GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

August 29, 2019

TVA Deliverables
Environmental Standards, Inc.
1140 Valley Forge Road
Valley Forge, Pennsylvania 19482

Re: JSF EIP GW
Work Order: 487850

Dear TVA Deliverables:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 16, 2019. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4504.

Sincerely,

Erin B Trent

Erin Trent
Project Manager

Purchase Order: 5372407
Chain of Custody: JSF_GW_20190815_1B
Enclosures

Table of Contents

Case Narrative.....3

Data Review Qualifier Definitions.....5

Chain of Custody and Supporting Documentation.....8

Laboratory Certifications.....18

Radiological Analysis.....20

Case Narrative.....21

Sample Data Summary.....25

Quality Control Summary.....30

Gas Flow Raw Data.....33

Continuing Calibration Data.....49

Background Counts Data.....82

Method Calibration Data.....89

RAD Standards Traceability.....297

Runlogs.....317

Case Narrative

Case Narrative
for
Tennessee Valley Authority (13723)
SDG: 487850

August 29, 2019

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 August 16, 2019 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

Laboratory ID	Client ID
487850001	JSF-GW-029-20190815
487850002	JSF-GW-028-20190815
487850003	JSF-GW-EB01-20190815
487850004	JSF-GW-FB04-20190815

Case Narrative

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

Data Package

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

Erin Trent
Project Manager

Data Review Qualifier Definitions

Data Review Qualifier Definitions

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

P Organics-The concentrations between the primary and confirmation columns/detectors is >40% difference. For HPLC, the difference is >70%.

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

Chain of Custody and Supporting Documentation

TVA Environmental Investigations

Tennessee Valley Authority

487850

COOLER No.:		of	2
COC No:	JSF_GW_20190815_1B		
1 of 1 Pages			
Task Desc:	JSF_GW		

Chain-of-Custody / Analytical Request Document

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

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	GEL Laboratories LLC	Site ID #:	John Sevier Fossil Plant	Sampler:	A. Wilson / S. Stahl
Lab Address:	2040 Savage Road	Project #:	175568225	Sampling Company:	Stantec
	Charleston, SC 29407	Site Address	PLANT 611 OLD HWY 70 S	Address	601 Grassmere Park Rd, Suite 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone: (615) 685-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Erin Trent	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	843-769-7374/843-766-1178	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below _____

24 Hours

3 Business Days

5 Business Days

✓ 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit Start Depth	Sample Depth: Select Unit End Depth	MATRIX CODE	G=GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: GW_IMD	Filtered Y	Preserve HNO3
1	JSF-GW-029-20190815	JSF-208	40.5'	NA	GW	G	N	8/15/2019	0820	3	pH: 7.02	☐	X		
2	JSF-GW-028-20190815	JSF-207	36.5'	NA	GW	G	N	8/15/2019	0947	9	pH: 7.37	X	X		
3	JSF-GW-EB01-20190815	JSF-207	NA	NA	AQ	G	EB	8/15/2019	0950	3	None	☐	X		
4	JSF-GW-FB04-20190815	JSF-207	NA	NA	AQ	G	FB	8/15/2019	1015	3	None	☐	X		

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Anna Wilson / Stantec	8/15/2019	1300		8/16/19	850

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Anna Wilson /
	Stefan Stahl /

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

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

COOLER No.:	2 of 2
COC No:	JSF_GW_20190815_1B
1 of 1 Pages	
Task Desc:	JSF_GW

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	GEL Laboratories LLC	Site ID #:	John Sevier Fossil Plant	Sampler:	A. Wilson / S. Stahl
Lab Address:	2040 Savage Road	Project #:	175568225	Sampling Company:	Stantec
	Charleston, SC 29407	Site Address	PLANT 611 OLD HWY 70 S	Address	601 Grassmere Park Rd, Suite 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone: (615) 885-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Erin Trent	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	843-769-7374/843-766-1178	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time: ☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below _____

24 Hours

3 Business Days

5 Business Days

✓ 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Start Depth (Depth Unit)	Sample Depth: End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: GW_MD	Filtered (Y)	Preserve (YC)
2	JSF-GW-029-20190815	JSF-208	40.5'	NA	GW	G	N	8/15/2019	0820	3	pH: 7.02	☐	X		
2	JSF-GW-028-20190815	JSF-207	36.5'	NA	GW	G	N	8/15/2019	0947	9	pH: 7.37	X	X		
1	JSF-GW-EB01-20190815	JSF-207	NA	NA	AQ	G	EB	8/15/2019	0950	3	None	☐	X		
1	JSF-GW-FB04-20190815	JSF-207	NA	NA	AQ	G	FB	8/15/2019	1015	3	None	☐	X		

AW 8-15-19

AW 8-15-19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Anna Wilson / Stantec	8/15/2019	1300		8/16/19	8:50

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Anna Wilson /
	Stefan Stahl /

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Form TVA 30067A

GEL Laboratories LLC

ET

SAMPLE RECEIPT & REVIEW FORM

Client: TVAC	SDG/AR/COC/Work Order: 487850
Received By: AJA	Date Received: 8/16/19
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 7909 7442 3175 - 1°C 7909 7896 6409 - 1°C

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A)Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#: If UN2910, Is the Radioactive Shipment Survey Compliant? Yes___ No___
B) Did the client designate the samples are to be received as radioactive?		✓	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): Ø CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		✓	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		✓	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: 1°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR4-16 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, are Encores or Soil Kits present for solids? Yes___ No___ NA___(If yes, take to VOA Freezer). Do liquid VOA vials contain acid preservation? Yes___ No___ NA___(If unknown, select No) Are liquid VOA vials free of headspace? Yes___ No___ NA___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	✓			Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials MO Date 8/19 Page 1 of 1

GL-CHL-SR-001 Rev 6

Work Order Containers

Sample ID: 487850001
Client Sample ID: JSF−GW−029−20190815
Description: JSF−208 Ground Water

Label: 487850001.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
29−AUG−19 13:59:20	Lois Buist	Transfered custody to batch 1912709
29−AUG−19 13:59:20	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory

Label: 487850001.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
22−AUG−19 09:55:37	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 11:49:07	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage
26−AUG−19 12:32:41	Lois Buist	Transfered custody to batch 1911141
26−AUG−19 12:32:41	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
27−AUG−19 12:16:29	Caroline Gause	Changed batch_id from 1911141 to
27−AUG−19 12:16:29	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage
28−AUG−19 09:37:39	Kelli Dorrell	Transfered custody to batch 1911833
28−AUG−19 09:37:39	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
29−AUG−19 11:33:01	Lois Buist	Changed batch_id from 1911833 to
29−AUG−19 11:33:01	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
29−AUG−19 12:06:31	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage

Label: 487850001.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:54:59	Kelli Dorrell	Transfered custody to batch 1909938
22−AUG−19 09:54:59	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to

Work Order Containers

Sample ID: **487850001**
Client Sample ID: **JSF−GW−029−20190815**
Description: **JSF−208 Ground Water**

Label: 487850001.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 14:48:29	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Sample ID: **487850002**
Client Sample ID: **JSF−GW−028−20190815**
Description: **JSF−207 Ground Water**

Label: 487850002.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
22−AUG−19 09:55:37	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 11:49:07	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage
26−AUG−19 12:32:41	Lois Buist	Transfered custody to batch 1911141
26−AUG−19 12:32:41	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
27−AUG−19 12:16:29	Caroline Gause	Changed batch_id from 1911141 to
27−AUG−19 12:16:29	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage

Label: 487850002.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
28−AUG−19 09:37:39	Kelli Dorrell	Transfered custody to batch 1911833
28−AUG−19 09:37:39	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
29−AUG−19 11:33:01	Lois Buist	Changed batch_id from 1911833 to
29−AUG−19 11:33:01	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
29−AUG−19 12:06:31	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage

Label: 487850002.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Work Order Containers

Sample ID: **487850002**
Client Sample ID: **JSF−GW−028−20190815**
Description: **JSF−207 Ground Water**

Label: 487850002.04 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
22−AUG−19 09:55:37	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 14:48:29	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Label: 487850002.05 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
29−AUG−19 13:59:20	Lois Buist	Transfered custody to batch 1912709
29−AUG−19 13:59:20	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory

Label: 487850002.06 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Label: 487850002.07 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Label: 487850002.08 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Label: 487850002.09 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:54:59	Kelli Dorrell	Transfered custody to batch 1909938
22−AUG−19 09:54:59	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937

Work Order Containers

Sample ID: **487850002**
Client Sample ID: **JSF−GW−028−20190815**
Description: **JSF−207 Ground Water**

Label: 487850002.09 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 14:48:29	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Sample ID: **487850003**
Client Sample ID: **JSF−GW−EB01−20190815**
Description: **JSF−207 Water**

Label: 487850003.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
29−AUG−19 13:59:20	Lois Buist	Transfered custody to batch 1912709
29−AUG−19 13:59:20	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory

Label: 487850003.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
22−AUG−19 09:55:37	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 11:49:07	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage
26−AUG−19 12:32:41	Lois Buist	Transfered custody to batch 1911141
26−AUG−19 12:32:41	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
27−AUG−19 12:16:29	Caroline Gause	Changed batch_id from 1911141 to
27−AUG−19 12:16:29	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage
28−AUG−19 09:37:39	Kelli Dorrell	Transfered custody to batch 1911833
28−AUG−19 09:37:39	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
29−AUG−19 11:33:01	Lois Buist	Changed batch_id from 1911833 to
29−AUG−19 11:33:01	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
29−AUG−19 12:06:31	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage

Work Order Containers

Sample ID: 487850003
Client Sample ID: JSF−GW−EB01−20190815
Description: JSF−207 Water

Label: 487850003.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:54:59	Kelli Dorrell	Transfered custody to batch 1909938
22−AUG−19 09:54:59	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 14:48:29	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Sample ID: 487850004
Client Sample ID: JSF−GW−FB04−20190815
Description: JSF−207 Water

Label: 487850004.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
22−AUG−19 09:55:37	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 11:49:07	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage
26−AUG−19 12:32:41	Lois Buist	Transfered custody to batch 1911141
26−AUG−19 12:32:41	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
27−AUG−19 12:16:29	Caroline Gause	Changed batch_id from 1911141 to
27−AUG−19 12:16:29	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage
28−AUG−19 09:37:39	Kelli Dorrell	Transfered custody to batch 1911833
28−AUG−19 09:37:39	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
29−AUG−19 11:33:01	Lois Buist	Changed batch_id from 1911833 to
29−AUG−19 11:33:01	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
29−AUG−19 12:06:31	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage

Work Order Containers

Sample ID: **487850004**
Client Sample ID: **JSF−GW−FB04−20190815**
Description: **JSF−207 Water**

Label: 487850004.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
29−AUG−19 13:59:20	Lois Buist	Transfered custody to batch 1912709
29−AUG−19 13:59:20	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory

Label: 487850004.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16−AUG−19 15:19:08	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
19−AUG−19 09:16:04	Alexandra Almers	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
22−AUG−19 09:54:59	Kelli Dorrell	Transfered custody to batch 1909938
22−AUG−19 09:54:59	Kelli Dorrell	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
22−AUG−19 09:55:37	Kelli Dorrell	Transfered custody to batch 1909937
23−AUG−19 10:04:06	Lois Buist	Changed batch_id from 1909937 to
23−AUG−19 10:04:06	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
23−AUG−19 14:48:29	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Laboratory Certifications

List of current GEL Certifications as of 29 August 2019

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122020−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	2019−013
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−19−15
Utah NELAP	SC000122019−28
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Tennessee Valley Authority
SDG #: 487850

Product: **GFPC Radium-228, Liquid**
Analytical Method: EPA 904.0
Analytical Procedure: GL-RAD-A-009 REV# 17
Analytical Batch: 1909937

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

GEL Sample ID#	Client Sample Identification
487850001	JSF-GW-029-20190815
487850002	JSF-GW-028-20190815
487850003	JSF-GW-EB01-20190815
487850004	JSF-GW-FB04-20190815
1204364136	Method Blank (MB)
1204364137	487850002(JSF-GW-028-20190815) Sample Duplicate (DUP)
1204364138	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information

Recounts
Sample 487850004 (JSF-GW-FB04-20190815) was recounted due to high MDC. The recount is reported.

Product: **GFPC Radium-226, Liquid**
Analytical Method: EPA 903.0
Analytical Procedure: GL-RAD-A-010 REV# 18
Analytical Batch: 1912709

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

GEL Sample ID#	Client Sample Identification
487850001	JSF-GW-029-20190815
487850002	JSF-GW-028-20190815
487850003	JSF-GW-EB01-20190815
487850004	JSF-GW-FB04-20190815
1204370998	Method Blank (MB)
1204370999	487850002(JSF-GW-028-20190815) Sample Duplicate (DUP)
1204371000	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information

Sample Re-prep/Re-analysis
Samples were reprepped due to low recovery. The re-analysis is being reported.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

TVAC008 Tennessee Valley Authority (13723)

Client SDG: 487850 GEL Work Order: 487850

The Qualifiers in this report are defined as follows:

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

Review/Validation

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

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

Signature: Heather M. McCarty **Name:** **Heather McCarty**

Date: **30 AUG 2019** **Title:** **Analyst II**

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482 — Report Date: August 30, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-029-20190815
Sample ID: 487850001
Matrix: GW
Collect Date: 15-AUG-19
Receive Date: 16-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC Radium-226, Liquid "As Received"														
Radium-226	U	-0.137	+/-0.366	0.929	+/-0.367	1.00	pCi/L			KSD1	08/30/19	0957	1912709	1
GFPC Radium-228, Liquid "As Received"														
Radium-228	U	0.133	+/-0.547	0.985	+/-0.548	1.00	pCi/L			LXB3	08/26/19	1148	1909937	2
Radium-226+Radium-228 Calculation "See Parent Products"														
Radium-226+228 Sum		0.133	+/-0.659		+/-0.660		pCi/L		1	AEA	08/30/19	1226	1909939	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1912709	90.2	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1909937	62	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 30, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-028-20190815
Sample ID: 487850002
Matrix: GW
Collect Date: 15-AUG-19
Receive Date: 16-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC Radium-226, Liquid "As Received"														
Radium-226	U	0.606	+/-0.598	0.935	+/-0.608	1.00	pCi/L			KSD1	08/30/19	0957	1912709	1
GFPC Radium-228, Liquid "As Received"														
Radium-228	U	0.261	+/-0.526	0.922	+/-0.530	1.00	pCi/L			LXB3	08/26/19	1148	1909937	2
Radium-226+Radium-228 Calculation "See Parent Products"														
Radium-226+228 Sum		0.867	+/-0.796		+/-0.806		pCi/L		1	AEA	08/30/19	1226	1909939	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1912709	89.9	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1909937	63	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 30, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-EB01-20190815
Sample ID: 487850003
Matrix: AQ
Collect Date: 15-AUG-19
Receive Date: 16-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC Radium-226, Liquid "As Received"														
Radium-226	U	0.319	+/-0.488	0.839	+/-0.491	1.00	pCi/L			KSD1	08/30/19	0957	1912709	1
GFPC Radium-228, Liquid "As Received"														
Radium-228	U	0.452	+/-0.448	0.735	+/-0.463	1.00	pCi/L			LXB3	08/26/19	1148	1909937	2
Radium-226+Radium-228 Calculation "See Parent Products"														
Radium-226+228 Sum		0.771	+/-0.662		+/-0.675		pCi/L		1	AEA	08/30/19	1226	1909939	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1912709	83.6	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1909937	56	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 30, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-FB04-20190815
Sample ID: 487850004
Matrix: AQ
Collect Date: 15-AUG-19
Receive Date: 16-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC Radium-226, Liquid "As Received"														
Radium-226	U	0.696	+/-0.631	0.961	+/-0.643	1.00	pCi/L			KSD1	08/30/19	0957	1912709	1
GFPC Radium-228, Liquid "As Received"														
Radium-228	U	0.408	+/-0.468	0.788	+/-0.480	1.00	pCi/L			LXB3	08/26/19	1459	1909937	2
Radium-226+Radium-228 Calculation "See Parent Products"														
Radium-226+228 Sum		1.10	+/-0.786		+/-0.802		pCi/L		1	AEA	08/30/19	1226	1909939	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1912709	87.7	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1909937	54.9	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

Quality Control Summary

QC Summary

Report Date: August 30, 2019
Page 1 of 2

Client : **Environmental Standards, Inc.**
1140 Valley Forge Road

Valley Forge, Pennsylvania

Contact: **TVA Deliverables**

Workorder: **487850**

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1909937										
QC1204364137 487850002 DUP										
Radium-228	U	0.261	U	-0.109	pCi/L	1.18		(0-2)	LXB3	08/26/19 11:48
	Uncert:	+/-0.526		+/-0.309						
	TPU:	+/-0.530		+/-0.309						
	MDC:	0.922		0.642						
QC1204364138 LCS										
Radium-228	20.7			21.5	pCi/L		104	(80%-120%)	LXB3	08/26/19 11:48
	Uncert:			+/-1.62						
	TPU:			+/-5.70						
	MDC:			0.873						
QC1204364136 MB										
Radium-228			U	0.152	pCi/L				LXB3	08/26/19 11:47
	Uncert:			+/-0.365						
	TPU:			+/-0.367						
	MDC:			0.660						
Batch 1912709										
QC1204370999 487850002 DUP										
Radium-226	U	0.606		1.02	pCi/L	0.857		(0-2)	KSD1	08/30/19 09:57
	Uncert:	+/-0.598		+/-0.698						
	TPU:	+/-0.608		+/-0.720						
	MDC:	0.935		0.949						
QC1204371000 LCS										
Radium-226	555			450	pCi/L		81.2	(80%-120%)	KSD1	08/30/19 09:57
	Uncert:			+/-12.7						
	TPU:			+/-77.4						
	MDC:			1.39						
QC1204370998 MB										
Radium-226			U	0.532	pCi/L				KSD1	08/30/19 09:57
	Uncert:			+/-0.600						
	TPU:			+/-0.607						
	MDC:			0.985						

Notes:

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

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.

QC Summary

Workorder: **487850**

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

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Gas Flow Raw Data

Batch 1912709 Check-list

This check-list was completed on 30-AUG-19 by Kenshalla Oston

This batch was reviewed by Angela Johnson on 30-AUG-19 and Kenshalla Oston on 30-AUG-19.

Batch ID:	**Product:**	**Description:** Gas Flow Total Radium
1912709	GFCTORAL	GL-RAD-A-010

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

Prep Logbook

Total Radium in Liquid

Batch ID: **1912709**
Analyst: Kelli Dorrell (KSD1)
Method: EPA 900.1 Mod/ EPA 903.0 Mod
Lab SOP: GL−RAD−A−010 REV# 18
Instrument: GFC−51204863

Due Dates for Lab: 27−AUG−2019 Package: 29−AUG−2019 SDG: 30−AUG−2019

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204371000	Radium−226 SPIKE	0299−H	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Precipitation (date)	Initial Weight (g)	Final Weight (g)	Net Weight (mg)	Barium Carrier Yield (percent)
1	487850001 − 4	29−AUG−2019	1	200	08/29/19 14:44	0.0777	0.1022	24.5	90
2	487850002 − 4	29−AUG−2019	1	200	08/29/19 14:44	0.0779	0.1023	24.4	90
3	487850003 − 4	29−AUG−2019	1	200	08/29/19 14:44	0.0779	0.1006	22.7	84
4	487850004 − 4	29−AUG−2019	1	200	08/29/19 14:44	0.0779	0.1017	23.8	88
5	1204370998 MB	29−AUG−2019	1	200	08/29/19 14:44	0.0779	0.1027	24.8	91
6	1204370999 − 4 DUP (487850002)	29−AUG−2019	1	200	08/29/19 14:44	0.0779	0.1026	24.7	91
7	1204371000 LCS	29−AUG−2019	1	200	08/29/19 14:44	0.0778	0.0992	21.4	79

Reagent/Solvent Lot ID	Description	Amount
CARR 2948176	RGF−Barium Carrier 1mL=27.15	1 mL
REGNT 2932352	RGF−1:1 Sulfuric Acid	10 mL
REGNT 2968627.32	RGF−Hydrochloric Acid	10 mL

Comments:
Pipette 1: RAD−GFC−1795419
Pipette 2: RAD−GFC−1608405
Data Entry Date2: 29−AUG−2019 14:44 GFC−F30560 Kelli Dorrell
Data Entry Date3: 29−AUG−2019 00:00

Total Radium Liquid

Filename : TOTRA.XLS
File type : Excel
Version # : 1.3.9

Batch : 1912709
Analyst : KEL01237
Prep Date : 8/29/2019
Method Uncertainty: 0.0859

Geometry: 47mm Filter

Carrier S/N : 2948176
Carrier Exp Date : 6/25/2020
Carrier Volume Added: 1.00
Carrier Weight (mg/ml): 27.15
Carrier Weight StDev.: 0.13

Procedure Code : GFCTORAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Rn-222 : 3.8235 days

Sample Characteristics					**Carrier Calculations**				
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Carrier Weight (mg) (Standard)	Residue Weight (mg) (Sample)	Residue Weight StDev. (mg)	Carrier Aliquot (mL)	Carrier Aliquot StDev. (mL)
1	487850001.4	0.2000	1.6007E-05	8/15/2019 8:20	27.15	24.50	0.112631	1.0	0.002000
2	487850002.4	0.2000	1.6007E-05	8/15/2019 9:47	27.15	24.40	0.112201	1.0	0.002000
3	487850003.4	0.2000	1.6007E-05	8/15/2019 9:50	27.15	22.70	0.104895	1.0	0.002000
4	487850004.4	0.2000	1.6007E-05	8/15/2019 10:15	27.15	23.80	0.109622	1.0	0.002000
5	1204370998.1	0.2000	1.6007E-05	8/29/2019 0:00	27.15	24.80	0.113920	1.0	0.002000
6	1204370999.4	0.2000	1.6007E-05	8/15/2019 9:47	27.15	24.70	0.113491	1.0	0.002000
7	1204371000.1	0.2000	1.6007E-05	8/29/2019 0:00	27.15	21.40	0.099307	1.0	0.002000

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml
Pipet, 5 ml Stdev : +/-	0.010000	ml

Analytical SOP: GL-RAD-A-010
Instrument SOP: GL-RAD-I-016

Count Raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Gross Alpha CPM	Count Start Date/Time	Precipitation Date/Time	Ingrowth factor	Calculated Sample Recovery %	Sample Recovery Error %
1	2D	70	5	66	0.071	8/30/2019 9:57	8/29/2019 14:44	1.417	90.2%	0.83%
2	2B	70	14	61	0.200	8/30/2019 9:57	8/29/2019 14:44	1.417	89.9%	0.83%
3	1C	60	7	40	0.117	8/30/2019 9:57	8/29/2019 14:44	1.415	83.6%	0.83%
4	2A	70	16	37	0.229	8/30/2019 9:57	8/29/2019 14:44	1.417	87.7%	0.83%
5	5B	70	16	39	0.229	8/30/2019 9:57	8/29/2019 14:44	1.417	91.3%	0.83%
6	1B	70	20	76	0.286	8/30/2019 9:57	8/29/2019 14:44	1.417	91.0%	0.83%
7	5A	60	4837	2933	80.617	8/30/2019 9:57	8/29/2019 14:44	1.415	78.8%	0.84%

Calibration Data

Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Beta X-Talk	Weekly Bkg CPM	Weekly Bkg Count Start Date/Time	Weekly Bkg Count Time (min.)
PIC	5/1/2018	5/31/2020	0.3281	0.01278	0.00091	0.096	8/23/2019 17:20	500
PIC	5/1/2018	5/31/2020	0.3193	0.02011	0.00064	0.090	8/23/2019 17:20	500
PIC	5/1/2018	5/31/2020	0.3461	0.00967	0.00997	0.052	8/23/2019 17:20	500
PIC	5/1/2018	5/31/2020	0.3313	0.01946	0.00273	0.100	8/23/2019 17:20	500
PIC	5/1/2018	5/31/2020	0.3370	0.01152	0.00269	0.124	8/23/2019 17:22	500
PIC	5/1/2018	5/31/2020	0.3209	0.01356	0.00072	0.098	8/23/2019 17:20	500
PIC	5/1/2018	5/31/2020	0.3603	0.00491	0.00232	0.194	8/23/2019 17:22	500

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

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

LCS S/N : 0299-H
LCS Exp Date : 12/4/2019
LCS Activity (dpm/ml): 2462.11
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.4946	0.3492	1	0.9285	**-0.1365**	141.72%	-0.0246	0.0348	0.3664	0.3666		SAMPLE				
2	0.4940	0.3488	1	0.9350	**0.6061**	50.15%	0.1100	0.0551	0.5982	0.6075		SAMPLE				
3	0.3991	0.2818	1	0.8385	**0.3190**	70.00%	0.0647	0.0453	0.4878	0.4915		SAMPLE				
4	0.5146	0.3633	1	0.9611	**0.6957**	45.83%	0.1286	0.0589	0.6314	0.6431		SAMPLE				
5	0.5407	0.3817	1	0.9848	**0.5323**	56.70%	0.1046	0.0593	0.5999	0.6070		MB				
6	0.5068	0.3578	1	0.9489	**1.0177**	34.88%	0.1877	0.0654	0.6979	0.7195	487850002.4	DUP	50.7%	0.8567		
7	0.7858	0.5548	1	1.3898	**450.0736**	1.74%	80.4227	1.1593	12.7343	77.4200		LCS			554.5284	81.2%

1912709.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
487850001	2D	70	5	66	8/30/2019 9:57	8/30/2019 11:07	PIC	1912709
487850002	2B	70	14	61	8/30/2019 9:57	8/30/2019 11:07	PIC	1912709
487850003	1C	60	7	40	8/30/2019 9:57	8/30/2019 10:57	PIC	1912709
487850004	2A	70	16	37	8/30/2019 9:57	8/30/2019 11:07	PIC	1912709
1204370998	5B	70	16	39	8/30/2019 9:57	8/30/2019 11:07	PIC	1912709
1204370999	1B	70	20	76	8/30/2019 9:57	8/30/2019 11:07	PIC	1912709
1204371000	5A	60	4837	2933	8/30/2019 9:57	8/30/2019 10:57	PIC	1912709

Batch 1909937 Check-list

This check-list was completed on 27-AUG-19 by Nat Long

This batch was reviewed by Kenshalla Oston on 27-AUG-19 and Nat Long on 27-AUG-19.

Batch ID: 1909937

Product: GFC28RAL

Description: Gas Flow Radium 228 GL-RAD-A-009

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

Prep Logbook

Radium−228 in Liquid

Batch ID: **1909937**
Analyst: Lois Buist (LXB3)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−009 REV# 17
Instrument: GFC−51204863

Due Dates for Lab: 27−AUG−2019 **Package: 29−AUG−2019** **SDG: 30−AUG−2019**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204364138	Radium−228 SPIKE	1905−A	.2	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	487850001	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
2	487850002	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
3	487850003	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
4	487850004	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
5	1204364136 MB	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
6	1204364137 DUP (487850002)	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02
7	1204364138 LCS	22−AUG−2019	1	900	08/23/19 14:02	08/26/19 09:02

Reagent/Solvent Lot ID	Description	Amount
WORK 0487−E	Barium−133 Tracer	.2 mL
REGNT 2672182	RGF−1.5 Ammonium Sulfate	10 mL
REGNT 2896780.11	RGF−Hydrofluoric Acid	4 mL
REGNT 2911219	Barium Carrier Ra228−REG	1 mL
REGNT 2924781	Lot #DGA0006	2 g
REGNT 2931663	RGF−50% Potassium Carbonate	2 mL
REGNT 2936697	RGF−Neodymium Subtrate	5 mL
REGNT 2947553	RGF−Neodymium 500mg/L	.2 mL
REGNT 2957526.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 2959978	RGF−7M Nitric Acid	25 mL
REGNT 2959984	RGF−1M Citric Acid	5 mL
REGNT 2965866	RGF−2M Hydrochloric Acid	20 mL

Comments:

Pipet Id: RAD−GFC−1795419
Data Entry Date2: 22−AUG−2019 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-E
Tracer Exp Date : 1/14/2020
Tracer Volume Added: 0.20

Batch : 1909937
Analyst : LOI02092
Prep Date : 8/22/2019
Ra-228 Method Uncertainty : 0.1268

Geometry: 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 1 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	487850001.1	0.9000	2.0768E-05	8/15/2019 8:20	388.2	3.15%	240.5	4.16%	0.2	0.000200
2	487850002.1	0.9000	2.0768E-05	8/15/2019 9:47	388.2	3.15%	244.6	4.12%	0.2	0.000200
3	487850003.1	0.9000	2.0768E-05	8/15/2019 9:50	388.2	3.15%	217.2	4.43%	0.2	0.000200
4	487850004.1	0.9000	2.0768E-05	8/15/2019 10:15	388.2	3.15%	213.0	4.48%	0.2	0.000200
5	1204364136.1	0.9000	2.0768E-05	8/22/2019 0:00	388.2	3.15%	251.0	4.06%	0.2	0.000200
6	1204364137.1	0.9000	2.0768E-05	8/15/2019 9:47	388.2	3.15%	238.0	4.19%	0.2	0.000200
7	1204364138.1	0.9000	2.0768E-05	8/22/2019 0:00	388.2	3.15%	263.5	3.94%	0.2	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-009
Instrument SOP: GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	3B	60	15	78	1.300	8/26/2019 11:48	8/23/2019 14:02	8/26/2019 9:02	0.996	0.732	0.999	1.057	62.0%	2.61%
2	3C	60	16	76	1.267	8/26/2019 11:48	8/23/2019 14:02	8/26/2019 9:02	0.996	0.732	0.999	1.057	63.0%	2.60%
3	3D	60	7	44	0.733	8/26/2019 11:48	8/23/2019 14:02	8/26/2019 9:02	0.996	0.732	0.999	1.057	56.0%	2.72%
4	7D	130	12	84	0.646	8/26/2019 14:59	8/23/2019 14:02	8/26/2019 9:02	0.996	0.510	0.999	1.127	54.9%	2.74%
5	4B	60	9	37	0.617	8/26/2019 11:47	8/23/2019 14:02	8/26/2019 9:02	0.999	0.732	0.999	1.057	64.7%	2.57%
6	4C	60	4	24	0.400	8/26/2019 11:48	8/23/2019 14:02	8/26/2019 9:02	0.996	0.732	0.999	1.057	61.3%	2.62%
7	4D	60	57	795	13.250	8/26/2019 11:48	8/23/2019 14:02	8/26/2019 9:02	0.999	0.732	0.999	1.057	67.9%	2.53%

Calibration Data

Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2019	5/31/2020	0.6519	0.01614	1.226	8/23/2019 17:20	500
2	PIC	6/1/2019	5/31/2020	0.6567	0.00988	1.118	8/23/2019 17:20	500
3	PIC	6/1/2019	5/31/2020	0.6533	0.02297	0.506	8/23/2019 17:21	500
4	PIC	6/1/2019	5/31/2020	0.6555	0.01113	0.514	8/23/2019 17:19	500
5	PIC	6/1/2019	5/31/2020	0.6400	0.01519	0.530	8/23/2019 17:21	500
6	PIC	6/1/2019	5/31/2020	0.6541	0.00889	0.460	8/23/2019 17:21	500
7	PIC	6/1/2019	5/31/2020	0.6083	0.00773	0.992	8/23/2019 17:21	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

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N :	N/A
Spike Exp Date :	N/A
Spike Activity (dpm/ml):	N/A
Spike Volume Added:	N/A
LCS S/N :	1905-A
LCS Exp Date :	6/13/2020
LCS Activity (dpm/ml):	206.90
LCS Volume Added:	0.20

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.6338	0.4474	1	0.9848	**0.1331**	209.89%	0.0740	0.1553	0.5473	0.5484		SAMPLE				
2	0.5908	0.4171	1	0.9219	**0.2609**	102.82%	0.1487	0.1528	0.5256	0.5298		SAMPLE				
3	0.4500	0.3177	1	0.7347	**0.4517**	50.73%	0.2273	0.1150	0.4480	0.4630		SAMPLE				
4	0.5074	0.3582	1	0.7876	**0.4077**	58.68%	0.1322	0.0774	0.4683	0.4798		SAMPLE				
5	0.4056	0.2864	1	0.6602	**0.1517**	122.90%	0.0867	0.1065	0.3653	0.3673		MB				
6	0.3908	0.2759	1	0.6424	**-0.1086**	145.20%	-0.0600	0.0871	0.3090	0.3091	487850002.1	DUP	* 0.0%	1.1808		
7	0.5563	0.3928	1	0.8732	**21.5076**	4.67%	12.2580	0.4720	1.6233	5.6962		LCS			20.7109	103.8%

1909937r1.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
487850001	3B	60	15	78	8/26/2019 11:48	8/26/2019 12:48	PIC	1909937
487850002	3C	60	16	76	8/26/2019 11:48	8/26/2019 12:48	PIC	1909937
487850003	3D	60	7	44	8/26/2019 11:48	8/26/2019 12:48	PIC	1909937
487850004	7D	130	12	84	8/26/2019 14:59	8/26/2019 17:09	PIC	1909937
1204364136	4B	60	9	37	8/26/2019 11:47	8/26/2019 12:47	PIC	1909937
1204364137	4C	60	4	24	8/26/2019 11:48	8/26/2019 12:48	PIC	1909937
1204364138	4D	60	57	795	8/26/2019 11:48	8/26/2019 12:48	PIC	1909937

ASSAY 27-Aug-19 7:33:15

Protocol	id	9	228_REC2
Time	limit	180	
Count	limit	50000	
Isotope	Ba-133		
Protocol	date	26-Sep-13	15:01:58
Run	id.	56	

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF	1	72	1	180	1304	388.2	3.15		07:33:22
487850001	2	72	2	180	861	240.5	4.16	61.95	07:36:33
487850002	3	72	3	180	873	244.6	4.12	63.01	07:39:45
487850003	4	72	4	180	791	217.2	4.43	55.95	07:42:56
487850004	5	72	5	180	779	213	4.48	54.87	07:46:08
1204364136	6	37	6	180	892	251	4.06	64.66	07:49:32
1204364137	7	37	7	180	853	238	4.19	61.31	07:52:44
1204364138	8	37	8	180	930	263.5	3.94	67.88	07:55:55

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 26-Aug-2019

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1W		Alpha bkg				-1.08E-1	0.244	-1.15
G5400W1W		Alpha eff				9243	10360	-52.65
G5400W1W		Alpha XTalk				0.315	0.385	-30.15
G5400W1W		Beta bkg				0.468	1.988	-4.85
G5400W1W		Beta eff				10660	14690	-18.87
G5400W1W		Beta XTalk				1.79E-4	0.002	-3.66
G5400W1X		Alpha bkg				-7.73E-2	0.185	-1.23
G5400W1X		Alpha eff				11650	13220	-47.52
G5400W1X		Alpha XTalk				0.293	0.358	-30.08
G5400W1X		Beta bkg				0.627	1.812	-6.18
G5400W1X		Beta eff				11700	15100	-23.65
G5400W1X		Beta XTalk				1.27E-4	0.001	-3.80
G5400W1Y		Alpha bkg				-1.58E-1	0.421	-1.36
G5400W1Y		Alpha eff				7198	10460	-16.24
G5400W1Y		Alpha XTalk				0.233	0.471	-8.87
G5400W1Y		Beta bkg				0.588	1.905	-5.68
G5400W1Y		Beta eff				11890	15630	-22.07
G5400W1Y		Beta XTalk				8.82E-5	0.001	-3.57
G5400W1Z		Alpha bkg				-1.21E-1	0.229	-0.93
G5400W1Z		Alpha eff				9611	10680	-56.94
G5400W1Z		Alpha XTalk				0.294	0.349	-35.46
G5400W1Z		Beta bkg				0.499	1.662	-5.57
G5400W1Z		Beta eff				9613	19430	-8.88
G5400W1Z		Beta XTalk				-5.21E-1	0.543	-0.06
LB4100A1		Alpha bkg	26-Aug 04:50	60	0.017	-9.59E-2	0.252	-1.06
LB4100A1		Alpha eff	26-Aug 08:00	5	8133	7787	10420	-2.21
LB4100A1		Alpha XTalk	26-Aug 08:00	5	0.337	0.245	0.345	+2.54
LB4100A1		Beta bkg	26-Aug 04:50	60	1.617	0.588	1.928	+1.61
LB4100A1		Beta eff	26-Aug 04:22	5	21349	19040	22660	+0.83
LB4100A1		Beta XTalk	26-Aug 04:22	5	4.21E-4	1.76E-4	6.44E-4	+0.14
LB4100A2		Alpha bkg	26-Aug 04:50	60	0.050	-2.67E-1	0.448	-0.34
LB4100A2		Alpha eff	26-Aug 04:10	5	9548	8462	11400	-0.78
LB4100A2		Alpha XTalk	26-Aug 04:10	5	0.348	0.278	0.383	+0.99
LB4100A2		Beta bkg	26-Aug 04:50	60	1.417	-8.28E-1	3.179	+0.36
LB4100A2		Beta eff	26-Aug 04:22	5	21790	20130	23100	+0.35
LB4100A2		Beta XTalk	26-Aug 04:22	5	3.12E-4	9.55E-5	5.44E-4	-0.10
LB4100A3		Alpha bkg	26-Aug 04:50	60	0.067	-3.71E-2	0.206	-0.44
LB4100A3		Alpha eff	26-Aug 07:46	5	7904	7538	10210	-2.18
LB4100A3		Alpha XTalk	26-Aug 07:46	5	0.281	0.200	0.289	+2.43
LB4100A3		Beta bkg	26-Aug 04:50	60	1.233	-3.71E+2	399	-0.10
LB4100A3		Beta eff	26-Aug 04:22	5	20227	18460	23140	-0.73
LB4100A3		Beta XTalk	26-Aug 04:22	5	2.96E-4	4.76E-5	4.91E-4	+0.37

LB4100B1		Alpha bkg				-5.04E-2	0.323	-2.19
LB4100B1		Alpha eff				10030	12040	-32.94
LB4100B1		Alpha XTalk				0.142	0.253	-10.70
LB4100B1		Beta bkg				0.690	1.634	-7.39
LB4100B1		Beta eff				50540	59850	-35.57
LB4100B1		Beta XTalk				6.15E-5	2.28E-4	-5.22
LB4100B2		Alpha bkg				-1.89E-1	0.467	-1.27
LB4100B2		Alpha eff				7003	10510	-14.98
LB4100B2		Alpha XTalk				0.245	0.294	-32.68
LB4100B2		Beta bkg				0.418	1.814	-4.80
LB4100B2		Beta eff				18980	25790	-19.72
LB4100B2		Beta XTalk				1.57E-4	5.67E-4	-5.29
LB4100B3		Alpha bkg				-6.61E-2	0.276	-1.84
LB4100B3		Alpha eff				8427	16450	-9.30
LB4100B3		Alpha XTalk				0.270	0.653	-7.22
LB4100B3		Beta bkg				-2.44E+2	261	-0.10
LB4100B3		Beta eff				22590	31610	-18.03
LB4100B3		Beta XTalk				-4.93E-1	0.516	-0.07
LB4100B4		Alpha bkg				-5.19E-2	0.218	-1.85
LB4100B4		Alpha eff				10140	15160	-15.12
LB4100B4		Alpha XTalk				0.251	0.384	-14.36
LB4100B4		Beta bkg				0.529	1.722	-5.66
LB4100B4		Beta eff				35650	40530	-46.83
LB4100B4		Beta XTalk				7.36E-5	3.38E-4	-4.67
LB4100C1		Alpha bkg	26-Aug 04:41	60	0.100	-7.52E-3	0.336	-1.12
LB4100C1	Below	Alpha eff	26-Aug 08:07	5	10939	10960	11760	-3.16
LB4100C1		Alpha XTalk	26-Aug 08:07	5	0.189	0.170	0.205	+0.20
LB4100C1	Above	Beta bkg	26-Aug 04:41	60	2.433	0.070	3.594	+1.02
LB4100C1		Beta eff	26-Aug 04:30	5	15687	15330	16900	-1.64
LB4100C1		Beta XTalk	26-Aug 04:30	5	3.70E-4	2.67E-4	7.37E-4	-1.69
LB4100C2		Alpha bkg	26-Aug 04:41	60	0.050	-8.52E-2	0.312	-0.96
LB4100C2		Alpha eff	26-Aug 04:21	5	11233	10750	12990	-1.71
LB4100C2		Alpha XTalk	26-Aug 04:21	5	0.282	0.248	0.301	+0.88
LB4100C2		Beta bkg	26-Aug 04:41	60	1.167	0.511	1.777	+0.11
LB4100C2		Beta eff	26-Aug 04:30	5	16736	15090	19370	-0.69
LB4100C2		Beta XTalk	26-Aug 04:30	5	4.78E-4	1.13E-4	4.85E-4	+2.88
LB4100C3		Alpha bkg	26-Aug 04:41	60	0.067	-6.31E-2	0.282	-0.74
LB4100C3		Alpha eff	26-Aug 04:21	5	7926	7243	8653	-0.09
LB4100C3		Alpha XTalk	26-Aug 04:21	5	0.309	0.289	0.331	-0.11
LB4100C3		Beta bkg	26-Aug 04:41	60	1.183	0.776	2.251	-1.34
LB4100C3		Beta eff	26-Aug 04:30	5	16517	13900	18670	+0.29
LB4100C3		Beta XTalk	26-Aug 04:30	5	2.54E-4	7.94E-5	4.16E-4	+0.12
LB4100C4		Alpha bkg	26-Aug 04:41	60	0.133	-1.09E-1	0.257	+0.97
LB4100C4		Alpha eff	26-Aug 04:21	5	7448	5861	8515	+0.59

LB4100C4		Alpha XTalk	26-Aug 04:21	5	0.367	0.311	0.445	-0.50
LB4100C4	Above	Beta bkg	26-Aug 04:41	60	1675	-2.26E+0	8.835	+904.34
LB4100C4	Above	Beta eff	26-Aug 04:30	5	23414	16060	22510	+3.84
LB4100C4		Beta XTalk	26-Aug 04:30	5	1.28E-4	5.74E-5	3.48E-4	-1.54
LB4100D1		Alpha bkg				-6.92E-2	0.073	-0.08
LB4100D1		Alpha eff				-2.16E+3	2344	-0.12
LB4100D1		Alpha XTalk				-1.59E+0	53.770	-2.83
LB4100D1		Beta bkg				-7.61E-1	1.773	-1.20
LB4100D1		Beta eff				2672	27110	-3.66
LB4100D1		Beta XTalk				-5.07E-5	5.70E-5	-0.17
LB4100D2		Alpha bkg				0.100	0.528	-4.40
LB4100D2		Alpha eff				5391	14880	-6.41
LB4100D2		Alpha XTalk				-9.09E+2	960	-0.08
LB4100D2		Beta bkg				0.309	2.710	-3.77
LB4100D2		Beta eff				19300	47980	-7.04
LB4100D2		Beta XTalk				1.43E-4	4.77E-4	-5.57
LB4100D3		Alpha bkg				-1.55E-2	0.582	-2.84
LB4100D3		Alpha eff				11660	37470	-5.71
LB4100D3		Alpha XTalk				-1.31E+3	1383	-0.08
LB4100D3		Beta bkg				-1.53E+0	4.943	-1.58
LB4100D3		Beta eff				17260	61720	-5.33
LB4100D3		Beta XTalk				-1.60E-3	0.002	-0.37
LB4100D4		Alpha bkg				-6.65E-2	0.307	-1.93
LB4100D4		Alpha eff				8864	26240	-6.06
LB4100D4		Alpha XTalk				-1.73E+3	1829	-0.08
LB4100D4		Beta bkg				0.746	2.239	-6.00
LB4100D4		Beta eff				33390	97650	-6.12
LB4100D4		Beta XTalk				8.04E-5	2.34E-4	-6.14
LB4100E1		Alpha bkg	26-Aug 04:22	60	0.183	-5.45E-2	0.290	+1.15
LB4100E1		Alpha eff	26-Aug 03:55	5	11060	10380	11370	+1.12
LB4100E1		Alpha XTalk	26-Aug 03:55	5	0.205	0.186	0.223	+0.01
LB4100E1		Beta bkg	26-Aug 04:22	60	1.400	0.697	2.033	+0.16
LB4100E1		Beta eff	26-Aug 04:02	5	15247	14740	17130	-1.73
LB4100E1		Beta XTalk	26-Aug 04:02	5	4.33E-4	2.29E-4	7.39E-4	-0.60
LB4100E2	Above	Alpha bkg	26-Aug 04:22	60	0.233	-1.97E-2	0.222	+3.28
LB4100E2		Alpha eff	26-Aug 03:55	5	7666	5846	8521	+1.08
LB4100E2		Alpha XTalk	26-Aug 03:55	5	0.414	0.341	0.542	-0.81
LB4100E2	Above	Beta bkg	26-Aug 04:22	60	2.617	1.005	2.203	+5.07
LB4100E2	need 2nd	Beta eff	26-Aug 04:02	5	15959	15340	16820	-0.49
LB4100E2		Beta XTalk	26-Aug 04:02	5	2.63E-4	1.39E-4	5.04E-4	-0.96
LB4100E3		Alpha bkg	26-Aug 04:22	60	0.033	-4.15E-2	0.198	-1.12
LB4100E3		Alpha eff	26-Aug 03:55	5	8681	7895	9089	+0.95
LB4100E3		Alpha XTalk	26-Aug 03:55	5	0.243	0.230	0.285	-1.58
LB4100E3	Above	Beta bkg	26-Aug 04:22	60	2.117	1.790	2.114	+3.05
LB4100E3		Beta eff	26-Aug 04:02	5	15402	15110	16360	-1.60

LB4100E3		Beta XTalk	26-Aug 04:02	5	1.82E-4	1.08E-4	4.52E-4	-1.71
LB4100E4		Alpha bkg	26-Aug 04:22	60	0.067	-5.75E-2	0.174	+0.22
LB4100E4		Alpha eff	26-Aug 03:55	5	9935	9238	10300	+0.94
LB4100E4		Alpha XTalk	26-Aug 03:55	5	0.246	0.228	0.263	-0.01
LB4100E4		Beta bkg	26-Aug 04:22	60	1.533	0.455	2.172	+0.77
LB4100E4		Beta eff	26-Aug 04:02	5	17869	17000	20330	-1.43
LB4100E4		Beta XTalk	26-Aug 04:02	5	2.13E-4	6.94E-5	3.54E-4	+0.03
LB4100F1		Alpha bkg	26-Aug 04:22	60	0.033	-5.23E-2	0.181	-0.80
LB4100F1		Alpha eff	26-Aug 03:55	5	9743	9414	10300	-0.77
LB4100F1		Alpha XTalk	26-Aug 03:55	5	0.268	0.248	0.284	+0.41
LB4100F1		Beta bkg	26-Aug 04:22	60	1.183	0.602	1.924	-0.36
LB4100F1		Beta eff	26-Aug 04:02	5	41494	40590	43880	-1.35
LB4100F1		Beta XTalk	26-Aug 04:02	5	1.06E-4	4.22E-5	2.06E-4	-0.66
LB4100F2		Alpha bkg	26-Aug 04:22	60	0.267	0.039	0.317	+1.92
LB4100F2		Alpha eff	26-Aug 03:55	5	4882	4033	5271	+1.11
LB4100F2		Alpha XTalk	26-Aug 03:55	5	0.485	0.431	0.588	-0.91
LB4100F2		Beta bkg	26-Aug 04:22	60	1.233	0.714	1.605	+0.50
LB4100F2		Beta eff	26-Aug 04:02	5	16754	16140	17120	+0.76
LB4100F2		Beta XTalk	26-Aug 04:02	5	4.18E-4	1.34E-4	5.31E-4	+1.29
LB4100F3		Alpha bkg	26-Aug 04:22	60	0.100	-4.66E-2	0.248	-0.02
LB4100F3		Alpha eff	26-Aug 03:55	5	15264	13520	17440	-0.33
LB4100F3		Alpha XTalk	26-Aug 03:55	5	0.340	0.288	0.379	+0.45
LB4100F3		Beta bkg	26-Aug 04:22	60	1.250	0.636	1.613	+0.77
LB4100F3		Beta eff	26-Aug 04:02	5	27103	26340	27710	+0.34
LB4100F3		Beta XTalk	26-Aug 04:02	5	2.51E-4	9.36E-5	3.81E-4	+0.29
LB4100F4		Alpha bkg	26-Aug 04:22	60	0.050	-4.01E-2	0.180	-0.54
LB4100F4		Alpha eff	26-Aug 03:55	5	7527	5406	9284	+0.28
LB4100F4		Alpha XTalk	26-Aug 03:55	5	0.572	0.425	0.745	-0.24
LB4100F4		Beta bkg	26-Aug 04:22	60	1.283	0.704	1.854	+0.02
LB4100F4		Beta eff	26-Aug 04:02	5	32778	31480	34030	+0.05
LB4100F4		Beta XTalk	26-Aug 04:02	5	1.40E-4	7.46E-5	3.07E-4	-1.30
LB4100G1		Alpha bkg	26-Aug 04:22	60	0.017	-4.19E-2	0.157	-1.23
LB4100G1		Alpha eff	26-Aug 04:01	5	9570	7467	11340	+0.26
LB4100G1		Alpha XTalk	26-Aug 04:01	5	0.271	0.224	0.315	+0.09
LB4100G1		Beta bkg	26-Aug 04:22	60	0.867	0.375	1.637	-0.66
LB4100G1		Beta eff	26-Aug 04:10	5	15728	14840	16920	-0.44
LB4100G1		Beta XTalk	26-Aug 04:10	5	5.59E-4	1.64E-4	6.43E-4	+1.95
LB4100G2		Alpha bkg	26-Aug 04:22	60	0.183	-5.80E-2	0.275	+1.35
LB4100G2		Alpha eff	26-Aug 04:01	5	10734	8815	11510	+1.27
LB4100G2		Alpha XTalk	26-Aug 04:01	5	0.294	0.272	0.365	-1.57
LB4100G2	Above	Beta bkg	26-Aug 04:22	60	221	-5.43E+1	80.770	+9.22
LB4100G2		Beta eff	26-Aug 04:10	5	16379	15800	17170	-0.47
LB4100G2		Beta XTalk	26-Aug 04:10	5	2.81E-4	1.23E-4	5.12E-4	-0.57
LB4100G3		Alpha bkg	26-Aug 04:22	60	0.117	0.002	0.276	-0.49

LB4100G3		Alpha eff	26-Aug 04:01	5	7201	6620	7779	+0.01
LB4100G3		Alpha XTalk	26-Aug 04:01	5	0.342	0.309	0.375	+0.04
LB4100G3	Above	Beta bkg	26-Aug 04:22	60	3.167	0.810	1.674	+13.37
LB4100G3		Beta eff	26-Aug 04:10	5	22344	21640	22870	+0.43
LB4100G3		Beta XTalk	26-Aug 04:10	5	1.95E-4	7.49E-5	4.02E-4	-0.79
LB4100G4		Alpha bkg	26-Aug 04:22	60	0.067	-1.09E-1	0.250	-0.06
LB4100G4		Alpha eff	26-Aug 04:01	5	9827	9560	10390	-1.07
LB4100G4		Alpha XTalk	26-Aug 04:01	5	0.250	0.231	0.262	+0.68
LB4100G4		Beta bkg	26-Aug 04:22	60	1.167	0.468	1.527	+0.96
LB4100G4		Beta eff	26-Aug 04:10	5	18607	17900	19720	-0.67
LB4100G4		Beta XTalk	26-Aug 04:10	5	1.93E-4	5.50E-5	3.52E-4	-0.20
LB4100H1		Alpha bkg	26-Aug 04:22	60	0.150	-7.22E-2	0.211	+1.71
LB4100H1		Alpha eff	26-Aug 04:01	5	8644	8144	10440	-1.69
LB4100H1		Alpha XTalk	26-Aug 04:01	5	0.309	0.240	0.334	+1.43
LB4100H1		Beta bkg	26-Aug 04:22	60	1.200	0.507	1.476	+1.29
LB4100H1		Beta eff	26-Aug 04:10	5	39206	38960	41820	-2.48
LB4100H1		Beta XTalk	26-Aug 04:10	5	7.65E-5	3.54E-5	2.04E-4	-1.54
LB4100H2		Alpha bkg	26-Aug 04:22	60	0.083	-4.85E-2	0.203	+0.14
LB4100H2		Alpha eff	26-Aug 04:01	5	7262	6938	8446	-1.71
LB4100H2		Alpha XTalk	26-Aug 04:01	5	0.336	0.280	0.366	+0.95
LB4100H2	Above	Beta bkg	26-Aug 04:22	60	2.483	0.225	2.317	+3.48
LB4100H2		Beta eff	26-Aug 04:10	5	15843	15690	17100	-2.35
LB4100H2		Beta XTalk	26-Aug 04:10	5	3.66E-4	1.28E-4	4.99E-4	+0.85
LB4100H3		Alpha bkg	26-Aug 04:22	60	0.100	-4.20E-2	0.255	-0.13
LB4100H3		Alpha eff	26-Aug 04:01	5	17929	17570	22670	-2.58
LB4100H3		Alpha XTalk	26-Aug 04:01	5	0.296	0.268	0.306	+1.42
LB4100H3		Beta bkg	26-Aug 04:22	60	1.017	-6.23E+1	90.230	-0.51
LB4100H3		Beta eff	26-Aug 04:10	5	19504	18890	22560	-2.00
LB4100H3		Beta XTalk	26-Aug 04:10	5	2.97E-4	8.81E-5	3.81E-4	+1.29
LB4100H4		Alpha bkg	26-Aug 04:22	60	0.167	-3.73E-2	0.238	+1.45
LB4100H4		Alpha eff	26-Aug 04:01	5	11931	11030	14300	-1.35
LB4100H4		Alpha XTalk	26-Aug 04:01	5	0.360	0.297	0.385	+1.27
LB4100H4		Beta bkg	26-Aug 04:22	60	0.917	0.370	1.614	-0.36
LB4100H4		Beta eff	26-Aug 04:10	5	31588	30860	34020	-1.62
LB4100H4		Beta XTalk	26-Aug 04:10	5	2.22E-4	1.00E-4	3.28E-4	+0.20
LB4100I1		Alpha bkg	26-Aug 04:09	60	0.067	-8.66E-2	0.291	-0.56
LB4100I1		Alpha eff	26-Aug 03:49	5	10668	9278	11600	+0.59
LB4100I1		Alpha XTalk	26-Aug 03:49	5	0.182	0.155	0.201	+0.50
LB4100I1		Beta bkg	26-Aug 04:09	60	1.117	0.438	1.615	+0.46
LB4100I1		Beta eff	26-Aug 03:56	5	14682	13480	16690	-0.75
LB4100I1		Beta XTalk	26-Aug 03:56	5	5.31E-4	2.38E-4	7.83E-4	+0.23
LB4100I2		Alpha bkg	26-Aug 04:09	60	0.100	-1.86E-1	0.386	-0.00
LB4100I2		Alpha eff	26-Aug 03:49	5	13046	12430	13470	+0.55
LB4100I2		Alpha XTalk	26-Aug 03:49	5	0.223	0.208	0.252	-0.89
LB4100I2	Above	Beta bkg	26-Aug 04:09	60	2.450	0.180	2.594	+2.64

LB4100I2		Beta eff	26-Aug 03:56	5	16432	15820	17140	-0.22
LB4100I2		Beta XTalk	26-Aug 03:56	5	3.41E-4	1.38E-4	5.25E-4	+0.14
LB4100I3		Alpha bkg	26-Aug 04:09	60	0.117	-4.16E-2	0.204	+0.87
LB4100I3		Alpha eff	26-Aug 03:49	5	9709	9187	10140	+0.28
LB4100I3		Alpha XTalk	26-Aug 03:49	5	0.200	0.180	0.230	-0.63
LB4100I3	Above	Beta bkg	26-Aug 04:09	60	2.083	-4.28E-1	3.673	+0.67
LB4100I3		Beta eff	26-Aug 03:56	5	15977	14870	16650	+0.73
LB4100I3		Beta XTalk	26-Aug 03:56	5	2.50E-4	1.08E-4	4.81E-4	-0.71
LB4100I4		Alpha bkg	26-Aug 04:09	60	0.167	0.031	0.326	-0.24
LB4100I4		Alpha eff	26-Aug 03:49	5	11195	10640	11580	+0.54
LB4100I4		Alpha XTalk	26-Aug 03:49	5	0.196	0.185	0.220	-1.08
LB4100I4		Beta bkg	26-Aug 04:09	60	1.400	0.490	2.301	+0.01
LB4100I4		Beta eff	26-Aug 03:56	5	19161	18150	19980	+0.31
LB4100I4		Beta XTalk	26-Aug 03:56	5	1.77E-4	1.10E-4	4.02E-4	-1.62
LB4100J1		Alpha bkg	26-Aug 09:23	60	0.033	0.018	0.372	-2.74
LB4100J1		Alpha eff	26-Aug 03:49	5	10467	10460	11370	-2.95
LB4100J1		Alpha XTalk	26-Aug 03:49	5	0.171	0.155	0.187	-0.05
LB4100J1		Beta bkg	26-Aug 09:23	60	1.783	0.056	2.016	+2.29
LB4100J1		Beta eff	26-Aug 03:56	5	37402	35630	41690	-1.25
LB4100J1		Beta XTalk	26-Aug 03:56	5	1.44E-4	5.93E-5	2.38E-4	-0.14
LB4100J2		Alpha bkg	26-Aug 07:45	60	0.017	-8.17E-2	0.539	-2.05
LB4100J2	Below	Alpha eff	26-Aug 03:49	5	9045	9114	10090	-3.43
LB4100J2		Alpha XTalk	26-Aug 03:49	5	0.160	0.141	0.180	-0.09
LB4100J2		Beta bkg	26-Aug 07:45	60	0.817	0.775	1.935	-2.78
LB4100J2		Beta eff	26-Aug 03:56	5	14777	14440	16130	-1.80
LB4100J2		Beta XTalk	26-Aug 03:56	5	3.38E-4	1.82E-4	6.77E-4	-1.11
LB4100J3		Alpha bkg	26-Aug 04:09	60	0.183	-5.72E-2	0.305	+0.99
LB4100J3		Alpha eff	26-Aug 03:49	5	21843	19850	22740	+1.14
LB4100J3		Alpha XTalk	26-Aug 03:49	5	0.196	0.183	0.218	-0.84
LB4100J3		Beta bkg	26-Aug 04:09	60	1.233	0.431	1.507	+1.47
LB4100J3		Beta eff	26-Aug 03:56	5	18621	16720	20260	+0.22
LB4100J3		Beta XTalk	26-Aug 03:56	5	3.22E-4	1.15E-4	4.64E-4	+0.56
LB4100J4		Alpha bkg	26-Aug 04:09	60	0.267	0.014	0.314	+2.05
LB4100J4		Alpha eff	26-Aug 03:49	5	17386	16250	18210	+0.48
LB4100J4		Alpha XTalk	26-Aug 03:49	5	0.168	0.156	0.182	-0.27
LB4100J4		Beta bkg	26-Aug 04:09	60	0.917	0.504	1.329	+0.00
LB4100J4		Beta eff	26-Aug 03:56	5	30315	28300	32430	-0.07
LB4100J4		Beta XTalk	26-Aug 03:56	5	2.38E-4	1.05E-4	3.69E-4	+0.01
PIC1A		Alpha bkg	26-Aug 04:02	60	0.250	0.052	0.386	+0.56
PIC1A		Alpha eff	26-Aug 08:34	5	10589	10070	10770	+1.45
PIC1A		Alpha XTalk	26-Aug 08:34	5	0.282	0.264	0.303	-0.22
PIC1A		Beta bkg	26-Aug 04:02	60	0.733	-3.41E-2	1.327	+0.38
PIC1A		Beta eff	26-Aug 03:54	5	20292	19700	21670	-1.20
PIC1A		Beta XTalk	26-Aug 03:54	5	8.46E-4	2.91E-4	0.002	-1.23

PIC1B		Alpha bkg	26-Aug 04:02	60	0.117	-2.93E-2	0.323	-0.52
PIC1B		Alpha eff	26-Aug 03:45	5	12589	12150	13170	-0.42
PIC1B		Alpha XTalk	26-Aug 03:45	5	0.280	0.265	0.293	+0.27
PIC1B		Beta bkg	26-Aug 04:02	60	1.017	0.382	1.951	-0.57
PIC1B		Beta eff	26-Aug 03:54	5	21081	21060	21800	-2.83
PIC1B		Beta XTalk	26-Aug 03:54	5	0.001	2.63E-4	0.002	+0.80
PIC1C		Alpha bkg	26-Aug 04:02	60	0.083	-4.39E-2	0.359	-1.11
PIC1C		Alpha eff	26-Aug 08:09	5	9467	9319	9845	-1.31
PIC1C		Alpha XTalk	26-Aug 08:09	5	0.248	0.244	0.267	-2.02
PIC1C		Beta bkg	26-Aug 04:02	60	0.767	-4.73E-1	1.906	+0.13
PIC1C		Beta eff	26-Aug 03:54	5	21132	20780	21480	+0.02
PIC1C		Beta XTalk	26-Aug 03:54	5	0.012	0.007	0.018	-0.47
PIC1D		Alpha bkg	26-Aug 04:02	60	0.233	-8.40E-2	0.474	+0.41
PIC1D	Below	Alpha eff	26-Aug 08:34	5	10170	10270	10880	-3.99
PIC1D		Alpha XTalk	26-Aug 08:34	5	0.257	0.252	0.270	-1.38
PIC1D		Beta bkg	26-Aug 04:02	60	1.283	0.265	2.212	+0.14
PIC1D		Beta eff	26-Aug 03:54	5	24577	24080	25520	-0.93
PIC1D		Beta XTalk	26-Aug 03:54	5	0.010	0.002	0.013	+0.98
PIC2A		Alpha bkg	26-Aug 04:02	60	0.083	-5.03E-2	0.376	-1.12
PIC2A		Alpha eff	26-Aug 03:45	5	9878	9582	11210	-1.91
PIC2A		Alpha XTalk	26-Aug 03:45	5	0.280	0.254	0.286	+1.90
PIC2A		Beta bkg	26-Aug 04:02	60	0.483	-6.28E-1	1.918	-0.38
PIC2A		Beta eff	26-Aug 03:54	5	52279	51660	54000	-1.41
PIC2A		Beta XTalk	26-Aug 03:54	5	0.004	-1.97E-3	0.010	+0.13
PIC2B		Alpha bkg	26-Aug 04:02	60	0.100	-7.50E-2	0.308	-0.26
PIC2B		Alpha eff	26-Aug 03:45	5	9275	8942	9351	+1.88
PIC2B		Alpha XTalk	26-Aug 03:45	5	0.266	0.252	0.291	-0.88
PIC2B		Beta bkg	26-Aug 04:02	60	0.800	-1.82E-1	1.434	+0.65
PIC2B		Beta eff	26-Aug 03:54	5	21010	20010	21260	+1.80
PIC2B		Beta XTalk	26-Aug 03:54	5	0.001	2.80E-4	0.002	+0.60
PIC2C		Alpha bkg	26-Aug 04:02	60	0.200	0.027	0.357	+0.15
PIC2C		Alpha eff	26-Aug 03:46	5	20971	20500	21250	+0.77
PIC2C		Alpha XTalk	26-Aug 03:46	5	0.254	0.249	0.284	-2.12
PIC2C		Beta bkg	26-Aug 04:02	60	0.833	0.397	1.420	-0.44
PIC2C		Beta eff	26-Aug 03:54	5	25171	24460	25780	+0.23
PIC2C		Beta XTalk	26-Aug 03:54	5	0.005	5.48E-4	0.005	+2.19
PIC2D		Alpha bkg	26-Aug 04:03	60	0.100	-3.13E-2	0.367	-1.02
PIC2D		Alpha eff	26-Aug 03:46	5	15682	15280	16780	-1.39
PIC2D		Alpha XTalk	26-Aug 03:46	5	0.275	0.253	0.282	+1.55
PIC2D		Beta bkg	26-Aug 04:03	60	1.067	0.279	1.490	+0.90
PIC2D		Beta eff	26-Aug 03:55	5	40835	40700	41690	-2.18
PIC2D		Beta XTalk	26-Aug 03:55	5	0.004	0.003	0.015	-2.37
PIC3A		Alpha bkg				-7.50E-2	0.354	-1.95
PIC3A		Alpha eff				10170	11310	-56.53
PIC3A		Alpha XTalk				0.233	0.292	-26.54

PIC3A	Beta bkg				-5.41E-1	2.245	-1.83
PIC3A	Beta eff				19370	21150	-68.29
PIC3A	Beta XTalk				-1.78E-2	0.036	-1.01
PIC3B	Alpha bkg	26-Aug 08:08	60	0.200	-1.95E-2	0.376	+0.33
PIC3B	Alpha eff	26-Aug 03:53	5	12929	12510	13770	-1.00
PIC3B	Alpha XTalk	26-Aug 03:53	5	0.263	0.228	0.273	+1.78
PIC3B	Beta bkg	26-Aug 08:08	60	1.167	0.306	2.452	-0.59
PIC3B	Beta eff	26-Aug 04:01	5	20800	20470	21910	-1.62
PIC3B	Beta XTalk	26-Aug 04:01	5	0.011	0.005	0.016	+0.18
PIC3C	Alpha bkg	26-Aug 04:18	60	0.183	-9.57E-4	0.359	+0.07
PIC3C	Alpha eff	26-Aug 03:53	5	9396	9302	10490	-2.52
PIC3C	Alpha XTalk	26-Aug 03:53	5	0.272	0.254	0.277	+1.75
PIC3C	Beta bkg	26-Aug 04:18	60	1.133	0.008	1.299	+2.23
PIC3C	Beta eff	26-Aug 04:02	5	21239	20730	22020	-0.63
PIC3C	Beta XTalk	26-Aug 04:02	5	0.005	0.002	0.010	-0.71
PIC3D	Alpha bkg	26-Aug 07:45	60	0.050	-4.97E-2	0.369	-1.57
PIC3D	Alpha eff	26-Aug 03:53	5	10592	10210	10880	+0.42
PIC3D	Alpha XTalk	26-Aug 03:53	5	0.268	0.236	0.280	+1.28
PIC3D	Beta bkg	26-Aug 07:45	60	0.517	-8.46E-3	1.311	-0.61
PIC3D	Beta eff	26-Aug 04:02	5	24135	22540	25320	+0.44
PIC3D	Beta XTalk	26-Aug 04:02	5	0.005	-6.80E-4	0.007	+0.92
PIC4A	Alpha bkg	26-Aug 07:45	60	0.133	-9.48E-2	0.384	-0.14
PIC4A	Alpha eff	26-Aug 03:53	5	10515	10180	10710	+0.80
PIC4A	Alpha XTalk	26-Aug 03:53	5	0.273	0.262	0.290	-0.53
PIC4A	Beta bkg	26-Aug 07:45	60	1.250	-1.75E-1	2.154	+0.67
PIC4A	Beta eff	26-Aug 04:02	5	52282	50950	54660	-0.85
PIC4A	Beta XTalk	26-Aug 04:02	5	0.001	1.57E-4	0.002	-0.01
PIC4B	Alpha bkg	26-Aug 04:18	60	0.250	-5.36E-2	0.301	+2.14
PIC4B	Alpha eff	26-Aug 03:53	5	8072	7995	9186	-2.61
PIC4B	Alpha XTalk	26-Aug 03:53	5	0.355	0.298	0.434	-0.50
PIC4B	Beta bkg	26-Aug 04:18	60	0.633	0.072	1.413	-0.49
PIC4B	Beta eff	26-Aug 04:02	5	20241	19520	21820	-1.12
PIC4B	Beta XTalk	26-Aug 04:02	5	2.29E-4	1.54E-4	5.60E-4	-1.90
PIC4C	Alpha bkg	26-Aug 04:18	60	0.283	-3.49E-2	0.385	+1.54
PIC4C	Alpha eff	26-Aug 03:54	5	20927	20410	21520	-0.20
PIC4C	Alpha XTalk	26-Aug 03:54	5	0.266	0.244	0.291	-0.17
PIC4C	Beta bkg	26-Aug 04:18	60	0.567	0.053	1.027	+0.16
PIC4C	Beta eff	26-Aug 04:02	5	25297	24500	26770	-0.89
PIC4C	Beta XTalk	26-Aug 04:02	5	0.004	4.19E-4	0.005	+1.04
PIC4D	Alpha bkg	26-Aug 07:45	60	0.150	-1.06E-2	0.363	-0.42
PIC4D	Alpha eff	26-Aug 03:54	5	16974	16410	17490	+0.14
PIC4D	Alpha XTalk	26-Aug 03:54	5	0.247	0.231	0.286	-1.31
PIC4D	Beta bkg	26-Aug 07:45	60	0.850	0.115	1.249	+0.89
PIC4D	Beta eff	26-Aug 04:02	5	40558	39260	43390	-1.11
PIC4D	Beta XTalk	26-Aug 04:02	5	0.012	0.003	0.019	+0.35

PIC5A	Alpha bkg	26-Aug 04:27	60	0.167	0.055	0.368	-0.86
PIC5A	Alpha eff	26-Aug 04:01	5	10969	10560	11170	+1.03
PIC5A	Alpha XTalk	26-Aug 04:01	5	0.262	0.253	0.269	+0.28
PIC5A	Beta bkg	26-Aug 04:27	60	0.650	-1.06E-1	1.405	+0.00
PIC5A	Beta eff	26-Aug 04:16	5	15577	15410	16830	-2.30
PIC5A	Beta XTalk	26-Aug 04:16	5	0.004	0.001	0.006	+0.50
PIC5B	Alpha bkg	26-Aug 07:45	60	0.117	-1.14E-2	0.414	-1.19
PIC5B	Alpha eff	26-Aug 04:01	5	13175	12880	14070	-1.51
PIC5B	Alpha XTalk	26-Aug 04:01	5	0.264	0.252	0.271	+0.78
PIC5B	Beta bkg	26-Aug 07:45	60	0.517	-2.27E-1	1.609	-0.57
PIC5B	Beta eff	26-Aug 04:17	5	22111	21840	23210	-1.81
PIC5B	Beta XTalk	26-Aug 04:17	5	0.003	4.11E-4	0.006	-0.04
PIC5C	Alpha bkg	26-Aug 07:45	60	0.200	-6.28E-2	0.409	+0.34
PIC5C	Alpha eff	26-Aug 04:01	5	9461	9266	10200	-1.75
PIC5C	Alpha XTalk	26-Aug 04:01	5	0.271	0.256	0.276	+1.28
PIC5C	Beta bkg	26-Aug 07:45	60	0.533	-2.06E-1	1.558	-0.48
PIC5C	Beta eff	26-Aug 04:17	5	21574	21210	22460	-1.25
PIC5C	Beta XTalk	26-Aug 04:17	5	0.002	5.78E-4	0.004	-0.25
PIC5D	Alpha bkg	26-Aug 04:27	60	0.267	0.009	0.365	+1.35
PIC5D	Alpha eff	26-Aug 04:01	5	10841	10450	11610	-0.98
PIC5D	Alpha XTalk	26-Aug 04:01	5	0.269	0.251	0.274	+1.60
PIC5D	Beta bkg	26-Aug 04:27	60	1.433	0.019	2.073	+1.13
PIC5D	Beta eff	26-Aug 04:17	5	25419	24750	26620	-0.85
PIC5D	Beta XTalk	26-Aug 04:17	5	0.003	0.001	0.006	-1.42
PIC6A	Alpha bkg	26-Aug 04:28	60	0.267	-1.32E-2	0.360	+1.50
PIC6A	Alpha eff	26-Aug 04:02	5	9384	9161	10030	-1.46
PIC6A	Alpha XTalk	26-Aug 04:02	5	0.329	0.272	0.356	+1.10
PIC6A	Beta bkg	26-Aug 04:28	60	2.000	0.899	2.245	+1.91
PIC6A	Beta eff	26-Aug 04:18	5	50551	44350	52630	+1.49
PIC6A	Beta XTalk	26-Aug 04:18	5	1.67E-4	4.47E-5	2.34E-4	+0.88
PIC6B	Alpha bkg	26-Aug 07:47	60	0.183	-1.33E-1	0.383	+0.68
PIC6B	Alpha eff	26-Aug 04:02	5	8346	8240	9583	-2.53
PIC6B	Alpha XTalk	26-Aug 04:02	5	0.306	0.266	0.367	-0.58
PIC6B	Beta bkg	26-Aug 07:47	60	1.917	-6.80E-2	2.279	+2.07
PIC6B	Beta eff	26-Aug 04:17	5	19010	16700	20640	+0.52
PIC6B	Beta XTalk	26-Aug 04:17	5	3.58E-4	1.76E-4	6.31E-4	-0.59
PIC6C	Alpha bkg	26-Aug 05:01	60	0.167	0.009	0.328	-0.03
PIC6C	Alpha eff	26-Aug 04:03	5	20747	20270	21680	-0.97
PIC6C	Alpha XTalk	26-Aug 04:03	5	0.268	0.257	0.279	-0.09
PIC6C	Beta bkg	26-Aug 05:01	60	1.450	0.899	2.097	-0.24
PIC6C	Beta eff	26-Aug 04:18	5	23832	23410	25140	-1.54
PIC6C	Beta XTalk	26-Aug 04:18	5	1.94E-4	1.25E-4	4.43E-4	-1.69
PIC6D	Alpha bkg				-8.26E-2	0.335	-1.81
PIC6D	Alpha eff				17280	18850	-69.04

PIC6D	Alpha XTalk				0.051	0.542	-3.62
PIC6D	Beta bkg				0.019	2.434	-3.05
PIC6D	Beta eff				43700	47280	-76.24
PIC6D	Beta XTalk				-1.81E-3	0.004	-1.25
PIC7A	Alpha bkg	26-Aug 04:40	60	0.100	-3.46E-2	0.391	-1.10
PIC7A	Alpha eff	26-Aug 04:17	5	10717	10220	11180	+0.11
PIC7A	Alpha XTalk	26-Aug 04:17	5	0.275	0.249	0.293	+0.50
PIC7A	Beta bkg	26-Aug 04:40	60	0.483	-8.85E-2	1.924	-1.30
PIC7A	Beta eff	26-Aug 04:26	5	20472	20360	21720	-2.51
PIC7A	Beta XTalk	26-Aug 04:26	5	4.66E-4	6.75E-5	0.002	-1.85
PIC7B	Alpha bkg	26-Aug 04:40	60	0.117	-2.50E-2	0.372	-0.86
PIC7B	Alpha eff	26-Aug 04:17	5	12045	11990	13590	-2.80
PIC7B	Alpha XTalk	26-Aug 04:17	5	0.276	0.259	0.278	+2.26
PIC7B	Beta bkg	26-Aug 04:40	60	0.467	-6.64E-1	1.763	-0.20
PIC7B	Beta eff	26-Aug 04:26	5	21201	20950	22600	-2.09
PIC7B	Beta XTalk	26-Aug 04:26	5	7.32E-4	3.44E-4	0.002	-1.56
PIC7C	Alpha bkg	26-Aug 04:40	60	0.167	-4.17E-2	0.294	+0.72
PIC7C	Alpha eff	26-Aug 04:17	5	9207	9044	9654	-1.39
PIC7C	Alpha XTalk	26-Aug 04:17	5	0.293	0.255	0.313	+1.00
PIC7C	Beta bkg	26-Aug 04:40	60	0.667	-1.93E-1	1.388	+0.26
PIC7C	Beta eff	26-Aug 04:26	5	20494	19720	21610	-0.54
PIC7C	Beta XTalk	26-Aug 04:26	5	2.79E-4	6.91E-5	7.54E-4	-1.16
PIC7D	Alpha bkg	26-Aug 04:40	60	0.100	-3.52E-2	0.285	-0.47
PIC7D	Alpha eff	26-Aug 04:17	5	10577	10290	10720	+1.00
PIC7D	Alpha XTalk	26-Aug 04:17	5	0.275	0.252	0.283	+1.48
PIC7D	Beta bkg	26-Aug 04:40	60	0.650	0.109	1.041	+0.48
PIC7D	Beta eff	26-Aug 04:26	5	23950	23170	25350	-0.85
PIC7D	Beta XTalk	26-Aug 04:26	5	2.39E-4	3.99E-5	7.85E-4	-1.40
PIC8A	Alpha bkg	26-Aug 04:40	60	0.183	-4.64E-2	0.301	+0.97
PIC8A	Alpha eff	26-Aug 04:17	5	10027	9573	11160	-1.28
PIC8A	Alpha XTalk	26-Aug 04:17	5	0.273	0.232	0.331	-0.50
PIC8A	Beta bkg	26-Aug 04:40	60	0.683	0.033	1.296	+0.09
PIC8A	Beta eff	26-Aug 04:26	5	53397	50170	55770	+0.46
PIC8A	Beta XTalk	26-Aug 04:26	5	0.003	-3.39E-3	0.006	+0.67
PIC8B	Alpha bkg	26-Aug 04:40	60	0.067	-1.18E-1	0.335	-0.55
PIC8B	Alpha eff	26-Aug 08:11	5	8802	8562	9505	-1.47
PIC8B	Alpha XTalk	26-Aug 08:11	5	0.288	0.261	0.297	+1.60
PIC8B	Beta bkg	26-Aug 04:40	60	0.367	-2.49E-1	1.166	-0.39
PIC8B	Beta eff	26-Aug 04:26	5	20999	20990	22140	-2.95
PIC8B	Beta XTalk	26-Aug 04:26	5	5.19E-4	2.49E-4	0.001	-1.65
PIC8C	Alpha bkg	26-Aug 04:40	60	0.250	-2.61E-2	0.365	+1.24
PIC8C	Alpha eff	26-Aug 04:17	5	21479	20820	22080	+0.14
PIC8C	Alpha XTalk	26-Aug 04:17	5	0.255	0.251	0.282	-2.36
PIC8C	Beta bkg	26-Aug 04:40	60	0.483	-1.90E-1	1.144	+0.03
PIC8C	Beta eff	26-Aug 04:27	5	26087	25290	27010	-0.22

PIC8C	Beta XTalk	26-Aug 04:27	5	0.005	-7.70E-4	0.007	+1.14
PIC8D	Alpha bkg	26-Aug 04:40	60	0.200	-5.65E-2	0.438	+0.11
PIC8D	Alpha eff	26-Aug 04:17	5	16210	15120	17000	+0.48
PIC8D	Alpha XTalk	26-Aug 04:17	5	0.267	0.249	0.290	-0.34
PIC8D	Beta bkg	26-Aug 04:40	60	0.717	0.236	2.611	-1.79
PIC8D	Beta eff	26-Aug 04:27	5	41977	40720	43630	-0.41
PIC8D	Beta XTalk	26-Aug 04:27	5	0.006	-1.54E-3	0.012	+0.26
PIC9A	Alpha bkg	26-Aug 04:46	60	0.150	-2.15E-2	0.339	-0.15
PIC9A	Alpha eff	26-Aug 04:25	5	10932	10180	11170	+1.56
PIC9A	Alpha XTalk	26-Aug 04:25	5	0.261	0.249	0.304	-1.71
PIC9A	Beta bkg	26-Aug 04:46	60	1.317	0.178	1.390	+2.64
PIC9A	Beta eff	26-Aug 04:36	5	20938	20680	21950	-1.78
PIC9A	Beta XTalk	26-Aug 04:36	5	0.002	3.54E-4	0.003	+0.11
PIC9B	Alpha bkg	26-Aug 04:46	60	0.083	-5.14E-2	0.189	+0.36
PIC9B	Alpha eff	26-Aug 04:25	5	12191	11850	12570	-0.16
PIC9B	Alpha XTalk	26-Aug 04:25	5	0.279	0.267	0.287	+0.54
PIC9B	Beta bkg	26-Aug 04:46	60	0.967	0.216	1.395	+0.82
PIC9B	Beta eff	26-Aug 04:36	5	21478	21220	22080	-1.20
PIC9B	Beta XTalk	26-Aug 04:36	5	0.002	-4.93E-1	0.513	-0.05
PIC9C	Alpha bkg	26-Aug 04:46	60	0.150	0.010	0.330	-0.38
PIC9C	Alpha eff	26-Aug 04:25	5	9290	9161	9836	-1.85
PIC9C	Alpha XTalk	26-Aug 04:25	5	0.258	0.244	0.268	+0.68
PIC9C	Beta bkg	26-Aug 04:46	60	0.967	0.148	1.310	+1.23
PIC9C	Beta eff	26-Aug 04:36	5	21002	20810	21570	-1.48
PIC9C	Beta XTalk	26-Aug 04:36	5	0.002	7.26E-4	0.004	+0.69
PIC9D	Alpha bkg	26-Aug 04:46	60	0.117	0.017	0.351	-1.21
PIC9D	Alpha eff	26-Aug 04:25	5	10508	10280	10720	+0.11
PIC9D	Alpha XTalk	26-Aug 04:25	5	0.281	0.257	0.290	+1.31
PIC9D	Beta bkg	26-Aug 04:46	60	0.367	0.118	1.182	-1.60
PIC9D	Beta eff	26-Aug 04:37	5	24888	24330	25440	+0.02
PIC9D	Beta XTalk	26-Aug 04:37	5	0.002	3.66E-4	0.005	-0.56
PIC10A	Alpha bkg	26-Aug 04:46	60	0.133	-1.88E-2	0.299	-0.12
PIC10A	Alpha eff	26-Aug 04:26	5	10228	9912	10720	-0.65
PIC10A	Alpha XTalk	26-Aug 04:26	5	0.315	0.257	0.353	+0.63
PIC10A	Beta bkg	26-Aug 04:46	60	0.450	4.53E-4	1.191	-0.73
PIC10A	Beta eff	26-Aug 04:37	5	52373	52180	54540	-2.51
PIC10A	Beta XTalk	26-Aug 04:37	5	1.04E-4	5.75E-5	3.23E-4	-1.95
PIC10B	Alpha bkg	26-Aug 04:46	60	0.117	-4.93E-2	0.308	-0.22
PIC10B	Alpha eff	26-Aug 04:26	5	9242	9076	9507	-0.69
PIC10B	Alpha XTalk	26-Aug 04:26	5	0.270	0.253	0.285	+0.07
PIC10B	Beta bkg	26-Aug 04:46	60	1.250	-6.98E-1	2.876	+0.27
PIC10B	Beta eff	26-Aug 04:37	5	21155	20490	22130	-0.57
PIC10B	Beta XTalk	26-Aug 04:37	5	5.15E-4	2.11E-4	9.75E-4	-0.61
PIC10C	Alpha bkg	26-Aug 04:46	60	0.267	-6.14E-2	0.277	+2.82

PIC10C	Alpha eff	26-Aug 04:26	5	19892	19530	20870	-1.38
PIC10C	Alpha XTalk	26-Aug 04:26	5	0.305	0.271	0.326	+0.67
PIC10C	Beta bkg	26-Aug 04:46	60	1.183	-1.32E-1	1.289	+2.55
PIC10C	Beta eff	26-Aug 04:37	5	25608	25130	26180	-0.27
PIC10C	Beta XTalk	26-Aug 04:37	5	2.55E-4	1.14E-4	5.60E-4	-1.10
PIC10D	Alpha bkg	26-Aug 04:46	60	0.167	-9.81E-3	0.389	-0.34
PIC10D	Alpha eff	26-Aug 04:26	5	15459	14970	16930	-1.50
PIC10D	Alpha XTalk	26-Aug 04:26	5	0.306	0.267	0.339	+0.29
PIC10D	Beta bkg	26-Aug 04:46	60	0.950	-3.76E-1	2.164	+0.13
PIC10D	Beta eff	26-Aug 04:37	5	41706	40970	42500	-0.12
PIC10D	Beta XTalk	26-Aug 04:37	5	2.74E-4	5.50E-5	5.63E-4	-0.41
PIC11A	Alpha bkg	26-Aug 04:57	60	0.167	-5.28E-2	0.231	+1.65
PIC11A	Alpha eff	26-Aug 04:34	5	10423	10090	10810	-0.23
PIC11A	Alpha XTalk	26-Aug 04:34	5	0.321	0.280	0.359	+0.11
PIC11A	Beta bkg	26-Aug 04:57	60	1.367	0.522	1.773	+1.05
PIC11A	Beta eff	26-Aug 04:43	5	19943	19270	20640	-0.05
PIC11A	Beta XTalk	26-Aug 04:43	5	4.37E-4	2.30E-4	6.98E-4	-0.34
PIC11B	Alpha bkg	26-Aug 04:57	60	0.150	-2.01E-2	0.388	-0.50
PIC11B	Alpha eff	26-Aug 04:34	5	12936	12090	14430	-0.83
PIC11B	Alpha XTalk	26-Aug 04:34	5	0.273	0.238	0.295	+0.70
PIC11B	Beta bkg	26-Aug 04:57	60	0.900	-8.50E-2	1.719	+0.28
PIC11B	Beta eff	26-Aug 04:43	5	21652	19550	24160	-0.26
PIC11B	Beta XTalk	26-Aug 04:43	5	2.89E-4	1.32E-4	5.22E-4	-0.58
PIC11C	Alpha bkg	26-Aug 04:57	60	0.067	-5.75E-2	0.306	-0.95
PIC11C	Alpha eff	26-Aug 04:34	5	9227	9157	9745	-2.28
PIC11C	Alpha XTalk	26-Aug 04:34	5	0.295	0.271	0.301	+1.76
PIC11C	Beta bkg	26-Aug 04:57	60	0.600	-5.67E-2	1.194	+0.15
PIC11C	Beta eff	26-Aug 04:43	5	21217	20960	21740	-1.02
PIC11C	Beta XTalk	26-Aug 04:43	5	3.08E-4	9.37E-5	4.37E-4	+0.75
PIC11D	Alpha bkg	26-Aug 04:57	60	0.200	0.016	0.350	+0.31
PIC11D	Alpha eff	26-Aug 04:34	5	10711	10560	11390	-1.91
PIC11D	Alpha XTalk	26-Aug 04:34	5	0.294	0.243	0.305	+1.98
PIC11D	Beta bkg	26-Aug 04:57	60	1.350	0.436	2.296	-0.05
PIC11D	Beta eff	26-Aug 04:43	5	24453	23830	27150	-1.87
PIC11D	Beta XTalk	26-Aug 04:43	5	2.45E-4	8.26E-5	3.85E-4	+0.22
PIC12A	Alpha bkg	26-Aug 04:57	60	0.067	-2.85E-2	0.394	-1.65
PIC12A	Alpha eff	26-Aug 04:34	5	9600	9536	10660	-2.66
PIC12A	Alpha XTalk	26-Aug 04:34	5	0.310	0.265	0.355	-0.00
PIC12A	Beta bkg	26-Aug 04:57	60	0.650	-7.27E-3	2.082	-1.11
PIC12A	Beta eff	26-Aug 04:43	5	38240	36650	40990	-0.80
PIC12A	Beta XTalk	26-Aug 04:43	5	9.94E-5	6.06E-5	2.14E-4	-1.48
PIC12B	Alpha bkg	26-Aug 04:57	60	0.200	-5.03E-2	0.300	+1.29
PIC12B	Alpha eff	26-Aug 04:34	5	8713	8551	8934	-0.46
PIC12B	Alpha XTalk	26-Aug 04:34	5	0.296	0.278	0.304	+1.22
PIC12B	Beta bkg	26-Aug 04:57	60	0.850	0.100	1.734	-0.25

PIC12B		Beta eff	26-Aug 04:43	5	21071	20940	21550	-1.71
PIC12B		Beta XTalk	26-Aug 04:43	5	2.97E-4	1.66E-4	6.28E-4	-1.29
PIC12C		Alpha bkg	26-Aug 06:34	60	0.133	0.009	0.357	-0.85
PIC12C		Alpha eff	26-Aug 04:34	5	20074	20010	22040	-2.81
PIC12C		Alpha XTalk	26-Aug 04:34	5	0.281	0.255	0.290	+1.35
PIC12C	Above	Beta bkg	26-Aug 06:34	60	1.667	0.175	1.408	+4.26
PIC12C		Beta eff	26-Aug 04:44	5	25985	24320	26650	+1.29
PIC12C		Beta XTalk	26-Aug 04:44	5	3.35E-4	7.36E-5	6.09E-4	-0.07
PIC12D		Alpha bkg	26-Aug 04:58	60	0.150	-5.51E-2	0.306	+0.41
PIC12D		Alpha eff	26-Aug 04:34	5	16788	14580	17560	+1.45
PIC12D		Alpha XTalk	26-Aug 04:34	5	0.288	0.232	0.450	-1.47
PIC12D		Beta bkg	26-Aug 04:58	60	1.700	0.482	2.608	+0.44
PIC12D		Beta eff	26-Aug 08:10	5	41511	36440	43510	+1.30
PIC12D		Beta XTalk	26-Aug 08:10	5	2.30E-4	8.59E-5	3.39E-4	+0.41
PIC13A		Alpha bkg	26-Aug 04:58	60	0.100	-4.80E-2	0.311	-0.52
PIC13A		Alpha eff	26-Aug 04:42	5	10921	10610	11110	+0.73
PIC13A		Alpha XTalk	26-Aug 04:42	5	0.268	0.259	0.279	-0.41
PIC13A		Beta bkg	26-Aug 04:58	60	1.600	0.689	1.949	+1.34
PIC13A		Beta eff	26-Aug 04:49	5	21174	20940	21540	-0.66
PIC13A		Beta XTalk	26-Aug 04:49	5	6.43E-4	3.50E-4	0.001	-0.52
PIC13B		Alpha bkg	26-Aug 07:46	60	0.017	-1.04E-1	0.346	-1.39
PIC13B		Alpha eff	26-Aug 04:42	5	12997	12490	13510	-0.02
PIC13B		Alpha XTalk	26-Aug 04:42	5	0.276	0.261	0.286	+0.69
PIC13B		Beta bkg	26-Aug 07:46	60	0.667	-2.10E-1	1.369	+0.33
PIC13B		Beta eff	26-Aug 04:49	5	21569	21380	22380	-1.87
PIC13B		Beta XTalk	26-Aug 04:49	5	4.04E-4	1.69E-4	6.48E-4	-0.06
PIC13C		Alpha bkg				-1.03E-1	0.365	-1.68
PIC13C		Alpha eff				10670	10960	-223.76
PIC13C		Alpha XTalk				0.271	0.286	-109.82
PIC13C		Beta bkg				-3.09E-1	1.393	-1.91
PIC13C		Beta eff				22280	22830	-246.05
PIC13C		Beta XTalk				1.09E-4	3.59E-4	-5.62
PIC13D		Alpha bkg	26-Aug 05:04	60	0.117	-4.18E-2	0.346	-0.55
PIC13D		Alpha eff	26-Aug 04:42	5	10498	10280	11260	-1.66
PIC13D		Alpha XTalk	26-Aug 04:42	5	0.285	0.252	0.299	+1.22
PIC13D		Beta bkg	26-Aug 05:04	60	1.883	-2.59E-1	1.892	+2.98
PIC13D		Beta eff	26-Aug 04:50	5	24655	24410	26670	-2.35
PIC13D		Beta XTalk	26-Aug 04:50	5	2.43E-4	9.76E-5	5.02E-4	-0.84
PIC14A		Alpha bkg	26-Aug 05:04	60	0.083	-4.32E-3	0.227	-0.72
PIC14A		Alpha eff	26-Aug 04:42	5	9880	9464	10150	+0.63
PIC14A		Alpha XTalk	26-Aug 04:42	5	0.417	0.384	0.473	-0.80
PIC14A		Beta bkg	26-Aug 05:04	60	1.617	-7.82E-2	2.536	+0.89
PIC14A		Beta eff	26-Aug 04:50	5	52737	49980	55690	-0.10
PIC14A		Beta XTalk	26-Aug 04:50	5	1.39E-4	3.31E-5	1.93E-4	+1.00

PIC14B	Alpha bkg	26-Aug 06:34	60	0.050	-9.73E-2	0.263	-0.54
PIC14B	Alpha eff	26-Aug 04:43	5	8625	8386	9525	-1.74
PIC14B	Alpha XTalk	26-Aug 04:43	5	0.297	0.260	0.308	+1.60
PIC14B	Beta bkg	26-Aug 06:34	60	1.217	-2.72E-1	1.433	+2.24
PIC14B	Beta eff	26-Aug 04:50	5	21351	21130	21880	-1.23
PIC14B	Beta XTalk	26-Aug 04:50	5	5.23E-4	3.16E-4	0.001	-1.48
PIC14C	Alpha bkg	26-Aug 06:34	60	0.250	0.016	0.343	+1.29
PIC14C	Alpha eff	26-Aug 04:43	5	20870	20400	21620	-0.69
PIC14C	Alpha XTalk	26-Aug 04:43	5	0.292	0.270	0.314	+0.04
PIC14C	Beta bkg	26-Aug 06:34	60	1.483	0.566	2.220	+0.33
PIC14C	Beta eff	26-Aug 04:50	5	26212	25600	27170	-0.66
PIC14C	Beta XTalk	26-Aug 04:50	5	4.26E-4	1.33E-4	5.68E-4	+1.04
PIC14D	Alpha bkg	26-Aug 04:58	60	0.050	-5.06E-2	0.184	-0.43
PIC14D	Alpha eff	26-Aug 04:43	5	14564	13930	15520	-0.61
PIC14D	Alpha XTalk	26-Aug 04:43	5	0.385	0.345	0.411	+0.65
PIC14D	Beta bkg	26-Aug 04:58	60	0.433	0.145	0.770	-0.23
PIC14D	Beta eff	26-Aug 04:50	5	41613	41010	42340	-0.28
PIC14D	Beta XTalk	26-Aug 04:50	5	2.55E-4	8.35E-5	3.21E-4	+1.35

Reviewed by KOsta

Date 8/26/18

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 26-Aug-2019

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100C1	Below	Alpha eff	26-Aug 08:07	5	10939	10960	11760	-3.16
LB4100C1	Above	Beta bkg	26-Aug 04:41	60	2.433	0.070	3.594	+1.02
LB4100C4	Above	Beta bkg	26-Aug 04:41	60	1675	-2.26E+0	8.835	+904.34
LB4100C4	Above	Beta eff	26-Aug 04:30	5	23414	16060	22510	+3.84
LB4100E2	Above	Alpha bkg	26-Aug 04:22	60	0.233	-1.97E-2	0.222	+3.28
LB4100E2	Above	Beta bkg	26-Aug 04:22	60	2.617	1.005	2.203	+5.07
LB4100E2	need 2nd	Beta eff	26-Aug 04:02	5	15959	15340	16820	-0.49
LB4100E3	Above	Beta bkg	26-Aug 04:22	60	2.117	1.790	2.114	+3.05
LB4100G2	Above	Beta bkg	26-Aug 04:22	60	221	-5.43E+1	80.770	+9.22
LB4100G3	Above	Beta bkg	26-Aug 04:22	60	3.167	0.810	1.674	+13.37
LB4100H2	Above	Beta bkg	26-Aug 04:22	60	2.483	0.225	2.317	+3.48
LB4100I2	Above	Beta bkg	26-Aug 04:09	60	2.450	0.180	2.594	+2.64
LB4100I3	Above	Beta bkg	26-Aug 04:09	60	2.083	-4.28E-1	3.673	+0.67
LB4100J2	Below	Alpha eff	26-Aug 03:49	5	9045	9114	10090	-3.43
PIC1D	Below	Alpha eff	26-Aug 08:34	5	10170	10270	10880	-3.99
PIC12C	Above	Beta bkg	26-Aug 06:34	60	1.667	0.175	1.408	+4.26

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

G5400W1W	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1X	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Y	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Z	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by KOst

Date 8/26/19

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 30-Aug-2019

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1W		Alpha bkg	30-Aug 07:23	60	0.033	-1.08E-1	0.244	-0.59
G5400W1W		Alpha eff	30-Aug 06:31	5	10219	9243	10360	+2.24
G5400W1W		Alpha XTalk	30-Aug 06:31	5	0.327	0.315	0.385	-1.97
G5400W1W		Beta bkg	30-Aug 07:23	60	1.617	0.468	1.988	+1.53
G5400W1W		Beta eff	30-Aug 06:36	5	11857	10660	14690	-1.22
G5400W1W		Beta XTalk	30-Aug 06:36	5	9.11E-4	1.79E-4	0.002	-0.31
G5400W1X		Alpha bkg	30-Aug 03:38	60	0.067	-7.73E-2	0.185	+0.30
G5400W1X		Alpha eff	30-Aug 06:31	5	12585	11650	13220	+0.57
G5400W1X		Alpha XTalk	30-Aug 06:31	5	0.319	0.293	0.358	-0.56
G5400W1X		Beta bkg	30-Aug 03:38	60	1.117	0.627	1.812	-0.52
G5400W1X		Beta eff	30-Aug 06:36	5	12769	11700	15100	-1.11
G5400W1X		Beta XTalk	30-Aug 06:36	5	7.05E-4	1.27E-4	0.001	+0.64
G5400W1Y		Alpha bkg	30-Aug 03:38	60	0.033	-1.58E-1	0.421	-1.01
G5400W1Y		Alpha eff	30-Aug 06:31	5	8627	7198	10460	-0.37
G5400W1Y		Alpha XTalk	30-Aug 06:31	5	0.343	0.233	0.471	-0.22
G5400W1Y		Beta bkg	30-Aug 03:38	60	1.250	0.588	1.905	+0.02
G5400W1Y		Beta eff	30-Aug 06:36	5	13976	11890	15630	+0.35
G5400W1Y		Beta XTalk	30-Aug 06:36	5	5.29E-4	8.82E-5	0.001	-0.17
G5400W1Z		Alpha bkg	30-Aug 03:38	60	0.117	-1.21E-1	0.229	+1.08
G5400W1Z		Alpha eff	30-Aug 06:31	5	10277	9611	10680	+0.74
G5400W1Z		Alpha XTalk	30-Aug 06:31	5	0.312	0.294	0.349	-1.04
G5400W1Z		Beta bkg	30-Aug 03:38	60	1.167	0.499	1.662	+0.44
G5400W1Z		Beta eff	30-Aug 06:36	5	13199	9613	19430	-0.81
G5400W1Z		Beta XTalk	30-Aug 06:36	5	6.82E-4	-5.21E-1	0.543	-0.06
LB4100A1		Alpha bkg	30-Aug 06:19	60	0.083	-9.59E-2	0.252	+0.09
LB4100A1		Alpha eff	30-Aug 06:03	5	8348	7787	10420	-1.72
LB4100A1		Alpha XTalk	30-Aug 06:03	5	0.325	0.245	0.345	+1.80
LB4100A1		Beta bkg	30-Aug 06:19	60	1.067	0.588	1.928	-0.86
LB4100A1		Beta eff	30-Aug 05:54	5	20813	19040	22660	-0.06
LB4100A1		Beta XTalk	30-Aug 05:54	5	3.80E-4	1.76E-4	6.44E-4	-0.39
LB4100A2		Alpha bkg	30-Aug 06:19	60	0.117	-2.67E-1	0.448	+0.22
LB4100A2		Alpha eff	30-Aug 06:03	5	9752	8462	11400	-0.36
LB4100A2		Alpha XTalk	30-Aug 06:03	5	0.335	0.278	0.383	+0.28
LB4100A2		Beta bkg	30-Aug 06:19	60	1.200	-8.28E-1	3.179	+0.04
LB4100A2		Beta eff	30-Aug 05:54	5	21368	20130	23100	-0.50
LB4100A2		Beta XTalk	30-Aug 05:54	5	3.06E-4	9.55E-5	5.44E-4	-0.18
LB4100A3		Alpha bkg	30-Aug 06:19	60	0.117	-3.71E-2	0.206	+0.79
LB4100A3		Alpha eff	30-Aug 06:03	5	8065	7538	10210	-1.82
LB4100A3		Alpha XTalk	30-Aug 06:03	5	0.272	0.200	0.289	+1.82
LB4100A3		Beta bkg	30-Aug 06:19	60	1.633	-3.71E+2	399	-0.10
LB4100A3		Beta eff	30-Aug 05:54	5	21095	18460	23140	+0.38
LB4100A3		Beta XTalk	30-Aug 05:54	5	2.07E-4	4.76E-5	4.91E-4	-0.85

LB4100B1		Alpha bkg				-5.04E-2	0.323	-2.19
LB4100B1		Alpha eff				10030	12040	-32.94
LB4100B1		Alpha XTalk				0.142	0.253	-10.70
LB4100B1		Beta bkg				0.690	1.634	-7.39
LB4100B1		Beta eff				50540	59850	-35.57
LB4100B1		Beta XTalk				6.15E-5	2.28E-4	-5.22
LB4100B2		Alpha bkg				-1.89E-1	0.467	-1.27
LB4100B2		Alpha eff				7003	10510	-14.98
LB4100B2		Alpha XTalk				0.245	0.294	-32.68
LB4100B2		Beta bkg				0.418	1.814	-4.80
LB4100B2		Beta eff				18980	25790	-19.72
LB4100B2		Beta XTalk				1.57E-4	5.67E-4	-5.29
LB4100B3		Alpha bkg				-6.61E-2	0.276	-1.84
LB4100B3		Alpha eff				8427	16450	-9.30
LB4100B3		Alpha XTalk				0.270	0.653	-7.22
LB4100B3		Beta bkg				-2.44E+2	261	-0.10
LB4100B3		Beta eff				22590	31610	-18.03
LB4100B3		Beta XTalk				-4.93E-1	0.516	-0.07
LB4100B4		Alpha bkg				-5.19E-2	0.218	-1.85
LB4100B4		Alpha eff				10140	15160	-15.12
LB4100B4		Alpha XTalk				0.251	0.384	-14.36
LB4100B4		Beta bkg				0.529	1.722	-5.66
LB4100B4		Beta eff				35650	40530	-46.83
LB4100B4		Beta XTalk				7.36E-5	3.38E-4	-4.67
LB4100C1		Alpha bkg	30-Aug 06:20	60	0.117	-7.52E-3	0.336	-0.83
LB4100C1	Below	Alpha eff	30-Aug 05:54	5	10897	10960	11760	-3.47
LB4100C1		Alpha XTalk	30-Aug 05:54	5	0.188	0.170	0.205	+0.13
LB4100C1	Above	Beta bkg	30-Aug 06:20	60	2.200	0.070	3.594	+0.63
LB4100C1		Beta eff	30-Aug 06:03	5	15569	15330	16900	-2.09
LB4100C1		Beta XTalk	30-Aug 06:03	5	6.17E-4	2.67E-4	7.37E-4	+1.46
LB4100C2		Alpha bkg	30-Aug 06:20	60	0.067	-8.52E-2	0.312	-0.71
LB4100C2		Alpha eff	30-Aug 05:54	5	11357	10750	12990	-1.37
LB4100C2		Alpha XTalk	30-Aug 05:54	5	0.276	0.248	0.301	+0.24
LB4100C2		Beta bkg	30-Aug 06:20	60	1.083	0.511	1.777	-0.29
LB4100C2		Beta eff	30-Aug 06:03	5	16568	15090	19370	-0.93
LB4100C2		Beta XTalk	30-Aug 06:03	5	3.02E-4	1.13E-4	4.85E-4	+0.04
LB4100C3		Alpha bkg	30-Aug 06:20	60	0.083	-6.31E-2	0.282	-0.45
LB4100C3		Alpha eff	30-Aug 05:54	5	8000	7243	8653	+0.22
LB4100C3		Alpha XTalk	30-Aug 05:54	5	0.307	0.289	0.331	-0.47
LB4100C3		Beta bkg	30-Aug 06:20	60	1.217	0.776	2.251	-1.21
LB4100C3		Beta eff	30-Aug 06:03	5	16538	13900	18670	+0.32
LB4100C3		Beta XTalk	30-Aug 06:03	5	2.90E-4	7.94E-5	4.16E-4	+0.76
LB4100C4		Alpha bkg	30-Aug 06:20	60	0.117	-1.09E-1	0.257	+0.70
LB4100C4		Alpha eff	30-Aug 05:54	5	7605	5861	8515	+0.94

LB4100C4	need 2nd	Alpha XTalk	30-Aug 05:54	5	0.362	0.311	0.445	-0.69
LB4100C4	need 2nd	Beta bkg	30-Aug 06:20	60	1.350	-2.26E+0	8.835	-1.05
LB4100C4		Beta eff	30-Aug 06:03	5	18951	16060	22510	-0.31
LB4100C4		Beta XTalk	30-Aug 06:03	5	2.32E-4	5.74E-5	3.48E-4	+0.60
LB4100D1		Alpha bkg				-6.92E-2	0.073	-0.08
LB4100D1		Alpha eff				-2.16E+3	2344	-0.12
LB4100D1		Alpha XTalk				-1.59E+0	53.770	-2.83
LB4100D1		Beta bkg				-7.61E-1	1.773	-1.20
LB4100D1		Beta eff				2672	27110	-3.66
LB4100D1		Beta XTalk				-5.07E-5	5.70E-5	-0.17
LB4100D2		Alpha bkg				0.100	0.528	-4.40
LB4100D2		Alpha eff				5391	14880	-6.41
LB4100D2		Alpha XTalk				-9.09E+2	960	-0.08
LB4100D2		Beta bkg				0.309	2.710	-3.77
LB4100D2		Beta eff				19300	47980	-7.04
LB4100D2		Beta XTalk				1.43E-4	4.77E-4	-5.57
LB4100D3		Alpha bkg				-1.55E-2	0.582	-2.84
LB4100D3		Alpha eff				11660	37470	-5.71
LB4100D3		Alpha XTalk				-1.31E+3	1383	-0.08
LB4100D3		Beta bkg				-1.53E+0	4.943	-1.58
LB4100D3		Beta eff				17260	61720	-5.33
LB4100D3		Beta XTalk				-1.60E-3	0.002	-0.37
LB4100D4		Alpha bkg				-6.65E-2	0.307	-1.93
LB4100D4		Alpha eff				8864	26240	-6.06
LB4100D4		Alpha XTalk				-1.73E+3	1829	-0.08
LB4100D4		Beta bkg				0.746	2.239	-6.00
LB4100D4		Beta eff				33390	97650	-6.12
LB4100D4		Beta XTalk				8.04E-5	2.34E-4	-6.14
LB4100E1		Alpha bkg	30-Aug 05:56	60	0.133	-5.45E-2	0.290	+0.28
LB4100E1		Alpha eff	30-Aug 05:41	5	11004	10380	11370	+0.78
LB4100E1		Alpha XTalk	30-Aug 05:41	5	0.205	0.186	0.223	+0.02
LB4100E1		Beta bkg	30-Aug 05:56	60	1.467	0.697	2.033	+0.46
LB4100E1		Beta eff	30-Aug 05:48	5	15369	14740	17130	-1.42
LB4100E1		Beta XTalk	30-Aug 05:48	5	5.08E-4	2.29E-4	7.39E-4	+0.28
LB4100E2		Alpha bkg	30-Aug 05:56	60	0.183	-1.97E-2	0.222	+2.04
LB4100E2		Alpha eff	30-Aug 05:41	5	7882	5846	8521	+1.57
LB4100E2		Alpha XTalk	30-Aug 05:41	5	0.404	0.341	0.542	-1.11
LB4100E2	Above	Beta bkg	30-Aug 05:56	60	2.917	1.005	2.203	+6.57
LB4100E2		Beta eff	30-Aug 05:48	5	15982	15340	16820	-0.40
LB4100E2		Beta XTalk	30-Aug 05:48	5	2.75E-4	1.39E-4	5.04E-4	-0.77
LB4100E3		Alpha bkg	30-Aug 05:56	60	0.083	-4.15E-2	0.198	+0.13
LB4100E3		Alpha eff	30-Aug 05:41	5	8695	7895	9089	+1.02
LB4100E3		Alpha XTalk	30-Aug 05:41	5	0.240	0.230	0.285	-1.88
LB4100E3	need 2nd	Beta bkg	30-Aug 05:56	60	2.000	1.790	2.114	+0.89
LB4100E3		Beta eff	30-Aug 05:48	5	15298	15110	16360	-2.10

LB4100E3		Beta XTalk	30-Aug 05:48	5	2.22E-4	1.08E-4	4.52E-4	-1.01
LB4100E4		Alpha bkg	30-Aug 05:56	60	0.117	-5.75E-2	0.174	+1.51
LB4100E4		Alpha eff	30-Aug 05:41	5	9925	9238	10300	+0.88
LB4100E4		Alpha XTalk	30-Aug 05:41	5	0.244	0.228	0.263	-0.37
LB4100E4		Beta bkg	30-Aug 05:56	60	1.683	0.455	2.172	+1.29
LB4100E4		Beta eff	30-Aug 05:48	5	18301	17000	20330	-0.66
LB4100E4		Beta XTalk	30-Aug 05:48	5	2.08E-4	6.94E-5	3.54E-4	-0.08
LB4100F1		Alpha bkg	30-Aug 05:56	60	0.083	-5.23E-2	0.181	+0.49
LB4100F1		Alpha eff	30-Aug 05:41	5	9824	9414	10300	-0.23
LB4100F1		Alpha XTalk	30-Aug 05:41	5	0.265	0.248	0.284	-0.17
LB4100F1		Beta bkg	30-Aug 05:56	60	1.150	0.602	1.924	-0.51
LB4100F1		Beta eff	30-Aug 05:48	5	41328	40590	43880	-1.65
LB4100F1		Beta XTalk	30-Aug 05:48	5	8.23E-5	4.22E-5	2.06E-4	-1.53
LB4100F2		Alpha bkg	30-Aug 05:56	60	0.250	0.039	0.317	+1.56
LB4100F2		Alpha eff	30-Aug 05:41	5	5059	4033	5271	+1.97
LB4100F2		Alpha XTalk	30-Aug 05:41	5	0.470	0.431	0.588	-1.52
LB4100F2		Beta bkg	30-Aug 05:56	60	1.167	0.714	1.605	+0.05
LB4100F2		Beta eff	30-Aug 05:48	5	16726	16140	17120	+0.59
LB4100F2		Beta XTalk	30-Aug 05:48	5	2.99E-4	1.34E-4	5.31E-4	-0.51
LB4100F3		Alpha bkg	30-Aug 05:56	60	0.100	-4.66E-2	0.248	-0.02
LB4100F3		Alpha eff	30-Aug 05:41	5	15373	13520	17440	-0.16
LB4100F3		Alpha XTalk	30-Aug 05:41	5	0.336	0.288	0.379	+0.18
LB4100F3		Beta bkg	30-Aug 05:56	60	1.167	0.636	1.613	+0.26
LB4100F3		Beta eff	30-Aug 05:48	5	26929	26340	27710	-0.42
LB4100F3		Beta XTalk	30-Aug 05:48	5	2.02E-4	9.36E-5	3.81E-4	-0.73
LB4100F4		Alpha bkg	30-Aug 05:56	60	0.050	-4.01E-2	0.180	-0.54
LB4100F4		Alpha eff	30-Aug 05:41	5	8212	5406	9284	+1.34
LB4100F4		Alpha XTalk	30-Aug 05:41	5	0.514	0.425	0.745	-1.32
LB4100F4		Beta bkg	30-Aug 05:56	60	1.433	0.704	1.854	+0.80
LB4100F4		Beta eff	30-Aug 05:48	5	32378	31480	34030	-0.89
LB4100F4		Beta XTalk	30-Aug 05:48	5	1.98E-4	7.46E-5	3.07E-4	+0.18
LB4100G1	Above	Alpha bkg	30-Aug 05:56	60	0.183	-4.19E-2	0.157	+3.80
LB4100G1		Alpha eff	30-Aug 05:48	5	10607	7467	11340	+1.86
LB4100G1		Alpha XTalk	30-Aug 05:48	5	0.248	0.224	0.315	-1.39
LB4100G1	Above	Beta bkg	30-Aug 05:56	60	3869	0.375	1.637	+18,394.87
LB4100G1		Beta eff	30-Aug 05:42	5	16084	14840	16920	+0.59
LB4100G1		Beta XTalk	30-Aug 05:42	5	4.85E-4	1.64E-4	6.43E-4	+1.02
LB4100G2		Alpha bkg	30-Aug 05:56	60	0.150	-5.80E-2	0.275	+0.75
LB4100G2		Alpha eff	30-Aug 05:48	5	11065	8815	11510	+2.01
LB4100G2		Alpha XTalk	30-Aug 05:48	5	0.282	0.272	0.365	-2.40
LB4100G2	Above	Beta bkg	30-Aug 05:56	60	45.850	-5.43E+1	80.770	+1.45
LB4100G2		Beta eff	30-Aug 05:42	5	16260	15800	17170	-0.98
LB4100G2		Beta XTalk	30-Aug 05:42	5	3.20E-4	1.23E-4	5.12E-4	+0.03
LB4100G3		Alpha bkg	30-Aug 05:56	60	0.167	0.002	0.276	+0.60

LB4100G3		Alpha eff	30-Aug 05:48	5	7406	6620	7779	+1.07
LB4100G3		Alpha XTalk	30-Aug 05:48	5	0.331	0.309	0.375	-0.94
LB4100G3	Above	Beta bkg	30-Aug 05:56	60	3.667	0.810	1.674	+16.84
LB4100G3		Beta eff	30-Aug 05:42	5	22435	21640	22870	+0.88
LB4100G3		Beta XTalk	30-Aug 05:42	5	1.58E-4	7.49E-5	4.02E-4	-1.48
LB4100G4		Alpha bkg	30-Aug 05:56	60	0.050	-1.09E-1	0.250	-0.34
LB4100G4		Alpha eff	30-Aug 05:48	5	9883	9560	10390	-0.67
LB4100G4		Alpha XTalk	30-Aug 05:48	5	0.250	0.231	0.262	+0.69
LB4100G4		Beta bkg	30-Aug 05:56	60	0.917	0.468	1.527	-0.46
LB4100G4		Beta eff	30-Aug 05:42	5	18443	17900	19720	-1.21
LB4100G4		Beta XTalk	30-Aug 05:42	5	1.63E-4	5.50E-5	3.52E-4	-0.82
LB4100H1		Alpha bkg	30-Aug 05:56	60	0.117	-7.22E-2	0.211	+1.01
LB4100H1		Alpha eff	30-Aug 05:48	5	8720	8144	10440	-1.50
LB4100H1		Alpha XTalk	30-Aug 05:48	5	0.310	0.240	0.334	+1.48
LB4100H1		Beta bkg	30-Aug 05:56	60	0.950	0.507	1.476	-0.26
LB4100H1		Beta eff	30-Aug 05:42	5	39289	38960	41820	-2.31
LB4100H1		Beta XTalk	30-Aug 05:42	5	1.12E-4	3.54E-5	2.04E-4	-0.28
LB4100H2		Alpha bkg	30-Aug 05:56	60	0.183	-4.85E-2	0.203	+2.52
LB4100H2		Alpha eff	30-Aug 05:48	5	7435	6938	8446	-1.02
LB4100H2		Alpha XTalk	30-Aug 05:48	5	0.331	0.280	0.366	+0.60
LB4100H2	Above	Beta bkg	30-Aug 05:56	60	3.567	0.225	2.317	+6.58
LB4100H2		Beta eff	30-Aug 05:42	5	15824	15690	17100	-2.43
LB4100H2		Beta XTalk	30-Aug 05:42	5	3.41E-4	1.28E-4	4.99E-4	+0.45
LB4100H3		Alpha bkg	30-Aug 05:56	60	0.067	-4.20E-2	0.255	-0.80
LB4100H3		Alpha eff	30-Aug 05:48	5	17931	17570	22670	-2.58
LB4100H3		Alpha XTalk	30-Aug 05:48	5	0.297	0.268	0.306	+1.60
LB4100H3		Beta bkg	30-Aug 05:56	60	1.267	-6.23E+1	90.230	-0.50
LB4100H3		Beta eff	30-Aug 05:42	5	19592	18890	22560	-1.85
LB4100H3		Beta XTalk	30-Aug 05:42	5	2.35E-4	8.81E-5	3.81E-4	+0.00
LB4100H4		Alpha bkg	30-Aug 05:56	60	0.200	-3.73E-2	0.238	+2.18
LB4100H4		Alpha eff	30-Aug 05:48	5	12653	11030	14300	-0.02
LB4100H4		Alpha XTalk	30-Aug 05:48	5	0.336	0.297	0.385	-0.33
LB4100H4		Beta bkg	30-Aug 05:56	60	1.133	0.370	1.614	+0.68
LB4100H4		Beta eff	30-Aug 05:42	5	31522	30860	34020	-1.74
LB4100H4		Beta XTalk	30-Aug 05:42	5	2.35E-4	1.00E-4	3.28E-4	+0.55
LB4100I1		Alpha bkg	30-Aug 05:41	60	0.067	-8.66E-2	0.291	-0.56
LB4100I1		Alpha eff	30-Aug 05:33	5	10731	9278	11600	+0.75
LB4100I1		Alpha XTalk	30-Aug 05:33	5	0.176	0.155	0.201	-0.27
LB4100I1		Beta bkg	30-Aug 05:41	60	1.033	0.438	1.615	+0.04
LB4100I1		Beta eff	30-Aug 05:26	5	14347	13480	16690	-1.38
LB4100I1		Beta XTalk	30-Aug 05:26	5	4.46E-4	2.38E-4	7.83E-4	-0.71
LB4100I2		Alpha bkg	30-Aug 05:41	60	0.067	-1.86E-1	0.386	-0.35
LB4100I2		Alpha eff	30-Aug 05:33	5	12892	12430	13470	-0.33
LB4100I2		Alpha XTalk	30-Aug 05:33	5	0.224	0.208	0.252	-0.80
LB4100I2	Above	Beta bkg	30-Aug 05:41	60	9.550	0.180	2.594	+20.29

LB4100I2		Beta eff	30-Aug 05:26	5	15946	15820	17140	-2.43
LB4100I2		Beta XTalk	30-Aug 05:26	5	3.51E-4	1.38E-4	5.25E-4	+0.30
LB4100I3		Alpha bkg	30-Aug 05:41	60	0.167	-4.16E-2	0.204	+2.09
LB4100I3		Alpha eff	30-Aug 05:33	5	9646	9187	10140	-0.11
LB4100I3		Alpha XTalk	30-Aug 05:33	5	0.198	0.180	0.230	-0.86
LB4100I3	Above	Beta bkg	30-Aug 05:41	60	2.367	-4.28E-1	3.673	+1.09
LB4100I3		Beta eff	30-Aug 05:26	5	15938	14870	16650	+0.60
LB4100I3		Beta XTalk	30-Aug 05:26	5	3.14E-4	1.08E-4	4.81E-4	+0.31
LB4100I4		Alpha bkg	30-Aug 05:41	60	0.183	0.031	0.326	+0.10
LB4100I4		Alpha eff	30-Aug 05:33	5	11369	10640	11580	+1.66
LB4100I4		Alpha XTalk	30-Aug 05:33	5	0.196	0.185	0.220	-0.97
LB4100I4		Beta bkg	30-Aug 05:41	60	0.833	0.490	2.301	-1.86
LB4100I4		Beta eff	30-Aug 05:26	5	18955	18150	19980	-0.36
LB4100I4		Beta XTalk	30-Aug 05:26	5	2.64E-4	1.10E-4	4.02E-4	+0.16
LB4100J1		Alpha bkg	30-Aug 06:48	60	0.033	0.018	0.372	-2.74
LB4100J1		Alpha eff	30-Aug 05:33	5	10950	10460	11370	+0.23
LB4100J1		Alpha XTalk	30-Aug 05:33	5	0.166	0.155	0.187	-1.03
LB4100J1		Beta bkg	30-Aug 06:48	60	1.633	0.056	2.016	+1.83
LB4100J1		Beta eff	30-Aug 05:26	5	39131	35630	41690	+0.47
LB4100J1		Beta XTalk	30-Aug 05:26	5	1.43E-4	5.93E-5	2.38E-4	-0.19
LB4100J2		Alpha bkg	30-Aug 05:41	60	0.133	-8.17E-2	0.539	-0.92
LB4100J2		Alpha eff	30-Aug 05:33	5	9297	9114	10090	-1.87
LB4100J2		Alpha XTalk	30-Aug 05:33	5	0.163	0.141	0.180	+0.34
LB4100J2		Beta bkg	30-Aug 05:41	60	1.083	0.775	1.935	-1.40
LB4100J2		Beta eff	30-Aug 05:26	5	15325	14440	16130	+0.14
LB4100J2		Beta XTalk	30-Aug 05:26	5	4.57E-4	1.82E-4	6.77E-4	+0.33
LB4100J3		Alpha bkg	30-Aug 05:41	60	0.217	-5.72E-2	0.305	+1.54
LB4100J3		Alpha eff	30-Aug 05:33	5	21989	19850	22740	+1.44
LB4100J3		Alpha XTalk	30-Aug 05:33	5	0.195	0.183	0.218	-0.98
LB4100J3		Beta bkg	30-Aug 05:41	60	1.150	0.431	1.507	+1.01
LB4100J3		Beta eff	30-Aug 05:26	5	18845	16720	20260	+0.60
LB4100J3		Beta XTalk	30-Aug 05:26	5	3.40E-4	1.15E-4	4.64E-4	+0.86
LB4100J4		Alpha bkg	30-Aug 05:41	60	0.133	0.014	0.314	-0.61
LB4100J4		Alpha eff	30-Aug 05:33	5	17568	16250	18210	+1.03
LB4100J4		Alpha XTalk	30-Aug 05:33	5	0.169	0.156	0.182	-0.03
LB4100J4		Beta bkg	30-Aug 05:41	60	1.067	0.504	1.329	+1.09
LB4100J4		Beta eff	30-Aug 05:26	5	30798	28300	32430	+0.63
LB4100J4		Beta XTalk	30-Aug 05:26	5	2.08E-4	1.05E-4	3.69E-4	-0.67
PIC1A		Alpha bkg	30-Aug 06:05	60	0.283	0.052	0.386	+1.16
PIC1A		Alpha eff	30-Aug 07:41	5	10584	10070	10770	+1.41
PIC1A		Alpha XTalk	30-Aug 07:41	5	0.288	0.264	0.303	+0.71
PIC1A		Beta bkg	30-Aug 06:05	60	0.683	-3.41E-2	1.327	+0.16
PIC1A		Beta eff	30-Aug 04:52	5	20279	19700	21670	-1.24
PIC1A		Beta XTalk	30-Aug 04:52	5	6.85E-4	2.91E-4	0.002	-1.74

PIC1B		Alpha bkg	30-Aug 05:00	60	0.067	-2.93E-2	0.323	-1.37
PIC1B		Alpha eff	30-Aug 04:46	5	12720	12150	13170	+0.35
PIC1B		Alpha XTalk	30-Aug 04:46	5	0.274	0.265	0.293	-1.21
PIC1B		Beta bkg	30-Aug 05:00	60	0.683	0.382	1.951	-1.85
PIC1B		Beta eff	30-Aug 04:52	5	21389	21060	21800	-0.33
PIC1B		Beta XTalk	30-Aug 04:52	5	0.001	2.63E-4	0.002	+0.78
PIC1C		Alpha bkg	30-Aug 05:00	60	0.150	-4.39E-2	0.359	-0.11
PIC1C		Alpha eff	30-Aug 04:46	5	9472	9319	9845	-1.26
PIC1C		Alpha XTalk	30-Aug 04:46	5	0.258	0.244	0.267	+0.78
PIC1C		Beta bkg	30-Aug 05:00	60	0.650	-4.73E-1	1.906	-0.17
PIC1C		Beta eff	30-Aug 04:52	5	21143	20780	21480	+0.11
PIC1C		Beta XTalk	30-Aug 04:52	5	0.012	0.007	0.018	-0.25
PIC1D		Alpha bkg	30-Aug 07:24	60	0.267	-8.40E-2	0.474	+0.77
PIC1D	Below	Alpha eff	30-Aug 08:29	5	10171	10270	10880	-3.97
PIC1D		Alpha XTalk	30-Aug 08:29	5	0.257	0.252	0.270	-1.34
PIC1D		Beta bkg	30-Aug 07:24	60	1.467	0.265	2.212	+0.70
PIC1D		Beta eff	30-Aug 04:52	5	24527	24080	25520	-1.14
PIC1D		Beta XTalk	30-Aug 04:52	5	0.010	0.002	0.013	+1.17
PIC2A		Alpha bkg	30-Aug 05:00	60	0.217	-5.03E-2	0.376	+0.76
PIC2A		Alpha eff	30-Aug 04:45	5	9890	9582	11210	-1.86
PIC2A		Alpha XTalk	30-Aug 04:45	5	0.276	0.254	0.286	+1.11
PIC2A		Beta bkg	30-Aug 05:00	60	0.700	-6.28E-1	1.918	+0.13
PIC2A		Beta eff	30-Aug 04:53	5	52095	51660	54000	-1.88
PIC2A		Beta XTalk	30-Aug 04:53	5	0.004	-1.97E-3	0.010	-0.03
PIC2B		Alpha bkg	30-Aug 05:00	60	0.167	-7.50E-2	0.308	+0.79
PIC2B		Alpha eff	30-Aug 04:45	5	9276	8942	9351	+1.90
PIC2B		Alpha XTalk	30-Aug 04:45	5	0.267	0.252	0.291	-0.65
PIC2B		Beta bkg	30-Aug 05:00	60	0.800	-1.82E-1	1.434	+0.65
PIC2B		Beta eff	30-Aug 04:53	5	20759	20010	21260	+0.59
PIC2B		Beta XTalk	30-Aug 04:53	5	0.001	2.80E-4	0.002	+0.55
PIC2C		Alpha bkg	30-Aug 05:00	60	0.233	0.027	0.357	+0.75
PIC2C		Alpha eff	30-Aug 04:46	5	20940	20500	21250	+0.52
PIC2C		Alpha XTalk	30-Aug 04:46	5	0.255	0.249	0.284	-1.94
PIC2C		Beta bkg	30-Aug 05:00	60	0.983	0.397	1.420	+0.44
PIC2C		Beta eff	30-Aug 04:53	5	25193	24460	25780	+0.33
PIC2C		Beta XTalk	30-Aug 04:53	5	0.005	5.48E-4	0.005	+2.41
PIC2D		Alpha bkg	30-Aug 05:00	60	0.133	-3.13E-2	0.367	-0.52
PIC2D		Alpha eff	30-Aug 04:45	5	15634	15280	16780	-1.58
PIC2D		Alpha XTalk	30-Aug 04:45	5	0.277	0.253	0.282	+1.88
PIC2D		Beta bkg	30-Aug 05:00	60	0.750	0.279	1.490	-0.67
PIC2D		Beta eff	30-Aug 04:53	5	40789	40700	41690	-2.46
PIC2D		Beta XTalk	30-Aug 04:53	5	0.005	0.003	0.015	-2.25
PIC3A		Alpha bkg				-7.50E-2	0.354	-1.95
PIC3A		Alpha eff				10170	11310	-56.53
PIC3A		Alpha XTalk				0.233	0.292	-26.54

PIC3A		Beta bkg				-5.41E-1	2.245	-1.83
PIC3A		Beta eff				19370	21150	-68.29
PIC3A		Beta XTalk				-1.78E-2	0.036	-1.01
PIC3B	Above	Alpha bkg	30-Aug 07:26	60	0.333	-1.95E-2	0.376	+2.35
PIC3B		Alpha eff	30-Aug 04:53	5	12927	12510	13770	-1.02
PIC3B		Alpha XTalk	30-Aug 04:53	5	0.266	0.228	0.273	+2.13
PIC3B		Beta bkg	30-Aug 07:26	60	1.333	0.306	2.452	-0.13
PIC3B		Beta eff	30-Aug 04:46	5	21101	20470	21910	-0.37
PIC3B		Beta XTalk	30-Aug 04:46	5	0.010	0.005	0.016	-0.35
PIC3C		Alpha bkg	30-Aug 05:01	60	0.233	-9.57E-4	0.359	+0.90
PIC3C		Alpha eff	30-Aug 06:11	5	9433	9302	10490	-2.34
PIC3C		Alpha XTalk	30-Aug 06:11	5	0.265	0.254	0.277	-0.22
PIC3C		Beta bkg	30-Aug 05:01	60	0.917	0.008	1.299	+1.22
PIC3C		Beta eff	30-Aug 06:19	5	21211	20730	22020	-0.76
PIC3C		Beta XTalk	30-Aug 06:19	5	0.005	0.002	0.010	-0.79
PIC3D		Alpha bkg	30-Aug 07:26	60	0.200	-4.97E-2	0.369	+0.58
PIC3D		Alpha eff	30-Aug 04:53	5	10442	10210	10880	-0.92
PIC3D		Alpha XTalk	30-Aug 04:53	5	0.275	0.236	0.280	+2.26
PIC3D		Beta bkg	30-Aug 07:26	60	0.750	-8.46E-3	1.311	+0.45
PIC3D		Beta eff	30-Aug 04:46	5	24131	22540	25320	+0.43
PIC3D		Beta XTalk	30-Aug 04:46	5	0.004	-6.80E-4	0.007	+0.50
PIC4A		Alpha bkg	30-Aug 05:01	60	0.217	-9.48E-2	0.384	+0.91
PIC4A		Alpha eff	30-Aug 04:53	5	10517	10180	10710	+0.82
PIC4A		Alpha XTalk	30-Aug 04:53	5	0.270	0.262	0.290	-1.25
PIC4A		Beta bkg	30-Aug 05:01	60	1.650	-1.75E-1	2.154	+1.70
PIC4A		Beta eff	30-Aug 04:46	5	51526	50950	54660	-2.07
PIC4A		Beta XTalk	30-Aug 04:46	5	0.001	1.57E-4	0.002	+0.03
PIC4B		Alpha bkg	30-Aug 05:01	60	0.233	-5.36E-2	0.301	+1.85
PIC4B		Alpha eff	30-Aug 04:53	5	8077	7995	9186	-2.59
PIC4B		Alpha XTalk	30-Aug 04:53	5	0.351	0.298	0.434	-0.69
PIC4B		Beta bkg	30-Aug 05:01	60	0.683	0.072	1.413	-0.26
PIC4B		Beta eff	30-Aug 04:45	5	20400	19520	21820	-0.70
PIC4B		Beta XTalk	30-Aug 04:45	5	2.27E-4	1.54E-4	5.60E-4	-1.93
PIC4C		Alpha bkg	30-Aug 07:26	60	0.150	-3.49E-2	0.385	-0.36
PIC4C		Alpha eff	30-Aug 04:53	5	20808	20410	21520	-0.85
PIC4C		Alpha XTalk	30-Aug 04:53	5	0.265	0.244	0.291	-0.38
PIC4C		Beta bkg	30-Aug 07:26	60	0.617	0.053	1.027	+0.47
PIC4C		Beta eff	30-Aug 04:46	5	24791	24500	26770	-2.23
PIC4C		Beta XTalk	30-Aug 04:46	5	0.003	4.19E-4	0.005	+0.25
PIC4D		Alpha bkg	30-Aug 07:26	60	0.167	-1.06E-2	0.363	-0.15
PIC4D		Alpha eff	30-Aug 04:53	5	16857	16410	17490	-0.52
PIC4D		Alpha XTalk	30-Aug 04:53	5	0.249	0.231	0.286	-0.99
PIC4D		Beta bkg	30-Aug 07:26	60	0.617	0.115	1.249	-0.34
PIC4D		Beta eff	30-Aug 04:46	5	40451	39260	43390	-1.27
PIC4D		Beta XTalk	30-Aug 04:46	5	0.012	0.003	0.019	+0.31

PIC5A	Alpha bkg	30-Aug 06:19	60	0.183	0.055	0.368	-0.54
PIC5A	Alpha eff	30-Aug 04:59	5	11000	10560	11170	+1.33
PIC5A	Alpha XTalk	30-Aug 04:59	5	0.258	0.253	0.269	-1.15
PIC5A	Beta bkg	30-Aug 06:19	60	0.650	-1.06E-1	1.405	+0.00
PIC5A	Beta eff	30-Aug 05:06	5	15650	15410	16830	-1.99
PIC5A	Beta XTalk	30-Aug 05:06	5	0.003	0.001	0.006	-1.17
PIC5B	Alpha bkg	30-Aug 05:13	60	0.133	-1.14E-2	0.414	-0.96
PIC5B	Alpha eff	30-Aug 04:59	5	13181	12880	14070	-1.48
PIC5B	Alpha XTalk	30-Aug 04:59	5	0.261	0.252	0.271	-0.28
PIC5B	Beta bkg	30-Aug 05:13	60	0.400	-2.27E-1	1.609	-0.95
PIC5B	Beta eff	30-Aug 05:06	5	22000	21840	23210	-2.30
PIC5B	Beta XTalk	30-Aug 05:06	5	0.003	4.11E-4	0.006	-0.56
PIC5C	Alpha bkg	30-Aug 05:13	60	0.217	-6.28E-2	0.409	+0.56
PIC5C	Alpha eff	30-Aug 04:59	5	9432	9266	10200	-1.94
PIC5C	Alpha XTalk	30-Aug 04:59	5	0.273	0.256	0.276	+2.13
PIC5C	Beta bkg	30-Aug 05:13	60	0.500	-2.06E-1	1.558	-0.60
PIC5C	Beta eff	30-Aug 05:06	5	21549	21210	22460	-1.37
PIC5C	Beta XTalk	30-Aug 05:06	5	0.002	5.78E-4	0.004	-0.71
PIC5D	Alpha bkg	30-Aug 05:13	60	0.183	0.009	0.365	-0.06
PIC5D	Alpha eff	30-Aug 04:59	5	10754	10450	11610	-1.43
PIC5D	Alpha XTalk	30-Aug 04:59	5	0.265	0.251	0.274	+0.59
PIC5D	Beta bkg	30-Aug 05:13	60	1.717	0.019	2.073	+1.96
PIC5D	Beta eff	30-Aug 05:06	5	25108	24750	26620	-1.85
PIC5D	Beta XTalk	30-Aug 05:06	5	0.002	0.001	0.006	-2.08
PIC6A	Alpha bkg	30-Aug 05:15	60	0.267	-1.32E-2	0.360	+1.50
PIC6A	Alpha eff	30-Aug 05:00	5	9382	9161	10030	-1.47
PIC6A	Alpha XTalk	30-Aug 05:00	5	0.336	0.272	0.356	+1.59
PIC6A	Beta bkg	30-Aug 05:15	60	1.783	0.899	2.245	+0.94
PIC6A	Beta eff	30-Aug 05:08	5	46403	44350	52630	-1.51
PIC6A	Beta XTalk	30-Aug 05:08	5	1.70E-4	4.47E-5	2.34E-4	+0.99
PIC6B	Alpha bkg	30-Aug 05:15	60	0.150	-1.33E-1	0.383	+0.29
PIC6B	Alpha eff	30-Aug 05:00	5	8405	8240	9583	-2.26
PIC6B	Alpha XTalk	30-Aug 05:00	5	0.303	0.266	0.367	-0.79
PIC6B	Beta bkg	30-Aug 05:15	60	1.417	-6.80E-2	2.279	+0.80
PIC6B	Beta eff	30-Aug 05:08	5	19300	16700	20640	+0.96
PIC6B	Beta XTalk	30-Aug 05:08	5	3.81E-4	1.76E-4	6.31E-4	-0.29
PIC6C	Alpha bkg	30-Aug 05:15	60	0.200	0.009	0.328	+0.60
PIC6C	Alpha eff	30-Aug 06:35	5	20640	20270	21680	-1.42
PIC6C	Alpha XTalk	30-Aug 06:35	5	0.274	0.257	0.279	+1.57
PIC6C	Beta bkg	30-Aug 05:15	60	1.750	0.899	2.097	+1.26
PIC6C	Beta eff	30-Aug 06:22	5	23622	23410	25140	-2.27
PIC6C	Beta XTalk	30-Aug 06:22	5	3.69E-4	1.25E-4	4.43E-4	+1.60
PIC6D	Alpha bkg				-8.26E-2	0.335	-1.81
PIC6D	Alpha eff				17280	18850	-69.04

PIC6D		Alpha XTalk				0.051	0.542	-3.62
PIC6D		Beta bkg				0.019	2.434	-3.05
PIC6D		Beta eff				43700	47280	-76.24
PIC6D		Beta XTalk				-1.81E-3	0.004	-1.25
PIC7A		Alpha bkg	30-Aug 05:15	60	0.150	-3.46E-2	0.391	-0.39
PIC7A		Alpha eff	30-Aug 05:08	5	10766	10220	11180	+0.41
PIC7A		Alpha XTalk	30-Aug 05:08	5	0.277	0.249	0.293	+0.73
PIC7A		Beta bkg	30-Aug 05:15	60	1.033	-8.85E-2	1.924	+0.34
PIC7A		Beta eff	30-Aug 05:00	5	20374	20360	21720	-2.94
PIC7A		Beta XTalk	30-Aug 05:00	5	5.75E-4	6.75E-5	0.002	-1.53
PIC7B		Alpha bkg	30-Aug 05:15	60	0.083	-2.50E-2	0.372	-1.36
PIC7B		Alpha eff	30-Aug 06:22	5	12070	11990	13590	-2.70
PIC7B	Above	Alpha XTalk	30-Aug 06:22	5	0.279	0.259	0.278	+3.26
PIC7B		Beta bkg	30-Aug 05:15	60	0.600	-6.64E-1	1.763	+0.13
PIC7B		Beta eff	30-Aug 05:00	5	21471	20950	22600	-1.11
PIC7B		Beta XTalk	30-Aug 05:00	5	7.11E-4	3.44E-4	0.002	-1.64
PIC7C		Alpha bkg	30-Aug 05:15	60	0.067	-4.17E-2	0.294	-1.06
PIC7C		Alpha eff	30-Aug 05:08	5	9106	9044	9654	-2.39
PIC7C		Alpha XTalk	30-Aug 05:08	5	0.300	0.255	0.313	+1.71
PIC7C		Beta bkg	30-Aug 05:15	60	0.767	-1.93E-1	1.388	+0.64
PIC7C		Beta eff	30-Aug 05:00	5	20291	19720	21610	-1.19
PIC7C		Beta XTalk	30-Aug 05:00	5	3.22E-4	6.91E-5	7.54E-4	-0.78
PIC7D		Alpha bkg	30-Aug 05:15	60	0.083	-3.52E-2	0.285	-0.78
PIC7D		Alpha eff	30-Aug 05:08	5	10501	10290	10720	-0.06
PIC7D		Alpha XTalk	30-Aug 05:08	5	0.273	0.252	0.283	+1.08
PIC7D		Beta bkg	30-Aug 05:15	60	0.433	0.109	1.041	-0.91
PIC7D		Beta eff	30-Aug 05:00	5	23914	23170	25350	-0.95
PIC7D		Beta XTalk	30-Aug 05:00	5	1.94E-4	3.99E-5	7.85E-4	-1.76
PIC8A		Alpha bkg	30-Aug 05:15	60	0.117	-4.64E-2	0.301	-0.18
PIC8A		Alpha eff	30-Aug 05:08	5	10024	9573	11160	-1.30
PIC8A		Alpha XTalk	30-Aug 05:08	5	0.276	0.232	0.331	-0.31
PIC8A		Beta bkg	30-Aug 05:15	60	0.700	0.033	1.296	+0.17
PIC8A		Beta eff	30-Aug 05:01	5	53356	50170	55770	+0.41
PIC8A		Beta XTalk	30-Aug 05:01	5	0.003	-3.39E-3	0.006	+0.64
PIC8B		Alpha bkg	30-Aug 05:16	60	0.067	-1.18E-1	0.335	-0.55
PIC8B		Alpha eff	30-Aug 05:08	5	8754	8562	9505	-1.78
PIC8B		Alpha XTalk	30-Aug 05:08	5	0.289	0.261	0.297	+1.73
PIC8B		Beta bkg	30-Aug 05:16	60	0.450	-2.49E-1	1.166	-0.04
PIC8B		Beta eff	30-Aug 05:00	5	21353	20990	22140	-1.11
PIC8B		Beta XTalk	30-Aug 05:00	5	6.12E-4	2.49E-4	0.001	-1.19
PIC8C		Alpha bkg	30-Aug 05:16	60	0.200	-2.61E-2	0.365	+0.47
PIC8C		Alpha eff	30-Aug 05:08	5	21601	20820	22080	+0.72
PIC8C		Alpha XTalk	30-Aug 05:08	5	0.255	0.251	0.282	-2.24
PIC8C		Beta bkg	30-Aug 05:16	60	0.483	-1.90E-1	1.144	+0.03
PIC8C		Beta eff	30-Aug 05:00	5	26310	25290	27010	+0.56

PIC8C		Beta XTalk	30-Aug 05:00	5	0.004	-7.70E-4	0.007	+0.60
PIC8D		Alpha bkg	30-Aug 05:16	60	0.167	-5.65E-2	0.438	-0.29
PIC8D		Alpha eff	30-Aug 05:08	5	16129	15120	17000	+0.22
PIC8D		Alpha XTalk	30-Aug 05:08	5	0.267	0.249	0.290	-0.29
PIC8D		Beta bkg	30-Aug 05:16	60	0.617	0.236	2.611	-2.04
PIC8D		Beta eff	30-Aug 05:01	5	42180	40720	43630	+0.01
PIC8D		Beta XTalk	30-Aug 05:01	5	0.005	-1.54E-3	0.012	+0.14
PIC9A		Alpha bkg	30-Aug 05:28	60	0.133	-2.15E-2	0.339	-0.42
PIC9A		Alpha eff	30-Aug 05:14	5	10890	10180	11170	+1.30
PIC9A		Alpha XTalk	30-Aug 05:14	5	0.263	0.249	0.304	-1.49
PIC9A		Beta bkg	30-Aug 05:28	60	1.067	0.178	1.390	+1.40
PIC9A		Beta eff	30-Aug 05:20	5	20921	20680	21950	-1.86
PIC9A		Beta XTalk	30-Aug 05:20	5	0.001	3.54E-4	0.003	-0.50
PIC9B		Alpha bkg	30-Aug 05:28	60	0.083	-5.14E-2	0.189	+0.36
PIC9B		Alpha eff	30-Aug 05:14	5	12074	11850	12570	-1.13
PIC9B		Alpha XTalk	30-Aug 05:14	5	0.279	0.267	0.287	+0.64
PIC9B		Beta bkg	30-Aug 05:28	60	0.617	0.216	1.395	-0.96
PIC9B		Beta eff	30-Aug 05:20	5	21234	21220	22080	-2.91
PIC9B		Beta XTalk	30-Aug 05:20	5	0.001	-4.93E-1	0.513	-0.05
PIC9C		Alpha bkg	30-Aug 07:42	60	0.167	0.010	0.330	-0.06
PIC9C		Alpha eff	30-Aug 05:14	5	9299	9161	9836	-1.77
PIC9C		Alpha XTalk	30-Aug 05:14	5	0.261	0.244	0.268	+1.23
PIC9C	Above	Beta bkg	30-Aug 07:42	60	1.317	0.148	1.310	+3.03
PIC9C		Beta eff	30-Aug 05:20	5	21277	20810	21570	+0.69
PIC9C		Beta XTalk	30-Aug 05:20	5	0.002	7.26E-4	0.004	-0.51
PIC9D		Alpha bkg	30-Aug 05:29	60	0.117	0.017	0.351	-1.21
PIC9D		Alpha eff	30-Aug 05:14	5	10510	10280	10720	+0.14
PIC9D		Alpha XTalk	30-Aug 05:14	5	0.281	0.257	0.290	+1.35
PIC9D		Beta bkg	30-Aug 05:29	60	0.567	0.118	1.182	-0.47
PIC9D		Beta eff	30-Aug 05:21	5	24806	24330	25440	-0.43
PIC9D		Beta XTalk	30-Aug 05:21	5	0.002	3.66E-4	0.005	-1.02
PIC10A		Alpha bkg	30-Aug 05:29	60	0.167	-1.88E-2	0.299	+0.51
PIC10A		Alpha eff	30-Aug 05:14	5	10103	9912	10720	-1.58
PIC10A		Alpha XTalk	30-Aug 05:14	5	0.324	0.257	0.353	+1.19
PIC10A		Beta bkg	30-Aug 05:29	60	0.700	4.53E-4	1.191	+0.53
PIC10A		Beta eff	30-Aug 05:21	5	52472	52180	54540	-2.26
PIC10A		Beta XTalk	30-Aug 05:21	5	1.61E-4	5.75E-5	3.23E-4	-0.66
PIC10B		Alpha bkg	30-Aug 05:29	60	0.100	-4.93E-2	0.308	-0.49
PIC10B		Alpha eff	30-Aug 05:14	5	9289	9076	9507	-0.03
PIC10B		Alpha XTalk	30-Aug 05:14	5	0.273	0.253	0.285	+0.69
PIC10B		Beta bkg	30-Aug 05:29	60	1.317	-6.98E-1	2.876	+0.38
PIC10B		Beta eff	30-Aug 05:21	5	21196	20490	22130	-0.42
PIC10B		Beta XTalk	30-Aug 05:21	5	4.63E-4	2.11E-4	9.75E-4	-1.03
PIC10C		Alpha bkg	30-Aug 05:29	60	0.133	-6.14E-2	0.277	+0.46

PIC10C	Alpha eff	30-Aug 05:14	5	20076	19530	20870	-0.55
PIC10C	Alpha XTalk	30-Aug 05:14	5	0.304	0.271	0.326	+0.54
PIC10C	Beta bkg	30-Aug 05:29	60	0.733	-1.32E-1	1.289	+0.65
PIC10C	Beta eff	30-Aug 05:21	5	25500	25130	26180	-0.89
PIC10C	Beta XTalk	30-Aug 05:21	5	4.06E-4	1.14E-4	5.60E-4	+0.93
PIC10D	Alpha bkg	30-Aug 05:29	60	0.117	-9.81E-3	0.389	-1.10
PIC10D	Alpha eff	30-Aug 05:14	5	15517	14970	16930	-1.33
PIC10D	Alpha XTalk	30-Aug 05:14	5	0.306	0.267	0.339	+0.31
PIC10D	Beta bkg	30-Aug 05:29	60	0.750	-3.76E-1	2.164	-0.34
PIC10D	Beta eff	30-Aug 05:21	5	41701	40970	42500	-0.13
PIC10D	Beta XTalk	30-Aug 05:21	5	2.68E-4	5.50E-5	5.63E-4	-0.49
PIC11A	Alpha bkg	30-Aug 05:28	60	0.133	-5.28E-2	0.231	+0.94
PIC11A	Alpha eff	30-Aug 05:20	5	10413	10090	10810	-0.31
PIC11A	Alpha XTalk	30-Aug 05:20	5	0.320	0.280	0.359	+0.09
PIC11A	Beta bkg	30-Aug 05:28	60	1.417	0.522	1.773	+1.29
PIC11A	Beta eff	30-Aug 05:12	5	19996	19270	20640	+0.18
PIC11A	Beta XTalk	30-Aug 05:12	5	3.81E-4	2.30E-4	6.98E-4	-1.05
PIC11B	Alpha bkg	30-Aug 05:28	60	0.250	-2.01E-2	0.388	+0.97
PIC11B	Alpha eff	30-Aug 05:20	5	13081	12090	14430	-0.46
PIC11B	Alpha XTalk	30-Aug 05:20	5	0.270	0.238	0.295	+0.40
PIC11B	Beta bkg	30-Aug 05:28	60	1.317	-8.50E-2	1.719	+1.66
PIC11B	Beta eff	30-Aug 05:12	5	21597	19550	24160	-0.34
PIC11B	Beta XTalk	30-Aug 05:12	5	2.65E-4	1.32E-4	5.22E-4	-0.96
PIC11C	Alpha bkg	30-Aug 05:28	60	0.117	-5.75E-2	0.306	-0.13
PIC11C	Alpha eff	30-Aug 05:20	5	9363	9157	9745	-0.89
PIC11C	Alpha XTalk	30-Aug 05:20	5	0.288	0.271	0.301	+0.39
PIC11C	Beta bkg	30-Aug 05:28	60	0.600	-5.67E-2	1.194	+0.15
PIC11C	Beta eff	30-Aug 05:12	5	21273	20960	21740	-0.60
PIC11C	Beta XTalk	30-Aug 05:12	5	2.69E-4	9.37E-5	4.37E-4	+0.06
PIC11D	Alpha bkg	30-Aug 05:28	60	0.250	0.016	0.350	+1.21
PIC11D	Alpha eff	30-Aug 05:20	5	10674	10560	11390	-2.18
PIC11D	Alpha XTalk	30-Aug 05:20	5	0.296	0.243	0.305	+2.19
PIC11D	Beta bkg	30-Aug 05:28	60	1.317	0.436	2.296	-0.16
PIC11D	Beta eff	30-Aug 05:13	5	24139	23830	27150	-2.44
PIC11D	Beta XTalk	30-Aug 05:13	5	2.71E-4	8.26E-5	3.85E-4	+0.73
PIC12A	Alpha bkg	30-Aug 05:28	60	0.100	-2.85E-2	0.394	-1.17
PIC12A	Alpha eff	30-Aug 05:20	5	9653	9536	10660	-2.38
PIC12A	Alpha XTalk	30-Aug 05:20	5	0.313	0.265	0.355	+0.18
PIC12A	Beta bkg	30-Aug 05:28	60	0.883	-7.27E-3	2.082	-0.44
PIC12A	Beta eff	30-Aug 05:13	5	38186	36650	40990	-0.88
PIC12A	Beta XTalk	30-Aug 05:13	5	1.26E-4	6.06E-5	2.14E-4	-0.45
PIC12B	Alpha bkg	30-Aug 05:28	60	0.083	-5.03E-2	0.300	-0.71
PIC12B	Alpha eff	30-Aug 05:20	5	8809	8551	8934	+1.04
PIC12B	Alpha XTalk	30-Aug 05:20	5	0.293	0.278	0.304	+0.57
PIC12B	Beta bkg	30-Aug 05:28	60	1.150	0.100	1.734	+0.86

PIC12B		Beta eff	30-Aug 05:12	5	21156	20940	21550	-0.87
PIC12B		Beta XTalk	30-Aug 05:12	5	3.22E-4	1.66E-4	6.28E-4	-0.97
PIC12C		Alpha bkg	30-Aug 05:28	60	0.133	0.009	0.357	-0.85
PIC12C	need 2nd	Alpha eff	30-Aug 05:20	5	20285	20010	22040	-2.19
PIC12C		Alpha XTalk	30-Aug 05:20	5	0.280	0.255	0.290	+1.22
PIC12C	Above	Beta bkg	30-Aug 05:28	60	1.833	0.175	1.408	+5.07
PIC12C		Beta eff	30-Aug 05:12	5	25831	24320	26650	+0.89
PIC12C		Beta XTalk	30-Aug 05:12	5	2.74E-4	7.36E-5	6.09E-4	-0.75
PIC12D		Alpha bkg	30-Aug 07:41	60	0.100	-5.51E-2	0.306	-0.42
PIC12D		Alpha eff	30-Aug 05:20	5	16975	14580	17560	+1.82
PIC12D		Alpha XTalk	30-Aug 05:20	5	0.289	0.232	0.450	-1.43
PIC12D		Beta bkg	30-Aug 07:41	60	1.717	0.482	2.608	+0.48
PIC12D		Beta eff	30-Aug 05:12	5	42050	36440	43510	+1.76
PIC12D		Beta XTalk	30-Aug 05:12	5	2.01E-4	8.59E-5	3.39E-4	-0.27
PIC13A		Alpha bkg	30-Aug 05:41	60	0.233	-4.80E-2	0.311	+1.71
PIC13A		Alpha eff	30-Aug 05:26	5	10799	10610	11110	-0.73
PIC13A		Alpha XTalk	30-Aug 05:26	5	0.270	0.259	0.279	+0.40
PIC13A		Beta bkg	30-Aug 05:41	60	1.500	0.689	1.949	+0.86
PIC13A		Beta eff	30-Aug 05:33	5	21308	20940	21540	+0.68
PIC13A		Beta XTalk	30-Aug 05:33	5	8.31E-4	3.50E-4	0.001	+1.06
PIC13B		Alpha bkg	30-Aug 05:41	60	0.100	-1.04E-1	0.346	-0.28
PIC13B		Alpha eff	30-Aug 05:26	5	12948	12490	13510	-0.30
PIC13B		Alpha XTalk	30-Aug 05:26	5	0.277	0.261	0.286	+1.00
PIC13B		Beta bkg	30-Aug 05:41	60	0.767	-2.10E-1	1.369	+0.71
PIC13B		Beta eff	30-Aug 05:33	5	21570	21380	22380	-1.86
PIC13B		Beta XTalk	30-Aug 05:33	5	4.17E-4	1.69E-4	6.48E-4	+0.10
PIC13C		Alpha bkg				-1.03E-1	0.365	-1.68
PIC13C		Alpha eff				10670	10960	-223.76
PIC13C		Alpha XTalk				0.271	0.286	-109.82
PIC13C		Beta bkg				-3.09E-1	1.393	-1.91
PIC13C		Beta eff				22280	22830	-246.05
PIC13C		Beta XTalk				1.09E-4	3.59E-4	-5.62
PIC13D		Alpha bkg	30-Aug 05:41	60	0.083	-4.18E-2	0.346	-1.06
PIC13D		Alpha eff	30-Aug 05:26	5	10448	10280	11260	-1.97
PIC13D		Alpha XTalk	30-Aug 05:26	5	0.291	0.252	0.299	+2.02
PIC13D		Beta bkg	30-Aug 05:41	60	1.817	-2.59E-1	1.892	+2.79
PIC13D		Beta eff	30-Aug 05:33	5	24525	24410	26670	-2.69
PIC13D		Beta XTalk	30-Aug 05:33	5	2.00E-4	9.76E-5	5.02E-4	-1.48
PIC14A		Alpha bkg	30-Aug 05:41	60	0.133	-4.32E-3	0.227	+0.57
PIC14A		Alpha eff	30-Aug 05:26	5	9785	9464	10150	-0.19
PIC14A		Alpha XTalk	30-Aug 05:26	5	0.429	0.384	0.473	+0.03
PIC14A		Beta bkg	30-Aug 05:41	60	1.667	-7.82E-2	2.536	+1.00
PIC14A		Beta eff	30-Aug 05:33	5	52734	49980	55690	-0.11
PIC14A		Beta XTalk	30-Aug 05:33	5	8.27E-5	3.31E-5	1.93E-4	-1.13

PIC14B	Alpha bkg	30-Aug 05:41	60	0.183	-9.73E-2	0.263	+1.68
PIC14B	Alpha eff	30-Aug 05:26	5	8657	8386	9525	-1.57
PIC14B	Alpha XTalk	30-Aug 05:26	5	0.299	0.260	0.308	+1.86
PIC14B	Beta bkg	30-Aug 05:41	60	1.150	-2.72E-1	1.433	+2.00
PIC14B	Beta eff	30-Aug 05:33	5	21189	21130	21880	-2.53
PIC14B	Beta XTalk	30-Aug 05:33	5	4.50E-4	3.16E-4	0.001	-2.02
PIC14C	Alpha bkg	30-Aug 05:41	60	0.133	0.016	0.343	-0.85
PIC14C	Alpha eff	30-Aug 05:26	5	20763	20400	21620	-1.21
PIC14C	Alpha XTalk	30-Aug 05:26	5	0.299	0.270	0.314	+0.92
PIC14C	Beta bkg	30-Aug 05:41	60	1.983	0.566	2.220	+2.14
PIC14C	Beta eff	30-Aug 05:33	5	26267	25600	27170	-0.45
PIC14C	Beta XTalk	30-Aug 05:33	5	3.53E-4	1.33E-4	5.68E-4	+0.03
PIC14D	Alpha bkg	30-Aug 05:41	60	0.050	-5.06E-2	0.184	-0.43
PIC14D	Alpha eff	30-Aug 05:26	5	14392	13930	15520	-1.26
PIC14D	Alpha XTalk	30-Aug 05:26	5	0.389	0.345	0.411	+1.00
PIC14D	Beta bkg	30-Aug 05:41	60	0.767	0.145	0.770	+2.96
PIC14D	Beta eff	30-Aug 05:33	5	41525	41010	42340	-0.68
PIC14D	Beta XTalk	30-Aug 05:33	5	2.03E-4	8.35E-5	3.21E-4	+0.03

Reviewed by K. Deal-Harman

Date 8-30-19

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 30-Aug-2019

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100C1	Below	Alpha eff	30-Aug 05:54	5	10897	10960	11760	-3.47
LB4100C1	Above	Beta bkg	30-Aug 06:20	60	2.200	0.070	3.594	+0.63
LB4100C4	need 2nd	Alpha XTalk	30-Aug 05:54	5	0.362	0.311	0.445	-0.69
LB4100C4	need 2nd	Beta bkg	30-Aug 06:20	60	1.350	-2.26E+0	8.835	-1.05
LB4100E2	Above	Beta bkg	30-Aug 05:56	60	2.917	1.005	2.203	+6.57
LB4100E3	need 2nd	Beta bkg	30-Aug 05:56	60	2.000	1.790	2.114	+0.89
LB4100G1	Above	Alpha bkg	30-Aug 05:56	60	0.183	-4.19E-2	0.157	+3.80
LB4100G1	Above	Beta bkg	30-Aug 05:56	60	3869	0.375	1.637	+18,394.87
LB4100G2	Above	Beta bkg	30-Aug 05:56	60	45.850	-5.43E+1	80.770	+1.45
LB4100G3	Above	Beta bkg	30-Aug 05:56	60	3.667	0.810	1.674	+16.84
LB4100H2	Above	Beta bkg	30-Aug 05:56	60	3.567	0.225	2.317	+6.58
LB4100I2	Above	Beta bkg	30-Aug 05:41	60	9.550	0.180	2.594	+20.29
LB4100I3	Above	Beta bkg	30-Aug 05:41	60	2.367	-4.28E-1	3.673	+1.09
PIC1D	Below	Alpha eff	30-Aug 08:29	5	10171	10270	10880	-3.97
PIC3B	Above	Alpha bkg	30-Aug 07:26	60	0.333	-1.95E-2	0.376	+2.35
PIC7B	Above	Alpha XTalk	30-Aug 06:22	5	0.279	0.259	0.278	+3.26
PIC9C	Above	Beta bkg	30-Aug 07:42	60	1.317	0.148	1.310	+3.03
PIC12C	need 2nd	Alpha eff	30-Aug 05:20	5	20285	20010	22040	-2.19
PIC12C	Above	Beta bkg	30-Aug 05:28	60	1.833	0.175	1.408	+5.07

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100B1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by R. Stink-Harmon

Date 8-30-19

GEL Laboratories LLC

Background Counts Data

Gas Flow Proportional Counter Backgrounds as of 24-Aug-2019

Short Name	Status	Parmname	Run Time	Count Time	CPM	Low Limit	High Limit	Stdev
G5400W1W		Alpha bkg				-1.08E-1	0.244	-1.15
G5400W1W		Beta bkg				0.468	1.988	-4.85
G5400W1X		Alpha bkg				-7.73E-2	0.185	-1.23
G5400W1X		Beta bkg				0.627	1.812	-6.18
G5400W1Y		Alpha bkg				-1.58E-1	0.421	-1.36
G5400W1Y		Beta bkg				0.588	1.905	-5.68
G5400W1Z		Alpha bkg				-1.21E-1	0.229	-0.93
G5400W1Z		Beta bkg				0.499	1.662	-5.57
LB4100A1		Alpha bkg	23-Aug 19:10	500	0.052	-9.59E-2	0.252	-0.45
LB4100A1		Beta bkg	23-Aug 19:10	500	1.188	0.588	1.928	-0.31
LB4100A2		Alpha bkg	23-Aug 19:10	500	0.072	-2.67E-1	0.448	-0.15
LB4100A2		Beta bkg	23-Aug 19:10	500	1.112	-8.28E-1	3.179	-0.10
LB4100A3		Alpha bkg	23-Aug 19:10	500	0.062	-3.71E-2	0.206	-0.55
LB4100A3		Beta bkg	23-Aug 19:10	500	1.380	-3.71E+2	399	-0.10
LB4100B1		Alpha bkg				-5.04E-2	0.323	-2.19
LB4100B1		Beta bkg				0.690	1.634	-7.39
LB4100B2		Alpha bkg				-1.89E-1	0.467	-1.27
LB4100B2		Beta bkg				0.418	1.814	-4.80
LB4100B3		Alpha bkg				-6.61E-2	0.276	-1.84
LB4100B3		Beta bkg				-2.44E+2	261	-0.10
LB4100B4		Alpha bkg				-5.19E-2	0.218	-1.85
LB4100B4		Beta bkg				0.529	1.722	-5.66
LB4100C1		Alpha bkg	23-Aug 17:16	500	0.060	-7.52E-3	0.336	-1.82
LB4100C1		Beta bkg	23-Aug 17:16	500	1.922	0.070	3.594	+0.15
LB4100C2		Alpha bkg	23-Aug 17:16	500	0.042	-8.52E-2	0.312	-1.08
LB4100C2		Beta bkg	23-Aug 17:16	500	0.950	0.511	1.777	-0.92
LB4100C3		Alpha bkg	23-Aug 17:16	500	0.094	-6.31E-2	0.282	-0.27
LB4100C3		Beta bkg	23-Aug 17:16	500	1.060	0.776	2.251	-1.84
LB4100C4		Alpha bkg	23-Aug 17:16	500	0.060	-1.09E-1	0.257	-0.23
LB4100C4	Above	Beta bkg	23-Aug 17:16	500	2838	-2.26E+0	8.835	+1,532.98
LB4100D1		Alpha bkg				-6.92E-2	0.073	-0.08
LB4100D1		Beta bkg				-7.61E-1	1.773	-1.20

LB4100D2		Alpha bkg				0.100	0.528	-4.40
LB4100D2		Beta bkg				0.309	2.710	-3.77
LB4100D3		Alpha bkg				-1.55E-2	0.582	-2.84
LB4100D3		Beta bkg				-1.53E+0	4.943	-1.58
LB4100D4		Alpha bkg				-6.65E-2	0.307	-1.93
LB4100D4		Beta bkg				0.746	2.239	-6.00
LB4100E1		Alpha bkg	23-Aug 16:16	500	0.162	-5.45E-2	0.290	+0.78
LB4100E1		Beta bkg	23-Aug 16:16	500	1.490	0.697	2.033	+0.56
LB4100E2		Alpha bkg	23-Aug 16:16	500	0.086	-1.97E-2	0.222	-0.38
LB4100E2	Above	Beta bkg	23-Aug 16:16	500	2.850	1.005	2.203	+6.24
LB4100E3		Alpha bkg	23-Aug 16:16	500	0.026	-4.15E-2	0.198	-1.31
LB4100E3	Above	Beta bkg	23-Aug 16:16	500	2.402	1.790	2.114	+8.33
LB4100E4		Alpha bkg	23-Aug 16:16	500	0.048	-5.75E-2	0.174	-0.27
LB4100E4		Beta bkg	23-Aug 16:16	500	1.410	0.455	2.172	+0.34
LB4100F1		Alpha bkg	23-Aug 16:16	500	0.084	-5.23E-2	0.181	+0.51
LB4100F1		Beta bkg	23-Aug 16:16	500	1.092	0.602	1.924	-0.78
LB4100F2		Alpha bkg	23-Aug 16:16	500	0.190	0.039	0.317	+0.26
LB4100F2		Beta bkg	23-Aug 16:16	500	1.170	0.714	1.605	+0.07
LB4100F3		Alpha bkg	23-Aug 16:16	500	0.106	-4.66E-2	0.248	+0.11
LB4100F3		Beta bkg	23-Aug 16:16	500	1.132	0.636	1.613	+0.05
LB4100F4		Alpha bkg	23-Aug 16:16	500	0.068	-4.01E-2	0.180	-0.05
LB4100F4		Beta bkg	23-Aug 16:16	500	1.074	0.704	1.854	-1.07
LB4100G1		Alpha bkg	23-Aug 16:17	500	0.032	-4.19E-2	0.157	-0.77
LB4100G1		Beta bkg	23-Aug 16:17	500	0.912	0.375	1.637	-0.45
LB4100G2		Alpha bkg	23-Aug 16:17	500	0.076	-5.80E-2	0.275	-0.59
LB4100G2	Above	Beta bkg	23-Aug 16:17	500	87.784	-5.43E+1	80.770	+3.31
LB4100G3		Alpha bkg	23-Aug 16:17	500	0.110	0.002	0.276	-0.64
LB4100G3	Above	Beta bkg	23-Aug 16:17	500	3.130	0.810	1.674	+13.11
LB4100G4		Alpha bkg	23-Aug 16:17	500	0.042	-1.09E-1	0.250	-0.48
LB4100G4		Beta bkg	23-Aug 16:17	500	0.956	0.468	1.527	-0.23
LB4100H1		Alpha bkg	23-Aug 16:16	500	0.046	-7.22E-2	0.211	-0.49
LB4100H1		Beta bkg	23-Aug 16:16	500	0.970	0.507	1.476	-0.13
LB4100H2		Alpha bkg	23-Aug 16:16	500	0.076	-4.85E-2	0.203	-0.03
LB4100H2	Above	Beta bkg	23-Aug 16:16	500	2.396	0.225	2.317	+3.23
LB4100H3		Alpha bkg	23-Aug 16:16	500	0.042	-4.20E-2	0.255	-1.30

LB4100H3		Beta bkg	23-Aug 16:16	500	1.092	-6.23E+1	90.230	-0.51
LB4100H4		Alpha bkg	23-Aug 16:16	500	0.084	-3.73E-2	0.238	-0.35
LB4100H4		Beta bkg	23-Aug 16:16	500	0.956	0.370	1.614	-0.17
LB4100I1		Alpha bkg	23-Aug 16:16	500	0.078	-8.66E-2	0.291	-0.38
LB4100I1		Beta bkg	23-Aug 16:16	500	0.926	0.438	1.615	-0.51
LB4100I2		Alpha bkg	23-Aug 16:16	500	0.108	-1.86E-1	0.386	+0.08
LB4100I2	Above	Beta bkg	23-Aug 16:16	500	2.050	0.180	2.594	+1.65
LB4100I3		Alpha bkg	23-Aug 16:16	500	0.088	-4.16E-2	0.204	+0.17
LB4100I3	Above	Beta bkg	23-Aug 16:16	500	2.258	-4.28E-1	3.673	+0.93
LB4100I4		Alpha bkg	23-Aug 16:16	500	0.124	0.031	0.326	-1.11
LB4100I4		Beta bkg	23-Aug 16:16	500	1.038	0.490	2.301	-1.18
LB4100J1		Alpha bkg	23-Aug 16:16	500	0.042	0.018	0.372	-2.59
LB4100J1		Beta bkg	23-Aug 16:16	500	1.686	0.056	2.016	+1.99
LB4100J2		Alpha bkg	23-Aug 16:16	500	0.050	-8.17E-2	0.539	-1.73
LB4100J2		Beta bkg	23-Aug 16:16	500	1.014	0.775	1.935	-1.76
LB4100J3		Alpha bkg	23-Aug 16:16	500	0.102	-5.72E-2	0.305	-0.36
LB4100J3		Beta bkg	23-Aug 16:16	500	0.920	0.431	1.507	-0.27
LB4100J4		Alpha bkg	23-Aug 16:16	500	0.182	0.014	0.314	+0.36
LB4100J4		Beta bkg	23-Aug 16:16	500	0.866	0.504	1.329	-0.37
PIC1A		Alpha bkg	23-Aug 17:20	500	0.260	0.052	0.386	+0.74
PIC1A		Beta bkg	23-Aug 17:20	500	0.744	-3.41E-2	1.327	+0.43
PIC1B		Alpha bkg	23-Aug 17:20	500	0.098	-2.93E-2	0.323	-0.83
PIC1B		Beta bkg	23-Aug 17:20	500	0.820	0.382	1.951	-1.32
PIC1C		Alpha bkg	23-Aug 17:20	500	0.052	-4.39E-2	0.359	-1.57
PIC1C		Beta bkg	23-Aug 17:20	500	0.448	-4.73E-1	1.906	-0.68
PIC1D		Alpha bkg	23-Aug 17:20	500	0.214	-8.40E-2	0.474	+0.21
PIC1D		Beta bkg	23-Aug 17:20	500	1.724	0.265	2.212	+1.50
PIC2A		Alpha bkg	23-Aug 17:20	500	0.100	-5.03E-2	0.376	-0.88
PIC2A		Beta bkg	23-Aug 17:20	500	0.476	-6.28E-1	1.918	-0.40
PIC2B		Alpha bkg	23-Aug 17:20	500	0.090	-7.50E-2	0.308	-0.41
PIC2B		Beta bkg	23-Aug 17:20	500	0.562	-1.82E-1	1.434	-0.24
PIC2C		Alpha bkg	23-Aug 17:20	500	0.204	0.027	0.357	+0.22
PIC2C		Beta bkg	23-Aug 17:20	500	0.702	0.397	1.420	-1.21
PIC2D		Alpha bkg	23-Aug 17:20	500	0.096	-3.13E-2	0.367	-1.08
PIC2D		Beta bkg	23-Aug 17:20	500	0.872	0.279	1.490	-0.06

PIC3A	Alpha bkg				-7.50E-2	0.354	-1.95
PIC3A	Beta bkg				-5.41E-1	2.245	-1.83
PIC3B	Alpha bkg	23-Aug 17:20	500	0.230	-1.95E-2	0.376	+0.78
PIC3B	Beta bkg	23-Aug 17:20	500	1.226	0.306	2.452	-0.43
PIC3C	Alpha bkg	23-Aug 17:20	500	0.238	-9.57E-4	0.359	+0.98
PIC3C	Beta bkg	23-Aug 17:20	500	1.118	0.008	1.299	+2.16
PIC3D	Alpha bkg	23-Aug 17:21	500	0.158	-4.97E-2	0.369	-0.02
PIC3D	Beta bkg	23-Aug 17:21	500	0.506	-8.46E-3	1.311	-0.66
PIC4A	Alpha bkg	23-Aug 17:21	500	0.148	-9.48E-2	0.384	+0.05
PIC4A	Beta bkg	23-Aug 17:21	500	1.306	-1.75E-1	2.154	+0.82
PIC4B	Alpha bkg	23-Aug 17:21	500	0.138	-5.36E-2	0.301	+0.24
PIC4B	Beta bkg	23-Aug 17:21	500	0.530	0.072	1.413	-0.95
PIC4C	Alpha bkg	23-Aug 17:21	500	0.230	-3.49E-2	0.385	+0.78
PIC4C	Beta bkg	23-Aug 17:21	500	0.460	0.053	1.027	-0.49
PIC4D	Alpha bkg	23-Aug 17:21	500	0.192	-1.06E-2	0.363	+0.25
PIC4D	Beta bkg	23-Aug 17:21	500	0.992	0.115	1.249	+1.64
PIC5A	Alpha bkg	23-Aug 17:22	500	0.194	0.055	0.368	-0.34
PIC5A	Beta bkg	23-Aug 17:22	500	0.506	-1.06E-1	1.405	-0.57
PIC5B	Alpha bkg	23-Aug 17:22	500	0.124	-1.14E-2	0.414	-1.09
PIC5B	Beta bkg	23-Aug 17:22	500	0.442	-2.27E-1	1.609	-0.81
PIC5C	Alpha bkg	23-Aug 17:22	500	0.166	-6.28E-2	0.409	-0.09
PIC5C	Beta bkg	23-Aug 17:22	500	0.460	-2.06E-1	1.558	-0.73
PIC5D	Alpha bkg	23-Aug 17:22	500	0.122	0.009	0.365	-1.09
PIC5D	Beta bkg	23-Aug 17:22	500	1.214	0.019	2.073	+0.49
PIC6A	Alpha bkg	23-Aug 17:19	500	0.150	-1.32E-2	0.360	-0.38
PIC6A	Beta bkg	23-Aug 17:19	500	1.466	0.899	2.245	-0.47
PIC6B	Alpha bkg	23-Aug 17:19	500	0.194	-1.33E-1	0.383	+0.80
PIC6B	Beta bkg	23-Aug 17:19	500	1.746	-6.80E-2	2.279	+1.64
PIC6C	Alpha bkg	23-Aug 17:19	500	0.104	0.009	0.328	-1.21
PIC6C	Beta bkg	23-Aug 17:19	500	1.444	0.899	2.097	-0.27
PIC6D	Alpha bkg				-8.26E-2	0.335	-1.81
PIC6D	Beta bkg				0.019	2.434	-3.05
PIC7A	Alpha bkg	23-Aug 17:19	500	0.050	-3.46E-2	0.391	-1.81
PIC7A	Beta bkg	23-Aug 17:19	500	0.524	-8.85E-2	1.924	-1.17

PIC7B	Alpha bkg	23-Aug 17:19	500	0.066	-2.50E-2	0.372	-1.63
PIC7B	Beta bkg	23-Aug 17:19	500	0.282	-6.64E-1	1.763	-0.66
PIC7C	Alpha bkg	23-Aug 17:19	500	0.068	-4.17E-2	0.294	-1.04
PIC7C	Beta bkg	23-Aug 17:19	500	0.632	-1.93E-1	1.388	+0.13
PIC7D	Alpha bkg	23-Aug 17:19	500	0.070	-3.52E-2	0.285	-1.03
PIC7D	Beta bkg	23-Aug 17:19	500	0.514	0.109	1.041	-0.39
PIC8A	Alpha bkg	23-Aug 17:19	500	0.096	-4.64E-2	0.301	-0.54
PIC8A	Beta bkg	23-Aug 17:19	500	0.718	0.033	1.296	+0.25
PIC8B	Alpha bkg	23-Aug 17:19	500	0.044	-1.18E-1	0.335	-0.85
PIC8B	Beta bkg	23-Aug 17:19	500	0.368	-2.49E-1	1.166	-0.38
PIC8C	Alpha bkg	23-Aug 17:19	500	0.146	-2.61E-2	0.365	-0.36
PIC8C	Beta bkg	23-Aug 17:19	500	0.462	-1.90E-1	1.144	-0.07
PIC8D	Alpha bkg	23-Aug 17:20	500	0.150	-5.65E-2	0.438	-0.50
PIC8D	Beta bkg	23-Aug 17:20	500	0.450	0.236	2.611	-2.46
PIC9A	Alpha bkg	23-Aug 17:20	500	0.112	-2.15E-2	0.339	-0.78
PIC9A	Beta bkg	23-Aug 17:20	500	0.884	0.178	1.390	+0.50
PIC9B	Alpha bkg	23-Aug 17:20	500	0.042	-5.14E-2	0.189	-0.67
PIC9B	Beta bkg	23-Aug 17:20	500	0.916	0.216	1.395	+0.56
PIC9C	Alpha bkg	23-Aug 17:20	500	0.136	0.010	0.330	-0.64
PIC9C	Beta bkg	23-Aug 17:20	500	1.104	0.148	1.310	+1.94
PIC9D	Alpha bkg	23-Aug 17:20	500	0.134	0.017	0.351	-0.90
PIC9D	Beta bkg	23-Aug 17:20	500	0.416	0.118	1.182	-1.32
PIC10A	Alpha bkg	23-Aug 17:20	500	0.138	-1.88E-2	0.299	-0.04
PIC10A	Beta bkg	23-Aug 17:20	500	0.480	4.53E-4	1.191	-0.58
PIC10B	Alpha bkg	23-Aug 17:21	500	0.074	-4.93E-2	0.308	-0.93
PIC10B	Beta bkg	23-Aug 17:21	500	1.092	-6.98E-1	2.876	+0.00
PIC10C	Alpha bkg	23-Aug 17:21	500	0.056	-6.14E-2	0.277	-0.92
PIC10C	Beta bkg	23-Aug 17:21	500	0.654	-1.32E-1	1.289	+0.32
PIC10D	Alpha bkg	23-Aug 17:21	500	0.186	-9.81E-3	0.389	-0.05
PIC10D	Beta bkg	23-Aug 17:21	500	0.580	-3.76E-1	2.164	-0.74
PIC11A	Alpha bkg	23-Aug 17:16	500	0.082	-5.28E-2	0.231	-0.15
PIC11A	Beta bkg	23-Aug 17:16	500	1.152	0.522	1.773	+0.02
PIC11B	Alpha bkg	23-Aug 17:16	500	0.150	-2.01E-2	0.388	-0.50
PIC11B	Beta bkg	23-Aug 17:16	500	1.034	-8.50E-2	1.719	+0.72
PIC11C	Alpha bkg	23-Aug 17:16	500	0.052	-5.75E-2	0.306	-1.19

PIC11C		Beta bkg	23-Aug 17:16	500	0.550	-5.67E-2	1.194	-0.09
PIC11D		Alpha bkg	23-Aug 17:16	500	0.152	0.016	0.350	-0.55
PIC11D		Beta bkg	23-Aug 17:16	500	1.162	0.436	2.296	-0.66
PIC12A		Alpha bkg	23-Aug 17:16	500	0.048	-2.85E-2	0.394	-1.91
PIC12A		Beta bkg	23-Aug 17:16	500	0.660	-7.27E-3	2.082	-1.08
PIC12B		Alpha bkg	23-Aug 17:16	500	0.086	-5.03E-2	0.300	-0.66
PIC12B		Beta bkg	23-Aug 17:16	500	0.904	0.100	1.734	-0.05
PIC12C		Alpha bkg	23-Aug 17:17	500	0.150	0.009	0.357	-0.56
PIC12C	Above	Beta bkg	23-Aug 17:17	500	1.446	0.175	1.408	+3.18
PIC12D		Alpha bkg	23-Aug 17:17	500	0.106	-5.51E-2	0.306	-0.32
PIC12D		Beta bkg	23-Aug 17:17	500	1.906	0.482	2.608	+1.02
PIC13A		Alpha bkg	23-Aug 17:16	1000	0.059	-4.80E-2	0.311	-1.21
PIC13A		Beta bkg	23-Aug 17:16	1000	0.969	0.689	1.949	-1.67
PIC13B		Alpha bkg	23-Aug 17:16	1000	0.060	-1.04E-1	0.346	-0.82
PIC13B		Beta bkg	23-Aug 17:16	1000	0.991	-2.10E-1	1.369	+1.56
PIC13C		Alpha bkg				-1.03E-1	0.365	-1.68
PIC13C		Beta bkg				-3.09E-1	1.393	-1.91
PIC13D		Alpha bkg	23-Aug 17:16	1000	0.072	-4.18E-2	0.346	-1.24
PIC13D		Beta bkg	23-Aug 17:16	1000	1.516	-2.59E-1	1.892	+1.95
PIC14A		Alpha bkg	23-Aug 17:16	1000	0.062	-4.32E-3	0.227	-1.28
PIC14A		Beta bkg	23-Aug 17:16	1000	1.849	-7.82E-2	2.536	+1.42
PIC14B		Alpha bkg	23-Aug 17:16	1000	0.024	-9.73E-2	0.263	-0.98
PIC14B	Above	Beta bkg	23-Aug 17:16	1000	2.284	-2.72E-1	1.433	+5.99
PIC14C		Alpha bkg	23-Aug 17:16	1000	0.096	0.016	0.343	-1.53
PIC14C	Above	Beta bkg	23-Aug 17:16	1000	2.286	0.566	2.220	+3.24
PIC14D		Alpha bkg	23-Aug 17:16	1000	0.033	-5.06E-2	0.184	-0.87
PIC14D		Beta bkg	23-Aug 17:16	1000	0.460	0.145	0.770	+0.02

Reviewed by R. Leick-Harmon

Date 8-24-19

GEL Laboratories LLC

Method Calibration Data

Gas Flow Proportional Counter Calibration Package

Method: Total Radium

Instrument (circle one): LB4100 / Protean / G5400W

	Part 1: Efficiency determination	Included/ Acceptable	Comments
1	Efficiency spreadsheet (eff pts, graphs, trendline equation)	✓	
2	Applicable portion of GFPC_Machines.XLS	✓	
3	Raw Data for Calibration standards	✓	
4	Verification Spreadsheet and Raw Data (recoveries 75%-125%)	✓	
5	Plateau graph and raw data	✓	
6	Standardization of Carrier (if applicable)	✓	

	Part 2. Documentation for Calibration Source		
1	Vendor Certificate	✓	
2	Standard Traceability Log (from LIMS)	✓	
3	Current Verification of Source	✓	
4	Source preparation sheet	✓	

	Part 3. Documentation for Verification Source		
1	Vendor Certificate	✓	
2	Standard Traceability Log (from LIMS)	✓	
3	Current Verification of Source	✓	
4	Source preparation sheet	✓	

	Part 4. Enter into LIMS		
1	Alpha LIMS instrument calibration updated	✓	

Primary Review of Package Nathaniel Ivey III

Secondary Review of Package

Effective Date: 5/1/2018

*Verified 5/21/19

Expiration Date: 5/31/2020

GEL Laboratories
2040 Savage Road, Charleston, SC 29407
(843)556-8171

Rev 7 SSC 8/3/09

Total Radium Calibration - PIC - May 2018

Standard Data	Isotope	Ra-226
	Standard ID number	1541-A
	Half Life (days)	584400
	Std. Act. (dpm/mL)	19243.8853
	Reference Date	4/25/2011
	Volume of spike (mL)	0.5
	Std. Nominal (dpm)	9592.73
	Decay Date	5/2/2018

Precipitation Date/Time 4/11/2018 14:40
Rn-222 Half Life (days) 3.8235
The following detectors were not calibrated:
3A, 6D, 13C

Carrier Data	Std ID 2628181	Std weight 26.48	mg/mL
Source	Measured weight (mg)	Vol. Carrier Added (mL)	Theoretical weight (mg)	***Recovery
1	6.8	0.4	10.59	64.2%
2	12.7	0.6	15.89	79.9%
3	16.2	0.8	21.18	76.5%
4	24.1	1	26.48	91.0%
5	37.9	1.5	39.72	95.4%
6	52.2	2	52.96	98.6%
7	79.1	3	79.44	99.6%
8	92.7	3.5	92.68	100.0%

***Recovery values exceeding 100% will be evaluated at 100%.

*Background is considered neglible.
**Decay corrected to mid-point of cou

Raw Count Data											
Detector (#)	Source ID (#)	Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
1A	1	5/2/2018 17:26	2	18792	9396	64.2%	3.93475	3719.59	9592.72	**0.3878**	0.3771
1A	2	5/2/2018 17:35	2	20702	10351	79.9%	3.93482	3290.97	9592.72	**0.3431**	0.3574
1A	3	5/2/2018 17:32	2	20092	10046	76.5%	3.93479	3338.60	9592.72	**0.3480**	0.3462
1A	4	5/2/2018 17:29	2	21877	10938.5	91.0%	3.93477	3054.49	9592.72	**0.3184**	0.3223
1A	5	5/2/2018 17:38	2	20887	10443.5	95.4%	3.93484	2781.56	9592.72	**0.2900**	0.2851
1A	6	5/2/2018 17:47	2	19127	9563.5	98.6%	3.93492	2465.80	9592.72	**0.2570**	0.2528
1A	7	5/2/2018 17:44	2	15244	7622	99.6%	3.93489	1945.35	9592.72	**0.2028**	0.2090
1A	8	5/2/2018 17:41	2	14952	7476	100.0%	3.93487	1899.94	9592.72	**0.1981**	0.1953
1B	1	5/2/2018 17:29	2	18852	9426	64.2%	3.93477	3731.45	9592.72	**0.3890**	0.3809
1B	2	5/2/2018 17:26	2	21038	10519	79.9%	3.93475	3344.44	9592.72	**0.3486**	0.3599
1B	3	5/2/2018 17:35	2	20090	10045	76.5%	3.93482	3338.25	9592.72	**0.3480**	0.3480
1B	4	5/2/2018 17:32	2	22184	11092	91.0%	3.93479	3097.34	9592.72	**0.3229**	0.3227
1B	5	5/2/2018 17:41	2	20723	10361.5	95.4%	3.93487	2759.70	9592.72	**0.2877**	0.2840
1B	6	5/2/2018 17:38	2	18702	9351	98.6%	3.93484	2411.06	9592.72	**0.2513**	0.2510
1B	7	5/2/2018 17:47	2	15554	7777	99.6%	3.93492	1984.90	9592.72	**0.2069**	0.2087
1B	8	5/2/2018 17:44	2	14935	7467.5	100.0%	3.93490	1897.76	9592.72	**0.1978**	0.1971
1C	1	5/2/2018 17:32	2	19965	9982.5	64.2%	3.93479	3951.72	9592.72	**0.4120**	0.4016
1C	2	5/2/2018 17:29	2	22372	11186	79.9%	3.93477	3556.48	9592.72	**0.3707**	0.3799
1C	3	5/2/2018 17:26	2	21077	10538.5	76.5%	3.93475	3502.31	9592.72	**0.3651**	0.3677
1C	4	5/2/2018 17:35	2	23123	11561.5	91.0%	3.93482	3228.42	9592.72	**0.3365**	0.3417
1C	5	5/2/2018 17:44	2	22244	11122	95.4%	3.93489	2962.24	9592.72	**0.3088**	0.3019
1C	6	5/2/2018 17:41	2	20036	10018	98.6%	3.93487	2583.02	9592.72	**0.2693**	0.2682
1C	7	5/2/2018 17:38	2	16851	8425.5	99.6%	3.93484	2150.46	9592.72	**0.2242**	0.2255
1C	8	5/2/2018 17:47	2	16176	8088	100.0%	3.93492	2055.44	9592.72	**0.2143**	0.2142
1D	1	5/2/2018 17:34	2	19900	9950	64.2%	3.93482	3938.83	9592.72	**0.4106**	0.4008
1D	2	5/2/2018 17:32	2	22017	11008.5	79.9%	3.93479	3500.03	9592.72	**0.3649**	0.3786
1D	3	5/2/2018 17:29	2	21223	10611.5	76.5%	3.93477	3526.55	9592.72	**0.3676**	0.3660
1D	4	5/2/2018 17:26	2	23218	11609	91.0%	3.93475	3241.74	9592.72	**0.3379**	0.3393
1D	5	5/2/2018 17:47	2	21784	10892	95.4%	3.93492	2900.96	9592.72	**0.3024**	0.2984
1D	6	5/2/2018 17:44	2	19655	9827.5	98.6%	3.93489	2533.89	9592.72	**0.2641**	0.2637
1D	7	5/2/2018 17:41	2	16449	8224.5	99.6%	3.93487	2099.14	9592.72	**0.2188**	0.2195
1D	8	5/2/2018 17:38	2	15679	7839.5	100.0%	3.93484	1992.33	9592.72	**0.2077**	0.2077
2A	1	5/2/2018 17:38	2	19010	9505	64.2%	3.93484	3762.65	9592.72	**0.3922**	0.3853
2A	2	5/2/2018 17:47	2	21420	10710	79.9%	3.93492	3405.01	9592.72	**0.3550**	0.3656
2A	3	5/2/2018 17:44	2	20585	10292.5	76.5%	3.93490	3420.43	9592.72	**0.3566**	0.3544
2A	4	5/2/2018 17:41	2	22430	11215	91.0%	3.93487	3131.63	9592.72	**0.3265**	0.3304
2A	5	5/2/2018 17:26	2	21710	10855	95.4%	3.93475	2891.23	9592.72	**0.3014**	0.2931
2A	6	5/2/2018 17:35	2	19326	9663	98.6%	3.93482	2491.52	9592.72	**0.2597**	0.2603
2A	7	5/2/2018 17:32	2	15805	7902.5	99.6%	3.93480	2017.00	9592.72	**0.2103**	0.2152
2A	8	5/2/2018 17:29	2	15359	7679.5	100.0%	3.93477	1951.70	9592.72	**0.2035**	0.2007
2B	1	5/2/2018 17:41	2	18508	9254	64.2%	3.93487	3663.27	9592.72	**0.3819**	0.3747
2B	2	5/2/2018 17:38	2	20801	10400.5	79.9%	3.93485	3306.68	9592.72	**0.3447**	0.3550
2B	3	5/2/2018 17:47	2	20040	10020	76.5%	3.93492	3329.85	9592.72	**0.3471**	0.3439
2B	4	5/2/2018 17:44	2	21648	10824	91.0%	3.93490	3022.42	9592.72	**0.3151**	0.3202
2B	5	5/2/2018 17:29	2	20777	10388.5	95.4%	3.93477	2766.96	9592.72	**0.2884**	0.2836
2B	6	5/2/2018 17:26	2	18965	9482.5	98.6%	3.93475	2445.03	9592.72	**0.2549**	0.2522
2B	7	5/2/2018 17:35	2	15509	7754.5	99.6%	3.93482	1979.21	9592.72	**0.2063**	0.2109
2B	8	5/2/2018 17:32	2	15170	7585	100.0%	3.93480	1927.67	9592.72	**0.2010**	0.1989
2C	1	5/2/2018 17:44	2	19309	9654.5	64.2%	3.93490	3821.78	9592.72	**0.3984**	0.3885
2C	2	5/2/2018 17:41	2	21392	10696	79.9%	3.93487	3400.61	9592.72	**0.3545**	0.3670
2C	3	5/2/2018 17:38	2	20416	10208	76.5%	3.93485	3392.39	9592.72	**0.3536**	0.3549
2C	4	5/2/2018 17:47	2	22624	11312	91.0%	3.93492	3158.67	9592.72	**0.3293**	0.3291
2C	5	5/2/2018 17:32	2	21254	10627	95.4%	3.93480	2830.47	9592.72	**0.2951**	0.2895
2C	6	5/2/2018 17:29	2	18886	9443	98.6%	3.93477	2434.83	9592.72	**0.2538**	0.2557
2C	7	5/2/2018 17:26	2	15974	7987	99.6%	3.93475	2038.59	9592.72	**0.2125**	0.2120
2C	8	5/2/2018 17:35	2	15053	7526.5	100.0%	3.93482	1912.79	9592.72	**0.1994**	0.1999
2D	1	5/2/2018 17:47	2	19272	9636	64.2%	3.93492	3814.43	9592.72	**0.3976**	0.3864
2D	2	5/2/2018 17:44	2	21273	10636.5	79.9%	3.93490	3381.67	9592.72	**0.3525**	0.3658

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
2D	3	5/2/2018 17:41	2	20458	10229	76.5%	3.93487	3399.35	9592.72	**0.3544**	0.3542
2D	4	5/2/2018 17:38	2	22354	11177	91.0%	3.93485	3121.03	9592.72	**0.3254**	0.3293
2D	5	5/2/2018 17:35	2	21328	10664	95.4%	3.93482	2840.31	9592.72	**0.2961**	0.2907
2D	6	5/2/2018 17:32	2	19316	9658	98.6%	3.93480	2490.25	9592.72	**0.2596**	0.2572
2D	7	5/2/2018 17:29	2	15743	7871.5	99.6%	3.93477	2009.10	9592.72	**0.2094**	0.2123
2D	8	5/2/2018 17:26	2	15046	7523	100.0%	3.93475	1911.94	9592.72	**0.1993**	0.1985
3B	1	5/2/2018 17:04	2	20011	10005.5	64.2%	3.93457	3961.05	9592.72	**0.4129**	0.4018
3B	2	5/2/2018 17:02	2	22060	11030	79.9%	3.93455	3507.09	9592.72	**0.3656**	0.3804
3B	3	5/2/2018 17:11	2	21395	10697.5	76.5%	3.93462	3555.27	9592.72	**0.3706**	0.3682
3B	4	5/2/2018 17:07	2	23274	11637	91.0%	3.93459	3249.69	9592.72	**0.3388**	0.3425
3B	5	5/2/2018 17:17	2	22091	11045.5	95.4%	3.93467	2942.03	9592.72	**0.3067**	0.3029
3B	6	5/2/2018 17:14	2	20258	10129	98.6%	3.93465	2611.79	9592.72	**0.2723**	0.2691
3B	7	5/2/2018 17:23	2	16758	8379	99.6%	3.93472	2138.66	9592.72	**0.2229**	0.2255
3B	8	5/2/2018 17:20	2	16156	8078	100.0%	3.93470	2053.02	9592.72	**0.2140**	0.2134
3C	1	5/2/2018 17:07	2	19611	9805.5	64.2%	3.93459	3881.85	9592.72	**0.4047**	0.3981
3C	2	5/2/2018 17:04	2	22128	11064	79.9%	3.93457	3517.88	9592.72	**0.3667**	0.3775
3C	3	5/2/2018 17:02	2	21262	10631	76.5%	3.93455	3533.23	9592.72	**0.3683**	0.3659
3C	4	5/2/2018 17:11	2	23378	11689	91.0%	3.93462	3264.19	9592.72	**0.3403**	0.3412
3C	5	5/2/2018 17:20	2	22124	11062	95.4%	3.93469	2946.41	9592.72	**0.3072**	0.3031
3C	6	5/2/2018 17:17	2	20067	10033.5	98.6%	3.93467	2587.15	9592.72	**0.2697**	0.2704
3C	7	5/2/2018 17:14	2	17003	8501.5	99.6%	3.93465	2169.96	9592.72	**0.2262**	0.2274
3C	8	5/2/2018 17:23	2	16272	8136	100.0%	3.93472	2067.74	9592.72	**0.2156**	0.2150
3D	1	5/2/2018 17:11	2	19092	9546	64.2%	3.93462	3779.09	9592.72	**0.3940**	0.3891
3D	2	5/2/2018 17:07	2	21630	10815	79.9%	3.93459	3438.68	9592.72	**0.3585**	0.3692
3D	3	5/2/2018 17:04	2	20953	10476.5	76.5%	3.93457	3481.86	9592.72	**0.3630**	0.3579
3D	4	5/2/2018 17:02	2	22763	11381.5	91.0%	3.93455	3178.38	9592.72	**0.3313**	0.3337
3D	5	5/2/2018 17:23	2	21662	10831	95.4%	3.93472	2884.86	9592.72	**0.3007**	0.2960
3D	6	5/2/2018 17:20	2	19595	9797.5	98.6%	3.93470	2526.28	9592.72	**0.2634**	0.2631
3D	7	5/2/2018 17:17	2	16041	8020.5	99.6%	3.93467	2047.18	9592.72	**0.2134**	0.2179
3D	8	5/2/2018 17:14	2	15559	7779.5	100.0%	3.93465	1977.18	9592.72	**0.2061**	0.2035
4A	1	5/2/2018 17:14	2	19333	9666.5	64.2%	3.93465	3826.77	9592.72	**0.3989**	0.3908
4A	2	5/2/2018 17:23	2	21583	10791.5	79.9%	3.93472	3431.10	9592.72	**0.3577**	0.3697
4A	3	5/2/2018 17:20	2	20799	10399.5	76.5%	3.93470	3456.16	9592.72	**0.3603**	0.3577
4A	4	5/2/2018 17:17	2	22625	11312.5	91.0%	3.93467	3159.01	9592.72	**0.3293**	0.3322
4A	5	5/2/2018 17:02	2	21350	10675	95.4%	3.93455	2843.43	9592.72	**0.2964**	0.2929
4A	6	5/2/2018 17:11	2	19542	9771	98.6%	3.93462	2519.50	9592.72	**0.2626**	0.2593
4A	7	5/2/2018 17:08	2	15818	7909	99.6%	3.93460	2018.76	9592.72	**0.2104**	0.2155
4A	8	5/2/2018 17:05	2	15497	7748.5	100.0%	3.93457	1969.34	9592.72	**0.2053**	0.2030
4B	1	5/2/2018 17:17	2	16934	8467	64.2%	3.93467	3351.89	9592.72	**0.3494**	0.3427
4B	2	5/2/2018 17:14	2	18595	9297.5	79.9%	3.93465	2956.15	9592.72	**0.3082**	0.3233
4B	3	5/2/2018 17:23	2	18505	9252.5	76.5%	3.93472	3074.95	9592.72	**0.3206**	0.3123
4B	4	5/2/2018 17:20	2	19642	9821	91.0%	3.93470	2742.49	9592.72	**0.2859**	0.2890
4B	5	5/2/2018 17:05	2	18521	9260.5	95.4%	3.93457	2466.65	9592.72	**0.2571**	0.2531
4B	6	5/2/2018 17:02	2	16633	8316.5	98.6%	3.93455	2144.49	9592.72	**0.2236**	0.2226
4B	7	5/2/2018 17:11	2	13482	6741	99.6%	3.93462	1720.62	9592.72	**0.1794**	0.1832
4B	8	5/2/2018 17:08	2	13160	6580	100.0%	3.93460	1672.34	9592.72	**0.1743**	0.1723
4C	1	5/2/2018 17:20	2	19344	9672	64.2%	3.93470	3828.90	9592.72	**0.3991**	0.3907
4C	2	5/2/2018 17:17	2	21724	10862	79.9%	3.93467	3453.56	9592.72	**0.3600**	0.3702
4C	3	5/2/2018 17:14	2	20762	10381	76.5%	3.93465	3450.06	9592.72	**0.3597**	0.3585
4C	4	5/2/2018 17:23	2	22743	11371.5	91.0%	3.93472	3175.44	9592.72	**0.3310**	0.3338
4C	5	5/2/2018 17:08	2	21395	10697.5	95.4%	3.93460	2849.39	9592.72	**0.2970**	0.2957
4C	6	5/2/2018 17:05	2	19802	9901	98.6%	3.93457	2553.05	9592.72	**0.2661**	0.2630
4C	7	5/2/2018 17:02	2	16476	8238	99.6%	3.93455	2102.76	9592.72	**0.2192**	0.2200
4C	8	5/2/2018 17:11	2	15649	7824.5	100.0%	3.93462	1988.63	9592.72	**0.2073**	0.2076
4D	1	5/2/2018 17:23	2	19764	9882	64.2%	3.93472	3912.01	9592.72	**0.4078**	0.3973
4D	2	5/2/2018 17:20	2	21971	10985.5	79.9%	3.93470	3492.80	9592.72	**0.3641**	0.3767
4D	3	5/2/2018 17:17	2	20953	10476.5	76.5%	3.93467	3481.77	9592.72	**0.3630**	0.3650
4D	4	5/2/2018 17:14	2	23298	11649	91.0%	3.93465	3253.00	9592.72	**0.3391**	0.3402
4D	5	5/2/2018 17:11	2	22127	11063.5	95.4%	3.93462	2946.86	9592.72	**0.3072**	0.3017
4D	6	5/2/2018 17:08	2	20217	10108.5	98.6%	3.93460	2606.54	9592.72	**0.2717**	0.2685
4D	7	5/2/2018 17:05	2	16380	8190	99.6%	3.93457	2090.49	9592.72	**0.2179**	0.2245
4D	8	5/2/2018 17:02	2	16201	8100.5	100.0%	3.93455	2058.81	9592.72	**0.2146**	0.2114
5A	1	5/2/2018 16:36	2	20027	10013.5	64.2%	3.93434	3964.45	9592.72	**0.4133**	0.4114
5A	2	5/2/2018 16:46	2	23130	11565	79.9%	3.93442	3677.32	9592.72	**0.3833**	0.3898
5A	3	5/2/2018 16:43	2	22137	11068.5	76.5%	3.93439	3678.78	9592.72	**0.3835**	0.3776
5A	4	5/2/2018 16:40	2	24034	12017	91.0%	3.93437	3356.00	9592.72	**0.3498**	0.3516
5A	5	5/2/2018 16:49	2	22440	11220	95.4%	3.93444	2988.68	9592.72	**0.3116**	0.3115
5A	6	5/2/2018 16:58	2	20684	10342	98.6%	3.93452	2666.80	9592.72	**0.2780**	0.2769
5A	7	5/2/2018 16:55	2	17309	8654.5	99.6%	3.93449	2209.11	9592.72	**0.2303**	0.2315
5A	8	5/2/2018 16:52	2	16517	8258.5	100.0%	3.93447	2099.01	9592.72	**0.2188**	0.2182
5B	1	5/2/2018 16:40	2	19726	9863	64.2%	3.93436	3904.84	9592.72	**0.4071**	0.3918
5B	2	5/2/2018 16:46	2	21224	10612	79.9%	3.93442	3374.29	9592.72	**0.3518**	0.3728
5B	4	5/2/2018 16:43	2	23357	11678.5	91.0%	3.93439	3261.45	9592.72	**0.3400**	0.3390
5B	5	5/2/2018 16:52	2	22164	11082	95.4%	3.93447	2951.91	9592.72	**0.3077**	0.3030
5B	6	5/2/2018 16:49	2	20348	10174	98.6%	3.93444	2623.53	9592.72	**0.2735**	0.2714
5B	7	5/2/2018 16:58	2	16877	8438.5	99.6%	3.93452	2153.95	9592.72	**0.2245**	0.2279
5B	8	5/2/2018 16:55	2	16225	8112.5	100.0%	3.93449	2061.89	9592.72	**0.2149**	0.2137

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
5C	1	5/2/2018 16:43	2	20005	10002.5	64.2%	3.93439	3960.05	9592.72	**0.4128**	0.4145
5C	2	5/2/2018 16:40	2	22364	11182	79.9%	3.93436	3555.58	9592.72	**0.3707**	0.3919
5C	3	5/2/2018 16:46	2	23458	11729	76.5%	3.93442	3898.29	9592.72	**0.4064**	0.3791
5C	5	5/2/2018 16:55	2	22189	11094.5	95.4%	3.93449	2955.22	9592.72	**0.3081**	0.3099
5C	6	5/2/2018 16:52	2	20136	10068	98.6%	3.93447	2596.18	9592.72	**0.2706**	0.2738
5C	7	5/2/2018 16:49	2	16939	8469.5	99.6%	3.93444	2161.91	9592.72	**0.2254**	0.2260
5C	8	5/2/2018 16:58	2	16107	8053.5	100.0%	3.93452	2046.88	9592.72	**0.2134**	0.2120
5D	1	5/2/2018 16:46	2	20249	10124.5	64.2%	3.93441	4008.32	9592.72	**0.4179**	0.4054
5D	2	5/2/2018 16:43	2	22381	11190.5	79.9%	3.93439	3558.26	9592.72	**0.3709**	0.3846
5D	3	5/2/2018 16:40	2	21579	10789.5	76.5%	3.93437	3586.08	9592.72	**0.3738**	0.3728
5D	4	5/2/2018 16:36	2	23338	11669	91.0%	3.93434	3258.84	9592.72	**0.3397**	0.3476
5D	5	5/2/2018 16:58	2	22765	11382.5	95.4%	3.93452	3031.91	9592.72	**0.3161**	0.3086
5D	6	5/2/2018 16:55	2	20655	10327.5	98.6%	3.93449	2663.08	9592.72	**0.2776**	0.2748
5D	7	5/2/2018 16:52	2	17017	8508.5	99.6%	3.93447	2171.85	9592.72	**0.2264**	0.2294
5D	8	5/2/2018 16:49	2	16331	8165.5	100.0%	3.93445	2075.39	9592.72	**0.2164**	0.2156
6A	1	5/2/2018 16:51	2	17097	8548.5	64.2%	3.93446	3384.34	9592.72	**0.3528**	0.3434
6A	2	5/2/2018 17:01	2	18941	9470.5	79.9%	3.93454	3011.24	9592.72	**0.3139**	0.3244
6A	3	5/2/2018 16:57	2	18075	9037.5	76.5%	3.93451	3003.66	9592.72	**0.3131**	0.3136
6A	4	5/2/2018 16:54	2	19884	9942	91.0%	3.93449	2776.43	9592.72	**0.2894**	0.2908
6A	5	5/2/2018 16:38	2	18506	9253	95.4%	3.93436	2464.78	9592.72	**0.2569**	0.2557
6A	6	5/2/2018 16:48	2	16985	8492.5	98.6%	3.93444	2189.93	9592.72	**0.2283**	0.2259
6A	7	5/2/2018 16:45	2	14130	7065	99.6%	3.93441	1803.41	9592.72	**0.1880**	0.1876
6A	8	5/2/2018 16:42	2	13287	6643.5	100.0%	3.93439	1688.57	9592.72	**0.1760**	0.1771
6B	1	5/2/2018 16:54	2	18124	9062	64.2%	3.93449	3587.61	9592.72	**0.3740**	0.3658
6B	2	5/2/2018 16:51	2	20133	10066.5	79.9%	3.93446	3200.80	9592.72	**0.3337**	0.3466
6B	3	5/2/2018 17:01	2	19429	9714.5	76.5%	3.93454	3228.64	9592.72	**0.3366**	0.3357
6B	4	5/2/2018 16:57	2	21660	10830	91.0%	3.93451	3024.40	9592.72	**0.3153**	0.3125
6B	5	5/2/2018 16:42	2	20075	10037.5	95.4%	3.93438	2673.74	9592.72	**0.2787**	0.2764
6B	6	5/2/2018 16:38	2	18092	9046	98.6%	3.93436	2332.71	9592.72	**0.2432**	0.2450
6B	7	5/2/2018 16:48	2	15355	7677.5	99.6%	3.93444	1959.75	9592.72	**0.2043**	0.2026
6B	8	5/2/2018 16:45	2	14213	7106.5	100.0%	3.93441	1806.24	9592.72	**0.1883**	0.1894
6C	1	5/2/2018 16:57	2	19160	9580	64.2%	3.93451	3792.66	9592.72	**0.3954**	0.3881
6C	2	5/2/2018 16:54	2	21414	10707	79.9%	3.93449	3404.44	9592.72	**0.3549**	0.3664
6C	3	5/2/2018 16:51	2	20581	10290.5	76.5%	3.93446	3420.14	9592.72	**0.3565**	0.3541
6C	4	5/2/2018 17:01	2	22483	11241.5	91.0%	3.93454	3139.29	9592.72	**0.3273**	0.3281
6C	5	5/2/2018 16:45	2	20946	10473	95.4%	3.93441	2789.73	9592.72	**0.2908**	0.2882
6C	6	5/2/2018 16:42	2	19010	9505	98.6%	3.93438	2451.05	9592.72	**0.2555**	0.2543
6C	7	5/2/2018 16:38	2	15704	7852	99.6%	3.93436	2004.33	9592.72	**0.2089**	0.2109
6C	8	5/2/2018 16:48	2	15091	7545.5	100.0%	3.93444	1917.81	9592.72	**0.1999**	0.1991
7A	1	5/2/2018 16:13	2	19270	9635	64.2%	3.93414	3814.79	9592.72	**0.3977**	0.3907
7A	2	5/2/2018 16:23	2	21647	10823.5	79.9%	3.93422	3441.71	9592.72	**0.3588**	0.3700
7A	3	5/2/2018 16:19	2	21012	10506	76.5%	3.93420	3492.00	9592.72	**0.3640**	0.3582
7A	4	5/2/2018 16:16	2	22423	11211.5	91.0%	3.93417	3131.20	9592.72	**0.3264**	0.3330
7A	5	5/2/2018 16:26	2	21585	10792.5	95.4%	3.93425	2874.95	9592.72	**0.2997**	0.2941
7A	6	5/2/2018 16:35	2	19378	9689	98.6%	3.93433	2498.54	9592.72	**0.2605**	0.2602
7A	7	5/2/2018 16:32	2	16044	8022	99.6%	3.93430	2047.75	9592.72	**0.2135**	0.2146
7A	8	5/2/2018 16:29	2	15163	7581.5	100.0%	3.93428	1927.04	9592.72	**0.2009**	0.2006
7B	1	5/2/2018 16:16	2	19541	9770.5	64.2%	3.93417	3868.41	9592.72	**0.4033**	0.4016
7B	2	5/2/2018 16:13	2	21884	10942	79.9%	3.93414	3479.46	9592.72	**0.3627**	0.3794
7B	3	5/2/2018 16:23	2	22310	11155	76.5%	3.93422	3707.69	9592.72	**0.3865**	0.3669
7B	4	5/2/2018 16:19	2	22939	11469.5	91.0%	3.93420	3203.24	9592.72	**0.3339**	0.3402
7B	5	5/2/2018 16:29	2	21880	10940	95.4%	3.93428	2914.22	9592.72	**0.3038**	0.2990
7B	6	5/2/2018 16:26	2	19407	9703.5	98.6%	3.93425	2502.33	9592.72	**0.2609**	0.2637
7B	7	5/2/2018 16:35	2	16209	8104.5	99.6%	3.93433	2068.80	9592.72	**0.2157**	0.2173
7B	8	5/2/2018 16:32	2	15500	7750	100.0%	3.93430	1969.85	9592.72	**0.2053**	0.2039
7C	1	5/2/2018 16:19	2	18963	9481.5	64.2%	3.93419	3753.97	9592.72	**0.3913**	0.3793
7C	2	5/2/2018 16:16	2	20691	10345.5	79.9%	3.93417	3289.76	9592.72	**0.3429**	0.3579
7C	3	5/2/2018 16:13	2	20122	10061	76.5%	3.93414	3344.14	9592.72	**0.3486**	0.3459
7C	4	5/2/2018 16:23	2	21599	10799.5	91.0%	3.93422	3016.10	9592.72	**0.3144**	0.3203
7C	5	5/2/2018 16:32	2	20593	10296.5	95.4%	3.93430	2742.79	9592.72	**0.2859**	0.2814
7C	6	5/2/2018 16:29	2	18751	9375.5	98.6%	3.93428	2417.73	9592.72	**0.2520**	0.2487
7C	7	5/2/2018 16:26	2	15507	7753.5	99.6%	3.93425	1979.24	9592.72	**0.2063**	0.2081
7C	8	5/2/2018 16:35	2	14955	7477.5	100.0%	3.93433	1900.58	9592.72	**0.1981**	0.1981
7D	1	5/2/2018 16:23	2	19339	9669.5	64.2%	3.93422	3828.37	9592.72	**0.3991**	0.3872
7D	2	5/2/2018 16:19	2	21173	10586.5	79.9%	3.93420	3366.37	9592.72	**0.3509**	0.3657
7D	3	5/2/2018 16:16	2	20296	10148	76.5%	3.93417	3373.03	9592.72	**0.3516**	0.3535
7D	4	5/2/2018 16:13	2	22483	11241.5	91.0%	3.93414	3139.60	9592.72	**0.3273**	0.3277
7D	5	5/2/2018 16:35	2	21204	10602	95.4%	3.93433	2824.15	9592.72	**0.2944**	0.2879
7D	6	5/2/2018 16:32	2	18938	9469	98.6%	3.93430	2441.82	9592.72	**0.2545**	0.2539
7D	7	5/2/2018 16:29	2	15523	7761.5	99.6%	3.93428	1981.27	9592.72	**0.2065**	0.2099
7D	8	5/2/2018 16:26	2	15027	7513.5	100.0%	3.93425	1909.77	9592.72	**0.1991**	0.1976
8A	1	5/2/2018 16:26	2	19789	9894.5	64.2%	3.93425	3917.43	9592.72	**0.4084**	0.4004
8A	2	5/2/2018 16:35	2	22042	11021	79.9%	3.93433	3504.42	9592.72	**0.3653**	0.3781
8A	3	5/2/2018 16:32	2	21426	10713	76.5%	3.93430	3560.71	9592.72	**0.3712**	0.3656
8A	4	5/2/2018 16:29	2	22930	11465	91.0%	3.93428	3201.92	9592.72	**0.3338**	0.3389
8A	5	5/2/2018 16:13	2	21767	10883.5	95.4%	3.93414	2899.27	9592.72	**0.3022**	0.2980
8A	6	5/2/2018 16:23	2	19644	9822	98.6%	3.93423	2532.90	9592.72	**0.2640**	0.2631

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
8A	7	5/2/2018 16:19	2	16333	8166.5	99.6%	3.93420	2084.69	9592.72	**0.2173**	0.2183
8A	8	5/2/2018 16:17	2	15552	7776	100.0%	3.93417	1976.53	9592.72	**0.2060**	0.2060
8B	1	5/2/2018 16:29	2	20013	10006.5	64.2%	3.93428	3961.74	9592.72	**0.4130**	0.4026
8B	2	5/2/2018 16:26	2	22182	11091	79.9%	3.93425	3526.74	9592.72	**0.3676**	0.3791
8B	3	5/2/2018 16:36	2	21044	10522	76.5%	3.93433	3497.20	9592.72	**0.3646**	0.3659
8B	4	5/2/2018 16:32	2	23078	11539	91.0%	3.93431	3222.56	9592.72	**0.3359**	0.3381
8B	5	5/2/2018 16:16	2	21613	10806.5	95.4%	3.93417	2878.74	9592.72	**0.3001**	0.2957
8B	6	5/2/2018 16:13	2	19450	9725	98.6%	3.93414	2507.94	9592.72	**0.2614**	0.2604
8B	7	5/2/2018 16:23	2	16307	8153.5	99.6%	3.93423	2081.36	9592.72	**0.2170**	0.2174
8B	8	5/2/2018 16:20	2	15618	7809	100.0%	3.93420	1984.90	9592.72	**0.2069**	0.2073
8C	1	5/2/2018 16:32	2	19597	9798.5	64.2%	3.93430	3879.37	9592.72	**0.4044**	0.4001
8C	2	5/2/2018 16:29	2	22147	11073.5	79.9%	3.93428	3521.16	9592.72	**0.3671**	0.3785
8C	3	5/2/2018 16:26	2	21497	10748.5	76.5%	3.93425	3572.55	9592.72	**0.3724**	0.3662
8C	4	5/2/2018 16:36	2	23302	11651	91.0%	3.93433	3253.82	9592.72	**0.3392**	0.3402
8C	5	5/2/2018 16:19	2	21932	10966	95.4%	3.93420	2921.21	9592.72	**0.3045**	0.2999
8C	6	5/2/2018 16:16	2	19541	9770.5	98.6%	3.93417	2519.65	9592.72	**0.2627**	0.2652
8C	7	5/2/2018 16:13	2	16404	8202	99.6%	3.93414	2093.79	9592.72	**0.2183**	0.2193
8C	8	5/2/2018 16:23	2	15592	7796	100.0%	3.93423	1981.58	9592.72	**0.2066**	0.2057
8D	1	5/2/2018 16:35	2	20078	10039	64.2%	3.93433	3974.56	9592.72	**0.4143**	0.4063
8D	2	5/2/2018 16:32	2	22413	11206.5	79.9%	3.93430	3563.42	9592.72	**0.3715**	0.3844
8D	3	5/2/2018 16:29	2	21792	10896	76.5%	3.93428	3621.55	9592.72	**0.3775**	0.3721
8D	4	5/2/2018 16:26	2	23380	11690	91.0%	3.93425	3264.77	9592.72	**0.3403**	0.3458
8D	5	5/2/2018 16:23	2	22402	11201	95.4%	3.93423	2983.79	9592.72	**0.3110**	0.3053
8D	6	5/2/2018 16:19	2	20153	10076.5	98.6%	3.93420	2598.55	9592.72	**0.2709**	0.2707
8D	7	5/2/2018 16:16	2	16832	8416	99.6%	3.93417	2148.40	9592.72	**0.2240**	0.2255
8D	8	5/2/2018 16:13	2	16087	8043.5	100.0%	3.93414	2044.54	9592.72	**0.2131**	0.2126
9A	1	5/2/2018 15:49	2	19175	9587.5	64.2%	3.93394	3796.17	9592.72	**0.3957**	0.3886
9A	2	5/2/2018 15:58	2	21493	10746.5	79.9%	3.93402	3417.40	9592.72	**0.3562**	0.3670
9A	3	5/2/2018 15:55	2	20679	10339.5	76.5%	3.93399	3436.84	9592.72	**0.3583**	0.3548
9A	4	5/2/2018 15:52	2	22266	11133	91.0%	3.93397	3109.44	9592.72	**0.3241**	0.3288
9A	5	5/2/2018 16:01	2	21206	10603	95.4%	3.93404	2824.62	9592.72	**0.2945**	0.2890
9A	6	5/2/2018 16:10	2	19057	9528.5	98.6%	3.93412	2457.28	9592.72	**0.2562**	0.2551
9A	7	5/2/2018 16:07	2	15675	7837.5	99.6%	3.93409	2000.76	9592.72	**0.2086**	0.2117
9A	8	5/2/2018 16:04	2	15193	7596.5	100.0%	3.93407	1930.95	9592.72	**0.2013**	0.1999
9B	1	5/2/2018 15:52	2	19702	9851	64.2%	3.93397	3900.49	9592.72	**0.4066**	0.4000
9B	2	5/2/2018 15:49	2	22292	11146	79.9%	3.93395	3544.51	9592.72	**0.3695**	0.3784
9B	3	5/2/2018 15:58	2	21325	10662.5	76.5%	3.93402	3544.18	9592.72	**0.3695**	0.3662
9B	4	5/2/2018 15:55	2	23023	11511.5	91.0%	3.93400	3215.13	9592.72	**0.3352**	0.3403
9B	5	5/2/2018 16:04	2	21954	10977	95.4%	3.93407	2924.23	9592.72	**0.3048**	0.3003
9B	6	5/2/2018 16:01	2	19770	9885	98.6%	3.93404	2549.26	9592.72	**0.2657**	0.2660
9B	7	5/2/2018 16:10	2	16698	8349	99.6%	3.93412	2131.33	9592.72	**0.2222**	0.2215
9B	8	5/2/2018 16:07	2	15699	7849.5	100.0%	3.93409	1995.25	9592.72	**0.2080**	0.2088
9C	1	5/2/2018 15:55	2	19317	9658.5	64.2%	3.93399	3824.24	9592.72	**0.3987**	0.3920
9C	2	5/2/2018 15:52	2	21681	10840.5	79.9%	3.93397	3447.34	9592.72	**0.3594**	0.3709
9C	3	5/2/2018 15:49	2	21052	10526	76.5%	3.93394	3498.87	9592.72	**0.3647**	0.3590
9C	4	5/2/2018 15:58	2	22588	11294	91.0%	3.93402	3154.37	9592.72	**0.3288**	0.3335
9C	5	5/2/2018 16:07	2	21443	10721.5	95.4%	3.93409	2856.15	9592.72	**0.2977**	0.2941
9C	6	5/2/2018 16:04	2	19472	9736	98.6%	3.93407	2510.82	9592.72	**0.2617**	0.2600
9C	7	5/2/2018 16:01	2	15944	7972	99.6%	3.93405	2035.12	9592.72	**0.2122**	0.2147
9C	8	5/2/2018 16:10	2	15246	7623	100.0%	3.93412	1937.66	9592.72	**0.2020**	0.2010
9D	1	5/2/2018 15:58	2	19334	9667	64.2%	3.93402	3827.58	9592.72	**0.3990**	0.3916
9D	2	5/2/2018 15:55	2	21673	10836.5	79.9%	3.93399	3446.04	9592.72	**0.3592**	0.3700
9D	3	5/2/2018 15:52	2	20825	10412.5	76.5%	3.93397	3461.12	9592.72	**0.3608**	0.3577
9D	4	5/2/2018 15:49	2	22626	11313	91.0%	3.93394	3159.73	9592.72	**0.3294**	0.3316
9D	5	5/2/2018 16:10	2	21022	10511	95.4%	3.93412	2800.06	9592.72	**0.2919**	0.2914
9D	6	5/2/2018 16:07	2	19367	9683.5	98.6%	3.93409	2497.27	9592.72	**0.2603**	0.2569
9D	7	5/2/2018 16:04	2	15785	7892.5	99.6%	3.93407	2014.81	9592.72	**0.2100**	0.2117
9D	8	5/2/2018 16:01	2	15016	7508	100.0%	3.93405	1908.47	9592.72	**0.1989**	0.1987
10A	1	5/2/2018 16:01	2	18722	9361	64.2%	3.93405	3706.40	9592.72	**0.3864**	0.3782
10A	2	5/2/2018 16:10	2	20688	10344	79.9%	3.93412	3289.32	9592.72	**0.3429**	0.3567
10A	3	5/2/2018 16:07	2	20252	10126	76.5%	3.93410	3365.78	9592.72	**0.3509**	0.3446
10A	4	5/2/2018 16:04	2	21679	10839.5	91.0%	3.93407	3027.39	9592.72	**0.3156**	0.3188
10A	5	5/2/2018 15:49	2	20163	10081.5	95.4%	3.93394	2685.76	9592.72	**0.2800**	0.2795
10A	6	5/2/2018 15:58	2	18579	9289.5	98.6%	3.93402	2395.70	9592.72	**0.2497**	0.2463
10A	7	5/2/2018 15:55	2	15297	7648.5	99.6%	3.93400	1952.56	9592.72	**0.2035**	0.2048
10A	8	5/2/2018 15:52	2	14654	7327	100.0%	3.93397	1862.49	9592.72	**0.1942**	0.1942
10B	1	5/2/2018 16:04	2	19004	9502	64.2%	3.93407	3762.20	9592.72	**0.3922**	0.3858
10B	2	5/2/2018 16:01	2	21194	10597	79.9%	3.93405	3369.84	9592.72	**0.3513**	0.3653
10B	3	5/2/2018 16:10	2	20884	10442	76.5%	3.93412	3470.80	9592.72	**0.3618**	0.3537
10B	4	5/2/2018 16:07	2	22418	11209	91.0%	3.93410	3130.57	9592.72	**0.3263**	0.3289
10B	5	5/2/2018 15:52	2	21042	10521	95.4%	3.93397	2802.83	9592.72	**0.2922**	0.2903
10B	6	5/2/2018 15:49	2	19165	9582.5	98.6%	3.93394	2471.31	9592.72	**0.2576**	0.2567
10B	7	5/2/2018 15:58	2	15796	7898	99.6%	3.93402	2016.24	9592.72	**0.2102**	0.2113
10B	8	5/2/2018 15:55	2	14909	7454.5	100.0%	3.93400	1894.89	9592.72	**0.1975**	0.1972
10C	1	5/2/2018 16:07	2	18477	9238.5	64.2%	3.93409	3657.85	9592.72	**0.3813**	0.3759
10C	2	5/2/2018 16:04	2	20845	10422.5	79.9%	3.93407	3314.33	9592.72	**0.3455**	0.3551
10C	3	5/2/2018 16:01	2	20101	10050.5	76.5%	3.93405	3340.73	9592.72	**0.3483**	0.3433

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
10C	4	5/2/2018 16:10	2	21606	10803	91.0%	3.93412	3017.15	9592.72	**0.3145**	0.3182
10C	5	5/2/2018 15:55	2	20301	10150.5	95.4%	3.93400	2704.11	9592.72	**0.2819**	0.2797
10C	6	5/2/2018 15:52	2	18540	9270	98.6%	3.93397	2390.71	9592.72	**0.2492**	0.2469
10C	7	5/2/2018 15:49	2	15168	7584	99.6%	3.93394	1936.12	9592.72	**0.2018**	0.2045
10C	8	5/2/2018 15:58	2	14635	7317.5	100.0%	3.93402	1860.06	9592.72	**0.1939**	0.1928
10D	1	5/2/2018 16:10	2	18175	9087.5	64.2%	3.93412	3598.04	9592.72	**0.3751**	0.3661
10D	2	5/2/2018 16:07	2	20240	10120	79.9%	3.93410	3218.11	9592.72	**0.3355**	0.3462
10D	3	5/2/2018 16:04	2	19508	9754	76.5%	3.93407	3242.15	9592.72	**0.3380**	0.3349
10D	4	5/2/2018 16:01	2	20883	10441.5	91.0%	3.93405	2916.25	9592.72	**0.3040**	0.3109
10D	5	5/2/2018 15:58	2	20045	10022.5	95.4%	3.93402	2669.99	9592.72	**0.2783**	0.2738
10D	6	5/2/2018 15:55	2	18165	9082.5	98.6%	3.93400	2342.33	9592.72	**0.2442**	0.2418
10D	7	5/2/2018 15:52	2	14913	7456.5	99.6%	3.93397	1903.56	9592.72	**0.1984**	0.1995
10D	8	5/2/2018 15:49	2	14105	7052.5	100.0%	3.93394	1792.73	9592.72	**0.1869**	0.1871
11A	1	5/2/2018 15:23	2	19043	9521.5	64.2%	3.93373	3770.25	9592.72	**0.3930**	0.3834
11A	2	5/2/2018 15:32	2	20990	10495	79.9%	3.93380	3337.61	9592.72	**0.3479**	0.3631
11A	3	5/2/2018 15:29	2	20555	10277.5	76.5%	3.93378	3416.42	9592.72	**0.3561**	0.3516
11A	4	5/2/2018 15:26	2	22274	11137	91.0%	3.93375	3110.73	9592.72	**0.3243**	0.3270
11A	5	5/2/2018 15:36	2	21002	10501	95.4%	3.93384	2797.59	9592.72	**0.2916**	0.2888
11A	6	5/2/2018 15:46	2	19180	9590	98.6%	3.93392	2473.27	9592.72	**0.2578**	0.2555
11A	7	5/2/2018 15:43	2	15649	7824.5	99.6%	3.93390	1997.54	9592.72	**0.2082**	0.2102
11A	8	5/2/2018 15:40	2	14827	7413.5	100.0%	3.93387	1884.53	9592.72	**0.1965**	0.1959
11B	1	5/2/2018 15:26	2	19419	9709.5	64.2%	3.93375	3844.67	9592.72	**0.4008**	0.3909
11B	2	5/2/2018 15:23	2	21583	10791.5	79.9%	3.93373	3431.97	9592.72	**0.3578**	0.3700
11B	3	5/2/2018 15:32	2	20796	10398	76.5%	3.93380	3456.45	9592.72	**0.3603**	0.3582
11B	4	5/2/2018 15:29	2	22555	11277.5	91.0%	3.93378	3149.95	9592.72	**0.3284**	0.3329
11B	5	5/2/2018 15:40	2	21370	10685	95.4%	3.93387	2846.59	9592.72	**0.2967**	0.2938
11B	6	5/2/2018 15:36	2	19596	9798	98.6%	3.93384	2526.96	9592.72	**0.2634**	0.2600
11B	7	5/2/2018 15:46	2	16018	8009	99.6%	3.93392	2044.63	9592.72	**0.2131**	0.2150
11B	8	5/2/2018 15:43	2	15217	7608.5	100.0%	3.93390	1934.09	9592.72	**0.2016**	0.2015
11C	1	5/2/2018 15:29	2	19141	9570.5	64.2%	3.93378	3789.61	9592.72	**0.3951**	0.3883
11C	2	5/2/2018 15:26	2	21641	10820.5	79.9%	3.93375	3441.17	9592.72	**0.3587**	0.3668
11C	3	5/2/2018 15:23	2	20526	10263	76.5%	3.93373	3411.64	9592.72	**0.3556**	0.3547
11C	4	5/2/2018 15:32	2	22317	11158.5	91.0%	3.93381	3116.69	9592.72	**0.3249**	0.3289
11C	5	5/2/2018 15:43	2	21203	10601.5	95.4%	3.93389	2824.32	9592.72	**0.2944**	0.2894
11C	6	5/2/2018 15:40	2	19039	9519.5	98.6%	3.93387	2455.12	9592.72	**0.2559**	0.2557
11C	7	5/2/2018 15:36	2	15890	7945	99.6%	3.93384	2028.34	9592.72	**0.2114**	0.2125
11C	8	5/2/2018 15:46	2	15160	7580	100.0%	3.93392	1926.83	9592.72	**0.2009**	0.2006
11D	1	5/2/2018 15:32	2	20289	10144.5	64.2%	3.93380	4016.86	9592.72	**0.4187**	0.4078
11D	2	5/2/2018 15:29	2	22506	11253	79.9%	3.93378	3578.69	9592.72	**0.3731**	0.3861
11D	3	5/2/2018 15:26	2	21493	10746.5	76.5%	3.93375	3572.34	9592.72	**0.3724**	0.3738
11D	4	5/2/2018 15:23	2	23825	11912.5	91.0%	3.93373	3327.36	9592.72	**0.3469**	0.3477
11D	5	5/2/2018 15:46	2	22441	11220.5	95.4%	3.93392	2989.21	9592.72	**0.3116**	0.3075
11D	6	5/2/2018 15:43	2	20421	10210.5	98.6%	3.93389	2633.31	9592.72	**0.2745**	0.2731
11D	7	5/2/2018 15:40	2	17069	8534.5	99.6%	3.93387	2178.82	9592.72	**0.2271**	0.2285
11D	8	5/2/2018 15:36	2	16311	8155.5	100.0%	3.93384	2073.17	9592.72	**0.2161**	0.2159
12A	1	5/2/2018 15:36	2	17383	8691.5	64.2%	3.93384	3441.50	9592.72	**0.3588**	0.3524
12A	2	5/2/2018 15:46	2	19507	9753.5	79.9%	3.93392	3101.71	9592.72	**0.3233**	0.3332
12A	3	5/2/2018 15:43	2	18882	9441	76.5%	3.93389	3138.26	9592.72	**0.3271**	0.3224
12A	4	5/2/2018 15:39	2	20196	10098	91.0%	3.93387	2820.44	9592.72	**0.2940**	0.2992
12A	5	5/2/2018 15:23	2	19133	9566.5	95.4%	3.93373	2548.70	9592.72	**0.2657**	0.2631
12A	6	5/2/2018 15:32	2	17462	8731	98.6%	3.93381	2251.79	9592.72	**0.2347**	0.2315
12A	7	5/2/2018 15:29	2	13939	6969.5	99.6%	3.93378	1779.32	9592.72	**0.1855**	0.1886
12A	8	5/2/2018 15:26	2	13290	6645	100.0%	3.93376	1689.23	9592.72	**0.1761**	0.1750
12B	1	5/2/2018 15:39	2	18902	9451	64.2%	3.93386	3742.20	9592.72	**0.3901**	0.3849
12B	2	5/2/2018 15:36	2	21353	10676.5	79.9%	3.93384	3395.30	9592.72	**0.3539**	0.3642
12B	3	5/2/2018 15:46	2	20791	10395.5	76.5%	3.93392	3455.52	9592.72	**0.3602**	0.3524
12B	4	5/2/2018 15:43	2	22005	11002.5	91.0%	3.93389	3073.05	9592.72	**0.3204**	0.3274
12B	5	5/2/2018 15:26	2	21107	10553.5	95.4%	3.93375	2811.64	9592.72	**0.2931**	0.2886
12B	6	5/2/2018 15:23	2	19026	9513	98.6%	3.93373	2453.53	9592.72	**0.2558**	0.2551
12B	7	5/2/2018 15:33	2	15730	7865	99.6%	3.93381	2007.93	9592.72	**0.2093**	0.2106
12B	8	5/2/2018 15:30	2	14911	7455.5	100.0%	3.93378	1895.25	9592.72	**0.1976**	0.1972
12C	1	5/2/2018 15:43	2	19460	9730	64.2%	3.93389	3852.65	9592.72	**0.4016**	0.3937
12C	2	5/2/2018 15:39	2	21810	10905	79.9%	3.93387	3467.94	9592.72	**0.3615**	0.3723
12C	3	5/2/2018 15:36	2	20841	10420.5	76.5%	3.93384	3463.90	9592.72	**0.3611**	0.3601
12C	4	5/2/2018 15:46	2	22912	11456	91.0%	3.93392	3199.70	9592.72	**0.3336**	0.3343
12C	5	5/2/2018 15:29	2	21373	10686.5	95.4%	3.93378	2847.05	9592.72	**0.2968**	0.2944
12C	6	5/2/2018 15:26	2	19443	9721.5	98.6%	3.93375	2507.28	9592.72	**0.2614**	0.2602
12C	7	5/2/2018 15:23	2	16119	8059.5	99.6%	3.93373	2057.63	9592.72	**0.2145**	0.2153
12C	8	5/2/2018 15:33	2	15274	7637	100.0%	3.93381	1941.38	9592.72	**0.2024**	0.2023
12D	1	5/2/2018 15:46	2	18332	9166	64.2%	3.93392	3629.31	9592.72	**0.3783**	0.3731
12D	2	5/2/2018 15:43	2	20881	10440.5	79.9%	3.93389	3320.20	9592.72	**0.3461**	0.3535
12D	3	5/2/2018 15:39	2	19915	9957.5	76.5%	3.93387	3309.97	9592.72	**0.3451**	0.3423
12D	4	5/2/2018 15:37	2	21636	10818	91.0%	3.93384	3021.56	9592.72	**0.3150**	0.3186
12D	5	5/2/2018 15:32	2	20405	10202.5	95.4%	3.93381	2718.09	9592.72	**0.2833**	0.2816
12D	6	5/2/2018 15:29	2	18716	9358	98.6%	3.93378	2413.52	9592.72	**0.2516**	0.2493
12D	7	5/2/2018 15:26	2	15316	7658	99.6%	3.93376	1955.11	9592.72	**0.2038**	0.2054
12D	8	5/2/2018 15:23	2	14477	7238.5	100.0%	3.93373	1840.11	9592.72	**0.1918**	0.1915

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Alpha (counts)	Raw Alpha (cpm)	Recovery (%)	Rn-222 Ingrowth	Corrected Ra-226 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-226 Efficiency (cpm/dpm)	Calculated Efficiency (cpm/dpm)
13A	1	5/2/2018 14:50	3	29561	9853.66667	64.2%	3.93346	3902.05	9592.72	**0.4068**	0.3974
13A	2	5/2/2018 15:02	3	33183	11061	79.9%	3.93356	3517.83	9592.72	**0.3667**	0.3772
13A	3	5/2/2018 14:58	3	31771	10590.3333	76.5%	3.93352	3520.63	9592.72	**0.3670**	0.3656
13A	4	5/2/2018 14:54	3	34662	11554	91.0%	3.93349	3227.42	9592.72	**0.3364**	0.3410
13A	5	5/2/2018 15:06	3	32961	10987	95.4%	3.93359	2927.25	9592.72	**0.3052**	0.3026
13A	6	5/2/2018 15:18	3	30243	10081	98.6%	3.93369	2600.04	9592.72	**0.2710**	0.2690
13A	7	5/2/2018 15:14	3	25232	8410.66667	99.6%	3.93366	2147.32	9592.72	**0.2238**	0.2227
13A	8	5/2/2018 15:10	3	23335	7778.33333	100.0%	3.93363	1977.40	9592.72	**0.2061**	0.2077
13B	1	5/2/2018 14:54	3	29591	9863.66667	64.2%	3.93349	3905.98	9592.72	**0.4072**	0.3969
13B	2	5/2/2018 14:50	3	32682	10894	79.9%	3.93346	3464.80	9592.72	**0.3612**	0.3751
13B	3	5/2/2018 15:02	3	31780	10593.3333	76.5%	3.93356	3521.60	9592.72	**0.3671**	0.3627
13B	4	5/2/2018 14:58	3	34229	11409.6667	91.0%	3.93352	3187.07	9592.72	**0.3322**	0.3365
13B	5	5/2/2018 15:10	3	32034	10678	95.4%	3.93362	2844.90	9592.72	**0.2966**	0.2962
13B	6	5/2/2018 15:06	3	29603	9867.66667	98.6%	3.93359	2545.09	9592.72	**0.2653**	0.2618
13B	7	5/2/2018 15:18	3	24664	8221.33333	99.6%	3.93369	2098.96	9592.72	**0.2188**	0.2174
13B	8	5/2/2018 15:14	3	22992	7664	100.0%	3.93366	1948.31	9592.72	**0.2031**	0.2050
13D	1	5/2/2018 15:02	3	30204	10068	64.2%	3.93356	3986.82	9592.72	**0.4156**	0.4054
13D	2	5/2/2018 14:58	3	33731	11243.6667	79.9%	3.93352	3575.95	9592.72	**0.3728**	0.3827
13D	3	5/2/2018 14:54	3	32194	10731.3333	76.5%	3.93349	3567.54	9592.72	**0.3719**	0.3699
13D	4	5/2/2018 14:50	3	34409	11469.6667	91.0%	3.93346	3203.89	9592.72	**0.3340**	0.3428
13D	5	5/2/2018 15:18	3	33009	11003	95.4%	3.93369	2931.44	9592.72	**0.3056**	0.3014
13D	6	5/2/2018 15:14	3	30043	10014.3333	98.6%	3.93366	2582.87	9592.72	**0.2693**	0.2664
13D	7	5/2/2018 15:10	3	25245	8415	99.6%	3.93363	2148.44	9592.72	**0.2240**	0.2226
13D	8	5/2/2018 15:06	3	23707	7902.33333	100.0%	3.93359	2008.94	9592.72	**0.2094**	0.2113
14A	1	5/2/2018 15:06	3	27992	9330.66667	64.2%	3.93359	3694.81	9592.72	**0.3852**	0.3753
14A	2	5/2/2018 15:18	3	30926	10308.6667	79.9%	3.93369	3278.44	9592.72	**0.3418**	0.3554
14A	3	5/2/2018 15:14	3	29958	9986	76.5%	3.93366	3319.61	9592.72	**0.3461**	0.3440
14A	4	5/2/2018 15:10	3	32760	10920	91.0%	3.93363	3050.21	9592.72	**0.3180**	0.3199
14A	5	5/2/2018 14:50	3	30682	10227.3333	95.4%	3.93346	2724.95	9592.72	**0.2841**	0.2821
14A	6	5/2/2018 15:02	3	28167	9389	98.6%	3.93356	2421.65	9592.72	**0.2524**	0.2491
14A	7	5/2/2018 14:58	3	22677	7559	99.6%	3.93353	1929.95	9592.72	**0.2012**	0.2036
14A	8	5/2/2018 14:54	3	21447	7149	100.0%	3.93349	1817.47	9592.72	**0.1895**	0.1889
14B	1	5/2/2018 15:10	3	28807	9602.33333	64.2%	3.93363	3802.36	9592.72	**0.3964**	0.3894
14B	2	5/2/2018 15:06	3	32518	10839.3333	79.9%	3.93359	3447.30	9592.72	**0.3594**	0.3684
14B	3	5/2/2018 15:18	3	31031	10343.6667	76.5%	3.93370	3438.48	9592.72	**0.3584**	0.3566
14B	4	5/2/2018 15:15	3	33804	11268	91.0%	3.93366	3147.39	9592.72	**0.3281**	0.3313
14B	5	5/2/2018 14:54	3	31850	10616.6667	95.4%	3.93349	2828.66	9592.72	**0.2949**	0.2923
14B	6	5/2/2018 14:50	3	29079	9693	98.6%	3.93346	2500.12	9592.72	**0.2606**	0.2586
14B	7	5/2/2018 15:02	3	23984	7994.66667	99.6%	3.93356	2041.16	9592.72	**0.2128**	0.2141
14B	8	5/2/2018 14:58	3	22755	7585	100.0%	3.93353	1928.30	9592.72	**0.2010**	0.2008
14C	1	5/2/2018 15:14	3	28417	9472.33333	64.2%	3.93366	3750.85	9592.72	**0.3910**	0.3812
14C	2	5/2/2018 15:10	3	31614	10538	79.9%	3.93363	3351.43	9592.72	**0.3494**	0.3602
14C	3	5/2/2018 15:06	3	30403	10134.3333	76.5%	3.93359	3368.98	9592.72	**0.3512**	0.3484
14C	4	5/2/2018 15:19	3	32531	10843.6667	91.0%	3.93370	3028.84	9592.72	**0.3157**	0.3232
14C	5	5/2/2018 14:58	3	31012	10337.3333	95.4%	3.93352	2754.21	9592.72	**0.2871**	0.2844
14C	6	5/2/2018 14:54	3	28506	9502	98.6%	3.93349	2450.84	9592.72	**0.2555**	0.2511
14C	7	5/2/2018 14:50	3	23297	7765.66667	99.6%	3.93346	1982.75	9592.72	**0.2067**	0.2076
14C	8	5/2/2018 15:02	3	22018	7339.33333	100.0%	3.93356	1865.82	9592.72	**0.1945**	0.1951
14D	1	5/2/2018 15:18	3	26524	8841.33333	64.2%	3.93369	3500.95	9592.72	**0.3650**	0.3585
14D	2	5/2/2018 15:14	3	29905	9968.33333	79.9%	3.93366	3170.23	9592.72	**0.3305**	0.3380
14D	3	5/2/2018 15:10	3	28445	9481.66667	76.5%	3.93363	3151.99	9592.72	**0.3286**	0.3265
14D	4	5/2/2018 15:06	3	30578	10192.6667	91.0%	3.93359	2847.08	9592.72	**0.2968**	0.3021
14D	5	5/2/2018 15:02	3	28900	9633.33333	95.4%	3.93356	2566.62	9592.72	**0.2676**	0.2651
14D	6	5/2/2018 14:58	3	26641	8880.33333	98.6%	3.93352	2290.47	9592.72	**0.2388**	0.2343
14D	7	5/2/2018 14:54	3	21734	7244.66667	99.6%	3.93349	1849.71	9592.72	**0.1928**	0.1969
14D	8	5/2/2018 14:50	3	21497	7165.66667	100.0%	3.93346	1821.72	9592.72	**0.1899**	0.1883

1A $y = 1.535278E\text{-}05x^2 - 3.644220E\text{-}03x + 4.011850E\text{-}01$

1B $y = 1.780150E\text{-}05x^2 - 3.910798E\text{-}03x + 4.066578E\text{-}01$

1C $y = 1.869126E\text{-}05x^2 - 4.041447E\text{-}03x + 4.282517E\text{-}01$

1D $y = 1.907682E\text{-}05x^2 - 4.146265E\text{-}03x + 4.281558E\text{-}01$

2A $y = 1.490025E\text{-}05x^2 - 3.632208E\text{-}03x + 4.093277E\text{-}01$

2B $y = 1.607214E\text{-}05x^2 - 3.645846E\text{-}03x + 3.987269E\text{-}01$

2C $y = 1.804089E\text{-}05x^2 - 3.990768E\text{-}03x + 4.148143E\text{-}01$

2D $y = 1.623654E\text{-}05x^2 - 3.803403E\text{-}03x + 4.115174E\text{-}01$

3A

3B $y = 1.799300E\text{-}05x^2 - 3.983793E\text{-}03x + 4.280556E\text{-}01$

3C $y = 1.682581E\text{-}05x^2 - 3.805455E\text{-}03x + 4.231573E\text{-}01$

3D $y = 1.520747E\text{-}05x^2 - 3.673624E\text{-}03x + 4.133807E\text{-}01$

4A $y = 1.754284E\text{-}05x^2 - 3.932345E\text{-}03x + 4.167623E\text{-}01$

4B $y = 1.634512E\text{-}05x^2 - 3.609640E\text{-}03x + 3.664657E\text{-}01$

4C $y = 1.684458E\text{-}05x^2 - 3.807077E\text{-}03x + 4.157919E\text{-}01$

4D $y = 1.660767E\text{-}05x^2 - 3.816578E\text{-}03x + 4.225082E\text{-}01$

5A $y = 1.761283E\text{-}05x^2 - 4.001499E\text{-}03x + 4.378203E\text{-}01$

5B $y = 1.429847E\text{-}05x^2 - 3.495415E\text{-}03x + 4.148935E\text{-}01$

5C $y = 1.834541E\text{-}05x^2 - 4.182507E\text{-}03x + 4.420901E\text{-}01$

5D $y = 1.650464E\text{-}05x^2 - 3.851820E\text{-}03x + 4.308481E\text{-}01$

6A $y = 1.612309E\text{-}05x^2 - 3.541157E\text{-}03x + 3.667809E\text{-}01$

6B $y = 1.495681E\text{-}05x^2 - 3.542132E\text{-}03x + 3.891804E\text{-}01$

6C $y = 1.844348E\text{-}05x^2 - 4.034333E\text{-}03x + 4.146356E\text{-}01$

6D

7A	$y = 1.633605E\text{-}05x^2 - 3.838625E\text{-}03x + 4.160710E\text{-}01$
7B	$y = 1.816994E\text{-}05x^2 - 4.109275E\text{-}03x + 4.286888E\text{-}01$
7C	$y = 1.895346E\text{-}05x^2 - 3.995529E\text{-}03x + 4.056045E\text{-}01$
7D	$y = 1.797059E\text{-}05x^2 - 3.995480E\text{-}03x + 4.135415E\text{-}01$

$y = 1.879093E\text{-}05x^2 - 4.132478E\text{-}03x + 4.275934E\text{-}01$

8A $y = 2.120594E\text{-}05x^2 - 4.382766E\text{-}03x + 4.313847E\text{-}01$

8B $y = 1.746905E\text{-}05x^2 - 4.000783E\text{-}03x + 4.264631E\text{-}01$

8C $y = 1.810152E\text{-}05x^2 - 4.055306E\text{-}03x + 4.330175E\text{-}01$

8D

9A $y = 1.834204E\text{-}05x^2 - 4.022129E\text{-}03x + 4.151030E\text{-}01$

9B $y = 1.789593E\text{-}05x^2 - 4.006536E\text{-}03x + 4.264221E\text{-}01$

9C $y = 1.687108E\text{-}05x^2 - 3.902332E\text{-}03x + 4.177679E\text{-}01$

9D $y = 1.782061E\text{-}05x^2 - 4.019450E\text{-}03x + 4.181484E\text{-}01$

10A $y = 1.882677E\text{-}05x^2 - 4.016238E\text{-}03x + 4.046847E\text{-}01$

10B $y = 1.597513E\text{-}05x^2 - 3.785777E\text{-}03x + 4.108205E\text{-}01$

10C $y = 1.754359E\text{-}05x^2 - 3.877659E\text{-}03x + 4.014913E\text{-}01$

10D $y = 1.615427E\text{-}05x^2 - 3.691955E\text{-}03x + 3.904988E\text{-}01$

11A	$y = 1.566351E\text{-}05x^2 - 3.740331E\text{-}03x + 4.080708E\text{-}01$
11B	$y = 1.675605E\text{-}05x^2 - 3.873035E\text{-}03x + 4.164969E\text{-}01$
11C	$y = 1.815998E\text{-}05x^2 - 3.991252E\text{-}03x + 4.145818E\text{-}01$
11D	$y = 1.807426E\text{-}05x^2 - 4.031708E\text{-}03x + 4.343545E\text{-}01$

12A	$y = 1.472230E\text{-}05x^2 - 3.530352E\text{-}03x + 3.757044E\text{-}01$
12B	$y = 1.661469E\text{-}05x^2 - 3.838209E\text{-}03x + 4.102270E\text{-}01$
12C	$y = 1.760293E\text{-}05x^2 - 3.979673E\text{-}03x + 4.199932E\text{-}01$
12D	$y = 1.510562E\text{-}05x^2 - 3.617094E\text{-}03x + 3.969554E\text{-}01$

13A $y = 1.532986E\text{-}05x^2 - 3.734176E\text{-}03x + 4.221077E\text{-}01$

13B $y = 1.829142E\text{-}05x^2 - 4.054058E\text{-}03x + 4.235929E\text{-}01$

13C

13D $y = 1.978949E\text{-}05x^2 - 4.227611E\text{-}03x + 4.331893E\text{-}01$

14A $y = 1.505598E\text{-}05x^2 - 3.668065E\text{-}03x + 3.995104E\text{-}01$

14B $y = 1.691204E\text{-}05x^2 - 3.877500E\text{-}03x + 4.149620E\text{-}01$

14C $y = 1.728206E\text{-}05x^2 - 3.885160E\text{-}03x + 4.067837E\text{-}01$

14D $y = 1.866376E\text{-}05x^2 - 3.838463E\text{-}03x + 3.837850E\text{-}01$

Current Calibration - PIC

Geometry	47mm Filter				
Total Radium	**Cal Date**	5/1/2018	**Exp Date**	5/31/2020	
Protean	A0	A1	A2	A3	A4
1A	4.01185E-01	-3.64422E-03	1.53528E-05		
1B	4.06658E-01	-3.91080E-03	1.78015E-05		
1C	4.28252E-01	-4.04145E-03	1.86913E-05		
1D	4.28156E-01	-4.14627E-03	1.90768E-05		
2A	4.09328E-01	-3.63221E-03	1.49003E-05		
2B	3.98727E-01	-3.64585E-03	1.60721E-05		
2C	4.14814E-01	-3.99077E-03	1.80409E-05		
2D	4.11517E-01	-3.80340E-03	1.62365E-05		
3A	#N/A	#N/A	#N/A		
3B	4.28056E-01	-3.98379E-03	1.79930E-05		
3C	4.23157E-01	-3.80545E-03	1.68258E-05		
3D	4.13381E-01	-3.67362E-03	1.52075E-05		
4A	4.16762E-01	-3.93235E-03	1.75428E-05		
4B	3.66466E-01	-3.60964E-03	1.63451E-05		
4C	4.15792E-01	-3.80708E-03	1.68446E-05		
4D	4.22508E-01	-3.81658E-03	1.66077E-05		
5A	4.37820E-01	-4.00150E-03	1.76128E-05		
5B	4.14893E-01	-3.49542E-03	1.42985E-05		
5C	4.42090E-01	-4.18251E-03	1.83454E-05		
5D	4.30848E-01	-3.85182E-03	1.65046E-05		
6A	3.66781E-01	-3.54116E-03	1.61231E-05		
6B	3.89180E-01	-3.54213E-03	1.49568E-05		
6C	4.14636E-01	-4.03433E-03	1.84435E-05		
6D	#N/A	#N/A	#N/A		
7A	4.16071E-01	-3.83862E-03	1.63360E-05		
7B	4.28689E-01	-4.10928E-03	1.81699E-05		
7C	4.05605E-01	-3.99553E-03	1.89535E-05		
7D	4.13542E-01	-3.99548E-03	1.79706E-05		
8A	4.27593E-01	-4.13248E-03	1.87909E-05		
8B	4.31385E-01	-4.38277E-03	2.12059E-05		
8C	4.26463E-01	-4.00078E-03	1.74691E-05		
8D	4.33018E-01	-4.05531E-03	1.81015E-05		
9A	4.15103E-01	-4.02213E-03	1.83420E-05		
9B	4.26422E-01	-4.00654E-03	1.78959E-05		
9C	4.17768E-01	-3.90233E-03	1.68711E-05		
9D	4.18148E-01	-4.01945E-03	1.78206E-05		
10A	4.04685E-01	-4.01624E-03	1.88268E-05		
10B	4.10820E-01	-3.78578E-03	1.59751E-05		
10C	4.01491E-01	-3.87766E-03	1.75436E-05		
10D	3.90499E-01	-3.69195E-03	1.61543E-05		
11A	4.08071E-01	-3.74033E-03	1.56635E-05		
11B	4.16497E-01	-3.87303E-03	1.67560E-05		
11C	4.14582E-01	-3.99125E-03	1.81600E-05		
11D	4.34354E-01	-4.03171E-03	1.80743E-05		
12A	3.75704E-01	-3.53035E-03	1.47223E-05		
12B	4.10227E-01	-3.83821E-03	1.66147E-05		
12C	4.19993E-01	-3.97967E-03	1.76029E-05		
12D	3.96955E-01	-3.61709E-03	1.51056E-05		
13A	4.22108E-01	-3.73418E-03	1.53299E-05		
13B	4.23593E-01	-4.05406E-03	1.82914E-05		
13C	#N/A	#N/A	#N/A		
13D	4.33189E-01	-4.22761E-03	1.97895E-05		
14A	3.99510E-01	-3.66806E-03	1.50560E-05		
14B	4.14962E-01	-3.87750E-03	1.69120E-05		
14C	4.06784E-01	-3.88516E-03	1.72821E-05		
14D	3.83785E-01	-3.83846E-03	1.86638E-05		

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
C1	10A	2	18722	20225	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C2	10A	2	20688	23272	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C3	10A	2	20252	22148	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C4	10A	2	21679	25230	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C5	10A	2	20163	25877	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C6	10A	2	18579	26142	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C7	10A	2	15297	24302	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C8	10A	2	14654	25239	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C1	10B	2	19004	19465	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C2	10B	2	21194	22402	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C3	10B	2	20884	21177	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C4	10B	2	22418	24166	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C5	10B	2	21042	25086	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C6	10B	2	19165	25398	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C7	10B	2	15796	23929	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C8	10B	2	14909	24637	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C1	10C	2	18477	20231	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C2	10C	2	20845	22810	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C3	10C	2	20101	21557	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C4	10C	2	21606	24795	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C5	10C	2	20301	25375	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C6	10C	2	18540	25947	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C7	10C	2	15168	24103	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C8	10C	2	14635	24813	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C1	10D	2	18175	20557	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C2	10D	2	20240	23365	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C3	10D	2	19508	22075	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C4	10D	2	20883	24965	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C5	10D	2	20045	25946	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C6	10D	2	18165	26070	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C7	10D	2	14913	24302	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C8	10D	2	14105	24839	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C1	11A	2	19043	20052	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C2	11A	2	20990	22505	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C3	11A	2	20555	21590	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C4	11A	2	22274	24390	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C5	11A	2	21002	25390	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C6	11A	2	19180	25394	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C7	11A	2	15649	24026	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C8	11A	2	14827	24270	5/2/2018 15:40	5/2/2018 15:42	PIC	TRADC18
C1	11B	2	19419	19740	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C2	11B	2	21583	22640	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C3	11B	2	20796	21423	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C4	11B	2	22555	24414	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C5	11B	2	21370	25255	5/2/2018 15:40	5/2/2018 15:42	PIC	TRADC18
C6	11B	2	19596	25335	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C7	11B	2	16018	24208	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C8	11B	2	15217	24543	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C1	11C	2	19141	20022	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C2	11C	2	21641	22948	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C3	11C	2	20526	21840	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C4	11C	2	22317	24494	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C5	11C	2	21203	25988	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C6	11C	2	19039	25590	5/2/2018 15:40	5/2/2018 15:42	PIC	TRADC18
C7	11C	2	15890	24128	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C8	11C	2	15160	24881	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C1	11D	2	20289	20224	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C2	11D	2	22506	23218	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C3	11D	2	21493	21909	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C4	11D	2	23825	25172	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18

C5	11D	2	22441	25948	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C6	11D	2	20421	26045	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C7	11D	2	17069	24465	5/2/2018 15:40	5/2/2018 15:42	PIC	TRADC18
C8	11D	2	16311	25127	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C1	12A	2	17383	20826	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C2	12A	2	19507	23762	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C3	12A	2	18882	22870	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C4	12A	2	20196	25768	5/2/2018 15:39	5/2/2018 15:41	PIC	TRADC18
C5	12A	2	19133	26715	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C6	12A	2	17462	26139	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C7	12A	2	13939	24668	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C8	12A	2	13290	25714	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C1	12B	2	18902	19407	5/2/2018 15:39	5/2/2018 15:41	PIC	TRADC18
C2	12B	2	21353	22150	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C3	12B	2	20791	21071	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C4	12B	2	22005	24200	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C5	12B	2	21107	24789	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C6	12B	2	19026	25180	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C7	12B	2	15730	23557	5/2/2018 15:33	5/2/2018 15:35	PIC	TRADC18
C8	12B	2	14911	24443	5/2/2018 15:30	5/2/2018 15:32	PIC	TRADC18
C1	12C	2	19460	19467	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C2	12C	2	21810	22413	5/2/2018 15:39	5/2/2018 15:41	PIC	TRADC18
C3	12C	2	20841	21351	5/2/2018 15:36	5/2/2018 15:38	PIC	TRADC18
C4	12C	2	22912	24261	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C5	12C	2	21373	25099	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C6	12C	2	19443	24834	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C7	12C	2	16119	23582	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C8	12C	2	15274	24365	5/2/2018 15:33	5/2/2018 15:35	PIC	TRADC18
C1	12D	2	18332	20502	5/2/2018 15:46	5/2/2018 15:48	PIC	TRADC18
C2	12D	2	20881	23208	5/2/2018 15:43	5/2/2018 15:45	PIC	TRADC18
C3	12D	2	19915	21792	5/2/2018 15:39	5/2/2018 15:41	PIC	TRADC18
C4	12D	2	21636	24782	5/2/2018 15:37	5/2/2018 15:39	PIC	TRADC18
C5	12D	2	20405	25536	5/2/2018 15:32	5/2/2018 15:34	PIC	TRADC18
C6	12D	2	18716	25924	5/2/2018 15:29	5/2/2018 15:31	PIC	TRADC18
C7	12D	2	15316	24384	5/2/2018 15:26	5/2/2018 15:28	PIC	TRADC18
C8	12D	2	14477	24914	5/2/2018 15:23	5/2/2018 15:25	PIC	TRADC18
C1	13A	3	29561	29607	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C2	13A	3	33183	33432	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C3	13A	3	31771	31916	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C4	13A	3	34662	36316	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C5	13A	3	32961	37208	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C6	13A	3	30243	37602	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C7	13A	3	25232	35728	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C8	13A	3	23335	36414	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C1	13B	3	29591	29834	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C2	13B	3	32682	33944	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C3	13B	3	31780	32096	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C4	13B	3	34229	36913	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C5	13B	3	32034	37527	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C6	13B	3	29603	37951	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C7	13B	3	24664	35731	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C8	13B	3	22992	36742	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C1	13D	3	30204	29975	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C2	13D	3	33731	34409	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C3	13D	3	32194	32525	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C4	13D	3	34409	36991	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C5	13D	3	33009	37730	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C6	13D	3	30043	38265	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C7	13D	3	25245	36703	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C8	13D	3	23707	37162	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C1	14A	3	27992	32534	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18

C2	14A	3	30926	36952	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C3	14A	3	29958	35357	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C4	14A	3	32760	40340	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C5	14A	3	30682	41374	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C6	14A	3	28167	41328	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C7	14A	3	22677	38646	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C8	14A	3	21447	40022	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C1	14B	3	28807	30695	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C2	14B	3	32518	34761	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C3	14B	3	31031	32788	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C4	14B	3	33804	37723	5/2/2018 15:15	5/2/2018 15:18	PIC	TRADC18
C5	14B	3	31850	38749	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C6	14B	3	29079	38817	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C7	14B	3	23984	36919	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C8	14B	3	22755	37199	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C1	14C	3	28417	31464	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C2	14C	3	31614	35903	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C3	14C	3	30403	34255	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C4	14C	3	32531	38995	5/2/2018 15:19	5/2/2018 15:22	PIC	TRADC18
C5	14C	3	31012	39805	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C6	14C	3	28506	39951	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C7	14C	3	23297	38196	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C8	14C	3	22018	38807	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C1	14D	3	26524	32628	5/2/2018 15:18	5/2/2018 15:21	PIC	TRADC18
C2	14D	3	29905	36736	5/2/2018 15:14	5/2/2018 15:17	PIC	TRADC18
C3	14D	3	28445	35422	5/2/2018 15:10	5/2/2018 15:13	PIC	TRADC18
C4	14D	3	30578	40280	5/2/2018 15:06	5/2/2018 15:09	PIC	TRADC18
C5	14D	3	28900	41317	5/2/2018 15:02	5/2/2018 15:05	PIC	TRADC18
C6	14D	3	26641	41150	5/2/2018 14:58	5/2/2018 15:01	PIC	TRADC18
C7	14D	3	21734	39032	5/2/2018 14:54	5/2/2018 14:57	PIC	TRADC18
C8	14D	3	21497	40825	5/2/2018 14:50	5/2/2018 14:53	PIC	TRADC18
C1	1A	2	18792	19851	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C2	1A	2	20702	22436	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C3	1A	2	20092	21108	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C4	1A	2	21877	24396	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C5	1A	2	20887	25113	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C6	1A	2	19127	24864	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C7	1A	2	15244	23416	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C8	1A	2	14952	24321	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C1	1B	2	18852	19928	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C2	1B	2	21038	22316	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C3	1B	2	20090	21185	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C4	1B	2	22184	24441	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C5	1B	2	20723	24799	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C6	1B	2	18702	24908	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C7	1B	2	15554	23742	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C8	1B	2	14935	24278	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C1	1C	2	19965	18885	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C2	1C	2	22372	21519	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C3	1C	2	21077	20310	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C4	1C	2	23123	23508	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C5	1C	2	22244	24124	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C6	1C	2	20036	24248	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C7	1C	2	16851	22557	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C8	1C	2	16176	23385	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C1	1D	2	19900	19216	5/2/2018 17:34	5/2/2018 17:36	PIC	TRADC18
C2	1D	2	22017	21944	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C3	1D	2	21223	20578	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C4	1D	2	23218	23753	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C5	1D	2	21784	24026	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C6	1D	2	19655	24388	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18

C7	1D	2	16449	22973	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C8	1D	2	15679	23457	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C1	2A	2	19010	19459	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C2	2A	2	21420	21967	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C3	2A	2	20585	20818	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C4	2A	2	22430	24057	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C5	2A	2	21710	24338	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C6	2A	2	19326	24648	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C7	2A	2	15805	23203	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C8	2A	2	15359	24132	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C1	2B	2	18508	18943	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C2	2B	2	20801	21823	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C3	2B	2	20040	21089	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C4	2B	2	21648	24062	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C5	2B	2	20777	24802	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C6	2B	2	18965	24439	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C7	2B	2	15509	22948	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C8	2B	2	15170	24095	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C1	2C	2	19309	18932	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C2	2C	2	21392	21400	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C3	2C	2	20416	20389	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C4	2C	2	22624	23257	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C5	2C	2	21254	24349	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C6	2C	2	18886	23929	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C7	2C	2	15974	22838	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C8	2C	2	15053	23516	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C1	2D	2	19272	19032	5/2/2018 17:47	5/2/2018 17:49	PIC	TRADC18
C2	2D	2	21273	21676	5/2/2018 17:44	5/2/2018 17:46	PIC	TRADC18
C3	2D	2	20458	20732	5/2/2018 17:41	5/2/2018 17:43	PIC	TRADC18
C4	2D	2	22354	23369	5/2/2018 17:38	5/2/2018 17:40	PIC	TRADC18
C5	2D	2	21328	24211	5/2/2018 17:35	5/2/2018 17:37	PIC	TRADC18
C6	2D	2	19316	23871	5/2/2018 17:32	5/2/2018 17:34	PIC	TRADC18
C7	2D	2	15743	22536	5/2/2018 17:29	5/2/2018 17:31	PIC	TRADC18
C8	2D	2	15046	23568	5/2/2018 17:26	5/2/2018 17:28	PIC	TRADC18
C1	3B	2	20011	18928	5/2/2018 17:04	5/2/2018 17:06	PIC	TRADC18
C2	3B	2	22060	21563	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C3	3B	2	21395	20356	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C4	3B	2	23274	23572	5/2/2018 17:07	5/2/2018 17:09	PIC	TRADC18
C5	3B	2	22091	23996	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C6	3B	2	20258	24453	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C7	3B	2	16758	22797	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C8	3B	2	16156	23806	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C1	3C	2	19611	19247	5/2/2018 17:07	5/2/2018 17:09	PIC	TRADC18
C2	3C	2	22128	22093	5/2/2018 17:04	5/2/2018 17:06	PIC	TRADC18
C3	3C	2	21262	20888	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C4	3C	2	23378	24026	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C5	3C	2	22124	24344	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C6	3C	2	20067	24674	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C7	3C	2	17003	23083	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C8	3C	2	16272	23872	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C1	3D	2	19092	19078	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C2	3D	2	21630	21679	5/2/2018 17:07	5/2/2018 17:09	PIC	TRADC18
C3	3D	2	20953	20598	5/2/2018 17:04	5/2/2018 17:06	PIC	TRADC18
C4	3D	2	22763	23422	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C5	3D	2	21662	24132	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C6	3D	2	19595	24514	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C7	3D	2	16041	22948	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C8	3D	2	15559	23605	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C1	4A	2	19333	19552	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C2	4A	2	21583	21976	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C3	4A	2	20799	20841	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18

C4	4A	2	22625	24108	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C5	4A	2	21350	24562	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C6	4A	2	19542	24567	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C7	4A	2	15818	22969	5/2/2018 17:08	5/2/2018 17:10	PIC	TRADC18
C8	4A	2	15497	23863	5/2/2018 17:05	5/2/2018 17:07	PIC	TRADC18
C1	4B	2	16934	21673	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C2	4B	2	18595	24741	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C3	4B	2	18505	22920	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C4	4B	2	19642	27036	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C5	4B	2	18521	27502	5/2/2018 17:05	5/2/2018 17:07	PIC	TRADC18
C6	4B	2	16633	27585	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C7	4B	2	13482	25512	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C8	4B	2	13160	26392	5/2/2018 17:08	5/2/2018 17:10	PIC	TRADC18
C1	4C	2	19344	19143	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C2	4C	2	21724	21877	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C3	4C	2	20762	20425	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C4	4C	2	22743	23891	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C5	4C	2	21395	24223	5/2/2018 17:08	5/2/2018 17:10	PIC	TRADC18
C6	4C	2	19802	24917	5/2/2018 17:05	5/2/2018 17:07	PIC	TRADC18
C7	4C	2	16476	22779	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C8	4C	2	15649	23966	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C1	4D	2	19764	18661	5/2/2018 17:23	5/2/2018 17:25	PIC	TRADC18
C2	4D	2	21971	21418	5/2/2018 17:20	5/2/2018 17:22	PIC	TRADC18
C3	4D	2	20953	20629	5/2/2018 17:17	5/2/2018 17:19	PIC	TRADC18
C4	4D	2	23298	23295	5/2/2018 17:14	5/2/2018 17:16	PIC	TRADC18
C5	4D	2	22127	23960	5/2/2018 17:11	5/2/2018 17:13	PIC	TRADC18
C6	4D	2	20217	24107	5/2/2018 17:08	5/2/2018 17:10	PIC	TRADC18
C7	4D	2	16380	22775	5/2/2018 17:05	5/2/2018 17:07	PIC	TRADC18
C8	4D	2	16201	23300	5/2/2018 17:02	5/2/2018 17:04	PIC	TRADC18
C1	5A	2	20027	19500	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C2	5A	2	23130	22233	5/2/2018 16:46	5/2/2018 16:48	PIC	TRADC18
C3	5A	2	22137	21321	5/2/2018 16:43	5/2/2018 16:45	PIC	TRADC18
C4	5A	2	24034	24121	5/2/2018 16:40	5/2/2018 16:42	PIC	TRADC18
C5	5A	2	22440	24709	5/2/2018 16:49	5/2/2018 16:51	PIC	TRADC18
C6	5A	2	20684	25183	5/2/2018 16:58	5/2/2018 17:00	PIC	TRADC18
C7	5A	2	17309	23386	5/2/2018 16:55	5/2/2018 16:57	PIC	TRADC18
C8	5A	2	16517	24125	5/2/2018 16:52	5/2/2018 16:54	PIC	TRADC18
C1	5B	2	19726	19779	5/2/2018 16:40	5/2/2018 16:42	PIC	TRADC18
C2	5B	2	22065	22492	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C2	5B	2	21224	21301	5/2/2018 16:46	5/2/2018 16:48	PIC	TRADC18
C4	5B	2	23357	24049	5/2/2018 16:43	5/2/2018 16:45	PIC	TRADC18
C5	5B	2	22164	24950	5/2/2018 16:52	5/2/2018 16:54	PIC	TRADC18
C6	5B	2	20348	25229	5/2/2018 16:49	5/2/2018 16:51	PIC	TRADC18
C7	5B	2	16877	23679	5/2/2018 16:58	5/2/2018 17:00	PIC	TRADC18
C8	5B	2	16225	24214	5/2/2018 16:55	5/2/2018 16:57	PIC	TRADC18
C1	5C	2	20005	19793	5/2/2018 16:43	5/2/2018 16:45	PIC	TRADC18
C2	5C	2	22364	22672	5/2/2018 16:40	5/2/2018 16:42	PIC	TRADC18
C3	5C	2	21536	21455	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C3	5C	2	23458	24674	5/2/2018 16:46	5/2/2018 16:48	PIC	TRADC18
C5	5C	2	22189	24907	5/2/2018 16:55	5/2/2018 16:57	PIC	TRADC18
C6	5C	2	20136	24749	5/2/2018 16:52	5/2/2018 16:54	PIC	TRADC18
C7	5C	2	16939	23976	5/2/2018 16:49	5/2/2018 16:51	PIC	TRADC18
C8	5C	2	16107	24391	5/2/2018 16:58	5/2/2018 17:00	PIC	TRADC18
C1	5D	2	20249	19359	5/2/2018 16:46	5/2/2018 16:48	PIC	TRADC18
C2	5D	2	22381	22449	5/2/2018 16:43	5/2/2018 16:45	PIC	TRADC18
C3	5D	2	21579	21299	5/2/2018 16:40	5/2/2018 16:42	PIC	TRADC18
C4	5D	2	23338	24107	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C5	5D	2	22765	24876	5/2/2018 16:58	5/2/2018 17:00	PIC	TRADC18
C6	5D	2	20655	24984	5/2/2018 16:55	5/2/2018 16:57	PIC	TRADC18
C7	5D	2	17017	23405	5/2/2018 16:52	5/2/2018 16:54	PIC	TRADC18
C8	5D	2	16331	24431	5/2/2018 16:49	5/2/2018 16:51	PIC	TRADC18

C1	6A	2	17097	20218	5/2/2018 16:51	5/2/2018 16:53	PIC	TRADC18
C2	6A	2	18941	23262	5/2/2018 17:01	5/2/2018 17:03	PIC	TRADC18
C3	6A	2	18075	21738	5/2/2018 16:57	5/2/2018 16:59	PIC	TRADC18
C4	6A	2	19884	24521	5/2/2018 16:54	5/2/2018 16:56	PIC	TRADC18
C5	6A	2	18506	25359	5/2/2018 16:38	5/2/2018 16:40	PIC	TRADC18
C6	6A	2	16985	24976	5/2/2018 16:48	5/2/2018 16:50	PIC	TRADC18
C7	6A	2	14130	22962	5/2/2018 16:45	5/2/2018 16:47	PIC	TRADC18
C8	6A	2	13287	23963	5/2/2018 16:42	5/2/2018 16:44	PIC	TRADC18
C1	6B	2	18124	19049	5/2/2018 16:54	5/2/2018 16:56	PIC	TRADC18
C2	6B	2	20133	21524	5/2/2018 16:51	5/2/2018 16:53	PIC	TRADC18
C3	6B	2	19429	19971	5/2/2018 17:01	5/2/2018 17:03	PIC	TRADC18
C4	6B	2	21660	23161	5/2/2018 16:57	5/2/2018 16:59	PIC	TRADC18
C5	6B	2	20075	23726	5/2/2018 16:42	5/2/2018 16:44	PIC	TRADC18
C6	6B	2	18092	24268	5/2/2018 16:38	5/2/2018 16:40	PIC	TRADC18
C7	6B	2	15355	22088	5/2/2018 16:48	5/2/2018 16:50	PIC	TRADC18
C8	6B	2	14213	22648	5/2/2018 16:45	5/2/2018 16:47	PIC	TRADC18
C1	6C	2	19160	19279	5/2/2018 16:57	5/2/2018 16:59	PIC	TRADC18
C2	6C	2	21414	21719	5/2/2018 16:54	5/2/2018 16:56	PIC	TRADC18
C3	6C	2	20581	20909	5/2/2018 16:51	5/2/2018 16:53	PIC	TRADC18
C4	6C	2	22483	23575	5/2/2018 17:01	5/2/2018 17:03	PIC	TRADC18
C5	6C	2	20946	24370	5/2/2018 16:45	5/2/2018 16:47	PIC	TRADC18
C6	6C	2	19010	24438	5/2/2018 16:42	5/2/2018 16:44	PIC	TRADC18
C7	6C	2	15704	22772	5/2/2018 16:38	5/2/2018 16:40	PIC	TRADC18
C8	6C	2	15091	23904	5/2/2018 16:48	5/2/2018 16:50	PIC	TRADC18
C1	7A	2	19270	19896	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C2	7A	2	21647	22303	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C3	7A	2	21012	21442	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C4	7A	2	22423	24501	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C5	7A	2	21585	25324	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C6	7A	2	19378	25241	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C7	7A	2	16044	23661	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C8	7A	2	15163	24376	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C1	7B	2	19541	19664	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C2	7B	2	21884	22515	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C3	7B	2	22310	21982	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C4	7B	2	22939	24130	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C5	7B	2	21880	24844	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C6	7B	2	19407	24962	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C7	7B	2	16209	23063	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C8	7B	2	15500	24016	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C1	7C	2	18963	19783	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C2	7C	2	20691	22317	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C3	7C	2	20122	21372	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C4	7C	2	21599	24157	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C5	7C	2	20593	25081	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C6	7C	2	18751	24919	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C7	7C	2	15507	22957	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C8	7C	2	14955	23837	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C1	7D	2	19339	19582	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C2	7D	2	21173	21966	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C3	7D	2	20296	21006	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C4	7D	2	22483	24000	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C5	7D	2	21204	24829	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C6	7D	2	18938	24698	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C7	7D	2	15523	22889	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C8	7D	2	15027	23927	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C1	8A	2	19789	19857	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C2	8A	2	22042	22451	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C3	8A	2	21426	21422	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C4	8A	2	22930	24358	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C5	8A	2	21767	25121	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18

C6	8A	2	19644	25177	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C7	8A	2	16333	23605	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C8	8A	2	15552	24544	5/2/2018 16:17	5/2/2018 16:19	PIC	TRADC18
C1	8B	2	20013	20041	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C2	8B	2	22182	23132	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C3	8B	2	21044	21490	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C4	8B	2	23078	24671	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C5	8B	2	21613	25282	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C6	8B	2	19450	25276	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C7	8B	2	16307	23823	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C8	8B	2	15618	24597	5/2/2018 16:20	5/2/2018 16:22	PIC	TRADC18
C1	8C	2	19597	19953	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C2	8C	2	22147	22784	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C3	8C	2	21497	21322	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C4	8C	2	23302	24341	5/2/2018 16:36	5/2/2018 16:38	PIC	TRADC18
C5	8C	2	21932	25189	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C6	8C	2	19541	25181	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C7	8C	2	16404	23533	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C8	8C	2	15592	24121	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C1	8D	2	20078	19164	5/2/2018 16:35	5/2/2018 16:37	PIC	TRADC18
C2	8D	2	22413	22152	5/2/2018 16:32	5/2/2018 16:34	PIC	TRADC18
C3	8D	2	21792	20993	5/2/2018 16:29	5/2/2018 16:31	PIC	TRADC18
C4	8D	2	23380	24133	5/2/2018 16:26	5/2/2018 16:28	PIC	TRADC18
C5	8D	2	22402	24687	5/2/2018 16:23	5/2/2018 16:25	PIC	TRADC18
C6	8D	2	20153	24891	5/2/2018 16:19	5/2/2018 16:21	PIC	TRADC18
C7	8D	2	16832	23205	5/2/2018 16:16	5/2/2018 16:18	PIC	TRADC18
C8	8D	2	16087	24172	5/2/2018 16:13	5/2/2018 16:15	PIC	TRADC18
C1	9A	2	19175	19871	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C2	9A	2	21493	23022	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C3	9A	2	20679	21756	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C4	9A	2	22266	24682	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C5	9A	2	21206	25459	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C6	9A	2	19057	25344	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C7	9A	2	15675	24031	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C8	9A	2	15193	24421	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C1	9B	2	19702	19359	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C2	9B	2	22292	22137	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C3	9B	2	21325	20945	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C4	9B	2	23023	23915	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C5	9B	2	21954	24597	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C6	9B	2	19770	25036	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C7	9B	2	16698	23451	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C8	9B	2	15699	24150	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C1	9C	2	19317	19172	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C2	9C	2	21681	22082	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C3	9C	2	21052	20878	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C4	9C	2	22588	24078	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C5	9C	2	21443	24609	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C6	9C	2	19472	24865	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C7	9C	2	15944	23530	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18
C8	9C	2	15246	24015	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C1	9D	2	19334	19310	5/2/2018 15:58	5/2/2018 16:00	PIC	TRADC18
C2	9D	2	21673	22079	5/2/2018 15:55	5/2/2018 15:57	PIC	TRADC18
C3	9D	2	20825	20998	5/2/2018 15:52	5/2/2018 15:54	PIC	TRADC18
C4	9D	2	22626	24093	5/2/2018 15:49	5/2/2018 15:51	PIC	TRADC18
C5	9D	2	21022	24815	5/2/2018 16:10	5/2/2018 16:12	PIC	TRADC18
C6	9D	2	19367	24651	5/2/2018 16:07	5/2/2018 16:09	PIC	TRADC18
C7	9D	2	15785	23366	5/2/2018 16:04	5/2/2018 16:06	PIC	TRADC18
C8	9D	2	15016	23684	5/2/2018 16:01	5/2/2018 16:03	PIC	TRADC18

Total Radium Liquid

Filename : TOTRA.XLS
File type : Excel
Version # : 1.3.9

Batch : 1562969
Analyst : NXL1
Prep Date : 4/11/2018
Method Uncertainty: 0.0829

Geometry: Tuffryn Filter

Carrier S/N : 2628181
Carrier Exp Date : 12/7/2018
Carrier Volume Added: 0.50
Carrier Weight (mg/ml): 26.48
Carrier Weight StDev.: 0.10

Procedure Code : GFCGANBL
Parmname : Total Radium
Required MDA : 1 pCi/L
Halflife of Rn-222 : 3.8235 days

Sample Characteristics					Carrier Calculations				
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Carrier Weight (mg) (Standard)	Residue Weight (mg) (Sample)	Residue Weight StDev. (mg)	Carrier Aliquot (mL)	Carrier Aliquot StDev. (mL)
1	1203536991.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
2	1203536992.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
3	1203536993.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
4	1203536994.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
5	1203536995.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
6	1203536996.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
7	1203536997.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
8	1203536998.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
~~9~~	~~1203536999.1~~	~~1.0000~~	~~2.0399E-05~~	~~4/11/2018 0:00~~	~~26.48~~	~~8.00~~	~~0.041714~~	~~0.4~~	~~0.000200~~
10	1203537000.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
11	1203537001.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
12	1203537002.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
13	1203537003.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
14	1203537004.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
15	1203537005.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
16	1203537006.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
17	1203537007.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
18	1203537008.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
19	1203537009.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
20	1203537010.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
21	1203537011.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
22	1203537012.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
23	1203537013.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
~~24~~	~~1203537014.1~~	~~1.0000~~	~~2.0399E-05~~	~~4/11/2018 0:00~~	~~26.48~~	~~94.10~~	~~0.411772~~	~~3.5~~	~~0.000200~~
25	1203537015.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
26	1203537016.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
27	1203537017.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
28	1203537018.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
29	1203537019.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
30	1203537020.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
31	1203537021.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
32	1203537022.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
33	1203537023.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
34	1203537024.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
35	1203537025.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
36	1203537026.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
37	1203537027.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
38	1203537028.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
39	1203537029.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
40	1203537030.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml
Pipet, 5 ml Stdev : +/-	0.010000	ml

Analytical SOP: GL-RAD-A-001
Instrument SOP: GL-RAD-I-016

Count Raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Gross Alpha CPM	Count Start Date/Time	Precipitation Date/Time	Ingrowth factor	Calculated Sample Recovery %	Sample Recovery Error %
1	1A	2	2699	2974	1349.500	5/17/2019 13:40	4/11/2018 14:40	4.000	75.5%	0.83%
2	1B	2	2662	2819	1331.000	5/17/2019 13:40	4/11/2018 14:40	4.000	77.8%	0.83%
3	1C	2	3050	2966	1525.000	5/17/2019 13:40	4/11/2018 14:40	4.000	91.6%	0.76%
4	1D	2	2862	3087	1431.000	5/17/2019 13:40	4/11/2018 14:40	4.000	94.8%	0.78%
5	2A	2	2629	3074	1314.500	5/17/2019 13:41	4/11/2018 14:40	4.000	98.7%	0.74%
6	2B	2	2458	3012	1229.000	5/17/2019 13:41	4/11/2018 14:40	4.000	96.1%	0.73%
7	2C	2	2352	3113	1176.000	5/17/2019 13:41	4/11/2018 14:40	4.000	100%	0.73%
8	2D	2	2811	2701	1405.500	5/21/2019 11:41	4/11/2018 14:40	4.000	75.5%	0.83%
~~9~~	~~3A~~	~~2~~	~~0~~	~~0~~	~~0.000~~	~~5/17/2019 13:41~~	~~4/11/2018 14:40~~	~~4.000~~	~~75.5%~~	~~0.83%~~
10	3B	2	2781	2689	1390.500	5/17/2019 13:43	4/11/2018 14:40	4.000	77.8%	0.83%
11	3C	2	3085	3025	1542.500	5/17/2019 13:43	4/11/2018 14:40	4.000	91.6%	0.76%
12	3D	2	2908	3153	1454.000	5/17/2019 13:43	4/11/2018 14:40	4.000	94.8%	0.78%
13	4A	2	2569	3123	1284.500	5/17/2019 13:43	4/11/2018 14:40	4.000	98.7%	0.74%
14	4B	2	2111	3162	1055.500	5/17/2019 13:43	4/11/2018 14:40	4.000	96.1%	0.73%
15	4C	2	2430	2997	1215.000	5/17/2019 13:43	4/11/2018 14:40	4.000	100%	0.73%
16	4D	2	2805	2834	1402.500	5/21/2019 11:44	4/11/2018 14:40	4.000	75.5%	0.83%
17	5A	2	2982	2956	1491.000	5/17/2019 13:46	4/11/2018 14:40	4.000	75.5%	0.83%
18	5B	2	2776	2912	1388.000	5/17/2019 13:46	4/11/2018 14:40	4.000	77.8%	0.83%
19	5C	2	2962	2985	1481.000	5/17/2019 13:46	4/11/2018 14:40	4.000	91.6%	0.76%
20	5D	2	2962	3073	1481.000	5/17/2019 13:46	4/11/2018 14:40	4.000	94.8%	0.78%
21	6A	2	2270	3107	1135.000	5/17/2019 13:50	4/11/2018 14:40	4.000	98.7%	0.74%
22	6B	2	2246	3017	1123.000	5/17/2019 13:50	4/11/2018 14:40	4.000	96.1%	0.73%
23	6C	2	2305	3056	1152.500	5/17/2019 13:50	4/11/2018 14:40	4.000	100%	0.73%
~~24~~	~~6D~~	~~2~~	~~0~~	~~0~~	~~0.000~~	~~5/17/2019 13:50~~	~~4/11/2018 14:40~~	~~4.000~~	~~102%~~	~~0.72%~~
25	7A	2	2807	3011	1403.500	5/17/2019 13:52	4/11/2018 14:40	4.000	75.5%	0.83%
26	7B	2	2553	2685	1276.500	5/17/2019 13:52	4/11/2018 14:40	4.000	77.8%	0.83%
27	7C	2	2676	3164	1338.000	5/17/2019 13:52	4/11/2018 14:40	4.000	91.6%	0.76%
28	7D	2	2806	3189	1403.000	5/17/2019 13:52	4/11/2018 14:40	4.000	94.8%	0.78%
29	8A	2	2688	3032	1344.000	5/17/2019 13:52	4/11/2018 14:40	4.000	98.7%	0.74%
30	8B	2	2373	3090	1186.500	5/17/2019 13:52	4/11/2018 14:40	4.000	96.1%	0.73%
31	8C	2	2430	3048	1215.000	5/17/2019 13:52	4/11/2018 14:40	4.000	100%	0.73%
32	8D	2	2847	2926	1423.500	5/21/2019 11:52	4/11/2018 14:40	4.000	75.5%	0.83%
33	9A	2	2808	3176	1404.000	5/17/2019 13:55	4/11/2018 14:40	4.000	75.5%	0.83%
34	9B	2	2746	2837	1373.000	5/17/2019 13:55	4/11/2018 14:40	4.000	77.8%	0.83%
35	9C	2	2963	3045	1481.500	5/17/2019 13:55	4/11/2018 14:40	4.000	91.6%	0.76%
36	9D	2	2844	3025	1422.000	5/17/2019 13:55	4/11/2018 14:40	4.000	94.8%	0.78%
37	10A	2	2537	3259	1268.500	5/17/2019 13:55	4/11/2018 14:40	4.000	98.7%	0.74%
38	10B	2	2409	3010	1204.500	5/17/2019 13:55	4/11/2018 14:40	4.000	96.1%	0.73%
39	10C	2	2267	3350	1133.500	5/17/2019 13:55	4/11/2018 14:40	4.000	100%	0.73%
40	10D	2	2608	3042	1304.000	5/21/2019 11:56	4/11/2018 14:40	4.000	75.5%	0.83%

Calibration Data

Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Beta X-Talk	Weekly Bkg CPM	Weekly Bkg Count Start Date/Time	Weekly Bkg Count Time (min.)
PIC	5/1/2018	5/31/2019	0.3730	0.00667	0.00088	0.158	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.3683	0.01356	0.00072	0.126	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.3569	0.00967	0.00997	0.074	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.3361	0.00996	0.00630	0.194	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.2898	0.01946	0.00273	0.170	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.2548	0.02011	0.00064	0.112	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.2292	0.01156	0.00022	0.174	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3821	0.01278	0.00091	0.468	5/18/2019 10:08	500
~~PIC~~	~~5/1/2018~~	~~5/31/2019~~	~~0.0000~~	~~0.02940~~	~~0.00000~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
PIC	5/1/2018	5/31/2019	0.3889	0.00853	0.00922	0.194	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3557	0.00568	0.00412	0.236	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3308	0.00657	0.00423	0.182	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2896	0.01036	0.00116	0.166	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2251	0.00704	0.00014	0.110	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2371	0.01587	0.00288	0.216	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3930	0.00613	0.01246	0.196	5/17/2019 16:08	500
PIC	5/1/2018	5/31/2019	0.4069	0.00491	0.00232	0.200	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3804	0.01152	0.00269	0.088	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3679	0.01161	0.00179	0.156	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.3446	0.00639	0.00150	0.092	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.2527	0.02108	0.00021	0.112	5/10/2019 18:03	500
PIC	5/1/2018	5/31/2019	0.2476	0.01195	0.00017	0.176	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2279	0.01553	0.00029	0.126	5/10/2019 18:04	500
~~PIC~~	~~5/1/2018~~	~~5/31/2019~~	~~0.0000~~	~~0.01442~~	~~0.00000~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
PIC	5/1/2018	5/31/2019	0.3864	0.00525	0.00083	0.070	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3883	0.00479	0.00080	0.038	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3352	0.00790	0.00043	0.078	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3246	0.00619	0.00039	0.070	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2945	0.01473	0.00030	0.090	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2632	0.01664	0.00036	0.048	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.2377	0.01321	0.00205	0.170	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.4017	0.00794	0.00319	0.182	5/17/2019 16:13	500
PIC	5/1/2018	5/31/2019	0.3841	0.00726	0.00102	0.130	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3871	0.00633	0.00124	0.040	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3484	0.01265	0.00160	0.130	5/10/2019 18:04	500
PIC	5/1/2018	5/31/2019	0.3285	0.02427	0.00202	0.134	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.2762	0.01461	0.00021	0.118	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.2595	0.00844	0.00041	0.076	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.2212	0.00710	0.00035	0.088	5/10/2019 18:05	500
PIC	5/1/2018	5/31/2019	0.3620	0.00583	0.00024	0.144	5/17/2019 16:14	500

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

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

LCS S/N : 0299-H
LCS Exp Date : 12/4/2019
LCS Activity (dpm/ml): 2463.58
LCS Volume Added: 0.50

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.2623	0.1852	1	0.9699	**538.8269**	2.20%	1349.3420	25.9760	20.3506	90.6694		LCS			554.8607	97.1%
2	0.2303	0.1626	1	0.9149	**522.7361**	2.51%	1330.8740	25.7973	19.8750	88.7999		LCS			554.8607	94.2%
3	0.1547	0.1092	1	0.7353	**520.3382**	2.19%	1524.9260	27.6134	18.6485	88.3019		LCS			554.8607	93.8%
4	0.2570	0.1815	1	0.8931	**502.3178**	2.26%	1430.8060	26.7488	18.5319	85.1659		LCS			554.8607	90.5%
5	0.2680	0.1892	1	0.9689	**515.7815**	2.85%	1314.3300	25.6369	19.7820	88.9130		LCS			554.8607	93.0%
6	0.2541	0.1794	1	1.0485	**564.6777**	2.94%	1228.8880	24.7891	22.3433	97.4320		LCS			554.8607	101.8%
7	0.3368	0.2378	1	1.2092	**574.9164**	2.47%	1175.8260	24.2487	23.2453	97.5151		LCS			554.8607	103.6%
8	0.4407	0.3111	1	1.2075	**547.7376**	2.43%	1405.0320	26.5094	20.2732	92.8092		LCS			554.8607	98.7%
~~9~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~554.8607~~	~~#VALUE!~~
10	0.2706	0.1911	1	0.9404	**512.8462**	2.24%	1390.3060	26.3676	19.2350	87.0886		LCS			554.8607	92.4%
11	0.2773	0.1958	1	0.9101	**531.0702**	2.04%	1542.2640	27.7714	18.8195	89.2161		LCS			554.8607	95.7%
12	0.2530	0.1786	1	0.8960	**519.8070**	2.12%	1453.8180	26.9629	18.9824	87.5684		LCS			554.8607	93.7%
13	0.2650	0.1871	1	0.9653	**505.3832**	2.35%	1284.3340	25.3427	19.5732	85.4663		LCS			554.8607	91.1%
14	0.2850	0.2012	1	1.1833	**549.2890**	2.40%	1055.3900	22.9728	23.4394	92.9414		LCS			554.8607	99.0%
15	0.3627	0.2561	1	1.2214	**572.2984**	2.68%	1214.7840	24.6475	22.8401	98.0665		LCS			554.8607	103.1%
16	0.2773	0.1957	1	0.9605	**525.2639**	2.15%	1402.3040	26.4811	19.6894	89.3004		LCS			554.8607	94.7%
17	0.2705	0.1910	1	0.9315	**544.9632**	2.07%	1490.8000	27.3039	19.6078	91.4766		LCS			554.8607	98.2%
18	0.1864	0.1316	1	0.8339	**526.6501**	2.37%	1387.9120	26.3439	19.6483	89.2509		LCS			554.8607	94.9%
19	0.2180	0.1539	1	0.8092	**494.1327**	2.30%	1480.8440	27.2121	17.8294	83.4806		LCS			554.8607	89.1%
20	0.1726	0.1219	1	0.7610	**509.8155**	2.09%	1480.9080	27.2121	18.3899	85.5736		LCS			554.8607	91.9%
21	0.2494	0.1761	1	1.0294	**512.2218**	3.07%	1134.8880	23.8223	21.0800	88.7607		LCS			554.8607	92.3%
22	0.3277	0.2314	1	1.1724	**531.1494**	2.53%	1122.8240	23.6960	21.9753	90.2647		LCS			554.8607	95.7%
23	0.2882	0.2035	1	1.1448	**566.6048**	2.70%	1152.3740	24.0052	23.1427	96.8563		LCS			554.8607	102.1%
~~24~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~554.8607~~	~~#VALUE!~~
25	0.1685	0.1190	1	0.8168	**541.0474**	2.13%	1403.4300	26.4906	20.0344	90.8413		LCS			554.8607	97.5%
26	0.1200	0.0847	1	0.7286	**475.4695**	2.20%	1276.4620	25.2636	18.4600	79.9930		LCS			554.8607	85.7%
27	0.1691	0.1194	1	0.7890	**490.5339**	2.22%	1337.9220	25.8650	18.5963	82.5618		LCS			554.8607	88.4%
28	0.1599	0.1129	1	0.7748	**513.2842**	2.13%	1402.9300	26.4858	19.0013	86.1559		LCS			554.8607	92.5%
29	0.1919	0.1355	1	0.8522	**520.5758**	2.54%	1343.9100	25.9230	19.6880	88.4872		LCS			554.8607	93.8%
30	0.1610	0.1137	1	0.8950	**527.8445**	2.74%	1186.4520	24.3567	21.2489	90.3807		LCS			554.8607	95.1%
31	0.3211	0.2267	1	1.1609	**571.5521**	2.53%	1214.8300	24.6475	22.7872	97.3417		LCS			554.8607	103.0%
32	0.2614	0.1845	1	0.9258	**526.5195**	2.20%	1423.3180	26.6786	19.4069	88.7987		LCS			554.8607	94.9%
33	0.2311	0.1631	1	0.9085	**544.3205**	2.19%	1403.8700	26.4953	20.1584	91.5720		LCS			554.8607	98.1%
34	0.1235	0.0872	1	0.7354	**512.8221**	2.17%	1372.9600	26.2011	19.2063	86.2545		LCS			554.8607	92.4%
35	0.2101	0.1483	1	0.8260	**521.9732**	2.36%	1481.3700	27.2167	18.8275	88.3189		LCS			554.8607	94.1%
36	0.2186	0.1543	1	0.8511	**513.1434**	3.16%	1421.8660	26.6646	18.9018	89.4354		LCS			554.8607	92.5%
37	0.2343	0.1654	1	0.9506	**523.9042**	2.57%	1268.3820	25.1843	20.3942	89.1580		LCS			554.8607	94.4%
38	0.2055	0.1451	1	0.9674	**543.5205**	2.32%	1204.4240	24.5408	21.7171	91.7650		LCS			554.8607	98.0%
39	0.2482	0.1752	1	1.1106	**574.0904**	2.33%	1133.4120	23.8065	23.6468	96.9577		LCS			554.8607	103.5%
40	0.2580	0.1822	1	0.9822	**536.8792**	2.21%	1303.8560	25.5343	20.6134	90.2944		LCS			554.8607	96.8%

Total Radium Liquid

Filename : TOTRA.XLS
File type : Excel
Version # : 1.3.9

Carrier S/N : 2628181
Carrier Exp Date : 12/7/2018
Carrier Volume Added: 0.50
Carrier Weight (mg/ml): 26.48
Carrier Weight StDev.: 0.10

Batch : 1562969
Analyst : NXL1
Prep Date : 4/11/2018
Method Uncertainty: 0.0829

Procedure Code : GFCGANBL
Parmname : Total Radium
Required MDA : 1 pCi/L
Halflife of Rn-222 : 3.8235 days

Geometry: Tuffryn Filter

Sample Characteristics					Carrier Calculations				
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Carrier Weight (mg) (Standard)	Residue Weight (mg) (Sample)	Residue Weight StDev. (mg)	Carrier Aliquot (mL)	Carrier Aliquot StDev. (mL)
1	1203536991.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
2	1203536992.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
3	1203536993.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	19.40	0.090711	0.8	0.000200
4	1203536994.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
5	1203536995.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
6	1203536996.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
7	1203536997.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
8	1203536998.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
9	1203536999.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200
10	1203537000.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	10.30	0.051599	0.5	0.001000
~~11~~	~~1203537001.1~~	~~1.0000~~	~~2.0399E-05~~	~~4/11/2018 0:00~~	~~26.48~~	~~19.40~~	~~0.090711~~	~~0.8~~	~~0.000200~~
12	1203537002.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	25.10	0.115210	1.0	0.002000
13	1203537003.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	39.20	0.175812	1.5	0.000200
14	1203537004.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	50.90	0.226098	2.0	0.000200
15	1203537005.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	66.50	0.293147	2.5	0.000200
16	1203537006.1	1.0000	2.0399E-05	4/11/2018 0:00	26.48	8.00	0.041714	0.4	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml
Pipet, 5 ml Stdev : +/-	0.010000	ml

Analytical SOP: GL-RAD-A-001
Instrument SOP: GL-RAD-I-016

Count Raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Gross Alpha CPM	Count Start Date/Time	Precipitation Date/Time	Ingrowth factor	Calculated Sample Recovery %	Sample Recovery Error %
1	11A	2	2619	3241	1309.500	5/17/2019 13:56	4/11/2018 14:40	4.000	75.5%	0.83%
2	11B	2	2853	2963	1426.500	5/17/2019 13:56	4/11/2018 14:40	4.000	77.8%	0.83%
3	11C	2	3009	3167	1504.500	5/17/2019 13:56	4/11/2018 14:40	4.000	91.6%	0.76%
4	11D	2	2713	3282	1356.500	5/17/2019 13:56	4/11/2018 14:40	4.000	94.8%	0.78%
5	12A	2	2502	3114	1251.000	5/17/2019 13:56	4/11/2018 14:40	4.000	98.7%	0.74%
6	12B	2	2409	3113	1204.500	5/17/2019 13:56	4/11/2018 14:40	4.000	96.1%	0.73%
7	12C	2	2329	3073	1164.500	5/17/2019 13:56	4/11/2018 14:40	4.000	100%	0.73%
8	12D	2	2707	3016	1353.500	5/21/2019 11:59	4/11/2018 14:40	4.000	75.5%	0.83%
9	13A	2	2985	3028	1492.500	5/17/2019 13:59	4/11/2018 14:40	4.000	75.5%	0.83%
10	13B	2	2728	2993	1364.000	5/17/2019 13:59	4/11/2018 14:40	4.000	77.8%	0.83%
~~11~~	~~13C~~	~~2~~	~~0~~	~~0~~	~~0.000~~	~~5/17/2019 13:59~~	~~4/11/2018 14:40~~	~~4.000~~	~~91.6%~~	~~0.76%~~
12	13D	2	2899	3067	1449.500	5/17/2019 13:59	4/11/2018 14:40	4.000	94.8%	0.78%
13	14A	2	2164	3575	1082.000	5/17/2019 13:59	4/11/2018 14:40	4.000	98.7%	0.74%
14	14B	2	2244	3052	1122.000	5/17/2019 13:59	4/11/2018 14:40	4.000	96.1%	0.73%
15	14C	2	2290	3328	1145.000	5/17/2019 13:59	4/11/2018 14:40	4.000	100%	0.73%
16	14D	2	2418	3292	1209.000	5/21/2019 12:04	4/11/2018 14:40	4.000	75.5%	0.83%

Calibration Data

Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Beta X-Talk	Weekly Bkg CPM	Weekly Bkg Count Start Date/Time	Weekly Bkg Count Time (min.)
PIC	5/1/2018	5/31/2019	0.3792	0.00693	0.00021	0.042	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.3784	0.00743	0.00017	0.146	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.3440	0.01271	0.00018	0.094	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.3445	0.01128	0.00019	0.148	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.2599	0.01685	0.00015	0.078	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.2579	0.01035	0.00025	0.076	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.2332	0.02199	0.00021	0.158	5/10/2019 18:02	500
PIC	5/1/2018	5/31/2019	0.3690	0.01863	0.00019	0.084	5/17/2019 16:14	500
PIC	5/1/2018	5/31/2019	0.3932	0.00669	0.00030	0.052	5/10/2019 18:02	1000
PIC	5/1/2018	5/31/2019	0.3838	0.01043	0.00022	0.065	5/10/2019 18:02	1000
~~PIC~~	~~5/1/2018~~	~~5/31/2019~~	~~0.0000~~	~~0.02157~~	~~0.00000~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
PIC	5/1/2018	5/31/2019	0.3395	0.01236	0.00024	0.082	5/10/2019 18:02	1000
PIC	5/1/2018	5/31/2019	0.2789	0.02505	0.00017	0.067	5/10/2019 18:02	1000
PIC	5/1/2018	5/31/2019	0.2614	0.01557	0.00027	0.039	5/10/2019 18:02	1000
PIC	5/1/2018	5/31/2019	0.2248	0.02173	0.00027	0.127	5/10/2019 18:02	1000
PIC	5/1/2018	5/31/2019	0.3543	0.01512	0.00023	0.025	5/17/2019 16:15	1000

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

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

LCS S/N : 0299-H
LCS Exp Date : 12/4/2019
LCS Activity (dpm/ml): 2463.58
LCS Volume Added: 0.50

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.1330	0.0939	1	0.7777	**514.8055**	2.23%	1309.4580	25.5881	19.7223	86.6521		LCS			554.8607	92.8%
2	0.2413	0.1704	1	0.9146	**545.5767**	2.18%	1426.3540	26.7067	20.0255	91.6718		LCS			554.8607	98.3%
3	0.1809	0.1277	1	0.7917	**537.6949**	2.35%	1504.4060	27.4272	19.2172	90.8241		LCS			554.8607	96.9%
4	0.2190	0.1546	1	0.8264	**467.5821**	2.36%	1356.3520	26.0432	17.6009	79.0079		LCS			554.8607	84.3%
5	0.2024	0.1429	1	0.9442	**549.0215**	2.72%	1250.9220	25.0100	21.5185	93.8936		LCS			554.8607	98.9%
6	0.2068	0.1460	1	0.9734	**547.0094**	2.40%	1204.4240	24.5408	21.8523	92.5591		LCS			554.8607	98.6%
7	0.3155	0.2227	1	1.1666	**559.5938**	3.11%	1164.3420	24.1299	22.7366	97.1349		LCS			554.8607	100.9%
8	0.1933	0.1365	1	0.8791	**546.7699**	2.80%	1353.4160	26.0144	20.6033	93.8018		LCS			554.8607	98.5%
9	0.1426	0.1007	1	0.7701	**565.7329**	2.12%	1492.4480	27.3176	20.3022	94.9049		LCS			554.8607	102.0%
10	0.1586	0.1120	1	0.7897	**514.3356**	2.33%	1363.9350	26.1151	19.3067	86.8360		LCS			554.8607	92.7%
~~11~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~554.8607~~	~~#VALUE!~~
12	0.1652	0.1167	1	0.7582	**507.0105**	2.36%	1449.4180	26.9212	18.4623	85.6833		LCS			554.8607	91.4%
13	0.1747	0.1233	1	0.8604	**442.5964**	3.38%	1081.9330	23.2594	18.6544	77.6932		LCS			554.8607	79.8%
14	0.1460	0.1031	1	0.8785	**502.6978**	2.72%	1121.9610	23.6854	20.8079	86.0074		LCS			554.8607	90.6%
15	0.2930	0.2069	1	1.1616	**570.5942**	3.10%	1144.8730	23.9270	23.3820	99.0291		LCS			554.8607	102.8%
16	0.1097	0.0775	1	0.7863	**508.6541**	2.67%	1208.9750	24.5866	20.2812	86.8459		LCS			554.8607	91.7%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
R1	1A	2	2699	2974	5/17/2019 13:40	5/17/2019 13:42	PIC	TRADV19
R2	1B	2	2662	2819	5/17/2019 13:40	5/17/2019 13:42	PIC	TRADV19
R3	1C	2	3050	2966	5/17/2019 13:40	5/17/2019 13:42	PIC	TRADV19
R4	1D	2	2862	3087	5/17/2019 13:40	5/17/2019 13:42	PIC	TRADV19
R5	2A	2	2629	3074	5/17/2019 13:41	5/17/2019 13:43	PIC	TRADV19
R6	2B	2	2458	3012	5/17/2019 13:41	5/17/2019 13:43	PIC	TRADV19
R7	2C	2	2352	3113	5/17/2019 13:41	5/17/2019 13:43	PIC	TRADV19
R1	2D	2	2811	2701	5/21/2019 11:41	5/21/2019 11:43	PIC	TRADV19
R1	3A	2	0	0	5/17/2019 13:41	5/17/2019 13:43	PIC	TRADV19
R2	3B	2	2781	2689	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R3	3C	2	3085	3025	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R4	3D	2	2908	3153	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R5	4A	2	2569	3123	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R6	4B	2	2111	3162	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R7	4C	2	2430	2997	5/17/2019 13:43	5/17/2019 13:45	PIC	TRADV19
R1	4D	2	2805	2834	5/21/2019 11:44	5/21/2019 11:46	PIC	TRADV19
R1	5A	2	2982	2956	5/17/2019 13:46	5/17/2019 13:48	PIC	TRADV19
R2	5B	2	2776	2912	5/17/2019 13:46	5/17/2019 13:48	PIC	TRADV19
R3	5C	2	2962	2985	5/17/2019 13:46	5/17/2019 13:48	PIC	TRADV19
R4	5D	2	2962	3073	5/17/2019 13:46	5/17/2019 13:48	PIC	TRADV19
R5	6A	2	2270	3107	5/17/2019 13:50	5/17/2019 13:52	PIC	TRADV19
R6	6B	2	2246	3017	5/17/2019 13:50	5/17/2019 13:52	PIC	TRADV19
R7	6C	2	2305	3056	5/17/2019 13:50	5/17/2019 13:52	PIC	TRADV19
R8	6D	2	0	0	5/17/2019 13:50	5/17/2019 13:52	PIC	TRADV19
R1	7A	2	2807	3011	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R2	7B	2	2553	2685	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R3	7C	2	2676	3164	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R4	7D	2	2806	3189	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R5	8A	2	2688	3032	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R6	8B	2	2373	3090	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R7	8C	2	2430	3048	5/17/2019 13:52	5/17/2019 13:54	PIC	TRADV19
R1	8D	2	2847	2926	5/21/2019 11:52	5/21/2019 11:54	PIC	TRADV19
R1	9A	2	2808	3176	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19

R2	9B	2	2746	2837	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R3	9C	2	2963	3045	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R4	9D	2	2844	3025	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R5	10A	2	2537	3259	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R6	10B	2	2409	3010	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R7	10C	2	2267	3350	5/17/2019 13:55	5/17/2019 13:57	PIC	TRADV19
R1	10D	2	2608	3042	5/21/2019 11:56	5/21/2019 11:58	PIC	TRADV19
R1	11A	2	2619	3241	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R2	11B	2	2853	2963	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R3	11C	2	3009	3167	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R4	11D	2	2713	3282	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R5	12A	2	2502	3114	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R6	12B	2	2409	3113	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R7	12C	2	2329	3073	5/17/2019 13:56	5/17/2019 13:58	PIC	TRADV19
R1	12D	2	2707	3016	5/21/2019 11:59	5/21/2019 12:01	PIC	TRADV19
R1	13A	2	2985	3028	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R2	13B	2	2728	2993	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R3	13C	2	0	0	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R4	13D	2	2899	3067	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R5	14A	2	2164	3575	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R6	14B	2	2244	3052	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R7	14C	2	2290	3328	5/17/2019 13:59	5/17/2019 14:01	PIC	TRADV19
R1	14D	2	2418	3292	5/21/2019 12:04	5/21/2019 12:06	PIC	TRADV19

MPC 9600 Plateau Instrument 1 MPC 9604 Detector A 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	0	
795	0	+0.00
825	0	>100
855	1	>100
885	0	+55.56
915	2	+66.67
945	0	>100
975	2	>100
1005	42	>100
1035	145	>100
1065	544	>100
1095	1136	>100
1125	1967	>100
1155	2845	>100
1185	4078	>100
1215	5483	+93.18
1245	7400	+83.35
1275	9328	+75.40

VOLTS	COUNTS	%/100 Volts
1305	11640	+69.78
1335	14241	+62.88
1365	17534	+55.91
1395	20127	+45.04
1425	23254	+31.29
1455	24902	+20.41
1485	25605	+10.49
1515	26310	+6.44
1545	26535	+5.31
1575	26953	+2.79
1605	27399	+1.83
1635	27000	+1.71
1665	27255	+1.62
1695	27723	+3.14
1725	27705	+1.56
1755	28072	+1.15
1785	27729	+1.43
1815	28194	+3.24
1845	28243	
1875	29191	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector B 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+55.56
795	1	+83.33
825	1	+55.56
855	0	>100
885	1	+0.00
915	0	+0.00
945	1	>100
975	0	>100
1005	4	>100
1035	56	>100
1065	292	>100
1095	890	>100
1125	1841	>100
1155	2936	>100
1185	4179	>100
1215	5837	>100
1245	7821	+91.28
1275	10638	+83.88

VOLTS	COUNTS	%/100 Volts
1305	13188	+75.92
1335	16818	+67.60
1365	20420	+59.86
1395	24341	+47.85
1425	27854	+35.51
1455	30288	+23.26
1485	31798	+14.54
1515	32622	+8.32
1545	33496	+5.11
1575	33475	+4.43
1605	33903	+3.09
1635	34654	+2.46
1665	34485	+1.74
1695	34445	+1.84
1725	34908	+3.91
1755	35401	+6.80
1785	36062	+10.27
1815	37505	+14.30
1845	39508	
1875	41843	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector C 7/1/2009
Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	1	+0.00
795	0	>100
825	1	-55.56
855	1	+55.56
885	0	>100
915	1	>100
945	0	>100
975	4	>100
1005	32	>100
1035	206	>100
1065	639	>100
1095	1416	>100
1125	2551	>100
1155	3619	>100
1185	5037	+98.68
1215	6875	+91.19
1245	8915	+85.53
1275	11519	+77.28

VOLTS	COUNTS	%/100 Volts
1305	14817	+71.06
1335	17823	+63.34
1365	21704	+53.63
1395	25422	+42.55
1425	28424	+29.21
1455	30244	+18.11
1485	31305	+10.10
1515	31989	+6.07
1545	32223	+3.43
1575	32671	+2.15
1605	32621	+1.68
1635	32837	+1.52
1665	32961	+2.01
1695	33249	+2.64
1725	33409	+3.21
1755	33931	+4.07
1785	34234	+7.20
1815	34909	+10.28
1845	36660	
1875	38205	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector D 7/1/2009
Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+0.00
795	1	+0.00
825	0	+0.00
855	1	>100
885	0	>100
915	0	>100
945	0	>100
975	8	>100
1005	75	>100
1035	303	>100
1065	872	>100
1095	1656	>100
1125	2729	>100
1155	3862	>100
1185	5425	+98.19
1215	7256	+88.82
1245	9510	+81.89
1275	11944	+74.07

VOLTS	COUNTS	%/100 Volts
1305	15202	+66.36
1335	18216	+57.86
1365	21597	+45.58
1395	24648	+32.96
1425	26505	+19.92
1455	27475	+11.42
1485	27836	+7.08
1515	28609	+4.51
1545	28896	+2.93
1575	28862	+1.66
1605	28969	+0.36
1635	29292	+0.80
1665	28836	+1.06
1695	29279	+1.48
1725	29439	+3.59
1755	29642	+4.07
1785	30243	+6.51
1815	30699	+7.79
1845	31876	
1875	32444	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector A 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+83.33
795	0	-83.33
825	1	>100
855	0	>100
885	1	+100.00
915	1	>100
945	2	>100
975	12	>100
1005	91	>100
1035	421	>100
1065	1239	>100
1095	2155	>100
1125	3527	>100
1155	4974	>100
1185	6647	+97.44
1215	9250	+89.00
1245	12041	+82.15
1275	15094	+73.81

VOLTS	COUNTS	%/100 Volts
1305	19017	+67.45
1335	23157	+59.23
1365	27625	+45.78
1395	31465	+32.72
1425	33352	+20.41
1455	35084	+11.74
1485	35819	+7.11
1515	36292	+3.35
1545	36527	+1.63
1575	36540	+0.87
1605	36585	+0.48
1635	36742	+1.76
1665	36691	+1.53
1695	37461	+1.89
1725	37073	+3.07
1755	37603	+4.02
1785	38346	+6.58
1815	39111	+7.95
1845	40115	
1875	41409	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	2	>100
1005	3	>100
1035	14	>100
1065	127	>100
1095	500	>100
1125	1332	>100
1155	2373	>100
1185	3614	>100
1215	5227	>100
1245	7060	+97.33
1275	9574	+90.30

VOLTS	COUNTS	%/100 Volts
1305	12541	+83.18
1335	16192	+74.48
1365	20083	+67.17
1395	24273	+58.43
1425	29090	+46.86
1455	33223	+34.56
1485	35608	+22.67
1515	37581	+13.63
1545	38762	+8.18
1575	39185	+4.42
1605	39484	+3.06
1635	39806	+2.61
1665	40264	+2.03
1695	40353	+2.32
1725	40431	+3.28
1755	41127	+7.09
1785	41882	+12.40
1815	44049	+18.52
1845	46950	
1875	51097	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	1	>100
945	0	>100
975	17	>100
1005	87	>100
1035	438	>100
1065	1055	>100
1095	2114	>100
1125	3282	>100
1155	4625	>100
1185	6554	+97.66
1215	8743	+88.09
1245	11345	+81.31
1275	14261	+74.60

VOLTS	COUNTS	%/100 Volts
1305	18216	+67.74
1335	21995	+58.11
1365	26173	+46.11
1395	29479	+32.75
1425	32186	+20.62
1455	33022	+12.13
1485	33981	+7.22
1515	34520	+4.95
1545	35095	+2.07
1575	35014	+0.38
1605	34812	+0.55
1635	34859	+1.11
1665	35460	+1.94
1695	35273	+1.95
1725	35629	+2.73
1755	35811	+5.77
1785	36656	+6.44
1815	37896	+9.21
1845	38145	
1875	40283	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+83.33
795	2	+55.56
825	1	>100
855	0	>100
885	0	>100
915	0	>100
945	2	>100
975	9	>100
1005	89	>100
1035	439	>100
1065	1198	>100
1095	2164	>100
1125	3436	>100
1155	4917	>100
1185	6762	+96.59
1215	9006	+89.14
1245	11800	+81.34
1275	15132	+73.59

VOLTS	COUNTS	%/100 Volts
1305	18675	+65.94
1335	22620	+55.69
1365	26869	+44.63
1395	29957	+32.08
1425	32494	+20.49
1455	33836	+11.98
1485	34627	+6.45
1515	34849	+3.22
1545	35298	+1.98
1575	35180	+2.37
1605	35503	+1.57
1635	36006	+0.99
1665	35722	+0.89
1695	35597	+0.93
1725	36188	+1.86
1755	36272	+1.90
1785	36389	+2.55
1815	36529	+4.39
1845	37459	
1875	38170	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+55.56
795	1	>100
825	1	+0.00
855	1	>100
885	0	>100
915	0	>100
945	0	>100
975	9	>100
1005	53	>100
1035	302	>100
1065	878	>100
1095	1805	>100
1125	2887	>100
1155	4163	>100
1185	5842	+99.81
1215	7959	+90.90
1245	10323	+83.03
1275	13250	+75.91

VOLTS	COUNTS	%/100 Volts
1305	16654	+68.57
1335	20416	+59.26
1365	24191	+47.28
1395	27643	+34.04
1425	29891	+21.08
1455	31183	+12.30
1485	31558	+6.67
1515	32444	+4.05
1545	32413	+2.90
1575	32704	+0.81
1605	32837	+0.71
1635	32629	+0.49
1665	32797	+0.16
1695	32964	+1.32
1725	32746	+1.40
1755	33308	+1.56
1785	33318	+3.21
1815	33456	+3.92
1845	34283	
1875	34815	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	0	-55.56
795	0	>100
825	1	>100
855	3	+33.33
885	0	+0.00
915	1	>100
945	2	>100
975	29	>100
1005	165	>100
1035	613	>100
1065	1394	>100
1095	2558	>100
1125	3702	>100
1155	5222	>100
1185	7161	+96.06
1215	9507	+89.18
1245	12552	+81.52
1275	16030	+73.64

VOLTS	COUNTS	%/100 Volts
1305	19810	+64.73
1335	23962	+52.62
1365	28091	+39.27
1395	30594	+25.61
1425	32381	+14.86
1455	33206	+8.91
1485	33832	+4.41
1515	34260	+3.01
1545	34071	+2.33
1575	34623	+1.34
1605	34848	+1.22
1635	34564	+0.89
1665	34733	+1.01
1695	35144	+2.76
1725	35084	+3.66
1755	35839	+3.97
1785	36332	+5.39
1815	36654	+5.35
1845	37609	
1875	38164	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector C 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	1	
795	0	>100
825	0	+0.00
855	0	>100
885	1	>100
915	1	>100
945	1	>100
975	17	>100
1005	122	>100
1035	533	>100
1065	1287	>100
1095	2493	>100
1125	3753	>100
1155	5482	>100
1185	7538	+99.39
1215	10305	+90.31
1245	13415	+82.57
1275	17141	+75.13

VOLTS	COUNTS	%/100 Volts
1305	21412	+66.80
1335	26262	+56.32
1365	30679	+43.71
1395	34466	+31.61
1425	36949	+20.14
1455	38998	+11.16
1485	39313	+5.34
1515	39625	+2.44
1545	39751	+2.04
1575	40227	+1.45
1605	40228	+0.56
1635	40255	+0.13
1665	40075	+1.22
1695	40384	+1.95
1725	40900	+3.50
1755	41028	+3.05
1785	41899	+3.71
1815	41767	+5.64
1845	42852	
1875	44132	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+0.00
795	1	>100
825	0	+83.33
855	0	-83.33
885	1	>100
915	0	>100
945	1	>100
975	12	>100
1005	51	>100
1035	298	>100
1065	848	>100
1095	1649	>100
1125	2535	>100
1155	3602	>100
1185	5036	+98.31
1215	6880	+91.37
1245	8822	+82.29
1275	11546	+74.61

VOLTS	COUNTS	%/100 Volts
1305	14171	+66.45
1335	17362	+54.90
1365	20310	+43.83
1395	22647	+30.82
1425	24551	+20.19
1455	25440	+11.69
1485	26124	+5.90
1515	26245	+2.21
1545	26428	+1.39
1575	26151	+2.69
1605	26721	+2.72
1635	27168	+2.80
1665	27007	+0.87
1695	27135	+0.70
1725	27089	+1.24
1755	27414	+1.43
1785	27373	+3.21
1815	27581	+4.34
1845	28332	
1875	28750	

MPC 9600 Plateau Instrument 4 MPC 9604 Detector A 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	2	+55.56
855	1	>100
885	0	-55.56
915	3	>100
945	0	>100
975	16	>100
1005	114	>100
1035	451	>100
1065	1100	>100
1095	2068	>100
1125	3189	>100
1155	4386	>100
1185	6094	+94.81
1215	8184	+87.09
1245	10489	+78.88
1275	13273	+72.66

VOLTS	COUNTS	%/100 Volts
1305	16442	+66.24
1335	20146	+57.40
1365	23769	+46.40
1395	26926	+34.68
1425	29276	+24.40
1455	31037	+15.28
1485	32197	+7.91
1515	32425	+4.33
1545	32314	+2.14
1575	33071	+2.66
1605	32918	+2.52
1635	33435	+1.02
1665	33382	+0.73
1695	33349	+1.07
1725	33324	+1.28
1755	34001	+2.26
1785	33701	+3.08
1815	34304	+2.97
1845	34744	
1875	35012	

MPC 9600 Plateau Instrument 4 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+0.00
795	1	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	2	>100
975	31	>100
1005	176	>100
1035	550	>100
1065	1218	>100
1095	2114	>100
1125	3212	>100
1155	4416	>100
1185	6066	+92.28
1215	7936	+85.60
1245	10288	+76.79
1275	13020	+70.59

VOLTS	COUNTS	%/100 Volts
1305	15747	+62.38
1335	19230	+54.19
1365	22255	+44.46
1395	25299	+32.45
1425	27370	+22.24
1455	28625	+14.10
1485	29467	+8.56
1515	30213	+5.29
1545	30326	+2.77
1575	30564	+1.57
1605	30548	+1.52
1635	30820	+0.85
1665	30898	+0.79
1695	30779	+0.44
1725	30934	+0.45
1755	31008	+0.96
1785	30991	+2.01
1815	31196	+3.80
1845	31781	
1875	32406	

MPC 9600 Plateau Instrument 4 MPC 9604 Detector C 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+55.56
795	2	+0.00
825	0	-55.56
855	1	>100
885	0	>100
915	0	>100
945	2	>100
975	24	>100
1005	134	>100
1035	558	>100
1065	1361	>100
1095	2511	>100
1125	3762	>100
1155	5246	>100
1185	7268	+96.29
1215	9733	+88.98
1245	12701	+79.94
1275	16176	+73.13

VOLTS	COUNTS	%/100 Volts
1305	19796	+65.77
1335	24338	+57.55
1365	28686	+45.86
1395	32750	+32.27
1425	34919	+20.83
1455	36434	+11.45
1485	37487	+5.80
1515	37623	+3.32
1545	37528	+2.07
1575	38277	+2.12
1605	38338	+2.70
1635	38426	+1.12
1665	39007	+1.06
1695	38592	+0.64
1725	38870	+0.63
1755	38868	+1.30
1785	39238	+1.45
1815	39169	+2.34
1845	39570	
1875	40086	

MPC 9600 Plateau Instrument 4 MPC 9604 Detector D 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+0.00
795	0	>100
825	1	+83.33
855	1	+55.56
885	0	+0.00
915	1	>100
945	1	>100
975	60	>100
1005	297	>100
1035	855	>100
1065	1647	>100
1095	2700	>100
1125	3921	>100
1155	5471	+96.54
1185	7042	+90.21
1215	9405	+82.23
1245	12266	+76.33
1275	14989	+69.38

VOLTS	COUNTS	%/100 Volts
1305	18491	+61.09
1335	22444	+51.56
1365	25756	+37.44
1395	28379	+23.82
1425	29517	+14.00
1455	30309	+8.08
1485	30874	+6.03
1515	31345	+3.66
1545	31782	+2.17
1575	31567	+1.31
1605	31789	+0.78
1635	31963	+1.34
1665	31956	+0.29
1695	32123	+0.20
1725	31850	+1.46
1755	32114	+2.39
1785	32665	+3.95
1815	32876	+4.96
1845	33399	
1875	34206	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	
795	1	+83.33
825	1	-83.33
855	1	>100
885	0	-55.56
915	0	>100
945	1	>100
975	9	>100
1005	76	>100
1035	308	>100
1065	814	>100
1095	1600	>100
1125	2598	>100
1155	3596	>100
1185	5065	+96.05
1215	6773	+90.23
1245	8717	+81.43
1275	11391	+74.83

VOLTS	COUNTS	%/100 Volts
1305	13974	+68.00
1335	17170	+58.62
1365	20456	+47.04
1395	23332	+33.83
1425	24996	+21.10
1455	26290	+12.40
1485	26683	+7.74
1515	27270	+4.43
1545	27590	+3.48
1575	27635	+1.71
1605	27932	+1.20
1635	27807	+0.88
1665	28006	+0.62
1695	27964	+0.63
1725	28112	+0.98
1755	28020	+2.84
1785	28392	+3.76
1815	29028	+5.17
1845	29220	
1875	29849	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	>100
855	1	+41.67
885	2	-33.33
915	0	>100
945	1	>100
975	17	>100
1005	87	>100
1035	336	>100
1065	1010	>100
1095	1955	>100
1125	3124	>100
1155	4486	>100
1185	6017	>100
1215	8507	+91.20
1245	11148	+82.59
1275	14003	+74.21

VOLTS	COUNTS	%/100 Volts
1305	17414	+68.46
1335	21540	+59.98
1365	25854	+46.75
1395	29222	+33.38
1425	31128	+21.52
1455	32995	+13.26
1485	33846	+8.09
1515	34289	+3.25
1545	34528	+2.00
1575	34311	+1.78
1605	34866	+1.78
1635	35046	+1.14
1665	35087	-0.26
1695	34795	+0.11
1725	34857	+0.93
1755	35220	+2.81
1785	35363	+3.98
1815	36028	+4.79
1845	36577	
1875	37207	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector C 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	>100
885	0	>100
915	1	>100
945	2	>100
975	7	>100
1005	56	>100
1035	305	>100
1065	982	>100
1095	1874	>100
1125	2890	>100
1155	4260	>100
1185	6001	>100
1215	8050	+91.54
1245	10895	+82.98
1275	13556	+76.26

VOLTS	COUNTS	%/100 Volts
1305	17085	+68.24
1335	21135	+59.99
1365	25066	+47.39
1395	28530	+33.93
1425	30823	+22.30
1455	32287	+12.93
1485	33217	+6.71
1515	33474	+3.57
1545	33517	+1.17
1575	33921	+1.13
1605	33584	+1.27
1635	34014	+1.12
1665	34116	+0.98
1695	34225	-0.22
1725	33980	+0.58
1755	33971	+1.96
1785	34541	+3.64
1815	34954	+5.38
1845	35375	
1875	36384	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	6	>100
1005	81	>100
1035	318	>100
1065	897	>100
1095	1710	>100
1125	2714	>100
1155	3925	>100
1185	5395	+97.31
1215	7282	+88.49
1245	9426	+81.36
1275	12007	+75.65

VOLTS	COUNTS	%/100 Volts
1305	15025	+68.87
1335	18640	+58.97
1365	22048	+45.84
1395	24877	+32.08
1425	26653	+20.83
1455	27899	+13.08
1485	28670	+8.43
1515	29257	+5.13
1545	29568	+2.06
1575	29683	+0.52
1605	29362	+0.57
1635	29589	+0.80
1665	29870	+1.82
1695	29783	+0.90
1725	30077	+0.75
1755	29889	+2.02
1785	30152	+3.33
1815	30656	+6.54
1845	31211	
1875	32389	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector A 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	7	>100
1005	31	>100
1035	238	>100
1065	810	>100
1095	1637	>100
1125	2743	>100
1155	3932	>100
1185	5579	>100
1215	7602	+94.41
1245	10078	+84.86
1275	13091	+77.67

VOLTS	COUNTS	%/100 Volts
1305	16217	+71.57
1335	20184	+63.76
1365	24605	+53.98
1395	28528	+41.40
1425	31675	+28.02
1455	33899	+17.93
1485	34826	+10.65
1515	35815	+6.13
1545	36225	+4.15
1575	36456	+2.28
1605	36747	+1.47
1635	36801	+1.26
1665	36859	+0.85
1695	37095	+1.85
1725	37072	+4.01
1755	37724	+6.65
1785	38802	+10.33
1815	40036	+14.71
1845	41975	
1875	45123	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector B 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	+83.33
855	1	-83.33
885	0	>100
915	0	>100
945	5	>100
975	18	>100
1005	125	>100
1035	482	>100
1065	1255	>100
1095	2318	>100
1125	3540	>100
1155	5288	>100
1185	7168	+98.51
1215	9760	+88.48
1245	12656	+81.52
1275	16065	+74.58

VOLTS	COUNTS	%/100 Volts
1305	20094	+68.67
1335	24665	+59.40
1365	29591	+47.86
1395	33376	+34.51
1425	36440	+22.50
1455	38024	+13.58
1485	39187	+7.04
1515	39608	+3.63
1545	39722	+2.10
1575	39894	+2.32
1605	40298	+2.09
1635	40711	+1.41
1665	40574	+0.80
1695	40608	+1.02
1725	40839	+1.28
1755	41201	+1.97
1785	41065	+3.74
1815	41711	+5.42
1845	42917	
1875	43699	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector C 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	+0.00
855	0	>100
885	1	>100
915	1	>100
945	2	>100
975	8	>100
1005	70	>100
1035	353	>100
1065	990	>100
1095	1956	>100
1125	3024	>100
1155	4400	>100
1185	6173	+99.75
1215	8230	+89.85
1245	10904	+82.36
1275	13747	+76.18

VOLTS	COUNTS	%/100 Volts
1305	17350	+67.80
1335	21371	+60.27
1365	25084	+49.32
1395	29177	+36.15
1425	31927	+24.86
1455	33217	+14.70
1485	34545	+7.74
1515	35097	+4.64
1545	34927	+2.96
1575	35439	+2.21
1605	35939	+2.41
1635	35763	+0.94
1665	36053	+0.35
1695	35886	+1.15
1725	36066	+1.77
1755	36379	+3.03
1785	36768	+4.80
1815	37193	+6.14
1845	38320	
1875	39061	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	+0.00
825	0	>100
855	0	+0.00
885	0	>100
915	1	>100
945	0	>100
975	14	>100
1005	109	>100
1035	481	>100
1065	1177	>100
1095	2133	>100
1125	3243	>100
1155	4554	>100
1185	6285	+98.38
1215	8468	+89.75
1245	11266	+83.13
1275	14088	+74.43

VOLTS	COUNTS	%/100 Volts
1305	17954	+65.82
1335	21482	+57.64
1365	25373	+45.78
1395	29042	+34.80
1425	31373	+23.29
1455	33143	+14.25
1485	34006	+8.49
1515	34662	+4.71
1545	34892	+3.14
1575	35129	+1.86
1605	35411	+1.49
1635	35380	+0.62
1665	35554	+0.65
1695	35385	+1.18
1725	35755	+1.89
1755	35907	+3.26
1785	36305	+4.62
1815	36870	+6.98
1845	37807	
1875	39047	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	+83.33
855	1	-83.33
885	0	-55.56
915	0	>100
945	1	>100
975	3	>100
1005	42	>100
1035	242	>100
1065	613	>100
1095	1353	>100
1125	2213	>100
1155	3256	>100
1185	4474	>100
1215	5932	+94.10
1245	8072	+87.32
1275	10579	+79.61

VOLTS	COUNTS	%/100 Volts
1305	13228	+70.36
1335	16271	+60.12
1365	19506	+49.19
1395	22188	+36.46
1425	24373	+24.43
1455	25649	+15.99
1485	26433	+9.58
1515	27195	+5.74
1545	27367	+3.24
1575	27490	+1.86
1605	27608	+1.22
1635	27841	+1.33
1665	27695	+1.11
1695	27999	+1.42
1725	27992	+2.04
1755	28289	+2.52
1785	28408	+4.56
1815	28863	+5.70
1845	29664	
1875	30148	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

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	1	>100
975	3	>100
1005	34	>100
1035	221	>100
1065	825	>100
1095	1709	>100
1125	2873	>100
1155	4078	>100
1185	5858	>100
1215	7809	+91.82
1245	10336	+85.02
1275	13215	+77.79

VOLTS	COUNTS	%/100 Volts
1305	16978	+70.97
1335	20569	+61.39
1365	24989	+48.97
1395	28389	+36.69
1425	30977	+24.05
1455	32727	+14.93
1485	33697	+8.42
1515	34195	+4.89
1545	34437	+3.49
1575	34850	+2.11
1605	35174	+1.62
1635	34923	+0.68
1665	35250	+0.35
1695	35171	+1.24
1725	35237	+1.02
1755	35584	+2.79
1785	35587	+4.59
1815	36485	+6.74
1845	37270	
1875	38453	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	4	>100
1005	57	>100
1035	277	>100
1065	817	>100
1095	1666	>100
1125	2766	>100
1155	4077	>100
1185	5667	>100
1215	7694	+91.50
1245	10209	+84.83
1275	12950	+77.50

VOLTS	COUNTS	%/100 Volts
1305	16543	+70.03
1335	20257	+60.71
1365	24245	+48.17
1395	27602	+35.50
1425	30019	+23.48
1455	31614	+14.53
1485	32522	+8.91
1515	33103	+5.28
1545	33572	+2.60
1575	33695	+0.70
1605	33525	+1.48
1635	33477	+0.99
1665	34432	+1.49
1695	33745	+1.43
1725	34149	+1.60
1755	34350	+3.69
1785	34955	+3.62
1815	35251	+4.44
1845	35592	
1875	36382	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	5	>100
1005	29	>100
1035	204	>100
1065	609	>100
1095	1354	>100
1125	2316	>100
1155	3418	>100
1185	4654	>100
1215	6455	+92.99
1245	8669	+86.45
1275	10931	+79.15

VOLTS	COUNTS	%/100 Volts
1305	14016	+71.42
1335	17436	+62.21
1365	20814	+50.32
1395	23760	+36.91
1425	26302	+24.91
1455	27519	+15.17
1485	28410	+8.91
1515	28843	+5.41
1545	29396	+3.58
1575	29357	+1.54
1605	29719	+0.51
1635	29358	+0.23
1665	29623	+0.57
1695	29509	+2.12
1725	29896	+2.84
1755	30165	+4.42
1785	30570	+5.65
1815	31180	+6.95
1845	31995	
1875	32717	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector A 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	9	>100
1005	96	>100
1035	468	>100
1065	1084	>100
1095	2286	>100
1125	3479	>100
1155	4912	>100
1185	6819	+98.23
1215	9153	+89.05
1245	12105	+83.21
1275	15122	+75.24

VOLTS	COUNTS	%/100 Volts
1305	19482	+67.45
1335	23344	+59.35
1365	27793	+45.86
1395	31916	+34.29
1425	33979	+21.61
1455	35993	+11.71
1485	36530	+7.04
1515	36796	+3.11
1545	37393	+2.44
1575	37279	+1.41
1605	37650	+0.49
1635	37458	+0.91
1665	37579	+0.12
1695	37828	+1.10
1725	37535	+1.72
1755	38104	+2.18
1785	38416	+4.12
1815	38633	+4.92
1845	39649	
1875	40366	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	0	>100
1005	20	>100
1035	122	>100
1065	511	>100
1095	1263	>100
1125	2390	>100
1155	3641	>100
1185	5246	>100
1215	7212	+98.32
1245	9897	+89.80
1275	12742	+82.40

VOLTS	COUNTS	%/100 Volts
1305	16337	+74.91
1335	20471	+68.07
1365	25012	+57.86
1395	29694	+47.48
1425	33409	+35.17
1455	37013	+23.27
1485	38629	+14.35
1515	39529	+7.69
1545	40284	+4.34
1575	40711	+2.52
1605	40642	+1.97
1635	40879	+1.11
1665	41405	+0.98
1695	41011	+0.30
1725	41182	+0.41
1755	41178	+3.28
1785	41573	+6.47
1815	42858	+10.82
1845	44440	
1875	46780	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	4	>100
1005	46	>100
1035	202	>100
1065	697	>100
1095	1532	>100
1125	2614	>100
1155	3953	>100
1185	5474	>100
1215	7466	+93.09
1245	9842	+86.73
1275	12814	+80.29

VOLTS	COUNTS	%/100 Volts
1305	16303	+72.82
1335	20309	+64.32
1365	24364	+53.82
1395	28527	+40.95
1425	31774	+28.74
1455	33631	+16.87
1485	35030	+9.25
1515	35208	+5.21
1545	35741	+3.27
1575	36019	+2.95
1605	36373	+2.21
1635	36484	+2.27
1665	36713	+2.28
1695	37093	+2.46
1725	37325	+4.17
1755	37543	+7.52
1785	38833	+13.43
1815	40656	+19.49
1845	43753	
1875	47246	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	5	>100
1005	47	>100
1035	243	>100
1065	792	>100
1095	1744	>100
1125	2933	>100
1155	4123	>100
1185	5780	>100
1215	7791	+91.58
1245	10478	+84.93
1275	13118	+77.50

VOLTS	COUNTS	%/100 Volts
1305	16889	+70.18
1335	20600	+61.29
1365	24824	+50.40
1395	28208	+38.85
1425	31539	+25.79
1455	33391	+16.06
1485	33991	+8.60
1515	34782	+5.01
1545	35201	+4.10
1575	35380	+2.50
1605	35849	+1.87
1635	35784	+1.79
1665	36000	+1.43
1695	36269	+2.10
1725	36381	+3.46
1755	36733	+6.86
1785	37669	+11.78
1815	39465	+16.64
1845	41803	
1875	44665	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector A 7/1/2009
Alpha Volts: 870 Beta Volts: 1530

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	2	>100
1005	33	>100
1035	203	>100
1065	668	>100
1095	1403	>100
1125	2545	>100
1155	3800	>100
1185	5363	>100
1215	7355	+95.00
1245	9807	+87.69
1275	12700	+80.28

VOLTS	COUNTS	%/100 Volts
1305	16226	+71.71
1335	20083	+61.95
1365	23913	+49.99
1395	27526	+36.97
1425	30193	+24.54
1455	31747	+14.71
1485	32544	+7.71
1515	33198	+3.66
1545	33188	+1.51
1575	33227	+0.73
1605	33278	+1.04
1635	33518	+1.38
1665	33565	+1.95
1695	33774	+1.99
1725	34135	+3.30
1755	34244	+3.67
1785	35022	+4.84
1815	35229	+5.93
1845	36179	
1875	36821	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector B 7/1/2009
Alpha Volts: 870 Beta Volts: 1530

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	4	>100
1005	45	>100
1035	300	>100
1065	836	>100
1095	1742	>100
1125	2896	>100
1155	4198	>100
1185	5849	>100
1215	7887	+92.20
1245	10561	+83.55
1275	13442	+76.62

VOLTS	COUNTS	%/100 Volts
1305	16723	+68.78
1335	20749	+60.55
1365	24686	+48.78
1395	28343	+35.24
1425	30657	+24.31
1455	32208	+15.22
1485	33662	+9.32
1515	34098	+4.47
1545	34326	+2.17
1575	34133	+1.60
1605	34758	+1.41
1635	34706	+1.35
1665	34769	+0.30
1695	34830	-0.10
1725	34850	+0.90
1755	34613	+2.41
1785	35351	+3.87
1815	35849	+4.97
1845	36285	
1875	36814	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector C 7/1/2009
Alpha Volts: 870 Beta Volts: 1530

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	>100
915	1	>100
945	2	>100
975	3	>100
1005	64	>100
1035	349	>100
1065	970	>100
1095	1982	>100
1125	3328	>100
1155	5012	>100
1185	6669	>100
1215	9448	+92.67
1245	12293	+86.58
1275	15917	+76.99

VOLTS	COUNTS	%/100 Volts
1305	20192	+70.39
1335	24524	+60.97
1365	29650	+48.44
1395	33904	+35.09
1425	36549	+22.73
1455	38217	+13.58
1485	39628	+7.51
1515	40035	+3.73
1545	40020	+1.92
1575	40236	+2.06
1605	40680	+1.62
1635	40953	+1.03
1665	40643	+0.43
1695	40882	+1.41
1725	40979	+2.18
1755	41654	+2.20
1785	41602	+2.27
1815	41935	+4.50
1845	42259	
1875	44183	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector D 7/1/2009

Alpha Volts: 870 Beta Volts: 1530

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

VOLTS	COUNTS	%/100 Volts
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 Instrument 10 MPC 9604 Detector A 7/1/2009
Alpha Volts: 870 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	37	>100
1035	198	>100
1065	687	>100
1095	1491	>100
1125	2580	>100
1155	3920	>100
1185	5588	>100
1215	7384	+91.32
1245	9794	+84.81
1275	12572	+79.73

VOLTS	COUNTS	%/100 Volts
1305	16076	+72.76
1335	19985	+63.85
1365	24102	+50.95
1395	27819	+36.01
1425	30228	+23.86
1455	31343	+14.40
1485	32811	+8.77
1515	33243	+6.10
1545	33518	+3.25
1575	34010	+1.98
1605	34061	+1.59
1635	33973	+0.97
1665	34346	+0.93
1695	34366	+1.72
1725	34341	+1.54
1755	34860	+2.47
1785	34897	+4.50
1815	35377	+6.60
1845	36458	
1875	37630	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector B 7/1/2009
Alpha Volts: 870 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	7	>100
1005	28	>100
1035	190	>100
1065	597	>100
1095	1474	>100
1125	2383	>100
1155	3680	>100
1185	5131	>100
1215	6808	+89.95
1245	8990	+83.03
1275	11493	+77.30

VOLTS	COUNTS	%/100 Volts
1305	14469	+71.08
1335	17904	+63.07
1365	21677	+51.20
1395	25027	+38.06
1425	27237	+24.55
1455	28914	+14.61
1485	29480	+8.48
1515	30075	+5.06
1545	30374	+3.42
1575	30738	+1.68
1605	30703	+1.08
1635	30679	+0.77
1665	30902	+1.46
1695	30992	+1.89
1725	31224	+2.40
1755	31397	+3.27
1785	31826	+4.13
1815	32236	+5.59
1845	32782	
1875	33632	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector C 7/1/2009

Alpha Volts: 870 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	>100
915	0	>100
945	2	>100
975	2	>100
1005	36	>100
1035	220	>100
1065	780	>100
1095	1712	>100
1125	2926	>100
1155	4297	>100
1185	6097	>100
1215	8397	+95.11
1245	11155	+85.84
1275	14430	+78.79

VOLTS	COUNTS	%/100 Volts
1305	18051	+71.16
1335	22586	+62.34
1365	26973	+51.47
1395	31137	+38.24
1425	34321	+25.70
1455	36267	+15.37
1485	37197	+9.21
1515	37851	+5.38
1545	38622	+3.00
1575	38600	+1.55
1605	38538	+1.03
1635	38786	+0.91
1665	39129	+1.38
1695	38832	+1.20
1725	39323	+2.00
1755	39390	+3.35
1785	40031	+4.86
1815	40466	+6.64
1845	41713	
1875	42620	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector D 7/1/2009

Alpha Volts: 870 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	3	>100
1005	49	>100
1035	244	>100
1065	764	>100
1095	1584	>100
1125	2677	>100
1155	3763	>100
1185	5395	>100
1215	7350	+93.71
1245	9655	+83.52
1275	12504	+76.82

VOLTS	COUNTS	%/100 Volts
1305	15430	+69.87
1335	19258	+61.49
1365	23018	+50.06
1395	26562	+35.34
1425	28750	+22.67
1455	29911	+13.20
1485	30798	+8.01
1515	31375	+4.83
1545	31684	+3.74
1575	31721	+2.38
1605	32398	+1.44
1635	32154	+0.64
1665	32157	-0.77
1695	32152	+0.99
1725	32029	+1.41
1755	32699	+3.00
1785	32566	+4.71
1815	33351	+5.92
1845	34031	
1875	34941	

Plateau 7/1/09 Instrument 11 MPC 9604 Detector A 7/1/2009

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	+0.00
975	0	>100
1005	0	>100
1035	2	>100
1065	9	>100
1095	61	>100
1125	248	>100
1155	528	>100
1185	882	>100
1215	1270	>100
1245	1786	>100
1275	2478	+93.67

VOLTS	COUNTS	%/100 Volts
1305	3225	+87.64
1335	4189	+80.15
1365	5428	+75.12
1395	6662	+68.60
1425	8241	+58.14
1455	9857	+46.65
1485	11018	+33.24
1515	11953	+21.01
1545	12538	+13.57
1575	12760	+8.35
1605	13114	+5.84
1635	13258	+4.78
1665	13430	+3.99
1695	13551	+5.46
1725	13771	+8.65
1755	14204	+16.44
1785	14916	+30.03
1815	16579	+48.74
1845	19717	
1875	25029	

Plateau 7/1/09 Instrument 11 MPC 9604 Detector B 7/1/2009

Alpha Volts: 1515 Beta Volts: 1515

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	11	>100
1005	47	>100
1035	280	>100
1065	610	>100
1095	1192	>100
1125	1789	>100
1155	2466	>100
1185	3337	+94.91
1215	4526	+88.85
1245	5885	+78.40
1275	7518	+72.09

VOLTS	COUNTS	%/100 Volts
1305	8947	+65.63
1335	11238	+56.58
1365	13246	+46.66
1395	14838	+30.69
1425	16166	+20.11
1455	16396	+11.95
1485	17161	+5.61
1515	17274	+3.59
1545	17144	-0.00
1575	17323	+0.80
1605	17136	+2.21
1635	17484	+1.94
1665	17638	+2.16
1695	17580	+0.85
1725	17655	+1.05
1755	17700	+1.98
1785	17857	+2.38
1815	18006	+3.36
1845	18140	
1875	18468	

Plateau 7/1/09 Instrument 11 MPC 9604 Detector C 7/1/2009

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+0.00
795	0	>100
825	1	+0.00
855	0	>100
885	0	+0.00
915	0	>100
945	1	>100
975	7	>100
1005	46	>100
1035	191	>100
1065	540	>100
1095	957	>100
1125	1597	>100
1155	2217	>100
1185	3154	+98.74
1215	4239	+89.75
1245	5550	+79.98
1275	6980	+73.12

VOLTS	COUNTS	%/100 Volts
1305	8636	+66.44
1335	10593	+56.56
1365	12582	+46.23
1395	13957	+33.45
1425	15443	+21.49
1455	16048	+13.14
1485	16331	+6.45
1515	16603	+4.19
1545	16736	+2.73
1575	16884	+1.11
1605	16875	+1.91
1635	16813	+2.86
1665	17257	+2.60
1695	17425	+1.58
1725	17238	+0.49
1755	17230	+0.63
1785	17482	+3.27
1815	17468	+4.46
1845	17977	
1875	18163	

Plateau 7/1/09 Instrument 11 MPC 9604 Detector D 7/1/2009

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	+83.33
885	1	+55.56
915	0	>100
945	1	>100
975	9	>100
1005	60	>100
1035	173	>100
1065	480	>100
1095	911	>100
1125	1508	>100
1155	2024	>100
1185	2872	+97.38
1215	3858	+89.30
1245	5070	+78.02
1275	6322	+73.30

VOLTS	COUNTS	%/100 Volts
1305	7679	+65.97
1335	9737	+57.57
1365	11301	+45.87
1395	12767	+31.71
1425	13767	+19.90
1455	14399	+10.72
1485	14467	+4.38
1515	14671	+2.12
1545	14576	+2.61
1575	14808	+1.80
1605	14974	+3.15
1635	14872	+1.76
1665	15248	-0.41
1695	15067	-0.27
1725	14784	-0.43
1755	15044	+2.01
1785	15163	+2.82
1815	15333	+3.61
1845	15278	
1875	15817	

Plateau 7/1/09 Instrument 12 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	3	>100
1035	17	>100
1065	84	>100
1095	267	>100
1125	709	>100
1155	1299	>100
1185	1813	>100
1215	2638	>100
1245	3777	+96.47
1275	4915	+87.98

VOLTS	COUNTS	%/100 Volts
1305	6302	+80.03
1335	8191	+73.78
1365	10140	+66.18
1395	12247	+55.83
1425	14468	+43.92
1455	16303	+31.28
1485	17411	+18.64
1515	18150	+9.87
1545	18275	+5.30
1575	18496	+3.16
1605	18685	+2.66
1635	18820	+2.63
1665	18855	+4.16
1695	19152	+7.70
1725	19706	+13.90
1755	20640	+26.51
1785	22308	+40.92
1815	26460	+51.46
1845	31616	
1875	37348	

Plateau 7/1/09 Instrument 12 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	+83.33
885	1	-83.33
915	0	-55.56
945	0	>100
975	1	>100
1005	43	>100
1035	165	>100
1065	557	>100
1095	1055	>100
1125	1775	>100
1155	2470	>100
1185	3617	+98.46
1215	4757	+90.95
1245	6186	+83.59
1275	8021	+77.85

VOLTS	COUNTS	%/100 Volts
1305	10207	+70.42
1335	12473	+60.75
1365	14900	+48.87
1395	17101	+35.36
1425	18643	+22.53
1455	19350	+12.34
1485	19848	+6.68
1515	20014	+3.51
1545	20278	+2.03
1575	20186	+0.80
1605	20375	+0.32
1635	20209	+1.36
1665	20364	+0.83
1695	20607	+2.43
1725	20429	+2.51
1755	20924	+3.64
1785	20984	+5.11
1815	21470	+5.63
1845	21773	
1875	22346	

Plateau 7/1/09 Instrument 12 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	+0.00
915	0	>100
945	0	>100
975	7	>100
1005	52	>100
1035	214	>100
1065	590	>100
1095	1201	>100
1125	1759	>100
1155	2569	>100
1185	3440	+95.13
1215	4583	+87.74
1245	5985	+81.67
1275	7682	+74.54

VOLTS	COUNTS	%/100 Volts
1305	9543	+67.01
1335	11617	+56.47
1365	13791	+45.47
1395	15387	+31.66
1425	16819	+20.02
1455	17210	+11.63
1485	17742	+6.05
1515	17892	+3.04
1545	18070	+1.09
1575	17856	+1.43
1605	18054	+0.42
1635	18287	+1.06
1665	17969	+0.78
1695	18187	+1.48
1725	18317	+4.89
1755	18518	+4.76
1785	19156	+5.18
1815	19100	+5.18
1845	19496	
1875	19842	

Plateau 7/1/09 Instrument 12 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	4	>100
1005	26	>100
1035	169	>100
1065	483	>100
1095	955	>100
1125	1639	>100
1155	2233	>100
1185	3262	+98.61
1215	4306	+89.77
1245	5662	+82.36
1275	7113	+76.36

VOLTS	COUNTS	%/100 Volts
1305	9144	+69.92
1335	11120	+58.43
1365	13399	+45.40
1395	14711	+32.57
1425	16134	+20.69
1455	16805	+13.46
1485	17209	+7.90
1515	17500	+4.31
1545	17812	+3.48
1575	17629	+2.80
1605	18066	+2.23
1635	18122	+1.44
1665	18166	+1.20
1695	17967	+1.60
1725	18469	+3.41
1755	18409	+6.35
1785	18884	+9.47
1815	19535	+11.98
1845	20630	
1875	21076	

Plateau 7/1/09 Instrument 13 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+55.56
795	2	>100
825	0	+0.00
855	0	>100
885	1	>100
915	0	>100
945	1	>100
975	14	>100
1005	104	>100
1035	281	>100
1065	720	>100
1095	1302	>100
1125	1834	>100
1155	2544	>100
1185	3485	+92.28
1215	4624	+85.50
1245	5878	+77.82
1275	7515	+71.49

VOLTS	COUNTS	%/100 Volts
1305	9209	+64.55
1335	11200	+55.94
1365	13123	+43.27
1395	14957	+29.04
1425	15658	+17.41
1455	16123	+8.01
1485	16530	+4.92
1515	16437	+2.71
1545	16704	+0.83
1575	16707	+2.14
1605	16602	+0.55
1635	17024	-0.28
1665	16684	-0.42
1695	16597	-0.85
1725	16711	+1.27
1755	16796	+1.51
1785	16903	+1.57
1815	16880	+1.46
1845	17066	
1875	17085	

Plateau 7/1/09 Instrument 13 MPC 9604 Detector B 7/1/2009
Alpha Volts: 705 Beta Volts: 1515

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	4	>100
1005	70	>100
1035	257	>100
1065	648	>100
1095	1116	>100
1125	1784	>100
1155	2560	>100
1185	3531	+96.11
1215	4568	+89.22
1245	6137	+81.65
1275	7855	+74.42

VOLTS	COUNTS	%/100 Volts
1305	9666	+64.39
1335	11722	+55.91
1365	13680	+44.91
1395	15677	+31.56
1425	16786	+19.46
1455	17283	+10.57
1485	17608	+5.95
1515	17972	+3.32
1545	18006	+1.84
1575	17970	+1.58
1605	18104	+0.74
1635	18351	+0.24
1665	18016	+0.16
1695	18080	-0.63
1725	18283	+0.29
1755	18047	-0.47
1785	18110	-0.32
1815	18040	+1.17
1845	18200	
1875	18320	

Plateau 7/1/09 Instrument 13 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	9	>100
1005	93	>100
1035	325	>100
1065	834	>100
1095	1525	>100
1125	2318	>100
1155	3233	>100
1185	4357	+92.07
1215	5755	+85.64
1245	7438	+78.35
1275	9463	+70.89

VOLTS	COUNTS	%/100 Volts
1305	11573	+64.95
1335	13929	+56.47
1365	16726	+43.82
1395	18834	+29.38
1425	19743	+16.84
1455	20314	+7.95
1485	20860	+4.16
1515	20670	+3.23
1545	20844	+2.09
1575	21330	+2.48
1605	21188	+1.16
1635	21280	-0.32
1665	21237	+0.08
1695	21202	+0.42
1725	21254	+0.60
1755	21406	+1.41
1785	21326	+0.42
1815	21619	+0.16
1845	21282	
1875	21478	

Plateau 7/1/09 Instrument 13 MPC 9604 Detector D 7/1/2009
Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	9	>100
1005	58	>100
1035	228	>100
1065	544	>100
1095	936	>100
1125	1468	>100
1155	2110	>100
1185	2770	+94.71
1215	3670	+85.91
1245	4937	+79.46
1275	6066	+70.79

VOLTS	COUNTS	%/100 Volts
1305	7524	+61.93
1335	9002	+55.36
1365	10542	+44.70
1395	12064	+31.21
1425	12981	+19.20
1455	13192	+10.41
1485	13570	+5.93
1515	13820	+4.08
1545	13866	+0.75
1575	13880	+0.21
1605	13695	+0.59
1635	13950	+0.77
1665	13954	+1.92
1695	13911	+0.19
1725	14116	+0.02
1755	13908	-0.24
1785	13960	-0.81
1815	13939	+0.71
1845	13931	
1875	14071	

Plateau 7/1/09 Instrument 14 MPC 9604 Detector A 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	+0.00
915	0	>100
945	0	>100
975	0	>100
1005	18	>100
1035	137	>100
1065	430	>100
1095	865	>100
1125	1444	>100
1155	2151	>100
1185	2981	>100
1215	4168	+92.14
1245	5377	+84.73
1275	6924	+74.92

VOLTS	COUNTS	%/100 Volts
1305	8778	+67.49
1335	10502	+57.68
1365	12516	+46.36
1395	14215	+35.88
1425	15472	+22.01
1455	16469	+12.99
1485	16342	+6.70
1515	16874	+3.07
1545	16918	+2.53
1575	16950	+0.58
1605	16943	+0.95
1635	17008	+2.13
1665	17130	+2.45
1695	17403	+2.43
1725	17377	+2.43
1755	17515	+4.88
1785	17710	+7.54
1815	18533	+9.04
1845	18905	
1875	19415	

Plateau 7/1/09 Instrument 14 MPC 9604 Detector B 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	+0.00
885	0	>100
915	0	>100
945	0	>100
975	3	>100
1005	40	>100
1035	210	>100
1065	590	>100
1095	983	>100
1125	1645	>100
1155	2342	>100
1185	3045	+96.43
1215	4201	+90.42
1245	5579	+83.64
1275	7121	+74.44

VOLTS	COUNTS	%/100 Volts
1305	8797	+65.44
1335	10726	+54.47
1365	12570	+41.11
1395	13917	+26.79
1425	14687	+15.44
1455	15048	+8.47
1485	15318	+5.00
1515	15494	+3.76
1545	15606	+3.04
1575	15776	+2.35
1605	15889	+1.44
1635	15907	-0.16
1665	15881	+0.64
1695	15741	+1.21
1725	16124	+3.63
1755	16076	+5.41
1785	16588	+5.79
1815	16830	+7.53
1845	17185	
1875	17682	

Plateau 7/1/09 Instrument 14 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	+0.00
915	0	>100
945	0	>100
975	2	>100
1005	21	>100
1035	132	>100
1065	491	>100
1095	1036	>100
1125	1698	>100
1155	2517	>100
1185	3468	>100
1215	4721	+91.83
1245	6175	+85.13
1275	8025	+76.82

VOLTS	COUNTS	%/100 Volts
1305	10118	+69.76
1335	12269	+59.65
1365	14810	+47.35
1395	16773	+33.46
1425	18104	+20.13
1455	18720	+11.98
1485	19122	+6.50
1515	19580	+4.77
1545	19527	+2.48
1575	19902	+0.81
1605	19690	+0.53
1635	19739	+0.23
1665	19765	+1.29
1695	19932	+1.40
1725	19976	+2.72
1755	20051	+2.92
1785	20523	+4.26
1815	20542	+5.57
1845	21035	
1875	21528	

Plateau 7/1/09 Instrument 14 MPC 9604 Detector D 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	14	>100
1035	130	>100
1065	363	>100
1095	785	>100
1125	1357	>100
1155	1996	>100
1185	2735	+99.45
1215	3785	+94.20
1245	4857	+86.43
1275	6571	+78.80

VOLTS	COUNTS	%/100 Volts
1305	8095	+71.16
1335	10052	+58.38
1365	11990	+47.92
1395	13400	+35.01
1425	14808	+23.58
1455	15554	+13.45
1485	15987	+6.39
1515	15861	+3.45
1545	16156	+2.18
1575	16297	+1.72
1605	16297	+1.33
1635	16208	+1.62
1665	16526	+2.92
1695	16581	+3.94
1725	16832	+5.91
1755	17039	+8.68
1785	17800	+11.53
1815	18351	+11.46
1845	19265	
1875	19468	

Standardization of Barium Carrier 2628181

v1.2.1

Analyst	BXF1

Standard Information	
Isotope	Barium
Serial Number	2628181
Amount of Std. (mL)	1.0
Standard Prepared	12/7/2017

Parent Information	
Parent Serial #	2494363
Parent Exp. Date	5/11/2019

Std #	Weight of carrier added (g)	Weight of crucible or filter (g)	Weight of crucible or filter + ppt. (g)	Weight of ppt. (g)	mg Barium/mL	mg Barium/g
1	1.0100	0.0744	0.1008	0.0264	26.40	26.14
2	1.0200	0.0745	0.1010	0.0265	26.50	25.98
3	1.0300	0.0741	0.1005	0.0264	26.40	25.63
4	1.0100	0.0743	0.1009	0.0266	26.60	26.34

Mean Value (mg/mL) =	26.48
Stdev (mg/mL) =	± 0.10
1.0% of Mean Value =	0.264750
	Pass
Expiration Date	**12/7/2018**
Mean Value (mg/1.0mL) =	26.48

Standardization Rule

A satisfactory standardization is obtained when results give a standard deviation of less than 1.0% of the mean value.

12-8-17

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

15541

84468-278
5 mL Liquid in Flame Sealed Vial

Customer: General Engineering Labs, LLC/Charleston, SC
P.O. No.: 936808RD, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked with a germanium gamma spectrometer system. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ra-226	5.844E+05	3.786E+04	0.5	2.4	4.9	04/25/2011

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities (other than decay products) < 0.1 %. 5.04904 grams 0.1M HCl solution with approximately 50 μg/g Ba carrier.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 4/25/11
J. D. McCorvey, QA Manager Alternate

RECEIVED 4/27/11

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

RC-S-060-086

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1541
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	04/25/2011
Ampoule Mass (g):	5.04904 g
Uncertainty:	+/- 4.9 %
LogBook No:	RC-S-060-086

A Solution Material Info	
Isotope:	Radium-226
Prepared By:	Gregory Ramsay
Prep Date:	03/06/2012
Verification Date:	04/11/2018
Expiration Date:	04/11/2019
Primary Code:	1541-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.2773 g
Density(g/mL):	0.9971
Balance ID:	38080204

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

(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / (Ampoule Mass(g) *(Dilution Vol)) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / Density / (Ampoule Mass (g) * (Dilution Vol)) = Parent Activity (dpm/g)
(4.2773 g) * (37860 Bq) * (60 dpm/Bq) / (5.04904 g * 100 mL) = 19243.8853 dpm/mL
(4.2773 g) * (37860 Bq) * (60 dpm/Bq) / (0.9971 g/mL)/ (5.04904 g * 100 mL) = 19299.1388 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

Verification for Ra-226 Standard 1541-A

v1.0.2

Instrument	Red
Analyst	GXR1
Verification Prep Date	4/11/2018

Standard Information	
Isotope	Ra-226
Serial Number	1541-A
Isotope Halflife	1.6000E+03 Y
Reference Date	4/25/2011
Ref. Act. (DPM/mL)	19243.8853
Amount of Std. (mL)	0.1
Standard Prep Date	3/6/2012

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	5/2/2018	79.40	7826.15	7.47
2	5/2/2018	79.50	7775.38	7.47
3	5/2/2018	79.60	7714.07	7.47

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	7818.68	4.145457	18860.84	1886.08
2	7767.91	4.145457	18738.37	1873.84
3	7706.60	4.145457	18590.47	1859.05

	dpm/mL
Mean Value =	18729.90
Stdev =	135.3832494
Certificate Value* =	**19185.5**
Two sigma =	270.766
10 % of Mean =	1872.990
Rule A (Pass/Fail)	**Pass**
% Recovery	97.63%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**4/11/2019**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 1541-A by transferring 0.1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Mineral Oil liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Mineral Oil liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCRed for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 4/11/2018 using Ra-226 source 0299-J.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

5/3/18

5/2/18

General Engineering Laboratories
GFC Calibration Source Preparation Sheet

Total Radium

Applicable SOP Number	GL-RAD-A-010 / GL-RAD-A-044	Isotope	Ra-226
Date Standards Prepared	4/11/2018		
Standard ID	1541-A	Matrix of Planchett/Filter	Barium Sulfate ppt on 47 mm 0.45 filter
Amount Used (g or ml)	0.5 mL		
Standard Activity (DPM/g or mL)	* 19243.89 dpm/mL	Residue/Carrier Agent	Barium Carrier - 2628181
Reference Date	4/25/2011	Pipette ID Used	2154115
Expiration Date	4/11/2019	Balance ID Used	F30560

*** Not Decay Corrected**

Separation Date / Time: 4/11/2018 14:40

	Standard Number	Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	C1	0.4	0.0657	0.0725	6.8
	C2	0.6	0.0660	0.0787	12.7
	C3	0.8	0.0653	0.0815	16.2
	C4	1.0	0.0660	0.0901	24.1
	C5	1.5	0.0660	0.1039	37.9
	C6	2.0	0.0651	0.1173	52.2
	C7	3.0	0.0654	0.1445	79.1
	C8	3.5	0.0657	0.1584	92.7

Prepared By: Date 5/4/2018

Reviewed By: Date 5/4/2018

Nycomed Amersham plc
Amersham Laboratories

[redacted]

NAMAS
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 Signatory

Date of issue 17th December 1999

Nycomed Amersham

B D D Singleton

This certificate is issued in accordance with the requirements of the United Kingdom Accreditation Service as specified in the NAMAS Accreditation Standard and NAMAS regulations. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not

RC-S-028-128 A

0299

[redacted]

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Measurement	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.

Accuracy

Expanded uncertainty in the radioactive concentration quoted above: ± 2.5 %

Combined Type A uncertainty: ± 0.2 %

Combined Type B uncertainty: ± 1.3 %

Radionuclidic 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 composition

Carrier free in 0.5M HCl.

Remarks

This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.

RC-S-028-128 B

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:	04/14/2016
Expiration Date:	04/14/2017
Primary Code:	0299-A
Dilution(mL):	100 mL
Mass of Parent(g):	4.6634 g
Density(g/mL):	1.0011
Balance ID:	C31514

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

(Mass of parent(g)) * (Parm Activity (kBq/g)) * (conversion dpm to kBq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (kBq/g)) * (conversion dpm to kBq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.6634 g) * (43.75 kBq/g) * (60000 dpm/kBq) / (100 mL) = 122414.2500 dpm/mL
(4.6634 g) * (43.75 kBq/g) * (60000 dpm/kBq) / (1.0011 g/mL) / (100 mL) = 122280.0000 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	12/20/2017	12/20/2018
03/15/2011	Gregory Ramsay	5.0716	250	0299-I	2480.4858 dpm/mL	01/08/2016	01/08/2017
05/29/2012	Gregory Ramsay	1.5087	100	0299-J	1844.73785 dpm/mL	06/16/2017	06/16/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 0299-H

v1.0.2

Instrument	Yellow
Analyst	GXR1
Verification Prep Date	12/20/2017

Standard Information	
Isotope	Ra-226
Serial Number	0299-H
Isotope Halflife	1.6000E+03 Y
Reference Date	12/15/1999
Ref. Act. (DPM/mL)	2483.2133
Amount of Std. (mL)	0.5
Standard Prep Date	8/7/2009

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/21/2017	769.07	526.30	10.20
2	12/21/2017	769.61	534.20	10.20
3	12/21/2017	768.82	523.10	10.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	516.10	0.418431	2466.83	1233.42
2	524.00	0.418431	2504.60	1252.30
3	512.90	0.418431	2451.54	1225.77

	dpm/mL
Mean Value =	2474.32
Stdev =	27.30885385
Certificate Value* =	**2463.9**
Two sigma =	54.618
10 % of Mean =	247.432
Rule A (Pass/Fail)	**Pass**
% Recovery	100.42%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/20/2018**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 0299-H by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYellow for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/19/2017 using Ra-226 source 1715-D.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

2-5-18

2/2/18

General Engineering Laboratories
GFC Verification Source Preparation Sheet

Total Radium

Applicable SOP Number	GL-RAD-A-010 / GL-RAD-A-044	Isotope	Ra-226
Date Standards Prepared	4/11/2018		
Standard ID	0299-H	Matrix of Planchett/Filter	Barium Sulfate ppt on 47 mm 0.45 filter
Amount Used (g or ml)	0.5 mL		
Standard Activity (DPM/g or mL)	* 2483.21 dpm/mL	Residue/Carrier Agent	Barium Carrier - 2628181
Reference Date	12/15/1999	Pipette ID Used	2154115
Expiration Date	12/20/2018	Balance ID Used	F30560

*** Not Decay Corrected**

Separation Date / Time: 4/11/2018 14:40

	Standard Number	Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	V1	0.4	0.0652	0.0732	8.0
	V2	0.5	0.0657	0.0760	10.3
	V3	0.8	0.0658	0.0852	19.4
	V4	1.0	0.0654	0.0905	25.1
	V5	1.5	0.0655	0.1047	39.2
	V6	2.0	0.0651	0.1160	50.9
	V7	2.5	0.0654	0.1319	66.5
	V8	3.5	0.0656	0.1597	94.1

Prepared By: _____ Date 5/4/2018

Reviewed By: _____ Date 5/4/2018

Gas Flow Proportional Counter Calibration Package

Method: Radium 228

Instrument (circle one): LB4100 / Protean / G5400W

	Part 1: Efficiency determination	Included/ Acceptable	Comments
1	Efficiency spreadsheet (eff pts, graphs, trendline equation)	✓	
2	Applicable portion of GFPC_Machines.XLS	✓	
3	Raw Data for Calibration standards	✓	
4	Verification Spreadsheet and Raw Data (recoveries 75%-125%)	✓	
5	Plateau graph and raw data	✓	
6	Standardization of Carrier (if applicable)	NA	

	Part 2. Documentation for Calibration Source		
1	Vendor Certificate	✓	
2	Standard Traceability Log (from LIMS)	✓	
3	Current Verification of Source	✓	
4	Source preparation sheet	✓	

	Part 3. Documentation for Verification Source		
1	Vendor Certificate	✓	
2	Standard Traceability Log (from LIMS)	✓	
3	Current Verification of Source	✓	
4	Source preparation sheet	✓	

	Part 4. Enter into LIMS		
1	Alpha LIMS instrument calibration updated	✓	

Primary Review of Package Nathaniel Ivey III

Secondary Review of Package Angela A Gil

Effective Date: 6/1/2019

Expiration Date: 5/31/2020

GEL Laboratories
2040 Savage Road, Charleston, SC 29407
(843)556-8171

Rev 7 SSC 8/3/09

Ra-228 Calibration - PIC - May 2019

Standard Data		
	Isotope	**Ra-228**
	Standard ID number	1835-A
	Half Life (days)	2100.1875
	Std. Act. (dpm/mL)	602.7021
	Reference Date	10/7/2010
	Volume of spike (mL)	5.0
	Std. Nominal (dpm)	1068.35
	Decay Date	5/15/2019

Separation Date/Time 5/15/2019 9:05
Ac-228 Half Life (days) 0.25625
The following detectors were not calibrated:
3A, 6D, 13C

*Background is considered neglible.
**Decay corrected to mid-point of count

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
1A	1	5/15/2019 10:53	3	1764	588.00	0.81312	723.14	1068.19	**0.6770**	
1A	2	5/15/2019 11:06	3	1702	567.33	0.79437	714.19	1068.19	**0.6686**	
1A	3	5/15/2019 11:02	3	1712	570.67	0.80034	713.03	1068.19	**0.6675**	
1A	4	5/15/2019 10:57	3	1709	569.67	0.80665	706.21	1068.19	**0.6611**	
1A	5	5/15/2019 11:10	3	1603	534.33	0.78830	677.83	1068.19	**0.6346**	
1A	6	5/15/2019 11:23	3	1549	516.33	0.76849	671.88	1068.19	**0.6290**	
1A	7	5/15/2019 11:18	3	1649	549.67	0.77640	707.97	1068.19	**0.6628**	
1A	8	5/15/2019 11:14	3	1784	594.67	0.78257	759.89	1068.19	**0.7114**	0.6640
1B	1	5/15/2019 10:57	3	1681	560.33	0.80660	694.68	1068.19	**0.6503**	
1B	2	5/15/2019 10:53	3	1659	553.00	0.81296	680.23	1068.19	**0.6368**	
1B	3	5/15/2019 11:06	3	1759	586.33	0.79427	738.20	1068.19	**0.6911**	
1B	4	5/15/2019 11:02	3	1655	551.67	0.80029	689.34	1068.19	**0.6453**	
1B	5	5/15/2019 11:14	3	1606	535.33	0.78238	684.24	1068.19	**0.6406**	
1B	6	5/15/2019 11:10	3	1680	560.00	0.78820	710.48	1068.19	**0.6651**	
1B	7	5/15/2019 11:23	3	1725	575.00	0.76839	748.31	1068.19	**0.7005**	
1B	8	5/15/2019 11:18	3	1748	582.67	0.77630	750.57	1068.19	**0.7027**	0.6666
1C	1	5/15/2019 11:02	3	1608	536.00	0.80011	669.91	1068.19	**0.6271**	
1C	2	5/15/2019 10:58	3	1554	518.00	0.80642	642.34	1068.19	**0.6013**	
1C	3	5/15/2019 10:53	3	1672	557.33	0.81276	685.73	1068.19	**0.6420**	
1C	4	5/15/2019 11:06	3	1577	525.67	0.79415	661.93	1068.19	**0.6197**	
1C	5	5/15/2019 11:18	3	1512	504.00	0.77616	649.35	1068.19	**0.6079**	
1C	6	5/15/2019 11:14	3	1551	517.00	0.78228	660.89	1068.19	**0.6187**	
1C	7	5/15/2019 11:10	3	1638	546.00	0.78808	692.82	1068.19	**0.6486**	
1C	8	5/15/2019 11:23	3	1661	553.67	0.76830	720.64	1068.19	**0.6746**	0.6300
1D	1	5/15/2019 11:06	3	1747	582.33	0.79407	733.35	1068.19	**0.6865**	
1D	2	5/15/2019 11:02	3	1611	537.00	0.80004	671.22	1068.19	**0.6284**	
1D	3	5/15/2019 10:58	3	1653	551.00	0.80635	683.33	1068.19	**0.6397**	
1D	4	5/15/2019 10:53	3	1696	565.33	0.81258	695.72	1068.19	**0.6513**	
1D	5	5/15/2019 11:23	3	1635	545.00	0.76820	709.45	1068.19	**0.6642**	
1D	6	5/15/2019 11:18	3	1509	503.00	0.77611	648.11	1068.19	**0.6067**	
1D	7	5/15/2019 11:14	3	1638	546.00	0.78218	698.05	1068.19	**0.6535**	
1D	8	5/15/2019 11:10	3	1681	560.33	0.78798	711.10	1068.19	**0.6657**	0.6495
2A	1	5/15/2019 11:10	3	1570	523.33	0.78788	664.23	1068.19	**0.6218**	
2A	2	5/15/2019 11:23	3	1574	524.67	0.76813	683.04	1068.19	**0.6394**	
2A	3	5/15/2019 11:18	3	1594	531.33	0.77591	684.79	1068.19	**0.6411**	
2A	4	5/15/2019 11:14	3	1543	514.33	0.78208	657.65	1068.19	**0.6157**	
2A	5	5/15/2019 10:54	3	1661	553.67	0.81240	681.52	1068.19	**0.6380**	
2A	6	5/15/2019 11:06	3	1573	524.33	0.79395	660.41	1068.19	**0.6183**	
2A	7	5/15/2019 11:02	3	1744	581.33	0.79991	726.75	1068.19	**0.6804**	
2A	8	5/15/2019 10:58	3	1612	537.33	0.80622	666.48	1068.19	**0.6239**	0.6348
2B	1	5/15/2019 11:14	3	1667	555.67	0.78157	710.96	1068.19	**0.6656**	
2B	2	5/15/2019 11:10	3	1704	568.00	0.78773	721.06	1068.19	**0.6750**	
2B	3	5/15/2019 11:24	3	1643	547.67	0.76801	713.10	1068.18	**0.6676**	
2B	4	5/15/2019 11:18	3	1559	519.67	0.77586	669.79	1068.19	**0.6270**	
2B	5	5/15/2019 10:58	3	1612	537.33	0.80612	666.57	1068.19	**0.6240**	
2B	6	5/15/2019 10:54	3	1607	535.67	0.81228	659.46	1068.19	**0.6174**	
2B	7	5/15/2019 11:06	3	1741	580.33	0.79385	731.04	1068.19	**0.6844**	
2B	8	5/15/2019 11:02	3	1779	593.00	0.79986	741.38	1068.19	**0.6941**	0.6569

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
2C	1	5/15/2019 11:18	3	1635	545.00	0.77577	702.53	1068.19	**0.6577**	
2C	2	5/15/2019 11:14	3	1668	556.00	0.78152	711.43	1068.19	**0.6660**	
2C	3	5/15/2019 11:10	3	1647	549.00	0.78766	697.00	1068.19	**0.6525**	
2C	4	5/15/2019 11:24	3	1597	532.33	0.76796	693.18	1068.18	**0.6489**	
2C	5	5/15/2019 11:02	3	1664	554.67	0.79971	693.58	1068.19	**0.6493**	
2C	6	5/15/2019 10:58	3	1595	531.67	0.80602	659.62	1068.19	**0.6175**	
2C	7	5/15/2019 10:54	3	1799	599.67	0.81210	738.41	1068.19	**0.6913**	
2C	8	5/15/2019 11:06	3	1736	578.67	0.79375	729.03	1068.19	**0.6825**	0.6582
2D	1	5/15/2019 11:24	3	1511	503.67	0.76789	655.91	1068.18	**0.6140**	
2D	2	5/15/2019 11:18	3	1527	509.00	0.77569	656.19	1068.19	**0.6143**	
2D	3	5/15/2019 11:14	3	1584	528.00	0.78140	675.71	1068.19	**0.6326**	
2D	4	5/15/2019 11:10	3	1625	541.67	0.78756	687.78	1068.19	**0.6439**	
2D	5	5/15/2019 11:06	3	1591	530.33	0.79365	668.22	1068.19	**0.6256**	
2D	6	5/15/2019 11:02	3	1622	540.67	0.79961	676.16	1068.19	**0.6330**	
2D	7	5/15/2019 10:58	3	1703	567.67	0.80592	704.37	1068.19	**0.6594**	
2D	8	5/15/2019 10:54	3	1689	563.00	0.81192	693.42	1068.19	**0.6491**	0.6340
3B	1	5/15/2019 11:31	3	1551	517.00	0.75710	682.87	1068.18	**0.6393**	
3B	2	5/15/2019 11:27	3	1557	519.00	0.76291	680.29	1068.18	**0.6369**	
3B	3	5/15/2019 11:45	3	1544	514.67	0.73814	697.25	1068.18	**0.6527**	
3B	4	5/15/2019 11:41	3	1584	528.00	0.74385	709.82	1068.18	**0.6645**	
3B	5	5/15/2019 11:53	3	1445	481.67	0.72672	662.79	1068.18	**0.6205**	
3B	6	5/15/2019 11:49	3	1495	498.33	0.73234	680.47	1068.18	**0.6370**	
3B	7	5/15/2019 12:01	3	1540	513.33	0.71568	717.27	1068.18	**0.6715**	
3B	8	5/15/2019 11:57	3	1601	533.67	0.72121	739.96	1068.18	**0.6927**	0.6519
3C	1	5/15/2019 11:41	3	1613	537.67	0.74387	722.79	1068.18	**0.6767**	
3C	2	5/15/2019 11:31	3	1621	540.33	0.75700	713.78	1068.18	**0.6682**	
3C	3	5/15/2019 11:27	3	1623	541.00	0.76291	709.13	1068.18	**0.6639**	
3C	4	5/15/2019 11:45	3	1453	484.33	0.73807	656.21	1068.18	**0.6143**	
3C	5	5/15/2019 11:57	3	1520	506.67	0.72110	702.63	1068.18	**0.6578**	
3C	6	5/15/2019 11:53	3	1530	510.00	0.72638	702.11	1068.18	**0.6573**	
3C	7	5/15/2019 11:49	3	1594	531.33	0.73225	725.62	1068.18	**0.6793**	
3C	8	5/15/2019 12:01	3	1459	486.33	0.71557	679.65	1068.18	**0.6363**	0.6567
3D	1	5/15/2019 11:45	3	1471	490.33	0.73798	664.43	1068.18	**0.6220**	
3D	2	5/15/2019 11:41	3	1520	506.67	0.74387	681.12	1068.18	**0.6376**	
3D	3	5/15/2019 11:31	3	1622	540.67	0.75696	714.26	1068.18	**0.6687**	
3D	4	5/15/2019 11:27	3	1469	489.67	0.76291	641.84	1068.18	**0.6009**	
3D	5	5/15/2019 12:01	3	1496	498.67	0.71550	696.95	1068.18	**0.6525**	
3D	6	5/15/2019 11:57	3	1492	497.33	0.72099	689.79	1068.18	**0.6458**	
3D	7	5/15/2019 11:53	3	1613	537.67	0.72629	740.29	1068.18	**0.6930**	
3D	8	5/15/2019 11:49	3	1656	552.00	0.73218	753.91	1068.18	**0.7058**	0.6533
4A	1	5/15/2019 11:49	3	1612	537.33	0.73204	734.02	1068.18	**0.6872**	
4A	2	5/15/2019 12:01	3	1492	497.33	0.71528	695.30	1068.18	**0.6509**	
4A	3	5/15/2019 11:57	3	1528	509.33	0.72090	706.53	1068.18	**0.6614**	
4A	4	5/15/2019 11:53	3	1502	500.67	0.72620	689.43	1068.18	**0.6454**	
4A	5	5/15/2019 11:27	3	1511	503.67	0.76283	660.26	1068.18	**0.6181**	
4A	6	5/15/2019 11:45	3	1522	507.33	0.73786	687.57	1068.18	**0.6437**	
4A	7	5/15/2019 11:41	3	1654	551.33	0.74387	741.17	1068.18	**0.6939**	
4A	8	5/15/2019 11:31	3	1696	565.33	0.75686	746.94	1068.18	**0.6993**	0.6625
4B	1	5/15/2019 11:53	3	1460	486.67	0.72613	670.22	1068.18	**0.6274**	
4B	2	5/15/2019 11:49	3	1467	489.00	0.73197	668.06	1068.18	**0.6254**	
4B	3	5/15/2019 12:01	3	1446	482.00	0.71519	673.95	1068.18	**0.6309**	
4B	4	5/15/2019 11:57	3	1420	473.33	0.72083	656.65	1068.18	**0.6147**	
4B	5	5/15/2019 11:31	3	1600	533.33	0.75677	704.75	1068.18	**0.6598**	
4B	6	5/15/2019 11:27	3	1513	504.33	0.76283	661.13	1068.18	**0.6189**	
4B	7	5/15/2019 11:45	3	1553	517.67	0.73777	701.66	1068.18	**0.6569**	
4B	8	5/15/2019 11:41	3	1636	545.33	0.74389	733.08	1068.18	**0.6863**	0.6400
4C	1	5/15/2019 11:57	3	1460	486.67	0.72072	675.25	1068.18	**0.6322**	
4C	2	5/15/2019 11:53	3	1465	488.33	0.72597	672.66	1068.18	**0.6297**	
4C	3	5/15/2019 11:49	3	1584	528.00	0.73184	721.47	1068.18	**0.6754**	
4C	4	5/15/2019 12:02	3	1477	492.33	0.71510	688.48	1068.18	**0.6445**	
4C	5	5/15/2019 11:41	3	1611	537.00	0.74389	721.88	1068.18	**0.6758**	
4C	6	5/15/2019 11:31	3	1523	507.67	0.75665	670.94	1068.18	**0.6281**	
4C	7	5/15/2019 11:27	3	1647	549.00	0.76283	719.69	1068.18	**0.6737**	
4C	8	5/15/2019 11:45	3	1592	530.67	0.73768	719.37	1068.18	**0.6735**	0.6541
4D	1	5/15/2019 12:02	3	1384	461.33	0.71501	645.21	1068.18	**0.6040**	
4D	2	5/15/2019 11:57	3	1349	449.67	0.72063	623.99	1068.18	**0.5842**	
4D	3	5/15/2019 11:54	3	1452	484.00	0.72590	666.76	1068.18	**0.6242**	

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
4D	4	5/15/2019 11:49	3	1421	473.67	0.73177	647.29	1068.18	**0.6060**	
4D	5	5/15/2019 11:45	3	1432	477.33	0.73749	647.24	1068.18	**0.6059**	
4D	6	5/15/2019 11:41	3	1366	455.33	0.74389	612.09	1068.18	**0.5730**	
4D	7	5/15/2019 11:32	3	1556	518.67	0.75655	685.56	1068.18	**0.6418**	
4D	8	5/15/2019 11:27	3	1533	511.00	0.76283	669.87	1068.18	**0.6271**	0.6083
5A	1	5/15/2019 12:05	3	1470	490.00	0.70999	690.15	1068.17	**0.6461**	
5A	2	5/15/2019 12:20	3	1442	480.67	0.69059	696.02	1068.17	**0.6516**	
5A	3	5/15/2019 12:16	3	1533	511.00	0.69551	734.71	1068.17	**0.6878**	
5A	4	5/15/2019 12:12	3	1528	509.33	0.70100	726.58	1068.17	**0.6802**	
5A	5	5/15/2019 12:24	3	1510	503.33	0.68559	734.16	1068.17	**0.6873**	
5A	6	5/15/2019 12:35	3	1413	471.00	0.67113	701.80	1068.17	**0.6570**	
5A	7	5/15/2019 12:31	3	1469	489.67	0.67617	724.18	1068.17	**0.6780**	
5A	8	5/15/2019 12:28	3	1598	532.67	0.68069	782.54	1068.17	**0.7326**	0.6776
5B	1	5/15/2019 12:12	3	1417	472.33	0.70085	673.95	1068.17	**0.6309**	
5B	2	5/15/2019 12:05	3	1502	500.67	0.70999	705.17	1068.17	**0.6602**	
5B	3	5/15/2019 12:20	3	1510	503.33	0.69046	728.98	1068.17	**0.6825**	
5B	4	5/15/2019 12:16	3	1455	485.00	0.69538	697.46	1068.17	**0.6529**	
5B	5	5/15/2019 12:28	3	1428	476.00	0.68097	699.00	1068.17	**0.6544**	
5B	6	5/15/2019 12:24	3	1541	513.67	0.68559	749.23	1068.17	**0.7014**	
5B	7	5/15/2019 12:35	3	1512	504.00	0.67104	751.07	1068.17	**0.7031**	
5B	8	5/15/2019 12:31	3	1474	491.33	0.67606	726.76	1068.17	**0.6804**	0.6707
5C	1	5/15/2019 12:16	3	1409	469.67	0.69564	675.15	1068.17	**0.6321**	
5C	2	5/15/2019 12:12	3	1508	502.67	0.70078	717.29	1068.17	**0.6715**	
5C	3	5/15/2019 12:09	3	1609	536.33	0.70549	760.23	1068.17	**0.7117**	
5C	4	5/15/2019 12:20	3	1450	483.33	0.69037	700.11	1068.17	**0.6554**	
5C	5	5/15/2019 12:31	3	1490	496.67	0.67596	734.76	1068.17	**0.6879**	
5C	6	5/15/2019 12:28	3	1371	457.00	0.68093	671.14	1068.17	**0.6283**	
5C	7	5/15/2019 12:24	3	1536	512.00	0.68559	746.80	1068.17	**0.6991**	
5C	8	5/15/2019 12:35	3	1532	510.67	0.67094	761.12	1068.17	**0.7125**	0.6748
5D	1	5/15/2019 12:20	3	1419	473.00	0.69068	684.84	1068.17	**0.6411**	
5D	2	5/15/2019 12:16	3	1411	470.33	0.69560	676.15	1068.17	**0.6330**	
5D	3	5/15/2019 12:12	3	1498	499.33	0.70069	712.63	1068.17	**0.6671**	
5D	4	5/15/2019 12:05	3	1489	496.33	0.71001	699.05	1068.17	**0.6544**	
5D	5	5/15/2019 12:35	3	1417	472.33	0.67090	704.03	1068.17	**0.6591**	
5D	6	5/15/2019 12:32	3	1444	481.33	0.67585	712.19	1068.17	**0.6667**	
5D	7	5/15/2019 12:28	3	1466	488.67	0.68078	717.81	1068.17	**0.6720**	
5D	8	5/15/2019 12:24	3	1519	506.33	0.68559	738.54	1068.17	**0.6914**	0.6606
6A	1	5/15/2019 12:27	3	1447	482.33	0.68133	707.93	1068.17	**0.6627**	
6A	2	5/15/2019 12:39	3	1337	445.67	0.66636	668.81	1068.17	**0.6261**	
6A	3	5/15/2019 12:35	3	1318	439.33	0.67144	654.31	1068.17	**0.6126**	
6A	4	5/15/2019 12:31	3	1353	451.00	0.67655	666.62	1068.17	**0.6241**	
6A	5	5/15/2019 12:09	3	1430	476.67	0.70556	675.59	1068.17	**0.6325**	
6A	6	5/15/2019 12:23	3	1454	484.67	0.68624	706.27	1068.17	**0.6612**	
6A	7	5/15/2019 12:20	3	1503	501.00	0.69098	725.06	1068.17	**0.6788**	
6A	8	5/15/2019 12:16	3	1547	515.67	0.69628	740.61	1068.17	**0.6933**	0.6489
6B	1	5/15/2019 12:31	3	1422	474.00	0.67640	700.77	1068.17	**0.6560**	
6B	2	5/15/2019 12:27	3	1327	442.33	0.68123	649.32	1068.17	**0.6079**	
6B	3	5/15/2019 12:39	3	1360	453.33	0.66629	680.38	1068.17	**0.6370**	
6B	4	5/15/2019 12:35	3	1333	444.33	0.67136	661.84	1068.17	**0.6196**	
6B	5	5/15/2019 12:16	3	1379	459.67	0.69630	660.16	1068.17	**0.6180**	
6B	6	5/15/2019 12:09	3	1381	460.33	0.70556	652.44	1068.17	**0.6108**	
6B	7	5/15/2019 12:24	3	1404	468.00	0.68617	682.05	1068.17	**0.6385**	
6B	8	5/15/2019 12:20	3	1462	487.33	0.69089	705.37	1068.17	**0.6604**	0.6310
6C	1	5/15/2019 12:35	3	1274	424.67	0.67128	632.63	1068.17	**0.5923**	
6C	2	5/15/2019 12:31	3	1352	450.67	0.67632	666.35	1068.17	**0.6238**	
6C	3	5/15/2019 12:27	3	1497	499.00	0.68114	732.59	1068.17	**0.6858**	
6C	4	5/15/2019 12:39	3	1400	466.67	0.66621	700.48	1068.17	**0.6558**	
6C	5	5/15/2019 12:20	3	1473	491.00	0.69106	710.50	1068.17	**0.6652**	
6C	6	5/15/2019 12:16	3	1474	491.33	0.69630	705.64	1068.17	**0.6606**	
6C	7	5/15/2019 12:09	3	1479	493.00	0.70556	698.74	1068.17	**0.6541**	
6C	8	5/15/2019 12:24	3	1537	512.33	0.68593	746.91	1068.17	**0.6992**	0.6546
7A	1	5/15/2019 12:43	3	1364	454.67	0.66209	686.71	1068.17	**0.6429**	
7A	2	5/15/2019 12:54	3	1393	464.33	0.64790	716.67	1068.16	**0.6709**	
7A	3	5/15/2019 12:50	3	1356	452.00	0.65289	692.31	1068.16	**0.6481**	
7A	4	5/15/2019 12:46	3	1364	454.67	0.65757	691.44	1068.16	**0.6473**	
7A	5	5/15/2019 12:58	3	1351	450.33	0.64285	700.53	1068.16	**0.6558**	
7A	6	5/15/2019 13:11	3	1284	428.00	0.62809	681.43	1068.16	**0.6379**	

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
7A	7	5/15/2019 13:07	3	1380	460.00	0.63273	727.01	1068.16	**0.6806**	
7A	8	5/15/2019 13:03	3	1485	495.00	0.63758	776.37	1068.16	**0.7268**	0.6638
7B	1	5/15/2019 12:46	3	1263	421.00	0.65753	640.28	1068.16	**0.5994**	
7B	2	5/15/2019 12:43	3	1330	443.33	0.66209	669.59	1068.17	**0.6269**	
7B	3	5/15/2019 12:54	3	1358	452.67	0.64780	698.77	1068.16	**0.6542**	
7B	4	5/15/2019 12:50	3	1355	451.67	0.65281	691.88	1068.16	**0.6477**	
7B	5	5/15/2019 13:03	3	1336	445.33	0.63752	698.54	1068.16	**0.6540**	
7B	6	5/15/2019 12:58	3	1308	436.00	0.64279	678.29	1068.16	**0.6350**	
7B	7	5/15/2019 13:11	3	1381	460.33	0.62801	733.00	1068.16	**0.6862**	
7B	8	5/15/2019 13:07	3	1400	466.67	0.63265	737.64	1068.16	**0.6906**	0.6492
7C	1	5/15/2019 12:50	3	1345	448.33	0.65275	686.84	1068.16	**0.6430**	
7C	2	5/15/2019 12:46	3	1378	459.33	0.65742	698.69	1068.16	**0.6541**	
7C	3	5/15/2019 12:43	3	1355	451.67	0.66207	682.20	1068.17	**0.6387**	
7C	4	5/15/2019 12:54	3	1361	453.67	0.64770	700.43	1068.16	**0.6557**	
7C	5	5/15/2019 13:07	3	1285	428.33	0.63263	677.07	1068.16	**0.6339**	
7C	6	5/15/2019 13:03	3	1351	450.33	0.63744	706.47	1068.16	**0.6614**	
7C	7	5/15/2019 12:58	3	1438	479.33	0.64267	745.85	1068.16	**0.6983**	
7C	8	5/15/2019 13:11	3	1375	458.33	0.62793	729.91	1068.16	**0.6833**	0.6585
7D	1	5/15/2019 12:54	3	1316	438.67	0.64764	677.33	1068.16	**0.6341**	
7D	2	5/15/2019 12:50	3	1377	459.00	0.65269	703.25	1068.16	**0.6584**	
7D	3	5/15/2019 12:46	3	1375	458.33	0.65734	697.25	1068.16	**0.6528**	
7D	4	5/15/2019 12:43	3	1362	454.00	0.66207	685.73	1068.17	**0.6420**	
7D	5	5/15/2019 13:11	3	1280	426.67	0.62787	679.54	1068.16	**0.6362**	
7D	6	5/15/2019 13:07	3	1274	424.67	0.63255	671.36	1068.16	**0.6285**	
7D	7	5/15/2019 13:03	3	1444	481.33	0.63738	755.17	1068.16	**0.7070**	
7D	8	5/15/2019 12:58	3.01	1416	470.43	0.64254	732.14	1068.16	**0.6854**	0.6555
8A	1	5/15/2019 12:58	3	1262	420.67	0.64253	654.70	1068.16	**0.6129**	
8A	2	5/15/2019 13:11	3	1249	416.33	0.62781	663.15	1068.16	**0.6208**	
8A	3	5/15/2019 13:07	3	1308	436.00	0.63245	689.38	1068.16	**0.6454**	
8A	4	5/15/2019 13:03	3	1351	450.33	0.63728	706.65	1068.16	**0.6616**	
8A	5	5/15/2019 12:43	3	1389	463.00	0.66203	699.36	1068.17	**0.6547**	
8A	6	5/15/2019 12:54	3	1347	449.00	0.64754	693.40	1068.16	**0.6491**	
8A	7	5/15/2019 12:50	3	1326	442.00	0.65260	677.29	1068.16	**0.6341**	
8A	8	5/15/2019 12:46	3	1393	464.33	0.65726	706.47	1068.16	**0.6614**	0.6425
8B	1	5/15/2019 13:03	3	1295	431.67	0.63718	677.46	1068.16	**0.6342**	
8B	2	5/15/2019 12:59	3	1358	452.67	0.64247	704.57	1068.16	**0.6596**	
8B	3	5/15/2019 13:11	3	1304	434.67	0.62740	692.80	1068.16	**0.6486**	
8B	4	5/15/2019 13:07	3	1297	432.33	0.63233	683.71	1068.16	**0.6401**	
8B	5	5/15/2019 12:46	3	1358	452.67	0.65720	688.78	1068.16	**0.6448**	
8B	6	5/15/2019 12:43	3	1458	486.00	0.66203	734.11	1068.17	**0.6873**	
8B	7	5/15/2019 12:54	3	1471	490.33	0.64744	757.35	1068.16	**0.7090**	
8B	8	5/15/2019 12:50	3	1416	472.00	0.65250	723.37	1068.16	**0.6772**	0.6626
8C	1	5/15/2019 13:07	3	1316	438.67	0.63223	693.84	1068.16	**0.6496**	
8C	2	5/15/2019 13:03	3	1412	470.67	0.63712	738.74	1068.16	**0.6916**	
8C	3	5/15/2019 12:59	3	1347	449.00	0.64237	698.98	1068.16	**0.6544**	
8C	4	5/15/2019 13:11	3	1346	448.67	0.62732	715.21	1068.16	**0.6696**	
8C	5	5/15/2019 12:50	3	1343	447.67	0.65244	686.14	1068.16	**0.6424**	
8C	6	5/15/2019 12:47	3	1400	466.67	0.65709	710.20	1068.16	**0.6649**	
8C	7	5/15/2019 12:43	3	1439	479.67	0.66203	724.54	1068.17	**0.6783**	
8C	8	5/15/2019 12:55	3	1444	481.33	0.64733	743.56	1068.16	**0.6961**	0.6683
8D	1	5/15/2019 13:11	3	1284	428.00	0.62726	682.33	1068.16	**0.6388**	
8D	2	5/15/2019 13:07	3	1271	423.67	0.63215	670.20	1068.16	**0.6274**	
8D	3	5/15/2019 13:03	3	1317	439.00	0.63704	689.12	1068.16	**0.6451**	
8D	4	5/15/2019 12:59	3	1345	448.33	0.64231	698.00	1068.16	**0.6535**	
8D	5	5/15/2019 12:55	3	1328	442.67	0.64723	683.94	1068.16	**0.6403**	
8D	6	5/15/2019 12:51	3	1350	450.00	0.65211	690.06	1068.16	**0.6460**	
8D	7	5/15/2019 12:47	3	1375	458.33	0.65701	697.60	1068.16	**0.6531**	
8D	8	5/15/2019 12:43	3	1377	459.00	0.66201	693.34	1068.17	**0.6491**	0.6442
9A	1	5/15/2019 13:15	3	1323	441.00	0.62341	707.40	1068.16	**0.6623**	
9A	2	5/15/2019 13:26	3	1281	427.00	0.61064	699.27	1068.16	**0.6546**	
9A	3	5/15/2019 13:22	3	1364	454.67	0.61486	739.46	1068.16	**0.6923**	
9A	4	5/15/2019 13:18	3	1267	422.33	0.61905	682.23	1068.16	**0.6387**	
9A	5	5/15/2019 13:30	3	1280	426.67	0.60609	703.97	1068.15	**0.6591**	
9A	6	5/15/2019 13:42	3	1366	455.33	0.59243	768.59	1068.15	**0.7195**	
9A	7	5/15/2019 13:38	3	1306	435.33	0.59649	729.83	1068.15	**0.6833**	
9A	8	5/15/2019 13:34	3	1438	479.33	0.60129	797.18	1068.15	**0.7463**	0.6820
9B	1	5/15/2019 13:18	3	1229	409.67	0.61924	661.56	1068.16	**0.6193**	

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
9B	2	5/15/2019 13:15	3	1286	428.67	0.62341	687.62	1068.16	**0.6437**	
9B	3	5/15/2019 13:26	3	1234	411.33	0.61058	673.67	1068.16	**0.6307**	
9B	4	5/15/2019 13:22	3	1261	420.33	0.61480	683.69	1068.16	**0.6401**	
9B	5	5/15/2019 13:34	3	1245	415.00	0.60151	689.93	1068.15	**0.6459**	
9B	6	5/15/2019 13:30	3	1242	414.00	0.60601	683.16	1068.15	**0.6396**	
9B	7	5/15/2019 13:42	3	1294	431.33	0.59236	728.17	1068.15	**0.6817**	
9B	8	5/15/2019 13:38	3	1399	466.33	0.59637	781.95	1068.15	**0.7321**	0.6541
9C	1	5/15/2019 13:22	3	1214	404.67	0.61503	657.96	1068.16	**0.6160**	
9C	2	5/15/2019 13:18	3	1248	416.00	0.61919	671.85	1068.16	**0.6290**	
9C	3	5/15/2019 13:15	3	1291	430.33	0.62339	690.31	1068.16	**0.6463**	
9C	4	5/15/2019 13:26	3	1261	420.33	0.61052	688.48	1068.16	**0.6445**	
9C	5	5/15/2019 13:38	3	1231	410.33	0.59664	687.74	1068.15	**0.6439**	
9C	6	5/15/2019 13:34	3	1198	399.33	0.60144	663.97	1068.15	**0.6216**	
9C	7	5/15/2019 13:30	3	1311	437.00	0.60595	721.18	1068.15	**0.6752**	
9C	8	5/15/2019 13:42	3	1332	444.00	0.59230	749.62	1068.15	**0.7018**	0.6473
9D	1	5/15/2019 13:25	3	1189	396.33	0.61075	648.92	1068.16	**0.6075**	
9D	2	5/15/2019 13:22	3	1304	434.67	0.61496	706.83	1068.16	**0.6617**	
9D	3	5/15/2019 13:18	3	1329	443.00	0.61911	715.54	1068.16	**0.6699**	
9D	4	5/15/2019 13:15	3	1296	432.00	0.62343	692.94	1068.16	**0.6487**	
9D	5	5/15/2019 13:42	3	1225	408.33	0.59249	689.19	1068.15	**0.6452**	
9D	6	5/15/2019 13:38	3	1265	421.67	0.59654	706.85	1068.15	**0.6618**	
9D	7	5/15/2019 13:34	3	1281	427.00	0.60136	710.05	1068.15	**0.6648**	
9D	8	5/15/2019 13:30	3	1332	444.00	0.60592	732.77	1068.15	**0.6860**	0.6557
10A	1	5/15/2019 13:30	3	1163	387.67	0.60584	639.88	1068.15	**0.5991**	
10A	2	5/15/2019 13:42	3	1254	418.00	0.59217	705.88	1068.15	**0.6608**	
10A	3	5/15/2019 13:38	3	1298	432.67	0.59679	725.00	1068.15	**0.6787**	
10A	4	5/15/2019 13:34	3	1273	424.33	0.60099	706.06	1068.15	**0.6610**	
10A	5	5/15/2019 13:15	3	1294	431.33	0.62335	691.96	1068.16	**0.6478**	
10A	6	5/15/2019 13:26	3	1235	411.67	0.61037	674.45	1068.16	**0.6314**	
10A	7	5/15/2019 13:22	3	1397	465.67	0.61457	757.71	1068.16	**0.7094**	
10A	8	5/15/2019 13:19	3	1421	473.67	0.61874	765.53	1068.16	**0.7167**	0.6631
10B	1	5/15/2019 13:34	3	1135	378.33	0.60121	629.29	1068.15	**0.5891**	
10B	2	5/15/2019 13:30	3	1276	425.33	0.60578	702.12	1068.15	**0.6573**	
10B	3	5/15/2019 13:42	3	1290	430.00	0.59211	726.21	1068.15	**0.6799**	
10B	4	5/15/2019 13:38	3	1264	421.33	0.59671	706.09	1068.15	**0.6610**	
10B	5	5/15/2019 13:18	3	1319	439.67	0.61897	710.32	1068.16	**0.6650**	
10B	6	5/15/2019 13:15	3	1380	460.00	0.62335	737.95	1068.16	**0.6909**	
10B	7	5/15/2019 13:26	3	1323	441.00	0.61030	722.60	1068.16	**0.6765**	
10B	8	5/15/2019 13:22	3	1393	464.33	0.61449	755.64	1068.16	**0.7074**	0.6659
10C	1	5/15/2019 13:38	3	1237	412.33	0.59692	690.77	1068.15	**0.6467**	
10C	2	5/15/2019 13:34	3	1188	396.00	0.60112	658.77	1068.15	**0.6167**	
10C	3	5/15/2019 13:30	3	1271	423.67	0.60571	699.46	1068.15	**0.6548**	
10C	4	5/15/2019 13:42	3	1258	419.33	0.59204	708.29	1068.15	**0.6631**	
10C	5	5/15/2019 13:22	3	1286	428.67	0.61471	697.35	1068.16	**0.6529**	
10C	6	5/15/2019 13:18	3	1286	428.67	0.61892	692.61	1068.16	**0.6484**	
10C	7	5/15/2019 13:15	3	1399	466.33	0.62335	748.11	1068.16	**0.7004**	
10C	8	5/15/2019 13:26	3	1366	455.33	0.61022	746.18	1068.16	**0.6986**	0.6602
10D	1	5/15/2019 13:42	3	1152	384.00	0.59223	648.40	1068.15	**0.6070**	
10D	2	5/15/2019 13:38	3	1284	428.00	0.59684	717.11	1068.15	**0.6714**	
10D	3	5/15/2019 13:34	3	1236	412.00	0.60106	685.45	1068.15	**0.6417**	
10D	4	5/15/2019 13:30	3	1289	429.67	0.60565	709.43	1068.15	**0.6642**	
10D	5	5/15/2019 13:26	3	1267	422.33	0.61043	691.86	1068.16	**0.6477**	
10D	6	5/15/2019 13:22	3	1279	426.33	0.61465	693.62	1068.16	**0.6494**	
10D	7	5/15/2019 13:19	3	1322	440.67	0.61882	712.11	1068.16	**0.6667**	
10D	8	5/15/2019 13:15	3	1351	450.33	0.62333	722.46	1068.16	**0.6764**	0.6530
11A	1	5/15/2019 13:44	3	1220	406.67	0.58951	689.84	1068.15	**0.6458**	
11A	2	5/15/2019 13:57	3	1235	411.67	0.57604	714.65	1068.15	**0.6691**	
11A	3	5/15/2019 13:53	3	1182	394.00	0.58031	678.94	1068.15	**0.6356**	
11A	4	5/15/2019 13:49	3	1292	430.67	0.58453	736.78	1068.15	**0.6898**	
11A	5	5/15/2019 14:01	3	1192	397.33	0.57175	694.95	1068.15	**0.6506**	
11A	6	5/15/2019 14:13	3	1206	402.00	0.55820	720.17	1068.14	**0.6742**	
11A	7	5/15/2019 14:09	3	1276	425.33	0.56246	756.20	1068.14	**0.7080**	
11A	8	5/15/2019 14:05	3	1319	439.67	0.56725	775.08	1068.15	**0.7256**	0.6748
11B	1	5/15/2019 13:49	3	1148	382.67	0.58471	654.46	1068.15	**0.6127**	
11B	2	5/15/2019 13:44	3	1185	395.00	0.58951	670.05	1068.15	**0.6273**	
11B	3	5/15/2019 13:57	3	1231	410.33	0.57597	712.42	1068.15	**0.6670**	
11B	4	5/15/2019 13:53	3	1210	403.33	0.58024	695.11	1068.15	**0.6508**	

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
11B	5	5/15/2019 14:05	3	1198	399.33	0.56749	703.69	1068.15	**0.6588**	
11B	6	5/15/2019 14:01	3	1185	395.00	0.57169	690.93	1068.15	**0.6468**	
11B	7	5/15/2019 14:13	3	1247	415.67	0.55813	744.75	1068.14	**0.6972**	
11B	8	5/15/2019 14:09	3	1283	427.67	0.56241	760.42	1068.14	**0.7119**	0.6591
11C	1	5/15/2019 13:53	3	1221	407.00	0.58042	701.21	1068.15	**0.6565**	
11C	2	5/15/2019 13:49	3	1241	413.67	0.58464	707.56	1068.15	**0.6624**	
11C	3	5/15/2019 13:44	3	1298	432.67	0.58951	733.95	1068.15	**0.6871**	
11C	4	5/15/2019 13:57	3	1213	404.33	0.57592	702.07	1068.15	**0.6573**	
11C	5	5/15/2019 14:09	3	1209	403.00	0.56259	716.34	1068.14	**0.6706**	
11C	6	5/15/2019 14:05	3	1194	398.00	0.56740	701.45	1068.15	**0.6567**	
11C	7	5/15/2019 14:01	3	1277	425.67	0.57162	744.66	1068.15	**0.6972**	
11C	8	5/15/2019 14:14	3	1317	439.00	0.55808	786.63	1068.14	**0.7364**	0.6780
11D	1	5/15/2019 13:57	3	1178	392.67	0.57610	681.60	1068.15	**0.6381**	
11D	2	5/15/2019 13:53	3	1285	428.33	0.58039	738.01	1068.15	**0.6909**	
11D	3	5/15/2019 13:49	3	1305	435.00	0.58456	744.15	1068.15	**0.6967**	
11D	4	5/15/2019 13:44	3	1340	446.67	0.58951	757.70	1068.15	**0.7094**	
11D	5	5/15/2019 14:13	3	1222	407.33	0.55825	729.66	1068.14	**0.6831**	
11D	6	5/15/2019 14:09	3	1213	404.33	0.56252	718.80	1068.14	**0.6729**	
11D	7	5/15/2019 14:05	3	1320	440.00	0.56733	775.57	1068.15	**0.7261**	
11D	8	5/15/2019 14:01	3	1335	445.00	0.57155	778.58	1068.15	**0.7289**	0.6933
12A	1	5/15/2019 14:01	3	1139	379.67	0.57148	664.36	1068.15	**0.6220**	
12A	2	5/15/2019 14:13	3	1161	387.00	0.55850	692.93	1068.14	**0.6487**	
12A	3	5/15/2019 14:10	3	1114	371.33	0.56220	660.50	1068.14	**0.6184**	
12A	4	5/15/2019 14:05	3	1174	391.33	0.56701	690.17	1068.15	**0.6461**	
12A	5	5/15/2019 13:44	3	1224	408.00	0.58947	692.15	1068.15	**0.6480**	
12A	6	5/15/2019 13:57	3	1136	378.67	0.57575	657.69	1068.15	**0.6157**	
12A	7	5/15/2019 13:53	3	1224	408.00	0.58001	703.44	1068.15	**0.6586**	
12A	8	5/15/2019 13:49	3	1309	436.33	0.58420	746.89	1068.15	**0.6992**	0.6446
12B	1	5/15/2019 14:05	3	1173	391.00	0.56720	689.35	1068.15	**0.6454**	
12B	2	5/15/2019 14:01	3	1161	387.00	0.57143	677.25	1068.15	**0.6340**	
12B	3	5/15/2019 14:13	3	1174	391.33	0.55843	700.78	1068.14	**0.6561**	
12B	4	5/15/2019 14:10	3	1210	403.33	0.56215	717.49	1068.14	**0.6717**	
12B	5	5/15/2019 13:49	3	1191	397.00	0.58445	679.27	1068.15	**0.6359**	
12B	6	5/15/2019 13:44	3	1216	405.33	0.58947	687.62	1068.15	**0.6438**	
12B	7	5/15/2019 13:57	3	1256	418.67	0.57568	727.25	1068.15	**0.6809**	
12B	8	5/15/2019 13:53	3	1281	427.00	0.57993	736.29	1068.15	**0.6893**	0.6571
12C	1	5/15/2019 14:09	3	1176	392.00	0.56232	697.11	1068.14	**0.6526**	
12C	2	5/15/2019 14:05	3	1172	390.67	0.56711	688.87	1068.15	**0.6449**	
12C	3	5/15/2019 14:01	3	1284	428.00	0.57126	749.21	1068.15	**0.7014**	
12C	4	5/15/2019 14:13	3	1198	399.33	0.55834	715.22	1068.14	**0.6696**	
12C	5	5/15/2019 13:53	3	1236	412.00	0.58017	710.14	1068.15	**0.6648**	
12C	6	5/15/2019 13:49	3	1239	413.00	0.58436	706.75	1068.15	**0.6617**	
12C	7	5/15/2019 13:44	3	1271	423.67	0.58947	718.73	1068.15	**0.6729**	
12C	8	5/15/2019 13:57	3	1338	446.00	0.57559	774.86	1068.15	**0.7254**	0.6742
12D	1	5/15/2019 14:13	3	1171	390.33	0.55855	698.83	1068.14	**0.6543**	
12D	2	5/15/2019 14:10	3	1212	404.00	0.56227	718.52	1068.14	**0.6727**	
12D	3	5/15/2019 14:05	3	1203	401.00	0.56706	707.16	1068.15	**0.6620**	
12D	4	5/15/2019 14:01	3	1232	410.67	0.57119	718.96	1068.15	**0.6731**	
12D	5	5/15/2019 13:57	3	1238	412.67	0.57586	716.61	1068.15	**0.6709**	
12D	6	5/15/2019 13:53	3	1271	423.67	0.58006	730.38	1068.15	**0.6838**	
12D	7	5/15/2019 13:49	3	1321	440.33	0.58429	753.62	1068.15	**0.7055**	
12D	8	5/15/2019 13:44	3	1353	451.00	0.58945	765.12	1068.15	**0.7163**	0.6798
13A	1	5/15/2019 14:17	3	1129	376.33	0.55449	678.70	1068.14	**0.6354**	
13A	2	5/15/2019 14:29	3	1260	420.00	0.54194	774.99	1068.14	**0.7255**	
13A	3	5/15/2019 14:25	3	1147	382.33	0.54644	699.68	1068.14	**0.6550**	
13A	4	5/15/2019 14:21	3	1260	420.00	0.55065	762.74	1068.14	**0.7141**	
13A	5	5/15/2019 14:33	3	1145	381.67	0.53797	709.46	1068.14	**0.6642**	
13A	6	5/15/2019 14:46	3	1152	384.00	0.52511	731.28	1068.14	**0.6846**	
13A	7	5/15/2019 14:42	3	1203	401.00	0.52927	757.65	1068.14	**0.7093**	
13A	8	5/15/2019 14:37	3	1237	412.33	0.53403	772.12	1068.14	**0.7229**	0.6889
13B	1	5/15/2019 14:21	3	1123	374.33	0.55079	679.63	1068.14	**0.6363**	
13B	2	5/15/2019 14:17	3	1143	381.00	0.55449	687.12	1068.14	**0.6433**	
13B	3	5/15/2019 14:29	3	1210	403.33	0.54188	744.33	1068.14	**0.6968**	
13B	4	5/15/2019 14:25	3	1157	385.67	0.54639	705.84	1068.14	**0.6608**	
13B	5	5/15/2019 14:37	3	1131	377.00	0.53413	705.82	1068.14	**0.6608**	
13B	6	5/15/2019 14:33	3	1213	404.33	0.53792	751.66	1068.14	**0.7037**	
13B	7	5/15/2019 14:46	3	1218	406.00	0.52506	773.25	1068.14	**0.7239**	

Detector (#)	Source ID (#)	Raw Count Data Start Time	Count Time (min)	Beta (counts)	Raw Beta (cpm)	Ac-228 Decay	Decay Corrected Ra-228 (cpm)*	Decay Corrected Nominal (dpm)**	Ra-228 Efficiency (cpm/dpm)	Average Efficiency (cpm/dpm)
13B	8	5/15/2019 14:42	3	1213	404.33	0.52923	764.00	1068.14	**0.7153**	0.6801
13D	1	5/15/2019 14:29	3	1103	367.67	0.54199	678.36	1068.14	**0.6351**	
13D	2	5/15/2019 14:25	3	1144	381.33	0.54653	697.74	1068.14	**0.6532**	
13D	3	5/15/2019 14:21	3	1230	410.00	0.55072	744.48	1068.14	**0.6970**	
13D	4	5/15/2019 14:17	3	1216	405.33	0.55452	730.96	1068.14	**0.6843**	
13D	5	5/15/2019 14:46	3	1188	396.00	0.52516	754.06	1068.14	**0.7060**	
13D	6	5/15/2019 14:42	3	1100	366.67	0.52933	692.69	1068.14	**0.6485**	
13D	7	5/15/2019 14:37	3	1187	395.67	0.53408	740.84	1068.14	**0.6936**	
13D	8	5/15/2019 14:33	3	1212	404.00	0.53787	751.11	1068.14	**0.7032**	0.6776
14A	1	5/15/2019 14:33	3	1181	393.67	0.53782	731.97	1068.14	**0.6853**	
14A	2	5/15/2019 14:46	3	1220	406.67	0.52534	774.10	1068.14	**0.7247**	
14A	3	5/15/2019 14:42	3	1193	397.67	0.52904	751.68	1068.14	**0.7037**	
14A	4	5/15/2019 14:37	3	1156	385.33	0.53378	721.90	1068.14	**0.6758**	
14A	5	5/15/2019 14:17	3	1147	382.33	0.55454	689.46	1068.14	**0.6455**	
14A	6	5/15/2019 14:29	3	1143	381.00	0.54176	703.27	1068.14	**0.6584**	
14A	7	5/15/2019 14:25	3	1265	421.67	0.54617	772.05	1068.14	**0.7228**	
14A	8	5/15/2019 14:21	3	1289	429.67	0.55041	780.63	1068.14	**0.7308**	0.6934
14B	1	5/15/2019 14:37	3	1042	347.33	0.53396	650.48	1068.14	**0.6090**	
14B	2	5/15/2019 14:33	3	1067	355.67	0.53779	661.35	1068.14	**0.6192**	
14B	3	5/15/2019 14:46	3	1054	351.33	0.52529	668.84	1068.14	**0.6262**	
14B	4	5/15/2019 14:42	3	1158	386.00	0.52899	729.70	1068.14	**0.6832**	
14B	5	5/15/2019 14:21	3	1152	384.00	0.55061	697.40	1068.14	**0.6529**	
14B	6	5/15/2019 14:17	3	1089	363.00	0.55454	654.59	1068.14	**0.6128**	
14B	7	5/15/2019 14:29	3	1183	394.33	0.54171	727.95	1068.14	**0.6815**	
14B	8	5/15/2019 14:25	3	1216	405.33	0.54610	742.23	1068.14	**0.6949**	0.6475
14C	1	5/15/2019 14:42	3	1128	376.00	0.52915	710.57	1068.14	**0.6652**	
14C	2	5/15/2019 14:37	3	1173	391.00	0.53388	732.38	1068.14	**0.6857**	
14C	3	5/15/2019 14:33	3	1155	385.00	0.53768	716.03	1068.14	**0.6704**	
14C	4	5/15/2019 14:46	3	1097	365.67	0.52522	696.21	1068.14	**0.6518**	
14C	5	5/15/2019 14:25	3	1124	374.67	0.54630	685.82	1068.14	**0.6421**	
14C	6	5/15/2019 14:21	3	1178	392.67	0.55053	713.25	1068.14	**0.6678**	
14C	7	5/15/2019 14:17	3	1238	412.67	0.55454	744.16	1068.14	**0.6967**	
14C	8	5/15/2019 14:29	3	1205	401.67	0.54162	741.60	1068.14	**0.6943**	0.6717
14D	1	5/15/2019 14:46	3	1049	349.67	0.52539	665.54	1068.14	**0.6231**	
14D	2	5/15/2019 14:42	3	1092	364.00	0.52912	687.94	1068.14	**0.6441**	
14D	3	5/15/2019 14:37	3	1123	374.33	0.53381	701.25	1068.14	**0.6565**	
14D	4	5/15/2019 14:33	3	1056	352.00	0.53763	654.72	1068.14	**0.6130**	
14D	5	5/15/2019 14:29	3	1043	347.67	0.54182	641.66	1068.14	**0.6007**	
14D	6	5/15/2019 14:25	3	1109	369.67	0.54624	676.75	1068.14	**0.6336**	
14D	7	5/15/2019 14:21	3	1228	409.33	0.55046	743.62	1068.14	**0.6962**	
14D	8	5/15/2019 14:17	3	1276	425.33	0.55452	767.02	1068.14	**0.7181**	0.6481

Current Calibration - PIC

Geometry 25mm Filter

Ra-228	**Cal Date**	6/1/2019	**Exp Date**	5/31/2020	
Protean	A0	A1	A2	A3	A4
1A	6.639910E-01				
1B	6.665543E-01				
1C	6.299927E-01				
1D	6.495017E-01				
2A	6.348198E-01				
2B	6.568773E-01				
2C	6.582157E-01				
2D	6.339886E-01				
3A	#N/A				
3B	6.518933E-01				
3C	6.567156E-01				
3D	6.532844E-01				
4A	6.624843E-01				
4B	6.400489E-01				
4C	6.541204E-01				
4D	6.082799E-01				
5A	6.775764E-01				
5B	6.707283E-01				
5C	6.748224E-01				
5D	6.606185E-01				
6A	6.489122E-01				
6B	6.310231E-01				
6C	6.546055E-01				
6D	#N/A				
7A	6.638115E-01				
7B	6.492463E-01				
7C	6.585438E-01				
7D	6.555388E-01				
8A	6.425051E-01				
8B	6.626052E-01				
8C	6.683442E-01				
8D	6.441668E-01				
9A	6.820087E-01				
9B	6.541350E-01				
9C	6.472739E-01				
9D	6.556994E-01				
10A	6.631152E-01				
10B	6.658929E-01				
10C	6.601972E-01				
10D	6.530485E-01				
11A	6.748378E-01				
11B	6.590655E-01				
11C	6.780284E-01				
11D	6.932639E-01				
12A	6.445906E-01				
12B	6.571321E-01				
12C	6.741681E-01				
12D	6.798230E-01				
13A	6.888862E-01				
13B	6.801141E-01				
13C	#N/A				
13D	6.776087E-01				
14A	6.933857E-01				
14B	6.474522E-01				
14C	6.717322E-01				
14D	6.481484E-01				

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
C1	10A	3	2	1163	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C2	10A	3	6	1254	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C3	10A	3	9	1298	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C4	10A	3	9	1273	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C5	10A	3	7	1294	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C6	10A	3	3	1235	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C7	10A	3	6	1397	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C8	10A	3	3	1421	5/15/2019 13:19	5/15/2019 13:22	PIC	R228C19
C1	10B	3	5	1135	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C2	10B	3	7	1276	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C3	10B	3	7	1290	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C4	10B	3	7	1264	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C5	10B	3	7	1319	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C6	10B	3	8	1380	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C7	10B	3	12	1323	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C8	10B	3	11	1393	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C1	10C	3	8	1237	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C2	10C	3	7	1188	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C3	10C	3	8	1271	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C4	10C	3	5	1258	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C5	10C	3	3	1286	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C6	10C	3	7	1286	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C7	10C	3	3	1399	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C8	10C	3	1	1366	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C1	10D	3	5	1152	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C2	10D	3	3	1284	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C3	10D	3	12	1236	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C4	10D	3	6	1289	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C5	10D	3	8	1267	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C6	10D	3	6	1279	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C7	10D	3	8	1322	5/15/2019 13:19	5/15/2019 13:22	PIC	R228C19
C8	10D	3	8	1351	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C1	11A	3	2	1220	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19

C2	11A	3	3	1235	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C3	11A	3	4	1182	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C4	11A	3	2	1292	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C5	11A	3	1	1192	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C6	11A	3	3	1206	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C7	11A	3	8	1276	5/15/2019 14:09	5/15/2019 14:12	PIC	R228C19
C8	11A	3	5	1319	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C1	11B	3	6	1148	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C2	11B	3	5	1185	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C3	11B	3	3	1231	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C4	11B	3	3	1210	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C5	11B	3	6	1198	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C6	11B	3	3	1185	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C7	11B	3	4	1247	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C8	11B	3	4	1283	5/15/2019 14:09	5/15/2019 14:12	PIC	R228C19
C1	11C	3	1	1221	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C2	11C	3	3	1241	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C3	11C	3	1	1298	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C4	11C	3	1	1213	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C5	11C	3	9	1209	5/15/2019 14:09	5/15/2019 14:12	PIC	R228C19
C6	11C	3	4	1194	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C7	11C	3	4	1277	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C8	11C	3	1	1317	5/15/2019 14:14	5/15/2019 14:17	PIC	R228C19
C1	11D	3	4	1178	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C2	11D	3	3	1285	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C3	11D	3	5	1305	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C4	11D	3	4	1340	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C5	11D	3	12	1222	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C6	11D	3	4	1213	5/15/2019 14:09	5/15/2019 14:12	PIC	R228C19
C7	11D	3	3	1320	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C8	11D	3	4	1335	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C1	12A	3	4	1139	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C2	12A	3	2	1161	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C3	12A	3	2	1114	5/15/2019 14:10	5/15/2019 14:13	PIC	R228C19

C4	12A	3	4	1174	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C5	12A	3	1	1224	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C6	12A	3	3	1136	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C7	12A	3	2	1224	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C8	12A	3	3	1309	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C1	12B	3	5	1173	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C2	12B	3	3	1161	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C3	12B	3	4	1174	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C4	12B	3	7	1210	5/15/2019 14:10	5/15/2019 14:13	PIC	R228C19
C5	12B	3	6	1191	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C6	12B	3	3	1216	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C7	12B	3	5	1256	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C8	12B	3	7	1281	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C1	12C	3	7	1176	5/15/2019 14:09	5/15/2019 14:12	PIC	R228C19
C2	12C	3	9	1172	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C3	12C	3	8	1284	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C4	12C	3	3	1198	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C5	12C	3	6	1236	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C6	12C	3	11	1239	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C7	12C	3	6	1271	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C8	12C	3	5	1338	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C1	12D	3	3	1171	5/15/2019 14:13	5/15/2019 14:16	PIC	R228C19
C2	12D	3	8	1212	5/15/2019 14:10	5/15/2019 14:13	PIC	R228C19
C3	12D	3	3	1203	5/15/2019 14:05	5/15/2019 14:08	PIC	R228C19
C4	12D	3	4	1232	5/15/2019 14:01	5/15/2019 14:04	PIC	R228C19
C5	12D	3	2	1238	5/15/2019 13:57	5/15/2019 14:00	PIC	R228C19
C6	12D	3	4	1271	5/15/2019 13:53	5/15/2019 13:56	PIC	R228C19
C7	12D	3	3	1321	5/15/2019 13:49	5/15/2019 13:52	PIC	R228C19
C8	12D	3	7	1353	5/15/2019 13:44	5/15/2019 13:47	PIC	R228C19
C1	13A	3	8	1129	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C2	13A	3	5	1260	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C3	13A	3	6	1147	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C4	13A	3	8	1260	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C5	13A	3	6	1145	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19

C6	13A	3	4	1152	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C7	13A	3	6	1203	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C8	13A	3	12	1237	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C1	13B	3	8	1123	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C2	13B	3	3	1143	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C3	13B	3	5	1210	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C4	13B	3	5	1157	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C5	13B	3	7	1131	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C6	13B	3	7	1213	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C7	13B	3	6	1218	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C8	13B	3	9	1213	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C1	13D	3	4	1103	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C2	13D	3	10	1144	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C3	13D	3	6	1230	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C4	13D	3	3	1216	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C5	13D	3	2	1188	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C6	13D	3	4	1100	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C7	13D	3	5	1187	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C8	13D	3	4	1212	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C1	14A	3	4	1181	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C2	14A	3	4	1220	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C3	14A	3	4	1193	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C4	14A	3	2	1156	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C5	14A	3	2	1147	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C6	14A	3	5	1143	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C7	14A	3	4	1265	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C8	14A	3	7	1289	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C1	14B	3	8	1042	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C2	14B	3	8	1067	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C3	14B	3	10	1054	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C4	14B	3	12	1158	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C5	14B	3	16	1152	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C6	14B	3	12	1089	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C7	14B	3	15	1183	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19

C8	14B	3	9	1216	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C1	14C	3	4	1128	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C2	14C	3	4	1173	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C3	14C	3	6	1155	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C4	14C	3	6	1097	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C5	14C	3	3	1124	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C6	14C	3	2	1178	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C7	14C	3	11	1238	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C8	14C	3	12	1205	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C1	14D	3	4	1049	5/15/2019 14:46	5/15/2019 14:49	PIC	R228C19
C2	14D	3	9	1092	5/15/2019 14:42	5/15/2019 14:45	PIC	R228C19
C3	14D	3	8	1123	5/15/2019 14:37	5/15/2019 14:40	PIC	R228C19
C4	14D	3	5	1056	5/15/2019 14:33	5/15/2019 14:36	PIC	R228C19
C5	14D	3	2	1043	5/15/2019 14:29	5/15/2019 14:32	PIC	R228C19
C6	14D	3	6	1109	5/15/2019 14:25	5/15/2019 14:28	PIC	R228C19
C7	14D	3	3	1228	5/15/2019 14:21	5/15/2019 14:24	PIC	R228C19
C8	14D	3	3	1276	5/15/2019 14:17	5/15/2019 14:20	PIC	R228C19
C1	1A	3	19	1764	5/15/2019 10:53	5/15/2019 10:56	PIC	R228C19
C2	1A	3	13	1702	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C3	1A	3	18	1712	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C4	1A	3	20	1709	5/15/2019 10:57	5/15/2019 11:00	PIC	R228C19
C5	1A	3	21	1603	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C6	1A	3	23	1549	5/15/2019 11:23	5/15/2019 11:26	PIC	R228C19
C7	1A	3	19	1649	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C8	1A	3	21	1784	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C1	1B	3	13	1681	5/15/2019 10:57	5/15/2019 11:00	PIC	R228C19
C2	1B	3	10	1659	5/15/2019 10:53	5/15/2019 10:56	PIC	R228C19
C3	1B	3	22	1759	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C4	1B	3	13	1655	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C5	1B	3	24	1606	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C6	1B	3	16	1680	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C7	1B	3	13	1725	5/15/2019 11:23	5/15/2019 11:26	PIC	R228C19
C8	1B	3	20	1748	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C1	1C	3	80	1608	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19

C2	1C	3	94	1554	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C3	1C	3	88	1672	5/15/2019 10:53	5/15/2019 10:56	PIC	R228C19
C4	1C	3	87	1577	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C5	1C	3	65	1512	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C6	1C	3	89	1551	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C7	1C	3	96	1638	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C8	1C	3	104	1661	5/15/2019 11:23	5/15/2019 11:26	PIC	R228C19
C1	1D	3	73	1747	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C2	1D	3	62	1611	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C3	1D	3	55	1653	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C4	1D	3	58	1696	5/15/2019 10:53	5/15/2019 10:56	PIC	R228C19
C5	1D	3	52	1635	5/15/2019 11:23	5/15/2019 11:26	PIC	R228C19
C6	1D	3	60	1509	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C7	1D	3	68	1638	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C8	1D	3	68	1681	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C1	2A	3	33	1570	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C2	2A	3	35	1574	5/15/2019 11:23	5/15/2019 11:26	PIC	R228C19
C3	2A	3	44	1594	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C4	2A	3	40	1543	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C5	2A	3	53	1661	5/15/2019 10:54	5/15/2019 10:57	PIC	R228C19
C6	2A	3	47	1573	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C7	2A	3	46	1744	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C8	2A	3	48	1612	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C1	2B	3	23	1667	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C2	2B	3	14	1704	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C3	2B	3	16	1643	5/15/2019 11:24	5/15/2019 11:27	PIC	R228C19
C4	2B	3	14	1559	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C5	2B	3	19	1612	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C6	2B	3	20	1607	5/15/2019 10:54	5/15/2019 10:57	PIC	R228C19
C7	2B	3	14	1741	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C8	2B	3	22	1779	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C1	2C	3	28	1635	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C2	2C	3	22	1668	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C3	2C	3	22	1647	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19

C4	2C	3	28	1597	5/15/2019 11:24	5/15/2019 11:27	PIC	R228C19
C5	2C	3	27	1664	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C6	2C	3	27	1595	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C7	2C	3	32	1799	5/15/2019 10:54	5/15/2019 10:57	PIC	R228C19
C8	2C	3	27	1736	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C1	2D	3	67	1511	5/15/2019 11:24	5/15/2019 11:27	PIC	R228C19
C2	2D	3	71	1527	5/15/2019 11:18	5/15/2019 11:21	PIC	R228C19
C3	2D	3	68	1584	5/15/2019 11:14	5/15/2019 11:17	PIC	R228C19
C4	2D	3	86	1625	5/15/2019 11:10	5/15/2019 11:13	PIC	R228C19
C5	2D	3	61	1591	5/15/2019 11:06	5/15/2019 11:09	PIC	R228C19
C6	2D	3	80	1622	5/15/2019 11:02	5/15/2019 11:05	PIC	R228C19
C7	2D	3	66	1703	5/15/2019 10:58	5/15/2019 11:01	PIC	R228C19
C8	2D	3	83	1689	5/15/2019 10:54	5/15/2019 10:57	PIC	R228C19
C1	3B	3	76	1551	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C2	3B	3	73	1557	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C3	3B	3	79	1544	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C4	3B	3	79	1584	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C5	3B	3	73	1445	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C6	3B	3	63	1495	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C7	3B	3	75	1540	5/15/2019 12:01	5/15/2019 12:04	PIC	R228C19
C8	3B	3	80	1601	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C1	3C	3	54	1613	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C2	3C	3	66	1621	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C3	3C	3	49	1623	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C4	3C	3	43	1453	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C5	3C	3	40	1520	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C6	3C	3	56	1530	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C7	3C	3	56	1594	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C8	3C	3	47	1459	5/15/2019 12:01	5/15/2019 12:04	PIC	R228C19
C1	3D	3	46	1471	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C2	3D	3	41	1520	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C3	3D	3	50	1622	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C4	3D	3	55	1469	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C5	3D	3	63	1496	5/15/2019 12:01	5/15/2019 12:04	PIC	R228C19

C6	3D	3	57	1492	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C7	3D	3	51	1613	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C8	3D	3	58	1656	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C1	4A	3	20	1612	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C2	4A	3	16	1492	5/15/2019 12:01	5/15/2019 12:04	PIC	R228C19
C3	4A	3	24	1528	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C4	4A	3	27	1502	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C5	4A	3	29	1511	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C6	4A	3	21	1522	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C7	4A	3	28	1654	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C8	4A	3	23	1696	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C1	4B	3	4	1460	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C2	4B	3	4	1467	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C3	4B	3	1	1446	5/15/2019 12:01	5/15/2019 12:04	PIC	R228C19
C4	4B	3	9	1420	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C5	4B	3	4	1600	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C6	4B	3	2	1513	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C7	4B	3	6	1553	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C8	4B	3	4	1636	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C1	4C	3	38	1460	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C2	4C	3	29	1465	5/15/2019 11:53	5/15/2019 11:56	PIC	R228C19
C3	4C	3	38	1584	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C4	4C	3	42	1477	5/15/2019 12:02	5/15/2019 12:05	PIC	R228C19
C5	4C	3	48	1611	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C6	4C	3	44	1523	5/15/2019 11:31	5/15/2019 11:34	PIC	R228C19
C7	4C	3	55	1647	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C8	4C	3	40	1592	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C1	4D	3	102	1384	5/15/2019 12:02	5/15/2019 12:05	PIC	R228C19
C2	4D	3	99	1349	5/15/2019 11:57	5/15/2019 12:00	PIC	R228C19
C3	4D	3	110	1452	5/15/2019 11:54	5/15/2019 11:57	PIC	R228C19
C4	4D	3	121	1421	5/15/2019 11:49	5/15/2019 11:52	PIC	R228C19
C5	4D	3	102	1432	5/15/2019 11:45	5/15/2019 11:48	PIC	R228C19
C6	4D	3	106	1366	5/15/2019 11:41	5/15/2019 11:44	PIC	R228C19
C7	4D	3	116	1556	5/15/2019 11:32	5/15/2019 11:35	PIC	R228C19

C8	4D	3	135	1533	5/15/2019 11:27	5/15/2019 11:30	PIC	R228C19
C1	5A	3	38	1470	5/15/2019 12:05	5/15/2019 12:08	PIC	R228C19
C2	5A	3	35	1442	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C3	5A	3	39	1533	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C4	5A	3	34	1528	5/15/2019 12:12	5/15/2019 12:15	PIC	R228C19
C5	5A	3	28	1510	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C6	5A	3	41	1413	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C7	5A	3	35	1469	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C8	5A	3	34	1598	5/15/2019 12:28	5/15/2019 12:31	PIC	R228C19
C1	5B	3	36	1417	5/15/2019 12:12	5/15/2019 12:15	PIC	R228C19
C2	5B	3	33	1502	5/15/2019 12:05	5/15/2019 12:08	PIC	R228C19
C3	5B	3	35	1510	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C4	5B	3	33	1455	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C5	5B	3	30	1428	5/15/2019 12:28	5/15/2019 12:31	PIC	R228C19
C6	5B	3	41	1541	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C7	5B	3	25	1512	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C8	5B	3	43	1474	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C1	5C	3	27	1409	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C2	5C	3	20	1508	5/15/2019 12:12	5/15/2019 12:15	PIC	R228C19
C3	5C	3	23	1609	5/15/2019 12:09	5/15/2019 12:12	PIC	R228C19
C4	5C	3	29	1450	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C5	5C	3	26	1490	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C6	5C	3	24	1371	5/15/2019 12:28	5/15/2019 12:31	PIC	R228C19
C7	5C	3	39	1536	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C8	5C	3	26	1532	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C1	5D	3	19	1419	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C2	5D	3	30	1411	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C3	5D	3	28	1498	5/15/2019 12:12	5/15/2019 12:15	PIC	R228C19
C4	5D	3	18	1489	5/15/2019 12:05	5/15/2019 12:08	PIC	R228C19
C5	5D	3	25	1417	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C6	5D	3	23	1444	5/15/2019 12:32	5/15/2019 12:35	PIC	R228C19
C7	5D	3	32	1466	5/15/2019 12:28	5/15/2019 12:31	PIC	R228C19
C8	5D	3	27	1519	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C1	6A	3	1	1447	5/15/2019 12:27	5/15/2019 12:30	PIC	R228C19

C2	6A	3	5	1337	5/15/2019 12:39	5/15/2019 12:42	PIC	R228C19
C3	6A	3	2	1318	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C4	6A	3	6	1353	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C5	6A	3	3	1430	5/15/2019 12:09	5/15/2019 12:12	PIC	R228C19
C6	6A	3	0	1454	5/15/2019 12:23	5/15/2019 12:26	PIC	R228C19
C7	6A	3	5	1503	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C8	6A	3	4	1547	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C1	6B	3	4	1422	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C2	6B	3	5	1327	5/15/2019 12:27	5/15/2019 12:30	PIC	R228C19
C3	6B	3	3	1360	5/15/2019 12:39	5/15/2019 12:42	PIC	R228C19
C4	6B	3	6	1333	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C5	6B	3	6	1379	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C6	6B	3	2	1381	5/15/2019 12:09	5/15/2019 12:12	PIC	R228C19
C7	6B	3	0	1404	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C8	6B	3	3	1462	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C1	6C	3	2	1274	5/15/2019 12:35	5/15/2019 12:38	PIC	R228C19
C2	6C	3	4	1352	5/15/2019 12:31	5/15/2019 12:34	PIC	R228C19
C3	6C	3	3	1497	5/15/2019 12:27	5/15/2019 12:30	PIC	R228C19
C4	6C	3	8	1400	5/15/2019 12:39	5/15/2019 12:42	PIC	R228C19
C5	6C	3	4	1473	5/15/2019 12:20	5/15/2019 12:23	PIC	R228C19
C6	6C	3	5	1474	5/15/2019 12:16	5/15/2019 12:19	PIC	R228C19
C7	6C	3	4	1479	5/15/2019 12:09	5/15/2019 12:12	PIC	R228C19
C8	6C	3	0	1537	5/15/2019 12:24	5/15/2019 12:27	PIC	R228C19
C1	7A	3	6	1364	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C2	7A	3	5	1393	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19
C3	7A	3	7	1356	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C4	7A	3	6	1364	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19
C5	7A	3	6	1351	5/15/2019 12:58	5/15/2019 13:01	PIC	R228C19
C6	7A	3	10	1284	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C7	7A	3	5	1380	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C8	7A	3	3	1485	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C1	7B	3	18	1263	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19
C2	7B	3	10	1330	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C3	7B	3	9	1358	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19

C4	7B	3	10	1355	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C5	7B	3	8	1336	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C6	7B	3	16	1308	5/15/2019 12:58	5/15/2019 13:01	PIC	R228C19
C7	7B	3	11	1381	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C8	7B	3	8	1400	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C1	7C	3	4	1345	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C2	7C	3	6	1378	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19
C3	7C	3	3	1355	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C4	7C	3	1	1361	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19
C5	7C	3	6	1285	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C6	7C	3	4	1351	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C7	7C	3	6	1438	5/15/2019 12:58	5/15/2019 13:01	PIC	R228C19
C8	7C	3	6	1375	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C1	7D	3	8	1316	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19
C2	7D	3	5	1377	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C3	7D	3	12	1375	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19
C4	7D	3	5	1362	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C5	7D	3	6	1280	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C6	7D	3	2	1274	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C7	7D	3	1	1444	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C8	7D	3.01	8	1416	5/15/2019 12:58	5/15/2019 13:01	PIC	R228C19
C1	8A	3	24	1262	5/15/2019 12:58	5/15/2019 13:01	PIC	R228C19
C2	8A	3	27	1249	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C3	8A	3	31	1308	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C4	8A	3	29	1351	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C5	8A	3	23	1389	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C6	8A	3	38	1347	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19
C7	8A	3	26	1326	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C8	8A	3	44	1393	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19
C1	8B	3	4	1295	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C2	8B	3	10	1358	5/15/2019 12:59	5/15/2019 13:02	PIC	R228C19
C3	8B	3	11	1304	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C4	8B	3	6	1297	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C5	8B	3	9	1358	5/15/2019 12:46	5/15/2019 12:49	PIC	R228C19

C6	8B	3	10	1458	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C7	8B	3	8	1471	5/15/2019 12:54	5/15/2019 12:57	PIC	R228C19
C8	8B	3	11	1416	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C1	8C	3	25	1316	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C2	8C	3	23	1412	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C3	8C	3	33	1347	5/15/2019 12:59	5/15/2019 13:02	PIC	R228C19
C4	8C	3	46	1346	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C5	8C	3	34	1343	5/15/2019 12:50	5/15/2019 12:53	PIC	R228C19
C6	8C	3	27	1400	5/15/2019 12:47	5/15/2019 12:50	PIC	R228C19
C7	8C	3	35	1439	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C8	8C	3	37	1444	5/15/2019 12:55	5/15/2019 12:58	PIC	R228C19
C1	8D	3	55	1284	5/15/2019 13:11	5/15/2019 13:14	PIC	R228C19
C2	8D	3	42	1271	5/15/2019 13:07	5/15/2019 13:10	PIC	R228C19
C3	8D	3	34	1317	5/15/2019 13:03	5/15/2019 13:06	PIC	R228C19
C4	8D	3	38	1345	5/15/2019 12:59	5/15/2019 13:02	PIC	R228C19
C5	8D	3	36	1328	5/15/2019 12:55	5/15/2019 12:58	PIC	R228C19
C6	8D	3	44	1350	5/15/2019 12:51	5/15/2019 12:54	PIC	R228C19
C7	8D	3	46	1375	5/15/2019 12:47	5/15/2019 12:50	PIC	R228C19
C8	8D	3	44	1377	5/15/2019 12:43	5/15/2019 12:46	PIC	R228C19
C1	9A	3	9	1323	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C2	9A	3	12	1281	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C3	9A	3	10	1364	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C4	9A	3	17	1267	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C5	9A	3	16	1280	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C6	9A	3	10	1366	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C7	9A	3	6	1306	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C8	9A	3	7	1438	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C1	9B	3	10	1229	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C2	9B	3	16	1286	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C3	9B	3	15	1234	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C4	9B	3	10	1261	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C5	9B	3	14	1245	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C6	9B	3	14	1242	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C7	9B	3	19	1294	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19

C8	9B	3	20	1399	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C1	9C	3	16	1214	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C2	9C	3	14	1248	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C3	9C	3	19	1291	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C4	9C	3	22	1261	5/15/2019 13:26	5/15/2019 13:29	PIC	R228C19
C5	9C	3	13	1231	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C6	9C	3	18	1198	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C7	9C	3	14	1311	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19
C8	9C	3	17	1332	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C1	9D	3	19	1189	5/15/2019 13:25	5/15/2019 13:28	PIC	R228C19
C2	9D	3	28	1304	5/15/2019 13:22	5/15/2019 13:25	PIC	R228C19
C3	9D	3	16	1329	5/15/2019 13:18	5/15/2019 13:21	PIC	R228C19
C4	9D	3	13	1296	5/15/2019 13:15	5/15/2019 13:18	PIC	R228C19
C5	9D	3	23	1225	5/15/2019 13:42	5/15/2019 13:45	PIC	R228C19
C6	9D	3	16	1265	5/15/2019 13:38	5/15/2019 13:41	PIC	R228C19
C7	9D	3	32	1281	5/15/2019 13:34	5/15/2019 13:37	PIC	R228C19
C8	9D	3	26	1332	5/15/2019 13:30	5/15/2019 13:33	PIC	R228C19

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-E
Tracer Exp Date : 1/14/2020
Tracer Volume Added: 0.20

Batch : 1562969
Analyst : NXL1
Prep Date : 5/16/2019
Ra-228 Method Uncertainty : 0.0829

Geometry: CeF on 25mm Filter

Procedure Code : GFCGANBL
Parmname : Radium-228
Required MDA : 1 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					Tracer Calculations					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	1203536991.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
2	1203536992.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
3	1203536993.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	342.6	5.40%	0.2	0.000200
4	1203536994.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	362.8	5.25%	0.2	0.000200
5	1203536995.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	360.0	5.27%	0.2	0.000200
6	1203536996.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	355.0	5.31%	0.2	0.000200
7	1203536997.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	349.0	5.35%	0.2	0.000200
8	1203536998.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	333.4	5.48%	0.2	0.000200
~~9~~	~~1203536999.1~~	~~1.0000~~	~~2.0399E-05~~	~~5/16/2019 0:00~~	~~309.5~~	~~5.68%~~	~~329.8~~	~~5.51%~~	~~0.2~~	~~0.000200~~
10	1203537000.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	347.3	5.37%	0.2	0.000200
11	1203537001.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
12	1203537002.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
13	1203537003.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	342.6	5.40%	0.2	0.000200
14	1203537004.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	362.8	5.25%	0.2	0.000200
15	1203537005.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	360.0	5.27%	0.2	0.000200
16	1203537006.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	355.0	5.31%	0.2	0.000200
17	1203537007.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	349.0	5.35%	0.2	0.000200
18	1203537008.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	333.4	5.48%	0.2	0.000200
19	1203537009.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	329.8	5.51%	0.2	0.000200
20	1203537010.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	347.3	5.37%	0.2	0.000200
21	1203537011.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
22	1203537012.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
23	1203537013.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	342.6	5.40%	0.2	0.000200
~~24~~	~~1203537014.1~~	~~1.0000~~	~~2.0399E-05~~	~~5/16/2019 0:00~~	~~309.5~~	~~5.68%~~	~~362.8~~	~~5.25%~~	~~0.2~~	~~0.000200~~
25	1203537015.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	360.0	5.27%	0.2	0.000200
26	1203537016.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	355.0	5.31%	0.2	0.000200
27	1203537017.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	349.0	5.35%	0.2	0.000200
28	1203537018.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	333.4	5.48%	0.2	0.000200
29	1203537019.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	329.8	5.51%	0.2	0.000200
30	1203537020.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	347.3	5.37%	0.2	0.000200
31	1203537021.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
32	1203537022.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
33	1203537023.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	342.6	5.40%	0.2	0.000200
34	1203537024.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	362.8	5.25%	0.2	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-001
Instrument SOP: GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	1A	5	5	501	100.200	5/16/2019 10:07	5/14/2019 0:00	5/16/2019 8:35	1.000	0.841	0.998	1.005	100%	3.92%
2	1B	5	5	558	111.600	5/16/2019 10:07	5/14/2019 0:00	5/16/2019 8:35	1.000	0.841	0.998	1.005	100%	3.92%
3	1C	5	25	548	109.600	5/16/2019 10:07	5/14/2019 0:00	5/16/2019 8:35	1.000	0.841	0.998	1.005	100%	3.92%
4	1D	5	11	534	106.800	5/16/2019 10:07	5/14/2019 0:00	5/16/2019 8:35	1.000	0.841	0.998	1.005	100%	3.87%
5	2A	5	14	595	119.000	5/16/2019 10:14	5/14/2019 0:00	5/16/2019 8:35	1.000	0.829	0.998	1.005	100%	3.88%
6	2B	5	3	489	97.800	5/16/2019 10:07	5/14/2019 0:00	5/16/2019 8:35	1.000	0.840	0.998	1.005	100%	3.89%
7	2C	5	5	452	90.400	5/16/2019 10:14	5/14/2019 0:00	5/16/2019 8:35	1.000	0.829	0.998	1.005	100%	3.90%
8	2D	5	29	586	117.200	5/21/2019 9:59	5/14/2019 0:00	5/21/2019 8:50	0.998	0.878	1.000	1.005	100%	3.95%
~~9~~	~~3A~~	~~5~~	~~0~~	~~0~~	~~0.000~~	~~5/16/2019 10:14~~	~~5/14/2019 0:00~~	~~5/16/2019 8:35~~	~~1.000~~	~~0.829~~	~~0.998~~	~~1.005~~	~~100%~~	~~3.96%~~
10	3B	5	25	524	104.800	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.91%
11	3C	5	12	577	115.400	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.92%
12	3D	5	14	470	94.000	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.92%
13	4A	5	11	592	118.400	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.92%
14	4B	5	1	464	92.800	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.87%
15	4C	5	14	448	89.600	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.88%
16	4D	5	35	515	103.000	5/16/2019 10:20	5/14/2019 0:00	5/16/2019 8:35	1.000	0.820	0.998	1.005	100%	3.89%
17	5A	5	15	513	102.600	5/16/2019 10:26	5/14/2019 0:00	5/16/2019 8:35	1.000	0.810	0.998	1.005	100%	3.90%
18	5B	5	14	544	108.800	5/16/2019 10:26	5/14/2019 0:00	5/16/2019 8:35	1.000	0.810	0.998	1.005	100%	3.95%
19	5C	5	8	581	116.200	5/16/2019 10:26	5/14/2019 0:00	5/16/2019 8:35	1.000	0.810	0.998	1.005	100%	3.96%
20	5D	5	11	541	108.200	5/16/2019 10:26	5/14/2019 0:00	5/16/2019 8:35	1.000	0.810	0.998	1.005	100%	3.91%
21	6A	5	2	526	105.200	5/16/2019 10:30	5/14/2019 0:00	5/16/2019 8:35	1.000	0.805	0.998	1.005	100%	3.92%
22	6B	5	1	510	102.000	5/16/2019 10:30	5/14/2019 0:00	5/16/2019 8:35	1.000	0.805	0.998	1.005	100%	3.92%
23	6C	5	1	437	87.400	5/16/2019 10:30	5/14/2019 0:00	5/16/2019 8:35	1.000	0.805	0.998	1.005	100%	3.92%
~~24~~	~~6D~~	~~5~~	~~0~~	~~0~~	~~0.000~~	~~5/16/2019 10:30~~	~~5/14/2019 0:00~~	~~5/16/2019 8:35~~	~~1.000~~	~~0.805~~	~~0.998~~	~~1.005~~	~~100%~~	~~3.87%~~
25	7A	5	0	501	100.200	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.88%
26	7B	5	2	470	94.000	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.89%
27	7C	5	2	569	113.800	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.90%
28	7D	5	6	524	104.800	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.95%
29	8A	5	7	532	106.400	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.96%
30	8B	5	6	456	91.200	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.91%
31	8C	5	11	476	95.200	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.92%
32	8D	5	15	549	109.800	5/16/2019 10:36	5/14/2019 0:00	5/16/2019 8:35	1.000	0.797	0.998	1.005	100%	3.92%
33	9A	5	1	505	101.000	5/16/2019 10:43	5/14/2019 0:00	5/16/2019 8:35	1.000	0.786	0.998	1.005	100%	3.92%
34	9B	5	6	485	97.000	5/16/2019 10:43	5/14/2019 0:00	5/16/2019 8:35	1.000	0.786	0.998	1.005	100%	3.87%

Calibration Data

Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	5/1/2019	5/31/2020	0.6640	0.00738	0.960	5/10/2019 18:02	500
2	PIC	5/1/2019	5/31/2020	0.6666	0.00711	1.100	5/10/2019 18:03	500
3	PIC	5/1/2019	5/31/2020	0.6300	0.00847	0.500	5/10/2019 18:03	500
4	PIC	5/1/2019	5/31/2020	0.6495	0.00692	0.864	5/10/2019 18:03	500
5	PIC	5/1/2019	5/31/2020	0.6348	0.01914	2.106	5/10/2019 18:03	500
6	PIC	5/1/2019	5/31/2020	0.6569	0.02111	0.776	5/10/2019 18:03	500
7	PIC	5/1/2019	5/31/2020	0.6582	0.01274	0.828	5/10/2019 18:04	500
8	PIC	5/1/2019	5/31/2020	0.6340	0.00745	0.802	5/18/2019 10:08	500
~~9~~	~~PIC~~	~~5/1/2019~~	~~5/31/2020~~	~~0.0000~~	~~0.01401~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
10	PIC	5/1/2019	5/31/2020	0.6519	0.01614	1.042	5/10/2019 18:04	500
11	PIC	5/1/2019	5/31/2020	0.6567	0.00988	1.052	5/10/2019 18:04	500
12	PIC	5/1/2019	5/31/2020	0.6533	0.02297	0.542	5/10/2019 18:04	500
13	PIC	5/1/2019	5/31/2020	0.6625	0.01123	1.254	5/10/2019 18:04	500
14	PIC	5/1/2019	5/31/2020	0.6400	0.01519	0.596	5/10/2019 18:04	500
15	PIC	5/1/2019	5/31/2020	0.6541	0.00889	0.522	5/10/2019 18:04	500
16	PIC	5/1/2019	5/31/2020	0.6083	0.00773	0.970	5/10/2019 18:04	500
17	PIC	5/1/2019	5/31/2020	0.6776	0.00851	0.514	5/10/2019 18:04	500
18	PIC	5/1/2019	5/31/2020	0.6707	0.00426	0.480	5/10/2019 18:04	500
19	PIC	5/1/2019	5/31/2020	0.6748	0.00657	0.548	5/10/2019 18:05	500
20	PIC	5/1/2019	5/31/2020	0.6606	0.00925	1.262	5/10/2019 18:05	500
21	PIC	5/1/2019	5/31/2020	0.6489	0.02228	1.756	5/10/2019 18:03	500
22	PIC	5/1/2019	5/31/2020	0.6310	0.00851	1.594	5/10/2019 18:04	500
23	PIC	5/1/2019	5/31/2020	0.6546	0.01970	1.342	5/10/2019 18:04	500
~~24~~	~~PIC~~	~~5/1/2019~~	~~5/31/2020~~	~~0.0000~~	~~0.01311~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
25	PIC	5/1/2019	5/31/2020	0.6638	0.00594	0.634	5/10/2019 18:04	500
26	PIC	5/1/2019	5/31/2020	0.6492	0.00627	0.300	5/10/2019 18:04	500
27	PIC	5/1/2019	5/31/2020	0.6585	0.00790	0.522	5/10/2019 18:04	500
28	PIC	5/1/2019	5/31/2020	0.6555	0.01113	0.546	5/10/2019 18:04	500
29	PIC	5/1/2019	5/31/2020	0.6425	0.01579	0.568	5/10/2019 18:04	500
30	PIC	5/1/2019	5/31/2020	0.6626	0.02148	0.328	5/10/2019 18:04	500
31	PIC	5/1/2019	5/31/2020	0.6683	0.01955	0.562	5/10/2019 18:04	500
32	PIC	5/1/2019	5/31/2020	0.6442	0.00609	1.652	5/10/2019 18:04	500
33	PIC	5/1/2019	5/31/2020	0.6820	0.00758	0.794	5/10/2019 18:04	500
34	PIC	5/1/2019	5/31/2020	0.6541	0.00754	0.856	5/10/2019 18:04	500

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

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

LCS S/N : 1809-A
LCS Exp Date : 4/23/2020
LCS Activity (dpm/ml): 106.86
LCS Volume Added: 2.00

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.8329	0.5880	1	1.6631	**80.5595**	6.02%	99.2400	4.4768	7.1229	16.1813		LCS			96.2704	83.7%
2	0.8883	0.6272	1	1.7396	**89.3746**	5.84%	110.5000	4.7246	7.4899	17.7661		LCS			96.2704	92.8%
3	0.6338	0.4475	1	1.4085	**93.3839**	5.87%	109.1000	4.6820	7.8548	18.5968		LCS			96.2704	97.0%
4	0.8083	0.5707	1	1.6396	**87.9686**	5.87%	105.9360	4.6219	7.5224	17.5167		LCS			96.2704	91.4%
5	1.3090	0.9241	1	2.3651	**100.6844**	6.01%	116.8940	4.8790	8.2367	20.2058		LCS			96.2704	104.6%
6	0.7578	0.5350	1	1.5630	**79.7059**	6.35%	97.0240	4.4228	7.1215	16.3172		LCS			96.2704	82.8%
7	0.7917	0.5589	1	1.6164	**74.4181**	6.28%	89.5720	4.2523	6.9244	15.1669		LCS			96.2704	77.3%
8	0.7635	0.5390	1	1.5665	**94.7609**	5.78%	116.3980	4.8417	7.7256	18.7739		LCS			96.2704	98.4%
~~9~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~96.2704~~	~~#VALUE!~~
10	0.9071	0.6404	1	1.7899	**88.0434**	6.11%	103.7580	4.5784	7.6146	17.7746		LCS			96.2704	91.5%
11	0.9047	0.6387	1	1.7829	**96.3170**	5.83%	114.3480	4.8044	7.9317	19.1364		LCS			96.2704	100.0%
12	0.6528	0.4609	1	1.4298	**79.1345**	6.49%	93.4580	4.3360	7.1961	16.3320		LCS			96.2704	82.2%
13	0.9791	0.6912	1	1.8834	**97.8054**	5.82%	117.1460	4.8665	7.9635	19.4192		LCS			96.2704	101.6%
14	0.6986	0.4932	1	1.5050	**79.6797**	6.25%	92.2040	4.3083	7.2972	16.2180		LCS			96.2704	82.8%
15	0.6398	0.4517	1	1.4107	**75.3223**	6.20%	89.0780	4.2333	7.0160	15.2803		LCS			96.2704	78.2%
16	0.9378	0.6621	1	1.8698	**92.7759**	5.96%	102.0300	4.5389	8.0894	18.5661		LCS			96.2704	96.4%
17	0.6199	0.4376	1	1.3707	**84.2886**	5.97%	102.0860	4.5300	7.3309	16.8785		LCS			96.2704	87.6%
18	0.6052	0.4272	1	1.3549	**90.3489**	5.86%	108.3200	4.6649	7.6262	17.9760		LCS			96.2704	93.8%
19	0.6427	0.4537	1	1.4049	**95.8792**	5.79%	115.6520	4.8209	7.8335	18.9986		LCS			96.2704	99.6%
20	0.9963	0.7034	1	1.9148	**90.5612**	5.92%	106.9380	4.6522	7.7218	18.0842		LCS			96.2704	94.1%
21	1.2038	0.8499	1	2.2202	**89.7344**	6.33%	103.4440	4.5873	7.7995	18.3417		LCS			96.2704	93.2%
22	1.1794	0.8327	1	2.2006	**89.5682**	6.03%	100.4060	4.5170	7.8977	17.9920		LCS			96.2704	93.0%
23	1.0432	0.7365	1	1.9890	**74.0033**	6.55%	86.0580	4.1812	7.0473	15.3221		LCS			96.2704	76.9%
~~24~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~96.2704~~	~~#VALUE!~~
25	0.7150	0.5048	1	1.5241	**85.3782**	5.97%	99.5660	4.4767	7.5241	17.0919		LCS			96.2704	88.7%
26	0.5029	0.3550	1	1.2361	**82.1506**	6.08%	93.7000	4.3360	7.4510	16.5514		LCS			96.2704	85.3%
27	0.6540	0.4617	1	1.4420	**97.9133**	5.80%	113.2780	4.7709	8.0825	19.4130		LCS			96.2704	101.7%
28	0.6719	0.4744	1	1.4697	**90.5263**	6.01%	104.2540	4.5783	7.7919	18.1677		LCS			96.2704	94.0%
29	0.6991	0.4936	1	1.5187	**93.7490**	6.10%	105.8320	4.6131	8.0095	18.9086		LCS			96.2704	97.4%
30	0.5152	0.3637	1	1.2428	**78.0576**	6.48%	90.8720	4.2709	7.1905	16.0987		LCS			96.2704	81.1%
31	0.6686	0.4720	1	1.4550	**80.5944**	6.36%	94.6380	4.3636	7.2835	16.5077		LCS			96.2704	83.7%
32	1.1893	0.8396	1	2.2094	**95.5564**	5.87%	108.1480	4.6865	8.1161	19.0284		LCS			96.2704	99.3%
33	0.7890	0.5570	1	1.6214	**84.7281**	6.01%	100.2060	4.4946	7.4487	17.0001		LCS			96.2704	88.0%
34	0.8542	0.6030	1	1.7350	**84.7603**	6.04%	96.1440	4.4047	7.6111	17.0441		LCS			96.2704	88.0%

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-E
Tracer Exp Date : 1/14/2020
Tracer Volume Added: 0.20

Batch : 1562969
Analyst : NXL1
Prep Date : 5/16/2019
Ra-228 Method Uncertainty : 0.0829

Geometry: CeF on 25mm Filter

Procedure Code : GFCGANBL
Parmname : Radium-228
Required MDA : 1 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					Tracer Calculations					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	1203536991.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
2	1203536992.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
3	1203536993.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	342.6	5.40%	0.2	0.000200
4	1203536994.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	362.8	5.25%	0.2	0.000200
5	1203536995.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	360.0	5.27%	0.2	0.000200
6	1203536996.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	355.0	5.31%	0.2	0.000200
7	1203536997.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	349.0	5.35%	0.2	0.000200
8	1203536998.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	333.4	5.48%	0.2	0.000200
9	1203536999.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	341.5	5.41%	0.2	0.000200
10	1203537000.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	343.6	5.39%	0.2	0.000200
~~11~~	~~1203537001.1~~	~~1.0000~~	~~2.0399E-05~~	~~5/16/2019 0:00~~	~~309.5~~	~~5.68%~~	~~342.6~~	~~5.40%~~	~~0.2~~	~~0.000200~~
12	1203537002.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	362.8	5.25%	0.2	0.000200
13	1203537003.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	360.0	5.27%	0.2	0.000200
14	1203537004.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	355.0	5.31%	0.2	0.000200
15	1203537005.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	349.0	5.35%	0.2	0.000200
16	1203537006.1	1.0000	2.0399E-05	5/16/2019 0:00	309.5	5.68%	333.4	5.48%	0.2	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-001
Instrument SOP: GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	11A	5	0	529	105.800	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.779	0.998	1.005	100%	3.92%
2	11B	5	4	483	96.600	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.779	0.998	1.005	100%	3.92%
3	11C	5	0	588	117.600	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.779	0.998	1.005	100%	3.92%
4	11D	5	3	517	103.400	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.779	0.998	1.005	100%	3.87%
5	12A	5	4	533	106.600	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.780	0.998	1.005	100%	3.88%
6	12B	5	2	502	100.400	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.780	0.998	1.005	100%	3.89%
7	12C	5	5	674	134.800	5/21/2019 10:12	5/14/2019 0:00	5/21/2019 8:50	0.998	0.856	1.000	1.005	100%	3.90%
8	12D	5	0	566	113.200	5/16/2019 10:47	5/14/2019 0:00	5/16/2019 8:35	1.000	0.780	0.998	1.005	100%	3.95%
9	13A	5	1	458	91.600	5/16/2019 10:57	5/14/2019 0:00	5/16/2019 8:35	1.000	0.765	0.998	1.005	100%	3.92%
10	13B	5	2	473	94.600	5/16/2019 10:57	5/14/2019 0:00	5/16/2019 8:35	1.000	0.764	0.998	1.005	100%	3.92%
~~11~~	~~13C~~	~~5~~	~~0~~	~~0~~	~~0.000~~	~~5/16/2019 10:57~~	~~5/14/2019 0:00~~	~~5/16/2019 8:35~~	~~1.000~~	~~0.764~~	~~0.998~~	~~1.005~~	~~100%~~	~~3.92%~~
12	13D	5	7	497	99.400	5/16/2019 10:57	5/14/2019 0:00	5/16/2019 8:35	1.000	0.765	0.998	1.005	100%	3.87%
13	14A	5	2	470	94.000	5/16/2019 10:56	5/14/2019 0:00	5/16/2019 8:35	1.000	0.766	0.998	1.005	100%	3.88%
14	14B	5	3	453	90.600	5/16/2019 10:56	5/14/2019 0:00	5/16/2019 8:35	1.000	0.766	0.998	1.005	100%	3.89%
15	14C	5	2	619	123.800	5/21/2019 10:18	5/14/2019 0:00	5/21/2019 8:50	0.998	0.847	1.000	1.005	100%	3.90%
16	14D	5	2	469	93.800	5/16/2019 10:57	5/14/2019 0:00	5/16/2019 8:35	1.000	0.766	0.998	1.005	100%	3.95%

Calibration Data

Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	5/1/2019	5/31/2020	0.6748	0.01317	1.008	5/10/2019 18:02	500
2	PIC	5/1/2019	5/31/2020	0.6591	0.00697	1.144	5/10/2019 18:02	500
3	PIC	5/1/2019	5/31/2020	0.6780	0.01278	0.544	5/10/2019 18:02	500
4	PIC	5/1/2019	5/31/2020	0.6933	0.01068	1.100	5/10/2019 18:02	500
5	PIC	5/1/2019	5/31/2020	0.6446	0.01964	0.674	5/10/2019 18:02	500
6	PIC	5/1/2019	5/31/2020	0.6571	0.01114	0.448	5/10/2019 18:02	500
7	PIC	5/1/2019	5/31/2020	0.6742	0.01666	1.148	5/17/2019 16:14	500
8	PIC	5/1/2019	5/31/2020	0.6798	0.01845	1.550	5/10/2019 18:02	500
9	PIC	5/1/2019	5/31/2020	0.6889	0.00714	1.046	5/10/2019 18:02	1000
10	PIC	5/1/2019	5/31/2020	0.6801	0.00967	0.936	5/10/2019 18:02	1000
~~11~~	~~PIC~~	~~5/1/2019~~	~~5/31/2020~~	~~0.0000~~	~~0.01708~~	~~FAIL~~	~~12:00:00 AM~~	~~0~~
12	PIC	5/1/2019	5/31/2020	0.6776	0.01144	1.453	5/10/2019 18:02	1000
13	PIC	5/1/2019	5/31/2020	0.6934	0.02119	1.004	5/10/2019 18:02	1000
14	PIC	5/1/2019	5/31/2020	0.6475	0.01028	0.893	5/10/2019 18:02	1000
15	PIC	5/1/2019	5/31/2020	0.6717	0.01828	2.750	5/17/2019 16:15	1000
16	PIC	5/1/2019	5/31/2020	0.6481	0.00738	0.382	5/10/2019 18:02	1000

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

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

LCS S/N : 1809-A
LCS Exp Date : 4/23/2020
LCS Activity (dpm/ml): 106.86
LCS Volume Added: 2.00

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.9063	0.6398	1	1.7968	**90.3274**	6.03%	104.7920	4.6002	7.7719	18.1528		LCS			96.2704	93.8%
2	0.9886	0.6979	1	1.9254	**84.2491**	6.09%	95.4560	4.3957	7.6041	16.9821		LCS			96.2704	87.5%
3	0.6626	0.4678	1	1.4504	**100.4237**	5.85%	117.0560	4.8499	8.1551	19.9663		LCS			96.2704	104.3%
4	0.9216	0.6506	1	1.8047	**85.8356**	5.99%	102.3000	4.5478	7.4791	17.2067		LCS			96.2704	89.2%
5	0.7758	0.5477	1	1.6368	**95.5803**	6.16%	105.9260	4.6175	8.1664	19.3432		LCS			96.2704	99.3%
6	0.6204	0.4380	1	1.4071	**88.4685**	6.04%	99.9520	4.4812	7.7740	17.7850		LCS			96.2704	91.9%
7	0.8817	0.6225	1	1.7164	**105.0202**	5.75%	133.6520	5.1925	7.9971	20.7719		LCS			96.2704	109.1%
8	1.1155	0.7875	1	2.0884	**95.5270**	6.10%	111.6500	4.7585	7.9798	19.2663		LCS			96.2704	99.2%
9	0.9192	0.6490	1	1.8141	**77.9105**	6.19%	90.5540	4.2803	7.2180	15.7944		LCS			96.2704	80.9%
10	0.8813	0.6222	1	1.7677	**81.6794**	6.15%	93.6640	4.3498	7.4348	16.5271		LCS			96.2704	84.8%
~~11~~	~~#DIV/0!~~	~~#DIV/0!~~	~~1~~	~~#DIV/0!~~	~~**#VALUE!**~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~	~~#VALUE!~~		~~LCS~~			~~96.2704~~	~~#VALUE!~~
12	1.1012	0.7775	1	2.0797	**85.6604**	6.08%	97.9470	4.4589	7.6431	17.2640		LCS			96.2704	89.0%
13	0.8933	0.6307	1	1.7735	**79.3705**	6.42%	92.9960	4.3360	7.2534	16.3148		LCS			96.2704	82.4%
14	0.9025	0.6372	1	1.8230	**82.0183**	6.22%	89.7070	4.2569	7.6283	16.6624		LCS			96.2704	85.2%
15	1.3805	0.9746	1	2.4274	**96.4664**	5.96%	121.0500	4.9762	7.7726	19.3010		LCS			96.2704	100.2%
16	0.5899	0.4165	1	1.3812	**85.3569**	6.13%	93.4180	4.3313	7.7568	17.2537		LCS			96.2704	88.7%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
V1	1A	5	5	501	5/16/2019 10:07	5/16/2019 10:12	PIC	R228V19
V2	1B	5	5	558	5/16/2019 10:07	5/16/2019 10:12	PIC	R228V19
V3	1C	5	25	548	5/16/2019 10:07	5/16/2019 10:12	PIC	R228V19
V4	1D	5	11	534	5/16/2019 10:07	5/16/2019 10:12	PIC	R228V19
V5	2A	5	14	595	5/16/2019 10:14	5/16/2019 10:19	PIC	R228V19
V6	2B	5	3	489	5/16/2019 10:07	5/16/2019 10:12	PIC	R228V19
V7	2C	5	5	452	5/16/2019 10:14	5/16/2019 10:19	PIC	R228V19
V12	2D	5	29	586	5/21/2019 9:59	5/21/2019 10:04	PIC	R228V19
V1	3A	5	0	0	5/16/2019 10:14	5/16/2019 10:19	PIC	R228V19
V2	3B	5	25	524	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V3	3C	5	12	577	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V4	3D	5	14	470	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V5	4A	5	11	592	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V6	4B	5	1	464	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V7	4C	5	14	448	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V8	4D	5	35	515	5/16/2019 10:20	5/16/2019 10:25	PIC	R228V19
V1	5A	5	15	513	5/16/2019 10:26	5/16/2019 10:31	PIC	R228V19
V2	5B	5	14	544	5/16/2019 10:26	5/16/2019 10:31	PIC	R228V19
V3	5C	5	8	581	5/16/2019 10:26	5/16/2019 10:31	PIC	R228V19
V4	5D	5	11	541	5/16/2019 10:26	5/16/2019 10:31	PIC	R228V19
V5	6A	5	2	526	5/16/2019 10:30	5/16/2019 10:35	PIC	R228V19
V6	6B	5	1	510	5/16/2019 10:30	5/16/2019 10:35	PIC	R228V19
V7	6C	5	1	437	5/16/2019 10:30	5/16/2019 10:35	PIC	R228V19
V8	6D	5	0	0	5/16/2019 10:30	5/16/2019 10:35	PIC	R228V19
V1	7A	5	0	501	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V2	7B	5	2	470	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V3	7C	5	2	569	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V4	7D	5	6	524	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V5	8A	5	7	532	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V6	8B	5	6	456	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V7	8C	5	11	476	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V8	8D	5	15	549	5/16/2019 10:36	5/16/2019 10:41	PIC	R228V19
V1	9A	5	1	505	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19

V2	9B	5	6	485	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V3	9C	5	10	509	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V4	9D	5	8	522	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V5	10A	5	1	582	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V6	10B	5	1	484	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V12	10C	5	1	607	5/21/2019 10:08	5/21/2019 10:13	PIC	R228V19
V8	10D	5	3	538	5/16/2019 10:43	5/16/2019 10:48	PIC	R228V19
V1	11A	5	0	529	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V2	11B	5	4	483	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V3	11C	5	0	588	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V4	11D	5	3	517	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V5	12A	5	4	533	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V6	12B	5	2	502	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V12	12C	5	5	674	5/21/2019 10:12	5/21/2019 10:17	PIC	R228V19
V8	12D	5	0	566	5/16/2019 10:47	5/16/2019 10:52	PIC	R228V19
V1	13A	5	1	458	5/16/2019 10:57	5/16/2019 11:02	PIC	R228V19
V2	13B	5	2	473	5/16/2019 10:57	5/16/2019 11:02	PIC	R228V19
V3	13C	5	0	0	5/16/2019 10:57	5/16/2019 11:02	PIC	R228V19
V4	13D	5	7	497	5/16/2019 10:57	5/16/2019 11:02	PIC	R228V19
V5	14A	5	2	470	5/16/2019 10:56	5/16/2019 11:01	PIC	R228V19
V6	14B	5	3	453	5/16/2019 10:56	5/16/2019 11:01	PIC	R228V19
V12	14C	5	2	619	5/21/2019 10:18	5/21/2019 10:23	PIC	R228V19
V8	14D	5	2	469	5/16/2019 10:57	5/16/2019 11:02	PIC	R228V19

MPC 9600 Plateau Instrument 1 MPC 9604 Detector A 6/13/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	0	>100
1005	7	>100
1035	47	>100
1065	224	>100
1095	537	>100
1125	959	>100
1155	1429	>100
1185	2102	>100
1215	2872	+96.01
1245	3852	+87.18
1275	4927	+80.94

VOLTS	COUNTS	%/100 Volts
1305	6326	+74.49
1335	7924	+67.06
1365	9658	+56.48
1395	11345	+45.57
1425	12749	+34.20
1455	13989	+23.71
1485	14747	+16.09
1515	15183	+7.90
1545	15643	+3.22
1575	15315	+1.74
1605	15418	+1.35
1635	15699	+3.04
1665	15767	+2.61
1695	15853	+1.42
1725	15958	+0.75
1755	15940	+0.56
1785	15902	+0.43
1815	16015	+47.68
1845	16024	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector B 6/13/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	3	
795	3	-47.62
825	1	>100
855	0	>100
885	0	+0.00
915	0	>100
945	1	>100
975	1	>100
1005	6	>100
1035	17	>100
1065	116	>100
1095	340	>100
1125	763	>100
1155	1311	>100
1185	1955	>100
1215	2565	+95.09
1245	3476	+88.55
1275	4485	+85.68

VOLTS	COUNTS	%/100 Volts
1305	5870	+78.72
1335	7514	+71.50
1365	9167	+60.16
1395	10994	+47.62
1425	12427	+34.57
1455	13549	+22.46
1485	14141	+13.71
1515	14562	+8.11
1545	14778	+4.60
1575	14982	+1.93
1605	14944	+1.93
1635	14909	+0.43
1665	15248	+1.01
1695	14927	+1.35
1725	15163	+2.90
1755	15258	+5.36
1785	15747	+5.53
1815	15873	+85.14
1845	16152	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector C 6/13/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	1	+100.00
795	1	>100
825	2	-27.78
855	2	-55.56
885	0	-83.33
915	1	-33.33
945	1	>100
975	1	>100
1005	28	>100
1035	164	>100
1065	445	>100
1095	839	>100
1125	1397	>100
1155	1949	>100
1185	2660	+95.70
1215	3574	+90.94
1245	4678	+84.01
1275	6118	+75.34

VOLTS	COUNTS	%/100 Volts
1305	7594	+67.34
1335	9148	+58.21
1365	10935	+46.49
1395	12539	+32.26
1425	13373	+19.16
1455	13706	+10.61
1485	14066	+7.64
1515	14358	+4.73
1545	14655	+3.27
1575	14422	+1.45
1605	14743	+1.73
1635	14631	+1.59
1665	14932	+1.25
1695	14677	+1.13
1725	14998	+1.43
1755	14849	+2.60
1785	15167	+1.41
1815	15177	+78.97
1845	15152	

MPC 9600 Plateau Instrument 1 MPC 9604 Detector D 6/13/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	1	+0.00
945	0	>100
975	0	>100
1005	16	>100
1035	97	>100
1065	329	>100
1095	679	>100
1125	1163	>100
1155	1736	>100
1185	2459	+97.85
1215	3157	+88.88
1245	4179	+85.22
1275	5387	+78.84

VOLTS	COUNTS	%/100 Volts
1305	7020	+71.03
1335	8391	+61.78
1365	10166	+49.83
1395	11726	+38.32
1425	12849	+24.61
1455	13568	+14.03
1485	13833	+7.57
1515	14012	+4.22
1545	14181	+2.80
1575	14278	+1.16
1605	14294	-0.10
1635	14202	+0.49
1665	14197	+0.66
1695	14431	+1.70
1725	14320	+1.72
1755	14505	+1.54
1785	14531	+3.33
1815	14661	+66.43
1845	14971	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector A 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

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	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector B 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	2	>100
1005	3	>100
1035	14	>100
1065	127	>100
1095	500	>100
1125	1332	>100
1155	2373	>100
1185	3614	>100
1215	5227	>100
1245	7060	+97.33
1275	9574	+90.30

VOLTS	COUNTS	%/100 Volts
1305	12541	+83.18
1335	16192	+74.48
1365	20083	+67.17
1395	24273	+58.43
1425	29090	+46.86
1455	33223	+34.56
1485	35608	+22.67
1515	37581	+13.63
1545	38762	+8.18
1575	39185	+4.42
1605	39484	+3.06
1635	39806	+2.61
1665	40264	+2.03
1695	40353	+2.32
1725	40431	+3.28
1755	41127	+7.09
1785	41882	+12.40
1815	44049	+18.52
1845	46950	
1875	51097	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector C 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	1	>100
945	0	>100
975	17	>100
1005	87	>100
1035	438	>100
1065	1055	>100
1095	2114	>100
1125	3282	>100
1155	4625	>100
1185	6554	+97.66
1215	8743	+88.09
1245	11345	+81.31
1275	14261	+74.60

VOLTS	COUNTS	%/100 Volts
1305	18216	+67.74
1335	21995	+58.11
1365	26173	+46.11
1395	29479	+32.75
1425	32186	+20.62
1455	33022	+12.13
1485	33981	+7.22
1515	34520	+4.95
1545	35095	+2.07
1575	35014	+0.38
1605	34812	+0.55
1635	34859	+1.11
1665	35460	+1.94
1695	35273	+1.95
1725	35629	+2.73
1755	35811	+5.77
1785	36656	+6.44
1815	37896	+9.21
1845	38145	
1875	40283	

MPC 9600 Plateau Instrument 2 MPC 9604 Detector D 7/1/2009

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	+83.33
795	2	+55.56
825	1	>100
855	0	>100
885	0	>100
915	0	>100
945	2	>100
975	9	>100
1005	89	>100
1035	439	>100
1065	1198	>100
1095	2164	>100
1125	3436	>100
1155	4917	>100
1185	6762	+96.59
1215	9006	+89.14
1245	11800	+81.34
1275	15132	+73.59

VOLTS	COUNTS	%/100 Volts
1305	18675	+65.94
1335	22620	+55.69
1365	26869	+44.63
1395	29957	+32.08
1425	32494	+20.49
1455	33836	+11.98
1485	34627	+6.45
1515	34849	+3.22
1545	35298	+1.98
1575	35180	+2.37
1605	35503	+1.57
1635	36006	+0.99
1665	35722	+0.89
1695	35597	+0.93
1725	36188	+1.86
1755	36272	+1.90
1785	36389	+2.55
1815	36529	+4.39
1845	37459	
1875	38170	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	>100
825	2	-55.56
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	2	>100
1005	8	>100
1035	62	>100
1065	257	>100
1095	597	>100
1125	1089	>100
1155	1647	>100
1185	2293	>100
1215	3077	+94.67
1245	4110	+87.24
1275	5445	+80.06

VOLTS	COUNTS	%/100 Volts
1305	6793	+72.22
1335	8424	+63.90
1365	10197	+55.02
1395	11950	+42.77
1425	13411	+29.80
1455	14294	+19.59
1485	14805	+11.07
1515	15356	+6.20
1545	15310	+3.02
1575	15440	+2.16
1605	15455	+2.69
1635	15785	+2.30
1665	15765	+1.35
1695	15824	-0.00
1725	15753	+1.13
1755	15790	+1.90
1785	16050	+63.60
1815	16130	+80.13

MPC 9600 Plateau Instrument 3 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	2	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	5	>100
1005	27	>100
1035	126	>100
1065	377	>100
1095	785	>100
1125	1218	>100
1155	1817	>100
1185	2613	+98.98
1215	3403	+90.55
1245	4427	+84.39
1275	5822	+78.83

VOLTS	COUNTS	%/100 Volts
1305	7393	+69.59
1335	9033	+58.08
1365	10605	+46.52
1395	12037	+32.58
1425	13183	+20.95
1455	13442	+10.99
1485	13870	+6.04
1515	13883	+4.84
1545	14205	+4.41
1575	14286	+4.46
1605	14605	+2.79
1635	14642	+1.13
1665	14632	+0.11
1695	14518	+1.48
1725	14691	+2.91
1755	14939	+5.92
1785	15066	+79.21
1815	15660	+94.69

MPC 9600 Plateau Instrument 3 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	3	+0.00
795	1	>100
825	0	>100
855	0	+0.00
885	0	>100
915	1	>100
945	2	>100
975	1	>100
1005	22	>100
1035	132	>100
1065	361	>100
1095	792	>100
1125	1334	>100
1155	1898	>100
1185	2494	+97.73
1215	3507	+92.50
1245	4579	+86.31
1275	5977	+77.09

VOLTS	COUNTS	%/100 Volts
1305	7484	+69.37
1335	9155	+58.12
1365	10922	+48.50
1395	12240	+34.08
1425	13731	+22.36
1455	13877	+12.62
1485	14481	+6.63
1515	14469	+4.52
1545	14856	+3.27
1575	14670	+2.82
1605	15103	+1.10
1635	14972	+1.32
1665	14951	+1.16
1695	15042	+2.65
1725	15331	+3.43
1755	15384	+4.36
1785	15565	+88.19
1815	15936	

MPC 9600 Plateau Instrument 3 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	0	
795	0	+0.00
825	0	>100
855	1	>100
885	1	+100.00
915	2	+47.62
945	1	>100
975	2	>100
1005	6	>100
1035	90	>100
1065	299	>100
1095	658	>100
1125	1106	>100
1155	1652	>100
1185	2225	>100
1215	3151	+93.03
1245	4108	+85.91
1275	5297	+76.66

VOLTS	COUNTS	%/100 Volts
1305	6684	+70.65
1335	8166	+63.65
1365	9916	+50.98
1395	11645	+38.43
1425	12411	+26.60
1455	13312	+16.73
1485	13971	+12.51
1515	14151	+6.35
1545	14558	+3.08
1575	14358	+0.42
1605	14529	-0.48
1635	14256	+0.63
1665	14504	-0.02
1695	14507	+2.94
1725	14400	+3.51
1755	14948	+6.19
1785	15057	+53.75
1815	15562	+66.37

MPC 9600 Plateau Instrument 4 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	1	-55.56
825	1	-83.33
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	3	>100
1005	44	>100
1035	177	>100
1065	454	>100
1095	812	>100
1125	1287	>100
1155	1796	>100
1185	2471	+94.71
1215	3205	+87.75
1245	4290	+81.77
1275	5406	+73.53

VOLTS	COUNTS	%/100 Volts
1305	6813	+65.73
1335	8073	+56.39
1365	9720	+46.20
1395	10868	+34.10
1425	11995	+21.94
1455	12359	+14.98
1485	12774	+7.56
1515	13230	+5.52
1545	12996	+2.99
1575	13319	-0.14
1605	13318	+1.13
1635	13042	+0.36
1665	13358	+0.73
1695	13371	+1.50
1725	13299	+0.71
1755	13371	+1.64
1785	13500	+81.19
1815	13601	+97.56

MPC 9600 Plateau Instrument 4 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	+0.00
825	0	>100
855	1	+0.00
885	0	>100
915	0	>100
945	0	>100
975	2	>100
1005	23	>100
1035	92	>100
1065	288	>100
1095	621	>100
1125	1100	>100
1155	1562	>100
1185	2118	+96.83
1215	2831	+88.57
1245	3772	+83.53
1275	4722	+76.32

VOLTS	COUNTS	%/100 Volts
1305	6060	+67.89
1335	7350	+59.12
1365	8689	+50.15
1395	9925	+42.83
1425	11289	+33.88
1455	12434	+24.66
1485	13066	+13.99
1515	13490	+7.48
1545	13436	+5.40
1575	13733	+3.64
1605	14043	+3.89
1635	13937	+1.56
1665	14142	+1.49
1695	14011	+1.67
1725	14321	+1.17
1755	14202	+1.62
1785	14295	+65.73
1815	14371	+83.90

MPC 9600 Plateau Instrument 4 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	1	+55.56
795	0	>100
825	1	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	0	>100
1005	6	>100
1035	49	>100
1065	137	>100
1095	391	>100
1125	753	>100
1155	1097	>100
1185	1568	>100
1215	2119	+94.44
1245	2914	+87.11
1275	3635	+80.90

VOLTS	COUNTS	%/100 Volts
1305	4718	+73.54
1335	5897	+68.27
1365	7146	+57.98
1395	8555	+45.79
1425	9644	+30.98
1455	10364	+19.46
1485	10540	+11.54
1515	11034	+6.07
1545	11134	+4.39
1575	11052	+1.52
1605	11255	+2.54
1635	11228	+2.31
1665	11473	+0.19
1695	11334	+0.99
1725	11235	+3.23
1755	11516	+6.26
1785	11940	>100
1815	12072	

MPC 9600 Plateau Instrument 4 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	>100
885	0	+55.56
915	2	>100
945	0	>100
975	7	>100
1005	56	>100
1035	211	>100
1065	467	>100
1095	828	>100
1125	1282	>100
1155	1718	>100
1185	2507	+93.37
1215	3276	+85.96
1245	4116	+76.78
1275	5268	+71.00

VOLTS	COUNTS	%/100 Volts
1305	6502	+65.04
1335	7833	+56.32
1365	9271	+45.64
1395	10543	+34.63
1425	11381	+22.57
1455	12088	+13.41
1485	12259	+7.23
1515	12467	+2.61
1545	12509	+2.50
1575	12446	+2.12
1605	12738	+2.44
1635	12753	+2.32
1665	12818	+1.28
1695	12848	+2.04
1725	12936	+2.89
1755	13089	+5.16
1785	13260	+80.15
1815	13705	+96.56

MPC 9600 Plateau Instrument 5 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	6	>100
1035	57	>100
1065	225	>100
1095	562	>100
1125	966	>100
1155	1494	>100
1185	2158	>100
1215	2867	+94.78
1245	3933	+87.94
1275	5000	+80.89

VOLTS	COUNTS	%/100 Volts
1305	6485	+72.12
1335	7960	+65.10
1365	9585	+53.45
1395	11333	+41.32
1425	12468	+27.96
1455	13292	+15.98
1485	13667	+8.74
1515	13830	+4.75
1545	13962	+3.68
1575	14126	+2.33
1605	14291	+0.79
1635	14157	+0.76
1665	14115	+0.66
1695	14377	+1.43
1725	14323	+2.74
1755	14359	+3.97
1785	14714	+5.96
1815	15049	+58.93
1845	15296	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	1	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	1	>100
945	0	>100
975	3	>100
1005	16	>100
1035	95	>100
1065	332	>100
1095	695	>100
1125	1131	>100
1155	1639	>100
1185	2374	>100
1215	3186	+92.75
1245	4237	+84.15
1275	5389	+79.03

VOLTS	COUNTS	%/100 Volts
1305	6831	+71.04
1335	8580	+62.44
1365	10138	+51.78
1395	11727	+37.26
1425	13080	+24.15
1455	13481	+13.62
1485	13767	+8.54
1515	14087	+6.23
1545	14543	+3.90
1575	14406	+1.19
1605	14441	-1.23
1635	14394	+0.70
1665	14283	+1.29
1695	14636	+2.59
1725	14600	+1.64
1755	14800	-0.62
1785	14559	+1.39
1815	14520	+78.54
1845	15046	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	+0.00
825	0	>100
855	1	+0.00
885	0	+83.33
915	0	>100
945	1	>100
975	3	>100
1005	8	>100
1035	59	>100
1065	212	>100
1095	524	>100
1125	912	>100
1155	1304	>100
1185	1873	>100
1215	2732	+95.96
1245	3431	+86.17
1275	4513	+79.88

VOLTS	COUNTS	%/100 Volts
1305	5700	+73.51
1335	7262	+65.01
1365	8553	+53.56
1395	10141	+38.96
1425	11137	+24.85
1455	11669	+14.29
1485	11759	+7.77
1515	12273	+4.21
1545	12211	+2.96
1575	12203	+1.51
1605	12333	+1.67
1635	12491	+2.52
1665	12376	+0.07
1695	12650	-0.37
1725	12267	+0.40
1755	12476	-0.07
1785	12537	+1.92
1815	12501	+92.27
1845	12613	

MPC 9600 Plateau Instrument 5 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	-83.33
795	1	+0.00
825	0	+83.33
855	0	-83.33
885	1	>100
915	0	>100
945	1	>100
975	1	>100
1005	13	>100
1035	65	>100
1065	255	>100
1095	556	>100
1125	960	>100
1155	1531	>100
1185	2225	>100
1215	2917	+94.37
1245	3906	+86.39
1275	5141	+81.41

VOLTS	COUNTS	%/100 Volts
1305	6466	+72.73
1335	8122	+63.87
1365	9686	+53.79
1395	11340	+39.81
1425	12644	+25.32
1455	13213	+13.76
1485	13323	+7.11
1515	13650	+4.90
1545	13848	+3.16
1575	13950	+1.49
1605	13824	+1.87
1635	13972	+1.53
1665	14228	+0.67
1695	14070	-0.01
1725	13916	-0.48
1755	14126	+0.97
1785	14099	+3.05
1815	14183	-81.41
1845	14536	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1455 Beta Volts: 1455

VOLTS	COUNTS	%/100 Volts
705	1	
735	2	
765	1	-27.78
795	1	+0.00
825	1	-33.33
855	2	>100
885	0	-83.33
915	0	+83.33
945	1	>100
975	3	>100
1005	22	>100
1035	116	>100
1065	330	>100
1095	720	>100
1125	1158	>100
1155	1701	>100
1185	2311	+96.48
1215	3127	+89.12
1245	4006	+84.49
1275	5232	+77.58

VOLTS	COUNTS	%/100 Volts
1305	6669	+70.16
1335	8114	+60.16
1365	9652	+48.95
1395	11098	+37.74
1425	12185	+25.21
1455	12962	+15.24
1485	13188	+8.44
1515	13473	+5.05
1545	13585	+4.60
1575	13779	+2.16
1605	13974	+0.46
1635	13722	-0.32
1665	13708	+0.11
1695	13845	+2.33
1725	13936	+2.49
1755	14092	+2.26
1785	14106	-81.98
1815	14237	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1455 Beta Volts: 1455

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	+0.00
915	0	>100
945	0	>100
975	3	>100
1005	15	>100
1035	141	>100
1065	364	>100
1095	723	>100
1125	1218	>100
1155	1767	>100
1185	2350	>100
1215	3296	+88.41
1245	4354	+81.87
1275	5289	+73.91

VOLTS	COUNTS	%/100 Volts
1305	6772	+67.97
1335	8297	+62.13
1365	9910	+49.54
1395	11506	+36.86
1425	12438	+24.13
1455	13148	+13.99
1485	13466	+9.38
1515	13688	+5.81
1545	14048	+4.99
1575	14050	+4.06
1605	14326	+2.22
1635	14408	+0.32
1665	14344	-0.97
1695	14110	-0.65
1725	14268	+1.02
1755	14306	+1.89
1785	14465	>100
1815	14418	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1455 Beta Volts: 1455

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	+83.33
825	0	-83.33
855	1	+0.00
885	0	+83.33
915	0	+55.56
945	1	>100
975	1	>100
1005	42	>100
1035	134	>100
1065	407	>100
1095	742	>100
1125	1094	>100
1155	1670	>100
1185	2286	+94.95
1215	3004	+87.43
1245	3805	+81.53
1275	5062	+73.67

VOLTS	COUNTS	%/100 Volts
1305	6248	+67.92
1335	7429	+57.72
1365	9062	+45.88
1395	10243	+34.10
1425	10878	+21.00
1455	11550	+13.03
1485	11780	+7.76
1515	11999	+4.61
1545	12008	+3.37
1575	12261	+2.89
1605	12259	+1.28
1635	12401	+0.09
1665	12172	-0.69
1695	12322	-1.14
1725	12172	+1.13
1755	12191	+1.22
1785	12445	>100
1815	12411	

MPC 9600 Plateau Instrument 6 MPC 9604 Detector D 7/1/2009

Alpha Volts: 1455 Beta Volts: 1455

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	+0.00
825	0	>100
855	0	+0.00
885	0	>100
915	1	>100
945	0	>100
975	14	>100
1005	109	>100
1035	481	>100
1065	1177	>100
1095	2133	>100
1125	3243	>100
1155	4554	>100
1185	6285	+98.38
1215	8468	+89.75
1245	11266	+83.13
1275	14088	+74.43

VOLTS	COUNTS	%/100 Volts
1305	17954	+65.82
1335	21482	+57.64
1365	25373	+45.78
1395	29042	+34.80
1425	31373	+23.29
1455	33143	+14.25
1485	34006	+8.49
1515	34662	+4.71
1545	34892	+3.14
1575	35129	+1.86
1605	35411	+1.49
1635	35380	+0.62
1665	35554	+0.65
1695	35385	+1.18
1725	35755	+1.89
1755	35907	+3.26
1785	36305	+4.62
1815	36870	+6.98
1845	37807	
1875	39047	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	2	-33.33
795	0	>100
825	1	+55.56
855	0	>100
885	3	+71.43
915	1	+62.50
945	2	-16.67
975	2	>100
1005	2	>100
1035	49	>100
1065	228	>100
1095	526	>100
1125	869	>100
1155	1381	>100
1185	1909	>100
1215	2680	+96.74
1245	3646	+90.59
1275	4654	+84.23

VOLTS	COUNTS	%/100 Volts
1305	6076	+75.72
1335	7728	+66.18
1365	9226	+55.89
1395	10700	+40.99
1425	12309	+29.94
1455	12658	+17.67
1485	13491	+8.75
1515	13426	+6.54
1545	13645	+3.71
1575	13898	+3.94
1605	14017	+2.22
1635	14057	-0.03
1665	14030	+0.15
1695	13885	+1.13
1725	14135	+1.72
1755	14244	+3.29
1785	14215	+2.31
1815	14547	
1845	14480	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	1	
795	0	>100
825	0	+0.00
855	0	>100
885	1	+0.00
915	0	+83.33
945	0	>100
975	1	>100
1005	14	>100
1035	66	>100
1065	256	>100
1095	653	>100
1125	1057	>100
1155	1543	>100
1185	2233	>100
1215	3076	+96.48
1245	4052	+87.79
1275	5333	+78.59

VOLTS	COUNTS	%/100 Volts
1305	6753	+72.78
1335	8185	+62.49
1365	10153	+51.84
1395	11491	+39.19
1425	12777	+25.54
1455	13466	+16.34
1485	13900	+7.78
1515	14154	+3.76
1545	14027	+1.91
1575	14190	+2.34
1605	14287	+3.56
1635	14523	+2.25
1665	14626	+0.53
1695	14508	-0.08
1725	14410	-0.45
1755	14614	+0.89
1785	14476	+2.41
1815	14670	+82.56
1845	14910	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	>100
855	0	+0.00
885	1	+0.00
915	0	+0.00
945	1	>100
975	0	>100
1005	0	>100
1035	4	>100
1065	35	>100
1095	169	>100
1125	413	>100
1155	767	>100
1185	1153	>100
1215	1726	>100
1245	2367	+97.13
1275	3187	+89.17

VOLTS	COUNTS	%/100 Volts
1305	4064	+79.76
1335	5341	+72.84
1365	6401	+65.60
1395	7894	+55.60
1425	9277	+44.27
1455	10472	+30.27
1485	11108	+18.85
1515	11546	+11.68
1545	11806	+7.00
1575	12122	+3.77
1605	12052	+1.97
1635	12098	+1.28
1665	12174	+3.28
1695	12294	+2.70
1725	12556	+1.95
1755	12405	+2.93
1785	12480	+5.62
1815	12883	
1845	13391	

MPC 9600 Plateau Instrument 7 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	>100
855	0	+0.00
885	1	>100
915	0	>100
945	0	>100
975	0	>100
1005	6	>100
1035	61	>100
1065	205	>100
1095	444	>100
1125	898	>100
1155	1308	>100
1185	2006	>100
1215	2606	+96.85
1245	3630	+87.40
1275	4610	+81.49

VOLTS	COUNTS	%/100 Volts
1305	5928	+73.94
1335	7356	+66.14
1365	9036	+56.04
1395	10479	+44.25
1425	11878	+30.64
1455	12775	+18.37
1485	13157	+9.85
1515	13230	+4.41
1545	13560	+2.94
1575	13448	+2.44
1605	13640	+1.35
1635	13684	+2.74
1665	13717	+1.10
1695	13972	+1.08
1725	13722	+2.44
1755	13905	+5.74
1785	14259	+10.92
1815	14922	+71.04
1845	15586	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	
795	0	+0.00
825	1	+0.00
855	0	+0.00
885	1	>100
915	0	+83.33
945	0	>100
975	1	>100
1005	4	>100
1035	43	>100
1065	185	>100
1095	510	>100
1125	934	>100
1155	1454	>100
1185	2042	>100
1215	2888	+98.18
1245	3845	+91.32
1275	5054	+83.14

VOLTS	COUNTS	%/100 Volts
1305	6539	+75.74
1335	8143	+66.31
1365	9910	+57.05
1395	11567	+46.07
1425	13291	+33.37
1455	14369	+22.97
1485	14921	+12.91
1515	15556	+7.19
1545	15551	+4.22
1575	15696	+2.10
1605	15833	+1.64
1635	15910	+0.80
1665	15831	+0.02
1695	15887	+1.54
1725	15850	+1.69
1755	16268	+3.28
1785	16045	+4.72
1815	16584	+76.96
1845	16848	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts	VOLTS	COUNTS	%/100 Volts
705	0		1305	5419	+74.53
735	0		1335	6599	+66.65
765	0		1365	8186	+61.47
795	2	>100	1395	9739	+53.28
825	1	-41.67	1425	11490	+40.38
855	1	>100	1455	12739	+29.06
885	0	>100	1485	13418	+17.32
915	0	>100	1515	14139	+9.61
945	0	>100	1545	14219	+5.97
975	0	>100	1575	14324	+2.80
1005	1	>100	1605	14592	+2.80
1035	25	>100	1635	14555	+3.31
1065	120	>100	1665	14712	+1.52
1095	304	>100	1695	14990	+1.62
1125	743	>100	1725	14710	+1.38
1155	1212	>100	1755	14914	+1.13
1185	1685	>100	1785	15057	+1.63
1215	2250	>100	1815	15069	+99.35
1245	3164	+94.24	1845	14997	
1275	4280	+84.08			

MPC 9600 Plateau Instrument 8 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	0	
795	4	+0.00
825	2	>100
855	0	>100
885	0	>100
915	0	>100
945	1	>100
975	2	>100
1005	4	>100
1035	16	>100
1065	113	>100
1095	334	>100
1125	657	>100
1155	1123	>100
1185	1722	>100
1215	2353	>100
1245	3180	+88.82
1275	4154	+85.12

VOLTS	COUNTS	%/100 Volts
1305	5264	+77.91
1335	6888	+72.05
1365	8310	+64.52
1395	10144	+52.80
1425	11855	+41.41
1455	13080	+28.00
1485	13967	+16.63
1515	14420	+10.28
1545	14573	+5.56
1575	14967	+4.34
1605	14909	+3.32
1635	15217	+3.16
1665	15194	+2.67
1695	15544	+2.81
1725	15356	+6.33
1755	15787	+11.53
1785	16561	+21.58
1815	17742	+94.20
1845	19903	

MPC 9600 Plateau Instrument 8 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	2	
765	1	
795	0	>100
825	0	+55.56
855	1	>100
885	1	>100
915	1	>100
945	2	>100
975	4	>100
1005	25	>100
1035	87	>100
1065	319	>100
1095	622	>100
1125	1092	>100
1155	1496	>100
1185	2175	>100
1215	2991	+98.58
1245	3944	+88.49
1275	5322	+80.24

VOLTS	COUNTS	%/100 Volts
1305	6590	+71.71
1335	8172	+62.71
1365	9795	+53.64
1395	11505	+41.46
1425	12784	+28.66
1455	13628	+18.60
1485	14044	+11.65
1515	14588	+6.82
1545	14742	+3.87
1575	14747	+1.78
1605	14812	+2.43
1635	14948	+1.88
1665	15183	+0.50
1695	14983	+0.38
1725	14907	+0.20
1755	15171	+2.31
1785	15134	+5.43
1815	15394	+93.82
1845	16043	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	1	+0.00
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	0	>100
1005	14	>100
1035	51	>100
1065	196	>100
1095	497	>100
1125	930	>100
1155	1439	>100
1185	2020	>100
1215	2764	+97.68
1245	3861	+89.17
1275	4913	+80.38

VOLTS	COUNTS	%/100 Volts
1305	6242	+71.48
1335	7723	+64.38
1365	9334	+53.42
1395	10926	+41.22
1425	12057	+28.52
1455	12910	+17.07
1485	13354	+9.18
1515	13491	+5.52
1545	13567	+2.61
1575	13918	+1.66
1605	13673	+0.84
1635	13778	+0.77
1665	13811	+2.13
1695	14008	+2.13
1725	14001	+1.75
1755	14129	+1.79
1785	14118	+3.83
1815	14328	+81.44
1845	14721	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	1	+41.67
825	1	+0.00
855	1	>100
885	0	-55.56
915	0	+55.56
945	1	>100
975	1	>100
1005	15	>100
1035	81	>100
1065	297	>100
1095	664	>100
1125	1109	>100
1155	1716	>100
1185	2349	>100
1215	3266	+93.15
1245	4210	+85.26
1275	5566	+77.91

VOLTS	COUNTS	%/100 Volts
1305	6901	+69.44
1335	8589	+60.01
1365	10057	+51.08
1395	11695	+38.19
1425	13055	+26.48
1455	13622	+15.48
1485	14058	+8.51
1515	14293	+3.81
1545	14494	+1.23
1575	14212	-0.88
1605	14363	+0.38
1635	14170	+2.50
1665	14596	+2.55
1695	14635	+1.28
1725	14684	-0.87
1755	14405	+0.26
1785	14521	+1.21
1815	14774	+78.82
1845	14765	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	0	
735	2	
765	1	+33.33
795	1	+0.00
825	1	-33.33
855	2	-33.33
885	0	+27.78
915	1	+0.00
945	2	>100
975	1	>100
1005	10	>100
1035	68	>100
1065	293	>100
1095	568	>100
1125	1026	>100
1155	1443	>100
1185	1965	>100
1215	2709	+93.87
1245	3679	+86.83
1275	4656	+79.62

VOLTS	COUNTS	%/100 Volts
1305	5923	+72.26
1335	7410	+63.70
1365	8936	+52.54
1395	10255	+38.05
1425	11429	+24.27
1455	11859	+15.19
1485	12109	+7.57
1515	12569	+5.09
1545	12446	+2.76
1575	12632	+0.84
1605	12594	+0.80
1635	12653	+0.49
1665	12587	+0.57
1695	12729	+2.03
1725	12665	+2.50
1755	13002	+2.06
1785	12930	+4.45
1815	12994	
1845	13539	

MPC 9600 Plateau Instrument 9 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1575 Beta Volts: 1575

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	1	+83.33
915	1	+55.56
945	0	>100
975	1	>100
1005	5	>100
1035	56	>100
1065	251	>100
1095	465	>100
1125	862	>100
1155	1311	>100
1185	1760	+99.61
1215	2417	+93.51
1245	3147	+87.35
1275	4225	+78.39

VOLTS	COUNTS	%/100 Volts
1305	5261	+69.99
1335	6406	+62.00
1365	7663	+51.76
1395	9097	+39.28
1425	9861	+27.44
1455	10428	+16.57
1485	10949	+9.75
1515	11111	+5.71
1545	11082	+2.07
1575	11301	+0.78
1605	11200	+0.18
1635	11183	+1.24
1665	11171	+1.93
1695	11526	+1.68
1725	11355	+0.75
1755	11377	+0.24
1785	11374	+3.28
1815	11558	+83.90
1845	11831	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1552 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	+0.00
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	3	>100
1035	30	>100
1065	142	>100
1095	399	>100
1125	708	>100
1155	1174	>100
1185	1647	>100
1215	2378	>100
1245	3191	+93.04
1275	4223	+83.36

VOLTS	COUNTS	%/100 Volts
1305	5434	+76.21
1335	6753	+70.11
1365	8306	+59.82
1395	10112	+47.37
1425	11270	+33.95
1455	12180	+21.54
1485	12845	+13.84
1515	13175	+7.51
1545	13382	+3.23
1575	13375	+3.24
1605	13387	+3.63
1635	13826	+2.96
1665	13896	+2.76
1695	13726	+1.13
1725	14008	+2.69
1755	14005	+6.52
1785	14322	+12.18
1815	14959	+84.33
1845	16216	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1552 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	2	
735	0	
765	0	-41.67
795	1	+83.33
825	1	+55.56
855	0	>100
885	1	>100
915	0	+83.33
945	0	>100
975	1	>100
1005	8	>100
1035	57	>100
1065	201	>100
1095	547	>100
1125	942	>100
1155	1409	>100
1185	1956	>100
1215	2790	+99.31
1245	3671	+92.28
1275	4955	+83.03

VOLTS	COUNTS	%/100 Volts
1305	6327	+73.82
1335	7833	+61.30
1365	9348	+52.43
1395	10634	+43.16
1425	12219	+31.62
1455	13303	+21.13
1485	13622	+11.12
1515	13973	+5.62
1545	14128	+2.89
1575	14218	+1.76
1605	14107	+0.54
1635	14358	+0.66
1665	14173	+0.77
1695	14325	+2.06
1725	14288	+3.07
1755	14744	+3.43
1785	14629	+4.67
1815	14904	+68.69
1845	15242	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1552 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	+83.33
825	1	+55.56
855	0	>100
885	1	>100
915	0	>100
945	0	>100
975	2	>100
1005	2	>100
1035	32	>100
1065	136	>100
1095	388	>100
1125	729	>100
1155	1162	>100
1185	1789	>100
1215	2404	+97.27
1245	3199	+88.00
1275	4170	+82.12

VOLTS	COUNTS	%/100 Volts
1305	5378	+75.32
1335	6697	+67.25
1365	8177	+56.61
1395	9643	+45.47
1425	10819	+32.40
1455	11806	+19.97
1485	12214	+11.23
1515	12351	+4.62
1545	12560	+3.31
1575	12484	+3.55
1605	12766	+3.17
1635	12920	+2.34
1665	12947	+0.07
1695	12843	-0.65
1725	12818	+0.89
1755	12858	+5.14
1785	13111	+7.53
1815	13703	
1845	13895	

MPC 9600 Plateau Instrument 10 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1552 Beta Volts: 1552

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	1	-55.56
825	1	+55.56
855	0	>100
885	1	>100
915	0	+83.33
945	0	>100
975	1	>100
1005	5	>100
1035	37	>100
1065	137	>100
1095	387	>100
1125	708	>100
1155	1135	>100
1185	1565	>100
1215	2210	+99.33
1245	2925	+91.00
1275	3974	+82.28

VOLTS	COUNTS	%/100 Volts
1305	4948	+72.80
1335	6198	+63.36
1365	7362	+53.26
1395	8693	+42.03
1425	9577	+29.05
1455	10418	+18.35
1485	10561	+12.46
1515	10966	+7.22
1545	11277	+4.99
1575	11240	+1.52
1605	11251	-0.28
1635	11235	+1.52
1665	11233	+1.62
1695	11506	+2.87
1725	11390	+3.91
1755	11647	+6.69
1785	11838	+11.38
1815	12463	+94.91
1845	13044	

MPC 9600 Plateau Instrument 11 MPC 9604 Detector A 6/15/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	3	>100
1005	12	>100
1035	74	>100
1065	275	>100
1095	587	>100
1125	1048	>100
1155	1574	>100
1185	2202	>100
1215	3050	+94.35
1245	3959	+88.70
1275	5228	+79.73

VOLTS	COUNTS	%/100 Volts
1305	6752	+73.57
1335	8143	+64.04
1365	10030	+54.17
1395	11613	+41.17
1425	13081	+27.27
1455	13590	+15.54
1485	14152	+7.76
1515	14183	+4.34
1545	14401	+2.53
1575	14386	+3.29
1605	14595	+1.85
1635	14801	+1.37
1665	14597	+0.92
1695	14686	+1.54
1725	14856	+1.30
1755	15013	-0.02
1785	14721	+0.06
1815	14748	-83.35
1845	15001	

MPC 9600 Plateau Instrument 11 MPC 9604 Detector B 6/15/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	+83.33
795	0	+55.56
825	1	+83.33
855	1	+55.56
885	0	+0.00
915	1	+41.67
945	1	>100
975	1	>100
1005	26	>100
1035	145	>100
1065	409	>100
1095	886	>100
1125	1408	>100
1155	2081	>100
1185	2898	+98.88
1215	3902	+88.07
1245	5047	+79.50
1275	6369	+71.92

VOLTS	COUNTS	%/100 Volts
1305	7891	+65.30
1335	9548	+58.87
1365	11330	+49.98
1395	13183	+37.97
1425	14544	+24.56
1455	15210	+12.35
1485	15453	+5.52
1515	15465	+2.72
1545	15680	+2.45
1575	15730	+2.58
1605	15896	+1.77
1635	15966	+1.79
1665	15983	+0.88
1695	16114	+0.31
1725	16033	-0.18
1755	16015	-0.30
1785	15989	+1.51
1815	16064	-81.84
1845	16374	

MPC 9600 Plateau Instrument 11 MPC 9604 Detector C 6/15/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	3	
735	0	
765	0	
795	0	>100
825	1	+83.33
855	1	-83.33
885	0	+41.67
915	0	>100
945	2	>100
975	2	>100
1005	19	>100
1035	127	>100
1065	368	>100
1095	776	>100
1125	1310	>100
1155	1880	>100
1185	2644	+99.77
1215	3519	+91.82
1245	4695	+83.13
1275	6022	+74.91

VOLTS	COUNTS	%/100 Volts
1305	7464	+66.61
1335	9043	+60.02
1365	10779	+50.67
1395	12637	+39.10
1425	13839	+25.34
1455	14664	+14.24
1485	14840	+7.34
1515	15177	+2.86
1545	15206	+1.76
1575	15125	+0.67
1605	15266	+1.19
1635	15301	+1.19
1665	15391	+0.82
1695	15336	+1.75
1725	15437	+1.76
1755	15683	+1.76
1785	15626	+1.59
1815	15652	-82.73
1845	15825	

MPC 9600 Plateau Instrument 11 MPC 9604 Detector D 6/15/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	4	
735	0	
765	2	+0.00
795	0	+55.56
825	4	+0.00
855	0	-55.56
885	2	>100
915	0	>100
945	0	>100
975	8	>100
1005	22	>100
1035	129	>100
1065	379	>100
1095	818	>100
1125	1297	>100
1155	1855	>100
1185	2559	>100
1215	3613	+92.49
1245	4710	+82.75
1275	5970	+73.96

VOLTS	COUNTS	%/100 Volts
1305	7401	+67.31
1335	9100	+61.00
1365	10818	+48.97
1395	12673	+36.54
1425	13469	+24.34
1455	14402	+13.60
1485	14784	+7.48
1515	14879	+3.38
1545	14856	+2.34
1575	15116	+1.35
1605	15190	+1.26
1635	15015	+1.25
1665	15191	+2.34
1695	15401	+2.22
1725	15532	+0.16
1755	15353	+0.18
1785	15251	+0.92
1815	15583	-81.76
1845	15631	

MPC 9600 Plateau Instrument 12 MPC 9604 Detector A 6/13/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	0	
795	0	>100
825	0	>100
855	1	+83.33
885	1	-83.33
915	0	-55.56
945	0	>100
975	1	>100
1005	5	>100
1035	45	>100
1065	209	>100
1095	564	>100
1125	920	>100
1155	1418	>100
1185	2137	>100
1215	2883	+97.35
1245	3892	+86.85
1275	5025	+79.87

VOLTS	COUNTS	%/100 Volts
1305	6352	+72.57
1335	7894	+64.30
1365	9588	+55.26
1395	11118	+43.51
1425	12628	+29.89
1455	13520	+19.61
1485	13829	+11.01
1515	14368	+5.61
1545	14478	+3.27
1575	14383	+2.26
1605	14523	+1.17
1635	14838	+0.95
1665	14505	+0.03
1695	14599	+1.15
1725	14648	+4.38
1755	15021	-80.01
1785	15266	>100

MPC 9600 Plateau Instrument 12 MPC 9604 Detector B 6/13/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	
795	0	+0.00
825	1	+0.00
855	0	+0.00
885	1	>100
915	0	+83.33
945	0	>100
975	1	>100
1005	34	>100
1035	134	>100
1065	393	>100
1095	855	>100
1125	1443	>100
1155	1952	>100
1185	2684	+99.79
1215	3675	+95.72
1245	4998	+87.67
1275	6477	+78.76

VOLTS	COUNTS	%/100 Volts
1305	8105	+67.75
1335	9972	+59.65
1365	11619	+49.28
1395	13632	+36.94
1425	14881	+25.84
1455	15626	+13.02
1485	16201	+6.55
1515	15953	+2.83
1545	16269	+2.36
1575	16273	+3.90
1605	16617	+1.20
1635	16737	+1.22
1665	16332	+0.43
1695	16717	+1.41
1725	16733	+5.13
1755	16889	-80.10
1785	17543	>100

MPC 9600 Plateau Instrument 12 MPC 9604 Detector C 6/13/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	6	>100
1005	23	>100
1035	116	>100
1065	386	>100
1095	816	>100
1125	1367	>100
1155	2027	>100
1185	2726	>100
1215	3847	+89.76
1245	4953	+83.28
1275	6245	+74.40

VOLTS	COUNTS	%/100 Volts
1305	7954	+69.45
1335	9629	+60.65
1365	11694	+49.21
1395	13249	+35.70
1425	14574	+22.46
1455	15067	+13.31
1485	15507	+7.87
1515	15744	+5.19
1545	16051	+3.23
1575	16016	+2.09
1605	16141	+0.10
1635	16202	+0.59
1665	15983	+1.62
1695	16238	+2.06
1725	16516	+4.01
1755	16438	-81.04
1785	16871	>100

MPC 9600 Plateau Instrument 12 MPC 9604 Detector D 6/13/2017

Alpha Volts: 1515 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	1	>100
1035	2	>100
1065	19	>100
1095	100	>100
1125	297	>100
1155	592	>100
1185	856	>100
1215	1366	>100
1245	1844	>100
1275	2530	+91.11

VOLTS	COUNTS	%/100 Volts
1305	3259	+83.04
1335	4291	+76.15
1365	5239	+70.06
1395	6532	+60.80
1425	7849	+51.04
1455	8986	+38.42
1485	9909	+25.68
1515	10554	+15.65
1545	10768	+9.83
1575	10960	+6.91
1605	11283	+6.23
1635	11437	+3.89
1665	11576	+1.93
1695	11475	+3.79
1725	11596	+11.10
1755	12089	-73.23
1785	13268	>100

MPC 9600 Plateau Instrument_13 MPC 9604 Detector A 6/12/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	>100
825	1	+66.67
855	3	-100.00
885	0	-100.00
915	0	-27.78
945	1	>100
975	2	>100
1005	14	>100
1035	94	>100
1065	314	>100
1095	650	>100
1125	1229	>100
1155	1782	>100
1185	2535	+99.27
1215	3360	+90.87
1245	4404	+81.26
1275	5693	+74.97
1305	6965	+69.18
1335	8609	+61.20
1365	10440	+52.65
1395	11976	+42.03
1425	13398	+29.89
1455	14569	+18.53
1485	15008	+9.98
1515	15064	+3.56
1545	15348	+2.22
1575	15202	+1.84
1605	15446	+1.50
1635	15438	+1.73
1665	15576	+1.14
1695	15537	+0.05
1725	15661	+0.35
1755	15407	-82.93
1785	15723	>100

MPC 9600 Plateau Instrument_13 MPC 9604 Detector B 6/12/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	1	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	19	>100
1035	81	>100
1065	271	>100
1095	640	>100
1125	1154	>100
1155	1688	>100
1185	2434	>100
1215	3225	+94.28
1245	4436	+85.96
1275	5605	+79.54

VOLTS	COUNTS	%/100 Volts
1305	7132	+70.78
1335	8858	+63.33
1365	10585	+54.26
1395	12336	+42.24
1425	14007	+29.50
1455	14828	+17.40
1485	15271	+9.65
1515	15458	+6.02
1545	15877	+3.42
1575	15922	+0.67
1605	15842	+1.39
1635	15634	+1.75
1665	16352	+2.70
1695	16087	+2.11
1725	16265	+0.36
1755	16187	-82.27
1785	16389	>100

Plateau 7/1/09 Instrument 13 MPC 9604 Detector C 7/1/2009

Alpha Volts: 705 Beta Volts: 1515

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	0	>100
825	0	>100
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	9	>100
1005	93	>100
1035	325	>100
1065	834	>100
1095	1525	>100
1125	2318	>100
1155	3233	>100
1185	4357	+92.07
1215	5755	+85.64
1245	7438	+78.35
1275	9463	+70.89

VOLTS	COUNTS	%/100 Volts
1305	11573	+64.95
1335	13929	+56.47
1365	16726	+43.82
1395	18834	+29.38
1425	19743	+16.84
1455	20314	+7.95
1485	20860	+4.16
1515	20670	+3.23
1545	20844	+2.09
1575	21330	+2.48
1605	21188	+1.16
1635	21280	-0.32
1665	21237	+0.08
1695	21202	+0.42
1725	21254	+0.60
1755	21406	+1.41
1785	21326	+0.42
1815	21619	+0.16
1845	21282	
1875	21478	

MPC 9600 Plateau Instrument_13 MPC 9604 Detector D 6/12/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	1	
735	0	
765	1	-55.56
795	1	-83.33
825	0	>100
855	0	>100
885	0	>100
915	3	+83.33
945	0	>100
975	1	>100
1005	6	>100
1035	60	>100
1065	184	>100
1095	519	>100
1125	926	>100
1155	1424	>100
1185	2066	>100
1215	2780	+97.30
1245	3754	+87.48
1275	4951	+81.99

VOLTS	COUNTS	%/100 Volts
1305	6151	+72.13
1335	7850	+64.83
1365	9211	+56.19
1395	11047	+45.82
1425	12422	+33.77
1455	13698	+21.53
1485	14002	+12.74
1515	14499	+7.40
1545	14670	+4.75
1575	14959	+3.50
1605	14811	+1.44
1635	15206	+0.87
1665	14868	+0.41
1695	15126	-0.97
1725	14944	+0.56
1755	14949	-83.51
1785	15083	>100

MPC 9600 Plateau Instrument 14 MPC 9604 Detector A 6/13/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	1	
735	1	
765	2	-66.67
795	1	>100
825	0	-33.33
855	0	+0.00
885	2	+0.00
915	0	>100
945	0	+0.00
975	0	>100
1005	2	>100
1035	18	>100
1065	122	>100
1095	361	>100
1125	805	>100
1155	1281	>100
1185	1928	>100
1215	2675	>100
1245	3556	+91.96
1275	4797	+86.30

VOLTS	COUNTS	%/100 Volts
1305	6133	+78.47
1335	7866	+70.42
1365	9526	+60.07
1395	11517	+46.82
1425	12957	+33.04
1455	13997	+19.22
1485	14479	+10.75
1515	14653	+6.81
1545	14918	+3.70
1575	15276	+1.84
1605	14992	+0.97
1635	15029	+0.58
1665	15262	+2.18
1695	15273	+1.42
1725	15366	+2.90
1755	15301	+6.01
1785	15918	-78.38
1815	16409	

MPC 9600 Plateau Instrument 14 MPC 9604 Detector B 6/13/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	>100
825	2	-55.56
855	0	>100
885	0	>100
915	0	>100
945	0	>100
975	1	>100
1005	19	>100
1035	95	>100
1065	358	>100
1095	805	>100
1125	1411	>100
1155	2143	>100
1185	2985	+99.86
1215	4005	+91.40
1245	5195	+87.03
1275	6843	+79.15

VOLTS	COUNTS	%/100 Volts
1305	8843	+71.07
1335	10610	+58.88
1365	12742	+45.79
1395	14318	+33.63
1425	15508	+20.16
1455	16229	+13.03
1485	16331	+7.24
1515	17010	+3.77
1545	16898	+1.91
1575	16887	-0.90
1605	16875	+1.55
1635	16794	+2.18
1665	17339	+2.31
1695	17211	+2.26
1725	17258	+1.45
1755	17418	+2.63
1785	17613	>100
1815	17722	

MPC 9600 Plateau Instrument 14 MPC 9604 Detector C 6/13/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	0	
795	1	+0.00
825	0	>100
855	0	+0.00
885	0	>100
915	1	>100
945	0	>100
975	2	>100
1005	7	>100
1035	44	>100
1065	242	>100
1095	630	>100
1125	1183	>100
1155	1788	>100
1185	2527	>100
1215	3325	+94.91
1245	4628	+87.94
1275	5915	+81.86

VOLTS	COUNTS	%/100 Volts
1305	7549	+73.60
1335	9443	+65.10
1365	11478	+53.14
1395	13255	+38.97
1425	14627	+26.10
1455	15371	+15.74
1485	15955	+8.42
1515	16150	+4.33
1545	16216	+1.30
1575	16279	+0.11
1605	16206	+0.82
1635	16181	+0.89
1665	16465	+1.15
1695	16368	+1.98
1725	16394	+3.46
1755	16705	+5.41
1785	17159	-79.25
1815	17348	

MPC 9600 Plateau Instrument 14 MPC 9604 Detector D 6/13/2017

Alpha Volts: 1545 Beta Volts: 1545

VOLTS	COUNTS	%/100 Volts
705	0	
735	0	
765	1	+0.00
795	0	+83.33
825	0	-83.33
855	1	+0.00
885	0	+83.33
915	0	-83.33
945	1	>100
975	0	>100
1005	5	>100
1035	40	>100
1065	141	>100
1095	435	>100
1125	804	>100
1155	1180	>100
1185	1760	>100
1215	2459	+94.87
1245	3111	+86.23
1275	4091	+80.64

VOLTS	COUNTS	%/100 Volts
1305	5259	+75.53
1335	6588	+65.60
1365	7989	+53.03
1395	9257	+39.60
1425	10171	+26.90
1455	10822	+15.78
1485	11196	+8.47
1515	11238	+4.38
1545	11355	+3.36
1575	11480	+3.11
1605	11648	+2.75
1635	11626	+1.65
1665	11759	+1.12
1695	11712	+1.17
1725	11802	+1.83
1755	11811	+4.90
1785	12034	-79.45
1815	12475	

National Institute of Standards & Technology

Certificate

Received July 10, 2017

1835

Standard Reference Material® 4339b

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$(195 \pm 14)\ \mathrm{Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Robert L. Watters, Jr., Director
Office of Reference Materials

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012
SRM 4339b

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228**[(a)]
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq•g^{-1}**
Relative expanded uncertainty (k = 2)	**7.2 %**[(b)]

[(a)] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[(b)] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[(a)]
Solution mass	(5.180 ± 0.003) g[(a)]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[(b)]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[(c)]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[(d)] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^{9} a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[(a)] The stated uncertainty is two times the standard uncertainty. See reference 5.
[(b)] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[(c)] The maximum ^{232}Th activity concentration in ^{228}Ra.
[(d)] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ ($s^{-1}\cdot g^{-1}$)[i]	S_m (%)[ii]
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: 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) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1835
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-128

A Solution Material Info	
Isotope:	Radium-228 SPIKE
Prepared By:	Bethany Fiem
Prep Date:	04/16/2019
Verification Date:	04/23/2019
Expiration Date:	04/23/2020
Primary Code:	1835-A
Dilution(mL):	100 mL
Mass of Parent(g):	5.1513 g
Density(g/mL):	1.0000
Balance ID:	B733529066

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

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1513 g) * (195 Bq/g) * (60 dpm/Bq) / (100 mL) = 602.7021 dpm/mL
(5.1513 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0000 g/mL) / (100 mL) = 602.7021 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

Verification for Ra-228 Standard 1835-A

v1.0.2

Instrument	BLUE
Analyst	BXF1
Verification Prep Date	4/23/2019

Standard Information	
Isotope	Ra-228
Serial Number	1835-A
Isotope Halflife	5.7500 Y
Reference Date	10/7/2010
Ref. Act. (DPM/mL)	602.7021
Amount of Std. (mL)	2.0
Standard Prep Date	4/16/2019

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	4/24/2019	119.90	4486.22	44.20
2	4/24/2019	119.50	4488.00	44.20
3	4/24/2019	119.20	4402.61	44.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	4442.02	10.037126	221.28	442.56
2	4443.80	10.037126	221.37	442.74
3	4358.41	10.037126	217.11	434.23

	dpm/mL
Mean Value =	219.92
Stdev =	2.430686678
Certificate Value* =	**215.2**
Two sigma =	4.861
10 % of Mean =	21.992
Rule A (Pass/Fail)	**Pass**
% Recovery	102.21%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**4/23/2020**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-228 source 1835-A by transferring 2 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 4/23/2019 using Ra-228 source 1809-A.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

4-24-19

General Engineering Laboratories
GFC Calibration Source Preparation Sheet

Ra-228

Applicable SOP Number	GL-RAD-A-009	Isotope	Ra-228
Date Standards Prepared	5/15/2019		
Standard ID	1835-A	Matrix of Planchett/Filter	NdF precipitate on 25 mm filter
Amount Used (g or ml)	5.0 mL		
Standard Activity (DPM/g or mL)	602.7021	Residue/Carrier Agent	NA
Reference Date	10/7/2010	Pipette ID Used	15531079
Expiration Date	4/23/2020	Balance ID Used	F30560

*** Not Decay Corrected**

want around 3000 dpm in each cal std

Separation Date/Time: 5/15/2019 9:05

	Standard Number	Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	C1				
	C2				
	C3				
	C4				
	C5				
	C6				
	C7				
	C8				

Prepared By: _____ Date 5/15/2019

Reviewed By: _____ Date 5/15/2019

National Institute of Standards & Technology

Certificate

Received 3-9-17

Standard Reference Material® 4339b

1809

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$(195 \pm 14)\ \mathrm{Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Robert L. Watters, Jr., Director
Office of Reference Materials

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012
SRM 4339b

G1-CED-297-10

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq g^{-1}**
Relative expanded uncertainty (k = 2)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of k = 2 and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ (s^{-1} g^{-1})[i]	S_m (%)[ii]
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: 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) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1809
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-102

A Solution Material Info	
Isotope:	Radium-228 SPIKE
Prepared By:	Bethany Fiem
Prep Date:	09/15/2017
Verification Date:	04/23/2019
Expiration Date:	04/23/2020
Primary Code:	1809-A
Dilution(mL):	200 mL
Mass of Parent(g):	5.1542 g
Density(g/mL):	1.0243
Balance ID:	C31514

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

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1542 g) * (195 Bq/g) * (60 dpm/Bq) / (200 mL) = 301.5207 dpm/mL
(5.1542 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0243 g/mL) / (200 mL) = 294.3819 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

Verification for Ra-228 Standard 1809-A

v1.0.2

Instrument	BLUE
Analyst	BXF1
Verification Prep Date	4/23/2019

Standard Information	
Isotope	Ra-228
Serial Number	1809-A
Isotope Halflife	5.7500 Y
Reference Date	10/7/2010
Ref. Act. (DPM/mL)	301.5207
Amount of Std. (mL)	2.0
Standard Prep Date	9/15/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	4/24/2019	119.30	2215.16	44.20
2	4/24/2019	118.80	2224.89	44.20
3	4/24/2019	119.50	2221.98	44.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	2170.96	10.087325	107.61	215.22
2	2180.69	10.087325	108.09	216.18
3	2177.78	10.087325	107.95	215.89

	dpm/mL
Mean Value =	107.88
Stdev =	0.247549278
Certificate Value* =	**107.6**
Two sigma =	0.495
10 % of Mean =	10.788
Rule A (Pass/Fail)	**Pass**
% Recovery	100.23%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**4/23/2020**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-228 source 1809-A by transferring 2 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 4/23/2019 using Ra-228 source 1810-A.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

4-24-19

General Engineering Laboratories
GFC Verification Source Preparation Sheet

Ra-228

Applicable SOP Number	GL-RAD-A-009	Isotope	Ra-228
Date Standards Prepared	5/16/2019		
Standard ID	1809-A	Matrix of Planchett/Filter	NdF precipitate on 25 mm filter
Amount Used (g or ml)	2.0 mL		
Standard Activity (DPM/g or mL)	301.5207	Residue/Carrier Agent	NA
Reference Date	10/7/2010	Pipette ID Used	15505391
Expiration Date	4/23/2020	Balance ID Used	F30560

*** Not Decay Corrected**

Separation Date/Time: 5/16/2019 8:35
* 5/21/2019 8:50

	Standard Number	Residue Volume(mL)	Initial Wt. (g)	Final Wt. (g)	Net Wt. (mg)
	V1				
	V2				
	V3				
	V4				
	V5				
	V6				
	V7				
	V8				
	* V12				

Prepared By: _____ Date 5/16/2019

Reviewed By: _____ Date 5/16/2019

RAD Standards Traceability

0487

National Institute of Standards & Technology

0487

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 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 June 2004.

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 and D.B. Golas, Nuclear Energy Institute Research Associate.

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
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

RC-S-035-002a

Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration and a carrier concentration comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

RC-S-035-002b

PROPERTIES OF SRM 4251C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4251C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.015 ± 0.002) g•mL^{-1} at 22.1 °C [b]***		
Solution mass	**(5.054 ± 0.001) g [b]**		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O	54	0.96
	HCl	1.0	0.04
	$BaCl_2$	6×10^{-4}	1.2×10^{-4}
	$^{133}BaCl_2$	4×10^{-7}	8×10^{-8}
Radiological Properties:			
Radionuclide	**Barium-133**		
Reference time	**1200 EST, 1 September 1993**		
Massic activity of the solution [c] (Activity per unit mass of solution)	**4.876×10^5 Bq•g^{-1}**		
Relative expanded uncertainty (k=2)	**0.52% [d]**		
Photon-emitting impurities	None detected [e]		
Half lives used	Barium-133: (10.52 ± 0.13) a [f] Radium-226: (1600 ± 7) a [f]		
Measuring instrument	Pressurized "4π"γ ionization chamber A calibrated using a barium-133 solution whose activity was determined by 4π(e+X)-γ-anticoincidence counting		

*Notes and references are on pages 5 and 6.

RC-S-035-002

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [g]	Relative Sensitivity Factor, $\lvert\partial y/\partial x_i\rvert \cdot (x_i/y)$ [h]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [i]
PIC A net response per gram of SRM 4251C, measured relative to RRS20 [j]	Standard deviation of the mean for 1000 repeated measurements (A)	0.008	1.0	0.01
PIC A background response, measured relative to RRS20	Standard deviation of the mean for >150 repeated measurements (A)	0.25	0.001 [k]	0.00
PIC A net response for RRS200, measured relative to RRS20	Standard deviation of the mean for >100 repeated measurements (A)	0.06	1.0	0.06
PIC A net response per Bq of barium-133 in solution, measured relative to RRS200.	Standard deviation of the mean for 240 repeated measurements (A)	0.02	1.0	0.02
Gravimetric measurements	Estimated (B)	0.01	1.0	0.01
Half life of barium-133 Half life of radium-226	Standard uncertainty of the half life (A)	1.24 [m] 0.44 [m]	0.004 [n] 0.004 [n]	0.00 0.00
Activity used to calibrate PIC A net response per Bq of barium-133 in solution	Standard uncertainty of the activity determined by $4\pi(e+X)$-γ-anticoincidence counting. (B)	0.22	1.0	0.22
Live-time [p]	Estimated (B)	0.10	1.0	0.10
PIC A charge collection	Estimated (B)	0.05	1.0	0.05
Source Positioning	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection for Cs-134 (B) [q]	100.	0.00002	0.00
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.26
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.52

*Notes and references are on pages 5 and 6.

RC-S-035-002

NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	100	1.5	0.2

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] Estimated limits of detection for photon-emitting impurities are:
600 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 12 and 75 keV,
150 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 84 and 379 keV, and
3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 387 and 2700 keV, provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of barium-133.

[f] The stated uncertainty is the standard uncertainty. See reference [5].

[g] Relative standard uncertainty of the input quantity x_i.

[h] 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.

[i] Relative component of combined standard uncertainty of output quantity y, rounded to two decimal places. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

RC-S-035-002e

[j] The response of pressurized ionization chamber A (PIC A) is determined from measurement of the time required to collect a given amount of charge on a stable fixed capacitor. All of the response measurements in the NIST pressurized ionization chambers are made relative to the response of one or more artifact standards. These artifact standards consist of microgram quantities of aged radium-226 in small welded stainless-steel capsules. These capsules are encapsulated in plastic rods whose dimensions are similar to those of the standard NIST ampoule. The artifact standards are called **Radium Reference Sources** and are designated as RRSx, where x is the nominal mass (in micrograms) of radium-226 in the capsule.

[k] $|\partial y/\partial x_i| \cdot (x_i/y)$ = (average background response)/(average net sample response)

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i$ = 100%. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of Ba-133)}•{(Bq of impurity)/(Bq of Ba-133)}. 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), April 1994.

RC-S-035-002f

Standard Traceability Log Rad

Source Material Info	
Parent Code:	0487
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	09/01/1993
Ampoule Mass (g):	5.054 g
Uncertainty:	+/- .26 %
LogBook No:	RC S 035 002

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Angela Johnson		
Prep Date:	10/31/2002		
Verification Date:	01/14/2019		
Expiration Date:	01/14/2020		
Primary Code:	0487-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.7696 g		
Density(g/mL):	0.9984	Balance ID:	

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

(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (100 mL) = 1395394.1760 dpm/mL
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (0.9984 g/mL) / (100 mL) = 1397609.3930 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
12/18/2015	Gregory Ramsay	15.0062	1000	0487-B	20972.806 dpm/mL	11/18/2016	11/18/2017
01/17/2017	Bethany Fiem	15.1795	1000	0487-C	21215.0117 dpm/mL	01/17/2017	01/17/2018
11/08/2017	Bethany Fiem	15.5573	1000	0487-D	21708.5658 dpm/mL	10/10/2018	10/10/2019
01/14/2019	Bethany Fiem	15.0723	1000	0487-E	21065.188 dpm/mL	01/14/2019	01/14/2020

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 0487-E

v1.0.2

Instrument	SILVER
Analyst	BXF1
Verification Prep Date	1/14/2019

Standard Information	
Isotope	Ba-133
Serial Number	0487-E
Isotope Halflife	3.8410E+03 D
Reference Date	9/1/1993
Ref. Act. (DPM/mL)	21065.188
Amount of Std. (mL)	1.0
Standard Prep Date	1/14/2019

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	1/14/2019	90.80	3292.13	40.80
2	1/14/2019	91.40	3305.25	40.80
3	1/14/2019	92.60	3310.49	40.80

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	3251.33	0.826532	3933.70	3933.70
2	3264.45	0.826532	3949.58	3949.58
3	3269.69	0.826532	3955.92	3955.92

	dpm/mL
Mean Value =	3946.40
Stdev =	11.44255763
Certificate Value* =	**3957.0**
Two sigma =	22.885
10 % of Mean =	394.640
Rule A (Pass/Fail)	**Pass**
% Recovery	99.73%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**1/14/2020**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 0487-E by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCSILVER for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 1/14/2019 using Ba-133 source 1601-A.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

1-25-19

1/29/19

Standardization of Barium Carrier 2948176

v1.2.1

Analyst	BMF

Standard Information	
Isotope	Barium
Serial Number	2948176
Amount of Std. (mL)	1.0
Standard Prepared	6/25/2019

Parent Information	
Parent Serial #	2633844.1
Parent Exp. Date	3/12/2021

Std #	Weight of carrier added (g)	Weight of crucible or filter (g)	Weight of crucible or filter + ppt. (g)	Weight of ppt. (g)	mg Barium/mL	mg Barium/g
1	1.0100	0.0751	0.1023	0.0272	27.20	26.93
2	1.0300	0.0757	0.1030	0.0273	27.30	26.50
3	1.0300	0.0757	0.1028	0.0271	27.10	26.31
4	1.0200	0.0754	0.1024	0.0270	27.00	26.47

Mean Value (mg/mL) =	27.15
Stdev (mg/mL) =	± 0.13
1.0% of Mean Value =	0.271500
	Pass
Expiration Date	6/25/2020
Mean Value (mg/1.0mL) =	27.15

Standardization Rule

A satisfactory standardization is obtained when results give a standard deviation of less than 1.0% of the mean value.

6.26.19

Nycomed Amersham plc
Amersham Laboratories

[redacted]

NAMAS
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 Signatory

Date of issue 17th December 1999

Nycomed Amersham

B D D Singleton

This certificate is issued in accordance with the requirements of the United Kingdom Accreditation Service as specified in the NAMAS Accreditation Standard and NAMAS regulations. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not

RC-S-028-128 A

0299

[redacted]

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Measurement	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.

Accuracy

Expanded uncertainty in the radioactive concentration quoted above: ± 2.5 %

Combined Type A uncertainty: ± 0.2 %

Combined Type B uncertainty: ± 1.3 %

Radionuclidic 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 composition

Carrier free in 0.5M HCl.

Remarks

This product meets the quality assurance requirements for achieving traceability to NIST as defined in ANSI N42.22-1995.

1 year = 365.25 days

At the reference date radium-226 was shown to be in radioactive equilibrium with its daughter nuclides down the decay chain to polonium-214 and thallium-210, the precursors of lead-210. The ionisation chamber was calibrated using a standard supplied by the National Institute of Standards and Technology, Washington DC, USA.

RC-S-028-128 B

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:	04/14/2016		
Expiration Date:	04/14/2017		
Primary Code:	0299-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.6634 g		
Density(g/mL):	1.0011	Balance ID:	C31514

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

(Mass of parent(g)) * (Parm Activity (kBq/g)) * (conversion dpm to kBq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (kBq/g)) * (conversion dpm to kBq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.6634 g) * (43.75 kBq/g) * (60000 dpm/kBq) / (100 mL) = 122414.2500 dpm/mL
(4.6634 g) * (43.75 kBq/g) * (60000 dpm/kBq) / (1.0011 g/mL) / (100 mL) = 122280.0000 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	12/04/2018	12/04/2019
03/15/2011	Gregory Ramsay	5.0716	250	0299-I	2480.4858 dpm/mL	01/08/2016	01/08/2017
05/29/2012	Gregory Ramsay	1.5087	100	0299-J	1844.73785 dpm/mL	06/16/2018	07/01/2020

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 0299-H

v1.0.2

Instrument	YELLOW
Analyst	BXF1
Verification Prep Date	12/4/2018

Standard Information	
Isotope	Ra-226
Serial Number	0299-H
Isotope Halflife	1.6000E+03 Y
Reference Date	12/15/1999
Ref. Act. (DPM/mL)	2483.2133
Amount of Std. (mL)	0.5
Standard Prep Date	8/7/2009

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/8/2018	759.82	932.10	4.70
2	12/8/2018	758.84	937.30	4.70
3	12/8/2018	758.71	933.30	4.70

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	927.40	0.721758	2569.84	1284.92
2	932.60	0.721758	2584.25	1292.12
3	928.60	0.721758	2573.16	1286.58

	dpm/mL
Mean Value =	2575.75
Stdev =	7.544753289
Certificate Value* =	**2462.9**
Two sigma =	15.090
10 % of Mean =	257.575
Rule A (Pass/Fail)	**Pass**
% Recovery	104.58%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/4/2019**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 0299-H by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYELLOW for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/4/2018 using Ra-226 source 0024-A.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

12-10-18

12/11/18

1905

National Institute of Standards & Technology

Certificate

Received 6-10-2019 TOC

Standard Reference Material® 4339b

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$(195 \pm 14)\ \mathrm{Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Gaithersburg, Maryland 20899

Robert L. Watters, Jr., Director
Office of Reference Materials

Certificate Issue Date: 14 November 2012

TOC 6-10-19

GL-CED-297-198a

1905

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq•g^{-1}**
Relative expanded uncertainty (k = 2)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

TJC 6-10-19

GL-CED-297-1986

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ ($s^{-1}\cdot g^{-1}$)[i]	S_m (%)[ii]
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

JDC 6-10-14

GL-CED-297-198c

INSTRUCTIONS FOR HANDLING AND STORAGE

1905

Handling: 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) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1905
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-198

A Solution Material Info			
Isotope:	Radium-228 SPIKE		
Prepared By:	Bethany Fiem		
Prep Date:	06/13/2019		
Verification Date:	06/13/2019		
Expiration Date:	06/13/2020		
Primary Code:	1905-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	5.1538 g		
Density(g/mL):	1.0000	Balance ID:	B733529066

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

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1538 g) * (195 Bq/g) * (60 dpm/Bq) / (100 mL) = 602.9946 dpm/mL
(5.1538 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0000 g/mL) / (100 mL) = 602.9946 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

Verification for Ra-228 Standard 1905-A

v1.0.2

Instrument	BLUE
Analyst	BXF1
Verification Prep Date	6/13/2019

Standard Information	
Isotope	Ra-228
Serial Number	1905-A
Isotope Halflife	5.7500 Y
Reference Date	10/7/2010
Ref. Act. (DPM/mL)	602.9946
Amount of Std. (mL)	1.0
Standard Prep Date	6/13/2019

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	6/13/2019	107.60	2187.83	44.20
2	6/13/2019	107.00	2240.44	44.20
3	6/13/2019	107.80	2227.11	44.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	2143.63	10.112440	211.98	211.98
2	2196.24	10.112440	217.18	217.18
3	2182.91	10.112440	215.86	215.86

	dpm/mL
Mean Value =	215.01
Stdev =	2.704675238
Certificate Value* =	**211.7**
Two sigma =	5.409
10 % of Mean =	21.501
Rule A (Pass/Fail)	**Pass**
% Recovery	101.54%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**6/13/2020**

Verification Rules

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

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

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-228 source 1905-A by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ra-228 source standard verification. The Ra-228 efficiency calibration which was used for verification calculations was performed on 6/13/2019 using Ra-228 source 1809-A.

Standard results for each verification source was calculated as follows:

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

where:

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

RAD-M-001

6-17-19

6/25/19

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1909937**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204364136	MB	LXB3	PIC4B	AUG-26-19 11:47:58	DONE	25mm Filter	01-JUN-19 00:00
1204364137	DUP	LXB3	PIC4C	AUG-26-19 11:48:02	DONE	25mm Filter	01-JUN-19 00:00
1204364138	LCS	LXB3	PIC4D	AUG-26-19 11:48:04	DONE	25mm Filter	01-JUN-19 00:00
487850001	SAMPLE	LXB3	PIC3B	AUG-26-19 11:48:10	DONE	25mm Filter	01-JUN-19 00:00
487850002	SAMPLE	LXB3	PIC3C	AUG-26-19 11:48:14	DONE	25mm Filter	01-JUN-19 00:00
487850003	SAMPLE	LXB3	PIC3D	AUG-26-19 11:48:16	DONE	25mm Filter	01-JUN-19 00:00
487850004	SAMPLE	LXB3	PIC7D	AUG-26-19 14:59:57	DONE	25mm Filter	01-JUN-19 00:00

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1912709**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204370998	MB	KSD1	PIC5B	AUG-30-19 09:57:17	DONE	47mm Filter	01-MAY-18 00:00
1204370999	DUP	KSD1	PIC1B	AUG-30-19 09:57:27	DONE	47mm Filter	01-MAY-18 00:00
1204371000	LCS	KSD1	PIC5A	AUG-30-19 09:57:32	DONE	47mm Filter	01-MAY-18 00:00
487850001	SAMPLE	KSD1	PIC2D	AUG-30-19 09:57:39	DONE	47mm Filter	01-MAY-18 00:00
487850002	SAMPLE	KSD1	PIC2B	AUG-30-19 09:57:45	DONE	47mm Filter	01-MAY-18 00:00
487850003	SAMPLE	KSD1	PIC1C	AUG-30-19 09:57:48	DONE	47mm Filter	01-MAY-18 00:00
487850004	SAMPLE	KSD1	PIC2A	AUG-30-19 09:57:57	DONE	47mm Filter	01-MAY-18 00:00