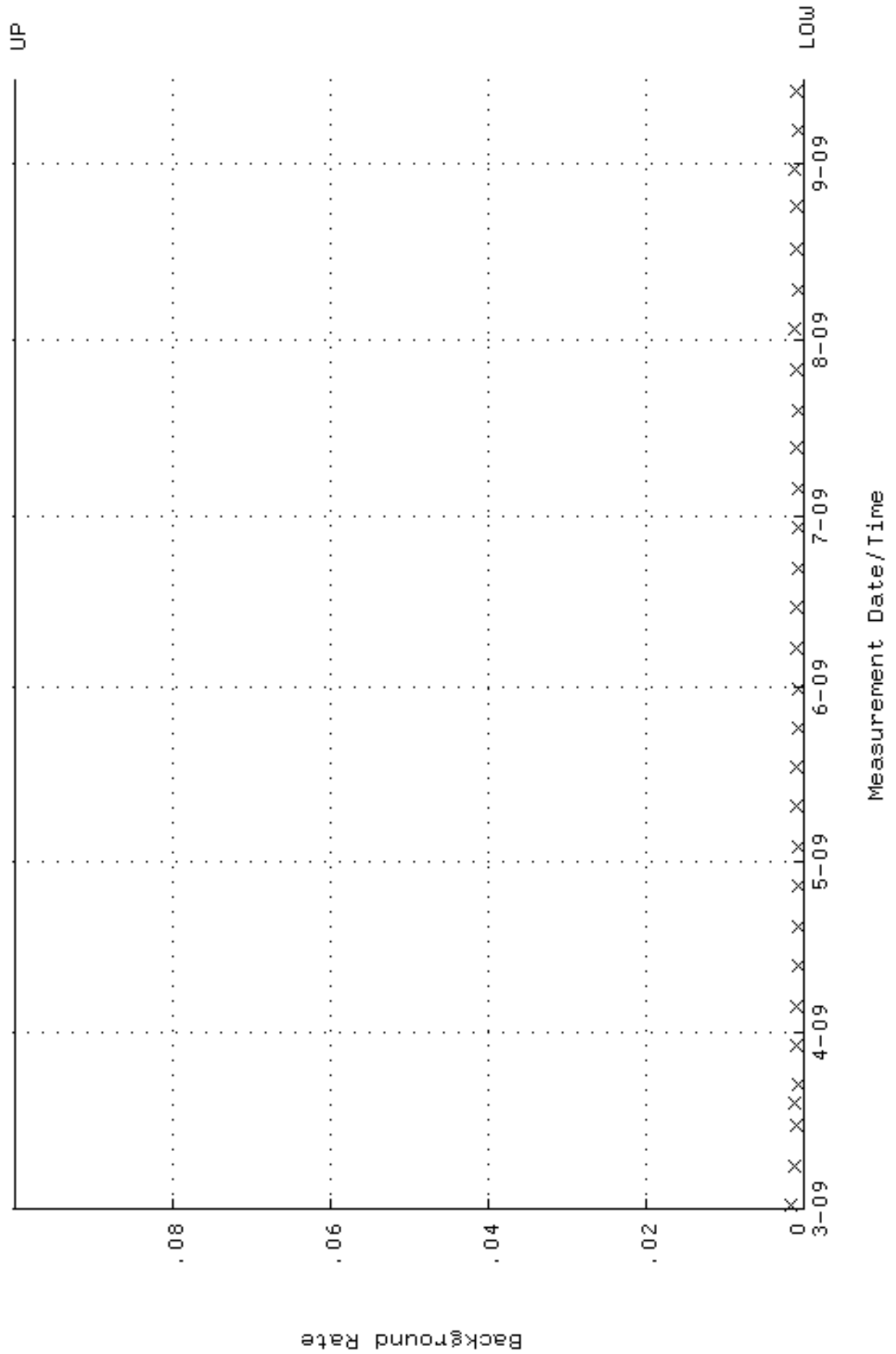
QA filename : DKA100:[ENV_ALPHA.QA.W]W149.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:08 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.242495 through 0.262495



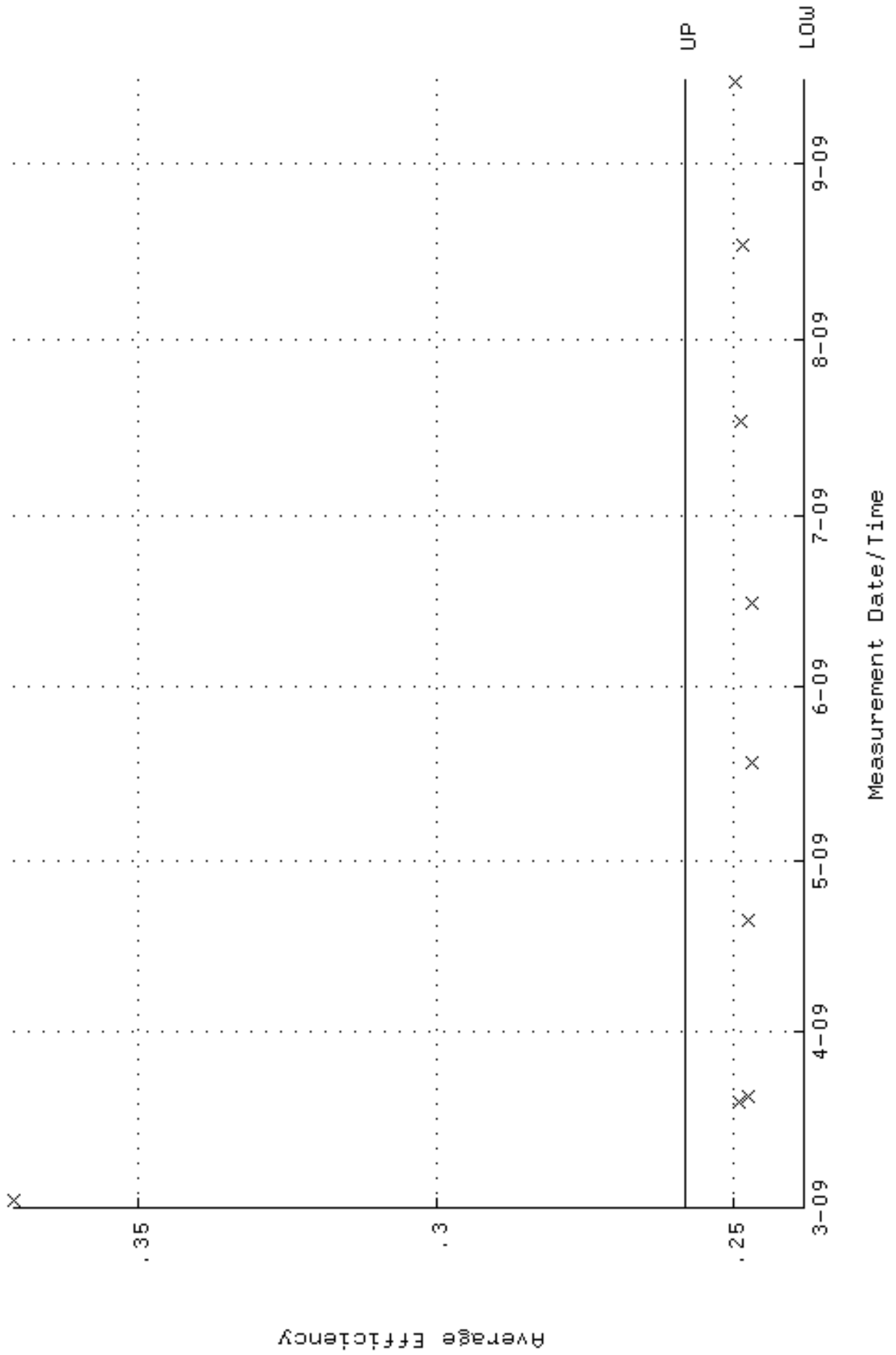
QA filename : DKA100:[ENV_ALPHA.QA.W]W149.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:08 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 84.8126 through 93.7402



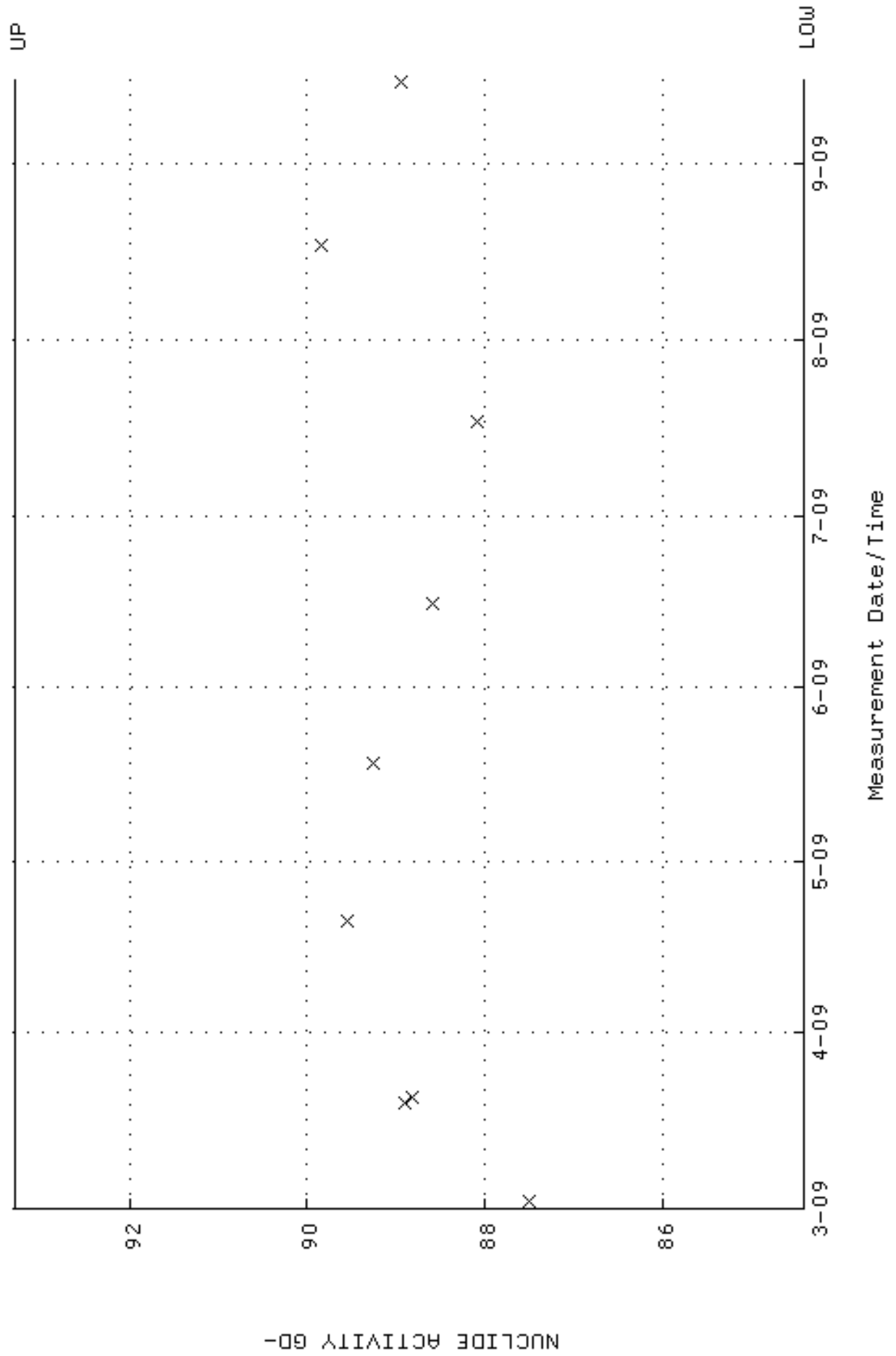
QA filename : DKA100:[ENV_ALPHA.QA.B]B149.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:17 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



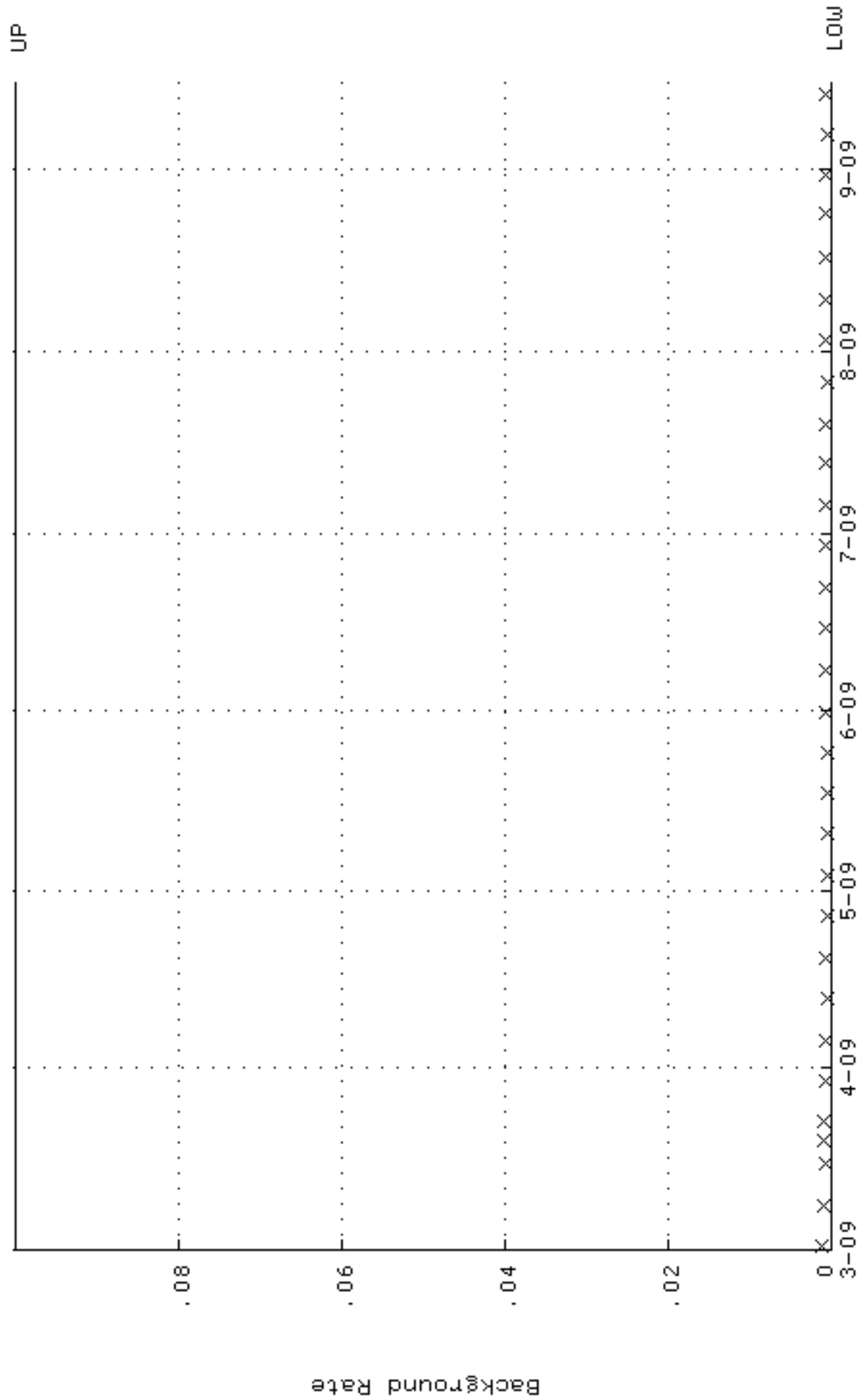
QA filename : DKA100:[ENV_ALPHA.QA.W]W150.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:14 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.238314 through 0.258314



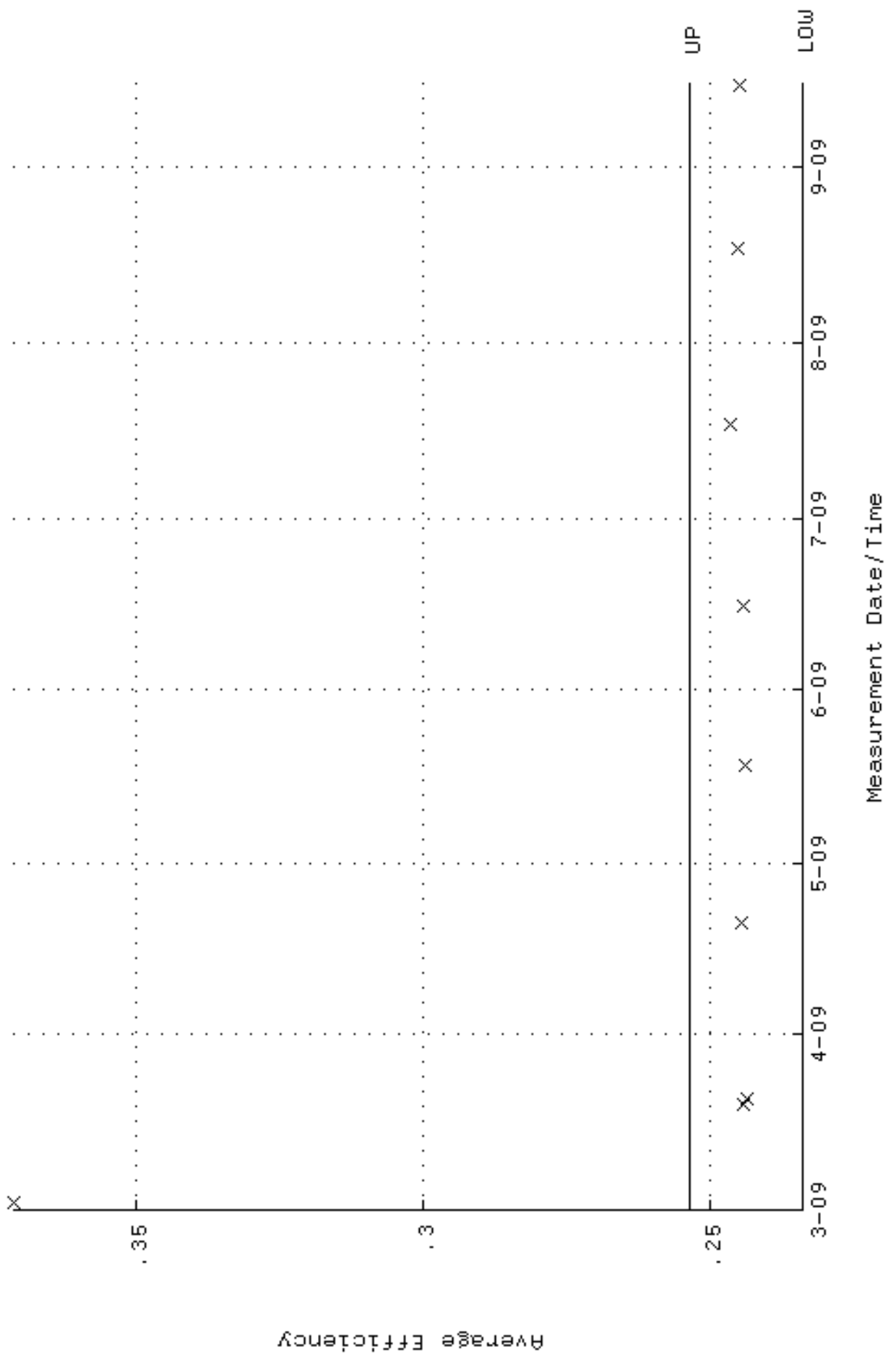
QA filename : DKA100:[ENV_ALPHA.QA.W]W150.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:14 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 84.4039 through 93.2885



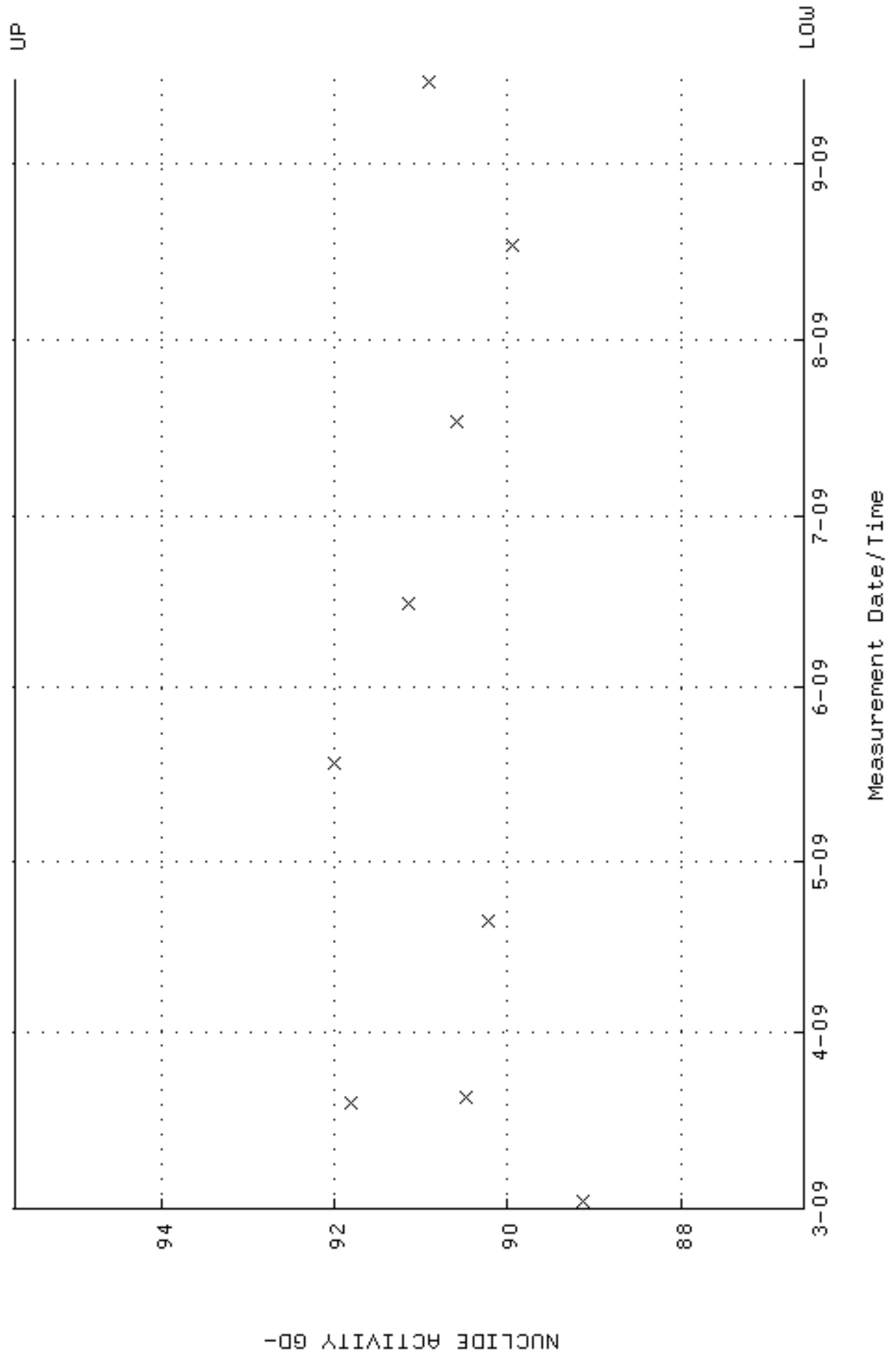
QA filename : DKA100:[ENV_ALPHA.QA.B]B150.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:21 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



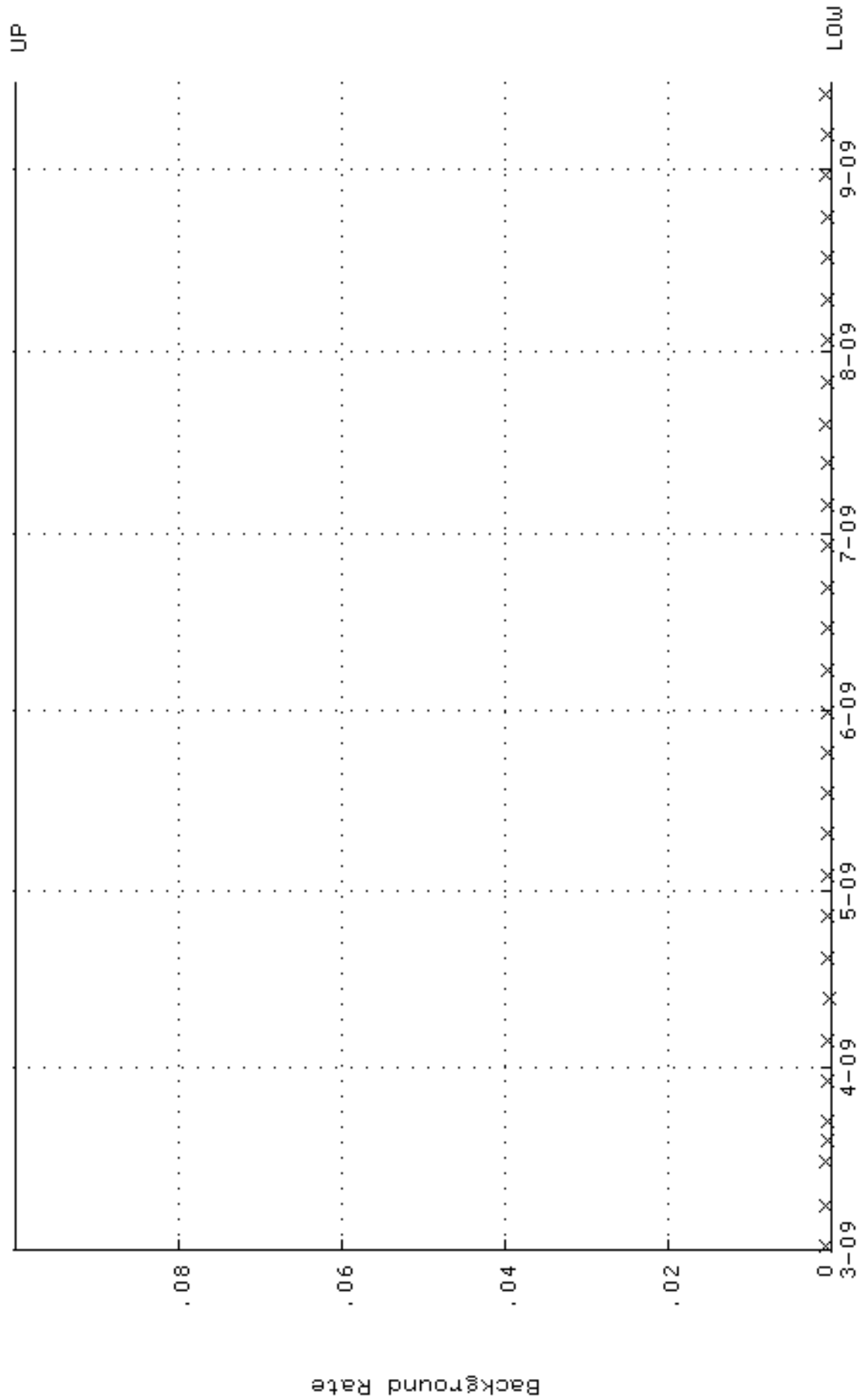
QA filename : DKA100:[ENV_ALPHA.QA.W]W151.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:19 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.233693 through 0.253693



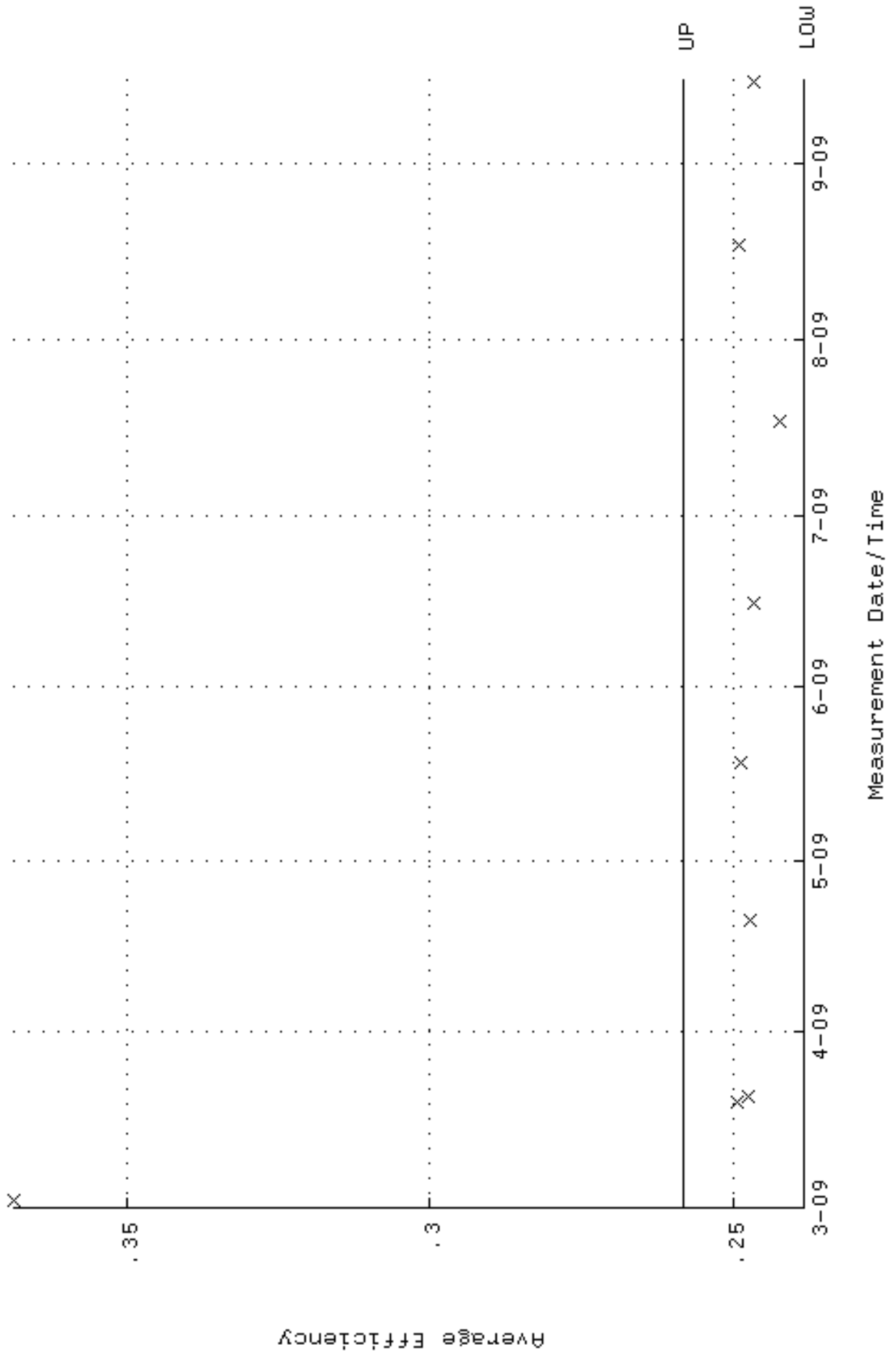
QA filename : DKA100:[ENV_ALPHA.QA.W]w151.QAF;1
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 2-MAR-2009 11:11:19 through 15-SEP-2009 12:00:00
Lower/Upper Lmts: 86.5749 through 95.6881



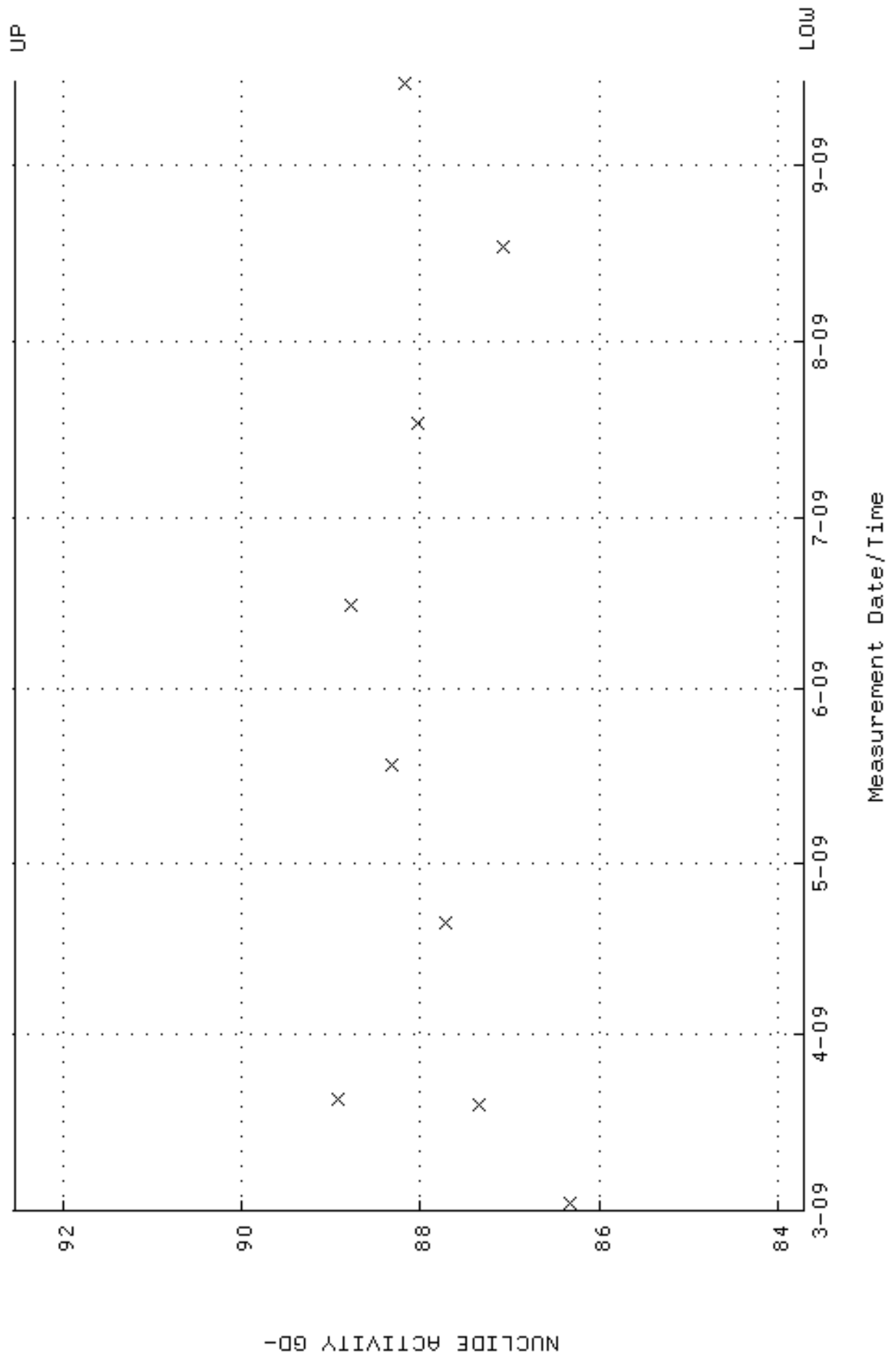
QA filename : DKA100:[ENV_ALPHA.QA.B]B151.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:25 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



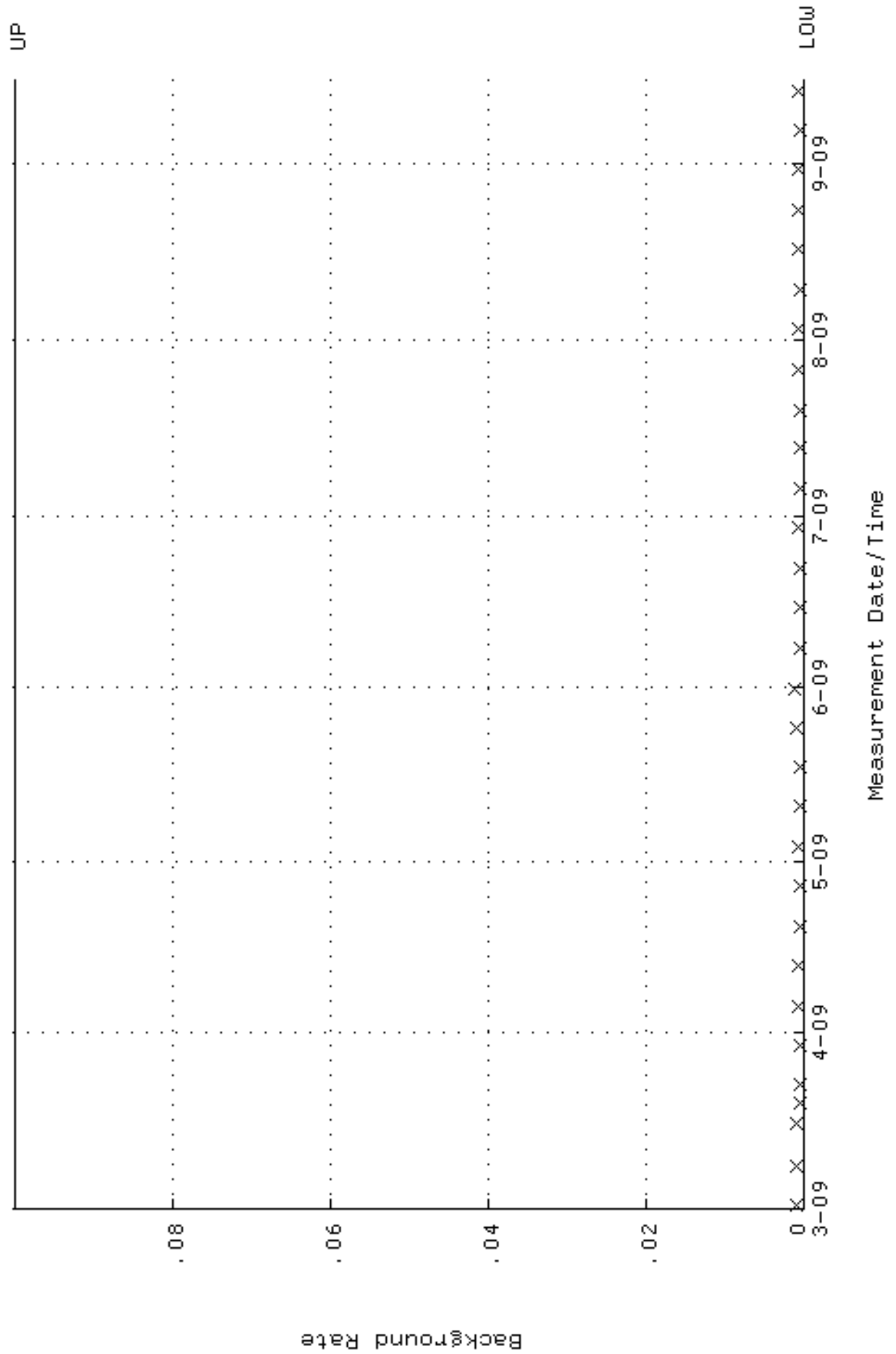
QA filename : DKA100:[ENV_ALPHA.QA.W]W152.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:24 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.238479 through 0.258479



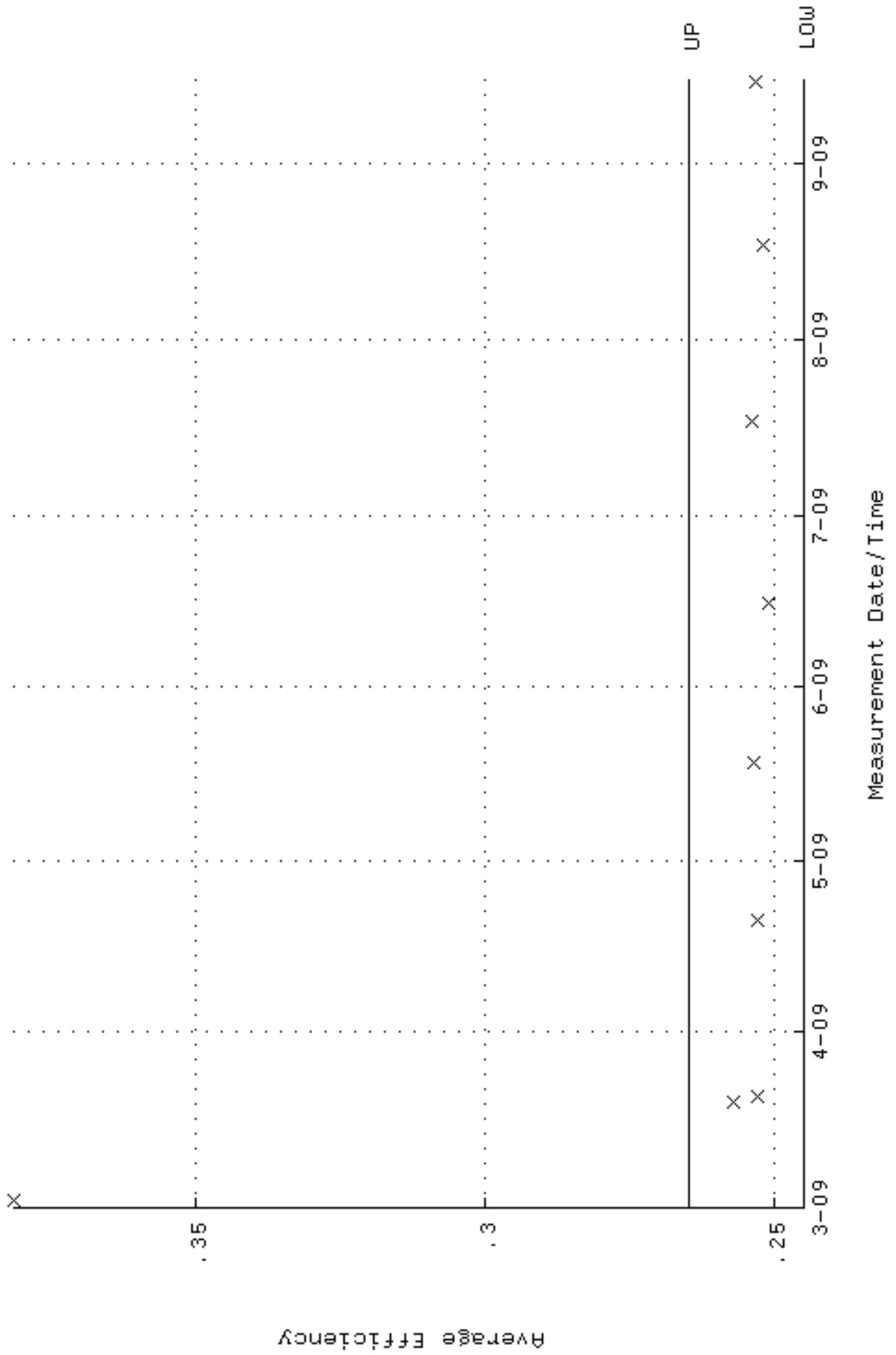
QA filename : DKA100:[ENV_ALPHA.QA.W]w152.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:24 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 83.7180 through 92.5304



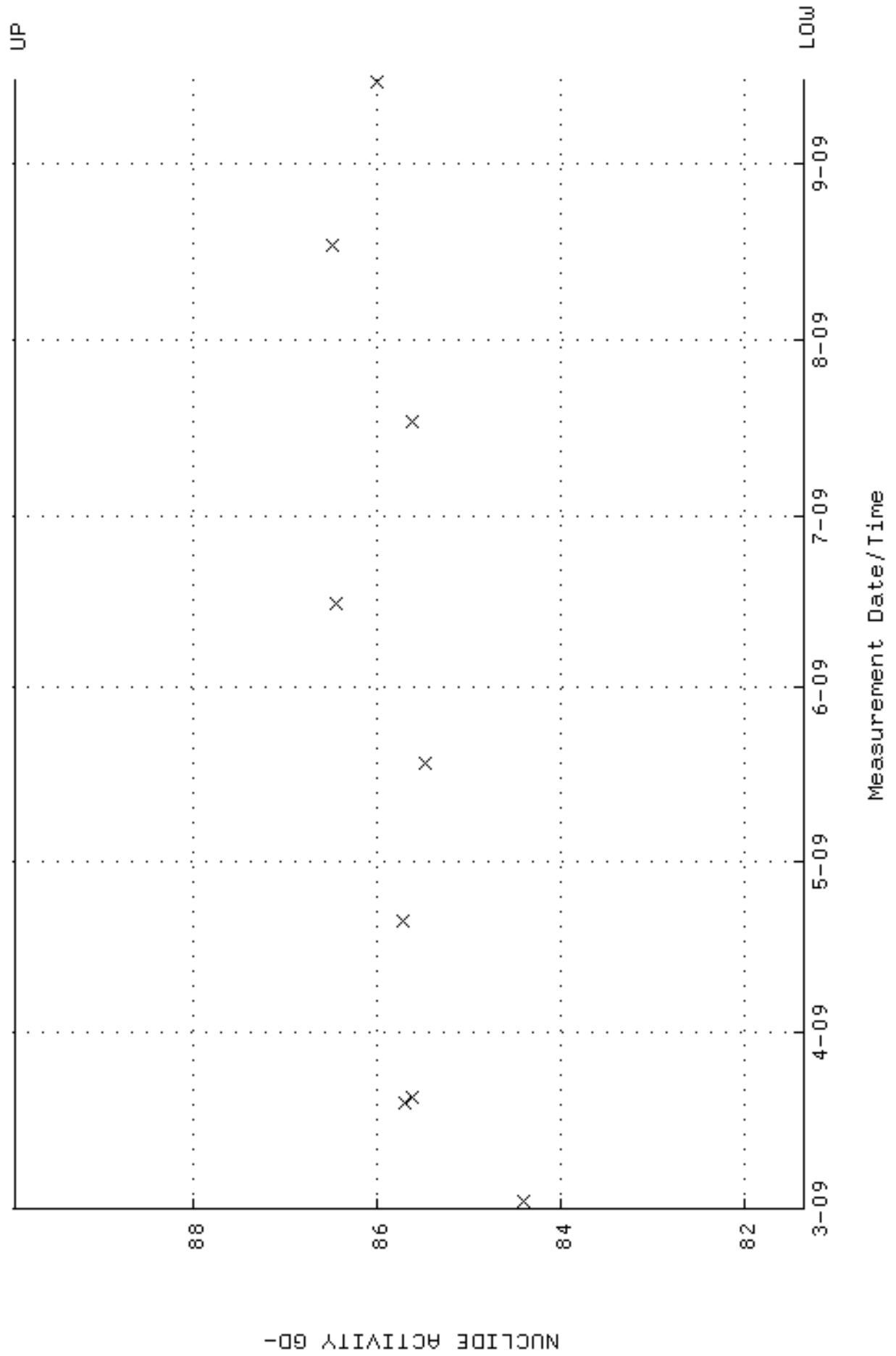
QA filename : DKA100:[ENV_ALPHA.QA.B]B152.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:28 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



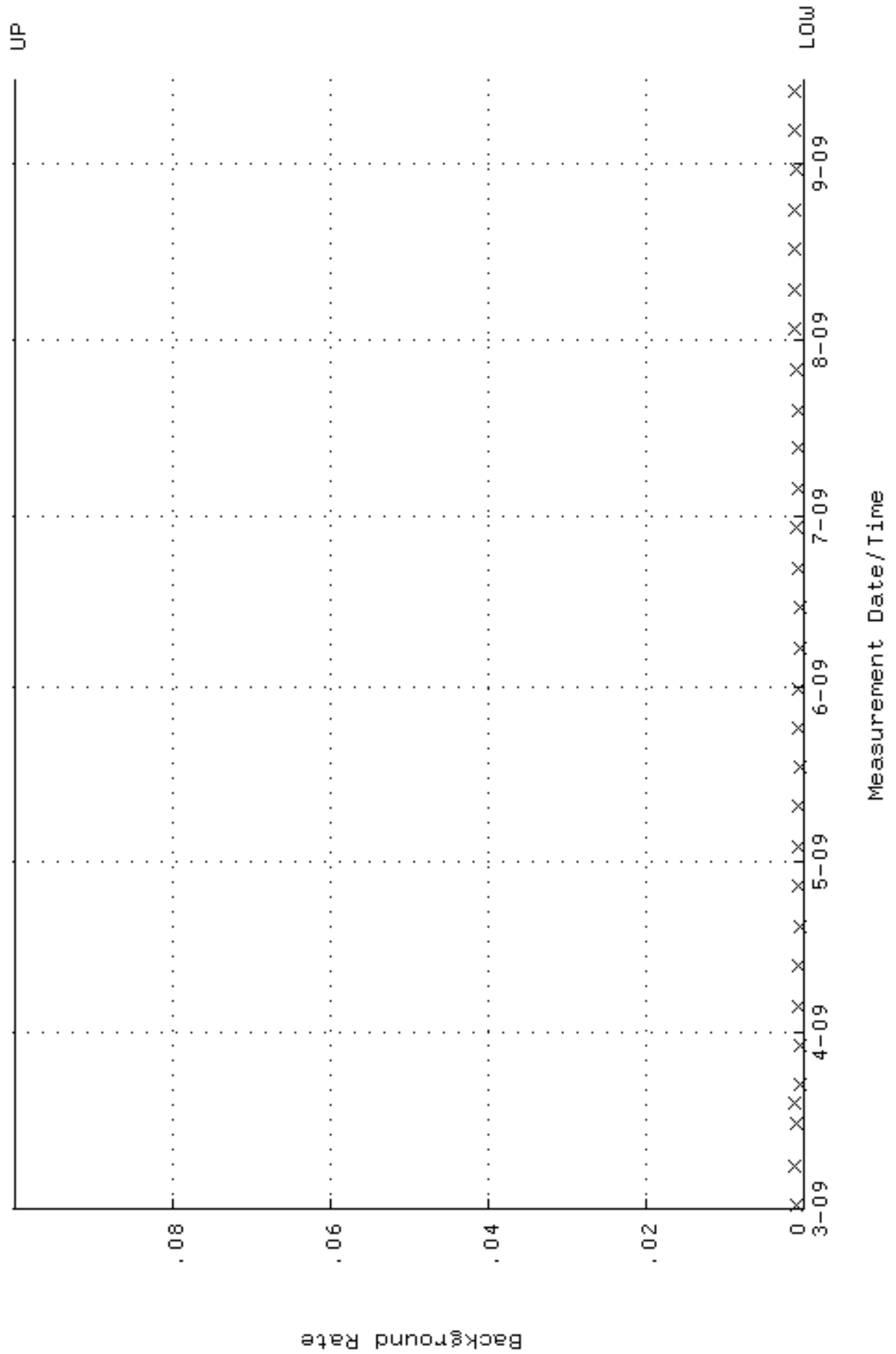
QA filename : DKA100:[ENV_ALPHA.QA.W]W153.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:30 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.244738 through 0.264738



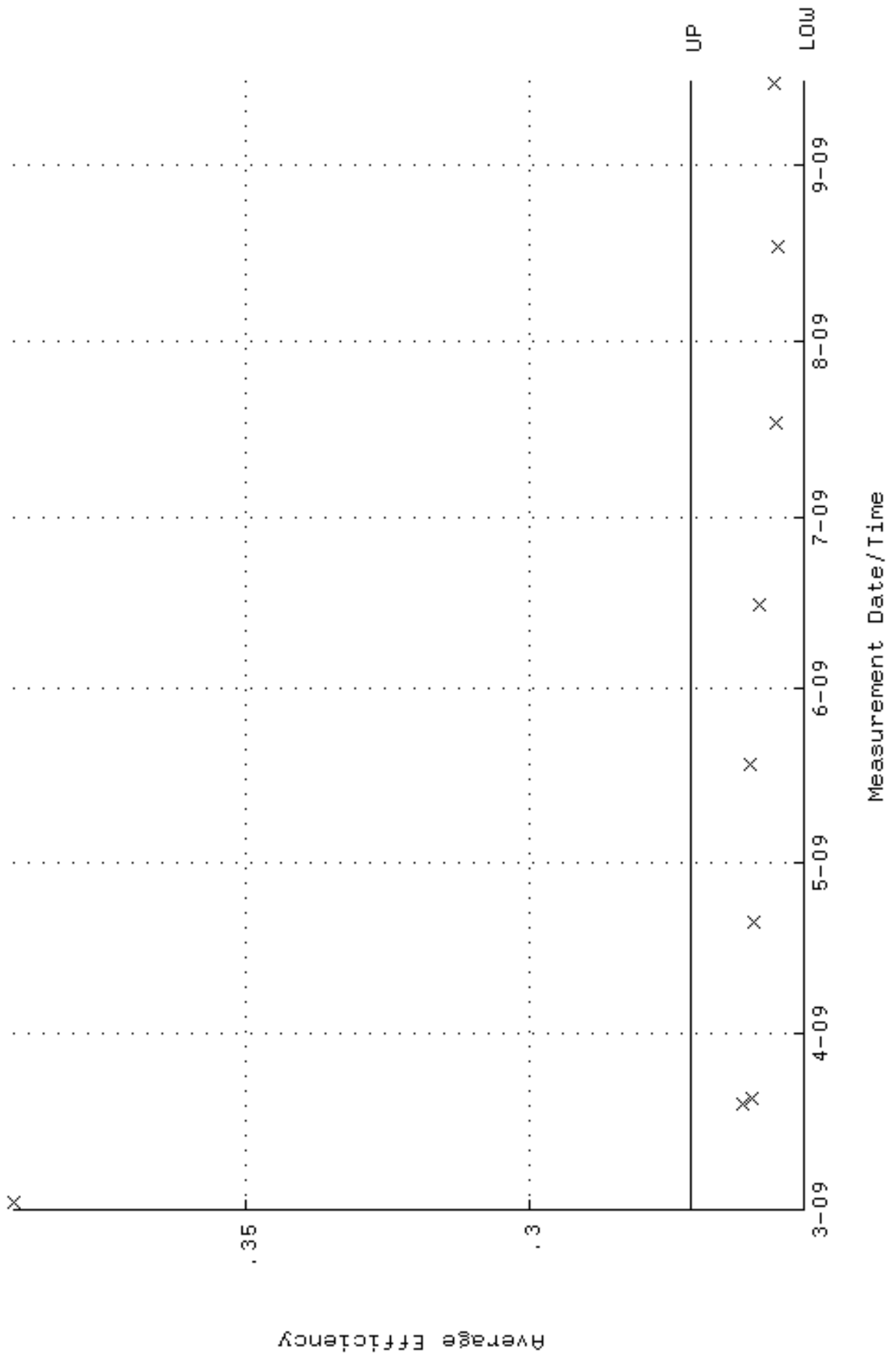
QA filename : DKA100:[ENV_ALPHA.QA.W]W153.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:30 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 81.3634 through 89.9280



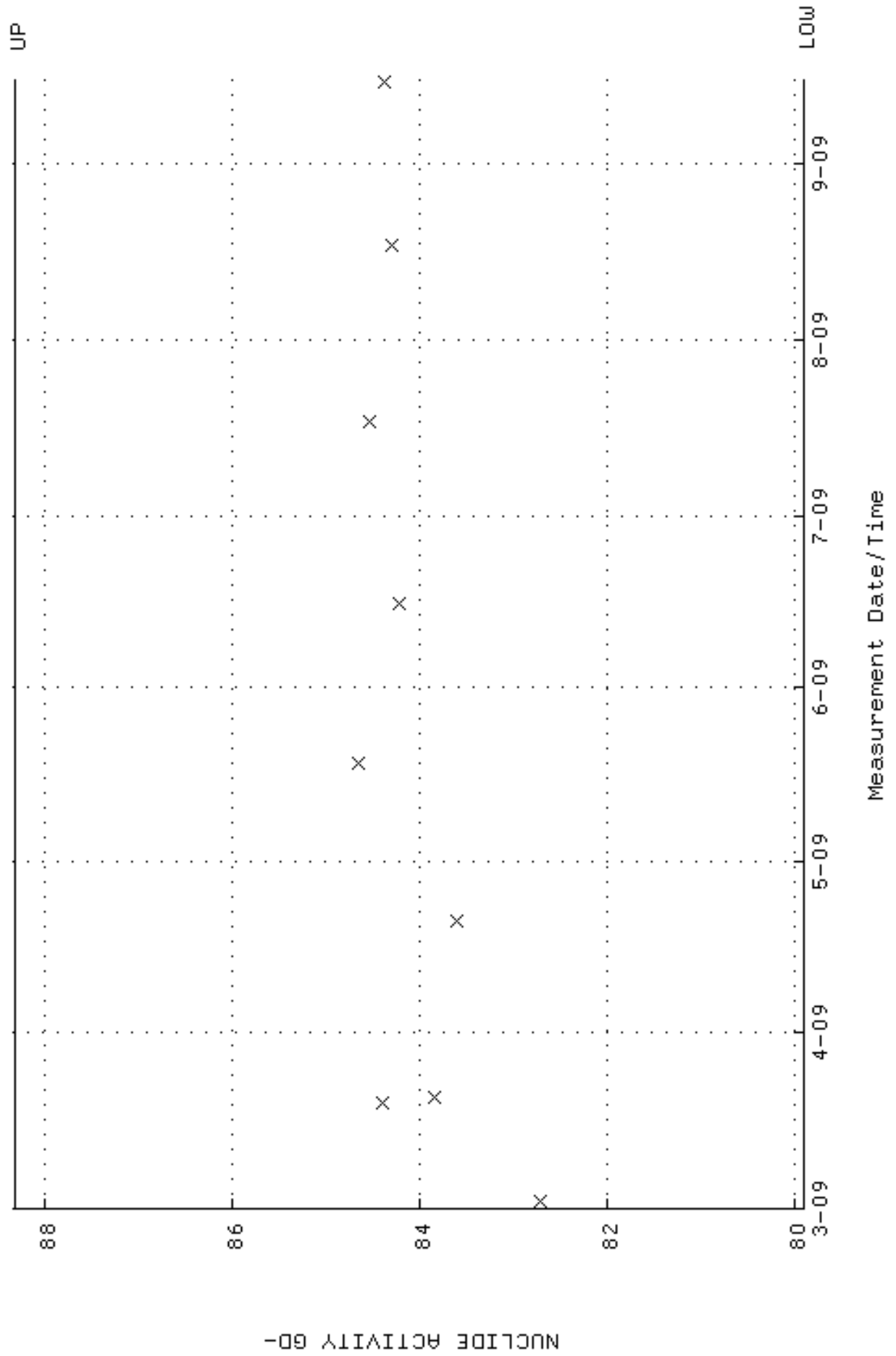
QA filename : DKA100:[ENV_ALPHA.QA.B]B153.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:32 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



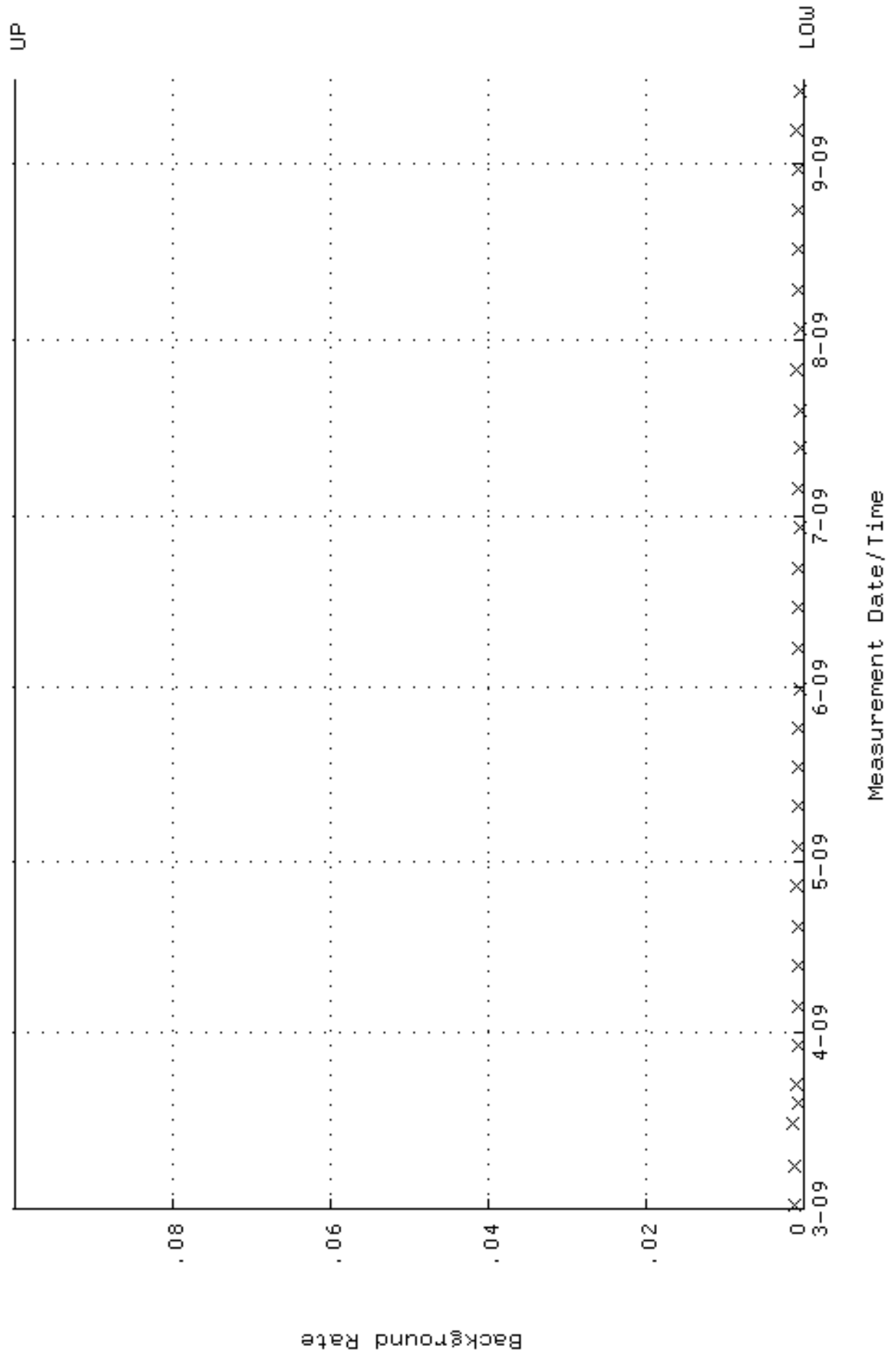
QA filename : DKA100:[ENV_ALPHA.QA.W]W154.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:36 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.251386 through 0.271386



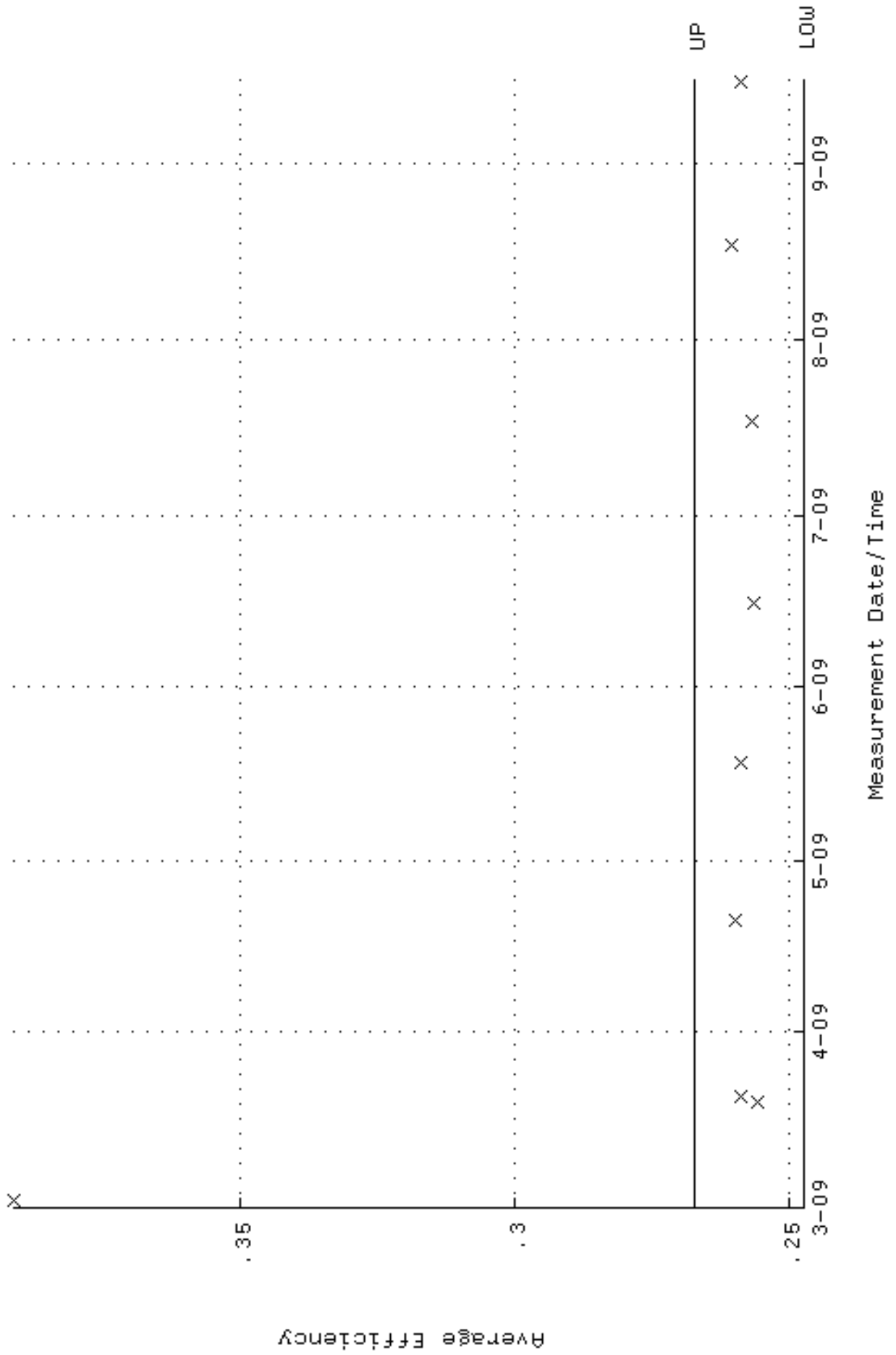
QA filename : DKA100:[ENV_ALPHA.QA.W]w154.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:36 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 79.9003 through 88.3109



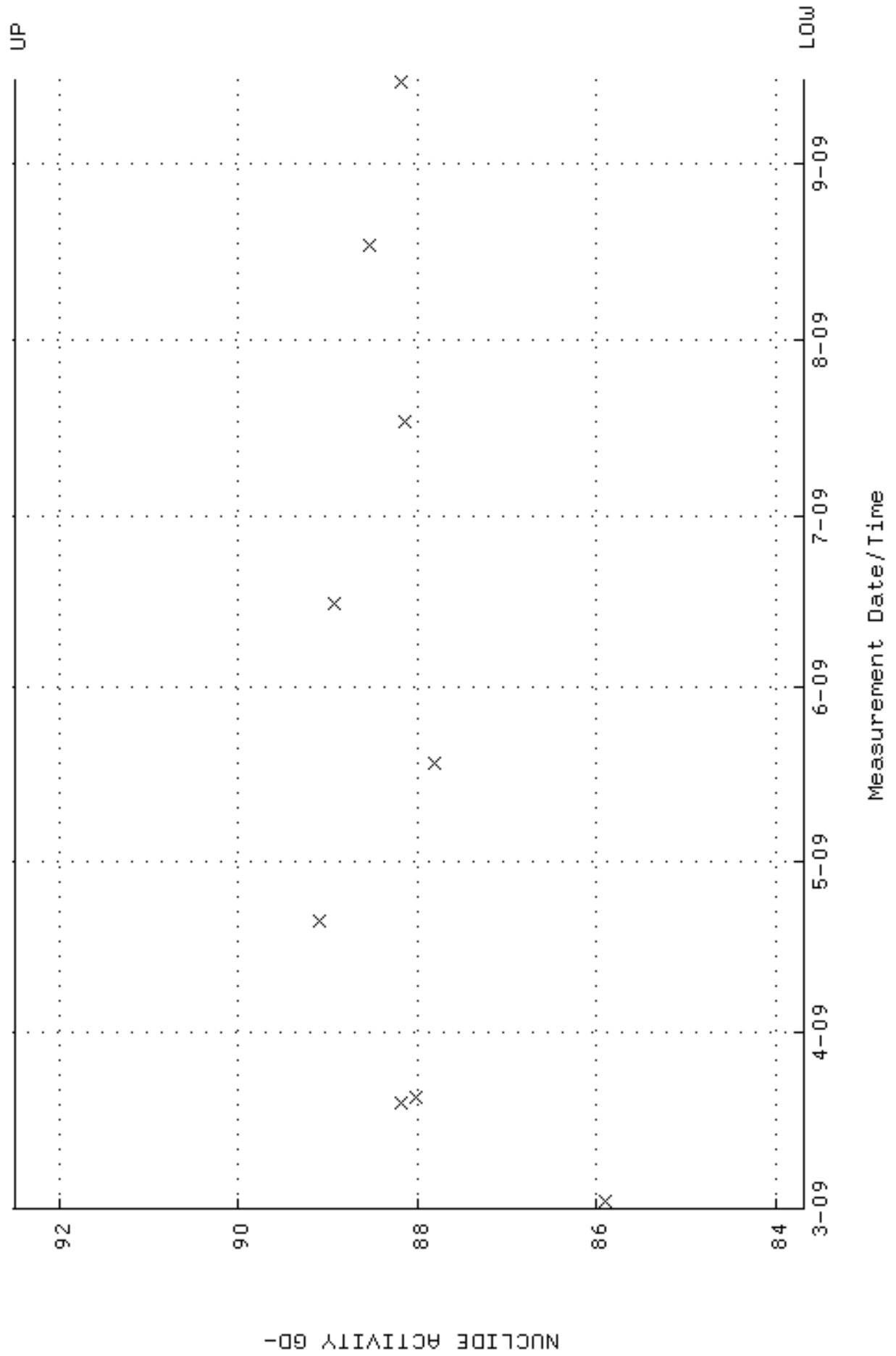
QA filename : DKA100:[ENV_ALPHA.QA.B]B154.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:36 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



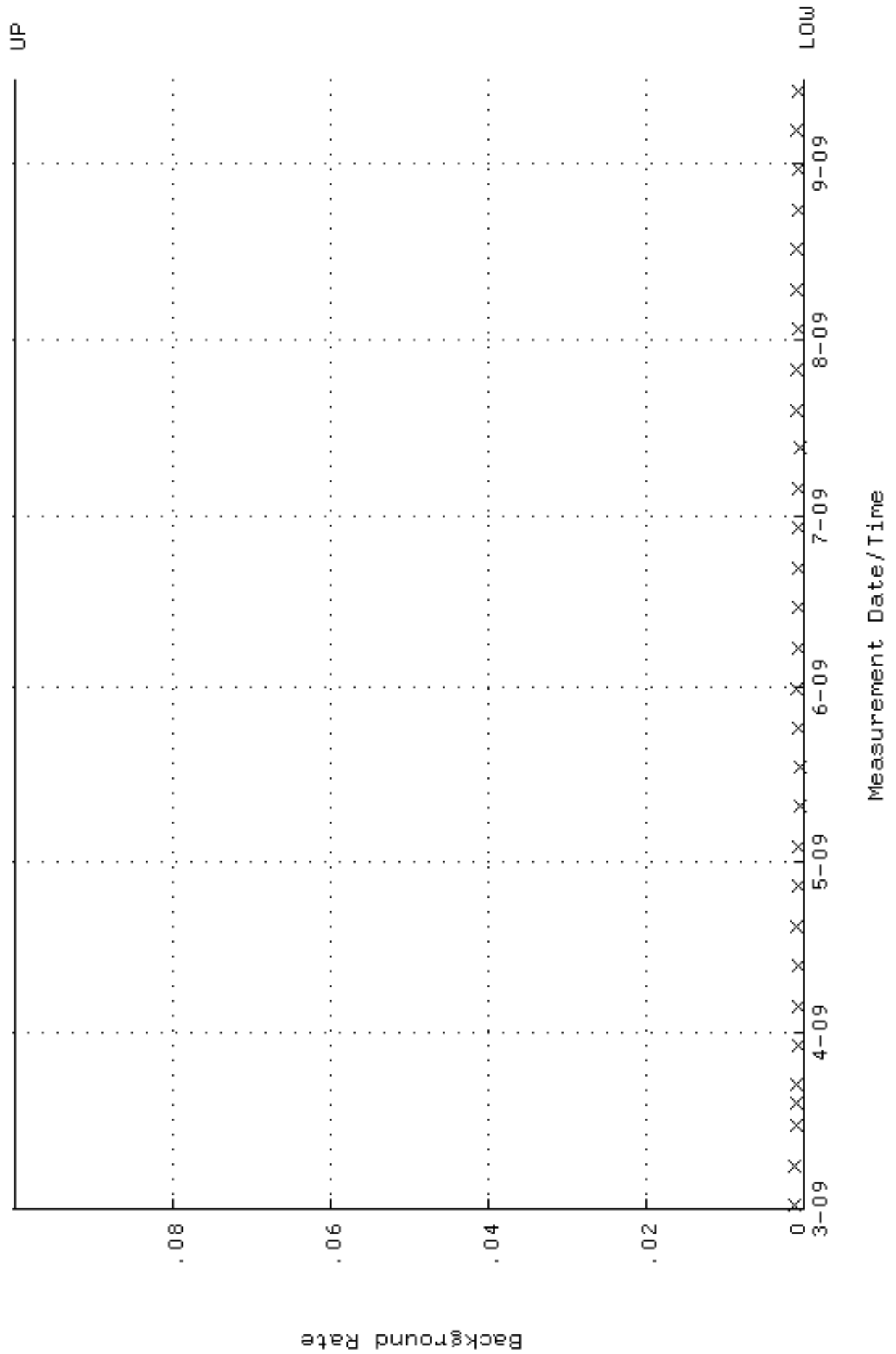
QA filename : DKA100:[ENV_ALPHA.QA.W]W155.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:42 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.247241 through 0.267241



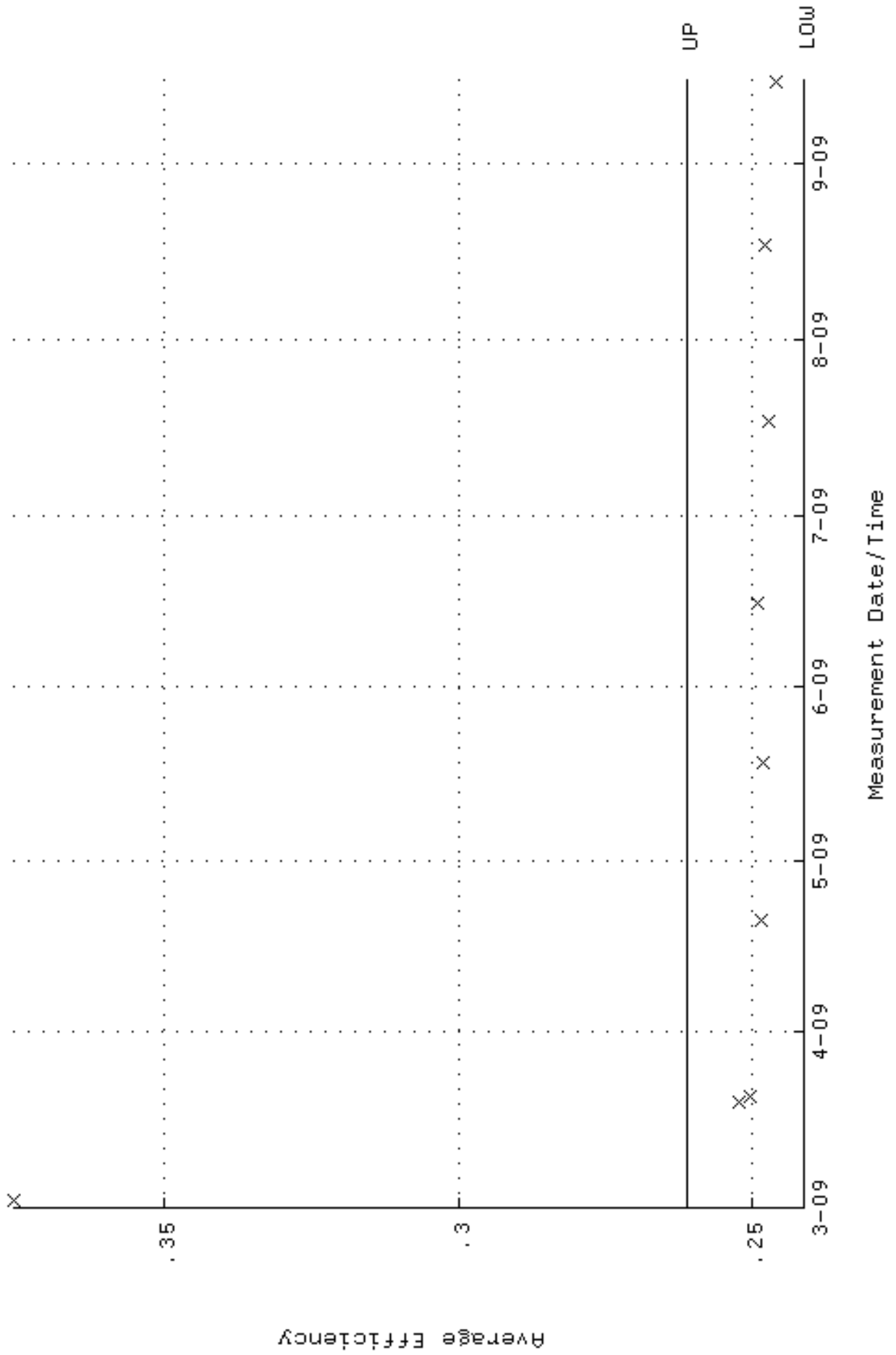
QA filename : DKA100:[ENV_ALPHA.QA.W]W155.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:42 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 83.6873 through 92.4965



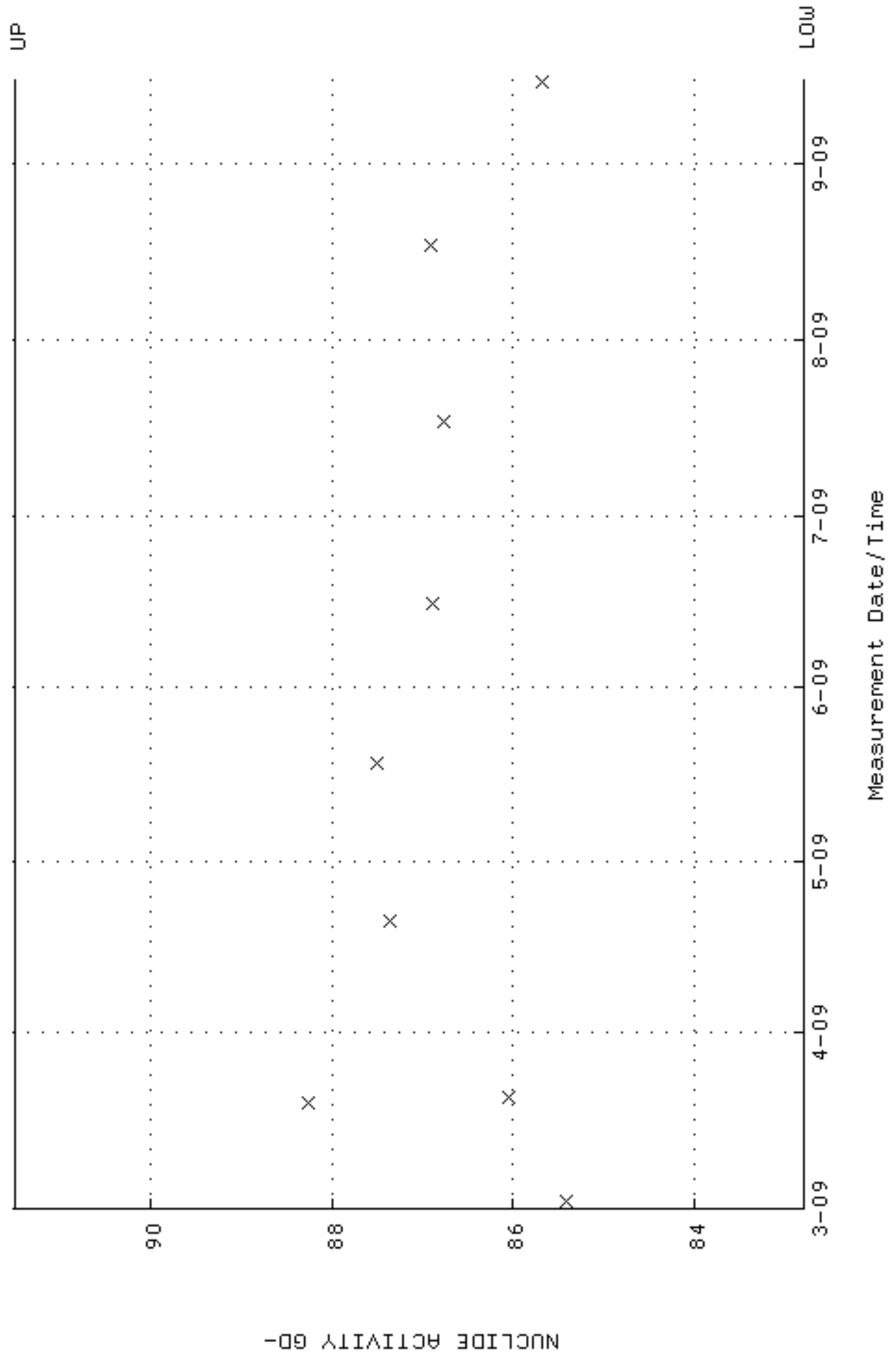
QA filename : DKA100:[ENV_ALPHA.QA.B]B155.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:39 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



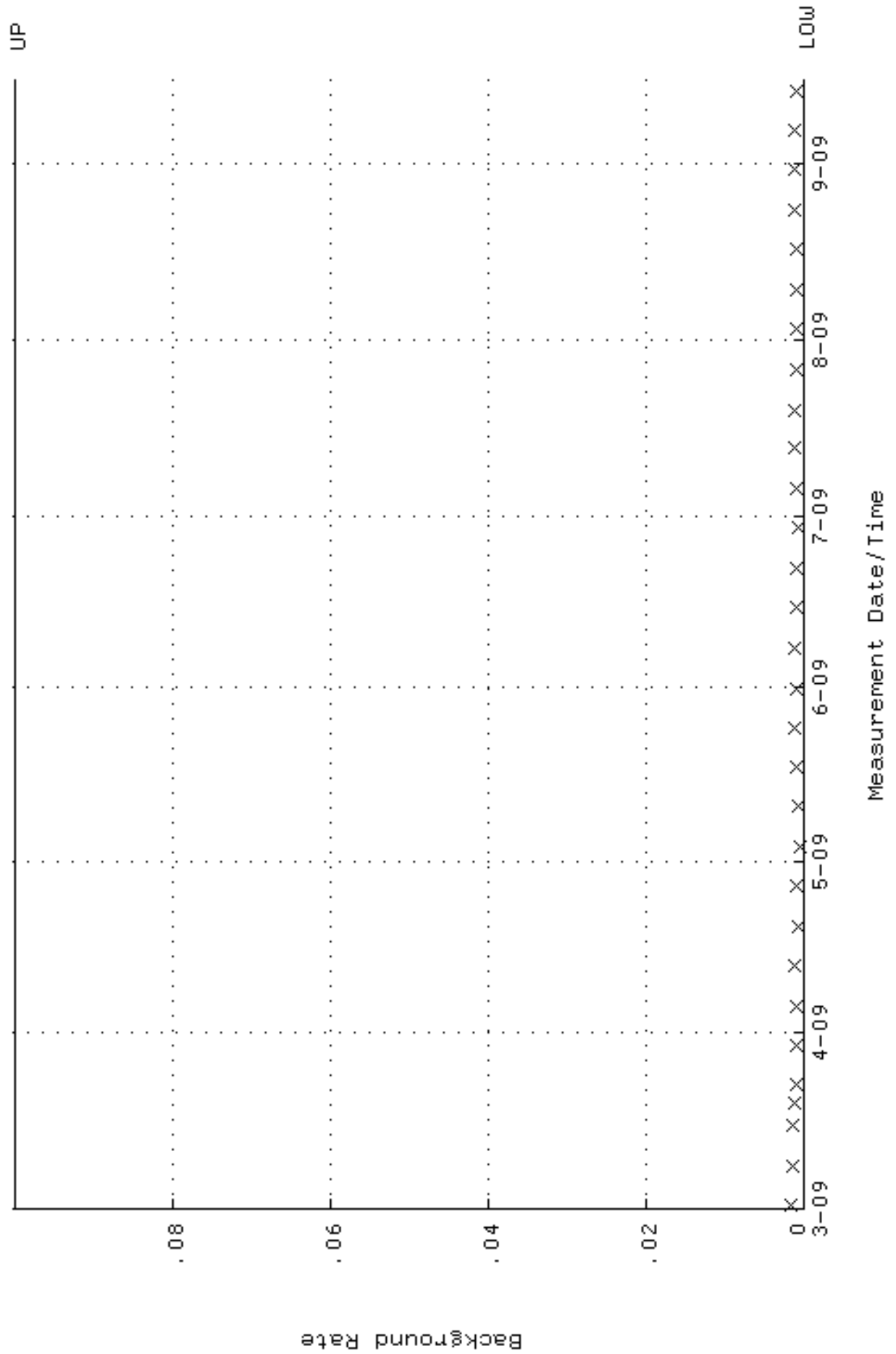
QA filename : DKA100:[ENV_ALPHA.QA.W]W156.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:49 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.241250 through 0.261250



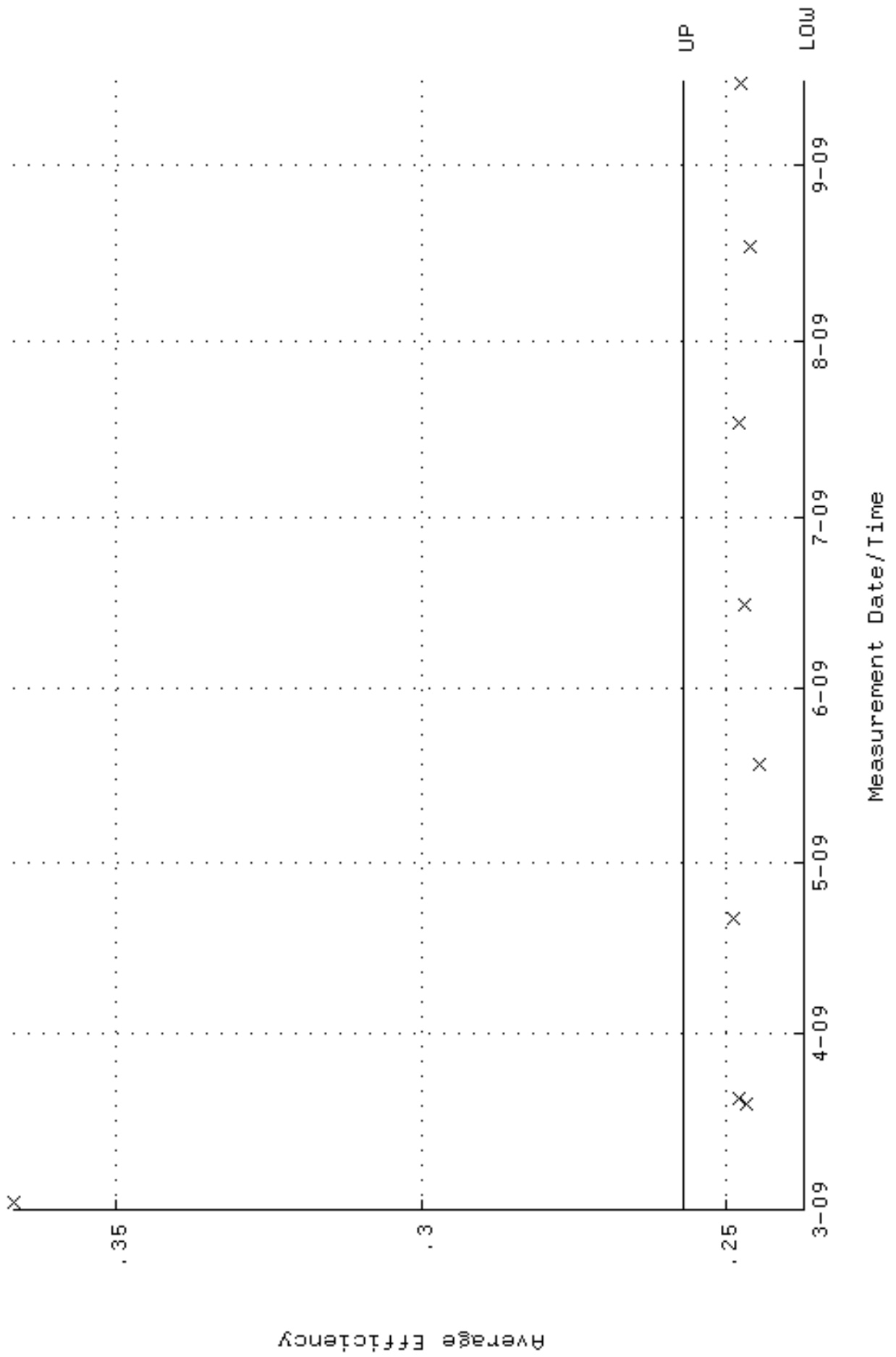
QA filename : DKA100:[ENV_ALPHA.QA.W]w156.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:49 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 82.7847 through 91.4989



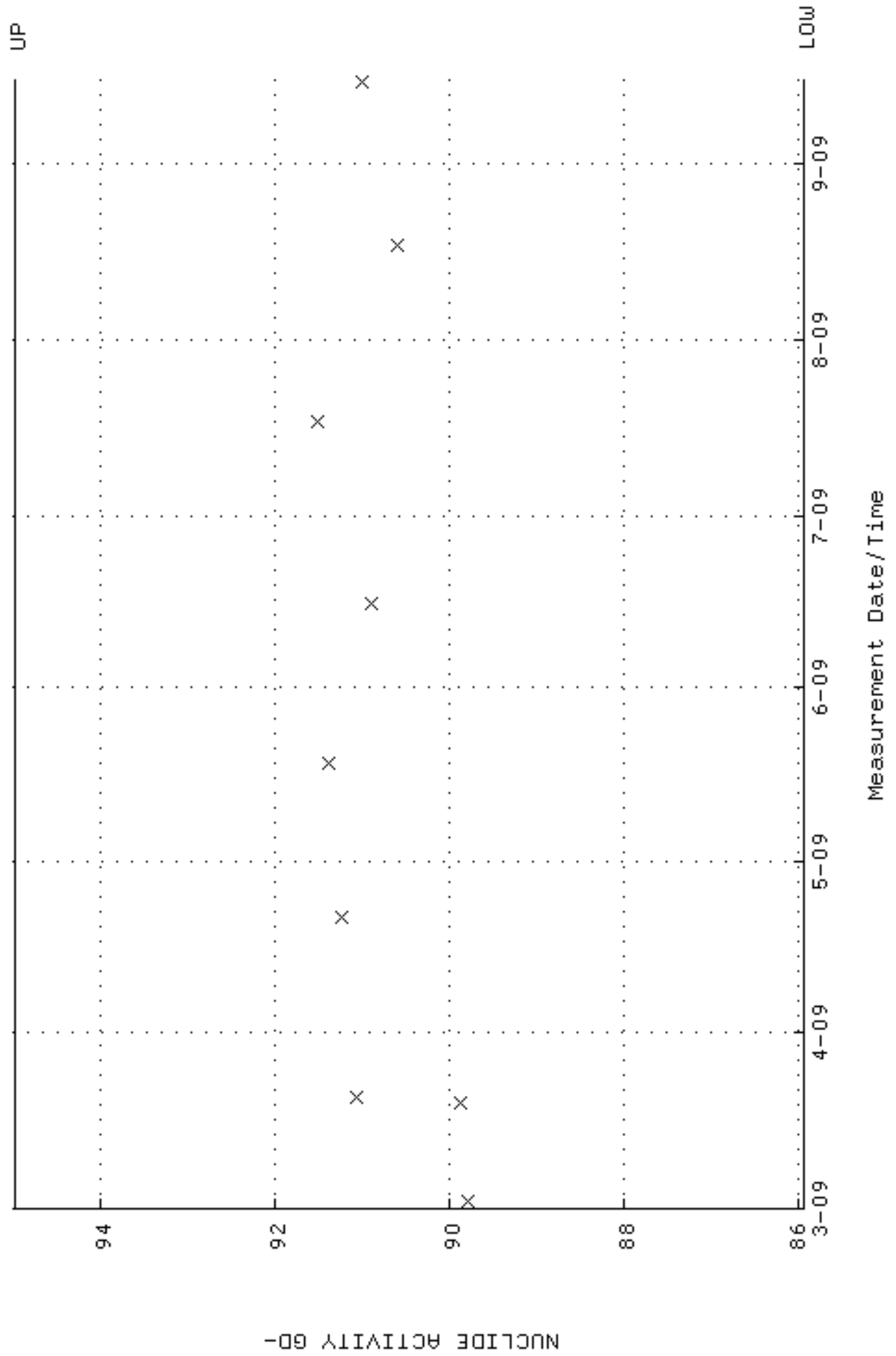
QA filename : DKA100:[ENV_ALPHA.QA.B]B156.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:43 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



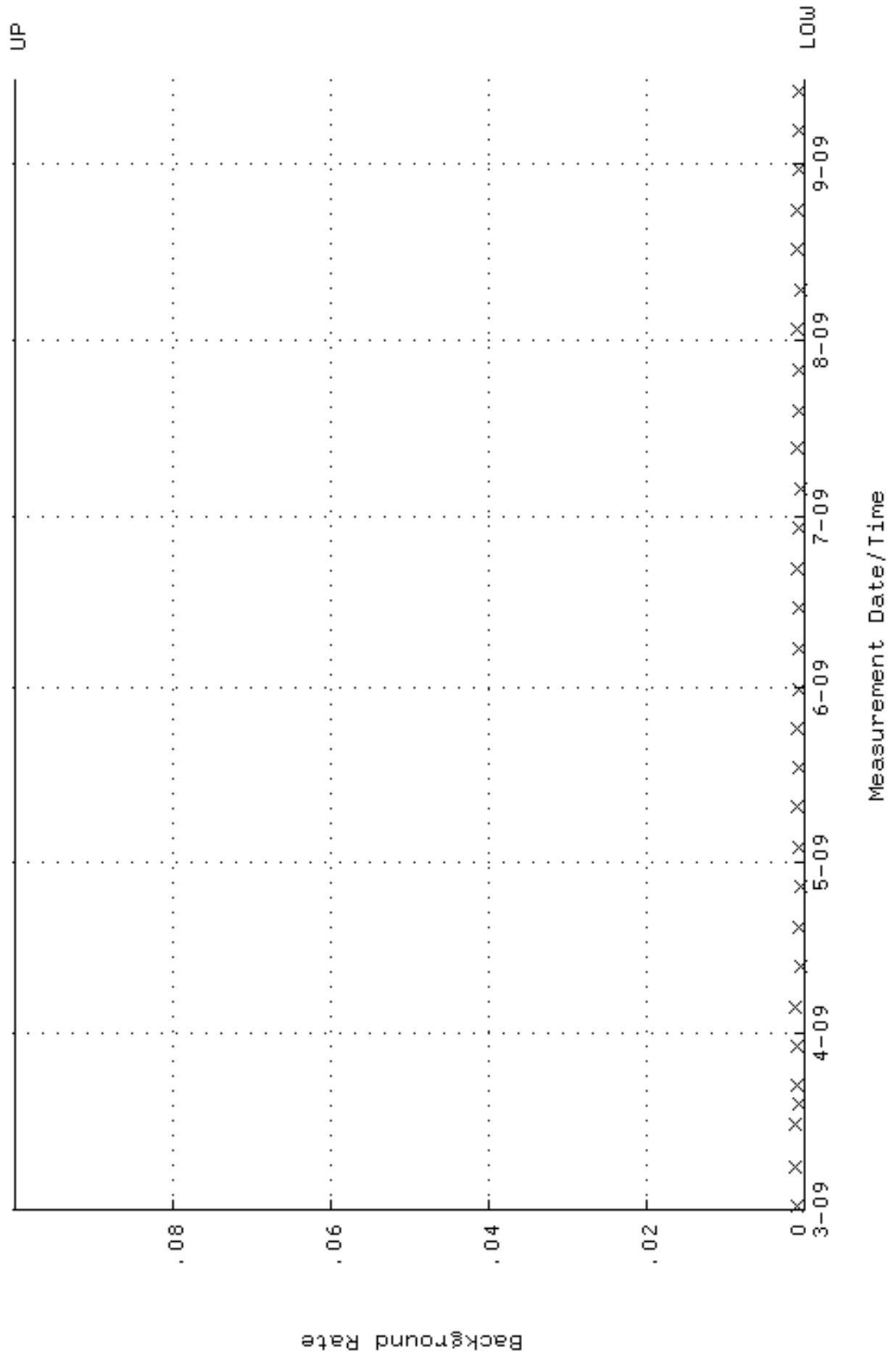
QA filename : DKA100:[ENV_ALPHA.QA.W]W157.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:11:54 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.237137 through 0.257137



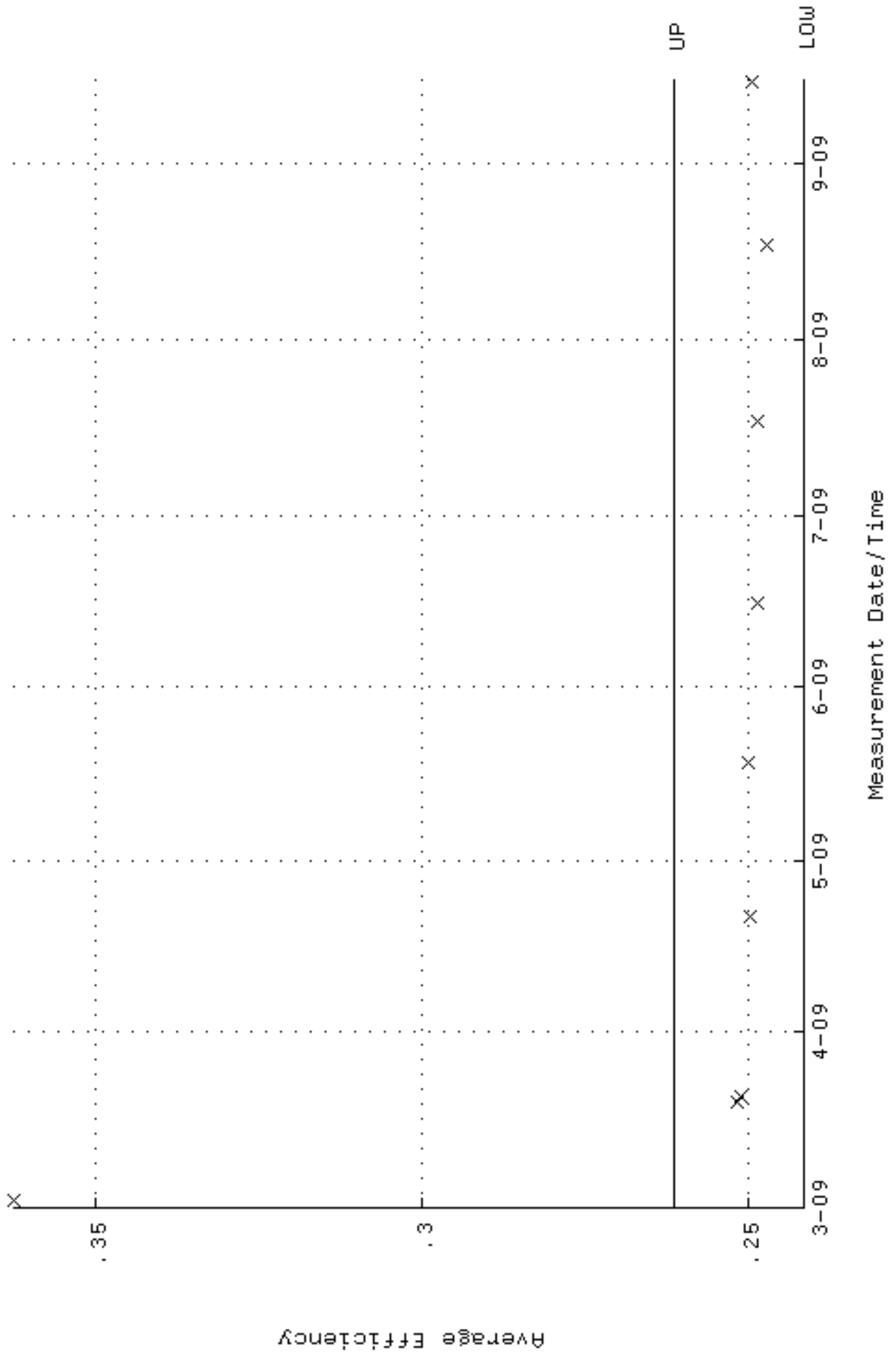
QA filename : DKA100:[ENV_ALPHA.QA.W]w157.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:11:54 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 85.9292 through 94.9744



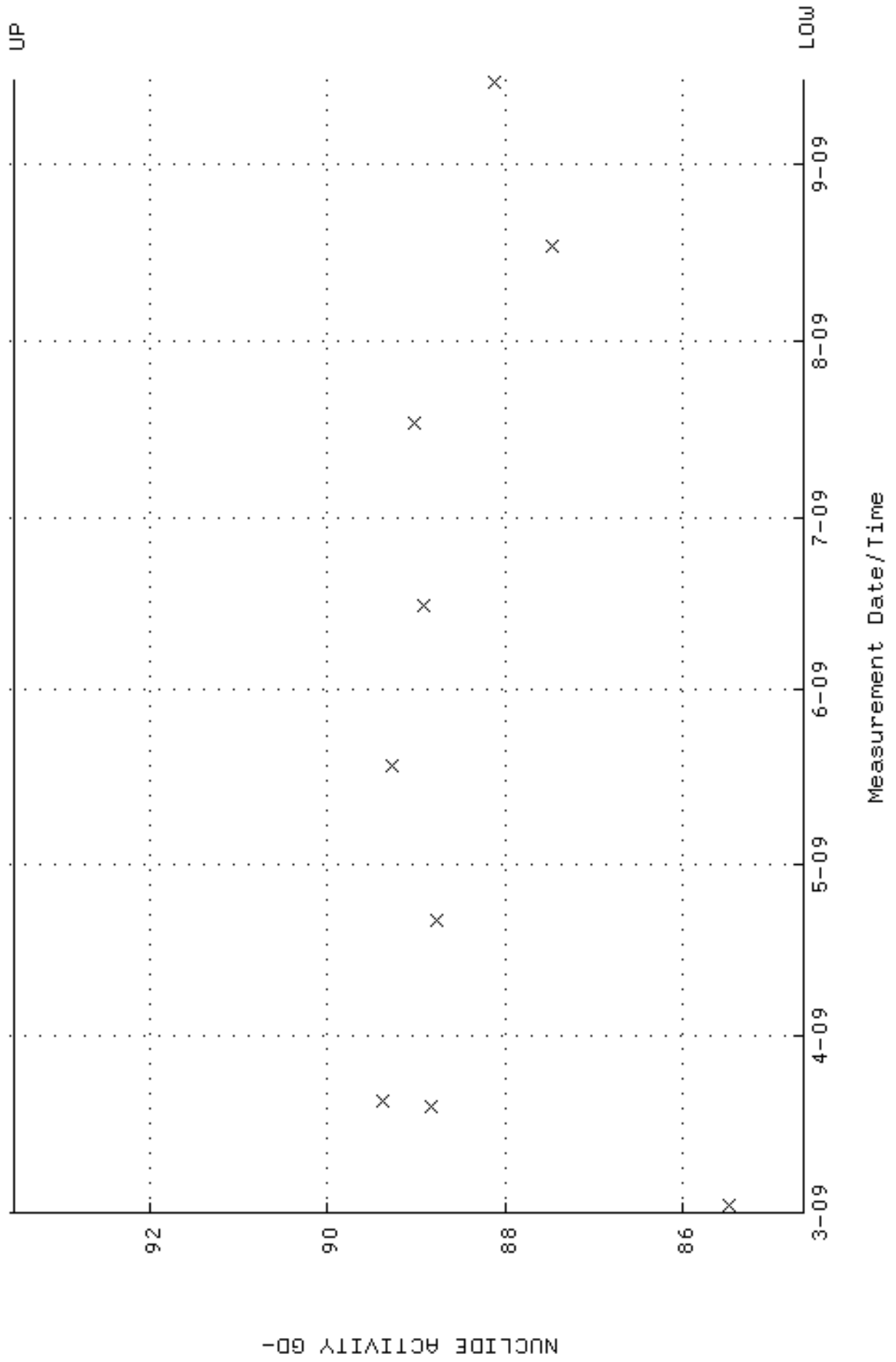
QA filename : DKA100:[ENV_ALPHA.QA.B]B157.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:47 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



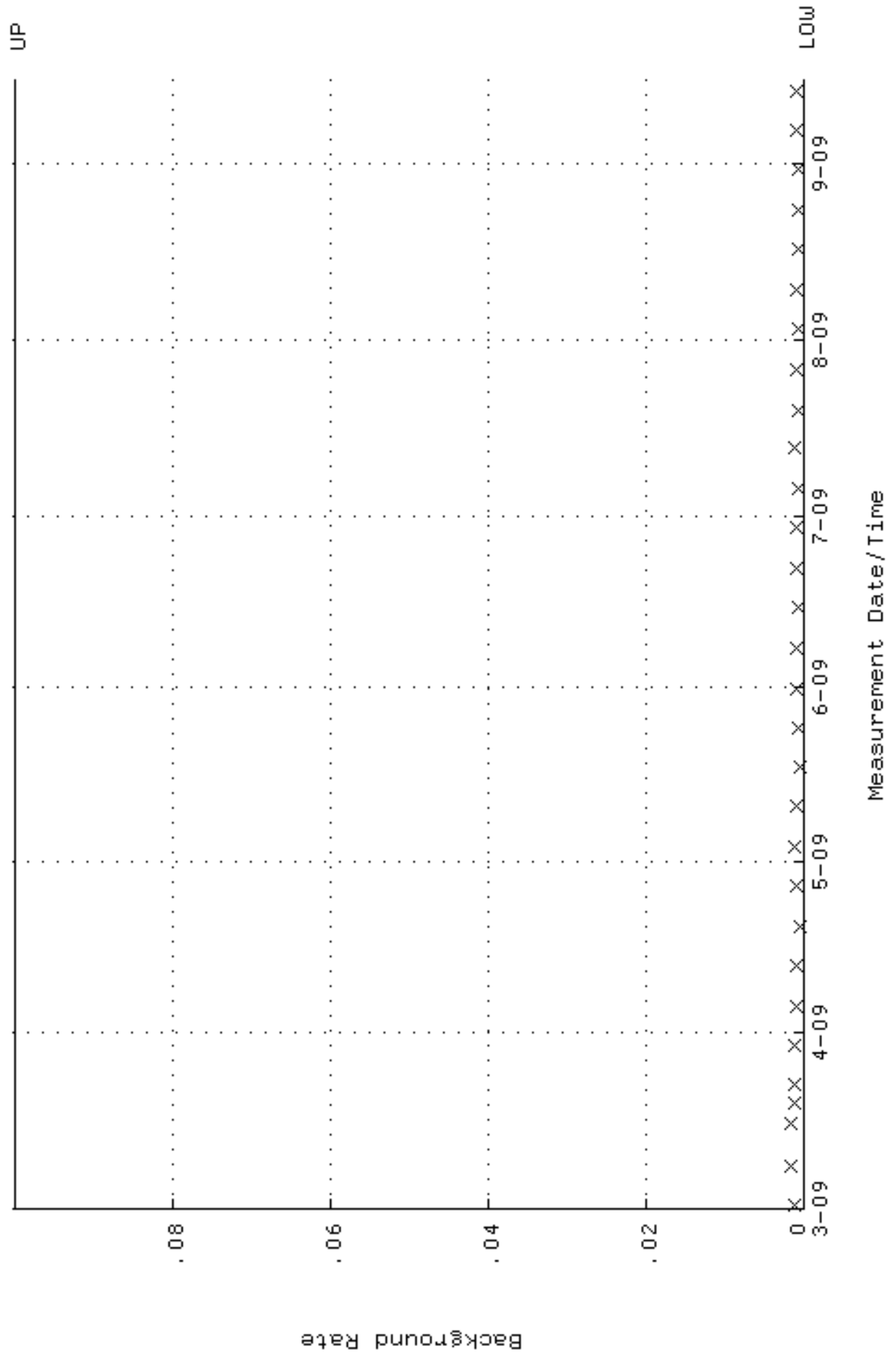
QA filename : DKA100:[ENV_ALPHA.QA.W]W158.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:12:01 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.241466 through 0.261466



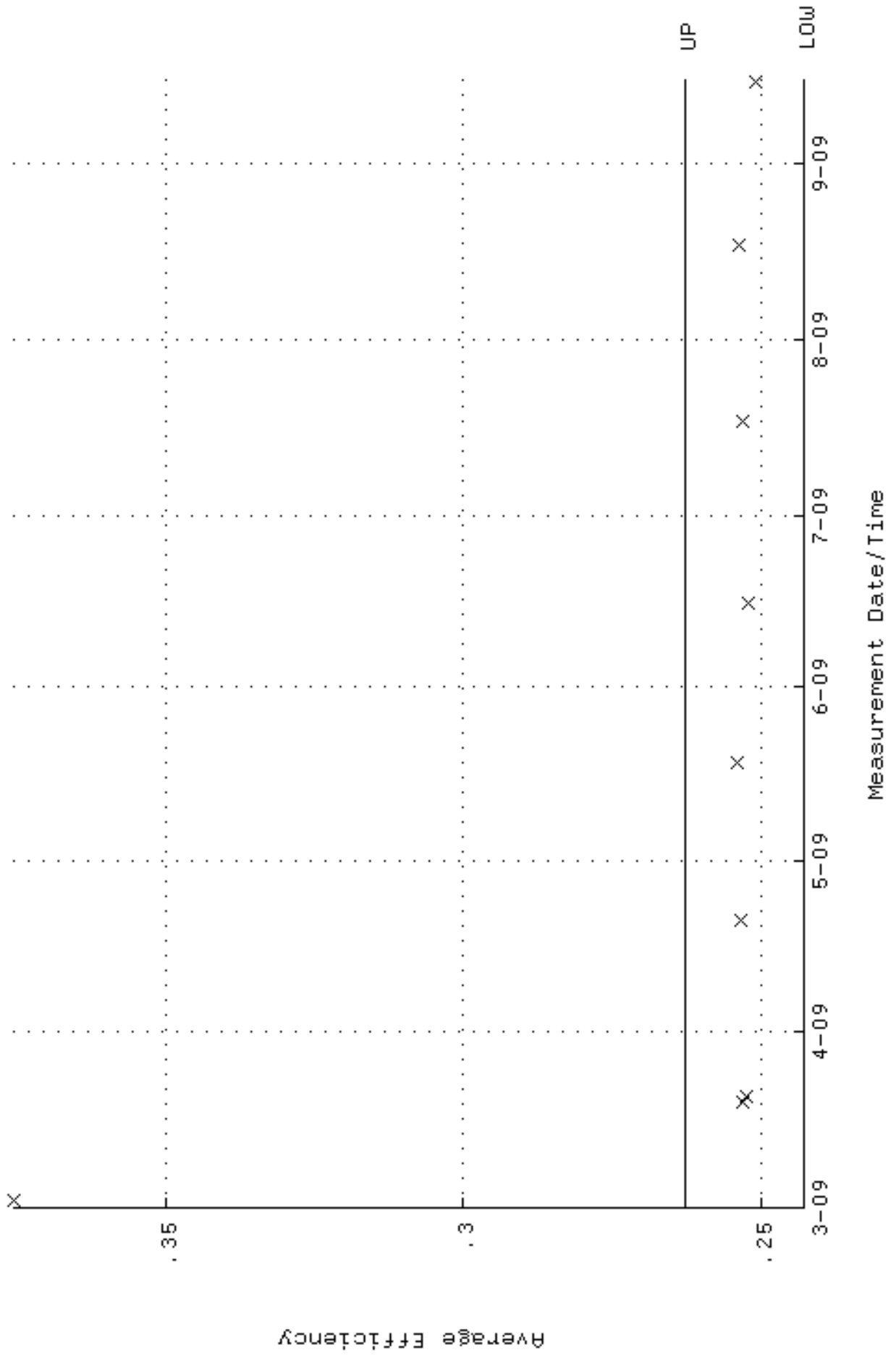
QA filename : DKA100:[ENV_ALPHA.QA.W]w158.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:12:01 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 84.6414 through 93.5510



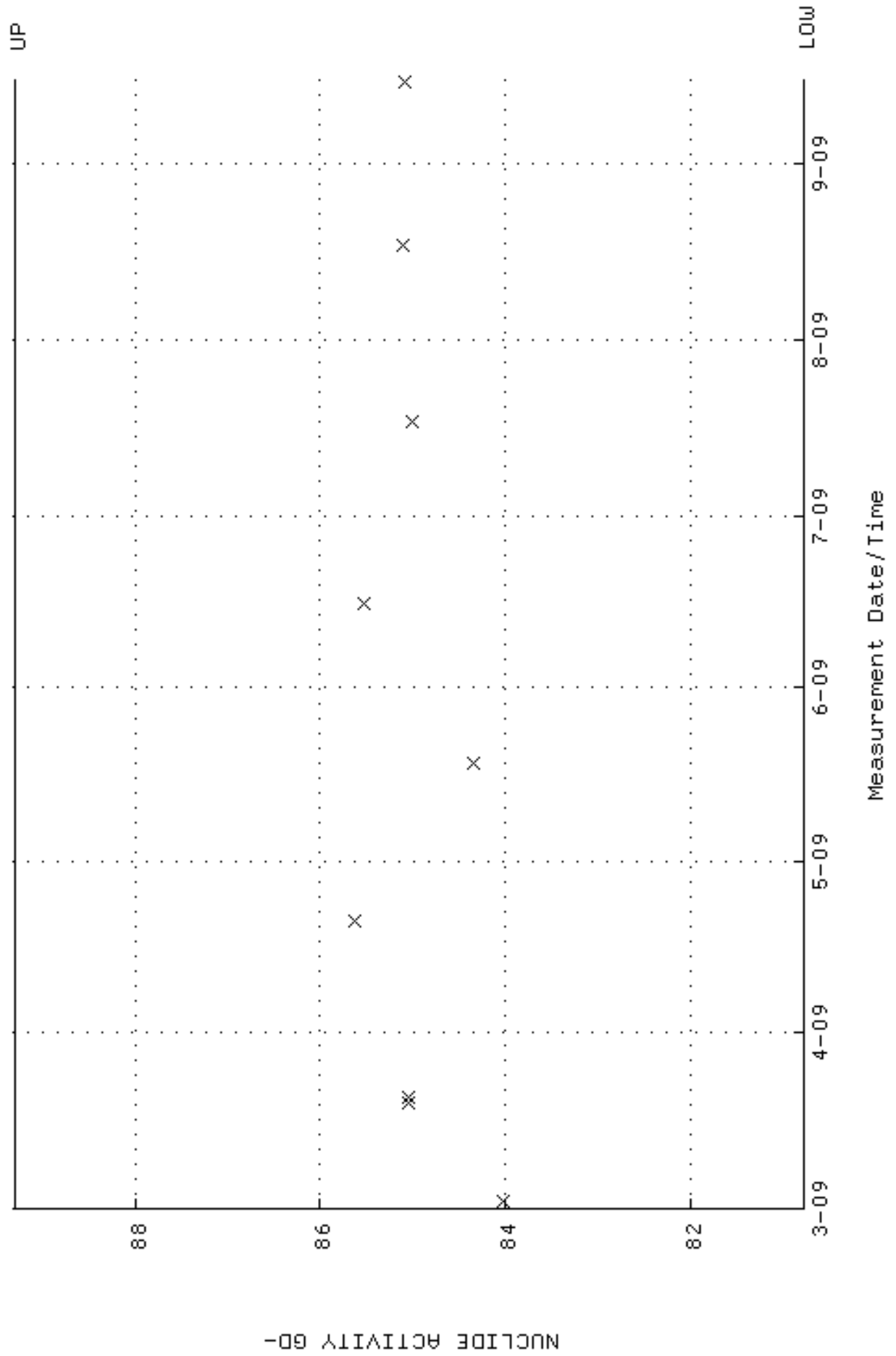
QA filename : DKA100:[ENV_ALPHA.QA.B]B158.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:51 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



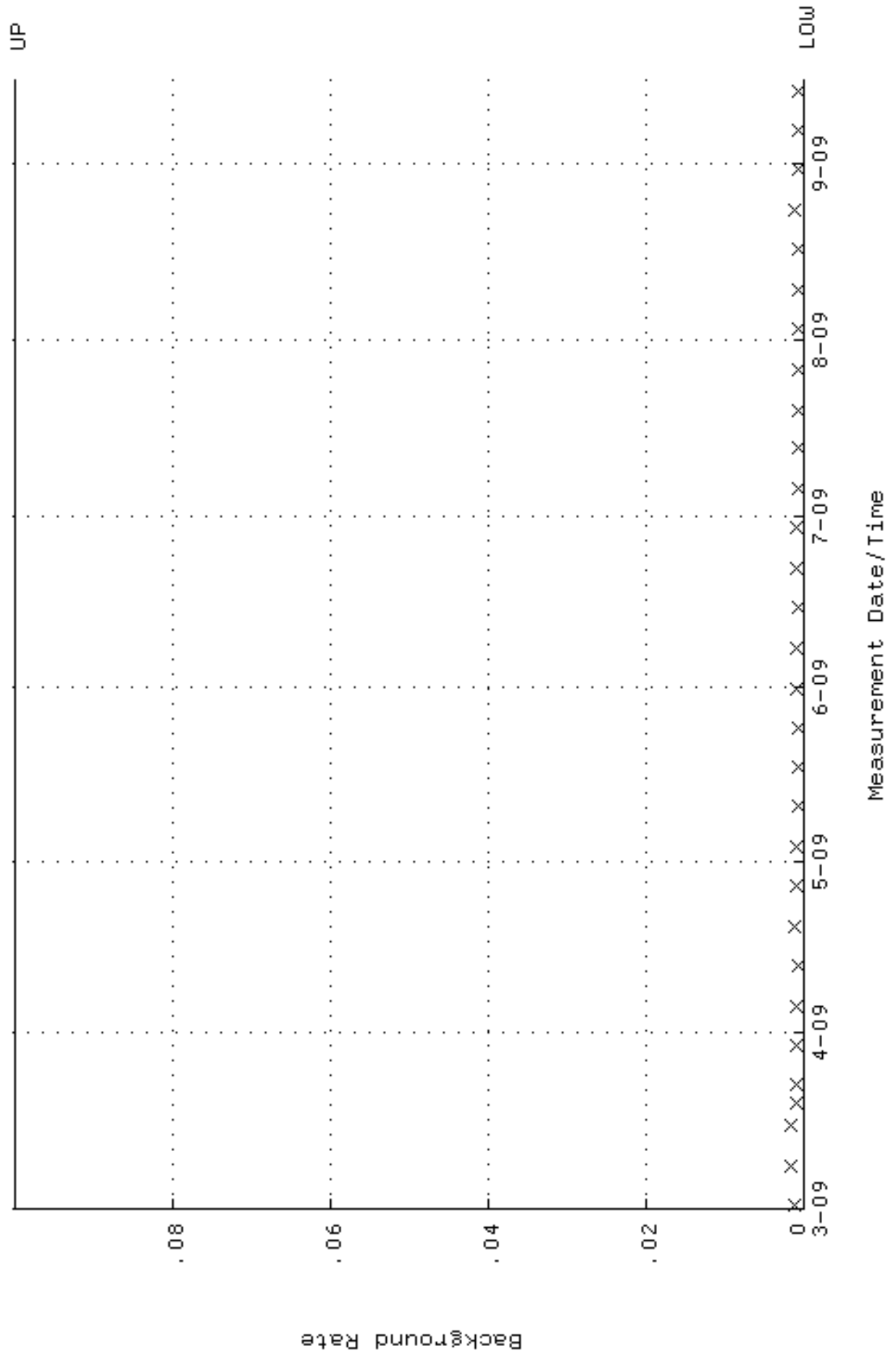
QA filename : DKA100:[ENV_ALPHA.QA.W]W159.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:12:08 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.242851 through 0.262851



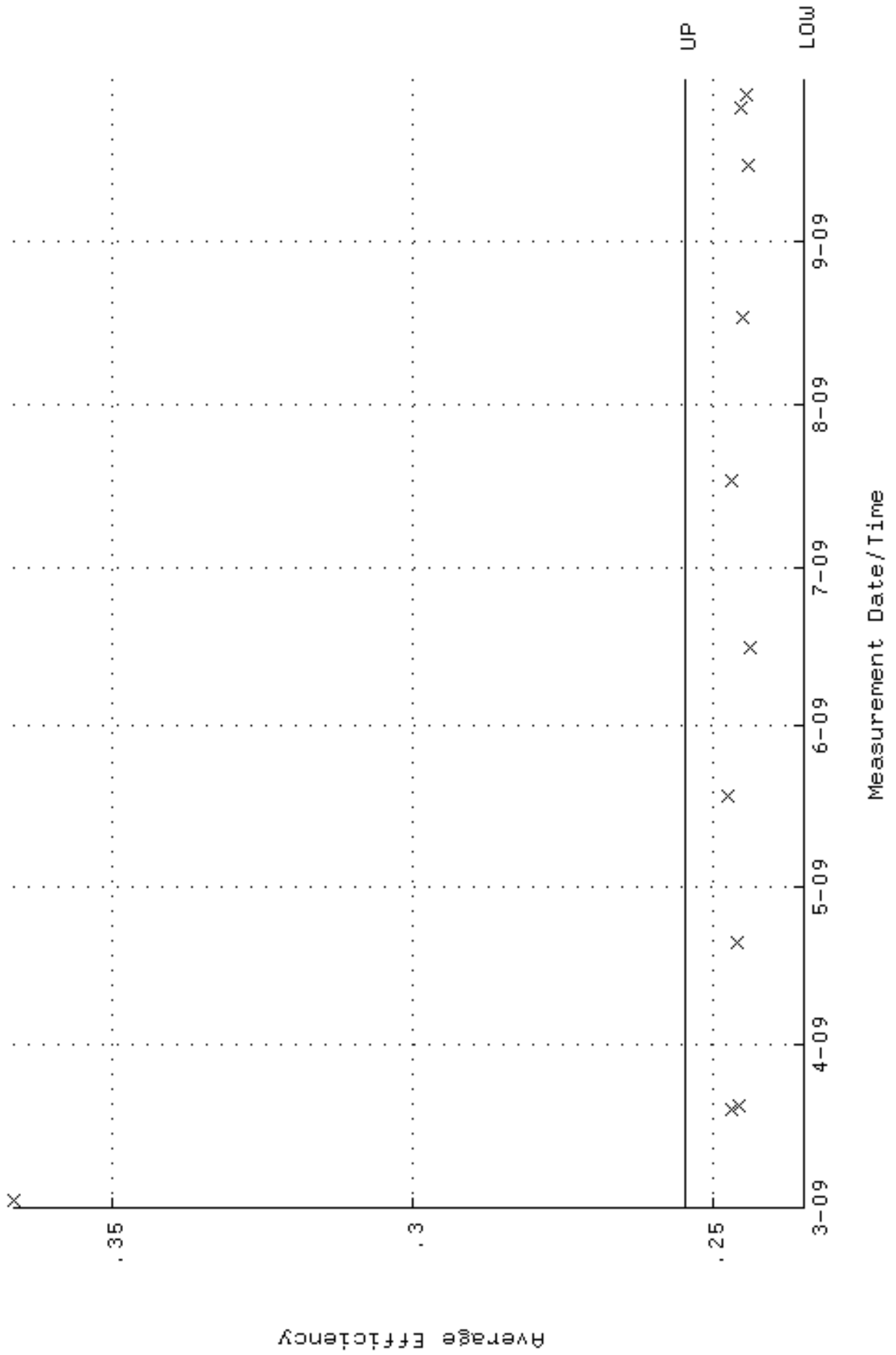
QA filename : DKA100:[ENV_ALPHA.QA.W]w159.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:12:08 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 80.7870 through 89.2909



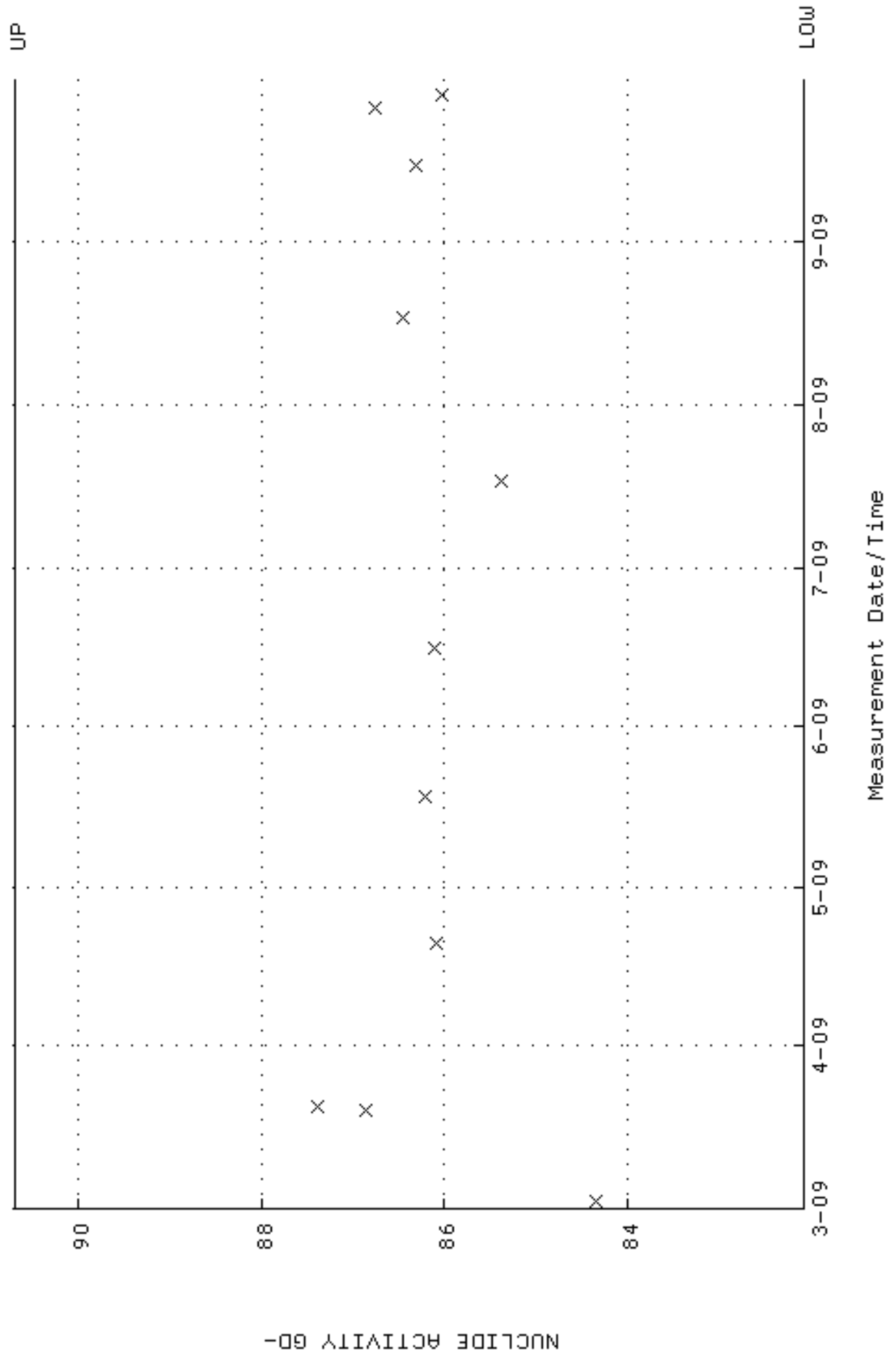
QA filename : DKA100:[ENV_ALPHA.QA.B]B159.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:55 through 15-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



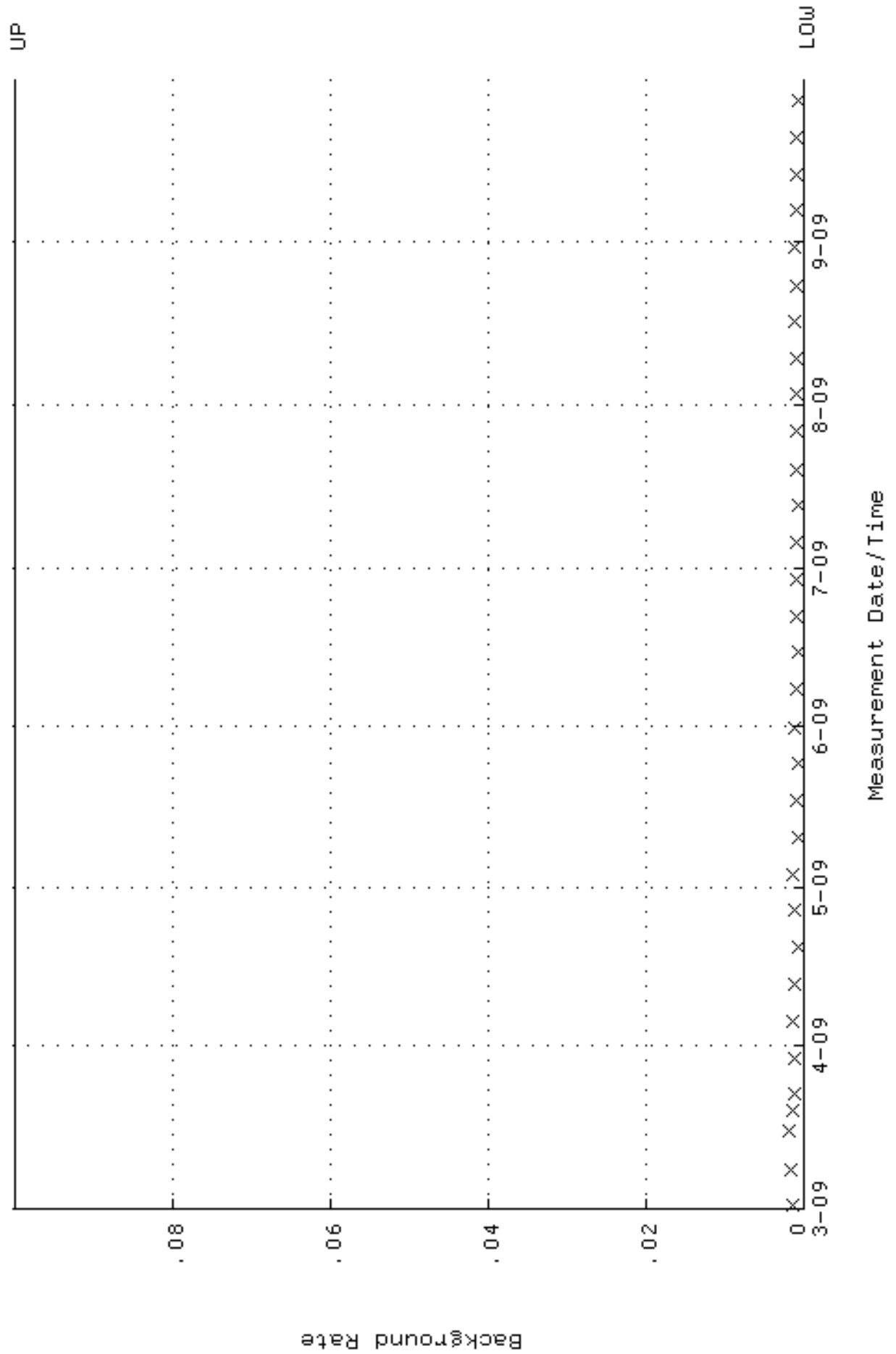
QA filename : DKA100:[ENV_ALPHA.QA.W]W160.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-MAR-2009 11:12:15 through 1-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.234941 through 0.254941



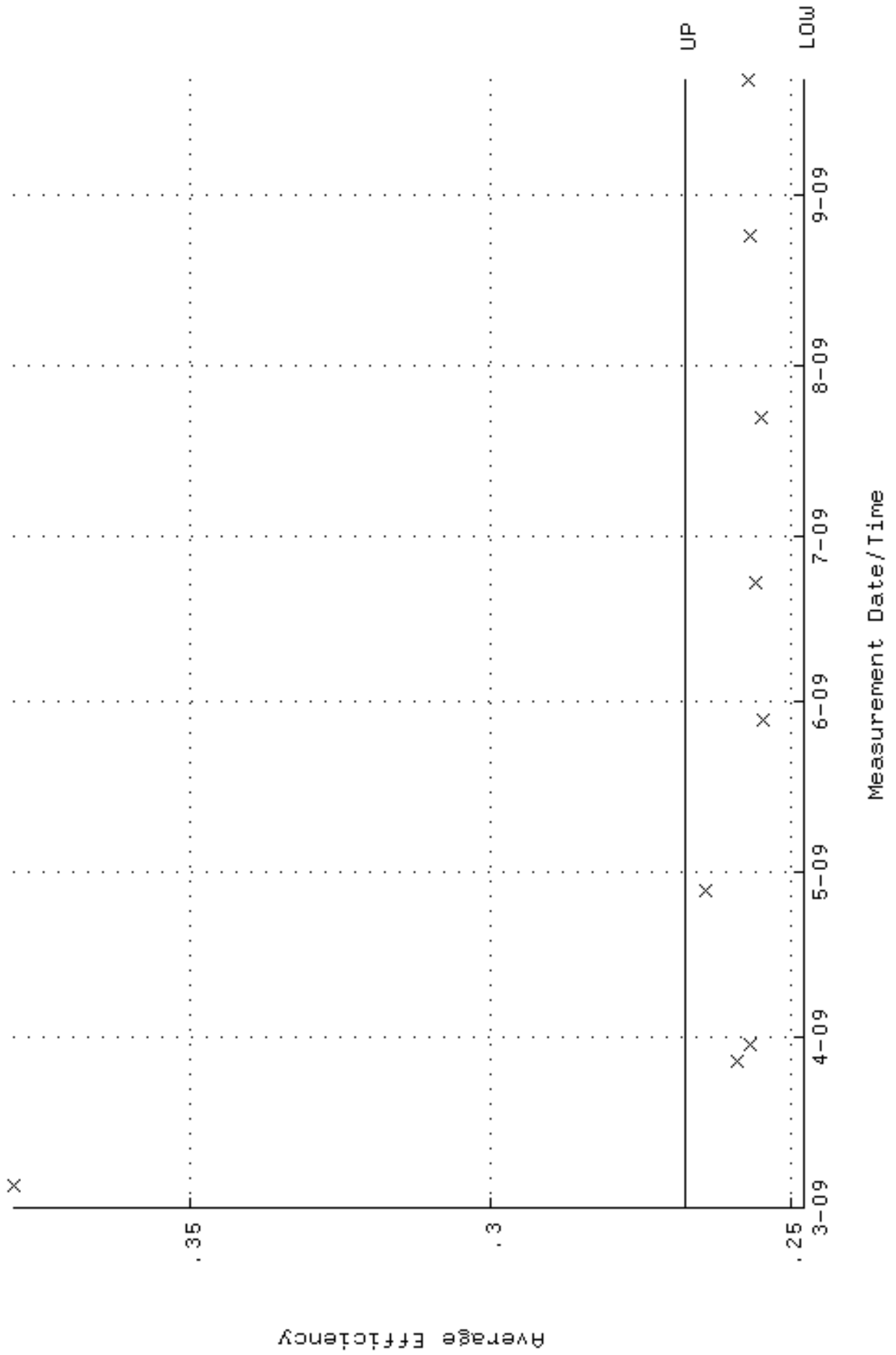
QA filename : DKA100:[ENV_ALPHA.QA.W]W160.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-MAR-2009 11:12:15 through 1-OCT-2009 12:00:00
 Lower/Upper Lmts: 82.0594 through 90.6972



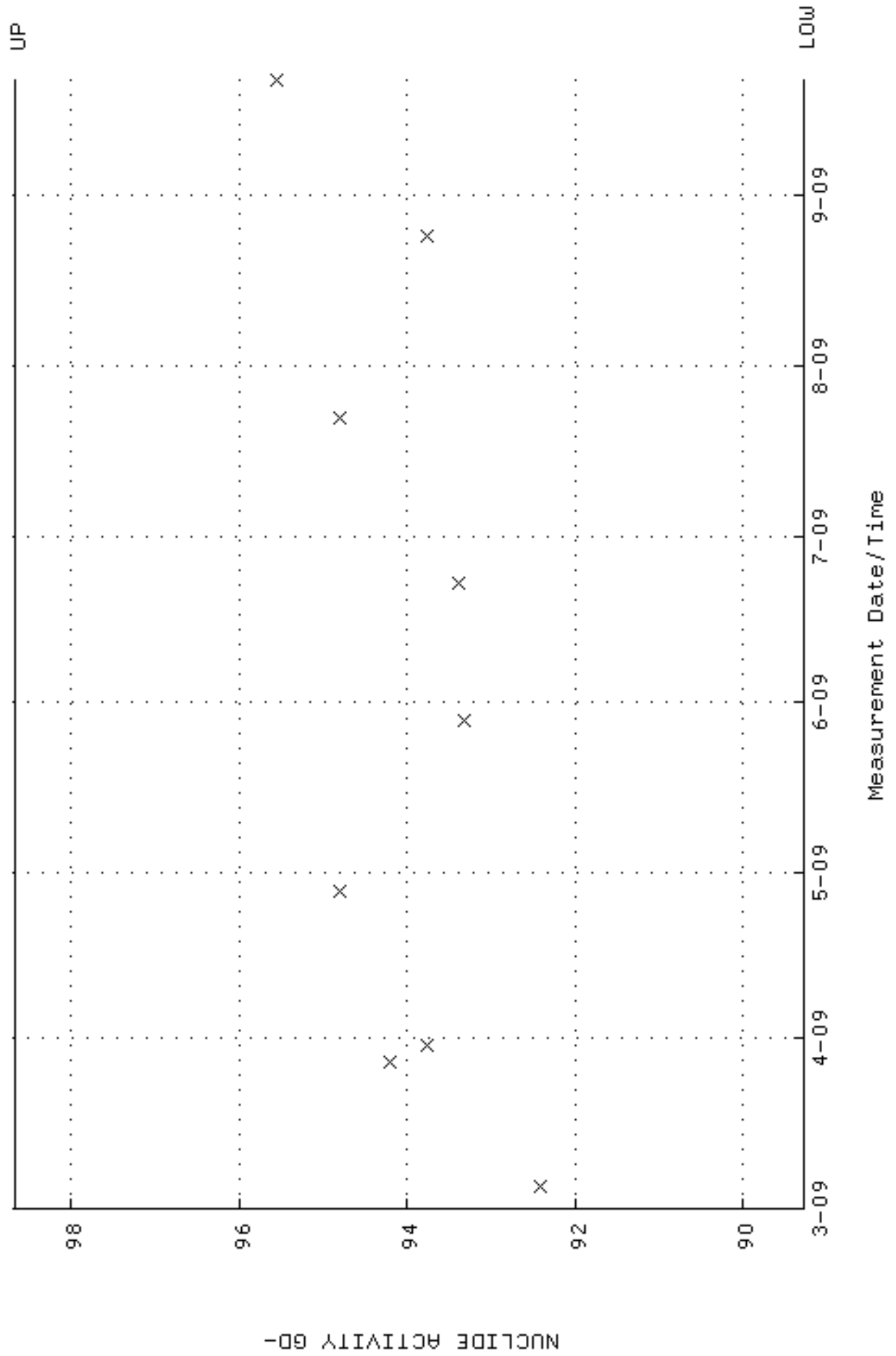
QA filename : DKA100:[ENV_ALPHA.QA.B]B160.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:20:59 through 1-OCT-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



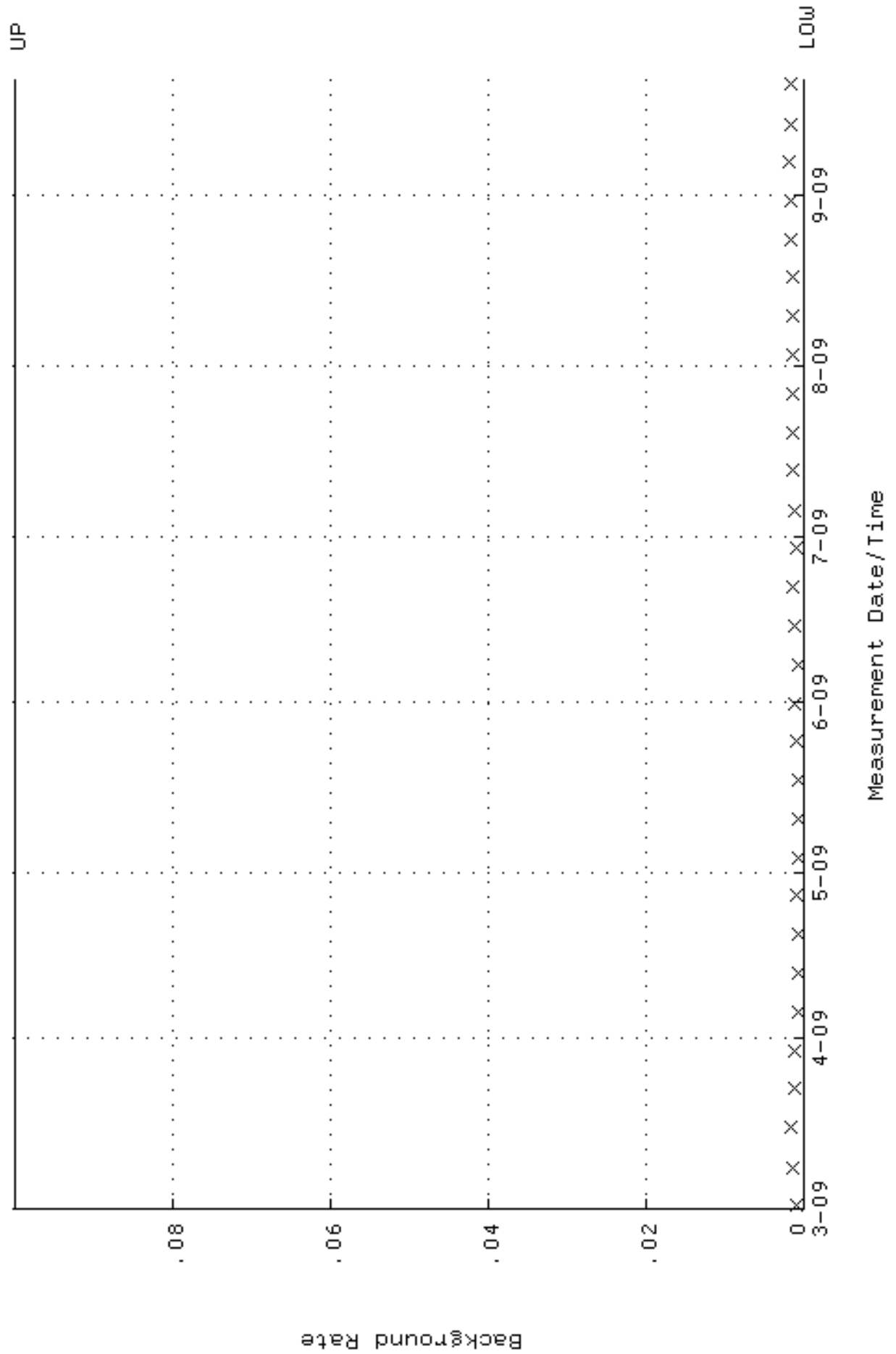
QA filename : DKA100:[ENV_ALPHA.QA.W]W181.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 4-MAR-2009 22:39:03 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.247722 through 0.267722



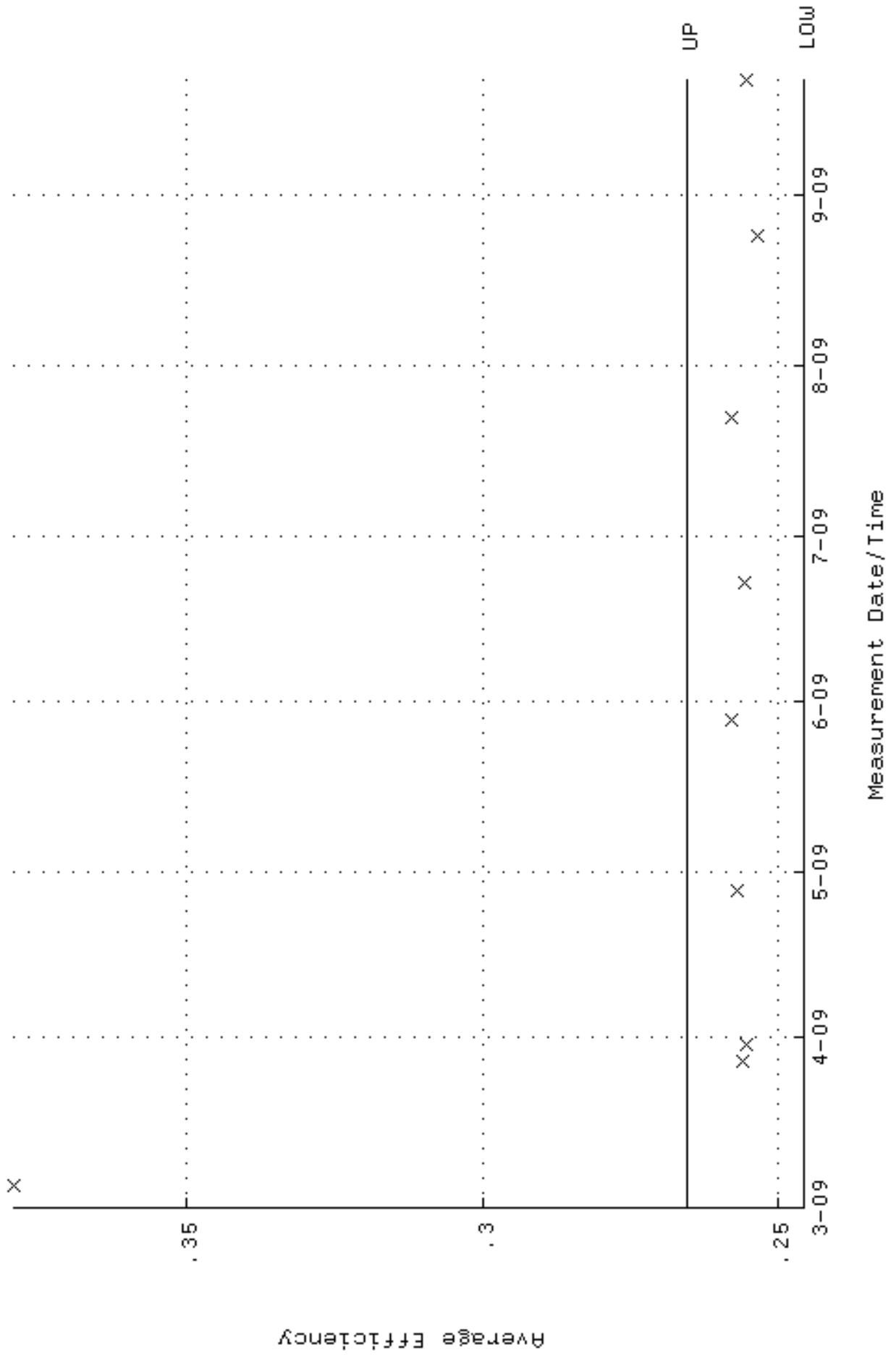
QA filename : DKA100:[ENV_ALPHA.QA.W]w181.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 4-MAR-2009 22:39:03 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 89.2737 through 98.6709



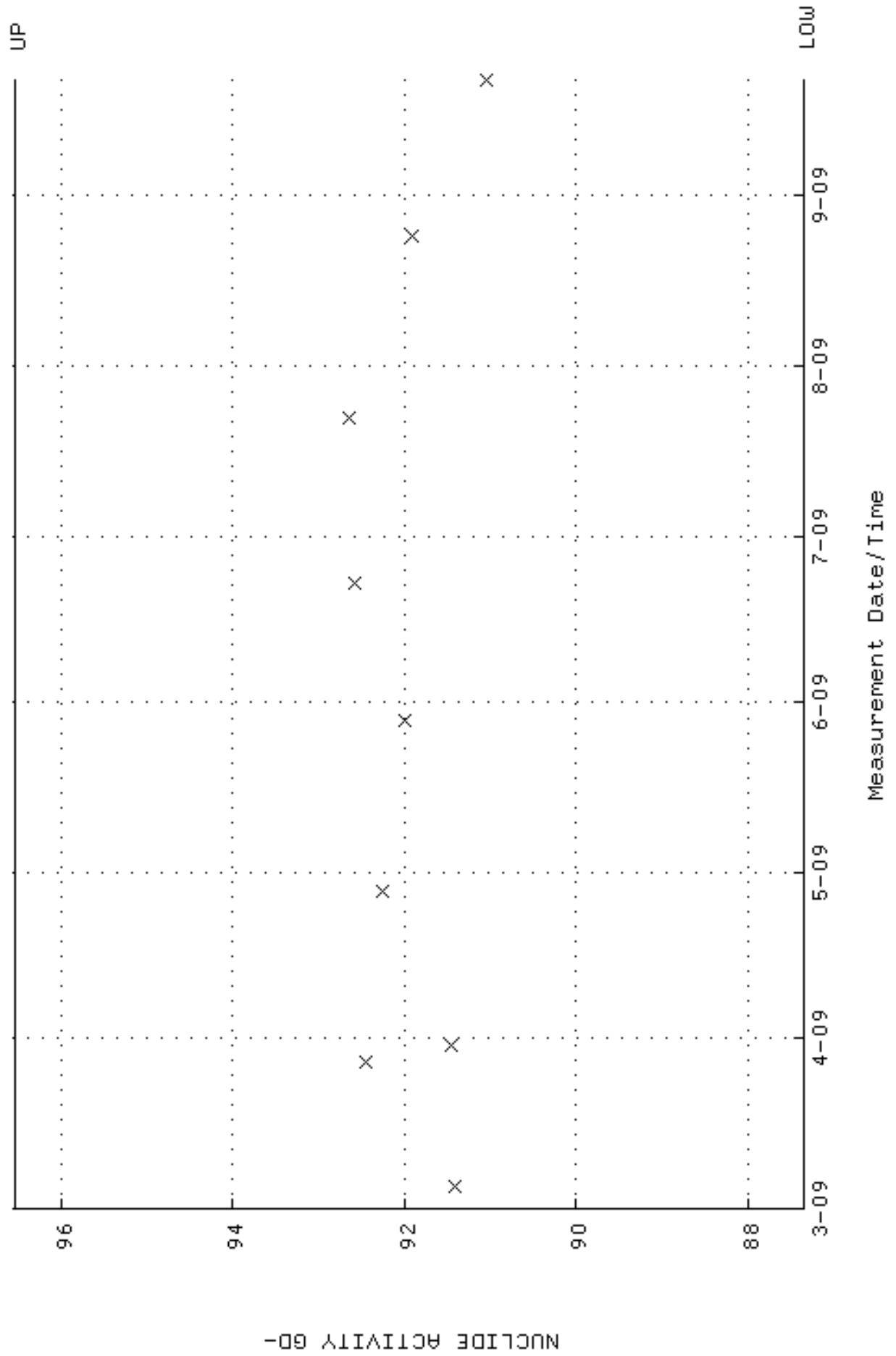
QA filename : DKA100:[ENV_ALPHA.QA.B]B181.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:22:17 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



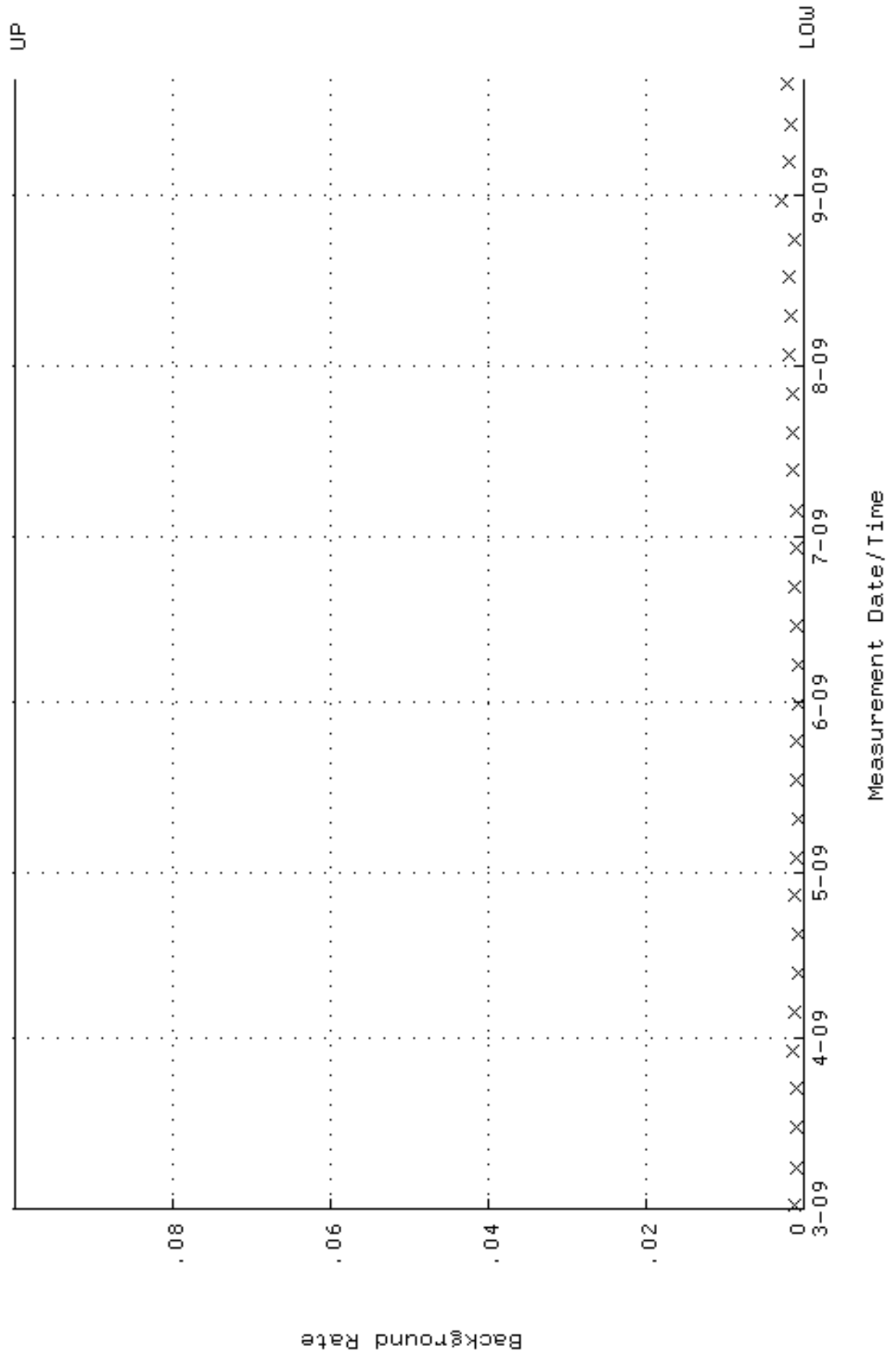
QA filename : DKA100:[ENV_ALPHA.QA.W]W182.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 4-MAR-2009 22:39:07 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.245707 through 0.265707



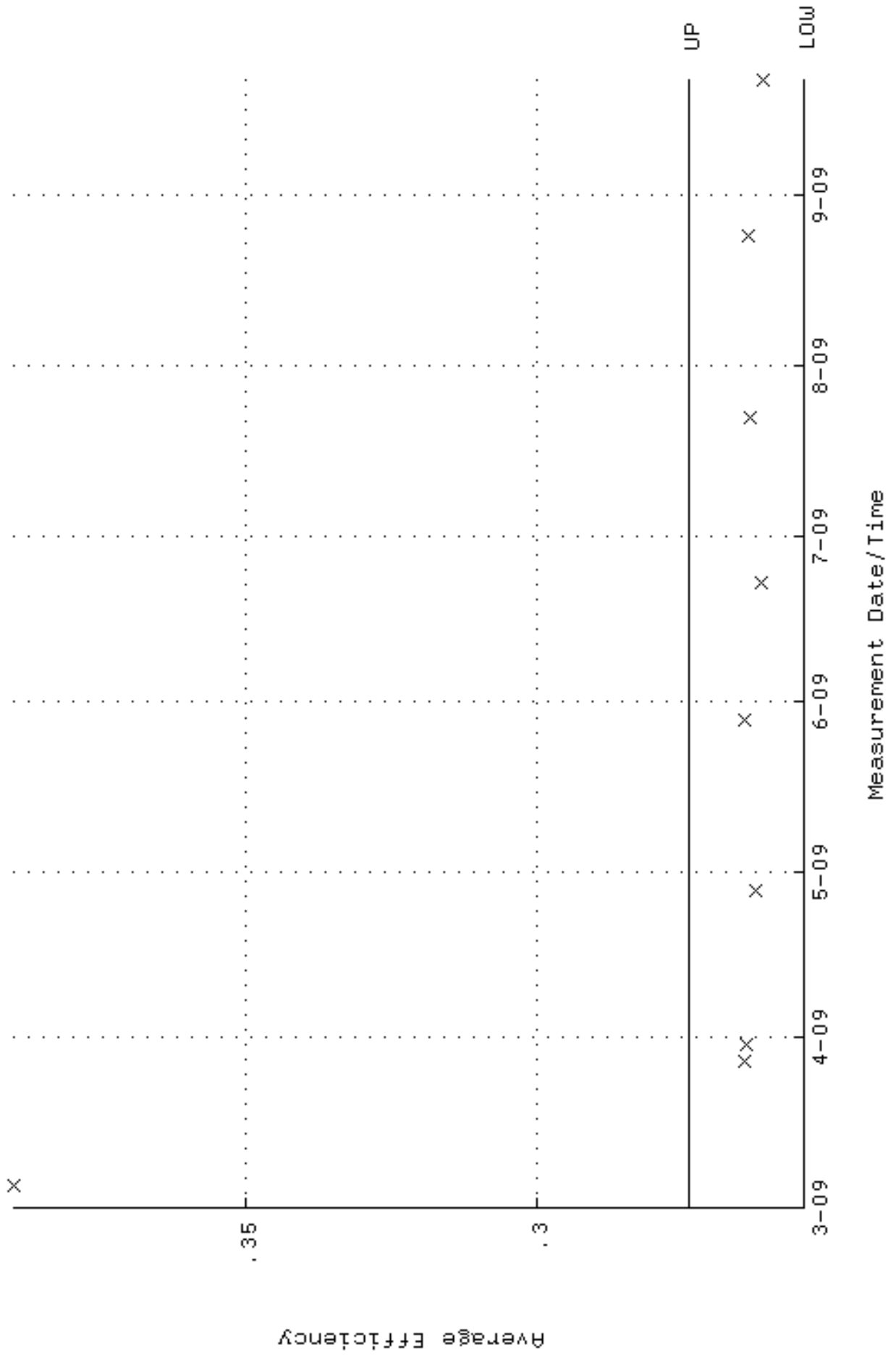
QA filename : DKA100:[ENV_ALPHA.QA.W]w182.QAF;1
Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
Start/End Dates : 4-MAR-2009 22:39:07 through 21-SEP-2009 12:00:00
Lower/Upper Lmts: 87.3454 through 96.5396



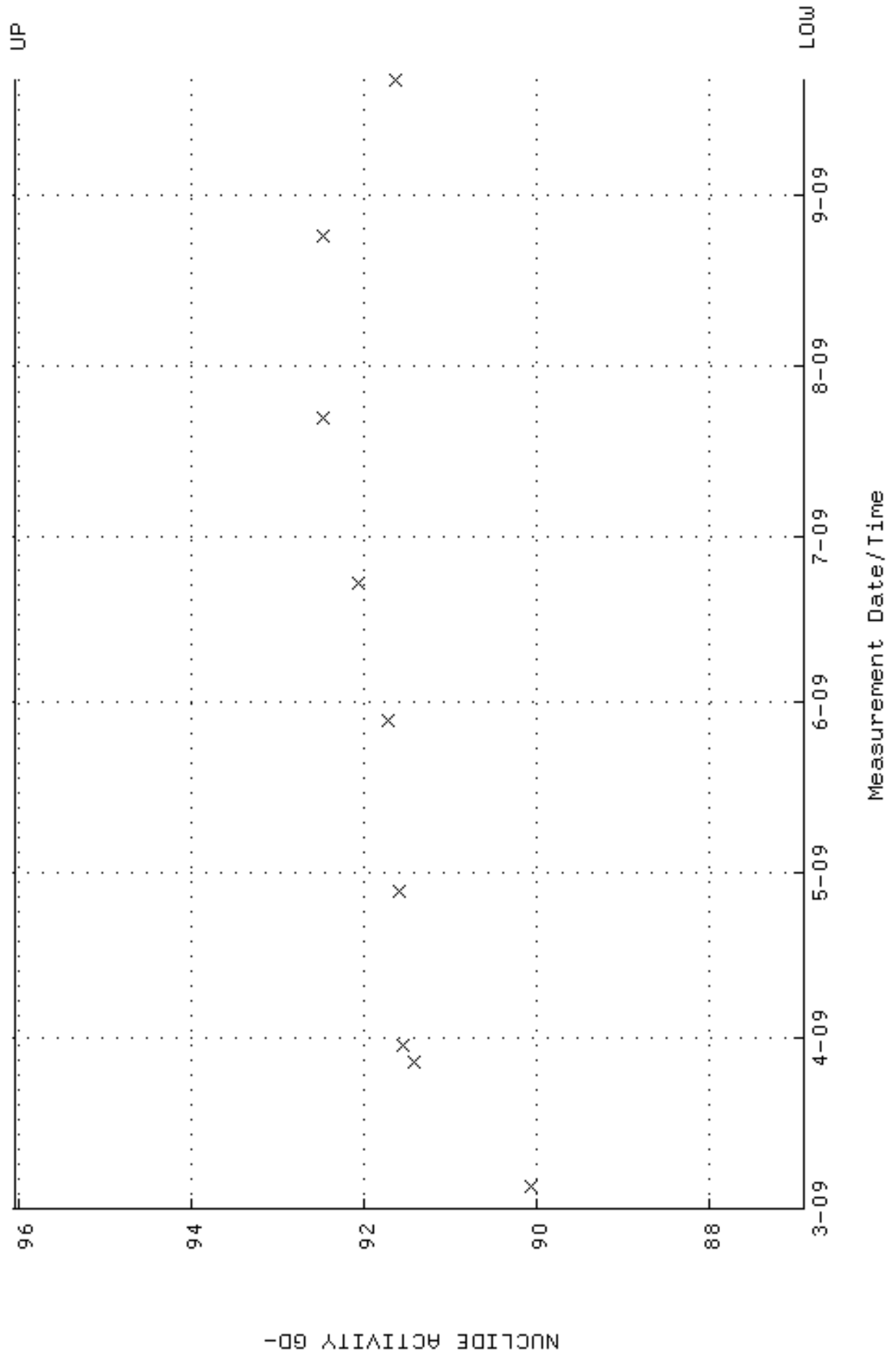
QA filename : DKA100:[ENV_ALPHA.QA.B]B182.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:22:20 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



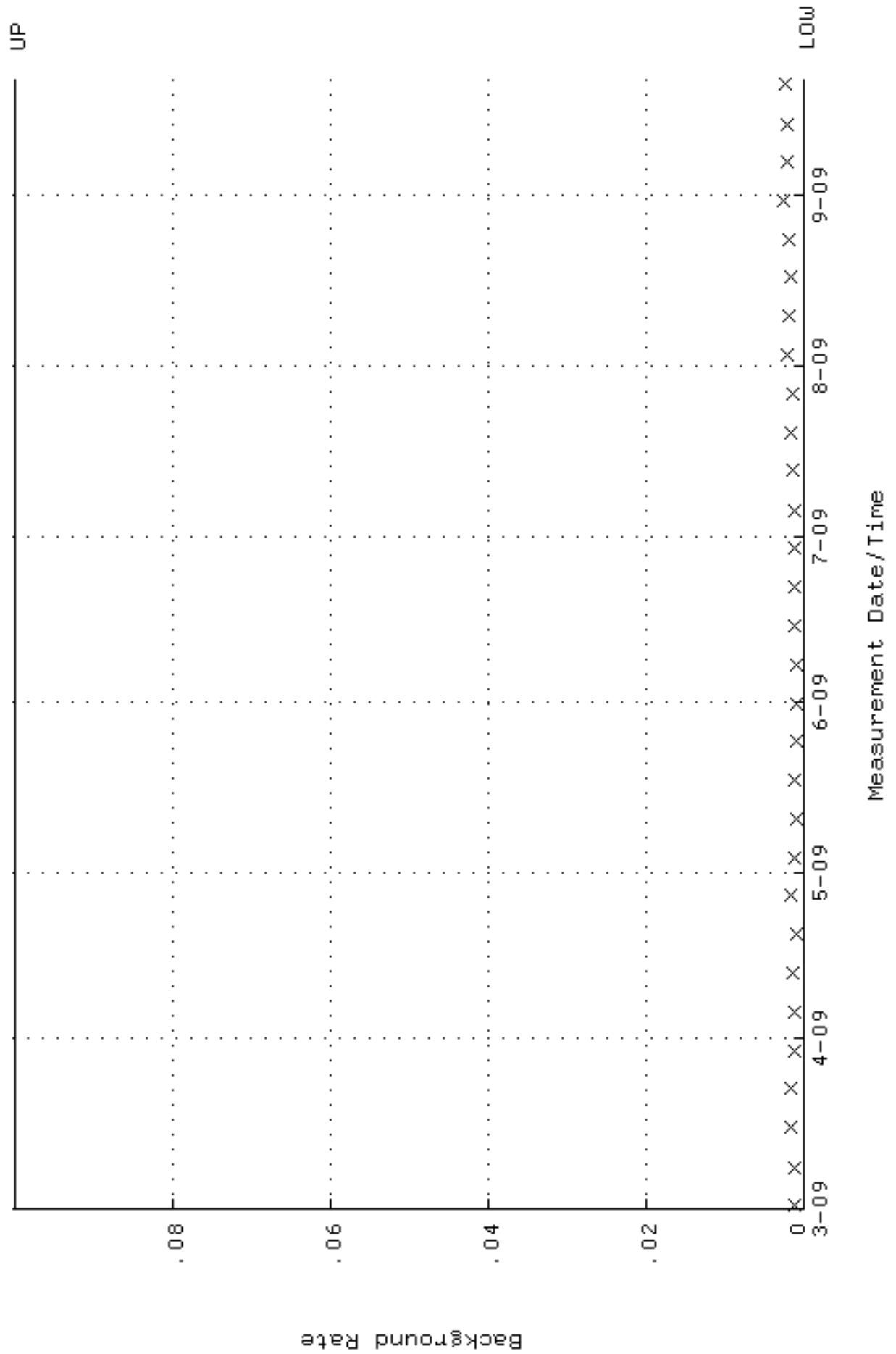
QA filename : DKA100:[ENV_ALPHA.QA.W]W183.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 4-MAR-2009 22:39:11 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.254364 through 0.274364



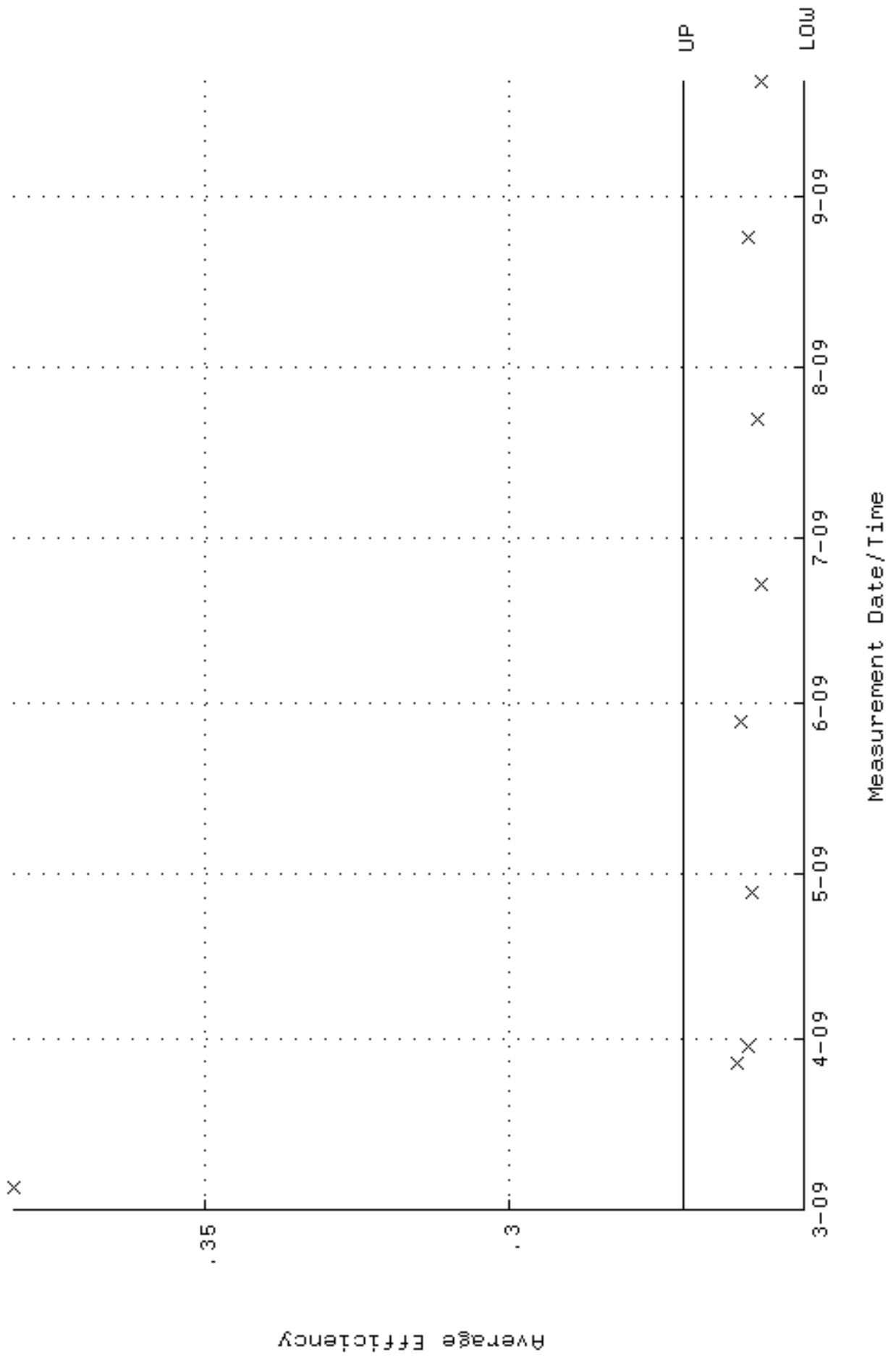
QA filename : DKA100:[ENV_ALPHA.QA.W]W183.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 4-MAR-2009 22:39:11 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 86.8927 through 96.0393



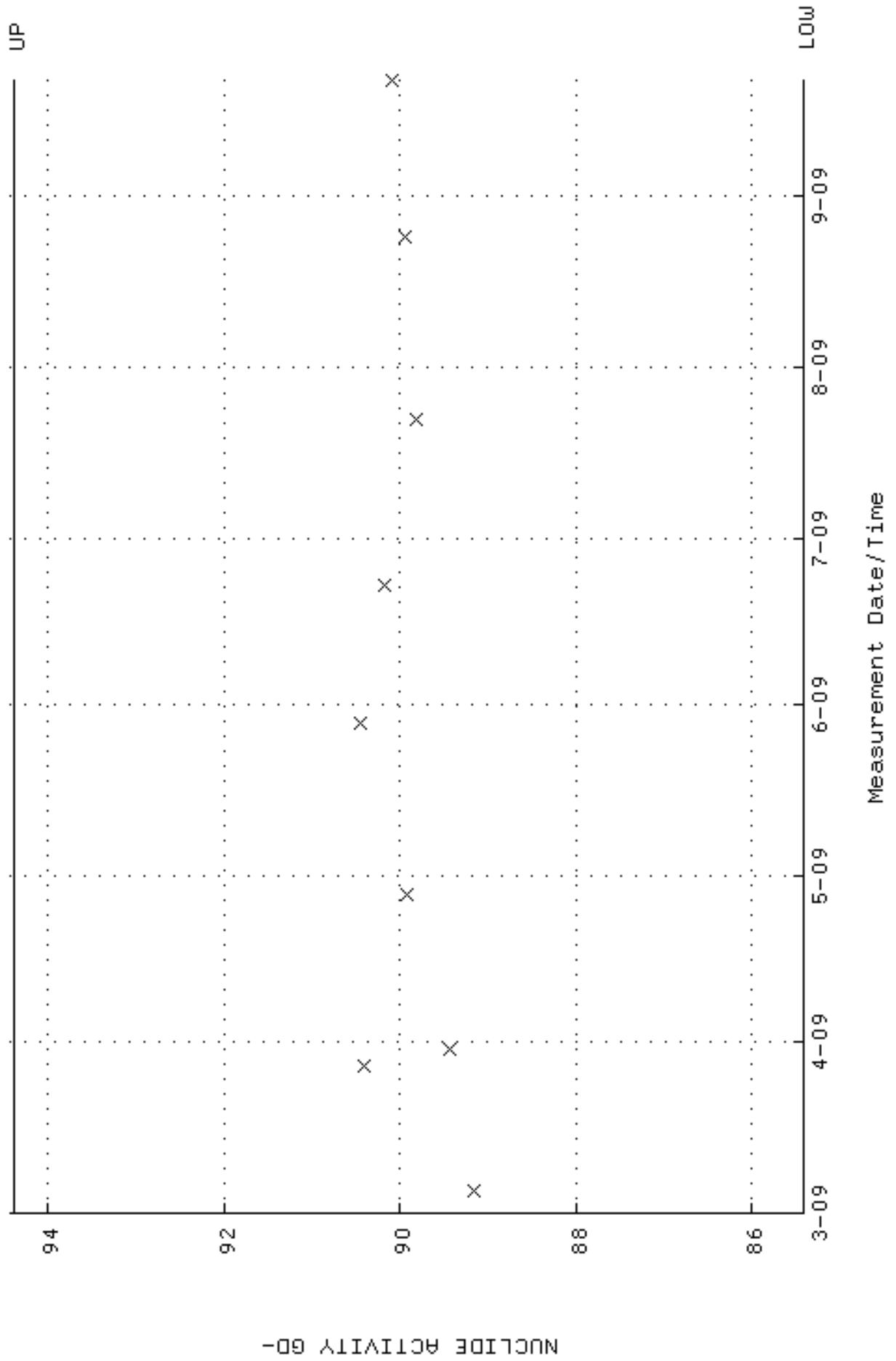
QA filename : DKA100:[ENV_ALPHA.QA.B]B183.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:22:24 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



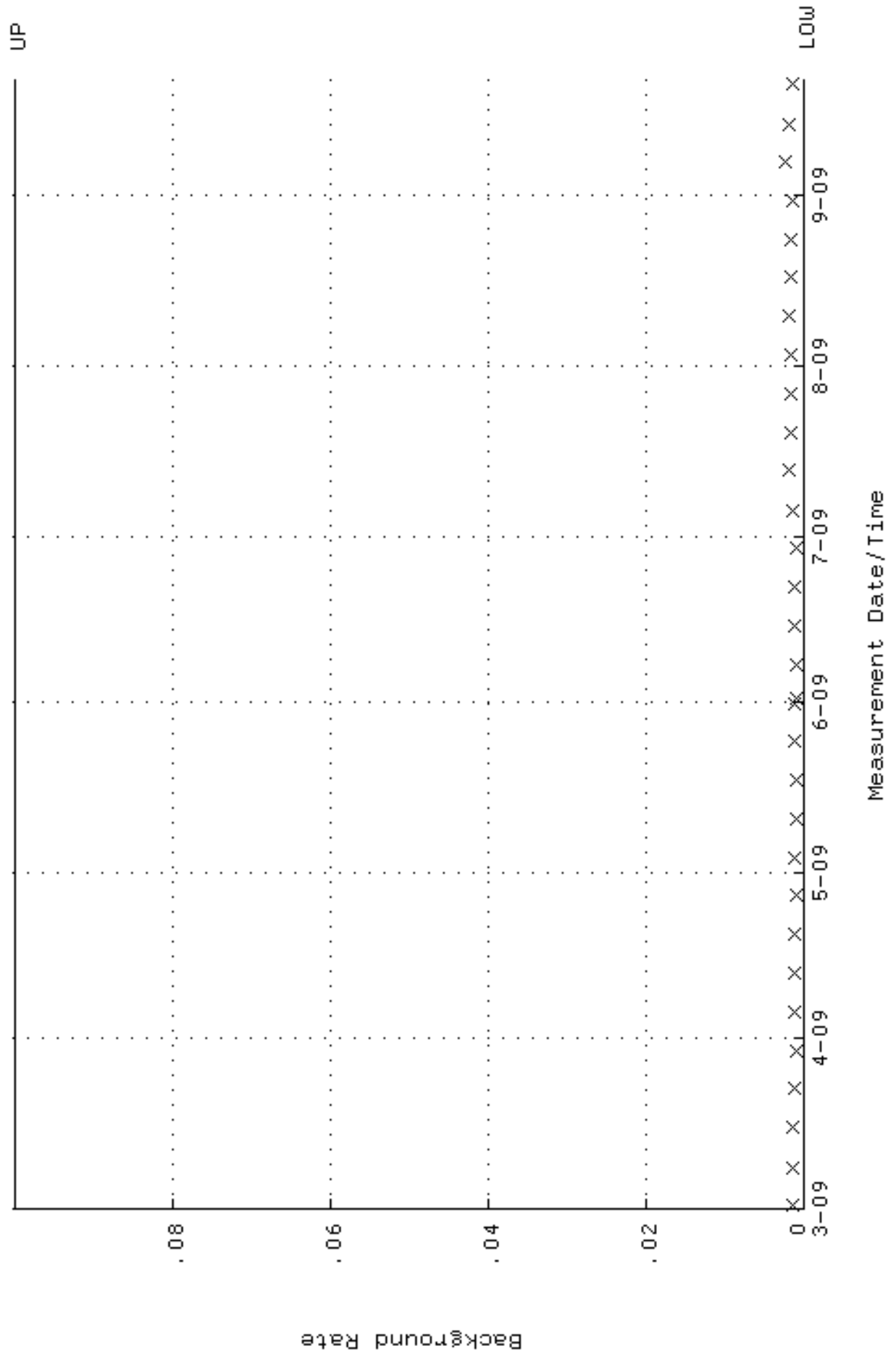
QA filename : DKA100:[ENV_ALPHA.QA.W]W184.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 4-MAR-2009 22:39:15 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.251367 through 0.271367



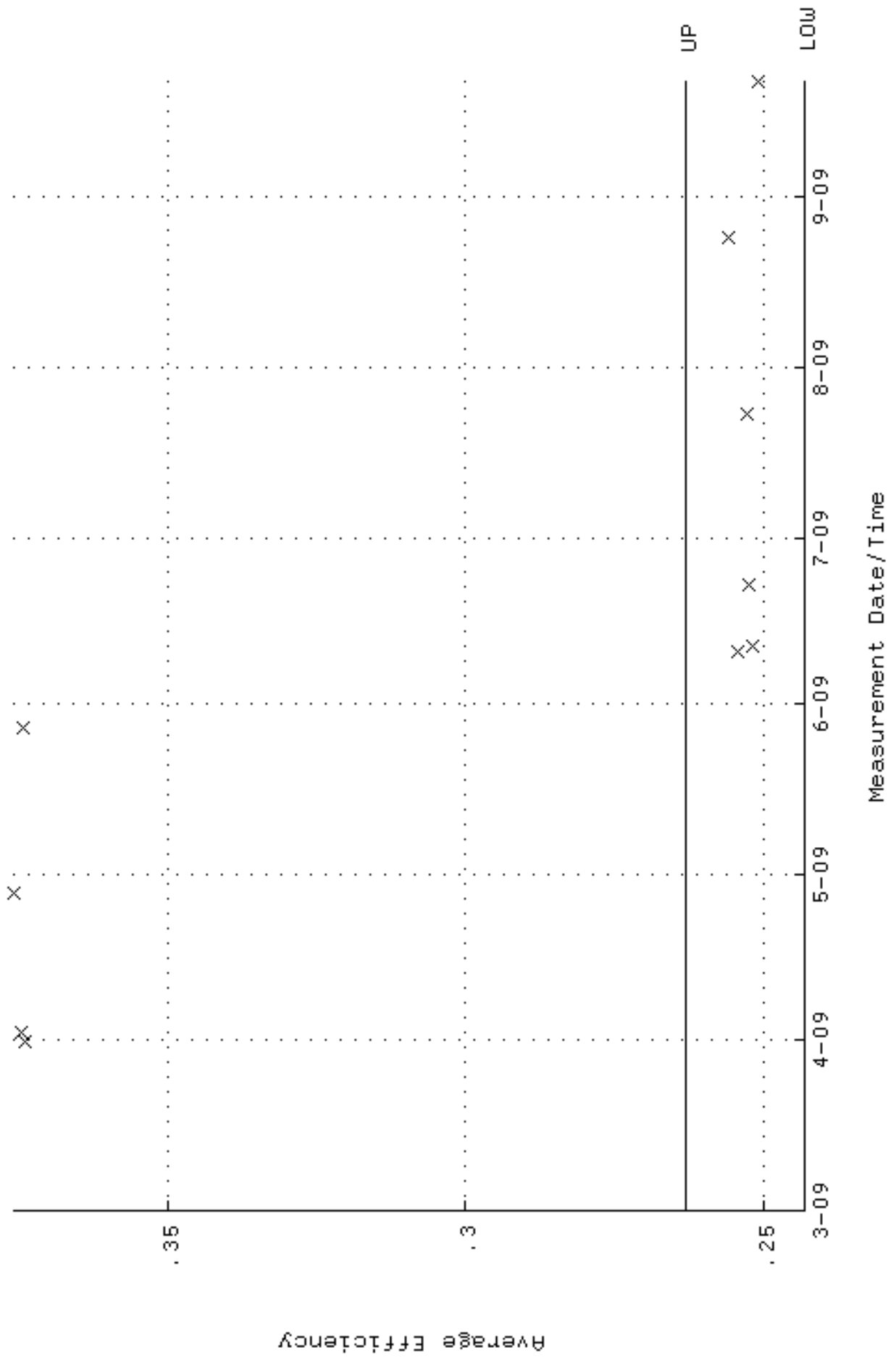
QA filename : DKA100:[ENV_ALPHA.QA.W]w184.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 4-MAR-2009 22:39:15 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 85.4139 through 94.4049



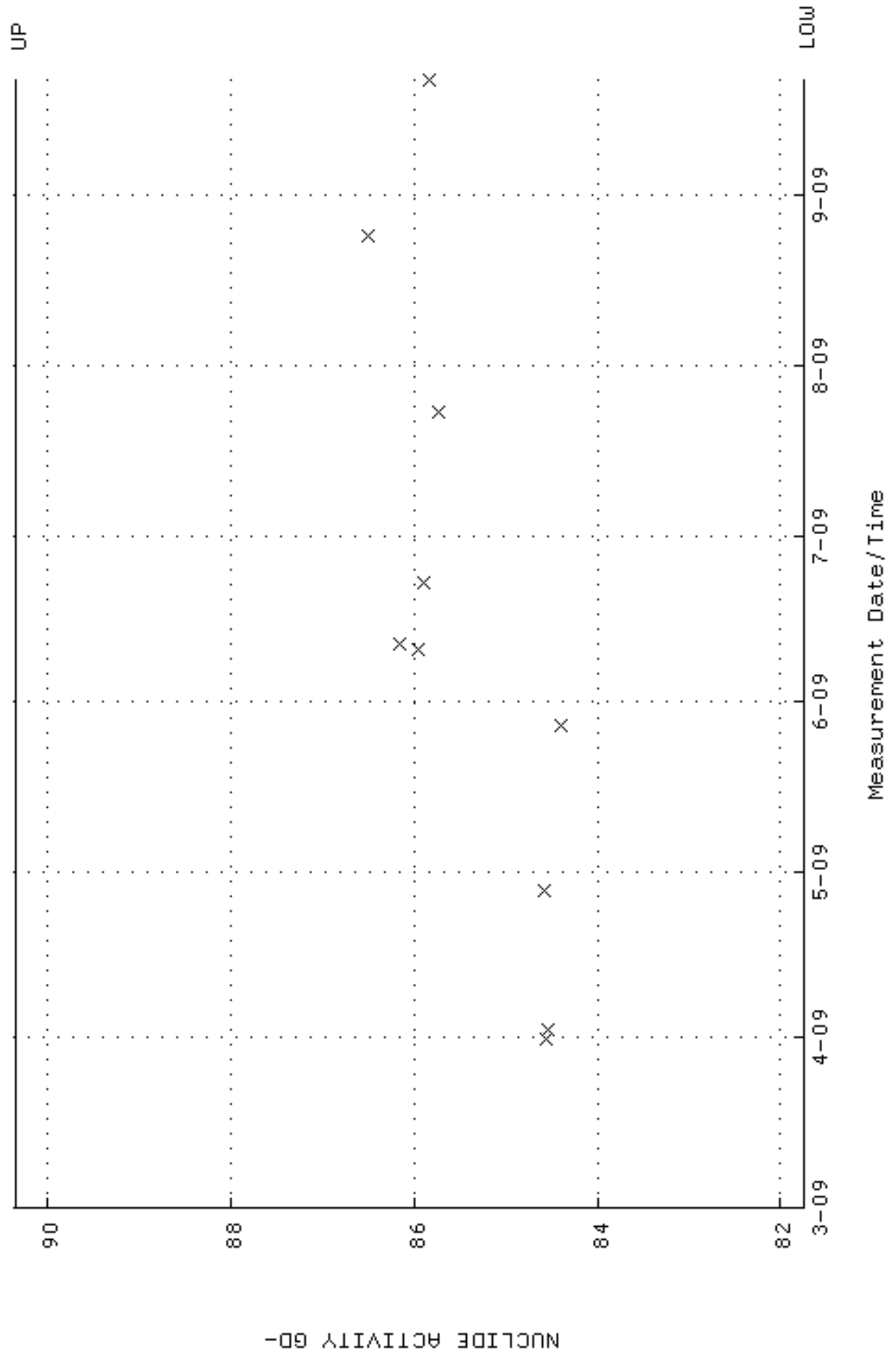
QA filename : DKA100:[ENV_ALPHA.QA.B]B184.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-MAR-2009 17:22:28 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



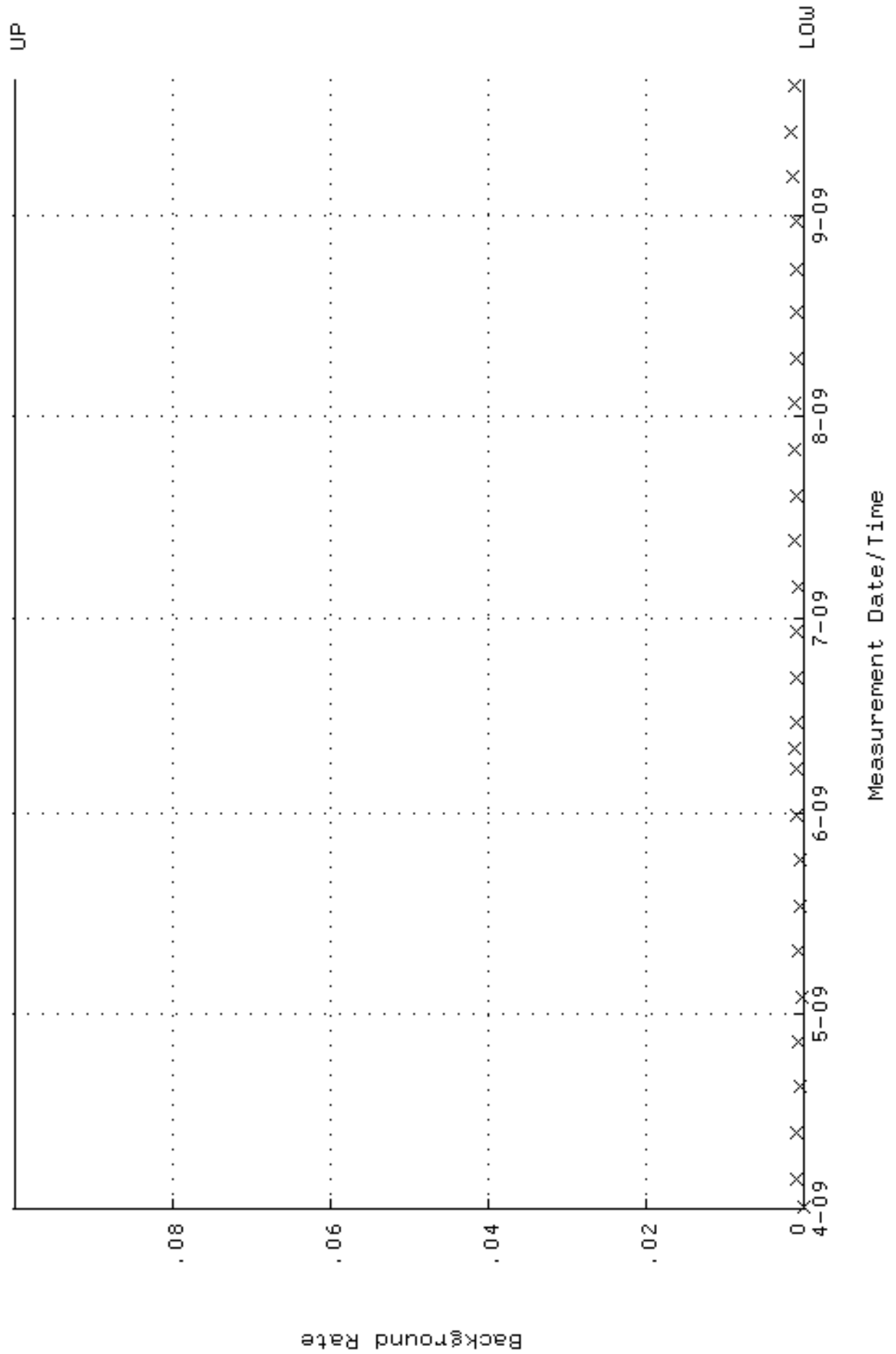
QA filename : DKA100:[ENV_ALPHA.QA.W]w208.QAF;1
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 31-MAR-2009 15:10:40 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.243128 through 0.263128



QA filename : DKA100:[ENV_ALPHA.QA.W]w208.QAF;1
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 31-MAR-2009 15:10:40 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 81.7467 through 90.3517



QA filename : DKA100:[ENV_ALPHA.QA.B]B208.QAF;1
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 1-APR-2009 08:03:15 through 21-SEP-2009 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



RUNLOGS

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 905696

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
237118001	SAMPLE	KSD1	LUCAS4	08-OCT-09 14:45	DONE	Lucas Cell	02-MAR-09 00:00
237118002	SAMPLE	KSD1	LUCAS5	08-OCT-09 14:45	DONE	Lucas Cell	25-MAR-09 00:00
237118003	SAMPLE	KSD1	LUCAS6	08-OCT-09 14:45	DONE	Lucas Cell	04-AUG-09 00:00
237118004	SAMPLE	KSD1	LUCAS7	08-OCT-09 14:45	DONE	Lucas Cell	30-SEP-09 00:00
237118005	SAMPLE	KSD1	LUCAS1	08-OCT-09 15:55	DONE	Lucas Cell	31-AUG-09 00:00
237118006	SAMPLE	KSD1	LUCAS2	08-OCT-09 15:55	DONE	Lucas Cell	19-DEC-08 00:00
237118007	SAMPLE	KSD1	LUCAS3	08-OCT-09 15:55	DONE	Lucas Cell	04-FEB-09 00:00
237118008	SAMPLE	KSD1	LUCAS4	08-OCT-09 15:55	DONE	Lucas Cell	02-MAR-09 00:00
237118009	SAMPLE	KSD1	LUCAS5	08-OCT-09 15:55	DONE	Lucas Cell	25-MAR-09 00:00
237118010	SAMPLE	KSD1	LUCAS6	08-OCT-09 15:55	DONE	Lucas Cell	04-AUG-09 00:00
237118011	SAMPLE	KSD1	LUCAS7	08-OCT-09 15:55	DONE	Lucas Cell	30-SEP-09 00:00
237118012	SAMPLE	KSD1	LUCAS1	08-OCT-09 16:25	DONE	Lucas Cell	31-AUG-09 00:00
237118013	SAMPLE	KSD1	LUCAS2	08-OCT-09 16:25	DONE	Lucas Cell	19-DEC-08 00:00
237118014	SAMPLE	KSD1	LUCAS3	08-OCT-09 16:25	DONE	Lucas Cell	04-FEB-09 00:00
237118015	SAMPLE	KSD1	LUCAS4	08-OCT-09 16:25	DONE	Lucas Cell	02-MAR-09 00:00
237118016	SAMPLE	KSD1	LUCAS5	08-OCT-09 16:25	DONE	Lucas Cell	25-MAR-09 00:00
237118017	SAMPLE	KSD1	LUCAS6	08-OCT-09 16:25	DONE	Lucas Cell	04-AUG-09 00:00
237118019	SAMPLE	KSD1	LUCAS2	08-OCT-09 17:00	DONE	Lucas Cell	19-DEC-08 00:00
237118020	SAMPLE	KSD1	LUCAS3	08-OCT-09 17:00	DONE	Lucas Cell	04-FEB-09 00:00
1201931175	MB	KSD1	LUCAS5	08-OCT-09 17:00	DONE	Lucas Cell	25-MAR-09 00:00
237118018	SAMPLE	KSD1	LUCAS7	08-OCT-09 17:00	DONE	Lucas Cell	30-SEP-09 00:00
1201931177	MS	KSD1	LUCAS5	08-OCT-09 17:35	DONE	Lucas Cell	25-MAR-09 00:00
1201931176	DUP	KSD1	LUCAS7	08-OCT-09 17:35	DONE	Lucas Cell	30-SEP-09 00:00
1201931178	LCS	KSD1	LUCAS7	08-OCT-09 18:05	DONE	Lucas Cell	30-SEP-09 00:00

Instrument Run Log

Instrument Type: GFPC

Batch ID: 906726

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1201933688	MB	JXC5	PIC9A	07-OCT-09 16:08	DONE	CeF on 25mm Filter	02-JUL-09 00:00
1201933689	DUP	JXC5	PIC9B	07-OCT-09 16:08	DONE	CeF on 25mm Filter	02-JUL-09 00:00
1201933690	MS	JXC5	PIC9C	07-OCT-09 16:08	DONE	CeF on 25mm Filter	02-JUL-09 00:00
1201933691	LCS	JXC5	PIC10A	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118001	SAMPLE	JXC5	PIC10B	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118002	SAMPLE	JXC5	PIC2C	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118003	SAMPLE	JXC5	PIC2D	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118004	SAMPLE	JXC5	PIC3C	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118005	SAMPLE	JXC5	PIC3D	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118006	SAMPLE	JXC5	PIC4A	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118007	SAMPLE	JXC5	PIC4C	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118008	SAMPLE	JXC5	PIC4D	07-OCT-09 16:09	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118009	SAMPLE	JXC5	PIC5A	07-OCT-09 16:10	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118010	SAMPLE	JXC5	PIC5B	07-OCT-09 16:10	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118011	SAMPLE	JXC5	PIC5C	07-OCT-09 16:10	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118013	SAMPLE	JXC5	PIC6A	07-OCT-09 16:10	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118014	SAMPLE	JXC5	PIC6D	07-OCT-09 16:11	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118015	SAMPLE	JXC5	PIC7A	07-OCT-09 16:11	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118016	SAMPLE	JXC5	PIC7B	07-OCT-09 16:11	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118018	SAMPLE	JXC5	PIC7D	07-OCT-09 16:11	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118017	SAMPLE	JXC5	LB4100A1	07-OCT-09 18:01	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118019	SAMPLE	JXC5	LB4100A2	07-OCT-09 18:01	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118020	SAMPLE	JXC5	LB4100C1	07-OCT-09 19:30	DONE	CeF on 25mm Filter	02-JUL-09 00:00
237118012	SAMPLE	JXC5	PIC14D	09-OCT-09 16:46	DONE	CeF on 25mm Filter	02-JUL-09 00:00

Instrument Run Log

Instrument Type: ALPHA SPECTROMETER

Batch ID: 906768

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
237118005	SAMPLE	KXM4	1026	06-OCT-09 08:55	DONE		
237118006	SAMPLE	KXM4	1027	06-OCT-09 08:55	DUSE		
237118007	SAMPLE	KXM4	1028	06-OCT-09 08:55	DONE		
237118008	SAMPLE	KXM4	1029	06-OCT-09 08:55	DONE		
237118009	SAMPLE	KXM4	1030	06-OCT-09 08:55	DONE		
237118010	SAMPLE	KXM4	1033	06-OCT-09 08:55	DONE		
237118011	SAMPLE	KXM4	1035	06-OCT-09 08:55	DONE		
237118012	SAMPLE	KXM4	1036	06-OCT-09 08:55	DONE		
237118013	SAMPLE	KXM4	1037	06-OCT-09 08:55	DONE		
237118014	SAMPLE	KXM4	1038	06-OCT-09 08:55	DONE		
237118015	SAMPLE	KXM4	1039	06-OCT-09 08:55	DONE		
237118016	SAMPLE	KXM4	1040	06-OCT-09 08:55	DONE		
237118017	SAMPLE	KXM4	1041	06-OCT-09 08:55	DONE		
237118018	SAMPLE	KXM4	1042	06-OCT-09 08:55	DONE		
237118019	SAMPLE	KXM4	1043	06-OCT-09 08:55	DONE		
237118020	SAMPLE	KXM4	1044	06-OCT-09 08:55	DONE		
1201933858	MB	KXM4	1045	06-OCT-09 08:55	DONE		
1201933859	DUP	KXM4	1046	06-OCT-09 08:55	DONE		
1201933860	MS	KXM4	1047	06-OCT-09 08:55	DONE		
1201933861	LCS	KXM4	1048	06-OCT-09 08:55	DONE		
237118001	SAMPLE	KXM4	1181	06-OCT-09 21:47	DONE		
237118002	SAMPLE	KXM4	1182	06-OCT-09 21:47	DONE		
237118003	SAMPLE	KXM4	1183	06-OCT-09 21:47	DONE		
237118004	SAMPLE	KXM4	1184	06-OCT-09 21:47	DONE		
237118006	SAMPLE	KXM4	1208	09-OCT-09 17:49	DONE		

Instrument Run Log

Instrument Type: ALPHA SPECTROMETER

Batch ID: 906769

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
237118001	SAMPLE	KXM4	1149	07-OCT-09 21:32	DONE		
237118002	SAMPLE	KXM4	1150	07-OCT-09 21:32	DONE		
237118003	SAMPLE	KXM4	1151	07-OCT-09 21:32	DONE		
237118004	SAMPLE	KXM4	1152	07-OCT-09 21:33	DONE		
237118005	SAMPLE	KXM4	1153	07-OCT-09 21:33	DONE		
237118006	SAMPLE	KXM4	1154	07-OCT-09 21:33	DONE		
237118007	SAMPLE	KXM4	1155	07-OCT-09 21:33	DONE		
237118008	SAMPLE	KXM4	1156	07-OCT-09 21:33	DONE		
237118009	SAMPLE	KXM4	1157	07-OCT-09 21:33	DONE		
237118010	SAMPLE	KXM4	1158	07-OCT-09 21:33	DONE		
237118011	SAMPLE	KXM4	1159	07-OCT-09 21:33	DONE		
237118012	SAMPLE	KXM4	1160	07-OCT-09 21:33	DONE		
237118013	SAMPLE	KXM4	1008	07-OCT-09 21:33	DONE		
237118014	SAMPLE	KXM4	1009	07-OCT-09 21:33	DONE		
237118015	SAMPLE	KXM4	1010	07-OCT-09 21:33	DONE		
237118016	SAMPLE	KXM4	1011	07-OCT-09 21:33	DONE		
237118017	SAMPLE	KXM4	1012	07-OCT-09 21:33	DONE		
237118018	SAMPLE	KXM4	1013	07-OCT-09 21:33	DONE		
237118019	SAMPLE	KXM4	1014	07-OCT-09 21:33	DONE		
237118020	SAMPLE	KXM4	1015	07-OCT-09 21:33	DONE		
1201933862	MB	KXM4	1016	07-OCT-09 21:33	DONE		
1201933863	DUP	KXM4	1017	07-OCT-09 21:33	DONE		
1201933864	MS	KXM4	1018	07-OCT-09 21:33	DONE		
1201933865	LCS	KXM4	1019	07-OCT-09 21:33	DONE		