Paragon Analytics

Radiochemistry Case Narrative
Gross Alpha/Beta

Kent & Sullivan Inc.

Ross Adams

PAI WO 0405095

1. This report consists of the analytical results and supporting documentation for one water sample received by Paragon on 5/11/04.
2. This sample was prepared according to Paragon Analytics procedure SOP702R16.
3. The sample was analyzed for gross alpha and beta activity by gas flow proportional counting according to Paragon Analytics procedure SOP724R8. The analyses were completed on 9/25/04. Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.
4. The analysis results for this sample are reported in units of pCi/L. The sample was not filtered prior to analysis.
5. A Laboratory Control Sample Duplicate (LCSD) was prepared to meet requirements of a separate work order. Results are in control and reported in the following data package.
6. Because this sample and associated quality control samples were underweight after aliquoting and drying, 1.0 m L of salt solution was added to each of the samples. The samples were then re-dried. Please refer to QASS 280816.
7. No anomalous situations were encountered during the preparation or analysis of this sample. All quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, Paragon Analytics certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Radiochemistry Instrument Technician	9-27-04 Date
Radiochemistry Final Data Review	9/28/04 Date

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PARAGON ANALYTICS
Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

Gross Alpha/Beta Analysis by GFPC Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: **Paragon Analytics**
PAI Work Order: 0405095

Page: 1 of 1
Reported on: Monday, September 27, 2004 3:14:49 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405095-1	SW-01	Sample	GROSS ALPHA	0.74 +/- 0.36	0.50	pCi/l	WATER	AB040921-1	9/25/2004	LT
0405095-1	SW-01	Sample	GROSS BETA	0.80 +/- 0.62	0.99	pCi/l	WATER	AB040921-1	9/25/2004	U

Comments:

Data Package ID: *ABW0405095-2*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

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PARAGON ANALYTICS

Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AB040921-1MB

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 21-Sep-04
Date Prepared: 21-Sep-04
Date Analyzed: 25-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 1000 minutes

Final Aliquot: 200 ml
Result Units: pCi/l
File Name: ABB0925

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
12587-46-1	GROSS ALPHA	0.04 +/- 0.30	0.52	U
12587-47-2	GROSS BETA	-0.05 +/- 0.61	1.03	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

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

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AB040921-1LCS

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 21-Sep-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 60 minutes

Final Aliquot: 200 ml
Result Units: pCi/l
File Name: ABB0924A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	214 +/- 36	3	229	93.5	70 - 130	P,M3
12587-47-2	GROSS BETA	234 +/- 39	9	226	104	70 - 130	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS Recovery within control limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AB040921-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 21-Sep-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 60 minutes

Final Aliquot: 200 ml
Result Units: pCi/l
File Name: ABB0924A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	222 +/- 38	3	229	96.9	70 - 130	P,M3
12587-47-2	GROSS BETA	234 +/- 39	9	226	103	70 - 130	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS Recovery within control limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Matrix Spike Results

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1MS

Sample Matrix: WATER
Prep SOP: PAI 702
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0924

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	212	0.74	2	229	92.5	70 - 130	P,M3
12587-47-2	GROSS BETA	223	0.80	5	226	98.1	70 - 130	P

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
N - Matrix Spike Recovery outside control limits
P - Matrix Spike Recovery within control limits
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Matrix Spike Results

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1MSD

Sample Matrix: WATER
Prep SOP: PAI 702
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0924

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	237	0.74	2	229	103	70 - 130	P,M3
12587-47-2	GROSS BETA	245	0.80	5	226	108	70 - 130	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
N - Matrix Spike Recovery outside control limits
P - Matrix Spike Recovery within control limits
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 25-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 1000 minutes

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0925

CASNO	Analyte	Sample Result +/- 2s TPU	Duplicate Result +/- 2s TPU	DER	Control Limit	Lab Qualifiers
12587-46-1	GROSS ALPHA	0.74 +/- 0.36	0.69 +/- 0.43	0.10	2.13	LT
12587-47-2	GROSS BETA	0.80 +/- 0.62	0.91 +/- 0.62	0.13	2.13	U

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1MSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 180 minutes

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0924

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
12587-46-1	GROSS ALPHA	212 +/- 35	237 +/- 39	0.47	2.13	P,M3
12587-47-2	GROSS BETA	223 +/- 36	245 +/- 40	0.42	2.13	P,M3

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:
Lab ID: AB040921-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 21-Sep-04
Date Prepared: 21-Sep-04
Date Analyzed: 24-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 60 minutes

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0924A

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
12587-46-1	GROSS ALPHA	214 +/- 36	222 +/- 38	0.02	2.13	P,M3
12587-47-2	GROSS BETA	234 +/- 39	234 +/- 39	0.00	2.13	P,M3

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *ABW0405095-2*

PARAGON ANALYTICS
Radiochemistry Data Package

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Section 3

INDIVIDUAL SAMPLE RESULTS

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 25-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 1000 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0925

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
12587-46-1	GROSS ALPHA	0.74 +/- 0.36	0.50	LT
12587-47-2	GROSS BETA	0.80 +/- 0.62	0.99	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

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

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *ABW0405095-2*

Gross Alpha/Beta Analysis by GFPC

PAI 724 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0405095
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SW-01
Lab ID: 0405095-1DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 16
Date Collected: 05-May-04
Date Prepared: 21-Sep-04
Date Analyzed: 25-Sep-04

Prep Batch: AB040921-1
QCBatchID: AB040921-1-1
Run ID: AB040921-1A
Count Time: 1000 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABB0925

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
12587-46-1	GROSS ALPHA	0.69 +/- 0.43	0.65	LT
12587-47-2	GROSS BETA	0.91 +/- 0.62	0.97	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *ABW0405095-2*

PARAGON ANALYTICS
Radiochemistry Data Package

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Section 4

RAW DATA

Gross Alpha/Beta Analysis by GFPC Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405095

Prep SOP: PAI 702
Analytical SOP: PAI 724

Reported on: Monday, September 27, 2004 2:21:29 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	Ingrowth Date /Time	Decay Date/Time	Matrix %Moist.	Samp Alq Analy Alq	Inst ID Det ID	AnRunID File Name	Count Date/Time	GrossCPM BkgCPM	BaseEff ProgEff	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405095-1	GROSS ALPHA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	0.148	20.85%	1000	0.74	0.50	pCi/l	NA	
SMP	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	A1	ABB0925	9:46 AM	0.081	NA	NA	0.36	NA	Unfiltered	NA	LT
0405095-1	GROSS BETA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	1.544	40.35%	1000	0.80	0.99	pCi/l	NA	
SMP	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	A1	ABB0925	9:46 AM	1.363	NA	NA	0.62	NA	Unfiltered	NA	U
0405095-1	GROSS ALPHA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	0.198	20.41%	1000	0.69	0.65	pCi/l	0.10	
DUP	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	A2	ABB0925	9:46 AM	0.137	NA	NA	0.43	NA	Unfiltered	NA	LT
0405095-1	GROSS BETA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	1.527	40.66%	1000	0.91	0.97	pCi/l	0.13	
DUP	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	A2	ABB0925	9:46 AM	1.312	NA	NA	0.62	NA	Unfiltered	NA	U
0405095-1	GROSS ALPHA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	19.528	21.48%	180	212	2	pCi/l	NA	92.5
MS	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	B3	ABB0924	10:24 AM	0.126	NA	NA	35	NA	Unfiltered	NA	P,M3
0405095-1	GROSS BETA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	48.511	42.53%	180	223	5	pCi/l	NA	98.1
MS	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	B3	ABB0924	10:24 AM	1.553	NA	NA	36	NA	Unfiltered	NA	P
0405095-1	GROSS ALPHA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	20.750	20.38%	180	237	2	pCi/l	0.47	103
MSD	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	B4	ABB0924	10:24 AM	0.083	NA	NA	39	NA	Unfiltered	NA	P,M3
0405095-1	GROSS BETA	5/5/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	50.650	40.28%	180	245	5	pCi/l	0.42	108
MSD	Trg. Analyte	4:40:00 PM	AB040921-1-1	NA	NA	NA	200 ml	B4	ABB0924	10:24 AM	1.586	NA	NA	40	NA	Unfiltered	NA	P,M3
AB040921-1	GROSS ALPHA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	0.098	20.63%	1000	0.04	0.52	pCi/l	NA	
MB	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	C4	ABB0925	9:46 AM	0.093	NA	NA	0.30	NA	Unfiltered	NA	U
AB040921-1	GROSS BETA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/25/2004	1.573	41.40%	1000	-0.05	1.03	pCi/l	NA	
MB	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	C4	ABB0925	9:46 AM	1.557	NA	NA	0.61	NA	Unfiltered	NA	U
AB040921-1	GROSS ALPHA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	19.750	20.85%	60	214	3	pCi/l	NA	93.5
LCS	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	A1	ABB0924A	11:28 AM	0.073	NA	NA	36	NA	Unfiltered	NA	P,M3

Comments:

Data Package ID: *ABW0405095-2*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

+ - Duplicate RPD not within limits.

LT - Result is less than Request MDC, greater than sample specific MDC

* - Aliquot Basis is 'As Recieved' while the Report Basis is 'Dry Weight'.

\# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

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

Notes:

1) The Tracer results are not yield corrected (i.e. activity measured not activity added).

2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

TR- Tracer TA - Target Analyte

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

DER - Duplicate Error Ratio

BDL - Below Detection Limit

000017

Gross Alpha/Beta Analysis by GFPC Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405095

Prep SOP: PAI 702
Analytical SOP: PAI 724

Reported on: Monday, September 27, 2004 2:21:29 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	Ingrowth Date /Time	Decay Date/Time	Matrix %Moist.	Samp Alq Analy Alq	Inst ID Det ID	AnRunID File Name	Count Date/Time	GrossCPM BkgCPM	BaseEff ProgEff	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
AB040921-1	GROSS BETA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	48.300	40.35%	60	234	9	pCi/l	NA	104
LCS	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	A1	ABB0924A	11:28 AM	1.315	NA	NA	39	NA	Unfiltered	NA	P,M3
AB040921-1	GROSS ALPHA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	20.217	20.41%	60	222	3	pCi/l	0.02	96.9
LCSD	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	A2	ABB0924A	11:28 AM	0.110	NA	NA	38	NA	Unfiltered	NA	P,M3
AB040921-1	GROSS BETA	9/21/2004	AB040921-1	NA	NA	WATER	200 ml	LB4100-B	AB040921-1A	9/24/2004	48.717	40.66%	60	234	9	pCi/l	0.00	103
LCSD	Trg. Analyte	10:35:42 AM	AB040921-1-1	NA	NA	NA	200 ml	A2	ABB0924A	11:28 AM	1.343	NA	NA	39	NA	Unfiltered	NA	P,M3

Comments:

Data Package ID: *ABW0405095-2*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
+ - Duplicate RPD not within limits.
LT - Result is less than Request MDC, greater than sample specific MDC
* - Aliquot Basis is 'As Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Notes:

1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

TR- Tracer TA - Target Analyte
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
DER - Duplicate Error Ratio
BDL - Below Detection Limit

PAI - Gas Flow Proportional Sample Analysis LB4100-B

Unit Type: LB4100 -B
Counting Unit ID: Aqua
High Voltage Mode: Simultaneous
Application Revision: 2
Application Version: Standard
Rev.12/29/03 JE

Data file name: ABB0924
Batch ID: AB040921-1
Count Preset (m): 180
Batch Ended: 9/24/04 13:26

Background logfile: BKGABW
Date of Bkg. Cal: 9/18/04
Alpha efficiency logfile: Am241-11/03
Alpha attenuation calibration: ABA1103.XLS
Beta efficiency logfile: Sr90R-11/03
Beta attenuation calibration: ABA1103.XLS

Alpha prog. logfile: n/a
Alpha prog. attenuation: n/a
Beta prog. logfile: n/a
Beta prog. attenuation: n/a

Alpha Attenuation Calibration y = b*m^(a*(mass-x0))		Beta Attenuation Calibration y = b*m^(a*(mass-x0))	
Alpha b=	1.24550	Beta b=	1.0000
m=	0.99400	m=	0.9999
a=	1.0000	a=	1.0000
x0=	0.0000	x0=	0.0000
Alpha to Beta X-talk y = m *b^-mass		**Beta to Alpha X-talk y = m*mass + b**	
a ->b xtalk m=	0.2740	b ->a xtalk m=	-2.00E-06
a ->b xtalk b=	1.0010	b ->a xtalk b=	0.0007

Det. ID	Sample ID	Count End Date & Time	Count Dur. (min)	Resid. Mass (mg)	Alpha Activity Gross CPM	Alpha Bkg. CPM	Alpha b>a xtlk CPM	Alpha Base Eff	Alpha Base Cor.Fact.	Alpha Progeny Eff	Alpha Progeny Cor.Fact.	Beta Activity Gross CPM	Beta Bkg. CPM	Beta a>b xtlk CPM	Beta Base Eff	Beta Base Cor.Fact.	Beta Progeny Eff	Beta Progeny Cor.Fact.
C1	0409129-6	9/24/04 13:25	180.00	24.8	0.111	0.089	0.001	0.2170	1.073	n/a	n/a	1.883	1.530	0.0297	0.4175	0.998	n/a	n/a
C2	0409129-6D	9/24/04 13:25	180.00	30.3	0.128	0.115	0.001	0.2127	1.038	n/a	n/a	1.650	1.475	0.0340	0.4176	0.997	n/a	n/a
C3	0409139-1	9/24/04 13:25	180.00	41.0	0.239	0.121	0.001	0.2117	0.973	n/a	n/a	2.128	1.623	0.0628	0.4191	0.996	n/a	n/a
C4	0409139-1D	9/24/04 13:25	180.00	40.7	0.178	0.065	0.001	0.2063	0.975	n/a	n/a	2.044	1.539	0.0468	0.4140	0.996	n/a	n/a
B3	0405095-1MS	9/24/04 13:26	180.00	43.9	19.528	0.126	0.030	0.2148	0.956	n/a	n/a	48.511	1.553	5.1209	0.4253	0.996	n/a	n/a
D1	0409139-1MS	9/24/04 13:26	180.00	41.0	17.922	0.080	0.032	0.2111	0.973	n/a	n/a	51.183	1.626	4.7135	0.4115	0.996	n/a	n/a
D2	0409139-1MSD	9/24/04 13:26	180.00	40.8	18.383	0.055	0.031	0.2101	0.974	n/a	n/a	50.933	1.782	4.8358	0.4102	0.996	n/a	n/a
B4	0405095-1MSD	9/24/04 13:26	180.00	42.6	20.750	0.083	0.031	0.2038	0.964	n/a	n/a	50.650	1.586	5.4485	0.4028	0.996	n/a	n/a

000019

PAI - Gas Flow Proportional Sample Analysis LB4100-B

Unit Type: LB4100 -B
Counting Unit ID: Aqua
High Voltage Mode: Simultaneous
Application Revision: 2
Application Version: Standard
Rev.12/29/03 JE

Data file name: ABB0924A
Batch ID: AB040921-1
Count Preset (m): 60
Batch Ended: 9/24/04 12:27

Background logfile: BKGABW
Date of Bkg. Cal: 9/18/04
Alpha efficiency logfile: Am241-11/03
Alpha attenuation calibration: ABA1103.XLS
Beta efficiency logfile: Sr90R-11/03
Beta attenuation calibration: ABA1103.XLS

Alpha prog. logfile: n/a
Alpha prog. attenuation: n/a
Beta prog. logfile: n/a
Beta prog. attenuation: n/a

Alpha Attenuation Calibration		Beta Attenuation Calibration	
y = b*m^(a*(mass-x0))		y = b*m^(a*(mass-x0))	
Alpha b=	1.24550	Beta b=	1.0000
m=	0.99400	m=	0.9999
a=	1.0000	a=	1.0000
x0=	0.0000	x0=	0.0000
Alpha to Beta X-talk		Beta to Alpha X-talk	
y = m *b^-mass		y = m*mass + b	
a ->b xtalk m=	0.2740	b ->a xtalk m=	-2.00E-05
a ->b xtalk b=	1.0010	b ->a xtalk b=	0.0007

Det. ID	Sample ID	Count End Date & Time	Count Dur. (min)	Resid. Mass (mg)	Alpha Activity Gross CPM	Alpha Bkg. CPM	Alpha b>a xtlk CPM	Alpha Base Eff	Alpha Base Cor.Fact.	Alpha Progeny Eff	Alpha Progeny Cor.Fact.	Beta Activity Gross CPM	Beta Bkg. CPM	Beta a>b xtlk CPM	Beta Base Eff	Beta Base Cor.Fact.	Beta Progeny Eff	Beta Progeny Cor.Fact.
A1	AB040921-1LCS	9/24/04 12:27	60.00	37.7	19.750	0.073	0.030	0.2085	0.993	n/a	n/a	48.300	1.315	5.2114	0.4035	0.996	n/a	n/a
A2	AB040921-1LCSD	9/24/04 12:27	60.00	36.6	20.217	0.110	0.031	0.2041	0.999	n/a	n/a	48.717	1.343	5.3404	0.4065	0.996	n/a	n/a

000023

72
9-27-04

PAI - Gas Flow Proportional Sample Analysis LB4100-B

Unit Type:	LB4100 -B	Data file name:	ABB0925
Counting Unit ID:	Aqua	Batch ID:	AB040921-1
High Voltage Mode:	Simultaneous	Count Preset (m):	1000
Application Revision:	2	Batch Ended:	9/26/04 2:29
Application Version:	Standard		
Rev.12/29/03 JE			

Background logfile:	BKGABW		
Date of Bkg. Cal:	9/25/04		
Alpha efficiency logfile:	Am241-11/03	Alpha prog. logfile:	n/a
Alpha attenuation calibration:	ABA1103.XLS	Alpha prog. attenuation:	n/a
Beta efficiency logfile:	Sr90R-11/03	Beta prog. logfile:	n/a
Beta attenuation calibration:	ABA1103.XLS	Beta prog. attenuation:	n/a

Alpha Attenuation Calibration		Beta Attenuation Calibration	
y = b*m^(a*(mass-x0))		y = b*m^(a*(mass-x0))	
Alpha b=	1.24550	Beta b=	1.0000
m=	0.99400	m=	0.9999
a=	1.0000	a=	1.0000
x0=	0.0000	x0=	0.0000
Alpha to Beta X-talk		Beta to Alpha X-talk	
y = m *b^-mass		y = m*mass + b	
a ->b xtalk m=	0.2740	b ->a xtalk m=	-2.00E-06
a ->b xtalk b=	1.0010	b ->a xtalk b=	0.0007

Det. ID	Sample ID	Count End Date & Time	Count Dur. (min)	Resid. Mass (mg)	Alpha Activity							Beta Activity						
					Gross CPM	Bkg. CPM	b>a xtlk CPM	Base Eff	Base Cor.Fact.	Progeny Eff	Progeny Cor.Fact.	Gross CPM	Bkg. CPM	a>b xtlk CPM	Base Eff	Base Cor.Fact.	Progeny Eff	Progeny Cor.Fact.
A1	0405095-1	9/26/04 2:28	1000.00	42.5	0.148	0.081	0.001	0.2085	0.964	n/a	n/a	1.544	1.363	0.0389	0.4035	0.996	n/a	n/a
A2	0405095-1D	9/26/04 2:28	1000.00	42.1	0.198	0.137	0.001	0.2041	0.967	n/a	n/a	1.527	1.312	0.0520	0.4065	0.996	n/a	n/a
A3	0409067-1	9/26/04 2:28	1000.00	69.3	0.124	0.091	0.001	0.2099	0.821	n/a	n/a	1.417	1.385	0.0317	0.4132	0.993	n/a	n/a
A4	0409067-1D	9/26/04 2:28	1000.00	68.9	0.121	0.091	0.001	0.2037	0.823	n/a	n/a	1.406	1.368	0.0309	0.4037	0.993	n/a	n/a
C1	0409067-3	9/26/04 2:29	1000.00	72.8	0.148	0.087	0.001	0.2170	0.804	n/a	n/a	1.832	1.493	0.0377	0.4175	0.993	n/a	n/a
C2	0409067-4	9/26/04 2:29	1000.00	68.9	0.170	0.096	0.001	0.2127	0.823	n/a	n/a	1.613	1.498	0.0435	0.4176	0.993	n/a	n/a
C3	0409067-5	9/26/04 2:29	1000.00	69.1	0.176	0.131	0.001	0.2117	0.822	n/a	n/a	1.680	1.497	0.0450	0.4191	0.993	n/a	n/a
C4	AB040921-1MB	9/26/04 2:29	1000.00	36.8	0.098	0.093	0.001	0.2063	0.998	n/a	n/a	1.573	1.557	0.0259	0.4140	0.996	n/a	n/a
B3	0409067-2	9/26/04 2:29	1000.00	62.0	0.112	0.065	0.001	0.2148	0.858	n/a	n/a	1.541	1.472	0.0288	0.4253	0.994	n/a	n/a

00021

7/2
9-27-04

Date 9-24-04 SOP 724r 8

Paragon Analytics

Low Background Gas Flow Proportional Counter Log

Instrument: LB4100B

Instrument Daily Response and Background Checks

Det.	Daily Response Check Start 1	Status	Start 2	Status	Background Check Start 1	Status	Start 2	Status	Det. Status
1	77	P			77	P			P
2									
3									
4									
5		P/OLB				P/OLB			OLB
6									
7		P				P			P
8									
9									
10									
11									
12									
13									
14									
15									OLBW
16									

Det = Detector; α = Alpha; β = Beta; P = Pass; H = High; L = Low; OL = Offline; R = Recount; W = Weekly; NP = Not Processed

Weekly Background Calibration

	Current Calib. File ID	Weekly Calib. Started	Status	File ID
Dr A	BKB0917W	77	P	BKB0924W
Dr B			Det 5, 6 OLB, Det 7 P Per Board	
Dr C			P	
Dr D			Det 13, 14 - P Det 15, 16 OLB	

Dr = Drawer

Gas Supply

P-10 Supply		P-10 Flow	
Tank 1	2000	Dr A	0-1
		Dr B	
Tank 2	1450	Dr C	
		Dr D	

Comments:

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Reviewed By / Date 77 9-24-04

Date 9-24-04 SOP 724r 8

Paragon Analytics

Low Background Gas Flow Proportional Counter Log

Instrument: LB4100B

Det.	Sample ID	Batch	Test	Count Dur. (min)	Start Time	Analyst Initials	File ID	Output Initials
1-16	Daily Eff	—	—	30	9:05	XZ	EFB0924	XZ
1-16	Daily Bkg	—	—	60	9:15	XZ	BKB0924	↓
1	SR040917-1LCS	SR040917-1	Sr90	60	10:21	XZ	SRB0924	XZ
2	-1LCSD	-1			↓		↓	
3	-2LCS	-2			10:22		SRB0924A	
4	-2LCSD	-2			↓		↓	
7	0405095-1MS	AB040921-1	AB	180	10:25	XZ	ABB0924	XZ
8	-1MSD							
9	0409129-6							
10	-6D							
11	0409139-1							
12	-1D							
13	-1MS							
14	-1MSD							
1	AB040921-1LCS			60	11:27		ABB0924A	
2	-1LCSD							
5	0409012-1	TR040909-1	Ra226	60	10:28	XZ	RDB0924	XZ
6	-2							
15	-3							
16	-3D							
5	-4				11:30		RDB0924A	
6	TR040909-1MB							
15	-1LCS							
1	0409041-3	SR040921-2	Sr90	120	13:48	XZ	SRB0924B	XZ
2	-4							
3	-5							
4	-6							
7	-7							
8	-8							
9	-8D							
10	-9							
11	-10							
12	-11							
13	-12							
14	-13							
1-16	Weekly Bkg XZ 9.24.04	—	—	1000	15:56	XZ	BKB0924W	XZ

XZ 9.24.04

Comments:

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Reviewed By / Date XZ 9.25.04

Date 9-25-04 SOP 724r 8

Paragon Analytics

Low Background Gas Flow Proportional Counter Log

Instrument: LB4100B

Instrument Daily Response and Background Checks

Det.	Daily Response Check Start 1	Status	Start 2	Status	Background Check Start 1	Status	Start 2	Status	Det. Status
1	72	P			✓				P
2									
3									
4									
5		P/OLB							OLB
6									
7		P							P
8									OLBW
9									P
10									
11									
12									
13									
14									
15									OLBW
16									

Det = Detector; α = Alpha; β = Beta; P = Pass; H = High; L = Low; OL = Offline; R = Recount; W = Weekly; NP = Not Processed

Weekly Background Calibration

	Current Calib. File ID	Weekly Calib. Started	Status	File ID
Dr A	BKB0924W			
Dr B		Det 8 - 72	Det 8 - P	BKB0925W
Dr C				
Dr D				

Dr = Drawer

Gas Supply

P-10 Supply		P-10 Flow	
Tank 1	2000	Dr A	0.1
		Dr B	
Tank 2	1250	Dr C	
		Dr D	

Comments:

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Date 9-25-04 SOP 724r 8

Paragon Analytics

Low Background Gas Flow Proportional Counter Log

Instrument: LB4100B

Det.	Sample ID	Batch	Test	Count Dur. (min)	Start Time	Analyst Initials	File ID	Output Initials
1-6	Daily EFF	—	—	30	9:28	XZ	EFB0925	XZ
8	weekly Bkg	—	—	1000	9:44	XZ	BKB0925L	JP
1	0405095-1	AB040921-1	AB	1000	9:46	XZ	ABB0925	JP
2	-1D							
3	0409067-1							
4	-1D							
7	-2							
9	-3							
10	-4							
11	-5							
12	AB040921-1MB							
13	0408263-60	AB040916-2	AB	1000	9:49	XZ	ABB0925A	JP
14	-61							

JP 9/26/04

Comments:

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Reviewed By / Date JP 9/26/04

000025

PARAGON ANALYTICS
Radiochemistry Data Package

Section 5

QUALITY ASSURANCE SUMMARY REPORTS

5

Paragon Analytics

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH 0405095, 0409139/AB040921-1
TEST G&B
METHOD prep
280816 SOP/REV (PREP) 702 R16
SOP/REV (ANAL) —

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

While taking planchets off the hotplate, sample 0409139-DUP was dropped and fell on AB040921-1 MB. Some of the matter in 0409139-DUP fell into the MB. Therefore, these samples were re-aliquotted.

Samples 0405095-1, -DUP, -MS, and -MSD were underweight after aliquotting and drying. Therefore, 1mL salt solution was added to each of these samples and dried.

Due to lab oversight, the new tare weight was not recorded in the LIMS systems for 0409139-DUP. After counting, this sample was dissolved in 8M HNO_3, placed on a steambath, rinsed with 8M HNO_3, rinsed with DI water, dried in a drying oven, and weighed. The new tare weight and sample weight will be given to the counting lab.

TECHNICIAN/ANALYST Becky Kellsler DATE 9/27/04

DEPARTMENT MANAGER [signature] DATE 9/27/04

FORM 302r6.doc (4/22/04)

PARAGON ANALYTICS
Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

6

Paragon Analytics

Radiochemistry Instrument Worksheet

Prep Batch: AB040921-1

Prep Procedure: GAB

Analytical QASS / NCR? Y / N 280816

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Residual Mass (mg)	Cnt 1 File	Cnt 1 Inst/Det	Cnt 1 Pos Chk By	Cnt 2 File	Cnt 2 Inst/Det	Cnt 2 Pos Chk By	Cnt 3 File	Cnt 3 Inst/Det	Cnt 3 Pos Chk By	Notes
1	0405095-1	SMP	200	200	ml	42.5		SEE PREV								
1	0405095-1	DUP	200	200	ml	42.1										
1	0405095-1	MS	200	200	ml	43.9										
1	0405095-1	MSD	200	200	ml	42.6										
1	0409067-1	SMP	5	5	ml	69.3										
1	0409067-1	DUP	5	5	ml	68.9										
1	0409067-2	SMP	5	5	ml	62										
1	0409067-3	SMP	10	10	ml	72.8										
1	0409067-4	SMP	10	10	ml	68.9										
1	0409067-5	SMP	10	10	ml	69.1										
1	0409129-6	SMP	200	200	ml	24.8										
1	0409129-6	DUP	200	200	ml	30.3										
1	0409139-1	SMP	200	200	ml	41										
1	0409139-1	DUP	200	200	ml	40.7										
1	0409139-1	MS	200	200	ml	41										
1	0409139-1	MSD	200	200	ml	40.8										
1	AB040921-1	MB	200	200	ml	36.8										
1	AB040921-1	LCS	200	200	ml	37.7										
1	AB040921-1	LCSD	200	200	ml	36.6										

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Sr-90	600.2613.54	50.172	DPM/ml	09/21/04	1	ml	RS-005
S2	AM-241	616.2613.42	101.568	DPM/ml	09/21/04	1	ml	RS-005

000023

Paragon Analytics

Radiochemistry Instrument Worksheet

Prep Batch: AB040921-1

Prep Procedure: GAB

Analytical QASS / NCR? Y / (N) NA

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Residual Mass (mg)	Cnt 1 File	Cnt 1 Inst/Det	Cnt 1 Pos Chk By	Cnt 2 File	Cnt 2 Inst/Det	Cnt 2 Pos Chk By	Cnt 3 File	Cnt 3 Inst/Det	Cnt 3 Pos Chk By	Notes
1	0405095-1	SMP	200	200	ml	42.5	AB30925	1	JD							
1	0405095-1	DUP	200	200	ml	42.1	↓	2	↓							
1	0405095-1	MS	200	200	ml	43.9	AB30924	7	7/7							
1	0405095-1	MSD	200	200	ml	42.6	↓	8	↓							
1	0409067-1	SMP	5	5	ml	69.3	AB30925	3	JD							
1	0409067-1	DUP	5	5	ml	68.9	↓	4	↓							
1	0409067-2	SMP	5	5	ml	62		7								
1	0409067-3	SMP	10	10	ml	72.8		9								
1	0409067-4	SMP	10	10	ml	68.9		10								
1	0409067-5	SMP	10	10	ml	69.1		11								
1	0409129-6	SMP	200	200	ml	24.8	AB30924	9	7/7							
1	0409129-6	DUP	200	200	ml	30.3	↓	10	↓							
1	0409139-1	SMP	200	200	ml	41		11								
1	0409139-1	DUP	200	200	ml	114		12								
1	0409139-1	MS	200	200	ml	41		13								
1	0409139-1	MSD	200	200	ml	40.8		14								
1	AB040921-1	MB	200	200	ml	36.8	AB30925	12	JD							
1	AB040921-1	LCS	200	200	ml	37.7	AB30924A	1	7/7							
1	AB040921-1	LCSD	200	200	ml	36.6	↓	2	↓							

DRAFT

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Sr-90	600.2613.54	50.172	DPM/ml	09/21/04	1	ml	RS-005
S2	AM-241	616.2613.42	101.568	DPM/ml	09/21/04	1	ml	RS-005

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AB040921-1

Prep Procedure: GAB

BK 9/27/04 BK 9/27/04 **Reviewed By:** BLK BLK **Review Date:** 9/27/04

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A WO# 0405095 **Prep QASS / NCR?** (Y) / N 280816

Prep SOP: PAI 702 **Rev:** 16
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Becky Kobliska
Prep Date: 9/21/04
Prep Dept: RS

Balance: 13
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Standards	Prep Notes
1	1	0405095-1	SMP		200	200	Unfiltered		
2	1	0405095-1	DUP		200	200	Unfiltered	BK 9/27/04	
3	1	0405095-1	MS		200	200	Unfiltered	S1,S2	
4	1	0405095-1	MSD		200	200	Unfiltered	S1,S2	
5	1	0409067-1	SMP		5	5	Unfiltered		
6	1	0409067-1	DUP		5	5	Unfiltered		
7	1	0409067-2	SMP		5	5	Unfiltered		
8	1	0409067-3	SMP		10	10	Unfiltered		
9	1	0409067-4	SMP		10	10	Unfiltered		
10	1	0409067-5	SMP		10	10	Unfiltered		
11	1	0409129-6	SMP		200	200	Unfiltered		
12	1	0409129-6	DUP		200	200	Unfiltered		
13	1	0409139-1	SMP		200	200	Unfiltered		
14	1	0409139-1	DUP		200	200	Unfiltered		
15	1	0409139-1	MS		200	200	Unfiltered	S1,S2	
16	1	0409139-1	MSD		200	200	Unfiltered	S1,S2	
17	1	AB040921-1	MB		200	200	Unfiltered	BK 9/27/04	
18	1	AB040921-1	LCS		200	200	Unfiltered	S1,S2	
19	1	AB040921-1	LCSD		200	200	Unfiltered	S1,S2	

BK 9/27/04 BK 9/27/04 BK 9/27/04

Spiked By: Becky Kobliska **Date:** 9/21/04
Witnessed By: Julie Kellogg **Date:** 9/21/04

Relinquished By: [signature] **Date:** 9/27/04
Received By: [signature] **Date:** PREV

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Sr-90	600.2613.54	50.172	DPM/ml	09/21/04	1	ml	RS-005
S2	AM-241	616.2613.42	101.568	DPM/ml	09/21/04	1	ml	RS-005

Comments
ALL SAMPLES DESICCATED @ 16:00, 9/23/04.

Supersedes: ~~9/21/04 10:51~~ 9/24/04 8:48

Paragon Analytics

Radiochemistry Prep Worksheet

Prep Batch: AB040921-1

Prep Procedure: GAB

Prep Batch Not Validated!!!

Reviewed By:

Review Date:

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep?** Y / N **Batch:** _____ **Prep QASS / NCR?** Y / N _____

Prep SOP: PAI 702 **Rev:** 16
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Becky Kobliska
Prep Date: 9/21/04
Prep Dept: RS

Balance: 13
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Standards	Prep Notes
1	1	0405095-1	SMP		200	200	Unfiltered		
2	1	0405095-1	DUP		200	200	Unfiltered		
3	1	0405095-1	MS		200	200	Unfiltered	S1,S2	
4	1	0405095-1	MSD		200	200	Unfiltered	S1,S2	
5	1	0409067-1	SMP		5	5	Unfiltered		
6	1	0409067-1	DUP		5	5	Unfiltered		
7	1	0409067-2	SMP		5	5	Unfiltered		
8	1	0409067-3	SMP		10	10	Unfiltered		
9	1	0409067-4	SMP		10	10	Unfiltered		
10	1	0409067-5	SMP		10	10	Unfiltered		
11	1	0409129-6	SMP		200	200	Unfiltered		
12	1	0409129-6	DUP		200	200	Unfiltered		
13	1	0409139-1	SMP		200	200	Unfiltered		
14	1	0409139-1	DUP		200	200	Unfiltered		
15	1	0409139-1	MS		200	200	Unfiltered	S1,S2	
16	1	0409139-1	MSD		200	200	Unfiltered	S1,S2	
17	1	AB040921-1	MB		200	200	Unfiltered		
18	1	AB040921-1	LCS		200	200	Unfiltered	S1,S2	
19	1	AB040921-1	LCSD		200	200	Unfiltered	S1,S2	

DRAFT

Spiked By: Becky Kobliska **Date:** 9/21/04

Witnessed By: Julie Kellogg **Date:** 9/21/04

Relinquished By: _____
Date: _____
Received By: KF
Date: 9-24-04

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Sr-90	600.2613.54	50.172	DPM/ml	09/21/04	1	ml	RS-005
S2	AM-241	616.2613.42	101.568	DPM/ml	09/21/04	1	ml	RS-005

Comments
ALL SAMPLES DESICCATED @ 16:00, 9/23/04. NEED TO REDISSOLVE PLANCHET#14

Supersedes: 4/21/04 10:51

Paragon Analytics

Radiochemistry Prep Worksheet

Prep Batch: AB040921-1

Prep Procedure: GAB

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep?** Y / N **Batch:** _____ **Prep QASS / NCR?** Y / N _____

Prep SOP: PAI 702 **Rev:** 16
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Becky Kobliska BK
Prep Date: 9/21/04
Prep Dept: RS

Balance: 13
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Standards	Prep Notes
1	1	0405095-1	SMP		200	200	Unfiltered		
2	1	0405095-1	DUP		200	200	Unfiltered		
3	1	0405095-1	MS		200	200	Unfiltered	S1,S2	
4	1	0405095-1	MSD		200	200	Unfiltered	S1,S2	
5	1	0409067-1	SMP		200	200	Unfiltered		
6	1	0409067-1	DUP		200	200	Unfiltered		
7	1	0409067-2	SMP		200	200	Unfiltered		
8	1	0409067-3	SMP		200	200	Unfiltered		
9	1	0409067-4	SMP		200	200	Unfiltered		
10	1	0409067-5	SMP		200	200	Unfiltered		
11	1	0409129-6	SMP		200	200	Unfiltered		
12	1	0409129-6	DUP		200	200	Unfiltered		
13	1	0409139-1	SMP		200	200	Unfiltered		
14	1	0409139-1	DUP		200	200	Unfiltered		
15	1	0409139-1	MS		200	200	Unfiltered	S1,S2	
16	1	0409139-1	MSD		200	200	Unfiltered	S1,S2	
17	1	AB040921-1	MB		200	200	Unfiltered		
18	1	AB040921-1	LCS		200	200	Unfiltered	S1,S2	
19	1	AB040921-1	LCSD		200	200	Unfiltered	S1,S2	

DRAFT

Spiked By: Becky Kobliska BK **Date:** 9/21/04
Witnessed By: JLK **Date:** 9/21/04

Relinquished By: _____
Date: _____
Received By: _____
Date: _____

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Sr-90	600.2613.54	50.172	DPM/ml	09/21/04	1	ml	RS-005
S2	AM-241	616.2613.42	101.568	DPM/ml	09/21/04	1	ml	RS-005

4/21/05

Tray 2 - Hood 3
Last h.p.

Comments
Desiccated @ 16:00, 9/23/04

Paragon Analytics

Radiochemistry Gravimetric Worksheet

Prep Batch: AB040921-1

Prep Procedure: **GAB**

Reviewed By: BLK BLK

Review Date: 9/27/04

Prep Num	Planc. Num	LabID	QC Type	Test Alq (ml)	Tare Mass (g)	Initial Gross Mass (g)	Initial Net Mass (mg)	Suggested Alq (ml)	Samp Vol Available (ml)	Samp Vol Taken (ml)	Fin Gross Mass (g)	Final Net Mass (mg)	Salt Sol. Added (ml)	Flag
1	1	0405095-1	SMP	10	8.9930	8.9945	1.5	200	200	200	9.0355	42.5	1	
1	2	0405095-1	DUP	10	9.0412	0.0000	0	200	200	200	9.0833	42.1	1	
1	3	0405095-1	MS	10	8.9972	0.0000	0	200	200	200	9.0411	43.9	1	
1	4	0405095-1	MSD	10	9.0001	0.0000	0	200	200	200	9.0427	42.6	1	
1	5	0409067-1	SMP	10	8.9918	0.0000	0	200	200	5	9.0611	69.3	0	
1	6	0409067-1	DUP	10	9.0045	0.0000	0	200	200	5	9.0734	68.9	0	
1	7	0409067-2	SMP	10	9.0103	0.0000	0	200	200	5	9.0723	62	0	
1	8	0409067-3	SMP	10	8.9853	9.0591	73.8	10	200	10	9.0581	72.8	0	
1	9	0409067-4	SMP	10	9.0102	9.0792	69	11	200	10	9.0791	68.9	0	
1	10	0409067-5	SMP	10	9.0132	9.0822	69	11	200	10	9.0823	69.1	0	
1	11	0409129-6	SMP	10	9.0381	9.0400	1.9	200	200	200	9.0629	24.8	0	
1	12	0409129-6	DUP	10	9.0537	0.0000	0	200	200	200	9.0840	30.3	0	
1	13	0409139-1	SMP	10	9.0114	9.0138	2.4	200	200	200	9.0524	41	0	
1	14	0409139-1	DUP	10	9.0482	0.0000	0	200	200	200	9.0889	40.7	0	
1	15	0409139-1	MS	10	8.9895	0.0000	0	200	200	200	9.0305	41	0	
1	16	0409139-1	MSD	10	9.0212	0.0000	0	200	200	200	9.0620	40.8	0	
1	17	AB040921-1	MB	10	9.0002	0.0000	0	200	200	200	9.0370	36.8	1	
1	18	AB040921-1	LCS	10	8.9952	0.0000	0	200	200	200	9.0329	37.7	1	
1	19	AB040921-1	LCSD	10	9.0388	0.0000	0	200	200	200	9.0754	36.6	1	

Paragon Analytics

Radiochemistry Gravimetric Worksheet

Prep Batch: AB040921-1

Prep Procedure: **GAB**

Prep Batch Not Validated!!!

Reviewed By:

Review Date:

Prep Num	Planc. Num	LabID	QC Type	Test Alq (ml)	Tare Mass (g)	Initial Gross Mass (g)	Initial Net Mass (mg)	Suggested Alq (ml)	Samp Vol Available (ml)	Samp Vol Taken (ml)	Fin Gross Mass (g)	Final Net Mass (mg)	Salt Sol. Added (ml)	Flag
1	1	0405095-1	SMP	10	8.9930	8.9945	1.5	200	200 200	0	0.0000	-8993	0	
1	2	0405095-1	DUP	10	9.0412	0.0000	0	200	200	0	0.0000	-9041.2	0	
1	3	0405095-1	MS	10	8.9972	0.0000	0	200	200	0	0.0000	-8997.2	0	
1	4	0405095-1	MSD	10	9.0001	0.0000	0	200	200	0	0.0000	-9000.1	0	
1	5	0409067-1	SMP	10	9.0215	9.1625	141	5	200 5	0	0.0000	-9021.5	0	
1	6	0409067-1	DUP	10	9.0045	0.0000	0	200	200	0	0.0000	-9004.5	0	
1	7	0409067-2	SMP	10	9.0315	9.1508	119.3	6	200 5	0	0.0000	-9031.5	0	
1	8	0409067-3	SMP	10	8.9853	9.0591	73.8	10	200 10	0	0.0000	-8985.3	0	
1	9	0409067-4	SMP	10	9.0102	9.0792	69	11	200	0	0.0000	-9010.2	0	
1	10	0409067-5	SMP	10	9.0132	9.0822	69	11	200	0	0.0000	-9013.2	0	
1	11	0409129-6	SMP	10	9.0381	9.0400	1.9	200	200 200	0	0.0000	-9038.1	0	
1	12	0409129-6	DUP	10	9.0537	0.0000	0	200	200	0	0.0000	-9053.7	0	
1	13	0409139-1	SMP	10	9.0114	9.0138	2.4	200	200 200	0	0.0000	-9011.4	0	
1	14	0409139-1	DUP	10	8.9749 *	0.0000	0	200	200	0	0.0000	-8974.9	0	
1	15	0409139-1	MS	10	8.9895	0.0000	0	200	200	0	0.0000	-8989.5	0	
1	16	0409139-1	MSD	10	9.0212	0.0000	0	200	200	0	0.0000	-9021.2	0	
1	17	AB040921-1	MB	10	8.9796 *	0.0000	0	200	200 200	0	0.0000	-8979.6	0	
1	18	AB040921-1	LCS	10	8.9952	0.0000	0	200	200	0	0.0000	-8995.2	0	
1	19	AB040921-1	LCSD	10	9.0388	0.0000	0	200	200	0	0.0000	-9038.8	0	

*New planchet used due to laboratory error.

DRAFT

000031

Supersedes: N/A

SAMPLE CONDITION FORM (LIQUID)

ANALYST: BK

ANALYSIS DATE: 9/21/04 METHOD: GAB

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		pH	Color	Remarks
0405095	1	<2	Clear	
0409067	1			
	2			
	3			
	4			
	5			
0409129	6	<2		
0409139	1			

BK 9/21/04

BK 9/21/04

000036

PARAGON ANALYTICS
Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS

7

PROJECT 616.2613.42 Am-241 Notebook No. 2613
Continued From Page

PREPARE A WORKING LEVEL SPIKING SOLUTION AT APPROXAMATELY 100 dpm/mL BY DILUTING 616.2382.38 WITH 1M HCl.

ACTIVITY OF 616.2382.38: 52,128.96

1. DETERMINE DENSITY OF 1M HCl

MASS OF EMPTY 100 ml CLASS A VOLUMETRIC FLASK 68.5642 g Bal#
MASS OF FLASK + 100 ml 1M HCl → 169.9544 g ↓
NET MASS OF 1M HCl → 101.3902 g

$\rho = \frac{101.3902 g}{100 ml} = 1.014 g/ml$

LOT # 43268

2. TRANSFER STD 616.2382.38 TO A 1L NALGENE BOTTLE

MASS OF BOTTLE W/O LID ~~74.37~~ Q 04/20/04 74.3654 g BAL# 12
MASS OF BOTTLE W/O LID + STD 76.2944 g ↓
NET MASS OF STD 1.9290 g

3. ADD 1M HCl TO FINAL DILUTION (1L)

MASS OF BOTTLE W/O LID (FROM ABOVE) 74.3654 g Bal#12
MASS OF BOTTLE + STD + 1M HCl 1074.4 g
NET MASS OF STD + 1M HCl 1000.0 g

4. FINAL ACTIVITY CALCULATION

$\frac{(52,128.96 dpm/g)(1.9290 g)(1.014 g/ml)}{1000.0 g} = \cancel{101.}$ Q 04/20/04 102.0 dpm/ml

SD 4/28/04

Stnd ID: 616.2613.42

Description: Am-241
Expiration: 4/21/05
Activity: 102.00 dpm/mL

2s Uncertainty: 2.24 dpm/mL
Ref. Date: 4/18/02
Ref Time: N/A
Prep Date: 4/20/04
Matrix/Comp. 1M HCl
Half Life (y): 4.32E+02

Prep by: AF

SD 4/28/04

SD 4/28/04

SD 4/28/04

Continued on Page

Read and Understood By

Signed 04/20/04 Date

Signed 4/28/04 Date

Am-241 primary dilution

prepare a primary dilution of RSO 616 (NIST: ~~SRM~~ CM 10-14-02 SRS 63651-307) by diluting w/ 1M HCl — DCB 10/14/02

1) Determine the density of 1M HCl (Lot # 42223 + Lot # 42216)

mass of 100ml Vol flask	62.4712 g	(Bal 12)
mass of flask + 1M HCl	163.8021 g	↓
Net mass of ~~std~~ HCl RG 12/3/02	101.330900 g	

2) Transfer contents of ampule to 40 ml VOA Vial

mass of VOA Vial w/o lid	22.3577 g	(Bal 12)
mass of opened amp ~~mass of VOA Vial~~ CM-10-14-02 + 50 ml beaker	37.9238 g	↓
mass of beaker + empty ampule	32.9862 g	
Net mass of std transferred	4.937600 g	

3) Dilute Std to final Vol w/ 1M HCl

mass of VOA Vial w/o lid (from above)	22.3577 g	(Bal 12)
mass of std + VOA Vial + 1M HCl	63.7403 g	↓
Net mass of diluted std	41.382600 g	

4) Final Activity Calc

$$\frac{\left(\frac{3.728 \times 10^4 \text{ dps}}{5.11972 \text{ g}}\right)\left(60 \frac{\text{dpm}}{\text{dps}}\right)\left(4.9376 \text{ g}\right)}{41.3826 \text{ g}} = \cancel{52066} \text{ dpm/g}$$

DCB 7/31/03

52,128.96 dpm/g

ANALYTICS
1380 Seaboard Ind Blvd * Atlanta, GA 30318 * USA * 404-352-8677
Am-241
SRS 63651-307 Amount 1.008 µCi QA [illegible]
Date 4/18/02 12:00 EST Exp. ---------
PO # EW040502, Item 3
5.11972 g 1M HCl solution
CAUTION RADIOACTIVE MATERIAL

DCB 10/14/02

Continued on Page

Read and Understood By

[signature] 10-14-02 [signature] 2/4/03

Signed Date Signed Date

ANALYTICS

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

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

PAI.FO 0616
rec'd 4-22-02

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

63651-307

Am-241 5 mL Liquid in Flame Sealed Vial

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

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

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

ISOTOPE:	Am-241
ACTIVITY (dps):	3.728 E4
HALF-LIFE:	4.322 E2 years
CALIBRATION DATE:	April 18, 2002 12:00 EST
TOTAL UNCERTAINTY*:	3.3%
SYSTEMATIC:	3.0%
RANDOM:	0.3%

*99% confidence level.

Impurities: γ-impurities <0.1%

5.11972 grams 1M HCl solution.

P O NUMBER EW040502, Item 3

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: M Rontz 4-19-02

000043

PROJECT Sr-90 600.2613.54 Notebook No. 2613

Continued From Page

PREP 8/16/04

PREPARE A WORKING LEVEL DILUTION OF ^{90}Sr 600.2613.30 @ ~50 dpm/ml BY DILUTING W/ 0.1M HCl (LOT#44105)

① DETERMINE DENSITY OF 0.1M HCl

MASS OF 100ml VOLUMETRIC FLASK	62.6236g	Bal 12
MASS OF 100ml FLASK + 100ml 0.1M HCl	162.30g	Bal 26
NET MASS OF 0.1M HCl	99.68g	
	ρ = 0.9968 g/ml	

② TRANSFER ^{90}Sr 600.2613.30 TO A NALGENE BOTTLE

MASS OF 1L NALGENE BOTTLE W/O LID	~~79.9652g~~ 72.9652 Q 8/16/04	Bal 12
MASS OF BOTTLE + STANDARD	75.3809g	↓
NET MASS OF STANDARD TRANSFERRED	2.4157g	

③ DILUTE TO FINAL VOLUME W/ 0.1M HCl

MASS OF BOTTLE W/O LID FROM ABOVE	72.9652g	
MASS OF BOTTLE + STANDARD + 0.1M HCl	1072.4g	Bal 26
NET MASS OF DILUTED STANDARD	999.4~~3~~g Q 8/16/04	

④ FINAL ACTIVITY CALCULATION 22390.967 dpm/g

ACTIVITY OF 600.2613.30 = ~~22341.71 dpm/ml~~

~~(22341.71 dpm/ml)(2.4157g)~~ Q 8/16/04

$$\frac{(22390.967\ dpm/g)(2.4157g)(0.9968g/ml)}{999.4g} = 53.9\ dpm/ml$$

RG 9/15/04

Stnd ID: 600.2613.54

Description: Sr-90
Expiration: 9/9/05
Activity: 53.90 dpm/mL

2s Uncertainty: 1.80 dpm/mL
Ref. Date: 12/1/01
Ref Time: N/A
Prep Date: 9/8/04 Prep by: NT
Matrix/Comp. 0.1M HCl
Half Life (y): 2.88E+01

RG 9/15/04 RG 9/15/04 RG 9/15/04

Continued on Page

Read and Understood By

Signed [signature] Date 9/15/04 Signed Renee Gallegos Date 9/15/04

30
PROJECT 600.2613.30 Sr-90 Notebook No. 2613

Continued From Page

Transfer contents of ampoule 600 to a 125 mL glass bottle for a 1° solution.

1) Transfer ampoule 600 to a 125 mL bottle

mass of open ampoule + std.	139.6110 g	Bal #12
mass of empty ampoule	89.5551 g	L
Net mass of std.	50.0559 g	

SD 12/10/03 Density from following page P = 0.99789 g/mL

2) Final Activity Calculation

$$\frac{(1.868\times10^4 \text{ dps})(60 \text{ dpm/dps})(\text{SD } 12/10/03)}{50.0559 \text{ g}} = \left(\frac{22{,}390.967}{\cancel{22{,}279.914}} \frac{\text{dpm}}{\text{g}}\right)(0.99789 \text{ g/mL})$$

~~50.3054~~ g
CW 12/10/03

CW 12/10/03
22,341.707
= ~~22,230.898~~ dpm/mL
SD 12/10/03

CW 12/1/03

ANALYTICS
1380 Seaboard Ind Blvd * Atlanta, GA 30318 * USA * 404-352-8677
Sr-90
SRS 62751-307 Amount 0.505 µCi QA
Date 12/01/01 12:00 EST Exp. -----
PO # 001703, Item 1
50.3054 g 0.1M HCl solution
CAUTION RADIOACTIVE MATERIAL
CW 12/1/03

SD 12/11/03

Stnd ID: 600.2613.30

Description: Sr-90
Expiration: 12/2/04
Activity: 22341.71 dpm/mL
2s Uncertainty: 744.72 dpm/mL
Ref. Date: 12/1/01
Ref Time: N/A
Prep Date: 12/1/03 Prep by: CW
Matrix/Comp. 0.1 M HCl
Half Life (y): 2.88E+01
SD 12/11/03

SD 12/11/03

Continued on Page

Read and Understood By

Signed 12/1/03 Date Signed 12/10/03 Date

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclude Source

PAI 00600
rec'd 12-05-01

62751-307

Sr-90 50 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 25931.

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

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

ISOTOPE:	Sr-90
ACTIVITY (dps):	1.868 E4
HALF-LIFE:	28.79 years
CALIBRATION DATE:	December 1, 2001 12:00 EST
TOTAL UNCERTAINTY*:	5.0%

*99% Confidence Level

Impurities: γ-impurities <0.1%

50.3054 grams 0.1M HCl solution with 30 μg/g Sr carrier.

P O NUMBER 001703, Item 1

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: 12-4-01

PARAGON ANALYTICS
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0405095
Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
SW-01	0405095-1		WATER	05-May-04	16:40
SW-02	0405095-2		WATER	05-May-04	15:50
SW-04	0405095-3		WATER	04-May-04	17:52
SW-05	0405095-4		WATER	06-May-04	11:45
SW-06	0405095-5		WATER	06-May-04	8:50
SW-07	0405095-6		WATER	03-May-04	16:03
SW-08	0405095-7		WATER	03-May-04	16:59
SW-09	0405095-8		WATER	05-May-04	12:30
SW-10	0405095-9		WATER	05-May-04	14:57
SW-11	0405095-10		WATER	06-May-04	17:00
FR-01	0405095-11		WATER	06-May-04	8:00
FR-02	0405095-12		WATER	06-May-04	8:10

Paragon Analytics, Inc.

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

Accession Number (LAB ID) 04105095

Chain-of-Custody

Date _____ Page 1 of 9

Project Name / No.: Ross Adams Sampler(s): _____ (circle one) Turnaround: Standard or Rush (Due _____) Dispose or Return to Client

Report To: SUE KENT
Phone: 907-283-0949
Fax: 907-283-0947
Company: KENT & SULLIVAN INC
Address: 53495 THUNDER RD
KENAI AK 99611

circle method or specify under comments

Sample ID	Date	Time *	Lab ID	Matrix	No. of Containers	VOCs SW8260B E624 E524.2 OLMO__	BTEX (only) SW8021B	SVOCs SW8270C E625 E525 OLMO__	OC Pesticides SW8081A E608 E508 OLMO__	PCBs SW8082 E608 E508 OLMO__	OP Pesticides SW8141A E614	Herbicides SW8151A E615	TCLP Organics SW1311 8260B 8270C 8081A 8151A	TCLP Metals SW 1311 6010B 7471	Total Metals SW6010B 7470 7471 E200 ILMO__	Dissolved Metals SW6010B 7470 E200 ILMO__	Reactive CN / S SW846 Chapter 7	Hexavalent Chromium SW7196A Alkaline Digest? Y / N	Inorganic Anions ** SW9056 E300 0	pH SW9040B 9045C	Oil & Grease SW9071A E413 2	TPH GRO DRO SW8015B (both)	TOX SW9020B	Gross Alpha / Beta SW9310 E900 0	Actinides by PAI SOP (circle) Pu / U / Am / Th / Cm	Total Uranium by KPA D5174-91	Tritium E906.0	Total Alpha-Emitting Radium SW9315 E903 0	Radium 226 SW9315 E903 0 Radium 228 SW9320 E904 0	Strontium 89 D5811-95 Strontium 90 D5811-95	Gamma Isotopes ** E901 1	Th-isotopic	Pb 210	Sample Hold Days
SW-01	5/5/04	1640	1	SW	5										(B)									X					X					X
SW-02	5/5/04	1550	2		5										(B)									X					X					X
SW-04	5/4/04	1752	3		5										(B)									X					X					X
SW-05	5/6/04	1145	4		8										X									X					X			X	X	X
SW-06	5/6/04	0850	5		5										(B)									X					(*)					X
SW-07	5/3/04	1603	6		8										X									X					X			X	X	X
SW-08	5/3/04	1659	7		5										(B)									X					(*)					X
SW-09	5/5/04	1230	8		5										(B)									X					(*)					X
SW-10	5/5/04	1457	9		5										(B)									X					(*)					X
SW-11	5/6/04	1700	10	↓	5										(B)									X					(*)					X

Comments:

(*) Run analysis only if gross alpha / beta > 5 pC/L

(B) Add printing analyses from samples SW-03 and SW-04.

Form 202r4.xls (1/3/01)

Relinquished By: (1)
Signature Gerald Warrick
Printed Name Gerald Warrick
Date 5-10-04 Time 10:00
Company Kent & Sullivan

Relinquished By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

Received By: (1)
Signature Amy Wolf
Printed Name Amy Wolf
Date 5/11/04 Time 1645
Company Paragon Analytics

Received By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

* Time Zone (circle one): EST CST MST PST ** Indicate specific analytes under comments.

Distribution: white / yellow (Paragon); pink retained by originator.

000046

Paragon Analytics, Inc. -- Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405095

PROJECT MANAGER: Debbie Fazio INITIALS: DW DATE: 5/12/04

1. Does this project require any special handling in addition to standard Paragon procedures?		Yes	No
IS PRE-SCREENING REQUIRED? (radiochemistry, DOE, etc.)		Yes	No
2. Are custody seals on shipping containers intact? How many custody seals are provided? 2 each	N/A	Yes	No
3. Are the custody seals on sample containers intact?	N/A	Yes	No
4. Is there a Chain-of-Custody (COC) or other representative documents, letters, or shipping memos?		Yes	No
5. Is the COC complete? Relinquished: Yes ✓ No___ Analyses Requested: Yes ✓ No___	N/A	Yes	No
6. Is the COC in agreement with the samples received? No. of Samples: Yes ✓ No___ Sample ID's: Yes ✓ No___ Matrix: Yes ✓ No___ No. of Containers: Yes ✓ No___	N/A	Yes	No
7. Were COC (if applicable) and sample labels legible?		Yes	No
8. Were airbills present and/or removable?	N/A	Yes	No
9. Are all aqueous samples requiring chemical preservation preserved correctly (excluding volatile organics)?	N/A	Yes	No
Are all aqueous **non-preserved** samples at the correct pH?		Yes	No
10. Is there enough sample for requested analyses? If so, were samples placed in the proper containers?		Yes	No
11. Are all samples within holding times for the requested analyses?		Yes	No
12. Were all sample containers received intact? (not broken or leaking, etc.)		Yes	No
13. Are samples requiring no headspace (volatiles, reactive cyanide/sulfide, radon), headspace free? **Size of bubble: ___ < green pea; ___ > green pea** (List sample IDs and affected containers on Page 2)	N/A	Yes	No
14. Were samples checked for and free from the presence of residual chlorine?	N/A	Yes	No
15. Were the sample(s) shipped on ice?	N/A	Yes	No
16. Were cooler temperatures measured at 0.1 - 6 °C ? **IR Gun Used*: 1 2**	N/A	Yes	No
17. Were all samples cooled that should have been cooled?	N/A	Yes	No

Cooler #'s	866	933	930	681	166	9	816	4	
Temperature	10°	10°	15°	10°	12°	12°	14°	11°	°C

Project Manager Signature / Date: Debbie Fazio 5/13/04

A NO RESPONSE TO ANY QUESTION EXCEPT # 1 REQUIRES THE COMPLETION OF PAGE 2 OF THIS FORM

* IR Gun #1 (original): Raytek, SN SC-PM3/T29403
IR Gun #2 (newer): Oakton, SN 2SCIR1201

Paragon Analytics, Inc. -- Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405095

PROJECT MANAGER: Debbie Fazio INITIALS: DW DATE: 5/12/04

- X **Custody seals** broken (on outside of shipping container or on sample containers).
- No Chain-of-Custody (**COC**) present.
- **Number of samples** on the COC do not match the number of samples received.
- Aqueous samples **not preserved correctly** (see pH discussion below).
- SVOC samples contained **residual chlorine** (list sample IDs and affected containers below).
- X Samples received at **inappropriate temperature**.
- **Insufficient sample** to perform requested analyses.
- Extraction or analytical **holding times** expired in transit.
- **Broken/leaking bottles** and intact bottles received in same cooler (list affected sample IDs below).
- **No analyses requested.**
- **Incorrect sample type** received.
- VOAs, reactive CN/S, radon not **headspace** free (list sample IDs and affected vials below).
- **Airbills** not present and/or removable (record applicable shipper's tracking number below).
- X Other (describe below).

Describe discrepancy:

• Sample #1 - #10: 500 ml poly bottles are labeled for alkalinity analysis and were received at pH 7. Labels list preservative as HNO_3.

• Cooler #930 received with rear outside custody seal intact. Front custody seal was present but was not intact. All straping tape was intact.

• All samples received between 10° - 15°C. Insufficient ice packed with samples. Refer to page 1 for cooler temperatures and refer to DOT ~~page~~ Survey pages for cooler contents.

DW 5/12/04

Was the client contacted? ___ No; ✓ Yes: Name Sue Kent Date/Time 5/13/04

Was the pH of any sample adjusted by the laboratory? ___ No; ___ Yes (see Table below):

NOTE: No pH adjustments shall be made without prior consent of Project Manager. After pH adjustment, hold metals and radchem samples ≥ 16 hr before analysis.

Sample ID	*Initial pH*	*Final pH (wait 30 min)*	*Type of Reagent Used*	*Lot No. of Reagent Used*	*Initials / Date / Time*

Was the laboratory directed to proceed with the analysis of any samples yielding the presence of residual chlorine? ___ No; ___ Yes (see notes above).

Project Manager Signature / Date: DF 5/13/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405095

Project Manager: Debbie Fazio Initials: AW Date: 5/12/04

COOLER #: 681 External Micro R Meter Reading (μ R/hr): 70

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405095-1-1	SW-01	< background
0405095-1-2	SW-01	< background
0405095-1-3	SW-01	< background
0405095-1-4	SW-01	< background
0405095-1-5	SW-01	< background
0405095-3-2	SW-04	< background
0405095-6-1	SW-07	< background
0405095-9-1	SW-10	< background
0405095-9-2	SW-10	< background
0405095-9-5	SW-10	< background

COOLER #: 166 External Micro R Meter Reading (μ R/hr): 60

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405095-2-4	SW-02	< background
0405095-2-5	SW-02	< background
0405095-3-1	SW-04	< background
0405095-3-3	SW-04	< background
0405095-9-4	SW-10	< background
0405095-11-1	FR-01	< background
0405095-11-2	FR-01	< background
0405095-12-1	FR-02	< background
0405095-12-2	FR-02	< background

COOLER #: 9 External Micro R Meter Reading (μ R/hr): 80

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405095-3-4	SW-04	< background
0405095-3-5	SW-04	< background
0405095-4-2	SW-05	< background
0405095-4-3	SW-05	< background
0405095-4-5	SW-05	< background
0405095-5-1	SW-06	< background
0405095-5-2	SW-06	< background
0405095-5-3	SW-06	< background
0405095-5-5	SW-06	< background

If applicable, was the client contacted? YES / NO / NA Client Rep. Name: S. Kent Date/Time: 5/13/04

Project Manager Signature/ Date: 5/13/04

000043

0405095

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0017

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS 50 2 seals

#846

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0003

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS

2 seals 150

#933

10oc

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0012

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS 380

#930

Back intact Front Not

15oc

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0004

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS 70

10oc

#

68V

2 seals

ARTIC 0-0410-3-1635

000050

0405095

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0013

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS

60 12.0

2 seals

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0016

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS

80 12.0

9 2 seals

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0005

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS

100

4 2 seals

ARTIC 0-0410-3-1635

1-800-2ALASKA

027 KTN 5436-6152 Box No. 0014

Destination DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL

3 MT COOLERS

50 14.0

816 2 seals

ARTIC 0-0410-3-1635

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

9

Gas Proportional Counter

Instrument Calibration

Background Calibration

LB4100-B Weekly Instrument Calibration and Check
Background Determinations

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	0.073	0.044	0.150	PASS	1.315	1.244	1.486	PASS	A1 (01)
A2 (02)	0.110	0.050	0.235	PASS	1.343	1.255	1.493	PASS	A2 (02)
A3 (03)	0.085	0.037	0.173	PASS	1.413	1.251	1.518	PASS	A3 (03)
A4 (04)	0.089	0.001	0.193	PASS	1.353	1.225	1.540	PASS	A4 (04)
B1 (05)	0.120	-0.006	0.283	PASS	1.708	1.428	1.981	OFFLINE	B1 (05)
B2 (06)	0.077	0.008	0.247	PASS	1.513	1.339	1.770	OFFLINE	B2 (06)
B3 (07)	0.126	0.039	0.259	PASS	1.553	1.421	1.747	PASS	B3 (07)
B4 (08)	0.083	-0.027	0.316	PASS	1.586	1.498	1.741	PASS	B4 (08)
C1 (09)	0.089	0.046	0.174	PASS	1.530	1.324	1.754	PASS	C1 (09)
C2 (10)	0.115	0.042	0.205	PASS	1.475	1.327	1.733	PASS	C2 (10)
C3 (11)	0.121	0.067	0.219	PASS	1.623	1.344	1.766	PASS	C3 (11)
C4 (12)	0.065	-0.012	0.216	PASS	1.539	1.338	1.726	PASS	C4 (12)
D1 (13)	0.080	0.028	0.206	PASS	1.626	1.302	1.759	PASS	D1 (13)
D2 (14)	0.055	0.017	0.207	PASS	1.782	1.730	2.319	PASS	D2 (14)
D3 (15)	0.064	0.044	0.147	PASS	1.509	1.566	2.045	FLAG-LOW	D3 (15)
D4 (16)	0.072	0.022	0.206	PASS	3.804	1.405	2.033	FLAG-HIGH	D4 (16)

- Detectors 15+16 are offline Beta for the week.

Reviewed by: JP

Date: 9/18/04

Control Limits set 1/26/04.
CJ 1/26/04

LB4100-B Weekly Instrument Calibration and Check
Background Determinations

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	0.081	0.044	0.150	PASS	1.363	1.244	1.486	PASS	A1 (01)
A2 (02)	0.137	0.050	0.235	PASS	1.312	1.255	1.493	PASS	A2 (02)
A3 (03)	0.091	0.037	0.173	PASS	1.385	1.251	1.518	PASS	A3 (03)
A4 (04)	0.091	0.001	0.193	PASS	1.368	1.225	1.540	PASS	A4 (04)
B1 (05)	0.128	-0.006	0.283	PASS	1.779	1.428	1.981	OFFLINE	B1 (05)
B2 (06)	0.071	0.008	0.247	PASS	1.389	1.339	1.770	OFFLINE	B2 (06)
B3 (07)	0.065	0.039	0.259	PASS	1.472	1.421	1.747	PASS	B3 (07)
+ B4 (08)	0.097	-0.027	0.316	PASS	1.497	1.498	1.741	FLAG-LOW	B4 (08)
C1 (09)	0.087	0.046	0.174	PASS	1.493	1.324	1.754	PASS	C1 (09)
C2 (10)	0.096	0.042	0.205	PASS	1.498	1.327	1.733	PASS	C2 (10)
C3 (11)	0.131	0.067	0.219	PASS	1.497	1.344	1.766	PASS	C3 (11)
C4 (12)	0.093	-0.012	0.216	PASS	1.557	1.338	1.726	PASS	C4 (12)
D1 (13)	0.101	0.028	0.206	PASS	1.575	1.302	1.759	PASS	D1 (13)
D2 (14)	0.110	0.017	0.207	PASS	1.766	1.730	2.319	PASS	D2 (14)
D3 (15)	0.074	0.044	0.147	PASS	1.519	1.566	2.045	FLAG-LOW	D3 (15)
D4 (16)	0.089	0.022	0.206	PASS	3.791	1.405	2.033	FLAG-HIGH	D4 (16)

+ Recounted in BKB0925W

Reviewed by: 7/7 Date: 9-25-04

Control Limits set 1/26/04
CJ 1/26/04

BKB0924W.XLD

Printed 9/ /04 9:28 AM

000055

LB4100-B Weekly Instrument Calibration and Check
Background Determinations

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	#REF!	0.044	0.150	**#REF!**	#REF!	1.244	1.486	**#REF!**	A1 (01)
A2 (02)	#REF!	0.050	0.235	**#REF!**	#REF!	1.255	1.493	**#REF!**	A2 (02)
A3 (03)	#REF!	0.037	0.173	**#REF!**	#REF!	1.251	1.518	**#REF!**	A3 (03)
A4 (04)	#REF!	0.001	0.193	**#REF!**	#REF!	1.225	1.540	**#REF!**	A4 (04)
B1 (05)	#REF!	-0.006	0.283	**#REF!**	#REF!	1.428	1.981	**OFFLINE**	B1 (05)
B2 (06)	#REF!	0.008	0.247	**#REF!**	#REF!	1.339	1.770	**OFFLINE**	B2 (06)
B3 (07)	#REF!	0.039	0.259	**#REF!**	#REF!	1.421	1.747	**#REF!**	B3 (07)
B4 (08)	0.102	-0.027	0.316	**PASS**	1.564	1.498	1.741	**PASS**	B4 (08)
C1 (09)	#REF!	0.046	0.174	**#REF!**	#REF!	1.324	1.754	**#REF!**	C1 (09)
C2 (10)	#REF!	0.042	0.205	**#REF!**	#REF!	1.327	1.733	**#REF!**	C2 (10)
C3 (11)	#REF!	0.067	0.219	**#REF!**	#REF!	1.344	1.766	**#REF!**	C3 (11)
C4 (12)	#REF!	0.012	0.216	**#REF!**	#REF!	1.338	1.726	**#REF!**	C4 (12)
D1 (13)	#REF!	0.028	0.206	**#REF!**	#REF!	1.302	1.759	**#REF!**	D1 (13)
D2 (14)	#REF!	0.017	0.207	**#REF!**	#REF!	1.730	2.319	**#REF!**	D2 (14)
D3 (15)	#REF!	0.044	0.147	**#REF!**	#REF!	1.566	2.045	**#REF!**	D3 (15)
D4 (16)	#REF!	0.022	0.206	**#REF!**	#REF!	1.405	2.033	**#REF!**	D4 (16)

Reviewed by JP Date 9/26/04

Control Limits set 1/26/04.
CJ 1/26/04

Gas Proportional Counter

Quality Control Data

Daily Background Checks

LB4100-B Daily Instrument Performance Checks
Background Checks

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	0.100	-0.032	0.178	**PASS**	1.233	0.871	1.759	**PASS**	A1 (01)
A2 (02)	0.167	-0.018	0.238	**PASS**	1.350	0.894	1.792	**PASS**	A2 (02)
A3 (03)	0.083	-0.028	0.198	**PASS**	1.117	0.953	1.873	**PASS**	A3 (03)
A4 (04)	0.067	-0.027	0.205	**PASS**	1.600	0.903	1.803	**PASS**	A4 (04)
B1 (05)	0.200	-0.014	0.254	**PASS**	1.733	1.202	2.214	**OFFLINE**	B1 (05)
B2 (06)	0.050	-0.030	0.184	**PASS**	1.233	1.037	1.989	**OFFLINE**	B2 (06)
B3 (07)	0.083	-0.011	0.263	**PASS**	1.350	1.070	2.036	**PASS**	B3 (07)
B4 (08)	0.067	-0.029	0.195	**PASS**	1.583	1.098	2.074	**PASS**	B4 (08)
C1 (09)	0.067	-0.027	0.205	**PASS**	1.767	1.051	2.009	**PASS**	C1 (09)
C2 (10)	0.150	-0.016	0.246	**PASS**	1.550	1.005	1.945	**PASS**	C2 (10)
C3 (11)	0.067	-0.014	0.256	**PASS**	1.600	1.130	2.116	**PASS**	C3 (11)
C4 (12)	0.083	-0.034	0.164	**PASS**	1.633	1.059	2.019	**PASS**	C4 (12)
D1 (13)	0.117	-0.030	0.190	**PASS**	1.467	1.132	2.120	**PASS**	D1 (13)
D2 (14)	0.117	-0.036	0.146	**PASS**	2.017	1.265	2.299	**PASS**	D2 (14)
D3 (15)	0.117	-0.034	0.162	**PASS**	1.567	1.033	1.985	**PASS**	D3 (15)
D4 (16)	0.067	-0.032	0.176	**PASS**	4.183	3.049	4.559	**PASS**	D4 (16)

Reviewed by: KZ Date: 9-24-04

Control limits established from prevoius weekly background determinations.
Weekly Background File: BKB0917W Date: 9/17/04 Analyst: JP

151148

QUALITY ASSURANCE SUMMARY SHEET

(B)
9/25/04

PAI W.O. # / Batch Gas Flow Proportional Count
TEST —

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from login-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

When weekly background counts are completed the morning of a new day, it is not necessary to perform daily BKG checks. However daily Efficiency checks will be run.

CM
11/17/98

TECHNICIAN/ANALYST CM DATE 11/17/98

RESOURCE MANAGER [illegible] DATE 11/17/98

FRM 302FC2.FRM (12/Jan/98)

LB4100-B Daily Instrument Performance Checks
Background Checks

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	0.033	-0.029	0.191	PASS	1.567	0.911	1.815	PASS	A1 (01)
A2 (02)	0.233	-0.006	0.280	PASS	1.383	0.868	1.756	PASS	A2 (02)
A3 (03)	0.183	-0.026	0.208	PASS	1.633	0.929	1.841	PASS	A3 (03)
A4 (04)	0.217	-0.026	0.208	FLAG-HIGH	1.667	0.915	1.821	PASS	A4 (04)
B1 (05)	0.200	-0.011	0.267	PASS	1.883	1.262	2.296	OFFLINE	B1 (05)
B2 (06)	0.150	-0.032	0.174	PASS	1.717	0.933	1.845	OFFLINE	B2 (06)
B3 (07)	0.133	-0.034	0.164	PASS	1.783	1.002	1.942	PASS	B3 (07)
B4 (08)	0.117	-0.022	0.226	PASS	1.700	1.080	2.048	PASS	B4 (08)
C1 (09)	0.083	-0.027	0.201	PASS	1.750	1.020	1.966	PASS	C1 (09)
C2 (10)	0.250	-0.024	0.216	FLAG-HIGH	1.833	1.024	1.972	PASS	C2 (10)
C3 (11)	0.100	-0.009	0.271	PASS	1.850	1.023	1.971	PASS	C3 (11)
C4 (12)	0.183	-0.025	0.211	PASS	1.517	1.074	2.040	PASS	C4 (12)
D1 (13)	0.183	-0.022	0.224	PASS	1.700	1.089	2.061	PASS	D1 (13)
D2 (14)	0.117	-0.018	0.238	PASS	1.700	1.251	2.281	PASS	D2 (14)
D3 (15)	0.083	-0.031	0.179	PASS	1.300	1.042	1.996	PASS	D3 (15)
D4 (16)	0.133	-0.027	0.205	PASS	4.150	3.037	4.545	PASS	D4 (16)

Recount Det. 4+10 in file BKB0926A

Reviewed by: JP Date 9/26/04

Control Limits established from previous weekly background determinations
Weekly Background File: BKB0924W Date: 9/24/04 Analyst

BKB0926.XLD Printed 9/26/04 10:07 AM

000063

LB4100-B Daily Instrument Performance Checks
Background Checks

Detector	Alpha				Beta				Detector
ID	CPM	LCL	UCL	Flag	CPM	LCL	UCL	Flag	ID
A1 (01)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	A1 (01)
A2 (02)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	A2 (02)
A3 (03)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	A3 (03)
A4 (04)	0.167	-0.026	0.208	**PASS**	1.333	0.915	1.821	**PASS**	A4 (04)
B1 (05)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**OFFLINE**	B1 (05)
B2 (06)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**OFFLINE**	B2 (06)
B3 (07)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	B3 (07)
B4 (08)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	B4 (08)
C1 (09)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	C1 (09)
C2 (10)	0.117	-0.024	0.216	**PASS**	1.800	1.024	1.972	**PASS**	C2 (10)
C3 (11)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	C3 (11)
C4 (12)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	C4 (12)
D1 (13)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	D1 (13)
D2 (14)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	D2 (14)
D3 (15)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	D3 (15)
D4 (16)	#REF!	#REF!	#REF!	**#REF!**	#REF!	#REF!	#REF!	**#REF!**	D4 (16)

Reviewed by: JP Date: 9/27/04

Control limits estab[illegible]ed from prevoius weekly background determinations.
Weekly Background [illegible] BKB0924W Date: 9/24/04 Analyst: JP

000061

Gas Proportional Counter

Quality Control Data

Daily Instrument Performance Checks

LB4100 - B

Daily Instrument Performance Check
Efficiency Determinations

Detector	Alpha				Beta				Detector
ID	Eff.	LCL	UCL	Flag	Eff.	LCL	UCL	Flag	ID
A1 (01)	0.2432	0.2277	0.2583	**PASS**	0.8624	0.8448	0.8995	**PASS**	A1 (01)
A2 (02)	0.2463	0.2314	0.2605	**PASS**	0.8656	0.8428	0.8989	**PASS**	A2 (02)
A3 (03)	0.2435	0.2291	0.2588	**PASS**	0.8757	0.8661	0.9191	**PASS**	A3 (03)
A4 (04)	0.2482	0.2302	0.2602	**PASS**	0.9002	0.8514	0.9123	**PASS**	A4 (04)
B1 (05)	0.2450	0.2342	0.2646	**PASS**	0.8885	0.9050	0.9663	**OFFLINE**	B1 (05)
B2 (06)	0.2326	0.2219	0.2484	**PASS**	0.8564	0.8585	0.9286	**OFFLINE**	B2 (06)
B3 (07)	0.2402	0.2343	0.2656	**PASS**	0.9041	0.8782	0.9579	**PASS**	B3 (07)
B4 (08)	0.2343	0.2236	0.2616	**PASS**	0.8893	0.8623	0.9360	**PASS**	B4 (08)
C1 (09)	0.2657	0.2453	0.2752	**PASS**	0.9194	0.8863	0.9595	**PASS**	C1 (09)
C2 (10)	0.2444	0.2311	0.2644	**PASS**	0.9149	0.8750	0.9478	**PASS**	C2 (10)
C3 (11)	0.2560	0.2362	0.2674	**PASS**	0.8789	0.8588	0.9345	**PASS**	C3 (11)
C4 (12)	0.2313	0.2241	0.2531	**PASS**	0.8681	0.8415	0.9081	**PASS**	C4 (12)
D1 (13)	0.2388	0.2332	0.2660	**PASS**	0.9185	0.8681	0.9355	**PASS**	D1 (13)
D2 (14)	0.2604	0.2375	0.2664	**PASS**	0.9129	0.8713	0.9377	**PASS**	D2 (14)
D3 (15)	0.2561	0.2387	0.2733	**PASS**	0.9015	0.8858	0.9433	**PASS**	D3 (15)
D4 (16)	0.2498	0.2381	0.2666	**PASS**	0.9074	0.8823	0.9367	**PASS**	D4 (16)

Reviewed by: JCF Date: 9-24-04

Control Limits established 12/21/03. JME

LB4100 - B

Daily Instrument Performance Check
Efficiency Determinations

Detector	Alpha				Beta				Detector
ID	Eff.	LCL	UCL	Flag	Eff.	LCL	UCL	Flag	ID
A1 (01)	0.2496	0.2277	0.2583	**PASS**	0.8542	0.8448	0.8995	**PASS**	A1 (01)
A2 (02)	0.2408	0.2314	0.2605	**PASS**	0.8696	0.8428	0.8989	**PASS**	A2 (02)
A3 (03)	0.2484	0.2291	0.2588	**PASS**	0.8919	0.8661	0.9191	**PASS**	A3 (03)
A4 (04)	0.2416	0.2302	0.2602	**PASS**	0.8819	0.8514	0.9123	**PASS**	A4 (04)
B1 (05)	0.2426	0.2342	0.2646	**PASS**	0.9075	0.9050	0.9663	**OFFLINE**	B1 (05)
B2 (06)	0.2345	0.2219	0.2484	**PASS**	0.8786	0.8585	0.9286	**OFFLINE**	B2 (06)
B3 (07)	0.2532	0.2343	0.2656	**PASS**	0.9083	0.8782	0.9579	**PASS**	B3 (07)
B4 (08)	0.2393	0.2236	0.2616	**PASS**	0.8966	0.8623	0.9360	**PASS**	B4 (08)
C1 (09)	0.2515	0.2453	0.2752	**PASS**	0.9125	0.8863	0.9595	**PASS**	C1 (09)
C2 (10)	0.2413	0.2311	0.2644	**PASS**	0.8890	0.8750	0.9478	**PASS**	C2 (10)
C3 (11)	0.2574	0.2362	0.2674	**PASS**	0.9136	0.8588	0.9345	**PASS**	C3 (11)
C4 (12)	0.2391	0.2241	0.2531	**PASS**	0.8752	0.8415	0.9081	**PASS**	C4 (12)
D1 (13)	0.2455	0.2332	0.2660	**PASS**	0.8993	0.8681	0.9355	**PASS**	D1 (13)
D2 (14)	0.2489	0.2375	0.2664	**PASS**	0.8932	0.8713	0.9377	**PASS**	D2 (14)
D3 (15)	0.2662	0.2387	0.2733	**PASS**	0.9252	0.8858	0.9433	**PASS**	D3 (15)
D4 (16)	0.2643	0.2381	0.2666	**PASS**	0.9231	0.8823	0.9367	**PASS**	D4 (16)

Reviewed by: NZ Date: 9-25-04

Control Limits estab[illegible] 2/21/03. JME

000064

LB4100 - B

Daily Instrument Performance Check
Efficiency Determinations

Detector	Alpha				Beta				Detector
ID	Eff.	LCL	UCL	Flag	Eff.	LCL	UCL	Flag	ID
A1 (01)	0.2477	0.2277	0.2583	PASS	0.8753	0.8448	0.8995	PASS	A1 (01)
A2 (02)	0.2466	0.2314	0.2605	PASS	0.8798	0.8428	0.8989	PASS	A2 (02)
A3 (03)	#VALUE!	0.2291	0.2588	#VALUE!	#VALUE!	0.8661	0.9191	#VALUE!	A3 (03)
A4 (04)	0.2377	0.2302	0.2602	PASS	0.8880	0.8514	0.9123	PASS	A4 (04)
B1 (05)	0.2495	0.2342	0.2646	PASS	0.8764	0.9050	0.9663	OFFLINE	B1 (05)
B2 (06)	0.2263	0.2219	0.2484	PASS	0.8678	0.8585	0.9286	OFFLINE	B2 (06)
B3 (07)	0.2378	0.2343	0.2656	PASS	0.8999	0.8782	0.9579	PASS	B3 (07)
B4 (08)	0.2412	0.2236	0.2616	PASS	0.8979	0.8623	0.9360	PASS	B4 (08)
C1 (09)	0.2564	0.2453	0.2752	PASS	0.8996	0.8863	0.9595	PASS	C1 (09)
C2 (10)	0.2431	0.2311	0.2644	PASS	0.8969	0.8750	0.9478	PASS	C2 (10)
C3 (11)	0.2511	0.2362	0.2674	PASS	0.8957	0.8588	0.9345	PASS	C3 (11)
C4 (12)	0.2389	0.2241	0.2531	PASS	0.8777	0.8415	0.9081	PASS	C4 (12)
D1 (13)	0.2543	0.2332	0.2660	PASS	0.9142	0.8681	0.9355	PASS	D1 (13)
D2 (14)	0.2533	0.2375	0.2664	PASS	0.9080	0.8713	0.9377	PASS	D2 (14)
D3 (15)	0.2474	0.2387	0.2733	PASS	0.9110	0.8858	0.9433	PASS	D3 (15)
D4 (16)	0.2593	0.2381	0.2666	PASS	0.9126	0.8823	0.9367	PASS	D4 (16)

- Detector 3 is recounted in file EFB0926A.

Reviewed By: JD Date: 9/26/04

Control Limits established 12/21/03. JME

000065

LB4100 - B

Daily Instrument Performance Check
Efficiency Determinations

Detector	Alpha				Beta				Detector
ID	Eff.	LCL	UCL	Flag	Eff.	LCL	UCL	Flag	ID
A1 (01)	#VALUE!	0.2277	0.2583	**#VALUE!**	#VALUE!	0.8448	0.8995	**#VALUE!**	A1 (01)
A2 (02)	#VALUE!	0.2314	0.2605	**#VALUE!**	#VALUE!	0.8428	0.8989	**#VALUE!**	A2 (02)
A3 (03)	0.2505	0.2291	0.2588	**PASS**	0.8836	0.8661	0.9191	**PASS**	A3 (03)
A4 (04)	#VALUE!	0.2302	0.2602	**#VALUE!**	#VALUE!	0.8514	0.9123	**#VALUE!**	A4 (04)
B1 (05)	#VALUE!	0.2342	0.2646	**#VALUE!**	#VALUE!	0.9050	0.9663	**OFFLINE**	B1 (05)
B2 (06)	#VALUE!	0.2219	0.2484	**#VALUE!**	#VALUE!	0.8585	0.9286	**OFFLINE**	B2 (06)
B3 (07)	#VALUE!	0.2343	0.2656	**#VALUE!**	#VALUE!	0.8782	0.9579	**#VALUE!**	B3 (07)
B4 (08)	#VALUE!	0.2236	0.2616	**#VALUE!**	#VALUE!	0.8623	0.9360	**#VALUE!**	B4 (08)
C1 (09)	#VALUE!	0.2453	0.2752	**#VALUE!**	#VALUE!	0.8863	0.9595	**#VALUE!**	C1 (09)
C2 (10)	#VALUE!	0.2311	0.2644	**#VALUE!**	#VALUE!	0.8750	0.9478	**#VALUE!**	C2 (10)
C3 (11)	#VALUE!	0.2362	0.2674	**#VALUE!**	#VALUE!	0.8588	0.9345	**#VALUE!**	C3 (11)
C4 (12)	#VALUE!	0.2241	0.2531	**#VALUE!**	#VALUE!	0.8415	0.9081	**#VALUE!**	C4 (12)
D1 (13)	#VALUE!	0.2332	0.2660	**#VALUE!**	#VALUE!	0.8681	0.9355	**#VALUE!**	D1 (13)
D2 (14)	#VALUE!	0.2375	0.2664	**#VALUE!**	#VALUE!	0.8713	0.9377	**#VALUE!**	D2 (14)
D3 (15)	#VALUE!	0.2387	0.2733	**#VALUE!**	#VALUE!	0.8858	0.9433	**#VALUE!**	D3 (15)
D4 (16)	#VALUE!	0.2381	0.2666	**#VALUE!**	#VALUE!	0.8823	0.9367	**#VALUE!**	D4 (16)

Reviewed by JD Date 9/26/04

Control Limits established 12/21/03. JME

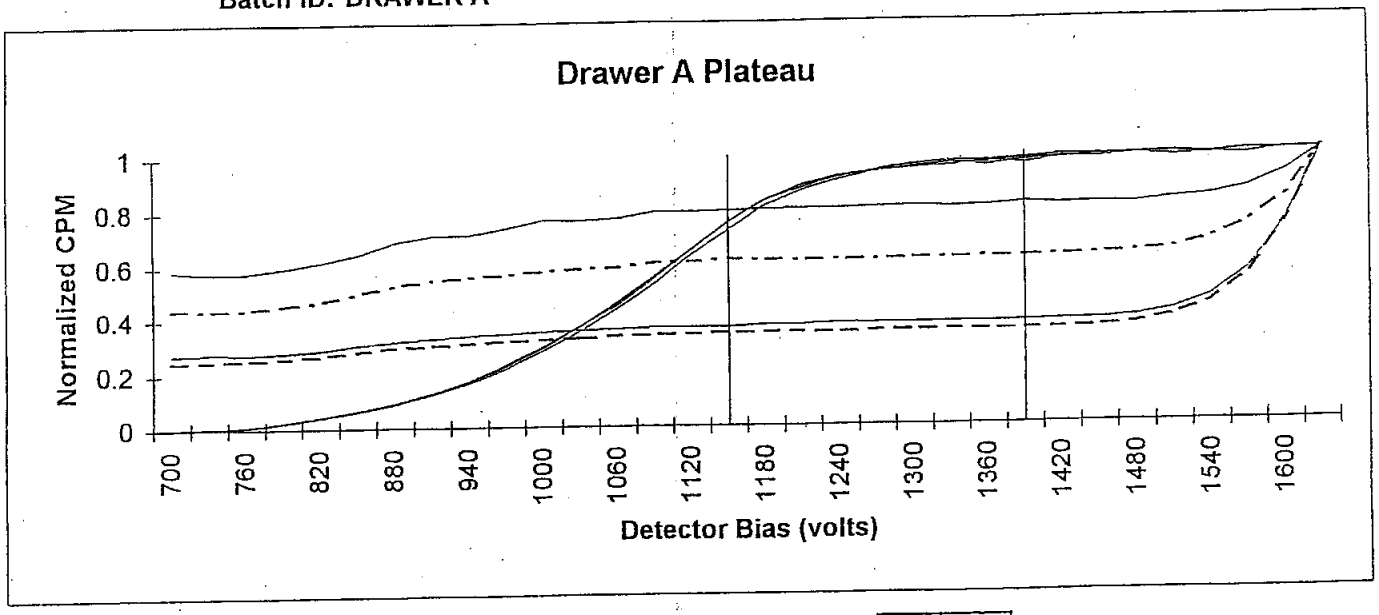
Gas Proportional Counter

Instrument Calibration

Initial Efficiency Calibration Standards Traceability

Unit Type: LB4100/W
Date Performed: 11/11/03 09:19
FileName: PTB1111A
Batch ID: DRAWER A

Unit Id: Aqua
Application Revision: 2
Application Version: Standard



Optimum alpha beta simultaneous operating voltage: 1402.5

Optimum alpha only operating voltage: 1147.5

	A1	A2	A3	A4
Beta slope at beta voltage	1.73%	1.36%	2.04%	1.59%
Alpha slope at beta voltage	0.75%	0.45%	0.63%	0.66%
Alpha slope at alpha voltage	1.76%	1.86%	1.20%	0.79%

11/13/03

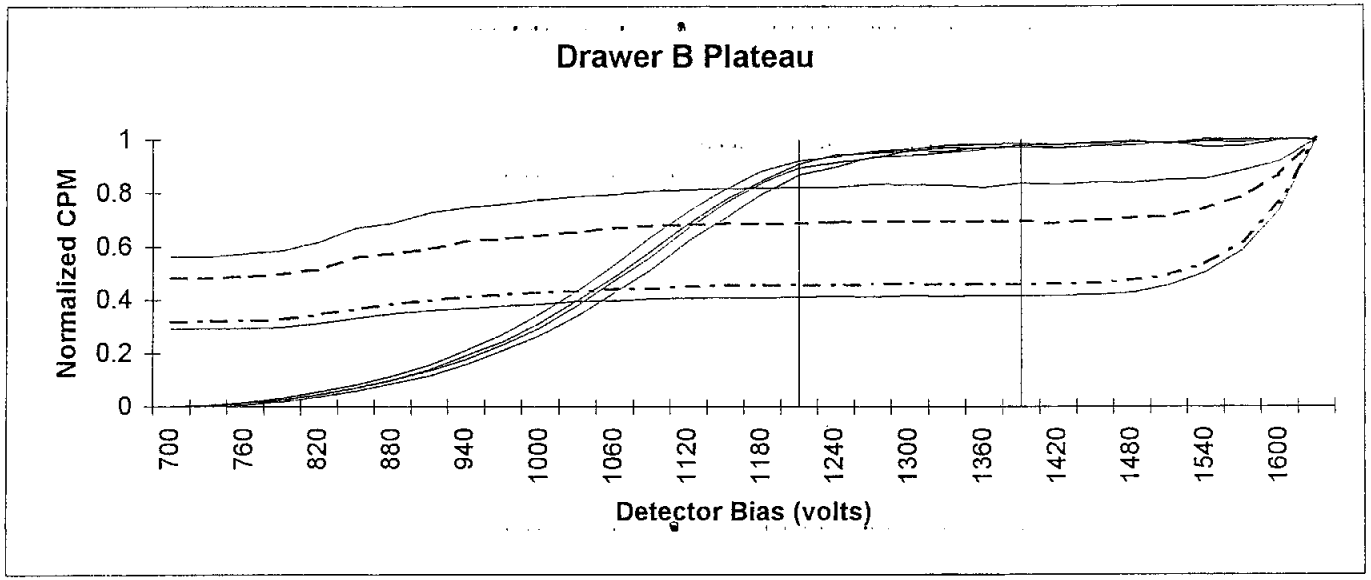
Printed 11/11/03 3:38 PM

000063

5/10/01
RG 5/4/01

Unit Type: LB4100/W
Date Performed: 11/11/03 09:19
FileName: PTB1111B
Batch ID: DRAWER B

Unit Id: Aqua
Application Revision: 2
Application Version: Standard



Optimum alpha beta simultaneous operating voltage: 1402.5

Optimum alpha only operating voltage: 1200

	B1	B2	B3	B4
Beta slope at beta voltage	0.25%	1.73%	1.96%	1.01%
Alpha slope at beta voltage	1.26%	0.14%	0.86%	0.88%
Alpha slope at alpha voltage	1.42%	0.92%	0.63%	0.59%

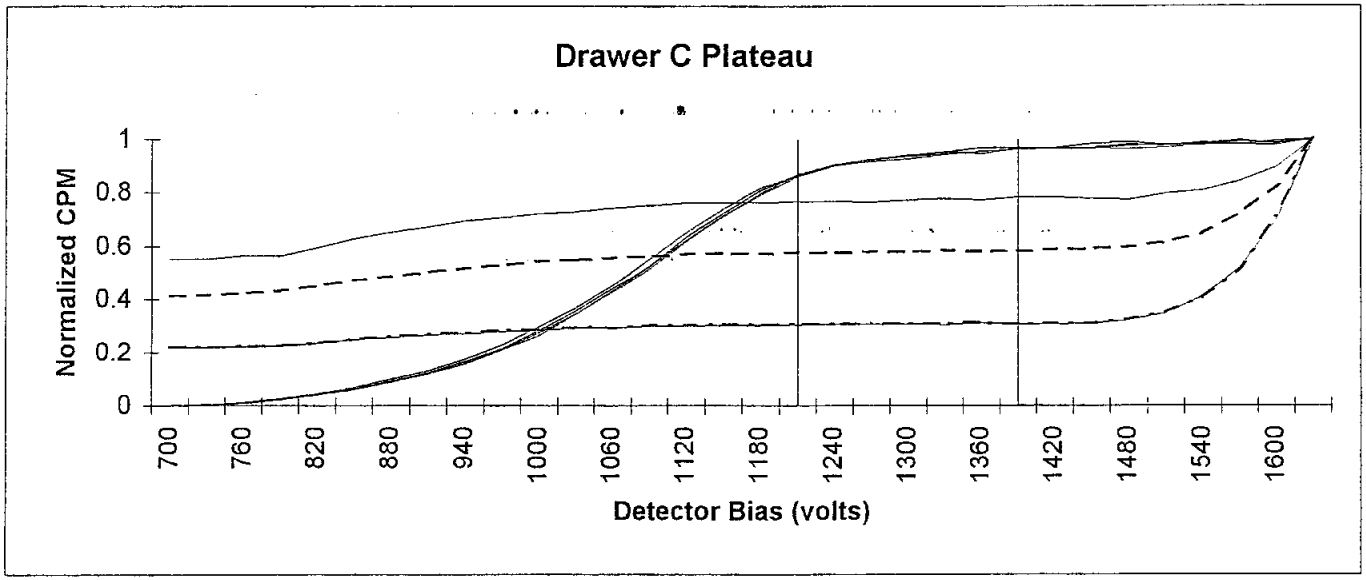
11/13/03

Printed 11/11/03 3:39 PM

000069

Unit Type: LB4100/W
Date Performed: 11/11/03 15:41
FileName: PTB1111C
Batch ID: DRAWER C

Unit Id: Aqua
Application Revision: 2
Application Version: Standard



Optimum alpha beta simultaneous operating voltage: 1380

Optimum alpha only operating voltage: 1200

	C1	C2	C3	C4
Beta slope at beta voltage	1.97%	2.08%	1.59%	2.05%
Alpha slope at beta voltage	0.49%	0.66%	0.69%	-0.24%
Alpha slope at alpha voltage	0.44%	1.15%	1.08%	1.14%

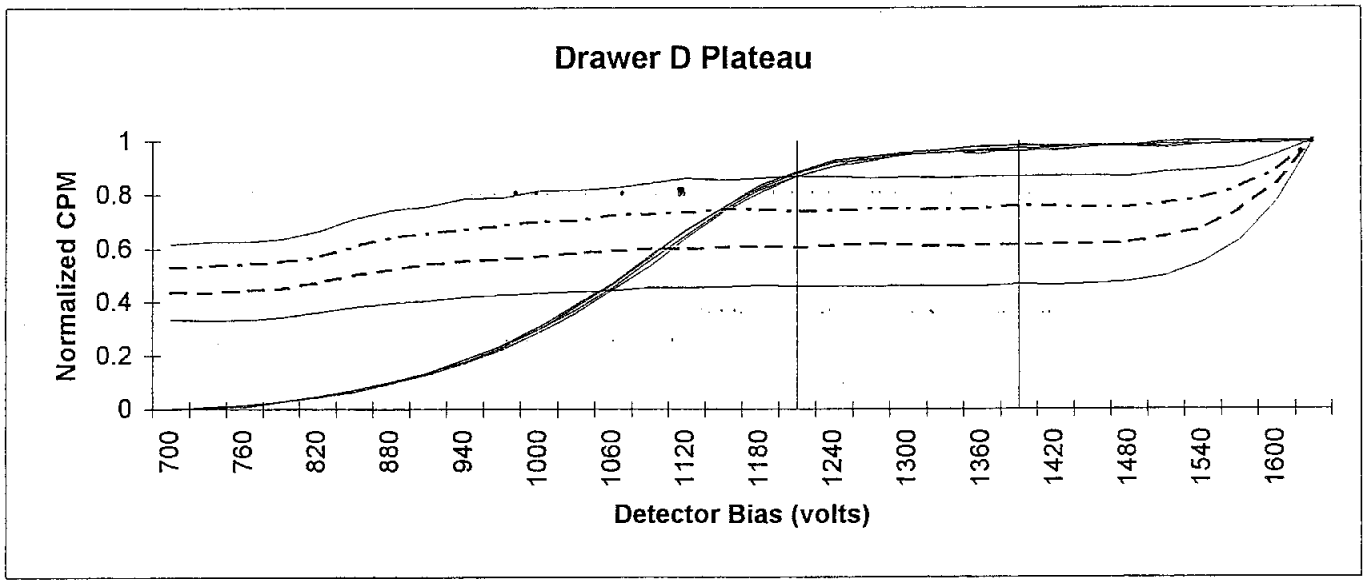
JE 11/13/03

Printed 11/12/03 11:16 AM

000073

Unit Type: LB4100/W
Date Performed: 11/11/03 15:42
FileName: PTB1111D
Batch ID: DRAWER D

Unit Id: Aqua
Application Revision: 2
Application Version: Standard



Optimum alpha beta simultaneous operating voltage: 1380

Optimum alpha only operating voltage: 1200

	D1	D2	D3	D4
Beta slope at beta voltage	1.81%	2.16%	1.11%	1.43%
Alpha slope at beta voltage	1.57%	0.87%	0.73%	0.96%
Alpha slope at alpha voltage	0.20%	1.53%	0.77%	0.04%

Printed 11/12/03 11:17 AM

SE 11/13/03

000071

LB4100-B Raw counts for Am-241 Ring Planchet Efficiency Calibrations (Control ID #1122)

Detector ID	A1	A2	A3	A4	B1	B2	B3	B4
total time	4.36	4.45	4.34	4.47	4.07	4.15	4.23	4.46
total counts	10016	10009	10036	10033	10014	10023	10010	10014
Alpha CPM	2297.15971	2249.06348	2312.3374	2244.43402	2460.33326	2415.05672	2366.26726	2245.16548
Alpha BKG CPM	0.088	0.15	0.105	0.085	0.109	0.124	0.163	0.126
Alpha Efficiency	0.20848693	0.20412179	0.20986444	0.20370163	0.22329634	0.2191871	0.21475904	0.20376802
archived STDEV	0.01083301	0.01060636	0.01090419	0.01058403	0.01160256	0.01138886	0.01115906	0.01058787
Data file	EAM1118A	EAM1118A	EAM1118A	EAM1118A	EAM1118B	EAM1118B	EAM1118B	EAM1118B

Detector ID	C1	C2	C3	C4	D1	D2	D3	D4
total time	4.19	4.27	4.3	4.4	4.31	4.33	4.33	4.35
total counts	10020	10009	10031	10002	10023	10022	10032	10020
Alpha CPM	2391.31311	2343.8961	2332.6297	2273.08882	2325.40704	2314.44365	2316.74512	2303.34528
Alpha BKG CPM	0.095	0.132	0.161	0.093	0.115	0.106	0.114	0.114
Alpha Efficiency	0.21703217	0.21272867	0.21170615	0.2063023	0.21105064	0.21005562	0.2102645	0.20904835
archived STDEV	0.01127694	0.01105357	0.011	0.01071977	0.01096609	0.0109144	0.01092506	0.01086211
Data file	EAM1118C	EAM1118C	EAM1118C	EAM1118C	EAM1118D	EAM1118D	EAM1118D	EAM1118D

OK
12/11/03

Source Database for OSUM for LB4100-B

Number of sources in table: 43

Application Revision: A

Control ID	Isotope	Type	Half-Life (days)	DPM	Std dev	Date	Status	Alpha/Beta Archive File
1119	I-129	Beta	5734268000	4414	220.70	15-Apr-93	PAI	I129-11/03
1120	Pb-210	Beta	8144.852	1187.602	59.38	18-Jun-03	PAI	Pb210-11/03
1121	Sr-90/Y-90	Beta	10446.15	22065.912	1103.30	18-Mar-99	PAI	Sr90R-11/03
1122	Am-241	Alpha	157861.05	11101.11	555.06	18-Mar-99	PAI	Am241-11/03

000073

JE
11/14/03

Pb-210 Calibration
Pb-210 on flat planchets

Benchsheet: 259526 Source ID: 1120 log file: Pb210-11/03

Source:	Det:	Filenames:
0322033-S1	A1 B1 C1	EPB1114A
-S3	A2 B2 C2	EPB1114B
-S4	A3 B3 C3	EPB1114C
-S5	A4 B4 C4	EPB1114D

11/18/03
JE

Gross Alpha (Am-241) Calibration
Am-241 on ringed planchets

Benchsheet: 240787 Source ID: 1122 log file: Am241-11/03

Source:	Det:	Filenames:
0317010-1	A1 B1 C1 D1	EAM1118A
-2	A2 B2 C2 D2	B
-3	A3 B3 C3 D3	C
-5	A4 B4 C4 D4	D

11/18/03
JE

Gross Beta (Sr-90) Calibration
Sr-90 on ringed planchets

Benchsheet: 240788 Source ID: 1121 log file: Sr90R-11/03

Source:	Det:	Filename:
0317011-1	A1 B1 C1 D1	EGB1118A
-2	A2 B2 C2 D2	B
-4	A3 B3 C3 D3	C
-5	A4 B4 C4 D4	D

12/1/03

Continued on Page

Read and Understood By

Clare Lemon 12/1/03 Signature Date

Julie Ellingson 12/1/03 Signature Date

pg 265845 a
(cont. from pg N/A b)

Paragon Analytics, Inc.

Low Background Gas Flow Proportional Counter Log

Instrument: **LB4100B**

SOP 724 Rev 8

Date: 11/18/03

Instrument Background and Response Checklist

P-10 Supply	P-10 Flow
1 1000	A 0.1
2 200	B
	C
	D

Bkg.	Cal. File ID
Dr A	BKB 1116W
Dr B	
Dr C	
Dr D	

Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On line	Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On-line
1	LGB		P		JE		P		✓	9	LGB		P		JE		P		✓
2									✓	10							P		✓
3									✓	11						JE	R	P	✓
4									✓	12							P		✓
5									✓	13									✓
6									✓	14									✓
7									✓	15									✓
8									✓	16							P		✓

P = passes; R = Recount, H = high; L = low; W = weekly; α = Alpha; B = Beta; DR = Daily Response Check; Stat = Status; Det = Detector; Bkg = Background; OL = Offline; NP = Not Processed.

Runlog

Det	SmpID	Batch	Test	File ID	Cnt Dur. (minutes)	Start Time	Anal. Init.	Outp Init.	Outp. Date	Cmnt Below
1-16	DR Checks	–	–	EFB 1118	30	0707	LGB	JE	11/18/03	A
1-16	BKG Check	–	–	BKB1118	60	0732	JE	JE	11/18/03	
11	BKG Recount	–	–	BKB1118A	60	0916	JE	JE	11/18/03	
1-4	0317016-1,3,5	240787	Am-241 eff	EAM1118A	10	1026	JE	JE	11/18/03	
5-8				B		1032	JE	JE	11/18/03	
9-12				C		1038	JE	JE	11/18/03	
13-16				D		1057	JE	JE	11/18/03	
1-4	0317011-1,2,4,5	240788	Sr-90 gross β eff	EGB1118A	5	1032	JE	JE	11/18/03	
5-8				B		1038	JE	JE	11/18/03	
9-12				C		1057	JE	JE	11/18/03	
13-16				D		1104	JE	JE	11/18/03	
0317014-1-20 1-16	~~17014AM~~ 11/18/03	17014AMC.XLS	Am-241 curve	ATC1118	10/step	1117	JE	JE	11/18/03	

11/19/03

Form 780r6.frm (4/6/2001)

Reviewed by JE Date 11/19/03

Comments:

000075

G-L efficiency

Paragon Analytics, Inc.

240787 A

WORKSHEET FOR IN-HOUSE OR RUSH SAMPLES

Matrix — Prep Analyst NT Prep Date 5/7/03 Analyte 241 Am Analytical Batch —

Pretreatment? (Y / N) Batch _____ Count Date / Time _____ Superseded _____

Paragon WO No.	Sample Wt. (g / L)	Sample Aliq. (g / L)	Aliquot Basis (Dry / AR)	Spike Information	Remarks	Det. No.	Filename	POS Ckd By
0317010-1				1				
-2								
-3								
-4							SY = outlier; do not use	
-5								DRB 5/1/03

NT 5/7/03

NT 5/7/03

NT 5/7/03

Balance No. NA Spiked By NT Date 5/7/03 Spike Witness [signature] Date 05/07/03 QASS? (Y / N) No. _____

	Isotope	No	Act / mL	Vol	P	Total Act (dpm)	Decay Corrected	~~Pipette~~ Pipet	Relinquished by / Date	Received by / Date
Spike 1	0 241 Am	512.1572.67	11101.1	1 ml	1	11,101.1		1	CW 5/9/03	[signature] 5/9/03
Spike 2										
Spike 3								2		
Spike 4										

NT 5/7/03

NT 5/9/03

NT 5/7/03

Electronic Benchsheet No. (if / when generated) NA Reviewed by / Date CW 5/9/03

 Form 798r0.frm (5/12/2002)

000076

240787 B

WORKSHEET FOR IN-HOUSE OR RUSH SAMPLES / ACTINIDES

Initials NT Date 5/7/03 Method (SOP / Rev) 702 R16 Matrix —

COMMENTS

^{241}Am (Gross) Efficiency planchets.

1) 5 rinsed planchets were labeled and placed on a hotplate
2) 5 ml concentrated HNO_3 was added to each sample
3) 1 ml of ^{241}Am was added to each planchet
4) Samples were then taken to digress and relinquished to the instrument lab for counting.

Reviewed by / Date CW 5/9/03

Am-241 Primary Standard

1) Transfer RSO#512 (Analytics # 57372 ~~031~~ 307 DCB 3/23/99) to ~~3/23/99~~ 100 ml poly. bottle.

a) Ampule, full w/ beaker 38.5221 g (Bal 12)
Ampule, empty w/ beaker 33.2720 g * see below
Net Std. mass 5.2501 g

* Note - a large piece of glass broke off of the ampule + fell into the 100 ml poly bottle. It was removed w/ a spatula + returned to the ampule prior to taking the empty weight. To confirm the amount transferred the 100 ml poly was weighed after transfer, as well as before:

100 ml poly, empty 14.6146 g (Bal 12)
100 ml poly, w/ std. 19.8506 g
Net std. transferred 5.2360 g

To account for losses to the spatula this value will be used, although it confirms the previous calc to within 0.27%

b) Add 3N HNO_3 to 100 ml poly;
100 ml poly, empty 14.6146 g (Bal 12)
~~100 ml poly, w/ HNO_3 93.9 g (Bal 16)~~ DCB 3/23/99
100 ml poly w/ HNO_3 108.6 g (Bal 16)
Net std mass 93.9 g

c) Quantitatively transfer contents of 100 ml poly to 250 ml poly + dilute w/ HNO_3. (Initial error in choosing bottle size)

250 ml poly, empty 26.5 g (Bal 16)
250 ml poly, w/ std, HNO_3 255.8 g
Tot. Std. Mass. 229.3 g

In summary, 5.2360 g of neat standard was diluted to 229.3 g w/ 3M HNO_3.

SEE NEXT PAGE

Continued on Page 68

Read and Understood By

David C Burn 3/23/99 [signature] 3/24/99
Signed Date Signed Date

Am 241 Primary Standard

2) Density of 3M HNO_3; using 100ml class A vol. flask:

$$\frac{109.6568\ g}{100\ ml} = 1.0966\ g/ml$$

3) Calculations:

Act. conc. of neat std.

DCB

wrong cert!! $\left(\frac{\cancel{36810\ dps}}{\cancel{5.03043\ g}}\right)\left(\frac{60\ s/m}{2.22\ dpm/pCi}\right) = \cancel{197,769.3\ pCi/g}$

Act. conc. of final std. DCB 3/23/99

$$\frac{(197,769.3\ pCi/g)(5.236\ g)}{(229.3\ g)} = 4516.0\ pCi/g$$

By volume:

$$\frac{4516.0\ pCi/g}{1.09}$$

Act. of neat std.

$$\left(\frac{40270\ dps}{5.45013\ g}\right)\left(\frac{60\ s/m}{2.22\ dpm/pCi}\right) = 199,697.7\ pCi/g$$

Act conc. of final std.

$$\frac{(199,697.7\ pCi/g)(5.236\ g)}{229.3\ g} = 4,560.0\ pCi/g$$

By Vol.

$$(4,560\ pCi/g)(1.0966\ g/ml) = 5,000.5\ pCi/ml$$

Ref Date = 3/18/99
Exp Date = 3/18/04

Verified 3/25/99 DCB

Continued on Page

Read and Understood By

[signature] 3/23/99 [signature] 3/24/99

Signed Date Signed Date

ANALYTICS

PAI IC 512
rec'd 3-22-99

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

57372-307

Am-241 5 mL Liquid in Flame Sealed Vial

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

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

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

ISOTOPE:	Am-241
ACTIVITY (dps):	4.027 E+04
HALF-LIFE:	432.2 years
CALIBRATION DATE:	March 18, 1999 12:00 EST
TOTAL UNCERTAINTY:	3.5%
SYSTEMATIC:	2.5%
RANDOM:	1.0%

5.45013 grams of solution 3M HNO_3.

P O NUMBER 22190, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: D.M. Mt 3-18-99

000030

Code #: 512.1572.67 Name of Standard: Am 241 Primary Std.

Date: 3/25/99 Analyst: DCB/BP

Aliquot for verification: 3ea - 1ml on ringed planchet

Work up: See attached benchsheet.

Expected activity and uncertainty: 5000.5 pCi/ml ± 175.0 pCi/ml

Results of Counting and counting uncertainty: 4986 ± 58.4 pCi/ml.
(= 99.72 % of expected)

Radiochemistry Technical Manager: [signature] Date: 3/25/99

Radiochemistry QA Manager: [signature] Date: 3/25/99

ATI FM 718FC
(2/27/9

Standard Verification for Am 241

Analyst:KH/BP
Prep. Date:S.3/24/99
Prep. Date;C3/24/99

Data Filename: WAT0323A
Count Date/Time: 3/24/99

W.O.#	Sample #	Digest Aliquot ML	Final Gross PC (g)	Final Solid Mass (mg)	Filtered or Unfiltered	Remarks	CAR GRP	Pos Car No.	POS Ckd by
99-15-021	1	1	NA	NA	NA			1	CM
99-15-021	2	1	NA	NA	NA			2	↓
99-15-021	3	1	NA	NA	NA			3	↓

Std. NO:	Std. type	Pipet No.	Vol. mL
512.1572.67	Am 241	RS-009	1.0043

Spike Witne BP 3/24/99
Reviewed b KH 3/24/99
Relinquishe KH 3/24/99
Received by: CM 3/24/99

PAI - Gross Alpha/Beta in Water Sample Analysis

Unit Type: LB4100/W
Counting Unit ID: Orange

Alpha efficiency logfile: AM241RNG
Alpha attenuation calibration: ATAM518R.XLD
Certainty level for MDA and flags: 95.00%
High Voltage Mode: Simultaneous

Beta Calibration Factors
Beta mM: 0.999056
polyn. a=>B xtalk A: 6.574E-06
polyn. a=>B xtalk B: -8.291E-04
polyn. a=>B xtalk C: 3.086E-01
Alpha mM 0.991587892
polyn. B=>a xtalk A: -2.353E-09
polyn. B=>a xtalk B: 3.880E-08
polyn. B=>a xtalk C: 7.064E-04

Beta efficiency logfile: SR90RING
Beta attenuation calibration: AT520SRY.XLD
Application Revision: C
Application Version: PAI

Offsets per QASS 151168
alpha B= 1.00000
beta B= 1.00000

Data file name: WAT0323a
Batch ID: 15021std, 15
Count Duration (m): 10
Batch Ended: #########
Activity Units: pCi
Date of Bkg. Cal: 3/19/99

Rev. 6/2/98 rts

Det. ID	Sample ID	Count End Date & Time	Count Duration (min)	Resid. Mass (mg)	Sample Volume (g / L)	Alpha Activity				Beta Activity			Alpha Calibrations			Beta Calibrations		
						Gross CPM	Activity Concentration	2σ	MDC	Gross CPM	Activity Concentration	MDC	bkg CPM	effM	b=>a x-tlk (fract.)	bkg CPM	effM	a=>b x-tlk (fract.)
C1	99-15-019-03	3/24/99 14:27	10.00	0.0	0.0010	6.900	-185.271	4037.160	7271.774	9786.200	9615332.110	3184.991	0.0930	0.25678	0.00071	1.9480	0.45630	0.30861
A1	99-15-021-01	3/24/99 14:27	10.00	0.0	0.0010	2794.000	4950611.388	58077.031	2910.358	974.400	109585.582	43421.997	0.1810	0.25306	0.00071	2.3400	0.44941	0.30861
A2	99-15-021-02	3/24/99 14:27	10.00	0.0	0.0010	2811.300	5024686.758	58765.180	2978.879	1037.900	167552.471	43428.023	0.1670	0.25087	0.00071	1.9640	0.45063	0.30861
A3	99-15-021-03	3/24/99 14:27	10.00	0.0	0.0010	2806.700	4982226.619	58315.123	2902.748	1001.000	132409.235	43492.575	0.1530	0.25259	0.00071	2.0880	0.44963	0.30861
B3	99-15-019-01	3/24/99 14:28	10.00	0.0	0.0010	5.200	-3032.660	3944.621	7553.667	9550.300	9686761.655	3089.243	0.1080	0.24469	0.00071	1.9530	0.44204	0.30861
B4	99-15-019-02	3/24/99 14:28	10.00	0.0	0.0010	4.400	-4548.044	3702.056	7356.203	9693.000	9623989.176	2900.815	0.1200	0.25318	0.00071	1.8890	0.45159	0.30861

Average Am Act.= 4.986E+06 pCi/l
Average Am Unc.= 5.839E+04 pCi/l (2 sigma)

Expected Am Act.= 5.000E+06

Relative Recovey= 99.72%

Average Sr/Y Act.= 9.642E+06 pCi/l
Average Sr/Y Unc.= 6.079E+04 pCi/l (2 sigma)

Expected Sr/Y Act.= 9.940E+06

Relative Recovey= 97.01%

000033

LB4100-B Raw counts for Sr-90 Ring Planchet Efficiency Calibrations (Control ID #1121)

Detector ID	A1	A2	A3	A4	B1	B2	B3	B4
total time	1.28	1.26	1.24	1.27	1.21	1.22	1.21	1.27
total counts	10178	10095	10098	10103	10025	10046	10142	10082
Beta CPM	7950.1775	8010.51876	8142.10739	7953.71211	8283.50597	8232.91523	8380.26018	7936.97468
Beta BKG CPM	1.385	1.386	1.441	1.406	1.618	1.511	1.558	1.608
Beta Efficiency	0.40348739	0.40654983	0.41322822	0.40366678	0.4204046	0.41783702	0.42531507	0.40281744
archived STDEV	0.0209593	0.02112154	0.02146839	0.02097145	0.02184417	0.0217099	0.02209459	0.02092817
Data file	EGB1118A	EGB1118A	EGB1118A	EGB1118A	EGB1118B	EGB1118B	EGB1118B	EGB1118B

Detector ID	C1	C2	C3	C4	D1	D2	D3	D4
total time	1.23	1.22	1.22	1.24	1.24	1.25	1.22	1.23
total counts	10121	10041	10076	10116	10055	10105	10086	10050
Beta CPM	8226.95228	8228.82487	8257.48239	8156.59252	8107.39697	8082.082	8265.33011	8168.96271
Beta BKG CPM	1.503	1.503	1.534	1.472	1.474	1.918	1.883	1.883
Beta Efficiency	0.41753475	0.41762979	0.41908422	0.41396385	0.41146719	0.4101824	0.41948262	0.41459178
archived STDEV	0.02169123	0.02169933	0.02177351	0.02150591	0.02137858	0.02130997	0.02179388	0.02154118
Data file	EGB1118C	EGB1118C	EGB1118C	EGB1118C	EGB1118D	EGB1118D	EGB1118D	EGB1118D

OK
AE
12/1/03

Source Database for OSUM for LB4100-B

Number of sources in table: 43

Application Revision: A

Control ID	Isotope	Type	Half-Life (days)	DPM	Std dev	Date	Status	Alpha/Beta Archive File
1119	I-129	Beta	5734268000	4414	220.70	15-Apr-93	PAI	I129-11/03
1120	Pb-210	Beta	8144.852	1187.602	59.38	18-Jun-03	PAI	Pb210-11/03
1121	Sr-90/Y-90	Beta	10446.15	22065.912	1103.30	18-Mar-99	PAI	Sr90R-11/03
1122	Am-241	Alpha	157861.05	11101.11	555.06	18-Mar-99	PAI	Am241-11/03

000083

JE
11/14/03

Pb-210 Calibration
Pb-210 on flat planchets

Benchsheet: 259526 Source ID: 1120 log file: Pb210-11/03

Source:	Det:	Filenames:
0322033-S1	A1 B1 C1	EPB1114A
-S3	A2 B2 C2	EPB1114B
-S4	A3 B3 C3	EPB1114C
-S5	A4 B4 C4	EPB1114D

11/18/03
JE

Gross Alpha (Am-241) Calibration
Am-241 on ringed planchets

Benchsheet: 240787 Source ID: 1122 log file: Am241-11/03

Source:	Det:	Filenames:
0317010-1	A1 B1 C1 D1	EAM1118A
-2	A2 B2 C2 D2	B
-3	A3 B3 C3 D3	C
-5	A4 B4 C4 D4	D

11/18/03
JE

Gross Beta (Sr-90) Calibration
Sr-90 on ringed planchets

Benchsheet: 240788 Source ID: 1121 log file: Sr90R-11/03

Source:	Det:	filename:
0317011-1	A1 B1 C1 D1	EGB1118A
-2	A2 B2 C2 D2	B
-4	A3 B3 C3 D3	C
-5	A4 B4 C4 D4	D

JE 12/1/03

Continued on Page

Read and Understood By

Clare Lenian 12/1/03
Signed Date

Julie Ellingson 12/1/03
Signed Date

pg 265845 a
(cont. from pg N/A b)

Paragon Analytics, Inc.

Low Background Gas Flow Proportional Counter Log

Instrument: **LB4100B**

SOP 724 Rev 8

Date: 11/18/03

Instrument Background and Response Checklist

P-10 Supply	P-10 Flow
1 1000	A 0.1
2 200	B
	C
	D

Bkg.	Cal. File ID
Dr A	BKB 1116W
Dr B	
Dr C	
Dr D	

Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On line	Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On-line
1	LGB		P		JE		P		✓	9	LGB		P		JE		P		✓
2									✓	10							P		✓
3									✓	11						JE	R	P	✓
4									✓	12							P		✓
5									✓	13									✓
6									✓	14									✓
7									✓	15									✓
8									✓	16							P		✓

P = passes; R = Recount, H = high; L = low; W = weekly; α = Alpha; B = Beta; DR = Daily Response Check; Stat = Status; Det = Detector; Bkg = Background; OL = Offline; NP = Not Processed.

Runlog

Det	SmpID	Batch	Test	File ID	Cnt Dur. (minutes)	Start Time	Anal. Init.	Outp Init.	Outp. Date	Cmnt Below
1-16	DR Checks	–	–	EFB 1118	30	0707	LGB	JE	11/18/03	A
1-16	BKG Check	–	–	BKB1118	60	0732	JE	JE	11/18/03	
11	BKG Recount	–	–	BKB1118A	60	0916	JE	JE	11/18/03	
1-4	0317016-1,3,5	240787	Am-241 eff	EAM1118A	10	1026	JE	JE	11/18/03	
5-8				B		1032	JE	JE	11/18/03	
9-12				C		1038	JE	JE	11/18/03	
13-16				D		1057	JE	JE	11/18/03	
1-4	0317011-1,2,4,5	240788	Sr-90 gross β eff	EGB1118A	5	1032	JE	JE	11/18/03	
5-8				B		1038	JE	JE	11/18/03	
9-12				C		1057	JE	JE	11/18/03	
13-16				D		1104	JE	JE	11/18/03	
0317014-1-20 1-16	~~17014AM~~ 11/18/03	17014AMC.XLS	Am-241 curve	ATC1118	10/step	1117	JE	JE	11/18/03	

11/19/03

Form 780r6.frm (4/6/2001)

Reviewed by [signature] Date 11/19/03

Comments:

000087

G-β efficiency

Paragon Analytics, Inc.

240788 A

WORKSHEET FOR IN-HOUSE OR RUSH SAMPLES

Matrix — Prep Analyst NT Prep Date 5/7/03 Analyte ^{90}Sr Analytical Batch

Pretreatment? (Y / N) Batch Count Date / Time Superseded

Paragon WO No.	Sample Wt. (g / L)	Sample Aliq. (g / L)	Aliquot Basis (Dry / AR)	Spike Information	Remarks	Det. No.	Filename	POS Ckd By
0317011 - 1				1			~~5/6~~	
- 2								
- 3							3 = outlier, do not use.	
- 4								8/1/03
- 5								

NT 5/7/03

NT 5/7/03

NT 5/7/03

Balance No. NA Spiked By NT Date 5/7/03 Spike Witness [illegible] Date 05/07/03 QASS? (Y / N) No.

	Isotope	No	Act / mL	Vol	P	Total Act (dpm)	Decay Corrected	Pipet	Relinquished by / Date	Received by / Date
Spike 1	^{90}Sr	514.1572 72	11032.956	1ml		11032.956		T-290	CW 5/9/03	[illegible] 5/9/03
Spike 2										
Spike 3								2		
Spike 4										

NT 5/7/03

NT 5/9/03

Electronic Benchsheet No. (if / when generated) NA Reviewed by / Date CW 5/9/03

 Form 798r0.frm (5/12/2002)

000083

240788 B

WORKSHEET FOR IN-HOUSE OR RUSH SAMPLES / ACTINIDES

Initials NT Date 5/7/03 Method (SOP / Rev) 702R16 Matrix ——

^{90}Sr (G-B) efficiency COMMENTS

1) 5 ringed planchets were labeled and placed on a hotplate.
2) 5ml concentrated HNO_3 was added to each sample planchet.
3) 1ml ~~95~~ NT 5/8/03 ^{90}Sr was added to each planchet.
4) Samples were then taken to dryness and relinquished to the instrument lab for counting.

Reviewed by / Date CW 5/9/03

Page 2 of 2 Form 798r0.frm (5/12/2002)

000089

72
PROJECT 514.1572.72

Notebook No. _____
Continued From Page _____

Sr-90 Primary Standard

1) Transfer RSO#514 (Analytics 57370-307) to a a 250 ml poly bottle & dilute to final conc. of approx 5000 pCi/ml w/ 0.1 M HCl.

a) Ampule, full w/ beaker 36.5911 g (Bal 12)
Ampule, empty w/ beaker 31.7310
Net std. transferred 4.8601 g

b) 250 ml poly, empty 26.4116 g (Bal 12)
bottle w/ std, 0.1 M HCl 223.6 g (Bal 16)
Total diluted std mass 197.2 g

2) Density of 0.1 M HCl using 100 ml class A flask.

99.7100 g / 100 ml = .9971 g/ml

3) Calculations

orig. std: $\left(\frac{3.75724 \text{ dpm}}{5.02081 \text{ g}}\right)\left(\frac{60 \text{ \%m}}{2.22 \text{ dpm/pCi}}\right) = 202{,}239.4$ pCi/g

dil. std by mass $\frac{(202{,}239.4 \text{ pCi/g})(4.8601 \text{ g})}{(197.2 \text{ g})} = 4984.3$ pCi/g

dil std by vol (4984.3 pCi/g)(.9971 g/ml) = 4969.8 pCi/ml.

Ref Date = 3/18/99
Exp Date = 3/23/04

Verified 3/25/99 DWS

Continued on Page

Read and Understood By

Signed: [illegible] Date: 3/23/99 Signed: [illegible] Date: 3/24/99

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.
Phone (404) 352-8677
Fax (404) 352-2837

PAI 514
rec'd 3-23-99

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

57370-307

Sr-90 5 mL Liquid in Flame Sealed Vial

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

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

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

ISOTOPE:	Sr-90
ACTIVITY (dps):	3.757 E+04
HALF-LIFE:	28.74 years
CALIBRATION DATE:	March 18, 1999 12:00 EST
TOTAL UNCERTAINTY:	4.0%
SYSTEMATIC:	3.5%
RANDOM:	0.5%

5.02081 grams of solution 30 ppm Sr carrier in 0.1M HCl.

P O NUMBER 22170, Item 2

SOURCE PREPARED BY: _____ for
M. D. Currie, Radiochemist

Q A APPROVED: _____ 3-18-99

STANDARD VERIFICATION FORM

Code #: 514.1572.72 Name of Standard: Sr 90 - Primary Std

Date: 3/24/99 Analyst: DCB / BP

Aliquot for verification: 3ea - 1ml std on a ringed planchet

Work up: Std. converted to HNO_3 matrix in glass beaker + quantitatively transferred to planchet. See attached benchsheet

Expected activity and uncertainty: 4969.8 ± 198.8 pCi/ml

Results of Counting and counting uncertainty: 4821 ± 60.8 pCi/ml
(= 97.01 % of expected value)

Radiochemistry Technical Manager: David C Burns Date: 3/25/99

Radiochemistry QA Manager: [signature] Date: 3/25/99

Standard Verification for Sr 90

Analyst: KH P
Prep. Date: 3/24/99
Prep. Date: 3/24/99

Data Filename: WAT0323A
Count Date/Time: 3/24/99

W.O.#	Sample #	Aliquot ML	Final Gross PC (g)	Final Solid Mass (mg)	Filtered or Unfiltered	Remarks	CAR GRP	Pos Car No.	POS Ckd by
99-15-019	1	1	NA	NA	NA			7	CM
99-15-019	2	1	NA	NA	NA			8	↓
99-15-019	3	1	NA	NA	NA			9	↓

Std. NO:	Std. type	Pipet Used	Vol. mL
514.1572.72	Sr-90	RS-009	1.0043

KH 3-30-99

Spike Witne BP 3/24/99
Reviewed b KH 3/24/99
Relinquishe KH 3/24/99
Received by: CM 3/24/99

3/24/99.....12:48 PM

R/BENCH-SH/15019STD.XLS

PAI - Gross Alpha/Beta in Water Sample Analysis

Unit Type: LB4100/W
Counting Unit ID: Orange

Alpha efficiency logfile: AM241RNG
Alpha attenuation calibration: ATAM518R.XLD
Certainty level for MDA and flags: 95.00%
High Voltage Mode: Simultaneous

Beta Calibration Factors
Beta mM: 0.999056
polyn. a=>B xtalk A: 6.574E-06
polyn. a=>B xtalk B: -8.291E-04
polyn. a=>B xtalk C: 3.086E-01

Alpha mM 0.991587892
polyn. B=>a xtalk A: -2.353E-09
polyn. B=>a xtalk B: 3.880E-08
polyn. B=>a xtalk C: 7.064E-04

Beta efficiency logfile: SR90RNG
Beta attenuation calibration: AT520SRY.XLD
Application Revision: C
Application Version: PAI

Offsets per QASS 151168
alpha B= 1.00000
beta B= 1.00000

Data file name: WAT0323a
Batch ID: 15021std, 15
Count Duration (m): 10
Batch Ended: ########
Activity Units: pCi
Date of Bkg. Cal: 3/19/99

Rev. 6/2/98 rts

Det. ID	Sample ID	Count End Date & Time	Count Duration (min)	Resid. Mass (mg)	Sample Volume (g / L)	Alpha Activity Gross CPM	Alpha Activity Activity Concentration	Alpha Activity 2σ	Alpha Activity MDC	Beta Activity Gross CPM	Beta Activity Activity Concentration	Beta Activity MDC	Alpha Calibrations bkg CPM	Alpha Calibrations effM	Alpha Calibrations b=>a x-tlk (fract.)	Beta Calibrations bkg CPM	Beta Calibrations effM	Beta Calibrations a=>b x-tlk (fract.)
C1	99-15-019-03	3/24/99 14:27	10.00	0.0	0.0010	6.900	-185.271	4037.160	7271.774	9786.200	9615332.110	3184.991	0.0930	0.25678	0.00071	1.9480	0.45630	0.30861
A1	99-15-021-01	3/24/99 14:27	10.00	0.0	0.0010	2794.000	4950611.388	58077.031	2910.358	974.400	109585.582	43421.997	0.1810	0.25306	0.00071	2.3400	0.44941	0.30861
A2	99-15-021-02	3/24/99 14:27	10.00	0.0	0.0010	2811.300	5024686.758	58765.180	2978.879	1037.900	167552.471	43428.023	0.1670	0.25087	0.00071	1.9640	0.45063	0.30861
A3	99-15-021-03	3/24/99 14:27	10.00	0.0	0.0010	2806.700	4982226.619	58315.123	2902.748	1001.000	132409.235	43492.575	0.1530	0.25259	0.00071	2.0880	0.44963	0.30861
B3	99-15-019-01	3/24/99 14:28	10.00	0.0	0.0010	5.200	-3032.660	3944.621	7553.667	9550.300	9686761.655	3089.243	0.1080	0.24469	0.00071	1.9530	0.44204	0.30861
B4	99-15-019-02	3/24/99 14:28	10.00	0.0	0.0010	4.400	-4548.044	3702.056	7356.203	9693.000	9623989.176	2900.815	0.1200	0.25318	0.00071	1.8890	0.45159	0.30861

Average Am Act.= 4.986E+06 pCi/l
Average Am Unc.= 5.839E+04 pCi/l (2 sigma)

Expected Am Act.= 5.000E+06

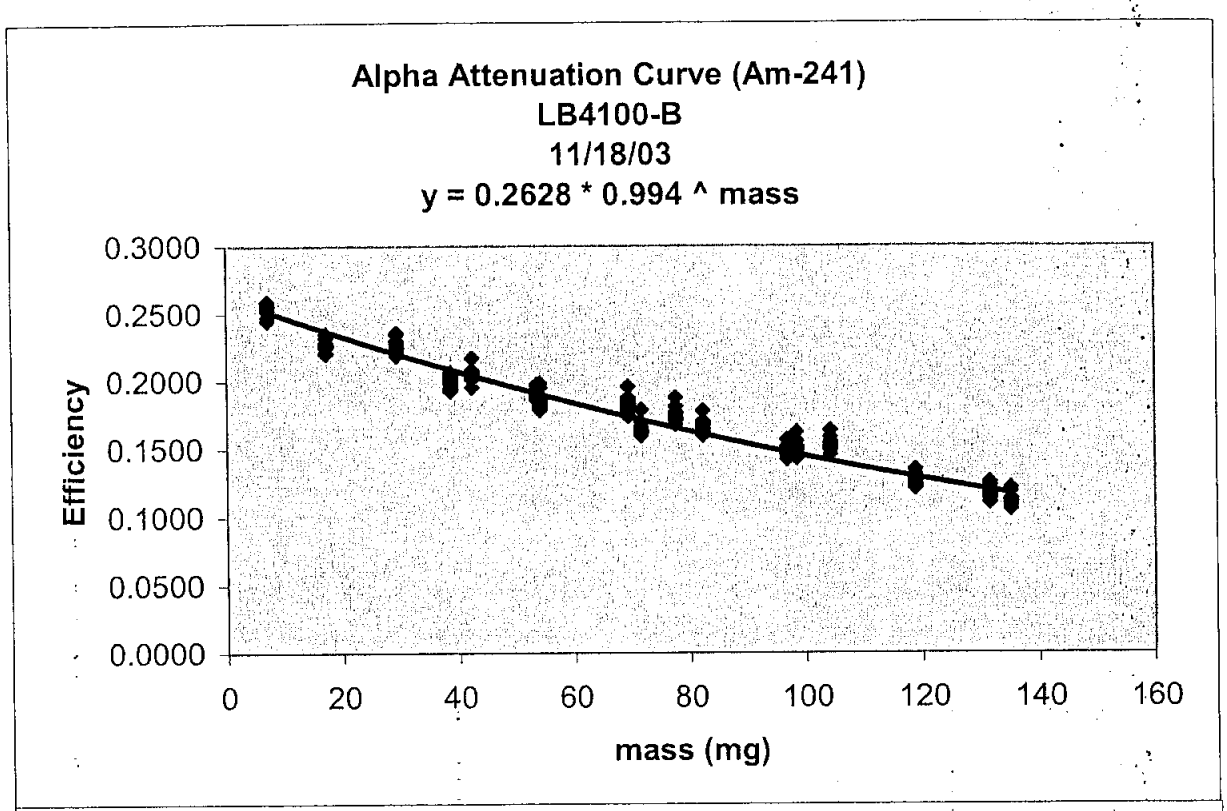
Relative Recovey= 99.72%

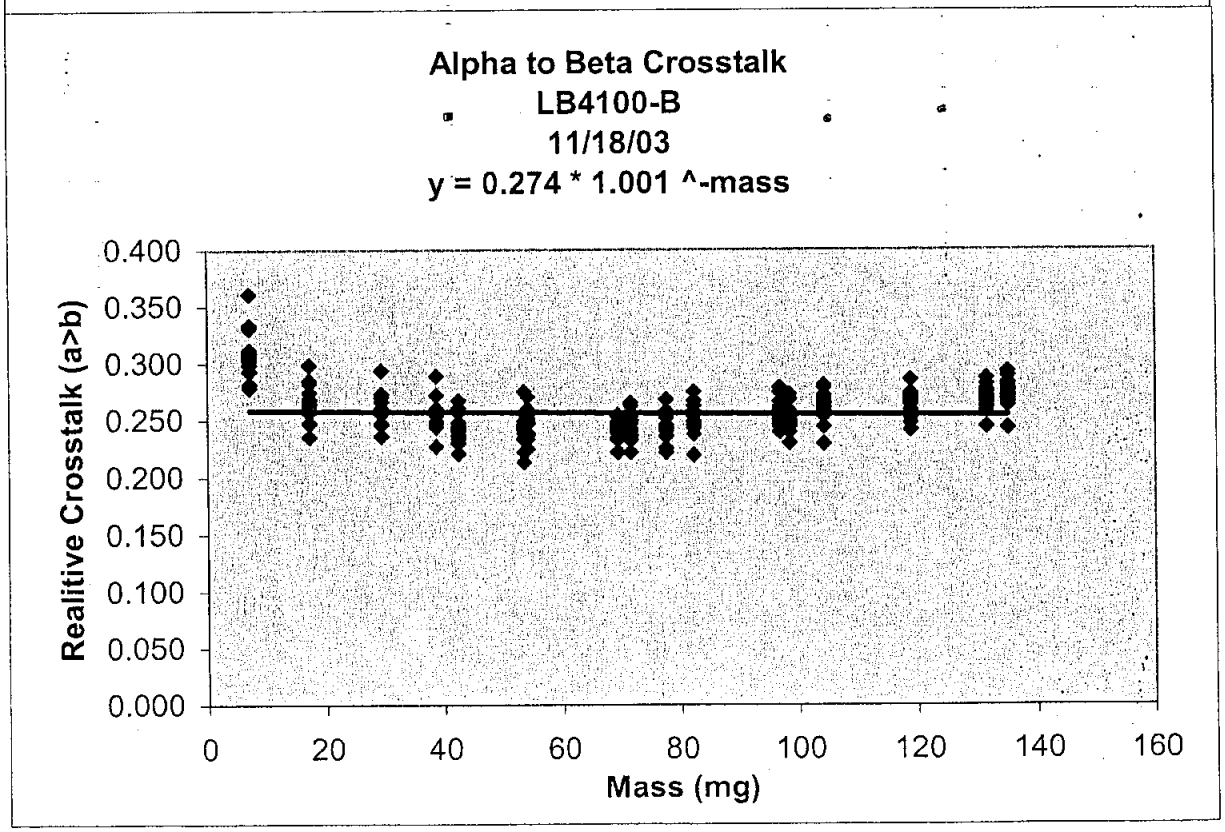
Average Sr/Y Act.= 9.642E+06 pCi/l
Average Sr/Y Unc.= 6.079E+04 pCi/l (2 sigma)

Expected Sr/Y Act.= 9.940E+06

Relative Recovey= 97.01%

000094


Alpha Attenuation Curve (Am-241)
LB4100-B
11/18/03
y = 0.2628 * 0.994 ^ mass
Efficiency
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0
20
40
60
80
100
120
140
160
mass (mg)


Alpha to Beta Crosstalk
LB4100-B
11/18/03
y = 0.274 * 1.001 ^-mass
Realitive Crosstalk (a>b)
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0
20
40
60
80
100
120
140
160
Mass (mg)

Paragon Analytics, Inc.

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH —

TEST Am-241 Calibration Curve

METHOD LB41.020-B

263223

SOP/REV (PREP) —

SOP/REV (ANAL) 724 R8

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

AE 12/1/03

- The mass attenuation curve used for gross alpha/Am-241 analysis does not adequately intercept the zero mass calibration results to allow the use of the zero mass standards to be included in the calibration curve.
- Consequently, the mass attenuation curve is produced without the zero mass data points as described below.
- Client samples will only be analyzed if the residual planchet mass exceeds the minimum mass in the mass attenuation curve. While this is believed to be a result of using muffled planchets instead of detergent-washed planchets, the quality of the analytical data is not affected and the calibrations will be used without qualification.
- The normal mass-corrected efficiency is of the form $e*b*m^x$, where x is the residual mass on the planchet in mg and e is the individual zero-mass detector efficiency. The actual mass-corrected efficiency curve generated by this data, exclusive of the zero mass standards is $0.2628*0.994^x$. The average zero mass efficiency is 0.2110.
- To facilitate the reporting of data with our current analytical software the mass attenuation correction used is $(0.2628/0.2110)*0.994^x$ or $1.2455*0.994^x$. This attenuation coefficient is relative to each detectors individual zero mass counting efficiency, so the final mass-corrected counting efficiency for an individual detector becomes $e*1.2455*0.994^x$. This is the equation used in the analytical process.

AE 12/1/03

AE 12/1/03

- r:\inst\gfp\am241.doc

AE 12/1/03

TECHNICIAN/ANALYST Alice Fellingham DATE 12/1/03

DEPARTMENT MANAGER [signature] DATE 12/1/03

FORM 302r5.FRM (04/30/01)

Alpha Attenuation Calibration Worksheet - LB4100 AB

5/27/04

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

y=b*m^ax

b	0.2628
m	0.994
a	1

min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	A1	1	10028	3.59	11/18/03 11:24	2793.31	24905.6	0.2	10991.1	0.2541	0.2085	7.1	0.2541	0.251808	0.0023	0.92%
ATC1118	A2	1	10048	3.59	11/18/03 11:32	2798.89	24905.6	0.2	10991.1	0.2547	0.2041	7.1	0.2547	0.251808	0.0028	1.12%
ATC1118	A3	1	10030	3.61	11/18/03 11:43	2778.39	24905.6	0.2	10991.1	0.2528	0.2099	7.1	0.2528	0.251808	0.0010	0.39%
ATC1118	A4	1	10008	3.72	11/18/03 11:54	2690.32	24905.6	0.2	10991.1	0.2448	0.2037	7.1	0.2448	0.251808	-0.0070	-2.87%
ATC1118	B1	1	10006	3.56	11/18/03 12:04	2810.67	24905.6	0.2	10991.1	0.2557	0.2233	7.1	0.2557	0.251808	0.0039	1.53%
ATC1118	B2	1	10001	3.55	11/18/03 12:28	2817.18	24905.6	0.2	10991.1	0.2563	0.2192	7.1	0.2563	0.251808	0.0045	1.76%
ATC1118	B3	1	10050	3.53	11/18/03 12:38	2847.03	24905.6	0.2	10991.1	0.2590	0.2148	7.1	0.2590	0.251808	0.0072	2.79%
ATC1118	B4	1	10022	3.68	11/18/03 12:48	2723.37	24905.6	0.2	10991.1	0.2478	0.2038	7.1	0.2478	0.251808	-0.0040	-1.63%
ATC1118	C1	1	10035	3.61	11/18/03 12:59	2779.78	24905.6	0.2	10991.1	0.2529	0.2170	7.1	0.2529	0.251808	0.0011	0.44%
ATC1118	C2	1	10011	3.56	11/18/03 13:09	2812.08	24905.6	0.2	10991.1	0.2559	0.2127	7.1	0.2559	0.251808	0.0040	1.58%
ATC1118	C3	1	10028	3.53	11/18/03 13:19	2840.79	24905.6	0.2	10991.1	0.2585	0.2117	7.1	0.2585	0.251808	0.0067	2.58%
ATC1118	C4	1	10025	3.61	11/18/03 13:30	2777.01	24905.6	0.2	10991.1	0.2527	0.2063	7.1	0.2527	0.251808	0.0009	0.34%
ATC1118	D1	1	10032	3.62	11/18/03 13:43	2771.27	24905.6	0.2	10991.1	0.2521	0.2111	7.1	0.2521	0.251808	0.0003	0.13%
ATC1118	D2	1	10009	3.56	11/18/03 13:53	2811.52	24905.6	0.2	10991.1	0.2558	0.2101	7.1	0.2558	0.251808	0.0040	1.56%
ATC1118	D3	1	10002	3.56	11/18/03 14:06	2809.55	24905.6	0.2	10991.1	0.2556	0.2103	7.1	0.2556	0.251808	0.0038	1.49%
ATC1118	D4	1	10054	3.58	11/18/03 14:16	2808.38	24905.6	0.2	10991.1	0.2555	0.2091	7.1	0.2555	0.251808	0.0037	1.45%
ATC1118	A1	3	10030	4.14	11/18/03 14:50	2422.71	24905.6	0.2	10991.1	0.2204	0.2085	17.2	0.2204	0.236958	-0.0165	-7.50%
ATC1118	A2	3	10042	4.13	11/18/03 14:59	2431.48	24905.6	0.2	10991.1	0.2212	0.2041	17.2	0.2212	0.236958	-0.0157	-7.11%
ATC1118	A3	3	10035	4.05	11/18/03 11:24	2477.78	24905.6	0.2	10991.1	0.2254	0.2099	17.2	0.2254	0.236958	-0.0115	-5.11%
ATC1118	A4	3	10031	4.05	11/18/03 11:32	2476.79	24905.6	0.2	10991.1	0.2253	0.2037	17.2	0.2253	0.236958	-0.0116	-5.15%
ATC1118	B1	3	10033	3.93	11/18/03 11:44	2552.93	24905.6	0.2	10991.1	0.2323	0.2233	17.2	0.2323	0.236958	-0.0047	-2.02%
ATC1118	B2	3	10020	3.88	11/18/03 11:54	2582.47	24905.6	0.2	10991.1	0.2350	0.2192	17.2	0.2350	0.236958	-0.0020	-0.85%
ATC1118	B3	3	10014	4.02	11/18/03 12:05	2491.04	24905.6	0.2	10991.1	0.2266	0.2148	17.2	0.2266	0.236958	-0.0103	-4.55%
ATC1118	B4	3	10020	4.03	11/18/03 12:28	2486.35	24905.6	0.2	10991.1	0.2262	0.2038	17.2	0.2262	0.236958	-0.0107	-4.75%
ATC1118	C1	3	10020	4.01	11/18/03 12:38	2498.75	24905.6	0.2	10991.1	0.2273	0.2170	17.2	0.2273	0.236958	-0.0096	-4.23%
ATC1118	C2	3	10020	4.05	11/18/03 12:49	2474.07	24905.6	0.2	10991.1	0.2251	0.2127	17.2	0.2251	0.236958	-0.0119	-5.27%
ATC1118	C3	3	10044	4.01	11/18/03 12:59	2504.74	24905.6	0.2	10991.1	0.2279	0.2117	17.2	0.2279	0.236958	-0.0091	-3.98%
ATC1118	C4	3	10011	4.04	11/18/03 13:10	2477.97	24905.6	0.2	10991.1	0.2255	0.2063	17.2	0.2255	0.236958	-0.0115	-5.10%
ATC1118	D1	3	10016	3.99	11/18/03 13:20	2510.28	24905.6	0.2	10991.1	0.2284	0.2111	17.2	0.2284	0.236958	-0.0086	-3.75%
ATC1118	D2	3	10029	3.99	11/18/03 13:30	2513.53	24905.6	0.2	10991.1	0.2287	0.2101	17.2	0.2287	0.236958	-0.0083	-3.62%
ATC1118	D3	3	10021	4.04	11/18/03 13:43	2480.45	24905.6	0.2	10991.1	0.2257	0.2103	17.2	0.2257	0.236958	-0.0113	-5.00%
ATC1118	D4	3	10009	4.04	11/18/03 13:54	2477.48	24905.6	0.2	10991.1	0.2254	0.2091	17.2	0.2254	0.236958	-0.0115	-5.12%
ATC1118	A1	6	10021	4.1	11/18/03 14:16	2444.15	24905.6	0.2	10991.1	0.2224	0.2085	29.4	0.2224	0.220184	0.0022	0.99%
ATC1118	A2	6	10019	4.17	11/18/03 14:27	2402.64	24905.6	0.2	10991.1	0.2186	0.2041	29.4	0.2186	0.220184	-0.0016	-0.72%
ATC1118	A3	6	10005	4.11	11/18/03 14:39	2434.31	24905.6	0.2	10991.1	0.2215	0.2099	29.4	0.2215	0.220184	0.0013	0.59%
ATC1118	A4	6	10016	4.06	11/18/03 14:50	2467.00	24905.6	0.2	10991.1	0.2245	0.2037	29.4	0.2245	0.220184	0.0043	1.90%
ATC1118	B1	6	10006	3.88	11/18/03 14:59	2578.87	24905.6	0.2	10991.1	0.2346	0.2233	29.4	0.2346	0.220184	0.0144	6.16%
ATC1118	B2	6	10008	3.86	11/18/03 11:24	2592.75	24905.6	0.2	10991.1	0.2359	0.2192	29.4	0.2359	0.220184	0.0157	6.66%

000097

Alpha Attenuation Calibration Worksheet - LB4100 A 6

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

y=b*m^ax

b	0.2628
m	0.994
a	1
min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	B3	6	10012	4.05	11/18/03 11:32	2472.10	24905.6	0.2	10991.1	0.2249	0.2148	29.4	0.2249	0.220184	0.0047	2.11%
ATC1118	B4	6	10020	3.96	11/18/03 11:44	2530.30	24905.6	0.2	10991.1	0.2302	0.2038	29.4	0.2302	0.220184	0.0100	4.36%
ATC1118	C1	6	10027	3.99	11/18/03 11:55	2513.03	24905.6	0.2	10991.1	0.2286	0.2170	29.4	0.2286	0.220184	0.0085	3.70%
ATC1118	C2	6	10030	4.04	11/18/03 12:05	2482.67	24905.6	0.2	10991.1	0.2259	0.2127	29.4	0.2259	0.220184	0.0057	2.52%
ATC1118	C3	6	10026	4.07	11/18/03 12:28	2463.39	24905.6	0.2	10991.1	0.2241	0.2117	29.4	0.2241	0.220184	0.0039	1.76%
ATC1118	C4	6	10022	4.08	11/18/03 12:38	2456.37	24905.6	0.2	10991.1	0.2235	0.2063	29.4	0.2235	0.220184	0.0033	1.48%
ATC1118	D1	6	10030	4.03	11/18/03 12:49	2488.83	24905.6	0.2	10991.1	0.2264	0.2111	29.4	0.2264	0.220184	0.0063	2.76%
ATC1118	D2	6	10026	4	11/18/03 12:59	2506.50	24905.6	0.2	10991.1	0.2280	0.2101	29.4	0.2280	0.220184	0.0079	3.45%
ATC1118	D3	6	10017	4.07	11/18/03 13:10	2461.18	24905.6	0.2	10991.1	0.2239	0.2103	29.4	0.2239	0.220184	0.0037	1.67%
ATC1118	D4	6	10019	4.03	11/18/03 13:20	2486.10	24905.6	0.2	10991.1	0.2262	0.2091	29.4	0.2262	0.220184	0.0060	2.66%
ATC1118	A1	8	10007	4.66	11/18/03 13:54	2147.42	24905.6	0.2	10991.1	0.1954	0.2085	38.7	0.1954	0.208199	-0.0128	-6.56%
ATC1118	A2	8	10031	4.74	11/18/03 14:07	2116.24	24905.6	0.2	10991.1	0.1925	0.2041	38.7	0.1925	0.208199	-0.0157	-8.13%
ATC1118	A3	8	10022	4.56	11/18/03 14:17	2197.81	24905.6	0.2	10991.1	0.2000	0.2099	38.7	0.2000	0.208199	-0.0082	-4.12%
ATC1118	A4	8	10009	4.7	11/18/03 14:27	2129.57	24905.6	0.2	10991.1	0.1938	0.2037	38.7	0.1938	0.208199	-0.0144	-7.45%
ATC1118	B1	8	10008	4.45	11/18/03 14:40	2248.99	24905.6	0.2	10991.1	0.2046	0.2233	38.7	0.2046	0.208199	-0.0036	-1.75%
ATC1118	B2	8	10021	4.53	11/18/03 14:50	2212.14	24905.6	0.2	10991.1	0.2013	0.2192	38.7	0.2013	0.208199	-0.0069	-3.44%
ATC1118	B3	8	10020	4.48	11/18/03 14:59	2236.61	24905.6	0.2	10991.1	0.2035	0.2148	38.7	0.2035	0.208199	-0.0047	-2.31%
ATC1118	B4	8	10018	4.42	11/18/03 11:24	2266.52	24905.6	0.2	10991.1	0.2062	0.2038	38.7	0.2062	0.208199	-0.0020	-0.96%
ATC1118	C1	8	10021	4.6	11/18/03 11:33	2178.48	24905.6	0.2	10991.1	0.1982	0.2170	38.7	0.1982	0.208199	-0.0100	-5.04%
ATC1118	C2	8	10011	4.56	11/18/03 11:44	2195.39	24905.6	0.2	10991.1	0.1997	0.2127	38.7	0.1997	0.208199	-0.0085	-4.23%
ATC1118	C3	8	10005	4.68	11/18/03 11:55	2137.82	24905.6	0.2	10991.1	0.1945	0.2117	38.7	0.1945	0.208199	-0.0137	-7.04%
ATC1118	C4	8	10021	4.59	11/18/03 12:05	2183.22	24905.6	0.2	10991.1	0.1986	0.2063	38.7	0.1986	0.208199	-0.0096	-4.81%
ATC1118	D1	8	10006	4.58	11/18/03 12:29	2184.72	24905.6	0.2	10991.1	0.1988	0.2111	38.7	0.1988	0.208199	-0.0094	-4.74%
ATC1118	D2	8	10012	4.56	11/18/03 12:39	2195.61	24905.6	0.2	10991.1	0.1998	0.2101	38.7	0.1998	0.208199	-0.0084	-4.22%
ATC1118	D3	8	10023	4.6	11/18/03 12:49	2178.91	24905.6	0.2	10991.1	0.1982	0.2103	38.7	0.1982	0.208199	-0.0100	-5.02%
ATC1118	D4	8	10022	4.53	11/18/03 13:00	2212.36	24905.6	0.2	10991.1	0.2013	0.2091	38.7	0.2013	0.208199	-0.0069	-3.43%
ATC1118	A1	7	10021	4.53	11/18/03 14:07	2212.14	24905.6	0.2	10991.1	0.2013	0.2085	42.4	0.2013	0.203614	-0.0023	-1.17%
ATC1118	A2	7	10025	4.67	11/18/03 14:17	2146.68	24905.6	0.2	10991.1	0.1953	0.2041	42.4	0.1953	0.203614	-0.0083	-4.25%
ATC1118	A3	7	10013	4.51	11/18/03 14:27	2220.18	24905.6	0.2	10991.1	0.2020	0.2099	42.4	0.2020	0.203614	-0.0016	-0.80%
ATC1118	A4	7	10012	4.49	11/18/03 14:40	2229.84	24905.6	0.2	10991.1	0.2029	0.2037	42.4	0.2029	0.203614	-0.0007	-0.36%
ATC1118	B1	7	10017	4.2	11/18/03 14:50	2385.00	24905.6	0.2	10991.1	0.2170	0.2233	42.4	0.2170	0.203614	0.0134	6.17%
ATC1118	B2	7	10017	4.41	11/18/03 14:59	2271.43	24905.6	0.2	10991.1	0.2067	0.2192	42.4	0.2067	0.203614	0.0030	1.47%
ATC1118	B3	7	10003	4.44	11/18/03 11:24	2252.93	24905.6	0.2	10991.1	0.2050	0.2148	42.4	0.2050	0.203614	0.0014	0.67%
ATC1118	B4	7	10008	4.42	11/18/03 11:33	2264.25	24905.6	0.2	10991.1	0.2060	0.2038	42.4	0.2060	0.203614	0.0024	1.16%
ATC1118	C1	7	10006	4.42	11/18/03 11:44	2263.80	24905.6	0.2	10991.1	0.2060	0.2170	42.4	0.2060	0.203614	0.0024	1.14%
ATC1118	C2	7	10029	4.44	11/18/03 11:55	2258.78	24905.6	0.2	10991.1	0.2055	0.2127	42.4	0.2055	0.203614	0.0019	0.92%
ATC1118	C3	7	10023	4.5	11/18/03 12:05	2227.33	24905.6	0.2	10991.1	0.2026	0.2117	42.4	0.2026	0.203614	-0.0010	-0.48%
ATC1118	C4	7	10018	4.45	11/18/03 12:29	2251.24	24905.6	0.2	10991.1	0.2048	0.2063	42.4	0.2048	0.203614	0.0012	0.59%

000098

Alpha Attenuation Calibration Worksheet - LB4100 AB

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

*y=b*m^ax*

b	*0.2628*
m	*0.994*
a	*1*

min rel dev'	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	D1	7	10011	4.48	11/18/03 12:39	2234.60	24905.6	0.2	10991.1	0.2033	0.2111	42.4	0.2033	0.203614	-0.0003	-0.15%
ATC1118	D2	7	10027	4.42	11/18/03 12:49	2268.55	24905.6	0.2	10991.1	0.2064	0.2101	42.4	0.2064	0.203614	0.0028	1.35%
ATC1118	D3	7	10020	4.49	11/18/03 13:00	2231.63	24905.6	0.2	10991.1	0.2030	0.2103	42.4	0.2030	0.203614	-0.0006	-0.28%
ATC1118	D4	7	10024	4.38	11/18/03 13:10	2288.58	24905.6	0.2	10991.1	0.2082	0.2091	42.4	0.2082	0.203614	0.0046	2.21%
ATC1118	A1	9	10031	4.85	11/18/03 13:44	2068.25	24905.6	0.2	10991.1	0.1882	0.2085	53.4	0.1882	0.190572	-0.0024	-1.27%
ATC1118	A2	9	10019	4.9	11/18/03 13:55	2044.69	24905.6	0.2	10991.1	0.1860	0.2041	53.4	0.1860	0.190572	-0.0045	-2.44%
ATC1118	A3	9	10013	4.86	11/18/03 14:07	2060.29	24905.6	0.2	10991.1	0.1875	0.2099	53.4	0.1875	0.190572	-0.0031	-1.66%
ATC1118	A4	9	10025	4.88	11/18/03 14:17	2054.30	24905.6	0.2	10991.1	0.1869	0.2037	53.4	0.1869	0.190572	-0.0037	-1.96%
ATC1118	B1	9	10022	4.62	11/18/03 14:27	2169.26	24905.6	0.2	10991.1	0.1974	0.2233	53.4	0.1974	0.190572	0.0068	3.44%
ATC1118	B2	9	10008	4.62	11/18/03 14:40	2166.23	24905.6	0.2	10991.1	0.1971	0.2192	53.4	0.1971	0.190572	0.0065	3.31%
ATC1118	B3	9	10013	4.68	11/18/03 14:50	2139.53	24905.6	0.2	10991.1	0.1947	0.2148	53.4	0.1947	0.190572	0.0041	2.10%
ATC1118	B4	9	10026	4.71	11/18/03 15:00	2128.66	24905.6	0.2	10991.1	0.1937	0.2038	53.4	0.1937	0.190572	0.0031	1.60%
ATC1118	C1	9	10014	4.84	11/18/03 11:25	2069.01	24905.6	0.2	10991.1	0.1882	0.2170	53.4	0.1882	0.190572	-0.0023	-1.24%
ATC1118	C2	9	10021	4.73	11/18/03 11:33	2118.60	24905.6	0.2	10991.1	0.1928	0.2127	53.4	0.1928	0.190572	0.0022	1.13%
ATC1118	C3	9	10012	4.83	11/18/03 11:44	2072.88	24905.6	0.2	10991.1	0.1886	0.2117	53.4	0.1886	0.190572	-0.0020	-1.05%
ATC1118	C4	9	10030	4.82	11/18/03 11:55	2080.91	24905.6	0.2	10991.1	0.1893	0.2063	53.4	0.1893	0.190572	-0.0012	-0.66%
ATC1118	D1	9	10014	4.74	11/18/03 12:05	2112.66	24905.6	0.2	10991.1	0.1922	0.2111	53.4	0.1922	0.190572	0.0016	0.86%
ATC1118	D2	9	10031	4.8	11/18/03 12:29	2089.79	24905.6	0.2	10991.1	0.1901	0.2101	53.4	0.1901	0.190572	-0.0004	-0.23%
ATC1118	D3	9	10026	4.77	11/18/03 12:39	2101.89	24905.6	0.2	10991.1	0.1912	0.2103	53.4	0.1912	0.190572	0.0007	0.35%
ATC1118	D4	9	10004	4.8	11/18/03 12:50	2084.17	24905.6	0.2	10991.1	0.1896	0.2091	53.4	0.1896	0.190572	-0.0009	-0.50%
ATC1118	A1	10	10013	5.07	11/18/03 13:31	1974.95	24905.6	0.2	10991.1	0.1797	0.2085	54	0.1797	0.189885	-0.0102	-5.68%
ATC1118	A2	10	10001	5.1	11/18/03 13:44	1960.98	24905.6	0.2	10991.1	0.1784	0.2041	54	0.1784	0.189885	-0.0115	-6.43%
ATC1118	A3	10	10043	4.9	11/18/03 13:55	2049.59	24905.6	0.2	10991.1	0.1865	0.2099	54	0.1865	0.189885	-0.0034	-1.83%
ATC1118	A4	10	10003	5	11/18/03 14:07	2000.60	24905.6	0.2	10991.1	0.1820	0.2037	54	0.1820	0.189885	-0.0079	-4.32%
ATC1118	B1	10	10002	4.59	11/18/03 14:17	2179.08	24905.6	0.2	10991.1	0.1983	0.2233	54	0.1983	0.189885	0.0084	4.22%
ATC1118	B2	10	10030	4.68	11/18/03 14:27	2143.16	24905.6	0.2	10991.1	0.1950	0.2192	54	0.1950	0.189885	0.0051	2.62%
ATC1118	B3	10	10005	4.95	11/18/03 14:40	2021.21	24905.6	0.2	10991.1	0.1839	0.2148	54	0.1839	0.189885	-0.0060	-3.26%
ATC1118	B4	10	10001	4.89	11/18/03 14:51	2045.19	24905.6	0.2	10991.1	0.1861	0.2038	54	0.1861	0.189885	-0.0038	-2.05%
ATC1118	C1	10	10014	4.93	11/18/03 15:00	2031.24	24905.6	0.2	10991.1	0.1848	0.2170	54	0.1848	0.189885	-0.0051	-2.75%
ATC1118	C2	10	10004	5.02	11/18/03 11:25	1992.83	24905.6	0.2	10991.1	0.1813	0.2127	54	0.1813	0.189885	-0.0086	-4.73%
ATC1118	C3	10	10007	4.95	11/18/03 11:33	2021.62	24905.6	0.2	10991.1	0.1839	0.2117	54	0.1839	0.189885	-0.0060	-3.24%
ATC1118	C4	10	10016	4.98	11/18/03 11:45	2011.24	24905.6	0.2	10991.1	0.1830	0.2063	54	0.1830	0.189885	-0.0069	-3.77%
ATC1118	D1	10	10005	4.92	11/18/03 11:56	2033.54	24905.6	0.2	10991.1	0.1850	0.2111	54	0.1850	0.189885	-0.0049	-2.63%
ATC1118	D2	10	10016	4.88	11/18/03 12:05	2052.46	24905.6	0.2	10991.1	0.1867	0.2101	54	0.1867	0.189885	-0.0031	-1.68%
ATC1118	D3	10	10021	5.05	11/18/03 12:29	1984.36	24905.6	0.2	10991.1	0.1805	0.2103	54	0.1805	0.189885	-0.0093	-5.17%
ATC1118	D4	10	10011	5.02	11/18/03 12:39	1994.22	24905.6	0.2	10991.1	0.1814	0.2091	54	0.1814	0.189885	-0.0084	-4.65%
ATC1118	A1	11	10010	5.13	11/18/03 13:21	1951.27	24905.6	0.2	10991.1	0.1775	0.2085	69.4	0.1775	0.173077	0.0045	2.51%
ATC1118	A2	11	10018	5.24	11/18/03 13:31	1911.83	24905.6	0.2	10991.1	0.1739	0.2041	69.4	0.1739	0.173077	0.0009	0.50%

000099

Alpha Attenuation Calibration Worksheet - LB4100 AB

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

*y=b*m^ax*

b	*0.2628*
m	*0.994*
a	*1*

min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	A3	11	10000	5.08	11/18/03 13:44	1968.50	24905.6	0.2	10991.1	0.1791	0.2099	69.4	0.1791	0.173077	0.0060	3.36%
ATC1118	A4	11	10003	5.23	11/18/03 13:55	1912.62	24905.6	0.2	10991.1	0.1740	0.2037	69.4	0.1740	0.173077	0.0009	0.54%
ATC1118	B1	11	10029	4.66	11/18/03 14:07	2152.15	24905.6	0.2	10991.1	0.1958	0.2233	69.4	0.1958	0.173077	0.0227	11.61%
ATC1118	B2	11	10005	4.85	11/18/03 14:17	2062.89	24905.6	0.2	10991.1	0.1877	0.2192	69.4	0.1877	0.173077	0.0146	7.78%
ATC1118	B3	11	10007	4.99	11/18/03 14:28	2005.41	24905.6	0.2	10991.1	0.1825	0.2148	69.4	0.1825	0.173077	0.0094	5.14%
ATC1118	B4	11	10014	4.91	11/18/03 14:40	2039.51	24905.6	0.2	10991.1	0.1856	0.2038	69.4	0.1856	0.173077	0.0125	6.73%
ATC1118	C1	11	10022	5.07	11/18/03 14:51	1976.73	24905.6	0.2	10991.1	0.1798	0.2170	69.4	0.1798	0.173077	0.0068	3.76%
ATC1118	C2	11	10026	4.99	11/18/03 15:00	2009.22	24905.6	0.2	10991.1	0.1828	0.2127	69.4	0.1828	0.173077	0.0097	5.32%
ATC1118	C3	11	10016	4.96	11/18/03 11:25	2019.35	24905.6	0.2	10991.1	0.1837	0.2117	69.4	0.1837	0.173077	0.0106	5.80%
ATC1118	C4	11	10005	5.02	11/18/03 11:33	1993.03	24905.6	0.2	10991.1	0.1813	0.2063	69.4	0.1813	0.173077	0.0083	4.55%
ATC1118	D1	11	10004	4.99	11/18/03 11:45	2004.81	24905.6	0.2	10991.1	0.1824	0.2111	69.4	0.1824	0.173077	0.0093	5.11%
ATC1118	D2	11	10004	4.94	11/18/03 11:56	2025.10	24905.6	0.2	10991.1	0.1842	0.2101	69.4	0.1842	0.173077	0.0112	6.06%
ATC1118	D3	11	10017	4.93	11/18/03 12:05	2031.85	24905.6	0.2	10991.1	0.1849	0.2103	69.4	0.1849	0.173077	0.0118	6.38%
ATC1118	D4	11	10021	5.06	11/18/03 12:29	1980.43	24905.6	0.2	10991.1	0.1802	0.2091	69.4	0.1802	0.173077	0.0071	3.95%
ATC1118	A1	12	10034	5.58	11/18/03 13:11	1798.21	24905.6	0.2	10991.1	0.1636	0.2085	71.6	0.1636	0.170801	-0.0072	-4.40%
ATC1118	A2	12	10018	5.71	11/18/03 13:21	1754.47	24905.6	0.2	10991.1	0.1596	0.2041	71.6	0.1596	0.170801	-0.0112	-7.00%
ATC1118	A3	12	10019	5.59	11/18/03 13:32	1792.31	24905.6	0.2	10991.1	0.1631	0.2099	71.6	0.1631	0.170801	-0.0077	-4.74%
ATC1118	A4	12	10017	5.64	11/18/03 13:45	1776.06	24905.6	0.2	10991.1	0.1616	0.2037	71.6	0.1616	0.170801	-0.0092	-5.70%
ATC1118	B1	12	10033	5.11	11/18/03 13:55	1963.41	24905.6	0.2	10991.1	0.1786	0.2233	71.6	0.1786	0.170801	0.0078	4.39%
ATC1118	B2	12	10013	5.37	11/18/03 14:08	1864.62	24905.6	0.2	10991.1	0.1696	0.2192	71.6	0.1696	0.170801	-0.0012	-0.68%
ATC1118	B3	12	10009	5.48	11/18/03 14:18	1826.46	24905.6	0.2	10991.1	0.1662	0.2148	71.6	0.1662	0.170801	-0.0046	-2.78%
ATC1118	B4	12	10025	5.49	11/18/03 14:28	1826.05	24905.6	0.2	10991.1	0.1661	0.2038	71.6	0.1661	0.170801	-0.0047	-2.81%
ATC1118	C1	12	10021	5.64	11/18/03 14:41	1776.77	24905.6	0.2	10991.1	0.1617	0.2170	71.6	0.1617	0.170801	-0.0091	-5.66%
ATC1118	C2	12	10022	5.59	11/18/03 14:51	1792.84	24905.6	0.2	10991.1	0.1631	0.2127	71.6	0.1631	0.170801	-0.0077	-4.71%
ATC1118	C3	12	10016	5.5	11/18/03 15:00	1821.09	24905.6	0.2	10991.1	0.1657	0.2117	71.6	0.1657	0.170801	-0.0051	-3.09%
ATC1118	C4	12	10026	5.52	11/18/03 11:25	1816.30	24905.6	0.2	10991.1	0.1653	0.2063	71.6	0.1653	0.170801	-0.0055	-3.36%
ATC1118	D1	12	10001	5.52	11/18/03 11:34	1811.78	24905.6	0.2	10991.1	0.1648	0.2111	71.6	0.1648	0.170801	-0.0060	-3.62%
ATC1118	D2	12	10012	5.49	11/18/03 11:45	1823.68	24905.6	0.2	10991.1	0.1659	0.2101	71.6	0.1659	0.170801	-0.0049	-2.94%
ATC1118	D3	12	10003	5.57	11/18/03 11:56	1795.87	24905.6	0.2	10991.1	0.1634	0.2103	71.6	0.1634	0.170801	-0.0074	-4.53%
ATC1118	D4	12	10009	5.55	11/18/03 12:06	1803.42	24905.6	0.2	10991.1	0.1641	0.2091	71.6	0.1641	0.170801	-0.0067	-4.10%
ATC1118	A1	13	10035	5.44	11/18/03 13:01	1844.67	24905.6	0.2	10991.1	0.1678	0.2085	77.6	0.1678	0.164744	0.0031	1.84%
ATC1118	A2	13	10011	5.43	11/18/03 13:11	1843.65	24905.6	0.2	10991.1	0.1677	0.2041	77.6	0.1677	0.164744	0.0030	1.79%
ATC1118	A3	13	10013	5.29	11/18/03 13:21	1892.82	24905.6	0.2	10991.1	0.1722	0.2099	77.6	0.1722	0.164744	0.0075	4.34%
ATC1118	A4	13	10012	5.32	11/18/03 13:31	1881.95	24905.6	0.2	10991.1	0.1712	0.2037	77.6	0.1712	0.164744	0.0065	3.79%
ATC1118	B1	13	10019	4.86	11/18/03 13:44	2061.52	24905.6	0.2	10991.1	0.1876	0.2233	77.6	0.1876	0.164744	0.0228	12.17%
ATC1118	B2	13	10035	5.04	11/18/03 13:55	1991.07	24905.6	0.2	10991.1	0.1812	0.2192	77.6	0.1812	0.164744	0.0164	9.06%
ATC1118	B3	13	10015	5.22	11/18/03 14:08	1918.58	24905.6	0.2	10991.1	0.1746	0.2148	77.6	0.1746	0.164744	0.0098	5.62%
ATC1118	B4	13	10013	5.27	11/18/03 14:18	1900.00	24905.6	0.2	10991.1	0.1729	0.2038	77.6	0.1729	0.164744	0.0081	4.70%

Alpha Attenuation Calibration Worksheet - LB4100 AB

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

*y=b*m^ax*

b	*0.2628*
m	*0.994*
a	*1*

min rel dev'	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	C1	13	10003	5.28	11/18/03 14:28	1894.51	24905.6	0.2	10991.1	0.1724	0.2170	77.6	0.1724	0.164744	0.0076	4.42%
ATC1118	C2	13	10016	5.15	11/18/03 14:41	1944.85	24905.6	0.2	10991.1	0.1769	0.2127	77.6	0.1769	0.164744	0.0122	6.90%
ATC1118	C3	13	10018	5.27	11/18/03 14:51	1900.95	24905.6	0.2	10991.1	0.1730	0.2117	77.6	0.1730	0.164744	0.0082	4.75%
ATC1118	C4	13	10009	5.34	11/18/03 15:00	1874.34	24905.6	0.2	10991.1	0.1705	0.2063	77.6	0.1705	0.164744	0.0058	3.40%
ATC1118	D1	13	10000	5.29	11/18/03 11:25	1890.36	24905.6	0.2	10991.1	0.1720	0.2111	77.6	0.1720	0.164744	0.0072	4.21%
ATC1118	D2	13	10010	5.28	11/18/03 11:34	1895.83	24905.6	0.2	10991.1	0.1725	0.2101	77.6	0.1725	0.164744	0.0077	4.49%
ATC1118	D3	13	10013	5.17	11/18/03 11:45	1936.75	24905.6	0.2	10991.1	0.1762	0.2103	77.6	0.1762	0.164744	0.0115	6.51%
ATC1118	D4	13	10019	5.22	11/18/03 11:56	1919.35	24905.6	0.2	10991.1	0.1746	0.2091	77.6	0.1746	0.164744	0.0099	5.66%
ATC1118	A1	14	10010	5.55	11/18/03 12:50	1803.60	24905.6	0.2	10991.1	0.1641	0.2085	82.3	0.1641	0.160149	0.0039	2.41%
ATC1118	A2	14	10009	5.71	11/18/03 13:01	1752.89	24905.6	0.2	10991.1	0.1595	0.2041	82.3	0.1595	0.160149	-0.0007	-0.42%
ATC1118	A3	14	10022	5.58	11/18/03 13:11	1796.06	24905.6	0.2	10991.1	0.1634	0.2099	82.3	0.1634	0.160149	0.0033	2.00%
ATC1118	A4	14	10015	5.55	11/18/03 13:21	1804.50	24905.6	0.2	10991.1	0.1642	0.2037	82.3	0.1642	0.160149	0.0040	2.45%
ATC1118	B1	14	10019	5.13	11/18/03 13:31	1953.02	24905.6	0.2	10991.1	0.1777	0.2233	82.3	0.1777	0.160149	0.0175	9.87%
ATC1118	B2	14	10000	5.34	11/18/03 13:44	1872.66	24905.6	0.2	10991.1	0.1704	0.2192	82.3	0.1704	0.160149	0.0102	6.00%
ATC1118	B3	14	10007	5.35	11/18/03 13:55	1870.47	24905.6	0.2	10991.1	0.1702	0.2148	82.3	0.1702	0.160149	0.0100	5.89%
ATC1118	B4	14	10002	5.4	11/18/03 14:08	1852.22	24905.6	0.2	10991.1	0.1685	0.2038	82.3	0.1685	0.160149	0.0084	4.97%
ATC1118	C1	14	10026	5.6	11/18/03 14:18	1790.36	24905.6	0.2	10991.1	0.1629	0.2170	82.3	0.1629	0.160149	0.0027	1.68%
ATC1118	C2	14	10001	5.42	11/18/03 14:28	1845.20	24905.6	0.2	10991.1	0.1679	0.2127	82.3	0.1679	0.160149	0.0077	4.61%
ATC1118	C3	14	10029	5.47	11/18/03 14:41	1833.46	24905.6	0.2	10991.1	0.1668	0.2117	82.3	0.1668	0.160149	0.0067	3.99%
ATC1118	C4	14	10022	5.54	11/18/03 14:51	1809.03	24905.6	0.2	10991.1	0.1646	0.2063	82.3	0.1646	0.160149	0.0044	2.70%
ATC1118	D1	14	10002	5.42	11/18/03 15:00	1845.39	24905.6	0.2	10991.1	0.1679	0.2111	82.3	0.1679	0.160149	0.0077	4.62%
ATC1118	D2	14	10007	5.44	11/18/03 11:25	1839.52	24905.6	0.2	10991.1	0.1674	0.2101	82.3	0.1674	0.160149	0.0072	4.31%
ATC1118	D3	14	10001	5.38	11/18/03 11:34	1858.92	24905.6	0.2	10991.1	0.1691	0.2103	82.3	0.1691	0.160149	0.0090	5.31%
ATC1118	D4	14	10007	5.54	11/18/03 11:45	1806.32	24905.6	0.2	10991.1	0.1643	0.2091	82.3	0.1643	0.160149	0.0042	2.55%
ATC1118	A1	16	10009	6.27	11/18/03 12:30	1596.33	24905.6	0.2	10991.1	0.1452	0.2085	96.8	0.1452	0.146767	-0.0015	-1.05%
ATC1118	A2	16	10010	6.4	11/18/03 12:40	1564.06	24905.6	0.2	10991.1	0.1423	0.2041	96.8	0.1423	0.146767	-0.0045	-3.14%
ATC1118	A3	16	10003	6.41	11/18/03 12:51	1560.53	24905.6	0.2	10991.1	0.1420	0.2099	96.8	0.1420	0.146767	-0.0048	-3.37%
ATC1118	A4	16	10023	6.29	11/18/03 13:02	1593.48	24905.6	0.2	10991.1	0.1450	0.2037	96.8	0.1450	0.146767	-0.0018	-1.23%
ATC1118	B1	16	10010	5.82	11/18/03 13:12	1719.93	24905.6	0.2	10991.1	0.1565	0.2233	96.8	0.1565	0.146767	0.0097	6.21%
ATC1118	B2	16	10017	6.01	11/18/03 13:22	1666.72	24905.6	0.2	10991.1	0.1516	0.2192	96.8	0.1516	0.146767	0.0049	3.22%
ATC1118	B3	16	10008	6.11	11/18/03 13:32	1637.97	24905.6	0.2	10991.1	0.1490	0.2148	96.8	0.1490	0.146767	0.0023	1.52%
ATC1118	B4	16	10009	6.19	11/18/03 13:45	1616.96	24905.6	0.2	10991.1	0.1471	0.2038	96.8	0.1471	0.146767	0.0003	0.24%
ATC1118	C1	16	10012	6.18	11/18/03 13:56	1620.06	24905.6	0.2	10991.1	0.1474	0.2170	96.8	0.1474	0.146767	0.0006	0.43%
ATC1118	C2	16	10014	6.29	11/18/03 14:09	1592.05	24905.6	0.2	10991.1	0.1448	0.2127	96.8	0.1448	0.146767	-0.0019	-1.32%
ATC1118	C3	16	10021	6.23	11/18/03 14:19	1608.51	24905.6	0.2	10991.1	0.1463	0.2117	96.8	0.1463	0.146767	-0.0004	-0.29%
ATC1118	C4	16	10013	6.23	11/18/03 14:29	1607.22	24905.6	0.2	10991.1	0.1462	0.2063	96.8	0.1462	0.146767	-0.0005	-0.37%
ATC1118	D1	16	10008	6.19	11/18/03 14:42	1616.80	24905.6	0.2	10991.1	0.1471	0.2111	96.8	0.1471	0.146767	0.0003	0.23%
ATC1118	D2	16	10007	6	11/18/03 14:52	1667.83	24905.6	0.2	10991.1	0.1517	0.2101	96.8	0.1517	0.146767	0.0050	3.28%

000101

Alpha Attenuation Calibration Worksheet - LB4100 A

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

*y=b*m^ax*

b	*0.2628*
m	*0.994*
a	*1*
min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	D3	16	10013	6.25	11/18/03 15:01	1602.08	24905.6	0.2	10991.1	0.1458	0.2103	96.8	0.1458	0.146767	-0.0010	-0.69%
ATC1118	D4	16	10016	6.22	11/18/03 11:26	1610.29	24905.6	0.2	10991.1	0.1465	0.2091	96.8	0.1465	0.146767	-0.0003	-0.18%
ATC1118	A1	15	10008	6.31	11/18/03 12:40	1586.05	24905.6	0.2	10991.1	0.1443	0.2085	98.5	0.1443	0.145273	-0.0010	-0.67%
ATC1118	A2	15	10010	6.38	11/18/03 12:51	1568.97	24905.6	0.2	10991.1	0.1427	0.2041	98.5	0.1427	0.145273	-0.0025	-1.77%
ATC1118	A3	15	10016	6.19	11/18/03 13:01	1618.09	24905.6	0.2	10991.1	0.1472	0.2099	98.5	0.1472	0.145273	0.0019	1.32%
ATC1118	A4	15	10006	6.14	11/18/03 13:12	1629.64	24905.6	0.2	10991.1	0.1483	0.2037	98.5	0.1483	0.145273	0.0030	2.02%
ATC1118	B1	15	10013	5.62	11/18/03 13:21	1781.67	24905.6	0.2	10991.1	0.1621	0.2233	98.5	0.1621	0.145273	0.0168	10.38%
ATC1118	B2	15	10011	5.86	11/18/03 13:32	1708.36	24905.6	0.2	10991.1	0.1554	0.2192	98.5	0.1554	0.145273	0.0102	6.54%
ATC1118	B3	15	10011	6.05	11/18/03 13:45	1654.71	24905.6	0.2	10991.1	0.1506	0.2148	98.5	0.1506	0.145273	0.0053	3.51%
ATC1118	B4	15	10001	6.11	11/18/03 13:56	1636.82	24905.6	0.2	10991.1	0.1489	0.2038	98.5	0.1489	0.145273	0.0037	2.45%
ATC1118	C1	15	10005	6.13	11/18/03 14:08	1632.14	24905.6	0.2	10991.1	0.1485	0.2170	98.5	0.1485	0.145273	0.0032	2.17%
ATC1118	C2	15	10007	6.02	11/18/03 14:18	1662.29	24905.6	0.2	10991.1	0.1512	0.2127	98.5	0.1512	0.145273	0.0060	3.95%
ATC1118	C3	15	10002	6.12	11/18/03 14:29	1634.31	24905.6	0.2	10991.1	0.1487	0.2117	98.5	0.1487	0.145273	0.0034	2.30%
ATC1118	C4	15	10010	6.08	11/18/03 14:41	1646.38	24905.6	0.2	10991.1	0.1498	0.2063	98.5	0.1498	0.145273	0.0045	3.02%
ATC1118	D1	15	10011	6.17	11/18/03 14:52	1622.53	24905.6	0.2	10991.1	0.1476	0.2111	98.5	0.1476	0.145273	0.0023	1.59%
ATC1118	D2	15	10013	6.01	11/18/03 15:01	1666.06	24905.6	0.2	10991.1	0.1516	0.2101	98.5	0.1516	0.145273	0.0063	4.16%
ATC1118	D3	15	10012	6.02	11/18/03 11:26	1663.12	24905.6	0.2	10991.1	0.1513	0.2103	98.5	0.1513	0.145273	0.0060	3.99%
ATC1118	D4	15	10002	6.08	11/18/03 11:34	1645.07	24905.6	0.2	10991.1	0.1497	0.2091	98.5	0.1497	0.145273	0.0044	2.94%
ATC1118	A1	18	10021	6.07	11/18/03 11:57	1650.91	24905.6	0.2	10991.1	0.1502	0.2085	104.3	0.1502	0.14029	0.0099	6.60%
ATC1118	A2	18	10006	6.26	11/18/03 12:07	1598.40	24905.6	0.2	10991.1	0.1454	0.2041	104.3	0.1454	0.14029	0.0051	3.53%
ATC1118	A3	18	10010	6.07	11/18/03 12:30	1649.09	24905.6	0.2	10991.1	0.1500	0.2099	104.3	0.1500	0.14029	0.0097	6.50%
ATC1118	A4	18	10026	6.13	11/18/03 12:40	1635.56	24905.6	0.2	10991.1	0.1488	0.2037	104.3	0.1488	0.14029	0.0085	5.72%
ATC1118	B1	18	10011	5.58	11/18/03 12:50	1794.09	24905.6	0.2	10991.1	0.1632	0.2233	104.3	0.1632	0.14029	0.0229	14.05%
ATC1118	B2	18	10014	5.75	11/18/03 13:01	1741.57	24905.6	0.2	10991.1	0.1585	0.2192	104.3	0.1585	0.14029	0.0182	11.46%
ATC1118	B3	18	10009	5.87	11/18/03 13:12	1705.11	24905.6	0.2	10991.1	0.1551	0.2148	104.3	0.1551	0.14029	0.0148	9.57%
ATC1118	B4	18	10011	5.91	11/18/03 13:22	1693.91	24905.6	0.2	10991.1	0.1541	0.2038	104.3	0.1541	0.14029	0.0138	8.97%
ATC1118	C1	18	10010	5.96	11/18/03 13:32	1679.53	24905.6	0.2	10991.1	0.1528	0.2170	104.3	0.1528	0.14029	0.0125	8.19%
ATC1118	C2	18	10004	5.95	11/18/03 13:45	1681.34	24905.6	0.2	10991.1	0.1530	0.2127	104.3	0.1530	0.14029	0.0127	8.29%
ATC1118	C3	18	10022	5.98	11/18/03 13:56	1675.92	24905.6	0.2	10991.1	0.1525	0.2117	104.3	0.1525	0.14029	0.0122	7.99%
ATC1118	C4	18	10013	6.12	11/18/03 14:08	1636.11	24905.6	0.2	10991.1	0.1489	0.2063	104.3	0.1489	0.14029	0.0086	5.76%
ATC1118	D1	18	10005	6.06	11/18/03 14:18	1650.99	24905.6	0.2	10991.1	0.1502	0.2111	104.3	0.1502	0.14029	0.0099	6.61%
ATC1118	D2	18	10029	5.95	11/18/03 14:29	1685.55	24905.6	0.2	10991.1	0.1534	0.2101	104.3	0.1534	0.14029	0.0131	8.52%
ATC1118	D3	18	10012	5.93	11/18/03 14:41	1688.36	24905.6	0.2	10991.1	0.1536	0.2103	104.3	0.1536	0.14029	0.0133	8.67%
ATC1118	D4	18	10014	5.94	11/18/03 14:52	1685.86	24905.6	0.2	10991.1	0.1534	0.2091	104.3	0.1534	0.14029	0.0131	8.54%
ATC1118	A1	17	10008	7.52	11/18/03 12:08	1330.85	24905.6	0.2	10991.1	0.1211	0.2085	118.9	0.1211	0.128489	-0.0074	-6.12%
ATC1118	A2	17	10007	7.52	11/18/03 12:32	1330.72	24905.6	0.2	10991.1	0.1211	0.2041	118.9	0.1211	0.128489	-0.0074	-6.13%
ATC1118	A3	17	10010	7.54	11/18/03 12:42	1327.59	24905.6	0.2	10991.1	0.1208	0.2099	118.9	0.1208	0.128489	-0.0077	-6.38%
ATC1118	A4	17	10007	7.53	11/18/03 12:52	1328.95	24905.6	0.2	10991.1	0.1209	0.2037	118.9	0.1209	0.128489	-0.0076	-6.27%

000102

Alpha Attenuation Calibration Worksheet - LB4100 AB

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

y=b*m^ax

b	0.2628
m	0.994
a	1

min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	B1	17	10012	6.77	11/18/03 13:02	1478.88	24905.6	0.2	10991.1	0.1346	0.2233	118.9	0.1346	0.128489	0.0061	4.51%
ATC1118	B2	17	10004	6.93	11/18/03 13:13	1443.58	24905.6	0.2	10991.1	0.1313	0.2192	118.9	0.1313	0.128489	0.0029	2.17%
ATC1118	B3	17	10012	7.35	11/18/03 13:23	1362.18	24905.6	0.2	10991.1	0.1239	0.2148	118.9	0.1239	0.128489	-0.0046	-3.67%
ATC1118	B4	17	10017	7.34	11/18/03 13:34	1364.71	24905.6	0.2	10991.1	0.1242	0.2038	118.9	0.1242	0.128489	-0.0043	-3.48%
ATC1118	C1	17	10009	7.41	11/18/03 13:46	1350.74	24905.6	0.2	10991.1	0.1229	0.2170	118.9	0.1229	0.128489	-0.0056	-4.55%
ATC1118	C2	17	10008	7.4	11/18/03 13:57	1352.43	24905.6	0.2	10991.1	0.1230	0.2127	118.9	0.1230	0.128489	-0.0054	-4.42%
ATC1118	C3	17	10017	7.27	11/18/03 14:10	1377.85	24905.6	0.2	10991.1	0.1254	0.2117	118.9	0.1254	0.128489	-0.0031	-2.50%
ATC1118	C4	17	10011	7.47	11/18/03 14:20	1340.16	24905.6	0.2	10991.1	0.1219	0.2063	118.9	0.1219	0.128489	-0.0066	-5.38%
ATC1118	D1	17	10003	7.21	11/18/03 14:30	1387.38	24905.6	0.2	10991.1	0.1262	0.2111	118.9	0.1262	0.128489	-0.0023	-1.79%
ATC1118	D2	17	10005	7.21	11/18/03 14:43	1387.66	24905.6	0.2	10991.1	0.1263	0.2101	118.9	0.1263	0.128489	-0.0022	-1.77%
ATC1118	D3	17	10010	7.11	11/18/03 14:53	1407.88	24905.6	0.2	10991.1	0.1281	0.2103	118.9	0.1281	0.128489	-0.0004	-0.31%
ATC1118	D4	17	10007	7.45	11/18/03 15:02	1343.22	24905.6	0.2	10991.1	0.1222	0.2091	118.9	0.1222	0.128489	-0.0063	-5.14%
ATC1118	A1	19	10001	8.03	11/18/03 11:48	1245.45	24905.6	0.2	10991.1	0.1133	0.2085	131.6	0.1133	0.119035	-0.0057	-5.05%
ATC1118	A2	19	10007	8.25	11/18/03 11:59	1212.97	24905.6	0.2	10991.1	0.1104	0.2041	131.6	0.1104	0.119035	-0.0087	-7.86%
ATC1118	A3	19	10004	7.88	11/18/03 12:08	1269.54	24905.6	0.2	10991.1	0.1155	0.2099	131.6	0.1155	0.119035	-0.0035	-3.05%
ATC1118	A4	19	10001	8.01	11/18/03 12:32	1248.56	24905.6	0.2	10991.1	0.1136	0.2037	131.6	0.1136	0.119035	-0.0054	-4.79%
ATC1118	B1	19	10009	7.27	11/18/03 12:41	1376.75	24905.6	0.2	10991.1	0.1253	0.2233	131.6	0.1253	0.119035	0.0062	4.97%
ATC1118	B2	19	10012	7.43	11/18/03 12:52	1347.51	24905.6	0.2	10991.1	0.1226	0.2192	131.6	0.1226	0.119035	0.0036	2.91%
ATC1118	B3	19	10007	7.91	11/18/03 13:03	1265.11	24905.6	0.2	10991.1	0.1151	0.2148	131.6	0.1151	0.119035	-0.0039	-3.42%
ATC1118	B4	19	10014	7.75	11/18/03 13:14	1292.13	24905.6	0.2	10991.1	0.1176	0.2038	131.6	0.1176	0.119035	-0.0015	-1.25%
ATC1118	C1	19	10013	7.94	11/18/03 13:24	1261.08	24905.6	0.2	10991.1	0.1147	0.2170	131.6	0.1147	0.119035	-0.0043	-3.75%
ATC1118	C2	19	10013	7.92	11/18/03 13:34	1264.27	24905.6	0.2	10991.1	0.1150	0.2127	131.6	0.1150	0.119035	-0.0040	-3.48%
ATC1118	C3	19	10011	7.89	11/18/03 13:47	1268.82	24905.6	0.2	10991.1	0.1154	0.2117	131.6	0.1154	0.119035	-0.0036	-3.11%
ATC1118	C4	19	10004	7.88	11/18/03 13:58	1269.54	24905.6	0.2	10991.1	0.1155	0.2063	131.6	0.1155	0.119035	-0.0035	-3.05%
ATC1118	D1	19	10014	7.93	11/18/03 14:10	1262.80	24905.6	0.2	10991.1	0.1149	0.2111	131.6	0.1149	0.119035	-0.0041	-3.60%
ATC1118	D2	19	10012	7.85	11/18/03 14:20	1275.41	24905.6	0.2	10991.1	0.1160	0.2101	131.6	0.1160	0.119035	-0.0030	-2.58%
ATC1118	D3	19	10011	7.85	11/18/03 14:31	1275.29	24905.6	0.2	10991.1	0.1160	0.2103	131.6	0.1160	0.119035	-0.0030	-2.59%
ATC1118	D4	19	10000	7.96	11/18/03 14:43	1256.28	24905.6	0.2	10991.1	0.1143	0.2091	131.6	0.1143	0.119035	-0.0047	-4.14%
ATC1118	A1	20	10011	8.32	11/18/03 11:37	1203.25	24905.6	0.2	10991.1	0.1095	0.2085	135.2	0.1095	0.116484	-0.0070	-6.40%
ATC1118	A2	20	10000	8.64	11/18/03 11:48	1157.41	24905.6	0.2	10991.1	0.1053	0.2041	135.2	0.1053	0.116484	-0.0112	-10.62%
ATC1118	A3	20	10004	8.25	11/18/03 11:59	1212.61	24905.6	0.2	10991.1	0.1103	0.2099	135.2	0.1103	0.116484	-0.0062	-5.58%
ATC1118	A4	20	9999	8.42	11/18/03 12:09	1187.53	24905.6	0.2	10991.1	0.1080	0.2037	135.2	0.1080	0.116484	-0.0084	-7.81%
ATC1118	B1	20	10008	7.53	11/18/03 12:32	1329.08	24905.6	0.2	10991.1	0.1209	0.2233	135.2	0.1209	0.116484	0.0044	3.67%
ATC1118	B2	20	10004	7.69	11/18/03 12:42	1300.91	24905.6	0.2	10991.1	0.1184	0.2192	135.2	0.1184	0.116484	0.0019	1.59%
ATC1118	B3	20	10004	8.14	11/18/03 12:53	1228.99	24905.6	0.2	10991.1	0.1118	0.2148	135.2	0.1118	0.116484	-0.0047	-4.17%
ATC1118	B4	20	10002	8.09	11/18/03 13:03	1236.34	24905.6	0.2	10991.1	0.1125	0.2038	135.2	0.1125	0.116484	-0.0040	-3.55%
ATC1118	C1	20	9999	8.13	11/18/03 13:14	1229.89	24905.6	0.2	10991.1	0.1119	0.2170	135.2	0.1119	0.116484	-0.0046	-4.10%
ATC1118	C2	20	10003	8.12	11/18/03 13:24	1231.90	24905.6	0.2	10991.1	0.1121	0.2127	135.2	0.1121	0.116484	-0.0044	-3.93%

000103

Alpha Attenuation Calibration Worksheet - LB4100 AB

	Am-241	Am-241
Standard ID	512.1572.67	541.1808.26
Cert Act (pCi/ml)	5000.5	24905.6
To	3/18/99	2/3/00

*y=b*m^ax*

b	*0.2628*
m	*0.994*
a	*1*

min rel dev*	-10.6%
max rel dev*	14.1%
limit	< 15%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Count Time min	TOD	Alpha cpm	Am-241 Activity pCi/ml	Spike ml	Alpha Activity dpm	Alpha cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev	%diff
ATC1118	C3	20	10002	8.13	11/18/03 13:34	1230.26	24905.6	0.2	10991.1	0.1119	0.2117	135.2	0.1119	0.116484	-0.0046	-4.07%
ATC1118	C4	20	10000	8.26	11/18/03 13:47	1210.65	24905.6	0.2	10991.1	0.1101	0.2063	135.2	0.1101	0.116484	-0.0063	-5.75%
ATC1118	D1	20	10003	8.24	11/18/03 13:58	1213.96	24905.6	0.2	10991.1	0.1104	0.2111	135.2	0.1104	0.116484	-0.0060	-5.46%
ATC1118	D2	20	10001	8.05	11/18/03 14:10	1242.36	24905.6	0.2	10991.1	0.1130	0.2101	135.2	0.1130	0.116484	-0.0034	-3.05%
ATC1118	D3	20	10008	8.2	11/18/03 14:21	1220.49	24905.6	0.2	10991.1	0.1110	0.2103	135.2	0.1110	0.116484	-0.0054	-4.90%
ATC1118	D4	20	10007	8.17	11/18/03 14:31	1224.85	24905.6	0.2	10991.1	0.1114	0.2091	135.2	0.1114	0.116484	-0.0050	-4.53%

000104

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 AB

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	A1	1	10028	2822	3.59	11/18/03 11:24	2793.31	786.07	63.2	7.1	0.281	0.272062	0.0093	3.32%	2.26%
ATC1118	A2	1	10048	2799	3.59	11/18/03 11:32	2798.89	779.67	63.1	7.1	0.279	0.272062	0.0065	2.33%	2.26%
ATC1118	A3	1	10030	3076	3.61	11/18/03 11:43	2778.39	852.08	63.4	7.1	0.307	0.272062	0.0346	11.29%	2.28%
ATC1118	A4	1	10008	3094	3.72	11/18/03 11:54	2690.32	831.72	61.5	7.1	0.309	0.272062	0.0371	12.00%	2.29%
ATC1118	B1	1	10006	3612	3.56	11/18/03 12:04	2810.67	1014.61	65.6	7.1	0.361	0.272062	0.0889	24.63%	2.33%
ATC1118	B2	1	10001	3307	3.55	11/18/03 12:28	2817.18	931.55	65.0	7.1	0.331	0.272062	0.0586	17.72%	2.31%
ATC1118	B3	1	10050	3089	3.53	11/18/03 12:38	2847.03	875.07	64.9	7.1	0.307	0.272062	0.0353	11.49%	2.28%
ATC1118	B4	1	10022	3340	3.68	11/18/03 12:48	2723.37	907.61	62.8	7.1	0.333	0.272062	0.0612	18.36%	2.31%
ATC1118	C1	1	10035	2996	3.61	11/18/03 12:59	2779.78	829.92	63.2	7.1	0.299	0.272062	0.0265	8.87%	2.28%
ATC1118	C2	1	10011	3064	3.56	11/18/03 13:09	2812.08	860.67	64.2	7.1	0.306	0.272062	0.0340	11.11%	2.28%
ATC1118	C3	1	10028	3066	3.53	11/18/03 13:19	2840.79	868.56	64.8	7.1	0.306	0.272062	0.0337	11.02%	2.28%
ATC1118	C4	1	10025	2937	3.61	11/18/03 13:30	2777.01	813.57	63.1	7.1	0.293	0.272062	0.0209	7.14%	2.27%
ATC1118	D1	1	10032	3047	3.62	11/18/03 13:43	2771.27	841.71	63.2	7.1	0.304	0.272062	0.0317	10.43%	2.28%
ATC1118	D2	1	10009	3026	3.56	11/18/03 13:53	2811.52	850.00	64.1	7.1	0.302	0.272062	0.0303	10.01%	2.28%
ATC1118	D3	1	10002	2990	3.56	11/18/03 14:06	2809.55	839.89	64.0	7.1	0.299	0.272062	0.0269	8.99%	2.28%
ATC1118	D4	1	10054	3132	3.58	11/18/03 14:16	2808.38	874.86	64.2	7.1	0.312	0.272062	0.0395	12.67%	2.28%
ATC1118	A1	3	10030	2361	4.14	11/18/03 14:50	2422.71	570.29	53.8	17.2	0.235	0.26933	-0.0339	-14.42%	2.22%
ATC1118	A2	3	10042	2486	4.13	11/18/03 14:59	2431.48	601.94	54.2	17.2	0.248	0.26933	-0.0218	-8.79%	2.23%
ATC1118	A3	3	10035	2653	4.05	11/18/03 11:24	2477.78	655.06	55.6	17.2	0.264	0.26933	-0.0050	-1.87%	2.24%
ATC1118	A4	3	10031	2584	4.05	11/18/03 11:32	2476.79	638.02	55.5	17.2	0.258	0.26933	-0.0117	-4.55%	2.24%
ATC1118	B1	3	10033	2995	3.93	11/18/03 11:44	2552.93	762.09	58.1	17.2	0.299	0.26933	0.0292	9.78%	2.28%
ATC1118	B2	3	10020	2830	3.88	11/18/03 11:54	2582.47	729.38	58.4	17.2	0.282	0.26933	0.0131	4.64%	2.26%
ATC1118	B3	3	10014	2688	4.02	11/18/03 12:05	2491.04	668.66	56.1	17.2	0.268	0.26933	-0.0009	-0.34%	2.25%
ATC1118	B4	3	10020	2853	4.03	11/18/03 12:28	2486.35	707.94	56.3	17.2	0.285	0.26933	0.0154	5.41%	2.26%
ATC1118	C1	3	10020	2566	4.01	11/18/03 12:38	2498.75	639.90	56.0	17.2	0.256	0.26933	-0.0132	-5.17%	2.24%
ATC1118	C2	3	10020	2687	4.05	11/18/03 12:49	2474.07	663.46	55.7	17.2	0.268	0.26933	-0.0012	-0.43%	2.25%
ATC1118	C3	3	10044	2700	4.01	11/18/03 12:59	2504.74	673.32	56.3	17.2	0.269	0.26933	-0.0005	-0.19%	2.25%
ATC1118	C4	3	10011	2617	4.04	11/18/03 13:10	2477.97	647.77	55.6	17.2	0.261	0.26933	-0.0079	-3.03%	2.25%
ATC1118	D1	3	10016	2473	3.99	11/18/03 13:20	2510.28	619.80	56.0	17.2	0.247	0.26933	-0.0224	-9.08%	2.23%
ATC1118	D2	3	10029	2752	3.99	11/18/03 13:30	2513.53	689.72	56.7	17.2	0.274	0.26933	0.0051	1.85%	2.25%
ATC1118	D3	3	10021	2658	4.04	11/18/03 13:43	2480.45	657.92	55.7	17.2	0.265	0.26933	-0.0041	-1.54%	2.25%
ATC1118	D4	3	10009	2658	4.04	11/18/03 13:54	2477.48	657.92	55.7	17.2	0.266	0.26933	-0.0038	-1.42%	2.25%
ATC1118	A1	6	10021	2363	4.1	11/18/03 14:16	2444.15	576.34	54.3	29.4	0.236	0.266066	-0.0303	-12.83%	2.22%

000105

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 Ab

y=b*m^-x

b	0.274
m	1.001
a	1

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	A2	6	10019	2464	4.17	11/18/03 14:27	2402.64	590.89	53.6	29.4	0.246	0.266066	-0.0201	-8.19%	2.23%
ATC1118	A3	6	10005	2603	4.11	11/18/03 14:39	2434.31	633.33	54.6	29.4	0.260	0.266066	-0.0059	-2.27%	2.24%
ATC1118	A4	6	10016	2474	4.06	11/18/03 14:50	2467.00	609.36	55.1	29.4	0.247	0.266066	-0.0191	-7.72%	2.23%
ATC1118	B1	6	10006	2937	3.88	11/18/03 14:59	2578.87	756.96	58.6	29.4	0.294	0.266066	0.0275	9.35%	2.27%
ATC1118	B2	6	10008	2730	3.86	11/18/03 11:24	2592.75	707.25	58.5	29.4	0.273	0.266066	0.0067	2.46%	2.26%
ATC1118	B3	6	10012	2585	4.05	11/18/03 11:32	2472.10	638.27	55.4	29.4	0.258	0.266066	-0.0079	-3.05%	2.24%
ATC1118	B4	6	10020	2592	3.96	11/18/03 11:44	2530.30	654.55	56.7	29.4	0.259	0.266066	-0.0074	-2.85%	2.24%
ATC1118	C1	6	10027	2477	3.99	11/18/03 11:55	2513.03	620.80	56.1	29.4	0.247	0.266066	-0.0190	-7.70%	2.23%
ATC1118	C2	6	10030	2736	4.04	11/18/03 12:05	2482.67	677.23	55.9	29.4	0.273	0.266066	0.0067	2.46%	2.25%
ATC1118	C3	6	10026	2669	4.07	11/18/03 12:28	2463.39	655.77	55.4	29.4	0.266	0.266066	0.0001	0.05%	2.25%
ATC1118	C4	6	10022	2605	4.08	11/18/03 12:38	2456.37	638.48	55.1	29.4	0.260	0.266066	-0.0061	-2.36%	2.24%
ATC1118	D1	6	10030	2607	4.03	11/18/03 12:49	2488.83	646.90	55.8	29.4	0.260	0.266066	-0.0061	-2.36%	2.24%
ATC1118	D2	6	10026	2558	4	11/18/03 12:59	2506.50	639.50	56.1	29.4	0.255	0.266066	-0.0109	-4.28%	2.24%
ATC1118	D3	6	10017	2706	4.07	11/18/03 13:10	2461.18	664.86	55.4	29.4	0.270	0.266066	0.0041	1.51%	2.25%
ATC1118	D4	6	10019	2612	4.03	11/18/03 13:20	2486.10	648.14	55.8	29.4	0.261	0.266066	-0.0054	-2.06%	2.24%
ATC1118	A1	8	10007	2271	4.66	11/18/03 13:54	2147.42	487.34	47.6	38.7	0.227	0.263604	-0.0367	-16.16%	2.21%
ATC1118	A2	8	10031	2476	4.74	11/18/03 14:07	2116.24	522.36	47.2	38.7	0.247	0.263604	-0.0168	-6.79%	2.23%
ATC1118	A3	8	10022	2607	4.56	11/18/03 14:17	2197.81	571.71	49.3	38.7	0.260	0.263604	-0.0035	-1.34%	2.24%
ATC1118	A4	8	10009	2543	4.7	11/18/03 14:27	2129.57	541.06	47.7	38.7	0.254	0.263604	-0.0095	-3.75%	2.24%
ATC1118	B1	8	10008	2889	4.45	11/18/03 14:40	2248.99	649.21	51.0	38.7	0.289	0.263604	0.0251	8.68%	2.27%
ATC1118	B2	8	10021	2723	4.53	11/18/03 14:50	2212.14	601.10	49.8	38.7	0.272	0.263604	0.0081	2.99%	2.25%
ATC1118	B3	8	10020	2588	4.48	11/18/03 14:59	2236.61	577.68	50.1	38.7	0.258	0.263604	-0.0053	-2.06%	2.24%
ATC1118	B4	8	10018	2594	4.42	11/18/03 11:24	2266.52	586.88	50.8	38.7	0.259	0.263604	-0.0047	-1.80%	2.24%
ATC1118	C1	8	10021	2483	4.6	11/18/03 11:33	2178.48	539.78	48.6	38.7	0.248	0.263604	-0.0158	-6.39%	2.23%
ATC1118	C2	8	10011	2593	4.56	11/18/03 11:44	2195.39	568.64	49.2	38.7	0.259	0.263604	-0.0046	-1.77%	2.24%
ATC1118	C3	8	10005	2541	4.68	11/18/03 11:55	2137.82	542.95	47.9	38.7	0.254	0.263604	-0.0096	-3.79%	2.24%
ATC1118	C4	8	10021	2444	4.59	11/18/03 12:05	2183.22	532.46	48.6	38.7	0.244	0.263604	-0.0197	-8.08%	2.23%
ATC1118	D1	8	10006	2491	4.58	11/18/03 12:29	2184.72	543.89	48.8	38.7	0.249	0.263604	-0.0147	-5.89%	2.23%
ATC1118	D2	8	10012	2581	4.56	11/18/03 12:39	2195.61	566.01	49.2	38.7	0.258	0.263604	-0.0058	-2.26%	2.24%
ATC1118	D3	8	10023	2470	4.6	11/18/03 12:49	2178.91	536.96	48.6	38.7	0.246	0.263604	-0.0172	-6.97%	2.23%
ATC1118	D4	8	10022	2565	4.53	11/18/03 13:00	2212.36	566.23	49.5	38.7	0.256	0.263604	-0.0077	-3.00%	2.24%
ATC1118	A1	7	10021	2211	4.53	11/18/03 14:07	2212.14	488.08	48.8	42.4	0.221	0.262631	-0.0420	-19.03%	2.21%
ATC1118	A2	7	10025	2308	4.67	11/18/03 14:17	2146.68	494.22	47.6	42.4	0.230	0.262631	-0.0324	-14.08%	2.22%

000106

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 A~~B~~

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	A3	7	10013	2424	4.51	11/18/03 14:27	2220.18	537.47	49.5	42.4	0.242	0.262631	-0.0205	-8.49%	2.23%
ATC1118	A4	7	10012	2299	4.49	11/18/03 14:40	2229.84	512.03	49.4	42.4	0.230	0.262631	-0.0330	-14.37%	2.22%
ATC1118	B1	7	10017	2674	4.2	11/18/03 14:50	2385.00	636.67	53.6	42.4	0.267	0.262631	0.0043	1.62%	2.25%
ATC1118	B2	7	10017	2611	4.41	11/18/03 14:59	2271.43	592.06	51.0	42.4	0.261	0.262631	-0.0020	-0.76%	2.24%
ATC1118	B3	7	10003	2477	4.44	11/18/03 11:24	2252.93	557.88	50.3	42.4	0.248	0.262631	-0.0150	-6.06%	2.23%
ATC1118	B4	7	10008	2564	4.42	11/18/03 11:33	2264.25	580.09	50.7	42.4	0.256	0.262631	-0.0064	-2.51%	2.24%
ATC1118	C1	7	10006	2368	4.42	11/18/03 11:44	2263.80	535.75	50.3	42.4	0.237	0.262631	-0.0260	-10.97%	2.22%
ATC1118	C2	7	10029	2446	4.44	11/18/03 11:55	2258.78	550.90	50.3	42.4	0.244	0.262631	-0.0187	-7.68%	2.23%
ATC1118	C3	7	10023	2368	4.5	11/18/03 12:05	2227.33	526.22	49.5	42.4	0.236	0.262631	-0.0264	-11.16%	2.22%
ATC1118	C4	7	10018	2341	4.45	11/18/03 12:29	2251.24	526.07	50.0	42.4	0.234	0.262631	-0.0290	-12.39%	2.22%
ATC1118	D1	7	10011	2421	4.48	11/18/03 12:39	2234.60	540.40	49.8	42.4	0.242	0.262631	-0.0208	-8.60%	2.23%
ATC1118	D2	7	10027	2434	4.42	11/18/03 12:49	2268.55	550.68	50.5	42.4	0.243	0.262631	-0.0199	-8.19%	2.23%
ATC1118	D3	7	10020	2452	4.49	11/18/03 13:00	2231.63	546.10	49.7	42.4	0.245	0.262631	-0.0179	-7.32%	2.23%
ATC1118	D4	7	10024	2410	4.38	11/18/03 13:10	2288.58	550.23	50.9	42.4	0.240	0.262631	-0.0222	-9.24%	2.22%
ATC1118	A1	9	10031	2138	4.85	11/18/03 13:44	2068.25	440.82	45.5	53.4	0.213	0.259759	-0.0466	-21.87%	2.20%
ATC1118	A2	9	10019	2222	4.9	11/18/03 13:55	2044.69	453.47	45.2	53.4	0.222	0.259759	-0.0380	-17.13%	2.21%
ATC1118	A3	9	10013	2424	4.86	11/18/03 14:07	2060.29	498.77	45.9	53.4	0.242	0.259759	-0.0177	-7.30%	2.23%
ATC1118	A4	9	10025	2441	4.88	11/18/03 14:17	2054.30	500.20	45.8	53.4	0.243	0.259759	-0.0163	-6.68%	2.23%
ATC1118	B1	9	10022	2754	4.62	11/18/03 14:27	2169.26	596.10	48.9	53.4	0.275	0.259759	0.0150	5.47%	2.26%
ATC1118	B2	9	10008	2560	4.62	11/18/03 14:40	2166.23	554.11	48.5	53.4	0.256	0.259759	-0.0040	-1.55%	2.24%
ATC1118	B3	9	10013	2465	4.68	11/18/03 14:50	2139.53	526.71	47.7	53.4	0.246	0.259759	-0.0136	-5.52%	2.23%
ATC1118	B4	9	10026	2451	4.71	11/18/03 15:00	2128.66	520.38	47.4	53.4	0.244	0.259759	-0.0153	-6.26%	2.23%
ATC1118	C1	9	10014	2411	4.84	11/18/03 11:25	2069.01	498.14	46.1	53.4	0.241	0.259759	-0.0190	-7.89%	2.23%
ATC1118	C2	9	10021	2460	4.73	11/18/03 11:33	2118.60	520.08	47.2	53.4	0.245	0.259759	-0.0143	-5.81%	2.23%
ATC1118	C3	9	10012	2328	4.83	11/18/03 11:44	2072.88	481.99	46.0	53.4	0.233	0.259759	-0.0272	-11.71%	2.22%
ATC1118	C4	9	10030	2338	4.82	11/18/03 11:55	2080.91	485.06	46.1	53.4	0.233	0.259759	-0.0267	-11.44%	2.22%
ATC1118	D1	9	10014	2384	4.74	11/18/03 12:05	2112.66	502.95	47.0	53.4	0.238	0.259759	-0.0217	-9.11%	2.22%
ATC1118	D2	9	10031	2496	4.8	11/18/03 12:29	2089.79	520.00	46.6	53.4	0.249	0.259759	-0.0109	-4.39%	2.23%
ATC1118	D3	9	10026	2429	4.77	11/18/03 12:39	2101.89	509.22	46.8	53.4	0.242	0.259759	-0.0175	-7.22%	2.23%
ATC1118	D4	9	10004	2338	4.8	11/18/03 12:50	2084.17	487.08	46.3	53.4	0.234	0.259759	-0.0261	-11.15%	2.22%
ATC1118	A1	10	10013	2247	5.07	11/18/03 13:31	1974.95	443.20	43.7	54	0.224	0.259603	-0.0352	-15.68%	2.21%
ATC1118	A2	10	10001	2363	5.1	11/18/03 13:44	1960.98	463.33	43.6	54	0.236	0.259603	-0.0233	-9.87%	2.22%
ATC1118	A3	10	10043	2529	4.9	11/18/03 13:55	2049.59	516.12	45.8	54	0.252	0.259603	-0.0078	-3.09%	2.23%

000107

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 A B

y=b*m^-x	
b	0.274
m	1.001
a	1
min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	A4	10	10003	2329	5	11/18/03 14:07	2000.60	465.80	44.4	54	0.233	0.259603	-0.0268	-11.50%	2.22%
ATC1118	B1	10	10002	2704	4.59	11/18/03 14:17	2179.08	589.11	49.1	54	0.270	0.259603	0.0107	3.97%	2.25%
ATC1118	B2	10	10030	2518	4.68	11/18/03 14:27	2143.16	538.03	47.9	54	0.251	0.259603	-0.0086	-3.41%	2.23%
ATC1118	B3	10	10005	2533	4.95	11/18/03 14:40	2021.21	511.72	45.2	54	0.253	0.259603	-0.0064	-2.54%	2.24%
ATC1118	B4	10	10001	2594	4.89	11/18/03 14:51	2045.19	530.47	45.9	54	0.259	0.259603	-0.0002	-0.09%	2.24%
ATC1118	C1	10	10014	2390	4.93	11/18/03 15:00	2031.24	484.79	45.2	54	0.239	0.259603	-0.0209	-8.77%	2.22%
ATC1118	C2	10	10004	2505	5.02	11/18/03 11:25	1992.83	499.00	44.6	54	0.250	0.259603	-0.0092	-3.68%	2.24%
ATC1118	C3	10	10007	2387	4.95	11/18/03 11:33	2021.62	482.22	45.0	54	0.239	0.259603	-0.0211	-8.83%	2.23%
ATC1118	C4	10	10016	2366	4.98	11/18/03 11:45	2011.24	475.10	44.7	54	0.236	0.259603	-0.0234	-9.90%	2.22%
ATC1118	D1	10	10005	2372	4.92	11/18/03 11:56	2033.54	482.11	45.2	54	0.237	0.259603	-0.0225	-9.50%	2.22%
ATC1118	D2	10	10016	2469	4.88	11/18/03 12:05	2052.46	505.94	45.8	54	0.247	0.259603	-0.0131	-5.31%	2.23%
ATC1118	D3	10	10021	2483	5.05	11/18/03 12:29	1984.36	491.68	44.3	54	0.248	0.259603	-0.0118	-4.77%	2.23%
ATC1118	D4	10	10011	2524	5.02	11/18/03 12:39	1994.22	502.79	44.6	54	0.252	0.259603	-0.0075	-2.97%	2.24%
ATC1118	A1	11	10010	2217	5.13	11/18/03 13:21	1951.27	432.16	43.1	69.4	0.221	0.255638	-0.0342	-15.42%	2.21%
ATC1118	A2	11	10018	2218	5.24	11/18/03 13:31	1911.83	423.28	42.2	69.4	0.221	0.255638	-0.0342	-15.46%	2.21%
ATC1118	A3	11	10000	2479	5.08	11/18/03 13:44	1968.50	487.99	44.0	69.4	0.248	0.255638	-0.0077	-3.12%	2.23%
ATC1118	A4	11	10003	2461	5.23	11/18/03 13:55	1912.62	470.55	42.7	69.4	0.246	0.255638	-0.0096	-3.91%	2.23%
ATC1118	B1	11	10029	2538	4.66	11/18/03 14:07	2152.15	544.64	48.1	69.4	0.253	0.255638	-0.0026	-1.02%	2.24%
ATC1118	B2	11	10005	2545	4.85	11/18/03 14:17	2062.89	524.74	46.2	69.4	0.254	0.255638	-0.0013	-0.50%	2.24%
ATC1118	B3	11	10007	2403	4.99	11/18/03 14:28	2005.41	481.56	44.6	69.4	0.240	0.255638	-0.0155	-6.46%	2.23%
ATC1118	B4	11	10014	2424	4.91	11/18/03 14:40	2039.51	493.69	45.4	69.4	0.242	0.255638	-0.0136	-5.61%	2.23%
ATC1118	C1	11	10022	2389	5.07	11/18/03 14:51	1976.73	471.20	43.9	69.4	0.238	0.255638	-0.0173	-7.24%	2.22%
ATC1118	C2	11	10026	2450	4.99	11/18/03 15:00	2009.22	490.98	44.8	69.4	0.244	0.255638	-0.0113	-4.61%	2.23%
ATC1118	C3	11	10016	2345	4.96	11/18/03 11:25	2019.35	472.78	44.8	69.4	0.234	0.255638	-0.0215	-9.19%	2.22%
ATC1118	C4	11	10005	2400	5.02	11/18/03 11:33	1993.03	478.09	44.4	69.4	0.240	0.255638	-0.0158	-6.57%	2.23%
ATC1118	D1	11	10004	2326	4.99	11/18/03 11:45	2004.81	466.13	44.5	69.4	0.233	0.255638	-0.0231	-9.95%	2.22%
ATC1118	D2	11	10004	2428	4.94	11/18/03 11:56	2025.10	491.50	45.1	69.4	0.243	0.255638	-0.0129	-5.33%	2.23%
ATC1118	D3	11	10017	2408	4.93	11/18/03 12:05	2031.85	488.44	45.2	69.4	0.240	0.255638	-0.0152	-6.34%	2.23%
ATC1118	D4	11	10021	2348	5.06	11/18/03 12:29	1980.43	464.03	44.0	69.4	0.234	0.255638	-0.0213	-9.10%	2.22%
ATC1118	A1	12	10034	2223	5.58	11/18/03 13:11	1798.21	398.39	39.7	71.6	0.222	0.255077	-0.0335	-15.13%	2.21%
ATC1118	A2	12	10018	2324	5.71	11/18/03 13:21	1754.47	407.01	38.9	71.6	0.232	0.255077	-0.0231	-9.96%	2.22%
ATC1118	A3	12	10019	2481	5.59	11/18/03 13:32	1792.31	443.83	40.0	71.6	0.248	0.255077	-0.0074	-3.01%	2.23%
ATC1118	A4	12	10017	2424	5.64	11/18/03 13:45	1776.06	429.79	39.6	71.6	0.242	0.255077	-0.0131	-5.41%	2.23%

000103

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 AB

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	B1	12	10033	2657	5.11	11/18/03 13:55	1963.41	519.96	44.1	71.6	0.265	0.255077	0.0097	3.68%	2.25%
ATC1118	B2	12	10013	2624	5.37	11/18/03 14:08	1864.62	488.64	41.9	71.6	0.262	0.255077	0.0070	2.66%	2.25%
ATC1118	B3	12	10009	2498	5.48	11/18/03 14:18	1826.46	455.84	40.8	71.6	0.250	0.255077	-0.0055	-2.20%	2.23%
ATC1118	B4	12	10025	2489	5.49	11/18/03 14:28	1826.05	453.37	40.8	71.6	0.248	0.255077	-0.0068	-2.74%	2.23%
ATC1118	C1	12	10021	2529	5.64	11/18/03 14:41	1776.77	448.40	39.7	71.6	0.252	0.255077	-0.0027	-1.07%	2.24%
ATC1118	C2	12	10022	2471	5.59	11/18/03 14:51	1792.84	442.04	40.0	71.6	0.247	0.255077	-0.0085	-3.46%	2.23%
ATC1118	C3	12	10016	2473	5.5	11/18/03 15:00	1821.09	449.64	40.6	71.6	0.247	0.255077	-0.0082	-3.31%	2.23%
ATC1118	C4	12	10026	2370	5.52	11/18/03 11:25	1816.30	429.35	40.3	71.6	0.236	0.255077	-0.0187	-7.91%	2.22%
ATC1118	D1	12	10001	2351	5.52	11/18/03 11:34	1811.78	425.91	40.3	71.6	0.235	0.255077	-0.0200	-8.51%	2.22%
ATC1118	D2	12	10012	2400	5.49	11/18/03 11:45	1823.68	437.16	40.6	71.6	0.240	0.255077	-0.0154	-6.41%	2.23%
ATC1118	D3	12	10003	2483	5.57	11/18/03 11:56	1795.87	445.78	40.1	71.6	0.248	0.255077	-0.0069	-2.76%	2.23%
ATC1118	D4	12	10009	2477	5.55	11/18/03 12:06	1803.42	446.31	40.3	71.6	0.247	0.255077	-0.0076	-3.07%	2.23%
ATC1118	A1	13	10035	2221	5.44	11/18/03 13:01	1844.67	408.27	40.7	77.6	0.221	0.253551	-0.0322	-14.56%	2.21%
ATC1118	A2	13	10011	2253	5.43	11/18/03 13:11	1843.65	414.92	40.8	77.6	0.225	0.253551	-0.0285	-12.66%	2.21%
ATC1118	A3	13	10013	2402	5.29	11/18/03 13:21	1892.82	454.06	42.1	77.6	0.240	0.253551	-0.0137	-5.70%	2.23%
ATC1118	A4	13	10012	2356	5.32	11/18/03 13:31	1881.95	442.86	41.8	77.6	0.235	0.253551	-0.0182	-7.75%	2.22%
ATC1118	B1	13	10019	2682	4.86	11/18/03 13:44	2061.52	551.85	46.4	77.6	0.268	0.253551	0.0141	5.28%	2.25%
ATC1118	B2	13	10035	2553	5.04	11/18/03 13:55	1991.07	506.55	44.5	77.6	0.254	0.253551	0.0009	0.34%	2.24%
ATC1118	B3	13	10015	2561	5.22	11/18/03 14:08	1918.58	490.61	43.0	77.6	0.256	0.253551	0.0022	0.85%	2.24%
ATC1118	B4	13	10013	2551	5.27	11/18/03 14:18	1900.00	484.06	42.5	77.6	0.255	0.253551	0.0012	0.48%	2.24%
ATC1118	C1	13	10003	2433	5.28	11/18/03 14:28	1894.51	460.80	42.2	77.6	0.243	0.253551	-0.0103	-4.24%	2.23%
ATC1118	C2	13	10016	2421	5.15	11/18/03 14:41	1944.85	470.10	43.3	77.6	0.242	0.253551	-0.0118	-4.90%	2.23%
ATC1118	C3	13	10018	2443	5.27	11/18/03 14:51	1900.95	463.57	42.4	77.6	0.244	0.253551	-0.0097	-3.97%	2.23%
ATC1118	C4	13	10009	2457	5.34	11/18/03 15:00	1874.34	460.11	41.8	77.6	0.245	0.253551	-0.0081	-3.29%	2.23%
ATC1118	D1	13	10000	2355	5.29	11/18/03 11:25	1890.36	445.18	42.0	77.6	0.236	0.253551	-0.0181	-7.67%	2.22%
ATC1118	D2	13	10010	2577	5.28	11/18/03 11:34	1895.83	488.07	42.5	77.6	0.257	0.253551	0.0039	1.51%	2.24%
ATC1118	D3	13	10013	2430	5.17	11/18/03 11:45	1936.75	470.02	43.2	77.6	0.243	0.253551	-0.0109	-4.48%	2.23%
ATC1118	D4	13	10019	2523	5.22	11/18/03 11:56	1919.35	483.33	42.9	77.6	0.252	0.253551	-0.0017	-0.69%	2.24%
ATC1118	A1	14	10010	2193	5.55	11/18/03 12:50	1803.60	395.14	39.8	82.3	0.219	0.252363	-0.0333	-15.19%	2.21%
ATC1118	A2	14	10009	2374	5.71	11/18/03 13:01	1752.89	415.76	39.0	82.3	0.237	0.252363	-0.0152	-6.40%	2.22%
ATC1118	A3	14	10022	2460	5.58	11/18/03 13:11	1796.06	440.86	40.0	82.3	0.245	0.252363	-0.0069	-2.81%	2.23%
ATC1118	A4	14	10015	2376	5.55	11/18/03 13:21	1804.50	428.11	40.1	82.3	0.237	0.252363	-0.0151	-6.37%	2.22%
ATC1118	B1	14	10019	2752	5.13	11/18/03 13:31	1953.02	536.45	44.1	82.3	0.275	0.252363	0.0223	8.12%	2.26%

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 AB

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	B2	14	10000	2664	5.34	11/18/03 13:44	1872.66	498.88	42.1	82.3	0.266	0.252363	0.0140	5.27%	2.25%
ATC1118	B3	14	10007	2481	5.35	11/18/03 13:55	1870.47	463.74	41.8	82.3	0.248	0.252363	-0.0044	-1.79%	2.23%
ATC1118	B4	14	10002	2488	5.4	11/18/03 14:08	1852.22	460.74	41.4	82.3	0.249	0.252363	-0.0036	-1.45%	2.23%
ATC1118	C1	14	10026	2534	5.6	11/18/03 14:18	1790.36	452.50	40.0	82.3	0.253	0.252363	0.0004	0.15%	2.24%
ATC1118	C2	14	10001	2456	5.42	11/18/03 14:28	1845.20	453.14	41.2	82.3	0.246	0.252363	-0.0068	-2.76%	2.23%
ATC1118	C3	14	10029	2451	5.47	11/18/03 14:41	1833.46	448.08	40.8	82.3	0.244	0.252363	-0.0080	-3.26%	2.23%
ATC1118	C4	14	10022	2459	5.54	11/18/03 14:51	1809.03	443.86	40.3	82.3	0.245	0.252363	-0.0070	-2.85%	2.23%
ATC1118	D1	14	10002	2427	5.42	11/18/03 15:00	1845.39	447.79	41.1	82.3	0.243	0.252363	-0.0097	-4.00%	2.23%
ATC1118	D2	14	10007	2621	5.44	11/18/03 11:25	1839.52	481.80	41.3	82.3	0.262	0.252363	0.0096	3.65%	2.25%
ATC1118	D3	14	10001	2430	5.38	11/18/03 11:34	1858.92	451.67	41.4	82.3	0.243	0.252363	-0.0094	-3.86%	2.23%
ATC1118	D4	14	10007	2579	5.54	11/18/03 11:45	1806.32	465.52	40.5	82.3	0.258	0.252363	0.0054	2.08%	2.24%
ATC1118	A1	16	10009	2394	6.27	11/18/03 12:30	1596.33	381.82	35.5	96.8	0.239	0.248732	-0.0095	-3.99%	2.23%
ATC1118	A2	16	10010	2441	6.4	11/18/03 12:40	1564.06	381.41	34.9	96.8	0.244	0.248732	-0.0049	-2.00%	2.23%
ATC1118	A3	16	10003	2516	6.41	11/18/03 12:51	1560.53	392.51	34.9	96.8	0.252	0.248732	0.0028	1.11%	2.24%
ATC1118	A4	16	10023	2502	6.29	11/18/03 13:02	1593.48	397.77	35.6	96.8	0.250	0.248732	0.0009	0.36%	2.23%
ATC1118	B1	16	10010	2785	5.82	11/18/03 13:12	1719.93	478.52	38.9	96.8	0.278	0.248732	0.0295	10.60%	2.26%
ATC1118	B2	16	10017	2744	6.01	11/18/03 13:22	1666.72	456.57	37.6	96.8	0.274	0.248732	0.0252	9.20%	2.26%
ATC1118	B3	16	10008	2611	6.11	11/18/03 13:32	1637.97	427.33	36.8	96.8	0.261	0.248732	0.0122	4.66%	2.24%
ATC1118	B4	16	10009	2744	6.19	11/18/03 13:45	1616.96	443.30	36.5	96.8	0.274	0.248732	0.0254	9.27%	2.26%
ATC1118	C1	16	10012	2463	6.18	11/18/03 13:56	1620.06	398.54	36.1	96.8	0.246	0.248732	-0.0027	-1.11%	2.23%
ATC1118	C2	16	10014	2546	6.29	11/18/03 14:09	1592.05	404.77	35.6	96.8	0.254	0.248732	0.0055	2.17%	2.24%
ATC1118	C3	16	10021	2518	6.23	11/18/03 14:19	1608.51	404.17	35.9	96.8	0.251	0.248732	0.0025	1.01%	2.23%
ATC1118	C4	16	10013	2528	6.23	11/18/03 14:29	1607.22	405.78	36.0	96.8	0.252	0.248732	0.0037	1.48%	2.24%
ATC1118	D1	16	10008	2600	6.19	11/18/03 14:42	1616.80	420.03	36.3	96.8	0.260	0.248732	0.0111	4.26%	2.24%
ATC1118	D2	16	10007	2571	6	11/18/03 14:52	1667.83	428.50	37.4	96.8	0.257	0.248732	0.0082	3.19%	2.24%
ATC1118	D3	16	10013	2659	6.25	11/18/03 15:01	1602.08	425.44	36.0	96.8	0.266	0.248732	0.0168	6.33%	2.25%
ATC1118	D4	16	10016	2606	6.22	11/18/03 11:26	1610.29	418.97	36.1	96.8	0.260	0.248732	0.0115	4.40%	2.24%
ATC1118	A1	15	10008	2298	6.31	11/18/03 12:40	1586.05	364.18	35.2	98.5	0.230	0.24831	-0.0187	-8.14%	2.22%
ATC1118	A2	15	10010	2436	6.38	11/18/03 12:51	1568.97	381.82	35.0	98.5	0.243	0.24831	-0.0050	-2.04%	2.23%
ATC1118	A3	15	10016	2520	6.19	11/18/03 13:01	1618.09	407.11	36.2	98.5	0.252	0.24831	0.0033	1.31%	2.24%
ATC1118	A4	15	10006	2390	6.14	11/18/03 13:12	1629.64	389.25	36.3	98.5	0.239	0.24831	-0.0095	-3.96%	2.23%
ATC1118	B1	15	10013	2728	5.62	11/18/03 13:21	1781.67	485.41	40.2	98.5	0.272	0.24831	0.0241	8.86%	2.25%
ATC1118	B2	15	10011	2685	5.86	11/18/03 13:32	1708.36	458.19	38.5	98.5	0.268	0.24831	0.0199	7.42%	2.25%

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 AB

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	B3	15	10011	2451	6.05	11/18/03 13:45	1654.71	405.12	36.9	98.5	0.245	0.24831	-0.0035	-1.42%	2.23%
ATC1118	B4	15	10001	2678	6.11	11/18/03 13:56	1636.82	438.30	36.9	98.5	0.268	0.24831	0.0195	7.27%	2.25%
ATC1118	C1	15	10005	2494	6.13	11/18/03 14:08	1632.14	406.85	36.5	98.5	0.249	0.24831	0.0010	0.39%	2.23%
ATC1118	C2	15	10007	2471	6.02	11/18/03 14:18	1662.29	410.47	37.1	98.5	0.247	0.24831	-0.0014	-0.56%	2.23%
ATC1118	C3	15	10002	2515	6.12	11/18/03 14:29	1634.31	410.95	36.6	98.5	0.251	0.24831	0.0031	1.25%	2.24%
ATC1118	C4	15	10010	2468	6.08	11/18/03 14:41	1646.38	405.92	36.7	98.5	0.247	0.24831	-0.0018	-0.71%	2.23%
ATC1118	D1	15	10011	2578	6.17	11/18/03 14:52	1622.53	417.83	36.4	98.5	0.258	0.24831	0.0092	3.58%	2.24%
ATC1118	D2	15	10013	2552	6.01	11/18/03 15:01	1666.06	424.63	37.3	98.5	0.255	0.24831	0.0066	2.57%	2.24%
ATC1118	D3	15	10012	2545	6.02	11/18/03 11:26	1663.12	422.76	37.2	98.5	0.254	0.24831	0.0059	2.32%	2.24%
ATC1118	D4	15	10002	2466	6.08	11/18/03 11:34	1645.07	405.59	36.7	98.5	0.247	0.24831	-0.0018	-0.71%	2.23%
ATC1118	A1	18	10021	2291	6.07	11/18/03 11:57	1650.91	377.43	36.6	104.3	0.229	0.246875	-0.0183	-7.98%	2.21%
ATC1118	A2	18	10006	2438	6.26	11/18/03 12:07	1598.40	389.46	35.6	104.3	0.244	0.246875	-0.0032	-1.32%	2.23%
ATC1118	A3	18	10010	2546	6.07	11/18/03 12:30	1649.09	419.44	36.9	104.3	0.254	0.246875	0.0075	2.94%	2.24%
ATC1118	A4	18	10026	2613	6.13	11/18/03 12:40	1635.56	426.26	36.7	104.3	0.261	0.246875	0.0137	5.28%	2.24%
ATC1118	B1	18	10011	2804	5.58	11/18/03 12:50	1794.09	502.51	40.6	104.3	0.280	0.246875	0.0332	11.86%	2.26%
ATC1118	B2	18	10014	2652	5.75	11/18/03 13:01	1741.57	461.22	39.1	104.3	0.265	0.246875	0.0180	6.78%	2.25%
ATC1118	B3	18	10009	2636	5.87	11/18/03 13:12	1705.11	449.06	38.3	104.3	0.263	0.246875	0.0165	6.26%	2.25%
ATC1118	B4	18	10011	2785	5.91	11/18/03 13:22	1693.91	471.24	38.3	104.3	0.278	0.246875	0.0313	11.26%	2.26%
ATC1118	C1	18	10010	2545	5.96	11/18/03 13:32	1679.53	427.01	37.6	104.3	0.254	0.246875	0.0074	2.90%	2.24%
ATC1118	C2	18	10004	2681	5.95	11/18/03 13:45	1681.34	450.59	37.9	104.3	0.268	0.246875	0.0211	7.88%	2.25%
ATC1118	C3	18	10022	2582	5.98	11/18/03 13:56	1675.92	431.77	37.5	104.3	0.258	0.246875	0.0108	4.18%	2.24%
ATC1118	C4	18	10013	2639	6.12	11/18/03 14:08	1636.11	431.21	36.8	104.3	0.264	0.246875	0.0167	6.33%	2.25%
ATC1118	D1	18	10005	2553	6.06	11/18/03 14:18	1650.99	421.29	37.0	104.3	0.255	0.246875	0.0083	3.25%	2.24%
ATC1118	D2	18	10029	2721	5.95	11/18/03 14:29	1685.55	457.31	38.0	104.3	0.271	0.246875	0.0244	9.01%	2.25%
ATC1118	D3	18	10012	2607	5.93	11/18/03 14:41	1688.36	439.63	37.9	104.3	0.260	0.246875	0.0135	5.19%	2.24%
ATC1118	D4	18	10014	2533	5.94	11/18/03 14:52	1685.86	426.43	37.7	104.3	0.253	0.246875	0.0061	2.40%	2.24%
ATC1118	A1	17	10008	2411	7.52	11/18/03 12:08	1330.85	320.61	29.6	118.9	0.241	0.243298	-0.0024	-0.99%	2.23%
ATC1118	A2	17	10007	2471	7.52	11/18/03 12:32	1330.72	328.59	29.7	118.9	0.247	0.243298	0.0036	1.47%	2.23%
ATC1118	A3	17	10010	2735	7.54	11/18/03 12:42	1327.59	362.73	29.9	118.9	0.273	0.243298	0.0299	10.95%	2.26%
ATC1118	A4	17	10007	2689	7.53	11/18/03 12:52	1328.95	357.10	29.9	118.9	0.269	0.243298	0.0254	9.46%	2.25%
ATC1118	B1	17	10012	2855	6.77	11/18/03 13:02	1478.88	421.71	33.5	118.9	0.285	0.243298	0.0419	14.68%	2.27%
ATC1118	B2	17	10004	2719	6.93	11/18/03 13:13	1443.58	392.35	32.6	118.9	0.272	0.243298	0.0285	10.48%	2.26%
ATC1118	B3	17	10012	2659	7.35	11/18/03 13:23	1362.18	361.77	30.6	118.9	0.266	0.243298	0.0223	8.39%	2.25%

000111

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 Aβ

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	B4	17	10017	2727	7.34	11/18/03 13:34	1364.71	371.53	30.8	118.9	0.272	0.243298	0.0289	10.63%	2.25%
ATC1118	C1	17	10009	2692	7.41	11/18/03 13:46	1350.74	363.29	30.4	118.9	0.269	0.243298	0.0257	9.54%	2.25%
ATC1118	C2	17	10008	2637	7.4	11/18/03 13:57	1352.43	356.35	30.4	118.9	0.263	0.243298	0.0202	7.66%	2.25%
ATC1118	C3	17	10017	2536	7.27	11/18/03 14:10	1377.85	348.83	30.8	118.9	0.253	0.243298	0.0099	3.90%	2.24%
ATC1118	C4	17	10011	2587	7.47	11/18/03 14:20	1340.16	346.32	30.1	118.9	0.258	0.243298	0.0151	5.85%	2.24%
ATC1118	D1	17	10003	2558	7.21	11/18/03 14:30	1387.38	354.79	31.1	118.9	0.256	0.243298	0.0124	4.86%	2.24%
ATC1118	D2	17	10005	2669	7.21	11/18/03 14:43	1387.66	370.18	31.2	118.9	0.267	0.243298	0.0235	8.80%	2.25%
ATC1118	D3	17	10010	2517	7.11	11/18/03 14:53	1407.88	354.01	31.5	118.9	0.251	0.243298	0.0082	3.24%	2.24%
ATC1118	D4	17	10007	2678	7.45	11/18/03 15:02	1343.22	359.46	30.2	118.9	0.268	0.243298	0.0243	9.09%	2.25%
ATC1118	A1	19	10001	2437	8.03	11/18/03 11:48	1245.45	303.49	27.8	131.6	0.244	0.240229	0.0034	1.41%	2.23%
ATC1118	A2	19	10007	2656	8.25	11/18/03 11:59	1212.97	321.94	27.3	131.6	0.265	0.240229	0.0252	9.49%	2.25%
ATC1118	A3	19	10004	2621	7.88	11/18/03 12:08	1269.54	332.61	28.5	131.6	0.262	0.240229	0.0218	8.31%	2.25%
ATC1118	A4	19	10001	2651	8.01	11/18/03 12:32	1248.56	330.96	28.1	131.6	0.265	0.240229	0.0248	9.37%	2.25%
ATC1118	B1	19	10009	2868	7.27	11/18/03 12:41	1376.75	394.50	31.2	131.6	0.287	0.240229	0.0463	16.16%	2.27%
ATC1118	B2	19	10012	2744	7.43	11/18/03 12:52	1347.51	369.31	30.4	131.6	0.274	0.240229	0.0338	12.35%	2.26%
ATC1118	B3	19	10007	2767	7.91	11/18/03 13:03	1265.11	349.81	28.6	131.6	0.277	0.240229	0.0363	13.12%	2.26%
ATC1118	B4	19	10014	2815	7.75	11/18/03 13:14	1292.13	363.23	29.2	131.6	0.281	0.240229	0.0409	14.54%	2.26%
ATC1118	C1	19	10013	2679	7.94	11/18/03 13:24	1261.08	337.41	28.4	131.6	0.268	0.240229	0.0273	10.21%	2.25%
ATC1118	C2	19	10013	2658	7.92	11/18/03 13:34	1264.27	335.61	28.4	131.6	0.265	0.240229	0.0252	9.50%	2.25%
ATC1118	C3	19	10011	2582	7.89	11/18/03 13:47	1268.82	327.25	28.4	131.6	0.258	0.240229	0.0177	6.86%	2.24%
ATC1118	C4	19	10004	2708	7.88	11/18/03 13:58	1269.54	343.65	28.6	131.6	0.271	0.240229	0.0305	11.25%	2.25%
ATC1118	D1	19	10014	2615	7.93	11/18/03 14:10	1262.80	329.76	28.3	131.6	0.261	0.240229	0.0209	8.01%	2.24%
ATC1118	D2	19	10012	2656	7.85	11/18/03 14:20	1275.41	338.34	28.7	131.6	0.265	0.240229	0.0251	9.44%	2.25%
ATC1118	D3	19	10011	2692	7.85	11/18/03 14:31	1275.29	342.93	28.7	131.6	0.269	0.240229	0.0287	10.66%	2.25%
ATC1118	D4	19	10000	2705	7.96	11/18/03 14:43	1256.28	339.82	28.3	131.6	0.271	0.240229	0.0303	11.19%	2.25%
ATC1118	A1	20	10011	2427	8.32	11/18/03 11:37	1203.25	291.71	26.8	135.2	0.242	0.239366	0.0031	1.27%	2.23%
ATC1118	A2	20	10000	2703	8.64	11/18/03 11:48	1157.41	312.85	26.1	135.2	0.270	0.239366	0.0309	11.44%	2.25%
ATC1118	A3	20	10004	2651	8.25	11/18/03 11:59	1212.61	321.33	27.3	135.2	0.265	0.239366	0.0256	9.67%	2.25%
ATC1118	A4	20	9999	2680	8.42	11/18/03 12:09	1187.53	318.29	26.7	135.2	0.268	0.239366	0.0287	10.69%	2.25%
ATC1118	B1	20	10008	2924	7.53	11/18/03 12:32	1329.08	388.31	30.2	135.2	0.292	0.239366	0.0528	18.07%	2.27%
ATC1118	B2	20	10004	2800	7.69	11/18/03 12:42	1300.91	364.11	29.4	135.2	0.280	0.239366	0.0405	14.48%	2.26%
ATC1118	B3	20	10004	2751	8.14	11/18/03 12:53	1228.99	337.96	27.7	135.2	0.275	0.239366	0.0356	12.95%	2.26%
ATC1118	B4	20	10002	2886	8.09	11/18/03 13:03	1236.34	356.74	28.1	135.2	0.289	0.239366	0.0492	17.04%	2.27%

000112

Alpha to Beta Crosstalk Calibration Worksheet - LB4100 Aβ

*y=b*m^-x*

b	*0.274*
m	*1.001*
a	*1*

min rel dev	-21.87%
max rel dev	24.63%
limit	< 25%

File ID	Detector ID	WorkOrder 0317014 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
ATC1118	C1	20	9999	2723	8.13	11/18/03 13:14	1229.89	334.93	27.7	135.2	0.272	0.239366	0.0330	12.10%	2.26%
ATC1118	C2	20	10003	2772	8.12	11/18/03 13:24	1231.90	341.38	27.8	135.2	0.277	0.239366	0.0378	13.62%	2.26%
ATC1118	C3	20	10002	2623	8.13	11/18/03 13:34	1230.26	322.63	27.6	135.2	0.262	0.239366	0.0229	8.72%	2.25%
ATC1118	C4	20	10000	2656	8.26	11/18/03 13:47	1210.65	321.55	27.2	135.2	0.266	0.239366	0.0262	9.88%	2.25%
ATC1118	D1	20	10003	2711	8.24	11/18/03 13:58	1213.96	329.00	27.4	135.2	0.271	0.239366	0.0317	11.68%	2.25%
ATC1118	D2	20	10001	2715	8.05	11/18/03 14:10	1242.36	337.27	28.0	135.2	0.271	0.239366	0.0321	11.83%	2.26%
ATC1118	D3	20	10008	2767	8.2	11/18/03 14:21	1220.49	337.44	27.6	135.2	0.276	0.239366	0.0371	13.42%	2.26%
ATC1118	D4	20	10007	2825	8.17	11/18/03 14:31	1224.85	345.78	27.7	135.2	0.282	0.239366	0.0429	15.21%	2.26%

000113

11/18/03
JE

Alpha Attenuation Curve (Am-241)

Am-241 on ringed planchets

Benchsheet: 17014AMC.XLS File name: ATC 1118

X / Y	11:17	11:28	11:39	11:50	12:00	12:29	12:39	12:49	12:55	13:06	13:15	13:26	13:39	13:49	14:02	14:12	14:22	14:35	14:45	14:55
1	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
2	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3
3	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4
4	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
5	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
6	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7
7	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8
8	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9
9	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10
10	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11
11	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12
*2	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13
13	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14
14	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15
15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16
16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17

* Data from planchets -2, -4, & 5 was not used due to poor fit. Quality of the curve is not affected as these planchets are mass duplicates of planchets -1, -3, & -6 respectively.
JE 11/20/03

JE 12/1/03

Read and Understood By

Continued on Page

Signed: Carl Zimmer Date: 12/1/03

Signed: Julie Ellingser Date: 12/4/03

pg 265845 a
(cont. from pg N/A b)

Paragon Analytics, Inc.

Low Background Gas Flow Proportional Counter Log

Instrument: **LB4100B**

SOP 724 Rev 8

Date: 11/18/03

Instrument Background and Response Checklist

P-10 Supply	P-10 Flow
1 1000	A 0.1
2 200	B
	C
	D

Bkg.	Cal. File ID
Dr A	BKB 1118W
Dr B	
Dr C	
Dr D	

Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On line	Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On-line
1	LGB		P		JE		P		✓	9	LGB		P		JE		P		✓
2									✓	10							P		✓
3									✓	11						JE	R	P	✓
4									✓	12							P		✓
5									✓	13									✓
6									✓	14									✓
7									✓	15									✓
8									✓	16							P		✓

P = passes; R = Recount, H = high; L = low; W = weekly; α = Alpha; B = Beta; DR = Daily Response Check; Stat = Status; Det = Detector; Bkg = Background; OL = Offline; NP = Not Processed.

Runlog

Det	SmplID	Batch	Test	File ID	Cnt Dur. (minutes)	Start-Time	Anal. Init.	Outp .Init.	Outp. Date	Cmnt Below
1-16	DR checks	–	–	EFB 1118	30	0707	LGB	JE	11/18/03	A
1-16	BKG Check	–	–	BKB1118	60	0732	JE	JE	11/18/03	
11	BKG Recount	–	–	BKB1118A	60	0916	JE	JE	11/18/03	
1-4	0317016-1-3,5	240787	Am-241 eff	EAM1118A	10	1026	JE	JE	11/18/03	
5-8				B		1032	JE	JE	11/18/03	
9-12				C		1038	JE	JE	11/18/03	
13-16				D		1057	JE	JE	11/18/03	
1-4	0317011-1,3,5	240788	Sr-90 gross β eff	EGB1118A	5	1032	JE	JE	11/18/03	
5-8				B		1038	JE	JE	11/18/03	
9-12				C		1057	JE	JE	11/18/03	
13-16				D		1104	JE	JE	11/18/03	
0317014-1-20 1-16	~~170144A~~ 11/18/03	170144MC.XLS	Am-241 curve	ATB1118	10/step	1117	JE	JE	11/18/03	

11/19/03

Form 780r6.frm (4/6/2001)

Reviewed by [signature] Date 11/19/03

Comments:

Gross Alpha/Beta in Water

Analyst: NT
Prep. Date:S. 05/08/03
Prep. Date:C 05/12/03

Analytical Balance No:13
SOP Used:702 Rev16

Data Filename:
Count Date/Time:

W.O.#	Sample #	Gravimetric Aliquot Determination Tare PC (g)	Gross PC (g)	Solid Mass (g)	Salt added (ml)	Remarks	CAR GRP	Pos Car No.	POS Ckd by
0317014	1	9.0299	9.037	7.1	0.2	ALL DESSICATED ON 05/12/03 @ 17:30			
0317014	2	9.0251	9.032	6.9	0.2				
0317014	3	9.0166	9.0338	17.2	0.5				
0317014	4	9.0126	9.0296	17	0.5				
0317014	5	9.0149	9.0461	31.2	0.8				
0317014	6	9.0261	9.0555	29.4	0.8				
0317014	7	9.0187	9.0611	42.4	1.1				
0317014	8	9.0487	9.0874	38.7	1.1				
0317014	9	9.0436	9.097	53.4	1.4				
0317014	10	9.0422	9.0962	54	1.4				
0317014	11	9.0332	9.1026	69.4	1.7				
0317014	12	8.9964	9.068	71.6	1.7				
0317014	13	9.0514	9.129	77.6	2				
0317014	14	9.032	9.1143	82.3	2				
0317014	15	9.0294	9.1279	98.5	2.3				
0317014	16	9.0159	9.1127	96.8	2.3				
0317014	17	9.0248	9.1437	118.9	2.6				
0317014	18	9.035	9.1393	104.3	2.6				
0317014	19	9.0143	9.1459	131.6	2.9				
0317014	20	9.032	9.1672	135.2	2.9				

*ALL DESSICATED ON 05/12/03 @ 17:30

Std. No.	Std. Type	Pipet NO.	Spike Vol (ml)	Spike dpm/ml
541.1808.26	Am 241	RS-010	0.2	11058.12

Spiked by: NT 05/08/03
Spike Witness: JRK 05/08/03
Reviewed by: Cw 5/13/03
Relinquished by: Cw 5/13/03
Received by: [illegible] 5/14/03

5/13/03.....3:15 PM

R/BENCH-SH/17014AMC.XLS

00016

Gross Alpha/Beta in Water

DRAFT

Analyst: NT NT
Prep. Date:S. 5/8/03
Prep. Date:C 5/12/03

Analytical Balance No:13
SOP Used:702 Rev15

Data Filename:
Count Date/Time:

all dessicated on 5/12/03 @ 17:30.

W.O.#	Sample #	Gravimetric Aliquot Determinatio Tare PC (g)	Gross PC (g)	Solid Mass (g)	Salt added (ml)
0317014	1			0	0.2
0317014	2			0	0.2
0317014	3			0	0.5
0317014	4			0	0.5
0317014	5			0	0.8
0317014	6			0	0.8
0317014	7			0	1.1
0317014	8			0	1.1
0317014	9			0	1.4
0317014	10			0	1.4
0317014	11			0	1.7
0317014	12			0	1.7
0317014	13			0	2
0317014	14			0	2
0317014	15			0	2.3
0317014	16			0	2.3
0317014	17			0	2.6
0317014	18			0	2.6
0317014	19			0	2.9
0317014	20			0	2.9

Std. No.	Std. Type	Pipet NO.	Spike Vol (ml)	Spike Act./ml
541.1808.26	Am 241	RS-010	0.2	11,038.17 dpm/ml

Spiked by: NT 5/8/03
Spike Witness: JAK 5/8/03
Reviewed by:

Relinquished by:
Received by:

5/8/03.....3:54 PM

R/BENCH-SH/17014AMC.XLS

000117

PROJECT 541.1808.26 Am-241 PRIMARY STD. Continued From Page

1) Prepare a primary dilution of Am-241. Transfer Std 541 (Analytics SRS 59175-307) to a 40 ml VOA vial + dilute to capacity w/ 3M HNO_3.

2) Determine mass of std transferred:

Mass of ampule (opened) + beaker	= 38.2533 g	Bal 12
Mass of empty ampule + beaker	= 33.1473 g	↓
Net mass of std transferred	= 5.1060 g	

3) Dilute standard to final mass w/ 3M HNO_3

Mass of empty 40 ml VOA w/ lid	= 27.1418 g	Bal 12
VOA + std + 3M HNO_3	= 72.0838 g	↓
Final mass of 1° std	44.9420 g	

4) Final Activity Calculation:

$$\frac{(4.096\times10^4\ dps)(5.1060\ g)(60\ dpm/dps)}{(5.55093\ g)(44.9420\ g)} = 50{,}300.7\ dpm/g$$

ANALYTICS
1380 Seaboard Ind. Blvd., Atlanta, GA 30318 USA (404) 352-8677
Type: Am-241
SRS: 59175-307 Date: 2/3/00 12:00 EST
Amount: 1.107 ml Exp: QA: [illegible]
PO: 23018 Item 1
5.55093 grams 3M HNO3 solution
CAUTION: RADIOACTIVE MATERIAL

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
[signature]	3/7/00	Melissa Gyttal	3/22/00

PAI19 00541
recd 2-04-00

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

59175-307

Am-241 5 mL Liquid in Flame Sealed Vial

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

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

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

ISOTOPE:	Am-241
ACTIVITY (dps):	4.096 E4
HALF-LIFE:	432.2 years
CALIBRATION DATE:	February 3, 2000 12:00 EST
TOTAL UNCERTAINTY*:	3.5%
SYSTEMATIC:	2.5%
RANDOM:	1.0%

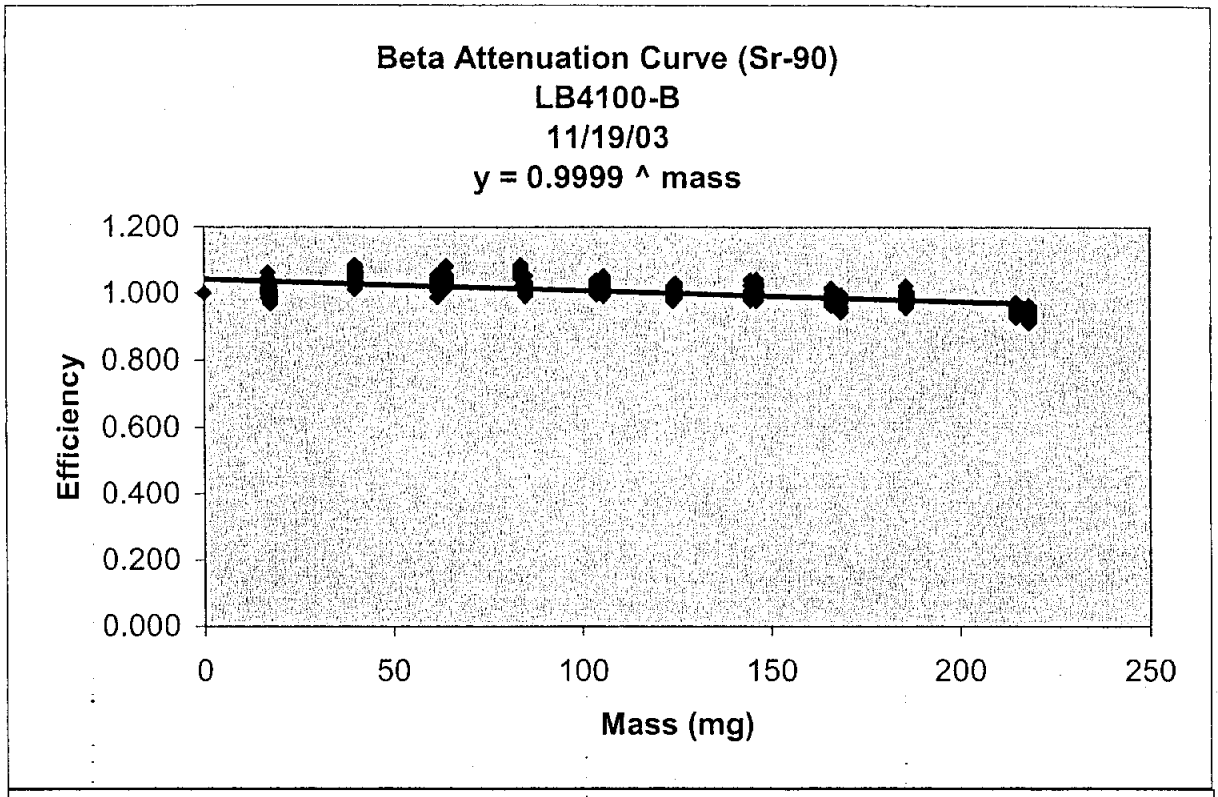
*99% confidence level.

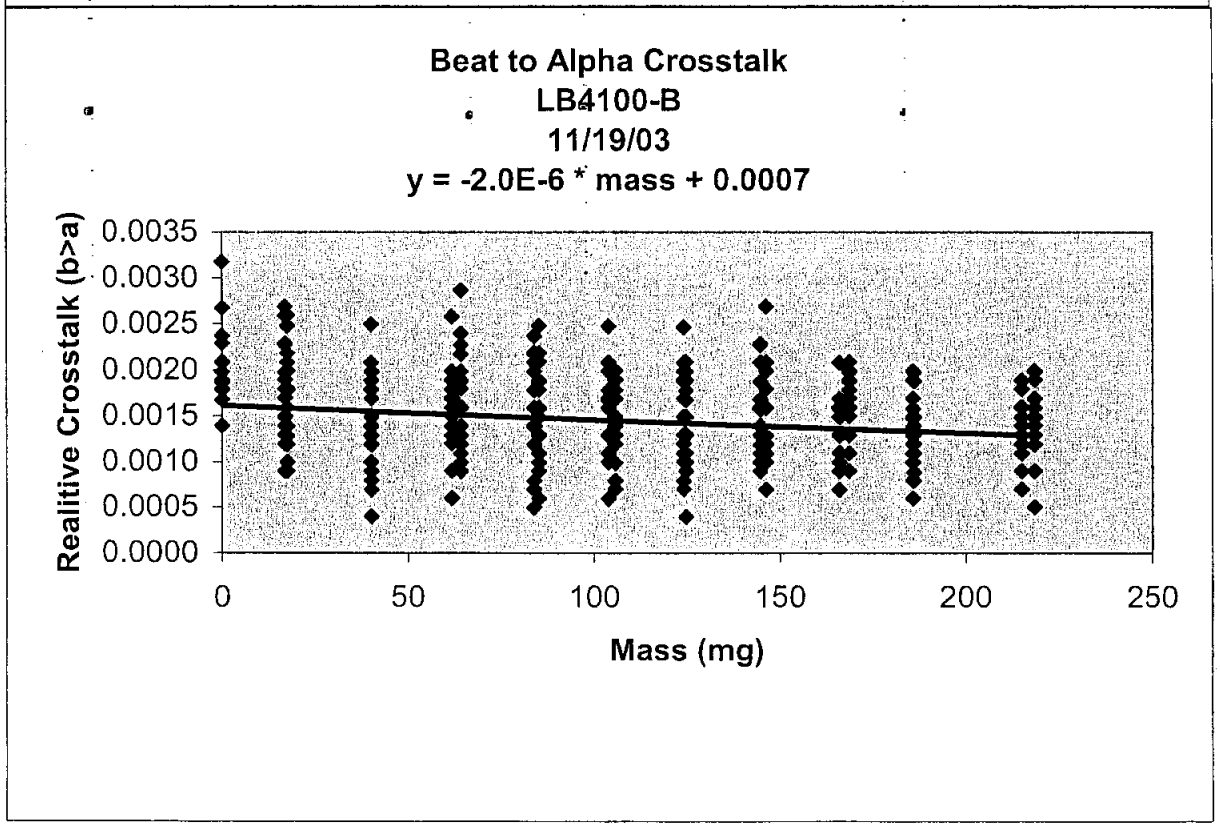
5.55093 grams 3M HNO_3 solution.

P O NUMBER 23018, Item 1

SOURCE PREPARED BY: _____
E. A. Taskaev, Radiochemist

Q A APPROVED: RCWW 2/3/00


Beta Attenuation Curve (Sr-90)
LB4100-B
11/19/03
y = 0.9999 ^ mass
Efficiency
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
50
100
150
200
250
Mass (mg)


Beat to Alpha Crosstalk
LB4100-B
11/19/03
y = -2.0E-6 * mass + 0.0007
Realitive Crosstalk (b>a)
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0
50
100
150
200
250
Mass (mg)

Beta Attenuation Calibration Worksheet - LB4100~~A~~B

9:12/01

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
EGB1118A	A1	1121	19	10178	1.28	11/18/03 10:34	1.385	7950	4437.76	1	19703.7	0.4035	0.4035	0	1.000	1	0.000
EGB1118A	A2	1121	20	10095	1.26	11/18/03 10:34	1.386	8011	4437.76	1	19703.7	0.4066	0.4066	0	1.000	1	0.000
EGB1118A	A3	1121	19	10098	1.24	11/18/03 10:34	1.441	8142	4437.76	1	19703.7	0.4132	0.4132	0	1.000	1	0.000
EGB1118A	A4	1121	21	10103	1.27	11/18/03 10:34	1.406	7954	4437.76	1	19703.7	0.4037	0.4037	0	1.000	1	0.000
EGB1118B	B1	1121	18	10025	1.21	11/18/03 10:40	1.618	8284	4437.76	1	19703.7	0.4204	0.4204	0	1.000	1	0.000
EGB1118B	B2	1121	21	10046	1.22	11/18/03 10:40	1.511	8233	4437.76	1	19703.7	0.4179	0.4179	0	1.000	1	0.000
EGB1118B	B3	1121	17	10142	1.21	11/18/03 10:40	1.558	8381	4437.76	1	19703.7	0.4253	0.4253	0	1.000	1	0.000
EGB1118B	B4	1121	18	10082	1.27	11/18/03 10:40	1.608	7937	4437.76	1	19703.7	0.4028	0.4028	0	1.000	1	0.000
EGB1118C	C1	1121	24	10121	1.23	11/18/03 10:59	1.503	8227	4437.76	1	19703.7	0.4175	0.4175	0	1.000	1	0.000
EGB1118C	C2	1121	23	10041	1.22	11/18/03 10:59	1.503	8229	4437.76	1	19703.7	0.4176	0.4176	0	1.000	1	0.000
EGB1118C	C3	1121	32	10076	1.22	11/18/03 10:59	1.534	8258	4437.76	1	19703.7	0.4191	0.4191	0	1.000	1	0.000
EGB1118C	C4	1121	19	10116	1.24	11/18/03 10:59	1.472	8157	4437.76	1	19703.7	0.4140	0.4140	0	1.000	1	0.000
EGB1118D	D1	1121	19	10055	1.24	11/18/03 11:05	1.474	8108	4437.75	1	19703.6	0.4115	0.4115	0	1.000	1	0.000
EGB1118D	D2	1121	27	10105	1.25	11/18/03 11:05	1.918	8082	4437.75	1	19703.6	0.4102	0.4102	0	1.000	1	0.000
EGB1118D	D3	1121	19	10086	1.22	11/18/03 11:05	1.883	8266	4437.75	1	19703.6	0.4195	0.4195	0	1.000	1	0.000
EGB1118D	D4	1121	14	10050	1.23	11/18/03 11:05	1.769	8169	4437.75	1	19703.6	0.4146	0.4146	0	1.000	1	0.000
BTC1119	A1	1	14	10076	1.25	37944.53065	1.385	8060	4437.75	1	19703.6	0.4090	0.4035	16.9	1.014	0.998312	0.015
BTC1119	A2	1	27	10058	1.25	37944.53323	1.386	8045	4437.75	1	19703.6	0.4083	0.4066	16.9	1.004	0.998312	0.006
BTC1119	A3	1	17	10030	1.23	37944.53564	1.441	8153	4437.75	1	19703.6	0.4138	0.4132	16.9	1.001	0.998312	0.003
BTC1119	A4	1	18	10025	1.21	37944.53797	1.406	8284	4437.75	1	19703.6	0.4204	0.4037	16.9	1.041	0.998312	0.043
BTC1119	B1	1	15	10099	1.17	37944.54043	1.618	8630	4437.75	1	19703.6	0.4380	0.4204	16.9	1.042	0.998312	0.044
BTC1119	B2	1	14	10078	1.19	37944.54289	1.511	8468	4437.75	1	19703.6	0.4298	0.4179	16.9	1.028	0.998312	0.030
BTC1119	B3	1	9	10076	1.22	37944.54531	1.558	8258	4437.75	1	19703.6	0.4191	0.4253	16.9	0.985	0.998312	-0.013
BTC1119	B4	1	12	10037	1.19	37944.54749	1.608	8433	4437.75	1	19703.6	0.4280	0.4028	16.9	1.062	0.998312	0.064
BTC1119	C1	1	19	10032	1.2	37944.5499	1.503	8359	4437.75	1	19703.6	0.4242	0.4175	16.9	1.016	0.998312	0.018
BTC1119	C2	1	15	10036	1.21	37944.55226	1.503	8293	4437.75	1	19703.6	0.4209	0.4176	16.9	1.008	0.998312	0.009
BTC1119	C3	1	20	10130	1.21	37944.55439	1.534	8371	4437.75	1	19703.6	0.4248	0.4191	16.9	1.014	0.998312	0.015
BTC1119	C4	1	13	10092	1.2	37944.55699	1.472	8409	4437.75	1	19703.6	0.4268	0.4140	16.9	1.031	0.998312	0.033
BTC1119	D1	1	13	10049	1.2	37944.55953	1.474	8373	4437.75	1	19703.6	0.4249	0.4115	16.9	1.033	0.998312	0.034
BTC1119	D2	1	23	10060	1.19	37944.56466	1.918	8452	4437.75	1	19703.6	0.4290	0.4102	16.9	1.046	0.998312	0.047
BTC1119	D3	1	26	10043	1.21	37944.568	1.883	8298	4437.75	1	19703.6	0.4212	0.4195	16.9	1.004	0.998312	0.006
BTC1119	D4	1	23	10118	1.24	37944.57081	1.769	8158	4437.75	1	19703.6	0.4140	0.4146	16.9	0.999	0.998312	0.000
BTC1119	A1	2	18	10024	1.27	37944.64159	1.385	7892	4437.75	1	19703.6	0.4005	0.4035	17.5	0.993	0.998252	-0.006
BTC1119	A2	2	20	10066	1.26	37944.53066	1.386	7988	4437.75	1	19703.6	0.4054	0.4066	17.5	0.997	0.998252	-0.001
BTC1119	A3	2	25	10086	1.26	37944.53324	1.441	8004	4437.75	1	19703.6	0.4062	0.4132	17.5	0.983	0.998252	-0.015
BTC1119	A4	2	26	10027	1.25	37944.53566	1.406	8020	4437.75	1	19703.6	0.4071	0.4037	17.5	1.008	0.998252	0.010
BTC1119	B1	2	20	10039	1.22	37944.53799	1.618	8227	4437.75	1	19703.6	0.4176	0.4204	17.5	0.993	0.998252	-0.005
BTC1119	B2	2	18	10114	1.23	37944.54049	1.511	8222	4437.75	1	19703.6	0.4173	0.4179	17.5	0.999	0.998252	0.000
BTC1119	B3	2	9	10060	1.24	37944.54293	1.558	8112	4437.75	1	19703.6	0.4117	0.4253	17.5	0.968	0.998252	-0.030
BTC1119	B4	2	16	10073	1.26	37944.54535	1.608	7993	4437.75	1	19703.6	0.4057	0.4028	17.5	1.007	0.998252	0.009

000121

Beta Attenuation Calibration Worksheet - LB4100A8

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	C1	2	20	10063	1.26	37944.54751	1.503	7985	4437.75	1	19703.6	0.4053	0.4175	17.5	0.971	0.998252	-0.028
BTC1119	C2	2	14	10105	1.23	37944.54993	1.503	8214	4437.75	1	19703.6	0.4169	0.4176	17.5	0.998	0.998252	0.000
BTC1119	C3	2	21	10077	1.25	37944.55228	1.534	8060	4437.75	1	19703.6	0.4091	0.4191	17.5	0.976	0.998252	-0.022
BTC1119	C4	2	10	10065	1.25	37944.55441	1.472	8051	4437.75	1	19703.6	0.4086	0.4140	17.5	0.987	0.998252	-0.011
BTC1119	D1	2	13	10179	1.23	37944.55703	1.474	8274	4437.75	1	19703.6	0.4199	0.4115	17.5	1.021	0.998252	0.022
BTC1119	D2	2	12	10082	1.26	37944.55957	1.918	8000	4437.75	1	19703.6	0.4060	0.4102	17.5	0.990	0.998252	-0.008
BTC1119	D3	2	22	10075	1.24	37944.56471	1.883	8123	4437.75	1	19703.6	0.4123	0.4195	17.5	0.983	0.998252	-0.015
BTC1119	D4	2	18	10099	1.27	37944.56806	1.769	7951	4437.75	1	19703.6	0.4035	0.4146	17.5	0.973	0.998252	-0.025
BTC1119	A1	4	19	10095	1.19	37944.63603	1.385	8482	4437.75	1	19703.6	0.4305	0.4035	40	1.067	0.996008	0.071
BTC1119	A2	4	10	10063	1.19	37944.63917	1.386	8455	4437.75	1	19703.6	0.4291	0.4066	40	1.055	0.996008	0.059
BTC1119	A3	4	18	10053	1.22	37944.64157	1.441	8239	4437.75	1	19703.6	0.4181	0.4132	40	1.012	0.996008	0.016
BTC1119	A4	4	21	10088	1.2	37944.53064	1.406	8405	4437.75	1	19703.6	0.4266	0.4037	40	1.057	0.996008	0.061
BTC1119	B1	4	10	10071	1.13	37944.53315	1.618	8911	4437.75	1	19703.6	0.4522	0.4204	40	1.076	0.996008	0.080
BTC1119	B2	4	10	10069	1.16	37944.5356	1.511	8679	4437.75	1	19703.6	0.4405	0.4179	40	1.054	0.996008	0.058
BTC1119	B3	4	9	10087	1.16	37944.53795	1.558	8694	4437.75	1	19703.6	0.4413	0.4253	40	1.037	0.996008	0.041
BTC1119	B4	4	14	10168	1.18	37944.54045	1.608	8616	4437.75	1	19703.6	0.4373	0.4028	40	1.085	0.996008	0.089
BTC1119	C1	4	15	10108	1.19	37944.54287	1.508	8493	4437.75	1	19703.6	0.4310	0.4175	40	1.032	0.996008	0.036
BTC1119	C2	4	13	10163	1.18	37944.54527	1.503	8611	4437.75	1	19703.6	0.4370	0.4176	40	1.046	0.996008	0.050
BTC1119	C3	4	15	10098	1.17	37944.54747	1.534	8629	4437.75	1	19703.6	0.4380	0.4191	40	1.045	0.996008	0.049
BTC1119	C4	4	13	10087	1.17	37944.54988	1.472	8620	4437.75	1	19703.6	0.4375	0.4140	40	1.057	0.996008	0.061
BTC1119	D1	4	12	10114	1.2	37944.55226	1.474	8427	4437.75	1	19703.6	0.4277	0.4115	40	1.039	0.996008	0.043
BTC1119	D2	4	14	10065	1.15	37944.55435	1.918	8751	4437.75	1	19703.6	0.4441	0.4102	40	1.083	0.996008	0.087
BTC1119	D3	4	18	10106	1.17	37944.55698	1.883	8636	4437.75	1	19703.6	0.4383	0.4195	40	1.045	0.996008	0.049
BTC1119	D4	4	25	10022	1.17	37944.55951	1.769	8564	4437.75	1	19703.6	0.4347	0.4146	40	1.048	0.996008	0.052
BTC1119	A1	3	15	10007	1.2	37944.63917	1.385	8338	4437.75	1	19703.6	0.4232	0.4035	40.1	1.049	0.995998	0.053
BTC1119	A2	3	15	10114	1.22	37944.64155	1.386	8289	4437.75	1	19703.6	0.4207	0.4066	40.1	1.035	0.995998	0.039
BTC1119	A3	3	20	10059	1.21	37944.53064	1.441	8312	4437.75	1	19703.6	0.4219	0.4132	40.1	1.021	0.995998	0.025
BTC1119	A4	3	19	10064	1.21	37944.53321	1.406	8316	4437.75	1	19703.6	0.4221	0.4037	40.1	1.046	0.995998	0.050
BTC1119	B1	3	12	10114	1.18	37944.53561	1.618	8570	4437.75	1	19703.6	0.4349	0.4204	40.1	1.035	0.995998	0.039
BTC1119	B2	3	15	10099	1.17	37944.53795	1.511	8630	4437.75	1	19703.6	0.4380	0.4179	40.1	1.048	0.995998	0.052
BTC1119	B3	3	9	10104	1.18	37944.54045	1.558	8561	4437.75	1	19703.6	0.4345	0.4253	40.1	1.022	0.995998	0.026
BTC1119	B4	3	4	10032	1.17	37944.54288	1.608	8573	4437.75	1	19703.6	0.4351	0.4028	40.1	1.080	0.995998	0.084
BTC1119	C1	3	17	10052	1.18	37944.54525	1.503	8517	4437.75	1	19703.6	0.4323	0.4175	40.1	1.035	0.995998	0.039
BTC1119	C2	3	12	10075	1.18	37944.54747	1.503	8537	4437.75	1	19703.6	0.4333	0.4176	40.1	1.037	0.995998	0.041
BTC1119	C3	3	13	10104	1.18	37944.54991	1.534	8561	4437.75	1	19703.6	0.4345	0.4191	40.1	1.037	0.995998	0.041
BTC1119	C4	3	7	10152	1.18	37944.55223	1.472	8602	4437.75	1	19703.6	0.4366	0.4140	40.1	1.055	0.995998	0.059
BTC1119	D1	3	8	10129	1.17	37944.55436	1.474	8656	4437.75	1	19703.6	0.4393	0.4115	40.1	1.068	0.995998	0.072
BTC1119	D2	3	12	10092	1.19	37944.557	1.918	8479	4437.75	1	19703.6	0.4303	0.4102	40.1	1.049	0.995998	0.053
BTC1119	D3	3	20	10096	1.15	37944.55949	1.883	8777	4437.75	1	19703.6	0.4455	0.4195	40.1	1.062	0.995998	0.066
BTC1119	D4	3	20	10113	1.18	37944.56465	1.769	8569	4437.75	1	19703.6	0.4349	0.4146	40.1	1.049	0.995998	0.053

Beta Attenuation Calibration Worksheet - LB4100A B

Standard ID	514.1572.72
Cert Act (pCi/g)	4969.8
To	3/18/99
Act. at Ct. Date	4437.76
	4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity[a] pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	A1	5	15	10056	1.22	37944.57281	1.385	8241	4437.75	1	19703.6	0.4183	0.4035	61.8	1.037	0.993839	0.043
BTC1119	A2	5	12	10015	1.24	37944.63608	1.386	8075	4437.75	1	19703.6	0.4098	0.4066	61.8	1.008	0.993839	0.014
BTC1119	A3	5	20	10075	1.19	37944.63917	1.441	8465	4437.75	1	19703.6	0.4296	0.4132	61.8	1.040	0.993839	0.046
BTC1119	A4	5	17	10035	1.21	37944.64155	1.406	8292	4437.75	1	19703.6	0.4208	0.4037	61.8	1.043	0.993839	0.049
BTC1119	B1	5	14	10072	1.17	37944.5306	1.618	8607	4437.75	1	19703.6	0.4368	0.4204	61.8	1.039	0.993839	0.045
BTC1119	B2	5	17	10086	1.19	37944.53319	1.511	8474	4437.75	1	19703.6	0.4301	0.4179	61.8	1.029	0.993839	0.035
BTC1119	B3	5	13	10109	1.22	37944.53565	1.558	8285	4437.75	1	19703.6	0.4205	0.4253	61.8	0.989	0.993839	-0.005
BTC1119	B4	5	9	10033	1.21	37944.53799	1.608	8290	4437.75	1	19703.6	0.4208	0.4028	61.8	1.044	0.993839	0.051
BTC1119	C1	5	18	10083	1.21	37944.54045	1.503	8332	4437.75	1	19703.6	0.4229	0.4175	61.8	1.013	0.993839	0.019
BTC1119	C2	5	6	10041	1.2	37944.54289	1.503	8366	4437.75	1	19703.6	0.4246	0.4176	61.8	1.017	0.993839	0.023
BTC1119	C3	5	14	10116	1.2	37944.54529	1.534	8429	4437.75	1	19703.6	0.4278	0.4191	61.8	1.021	0.993839	0.027
BTC1119	C4	5	19	10053	1.2	37944.54749	1.472	8376	4437.75	1	19703.6	0.4251	0.4140	61.8	1.027	0.993839	0.033
BTC1119	D1	5	18	10049	1.21	37944.54992	1.474	8304	4437.75	1	19703.6	0.4214	0.4115	61.8	1.024	0.993839	0.030
BTC1119	D2	5	16	10077	1.18	37944.55225	1.918	8538	4437.75	1	19703.6	0.4333	0.4102	61.8	1.056	0.993839	0.063
BTC1119	D3	5	26	10091	1.2	37944.55439	1.883	8408	4437.75	1	19703.6	0.4267	0.4195	61.8	1.017	0.993839	0.023
BTC1119	D4	5	19	10069	1.21	37944.55701	1.769	8320	4437.75	1	19703.6	0.4223	0.4146	61.8	1.018	0.993839	0.025
BTC1119	A1	6	19	10146	1.22	37944.57076	1.385	8315	4437.75	1	19703.6	0.4220	0.4035	64.2	1.046	0.993601	0.052
BTC1119	A2	6	19	10079	1.21	37944.57279	1.386	8329	4437.75	1	19703.6	0.4227	0.4066	64.2	1.040	0.993601	0.046
BTC1119	A3	6	20	10083	1.22	37944.63605	1.441	8264	4437.75	1	19703.6	0.4194	0.4132	64.2	1.015	0.993601	0.021
BTC1119	A4	6	24	10025	1.21	37944.63919	1.406	8284	4437.75	1	19703.6	0.4204	0.4037	64.2	1.041	0.993601	0.048
BTC1119	B1	6	10	10110	1.16	37944.64152	1.618	8714	4437.75	1	19703.6	0.4423	0.4204	64.2	1.052	0.993601	0.058
BTC1119	B2	6	18	10010	1.18	37944.53061	1.511	8482	4437.75	1	19703.6	0.4305	0.4179	64.2	1.030	0.993601	0.037
BTC1119	B3	6	13	10106	1.18	37944.53319	1.558	8563	4437.75	1	19703.6	0.4346	0.4253	64.2	1.022	0.993601	0.028
BTC1119	B4	6	11	10150	1.18	37944.53561	1.608	8600	4437.75	1	19703.6	0.4365	0.4028	64.2	1.084	0.993601	0.090
BTC1119	C1	6	16	10018	1.19	37944.53795	1.503	8417	4437.75	1	19703.6	0.4272	0.4175	64.2	1.023	0.993601	0.029
BTC1119	C2	6	12	10133	1.21	37944.54046	1.503	8373	4437.75	1	19703.6	0.4250	0.4176	64.2	1.018	0.993601	0.024
BTC1119	C3	6	22	10130	1.19	37944.54288	1.534	8511	4437.75	1	19703.6	0.4320	0.4191	64.2	1.031	0.993601	0.037
BTC1119	C4	6	9	10083	1.17	37944.54528	1.472	8617	4437.75	1	19703.6	0.4373	0.4140	64.2	1.056	0.993601	0.063
BTC1119	D1	6	14	10089	1.2	37944.54749	1.474	8406	4437.75	1	19703.6	0.4266	0.4115	64.2	1.037	0.993601	0.043
BTC1119	D2	6	23	10130	1.16	37944.54988	1.918	8731	4437.75	1	19703.6	0.4431	0.4102	64.2	1.080	0.993601	0.087
BTC1119	D3	6	16	10129	1.18	37944.55225	1.883	8582	4437.75	1	19703.6	0.4356	0.4195	64.2	1.038	0.993601	0.045
BTC1119	D4	6	29	10120	1.21	37944.5544	1.769	8362	4437.75	1	19703.6	0.4244	0.4146	64.2	1.024	0.993601	0.030
BTC1119	A1	8	7	10013	1.16	37944.56463	1.385	8631	4437.75	1	19703.6	0.4380	0.4035	83.8	1.086	0.991655	0.094
BTC1119	A2	8	18	10104	1.2	37944.56797	1.386	8419	4437.75	1	19703.6	0.4273	0.4066	83.8	1.051	0.991655	0.059
BTC1119	A3	8	16	10107	1.18	37944.57074	1.441	8564	4437.75	1	19703.6	0.4346	0.4132	83.8	1.052	0.991655	0.060
BTC1119	A4	8	22	10112	1.2	37944.57279	1.406	8425	4437.75	1	19703.6	0.4276	0.4037	83.8	1.059	0.991655	0.068
BTC1119	B1	8	14	10063	1.12	37944.636	1.618	8983	4437.75	1	19703.6	0.4559	0.4204	83.8	1.084	0.991655	0.093
BTC1119	B2	8	20	10080	1.14	37944.63914	1.511	8841	4437.75	1	19703.6	0.4487	0.4179	83.8	1.074	0.991655	0.082
BTC1119	B3	8	7	10068	1.18	37944.64154	1.558	8531	4437.75	1	19703.6	0.4330	0.4253	83.8	1.018	0.991655	0.026
BTC1119	B4	8	12	10124	1.18	37944.53063	1.608	8578	4437.75	1	19703.6	0.4354	0.4028	83.8	1.081	0.991655	0.089

000123

Beta Attenuation Calibration Worksheet - LB4100AB

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*
b 1
m 0.9999
a 1

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	C1	8	16	10077	1.17	37944.53317	1.503	8612	4437.75	1	19703.6	0.4371	0.4175	83.8	1.047	0.991655	0.055
BTC1119	C2	8	8	10162	1.16	37944.53559	1.503	8759	4437.75	1	19703.6	0.4445	0.4176	83.8	1.064	0.991655	0.073
BTC1119	C3	8	21	10077	1.15	37944.53793	1.534	8761	4437.75	1	19703.6	0.4447	0.4191	83.8	1.061	0.991655	0.069
BTC1119	C4	8	5	10155	1.18	37944.54044	1.472	8605	4437.75	1	19703.6	0.4367	0.4140	83.8	1.055	0.991655	0.063
BTC1119	D1	8	12	10098	1.16	37944.54286	1.474	8704	4437.75	1	19703.6	0.4417	0.4115	83.8	1.074	0.991655	0.082
BTC1119	D2	8	14	10147	1.16	37944.54528	1.918	8746	4437.75	1	19703.6	0.4439	0.4102	83.8	1.082	0.991655	0.090
BTC1119	D3	8	22	10056	1.16	37944.54748	1.883	8667	4437.75	1	19703.6	0.4399	0.4195	83.8	1.049	0.991655	0.057
BTC1119	D4	8	24	10138	1.19	37944.54993	1.769	8518	4437.75	1	19703.6	0.4323	0.4146	83.8	1.043	0.991655	0.051
BTC1119	A1	7	13	10152	1.25	37944.56801	1.385	8120	4437.75	1	19703.6	0.4121	0.4035	85.1	1.021	0.991527	0.030
BTC1119	A2	7	25	10088	1.25	37944.5708	1.386	8069	4437.75	1	19703.6	0.4095	0.4066	85.1	1.007	0.991527	0.016
BTC1119	A3	7	19	10137	1.23	37944.57282	1.441	8240	4437.75	1	19703.6	0.4182	0.4132	85.1	1.012	0.991527	0.020
BTC1119	A4	7	18	10073	1.23	37944.63608	1.406	8188	4437.75	1	19703.6	0.4156	0.4037	85.1	1.029	0.991527	0.038
BTC1119	B1	7	16	10152	1.2	37944.63918	1.618	8459	4437.75	1	19703.6	0.4293	0.4204	85.1	1.021	0.991527	0.030
BTC1119	B2	7	19	10075	1.2	37944.64156	1.511	8395	4437.75	1	19703.6	0.4260	0.4179	85.1	1.020	0.991527	0.028
BTC1119	B3	7	9	10049	1.21	37944.53065	1.558	8304	4437.75	1	19703.6	0.4214	0.4253	85.1	0.991	0.991527	-0.001
BTC1119	B4	7	15	10106	1.21	37944.53322	1.608	8351	4437.75	1	19703.6	0.4238	0.4028	85.1	1.052	0.991527	0.061
BTC1119	C1	7	16	10067	1.21	37944.53561	1.503	8319	4437.75	1	19703.6	0.4222	0.4175	85.1	1.011	0.991527	0.020
BTC1119	C2	7	10	10107	1.24	37944.538	1.503	8150	4437.75	1	19703.6	0.4136	0.4176	85.1	0.990	0.991527	-0.001
BTC1119	C3	7	16	10137	1.21	37944.54046	1.534	8376	4437.75	1	19703.6	0.4251	0.4191	85.1	1.014	0.991527	0.023
BTC1119	C4	7	6	10122	1.24	37944.54292	1.472	8162	4437.75	1	19703.6	0.4142	0.4140	85.1	1.001	0.991527	0.009
BTC1119	D1	7	13	10055	1.21	37944.54529	1.474	8309	4437.75	1	19703.6	0.4217	0.4115	85.1	1.025	0.991527	0.033
BTC1119	D2	7	11	10109	1.21	37944.5475	1.918	8353	4437.75	1	19703.6	0.4239	0.4102	85.1	1.033	0.991527	0.042
BTC1119	D3	7	21	10051	1.19	37944.54992	1.883	8445	4437.75	1	19703.6	0.4286	0.4195	85.1	1.022	0.991527	0.030
BTC1119	D4	7	22	10083	1.23	37944.55228	1.769	8196	4437.75	1	19703.6	0.4160	0.4146	85.1	1.003	0.991527	0.012
BTC1119	A1	9	11	10061	1.23	37944.55954	1.385	8179	4437.75	1	19703.6	0.4151	0.4035	103.9	1.029	0.989664	0.039
BTC1119	A2	9	17	10177	1.26	37944.56471	1.386	8076	4437.75	1	19703.6	0.4099	0.4066	103.9	1.008	0.989664	0.018
BTC1119	A3	9	20	10070	1.24	37944.56801	1.441	8120	4437.75	1	19703.6	0.4121	0.4132	103.9	0.997	0.989664	0.008
BTC1119	A4	9	18	10112	1.25	37944.5708	1.406	8088	4437.75	1	19703.6	0.4105	0.4037	103.9	1.017	0.989664	0.027
BTC1119	B1	9	16	10109	1.21	37944.57281	1.618	8353	4437.75	1	19703.6	0.4239	0.4204	103.9	1.008	0.989664	0.019
BTC1119	B2	9	13	10131	1.2	37944.63606	1.511	8441	4437.75	1	19703.6	0.4284	0.4179	103.9	1.025	0.989664	0.036
BTC1119	B3	9	17	10020	1.2	37944.63919	1.558	8349	4437.75	1	19703.6	0.4237	0.4253	103.9	0.996	0.989664	0.007
BTC1119	B4	9	10	10039	1.22	37944.64157	1.608	8227	4437.75	1	19703.6	0.4176	0.4028	103.9	1.037	0.989664	0.047
BTC1119	C1	9	13	10029	1.21	37944.53061	1.503	8287	4437.75	1	19703.6	0.4206	0.4175	103.9	1.007	0.989664	0.018
BTC1119	C2	9	6	10163	1.23	37944.53322	1.503	8261	4437.75	1	19703.6	0.4193	0.4176	103.9	1.004	0.989664	0.014
BTC1119	C3	9	21	10071	1.2	37944.53563	1.534	8391	4437.75	1	19703.6	0.4259	0.4191	103.9	1.016	0.989664	0.026
BTC1119	C4	9	10	10031	1.22	37944.53799	1.472	8221	4437.75	1	19703.6	0.4172	0.4140	103.9	1.008	0.989664	0.018
BTC1119	D1	9	13	10111	1.2	37944.54046	1.474	8425	4437.75	1	19703.6	0.4276	0.4115	103.9	1.039	0.989664	0.049
BTC1119	D2	9	16	10076	1.21	37944.54291	1.918	8326	4437.75	1	19703.6	0.4225	0.4102	103.9	1.030	0.989664	0.040
BTC1119	D3	9	21	10099	1.2	37944.5453	1.883	8414	4437.75	1	19703.6	0.4270	0.4195	103.9	1.018	0.989664	0.028
BTC1119	D4	9	25	10103	1.22	37944.54751	1.769	8280	4437.75	1	19703.6	0.4202	0.4146	103.9	1.014	0.989664	0.024

000124

Beta Attenuation Calibration Worksheet - LB4100AB

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	A1	10	14	10064	1.23	37944.557	1.385	8181	4437.75	1	19703.6	0.4152	0.4035	105.7	1.029	0.989486	0.040
BTC1119	A2	10	13	10086	1.23	37944.55955	1.386	8199	4437.75	1	19703.6	0.4161	0.4066	105.7	1.023	0.989486	0.034
BTC1119	A3	10	18	10105	1.24	37944.56469	1.441	8148	4437.75	1	19703.6	0.4135	0.4132	105.7	1.001	0.989486	0.011
BTC1119	A4	10	15	10063	1.22	37944.568	1.406	8247	4437.75	1	19703.6	0.4186	0.4037	105.7	1.037	0.989486	0.047
BTC1119	B1	10	18	10103	1.19	37944.57075	1.618	8489	4437.75	1	19703.6	0.4308	0.4204	105.7	1.025	0.989486	0.035
BTC1119	B2	10	15	10043	1.2	37944.57281	1.511	8368	4437.75	1	19703.6	0.4247	0.4179	105.7	1.016	0.989486	0.027
BTC1119	B3	10	10	10141	1.22	37944.63609	1.558	8311	4437.75	1	19703.6	0.4218	0.4253	105.7	0.992	0.989486	0.002
BTC1119	B4	10	7	10026	1.21	37944.6392	1.608	8285	4437.75	1	19703.6	0.4205	0.4028	105.7	1.044	0.989486	0.054
BTC1119	C1	10	14	10075	1.2	37944.64153	1.503	8395	4437.75	1	19703.6	0.4260	0.4175	105.7	1.020	0.989486	0.031
BTC1119	C2	10	12	10072	1.23	37944.53064	1.503	8187	4437.75	1	19703.6	0.4155	0.4176	105.7	0.995	0.989486	0.005
BTC1119	C3	10	20	10040	1.2	37944.53319	1.534	8365	4437.75	1	19703.6	0.4246	0.4191	105.7	1.013	0.989486	0.024
BTC1119	C4	10	17	10105	1.23	37944.53565	1.472	8214	4437.75	1	19703.6	0.4169	0.4140	105.7	1.007	0.989486	0.018
BTC1119	D1	10	19	10037	1.19	37944.53796	1.474	8433	4437.75	1	19703.6	0.4280	0.4115	105.7	1.040	0.989486	0.051
BTC1119	D2	10	8	10118	1.19	37944.54047	1.918	8501	4437.75	1	19703.6	0.4314	0.4102	105.7	1.052	0.989486	0.062
BTC1119	D3	10	19	10057	1.21	37944.54291	1.883	8310	4437.75	1	19703.6	0.4218	0.4195	105.7	1.005	0.989486	0.016
BTC1119	D4	10	17	10055	1.21	37944.54531	1.769	8308	4437.75	1	19703.6	0.4217	0.4146	105.7	1.017	0.989486	0.028
BTC1119	A1	12	11	10071	1.24	37944.55226	1.385	8121	4437.75	1	19703.6	0.4121	0.4035	124.2	1.021	0.987657	0.034
BTC1119	A2	12	17	10065	1.25	37944.55441	1.386	8051	4437.75	1	19703.6	0.4086	0.4066	124.2	1.005	0.987657	0.017
BTC1119	A3	12	25	10143	1.25	37944.55703	1.441	8113	4437.75	1	19703.6	0.4118	0.4132	124.2	0.996	0.987657	0.009
BTC1119	A4	12	21	10095	1.26	37944.55958	1.406	8011	4437.75	1	19703.6	0.4066	0.4037	124.2	1.007	0.987657	0.019
BTC1119	B1	12	15	10087	1.22	37944.56468	1.618	8267	4437.75	1	19703.6	0.4196	0.4204	124.2	0.998	0.987657	0.010
BTC1119	B2	12	19	10126	1.23	37944.56802	1.511	8231	4437.75	1	19703.6	0.4178	0.4179	124.2	1.000	0.987657	0.012
BTC1119	B3	12	8	10146	1.24	37944.57081	1.558	8181	4437.75	1	19703.6	0.4152	0.4253	124.2	0.976	0.987657	-0.011
BTC1119	B4	12	13	10061	1.24	37944.57285	1.608	8112	4437.75	1	19703.6	0.4117	0.4028	124.2	1.022	0.987657	0.034
BTC1119	C1	12	15	10048	1.22	37944.63605	1.503	8235	4437.75	1	19703.6	0.4179	0.4175	124.2	1.001	0.987657	0.013
BTC1119	C2	12	15	10100	1.22	37944.63918	1.503	8277	4437.75	1	19703.6	0.4201	0.4176	124.2	1.006	0.987657	0.018
BTC1119	C3	12	10	10031	1.23	37944.64156	1.534	8154	4437.75	1	19703.6	0.4138	0.4191	124.2	0.987	0.987657	0.000
BTC1119	C4	12	7	10010	1.24	37944.53066	1.472	8071	4437.75	1	19703.6	0.4096	0.4140	124.2	0.990	0.987657	0.002
BTC1119	D1	12	19	10023	1.22	37944.53322	1.474	8214	4437.75	1	19703.6	0.4169	0.4115	124.2	1.013	0.987657	0.026
BTC1119	D2	12	12	10033	1.24	37944.53566	1.918	8090	4437.75	1	19703.6	0.4106	0.4102	124.2	1.001	0.987657	0.013
BTC1119	D3	12	12	10022	1.2	37944.53797	1.883	8350	4437.75	1	19703.6	0.4238	0.4195	124.2	1.010	0.987657	0.023
BTC1119	D4	12	20	10067	1.23	37944.54049	1.769	8183	4437.75	1	19703.6	0.4153	0.4146	124.2	1.002	0.987657	0.014
BTC1119	A1	11	10	10034	1.23	37944.55439	1.385	8157	4437.75	1	19703.6	0.4140	0.4035	124.8	1.026	0.987598	0.038
BTC1119	A2	11	20	10084	1.26	37944.55704	1.386	8002	4437.75	1	19703.6	0.4061	0.4066	124.8	0.999	0.987598	0.011
BTC1119	A3	11	21	10039	1.24	37944.55956	1.441	8095	4437.75	1	19703.6	0.4108	0.4132	124.8	0.994	0.987598	0.007
BTC1119	A4	11	17	10145	1.25	37944.56471	1.406	8115	4437.75	1	19703.6	0.4118	0.4037	124.8	1.020	0.987598	0.033
BTC1119	B1	11	10	10041	1.19	37944.56797	1.618	8436	4437.75	1	19703.6	0.4282	0.4204	124.8	1.018	0.987598	0.031
BTC1119	B2	11	19	10057	1.21	37944.57078	1.511	8310	4437.75	1	19703.6	0.4218	0.4179	124.8	1.009	0.987598	0.022
BTC1119	B3	11	4	10147	1.21	37944.57282	1.558	8385	4437.75	1	19703.6	0.4255	0.4253	124.8	1.000	0.987598	0.013
BTC1119	B4	11	13	10007	1.24	37944.6361	1.608	8069	4437.75	1	19703.6	0.4095	0.4028	124.8	1.017	0.987598	0.029

000123

Beta Attenuation Calibration Worksheet - LB4100AB

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
y=b*m^ax
b 1
m 0.9999
a 1

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	C1	11	18	10127	1.21	37944.63918	1.503	8368	4437.75	1	19703.6	0.4247	0.4175	124.8	1.017	0.987598	0.030
BTC1119	C2	11	9	10050	1.21	37944.64154	1.503	8305	4437.75	1	19703.6	0.4215	0.4176	124.8	1.009	0.987598	0.022
BTC1119	C3	11	19	10078	1.24	37944.53065	1.534	8126	4437.75	1	19703.6	0.4124	0.4191	124.8	0.984	0.987598	-0.004
BTC1119	C4	11	11	10051	1.21	37944.53321	1.472	8305	4437.75	1	19703.6	0.4215	0.4140	124.8	1.018	0.987598	0.031
BTC1119	D1	11	10	10090	1.24	37944.53565	1.474	8136	4437.75	1	19703.6	0.4129	0.4115	124.8	1.003	0.987598	0.016
BTC1119	D2	11	15	10154	1.22	37944.538	1.918	8321	4437.75	1	19703.6	0.4223	0.4102	124.8	1.030	0.987598	0.042
BTC1119	D3	11	15	10072	1.23	37944.54049	1.883	8187	4437.75	1	19703.6	0.4155	0.4195	124.8	0.990	0.987598	0.003
BTC1119	D4	11	13	10090	1.24	37944.54293	1.769	8136	4437.75	1	19703.6	0.4129	0.4146	124.8	0.996	0.987598	0.008
BTC1119	A1	14	14	10095	1.24	37944.5475	1.385	8140	4437.75	1	19703.6	0.4131	0.4035	144.8	1.024	0.985625	0.038
BTC1119	A2	14	16	10055	1.26	37944.54995	1.386	7979	4437.75	1	19703.6	0.4050	0.4066	144.8	0.996	0.985625	0.010
BTC1119	A3	14	21	10078	1.25	37944.55228	1.441	8061	4437.75	1	19703.6	0.4091	0.4132	144.8	0.990	0.985625	0.004
BTC1119	A4	14	14	10066	1.27	37944.55444	1.406	7925	4437.75	1	19703.6	0.4022	0.4037	144.8	0.996	0.985625	0.011
BTC1119	B1	14	16	10183	1.25	37944.55704	1.618	8145	4437.75	1	19703.6	0.4134	0.4204	144.8	0.983	0.985625	-0.002
BTC1119	B2	14	9	10048	1.21	37944.55955	1.511	8303	4437.75	1	19703.6	0.4214	0.4179	144.8	1.008	0.985625	0.023
BTC1119	B3	14	14	10084	1.23	37944.56471	1.558	8197	4437.75	1	19703.6	0.4160	0.4253	144.8	0.978	0.985625	-0.008
BTC1119	B4	14	19	10153	1.23	37944.56803	1.608	8253	4437.75	1	19703.6	0.4189	0.4028	144.8	1.040	0.985625	0.054
BTC1119	C1	14	13	10079	1.23	37944.57078	1.503	8193	4437.75	1	19703.6	0.4158	0.4175	144.8	0.996	0.985625	0.010
BTC1119	C2	14	10	10097	1.24	37944.57281	1.503	8142	4437.75	1	19703.6	0.4132	0.4176	144.8	0.989	0.985625	0.004
BTC1119	C3	14	17	10125	1.22	37944.63606	1.534	8298	4437.75	1	19703.6	0.4211	0.4191	144.8	1.005	0.985625	0.019
BTC1119	C4	14	11	10107	1.24	37944.6392	1.472	8150	4437.75	1	19703.6	0.4136	0.4140	144.8	0.999	0.985625	0.013
BTC1119	D1	14	23	10111	1.25	37944.64157	1.474	8088	4437.75	1	19703.6	0.4105	0.4115	144.8	0.998	0.985625	0.012
BTC1119	D2	14	10	10073	1.24	37944.53066	1.918	8122	4437.75	1	19703.6	0.4122	0.4102	144.8	1.005	0.985625	0.019
BTC1119	D3	14	12	10170	1.23	37944.53323	1.883	8267	4437.75	1	19703.6	0.4196	0.4195	144.8	1.000	0.985625	0.015
BTC1119	D4	14	23	10067	1.24	37944.53566	1.769	8117	4437.75	1	19703.6	0.4120	0.4146	144.8	0.994	0.985625	0.008
BTC1119	A1	13	16	10048	1.26	37944.54993	1.385	7974	4437.75	1	19703.6	0.4047	0.4035	146.3	1.003	0.985477	0.017
BTC1119	A2	13	12	10050	1.26	37944.55229	1.386	7975	4437.75	1	19703.6	0.4048	0.4066	146.3	0.996	0.985477	0.010
BTC1119	A3	13	13	10104	1.27	37944.55442	1.441	7955	4437.75	1	19703.6	0.4037	0.4132	146.3	0.977	0.985477	-0.009
BTC1119	A4	13	21	10061	1.23	37944.55701	1.406	8179	4437.75	1	19703.6	0.4151	0.4037	146.3	1.028	0.985477	0.043
BTC1119	B1	13	16	10095	1.21	37944.55954	1.618	8342	4437.75	1	19703.6	0.4234	0.4204	146.3	1.007	0.985477	0.022
BTC1119	B2	13	21	10097	1.22	37944.56469	1.511	8275	4437.75	1	19703.6	0.4200	0.4179	146.3	1.005	0.985477	0.020
BTC1119	B3	13	7	10092	1.21	37944.568	1.558	8339	4437.75	1	19703.6	0.4232	0.4253	146.3	0.995	0.985477	0.010
BTC1119	B4	13	12	10090	1.22	37944.57079	1.608	8269	4437.75	1	19703.6	0.4197	0.4028	146.3	1.042	0.985477	0.056
BTC1119	C1	13	12	10106	1.23	37944.5728	1.503	8215	4437.75	1	19703.6	0.4169	0.4175	146.3	0.999	0.985477	0.013
BTC1119	C2	13	20	10052	1.23	37944.63606	1.503	8171	4437.75	1	19703.6	0.4147	0.4176	146.3	0.993	0.985477	0.007
BTC1119	C3	13	11	10130	1.23	37944.63919	1.534	8235	4437.75	1	19703.6	0.4179	0.4191	146.3	0.997	0.985477	0.012
BTC1119	C4	13	10	10065	1.2	37944.64154	1.472	8386	4437.75	1	19703.6	0.4256	0.4140	146.3	1.028	0.985477	0.043
BTC1119	D1	13	18	10019	1.23	37944.53065	1.474	8144	4437.75	1	19703.6	0.4133	0.4115	146.3	1.005	0.985477	0.019
BTC1119	D2	13	16	10083	1.22	37944.53323	1.918	8263	4437.75	1	19703.6	0.4194	0.4102	146.3	1.022	0.985477	0.037
BTC1119	D3	13	16	10085	1.2	37944.53563	1.883	8403	4437.75	1	19703.6	0.4264	0.4195	146.3	1.017	0.985477	0.031
BTC1119	D4	13	27	10040	1.24	37944.53801	1.769	8095	4437.75	1	19703.6	0.4109	0.4146	146.3	0.991	0.985477	0.005

000126

Beta Attenuation Calibration Worksheet - LB4100A B

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	A1	15	13	10035	1.28	37944.54534	1.385	7839	4437.75	1	19703.6	0.3978	0.4035	166.1	0.986	0.983528	0.002
BTC1119	A2	15	9	10054	1.28	37944.54753	1.386	7854	4437.75	1	19703.6	0.3986	0.4066	166.1	0.980	0.983528	-0.003
BTC1119	A3	15	16	10016	1.24	37944.54992	1.441	8076	4437.75	1	19703.6	0.4099	0.4132	166.1	0.992	0.983528	0.008
BTC1119	A4	15	11	10006	1.27	37944.55231	1.406	7878	4437.75	1	19703.6	0.3998	0.4037	166.1	0.990	0.983528	0.007
BTC1119	B1	15	17	10089	1.22	37944.5544	1.618	8268	4437.75	1	19703.6	0.4196	0.4204	166.1	0.998	0.983528	0.015
BTC1119	B2	15	21	10091	1.24	37944.55704	1.511	8137	4437.75	1	19703.6	0.4130	0.4179	166.1	0.988	0.983528	0.005
BTC1119	B3	15	9	10087	1.23	37944.55957	1.558	8200	4437.75	1	19703.6	0.4161	0.4253	166.1	0.978	0.983528	-0.005
BTC1119	B4	15	16	10074	1.25	37944.56473	1.608	8058	4437.75	1	19703.6	0.4090	0.4028	166.1	1.015	0.983528	0.032
BTC1119	C1	15	16	10148	1.26	37944.56801	1.503	8053	4437.75	1	19703.6	0.4087	0.4175	166.1	0.979	0.983528	-0.005
BTC1119	C2	15	13	10135	1.25	37944.57079	1.503	8107	4437.75	1	19703.6	0.4114	0.4176	166.1	0.985	0.983528	0.002
BTC1119	C3	15	10	10095	1.27	37944.57284	1.534	7948	4437.75	1	19703.6	0.4034	0.4191	166.1	0.962	0.983528	-0.021
BTC1119	C4	15	7	10119	1.27	37944.6361	1.472	7967	4437.75	1	19703.6	0.4043	0.4140	166.1	0.977	0.983528	-0.007
BTC1119	D1	15	15	10107	1.25	37944.63922	1.474	8084	4437.75	1	19703.6	0.4103	0.4115	166.1	0.997	0.983528	0.014
BTC1119	D2	15	13	10045	1.25	37944.6416	1.918	8034	4437.75	1	19703.6	0.4078	0.4102	166.1	0.994	0.983528	0.011
BTC1119	D3	15	11	10041	1.25	37944.53067	1.883	8031	4437.75	1	19703.6	0.4076	0.4195	166.1	0.972	0.983528	-0.012
BTC1119	D4	15	15	10068	1.27	37944.53325	1.769	7926	4437.75	1	19703.6	0.4023	0.4146	166.1	0.970	0.983528	-0.013
BTC1119	A1	16	11	10082	1.28	37944.54293	1.385	7875	4437.75	1	19703.6	0.3997	0.4035	168.7	0.991	0.983272	0.007
BTC1119	A2	16	20	10113	1.29	37944.54535	1.386	7838	4437.75	1	19703.6	0.3978	0.4066	168.7	0.978	0.983272	-0.005
BTC1119	A3	16	16	10032	1.27	37944.54753	1.441	7898	4437.75	1	19703.6	0.4008	0.4132	168.7	0.970	0.983272	-0.013
BTC1119	A4	16	15	10001	1.27	37944.54995	1.406	7874	4437.75	1	19703.6	0.3996	0.4037	168.7	0.990	0.983272	0.007
BTC1119	B1	16	17	10050	1.24	37944.55228	1.618	8104	4437.75	1	19703.6	0.4113	0.4204	168.7	0.978	0.983272	-0.005
BTC1119	B2	16	19	10042	1.24	37944.55441	1.511	8097	4437.75	1	19703.6	0.4109	0.4179	168.7	0.983	0.983272	0.000
BTC1119	B3	16	9	10032	1.27	37944.55705	1.558	7898	4437.75	1	19703.6	0.4008	0.4253	168.7	0.942	0.983272	-0.041
BTC1119	B4	16	20	10035	1.27	37944.55959	1.608	7900	4437.75	1	19703.6	0.4010	0.4028	168.7	0.995	0.983272	0.012
BTC1119	C1	16	16	10035	1.28	37944.56471	1.503	7839	4437.75	1	19703.6	0.3978	0.4175	168.7	0.953	0.983272	-0.031
BTC1119	C2	16	18	10078	1.28	37944.56803	1.503	7872	4437.75	1	19703.6	0.3995	0.4176	168.7	0.957	0.983272	-0.027
BTC1119	C3	16	19	10122	1.26	37944.5708	1.534	8032	4437.75	1	19703.6	0.4076	0.4191	168.7	0.973	0.983272	-0.011
BTC1119	C4	16	16	10099	1.29	37944.57286	1.472	7828	4437.75	1	19703.6	0.3973	0.4140	168.7	0.960	0.983272	-0.024
BTC1119	D1	16	18	10111	1.28	37944.63611	1.474	7898	4437.75	1	19703.6	0.4008	0.4115	168.7	0.974	0.983272	-0.009
BTC1119	D2	16	13	10070	1.27	37944.63924	1.918	7928	4437.75	1	19703.6	0.4023	0.4102	168.7	0.981	0.983272	-0.002
BTC1119	D3	16	21	10060	1.24	37944.64159	1.883	8111	4437.75	1	19703.6	0.4117	0.4195	168.7	0.981	0.983272	-0.002
BTC1119	D4	16	20	10019	1.26	37944.53068	1.769	7950	4437.75	1	19703.6	0.4035	0.4146	168.7	0.973	0.983272	-0.010
BTC1119	A1	17	10	10090	1.27	37944.54049	1.385	7944	4437.75	1	19703.6	0.4032	0.4035	186	0.999	0.981573	0.018
BTC1119	A2	17	17	10044	1.29	37944.54295	1.386	7785	4437.75	1	19703.6	0.3951	0.4066	186	0.972	0.981573	-0.010
BTC1119	A3	17	14	10094	1.29	37944.54536	1.441	7824	4437.75	1	19703.6	0.3971	0.4132	186	0.961	0.981573	-0.021
BTC1119	A4	17	19	10048	1.28	37944.54755	1.406	7849	4437.75	1	19703.6	0.3983	0.4037	186	0.987	0.981573	0.005
BTC1119	B1	17	13	10152	1.24	37944.54994	1.618	8186	4437.75	1	19703.6	0.4154	0.4204	186	0.988	0.981573	0.007
BTC1119	B2	17	15	10159	1.25	37944.5523	1.511	8126	4437.75	1	19703.6	0.4124	0.4179	186	0.987	0.981573	0.005
BTC1119	B3	17	6	10017	1.25	37944.55442	1.558	8012	4437.75	1	19703.6	0.4066	0.4253	186	0.956	0.981573	-0.026
BTC1119	B4	17	10	10062	1.24	37944.55704	1.608	8113	4437.75	1	19703.6	0.4118	0.4028	186	1.022	0.981573	0.041

001127

Beta Attenuation Calibration Worksheet - LB4100A B

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
y=b*m^ax

b	1
m	0.9999
a	1

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	C1	17	15	10109	1.26	37944.55955	1.503	8022	4437.75	1	19703.6	0.4071	0.4175	186	0.975	0.981573	-0.007
BTC1119	C2	17	12	10078	1.25	37944.5647	1.503	8061	4437.75	1	19703.6	0.4091	0.4176	186	0.980	0.981573	-0.002
BTC1119	C3	17	20	10051	1.27	37944.56804	1.534	7913	4437.75	1	19703.6	0.4016	0.4191	186	0.958	0.981573	-0.023
BTC1119	C4	17	8	10053	1.24	37944.5708	1.472	8106	4437.75	1	19703.6	0.4114	0.4140	186	0.994	0.981573	0.012
BTC1119	D1	17	15	10063	1.28	37944.57286	1.474	7861	4437.75	1	19703.6	0.3989	0.4115	186	0.970	0.981573	-0.012
BTC1119	D2	17	11	10103	1.24	37944.63609	1.918	8146	4437.75	1	19703.6	0.4134	0.4102	186	1.008	0.981573	0.026
BTC1119	D3	17	16	10126	1.23	37944.63921	1.883	8231	4437.75	1	19703.6	0.4177	0.4195	186	0.996	0.981573	0.014
BTC1119	D4	17	19	10046	1.25	37944.6416	1.769	8035	4437.75	1	19703.6	0.4078	0.4146	186	0.984	0.981573	0.002
BTC1119	A1	18	12	10025	1.28	37944.53801	1.385	7831	4437.75	1	19703.6	0.3974	0.4035	186.3	0.985	0.981543	0.003
BTC1119	A2	18	15	10119	1.27	37944.5405	1.386	7967	4437.75	1	19703.6	0.4043	0.4066	186.3	0.994	0.981543	0.013
BTC1119	A3	18	20	10138	1.27	37944.54294	1.441	7982	4437.75	1	19703.6	0.4051	0.4132	186.3	0.980	0.981543	-0.001
BTC1119	A4	18	13	10044	1.26	37944.54532	1.406	7970	4437.75	1	19703.6	0.4045	0.4037	186.3	1.002	0.981543	0.021
BTC1119	B1	18	14	10097	1.23	37944.54751	1.618	8208	4437.75	1	19703.6	0.4166	0.4204	186.3	0.991	0.981543	0.009
BTC1119	B2	18	13	10090	1.26	37944.54997	1.511	8007	4437.75	1	19703.6	0.4064	0.4179	186.3	0.972	0.981543	-0.009
BTC1119	B3	18	9	10200	1.24	37944.55229	1.558	8225	4437.75	1	19703.6	0.4174	0.4253	186.3	0.981	0.981543	0.000
BTC1119	B4	18	15	10040	1.26	37944.55444	1.608	7967	4437.75	1	19703.6	0.4043	0.4028	186.3	1.004	0.981543	0.022
BTC1119	C1	18	15	10059	1.25	37944.55701	1.503	8046	4437.75	1	19703.6	0.4084	0.4175	186.3	0.978	0.981543	-0.004
BTC1119	C2	18	19	10106	1.27	37944.55956	1.503	7956	4437.75	1	19703.6	0.4038	0.4176	186.3	0.967	0.981543	-0.015
BTC1119	C3	18	14	10061	1.24	37944.56469	1.534	8112	4437.75	1	19703.6	0.4117	0.4191	186.3	0.982	0.981543	0.001
BTC1119	C4	18	11	10080	1.25	37944.56802	1.472	8063	4437.75	1	19703.6	0.4092	0.4140	186.3	0.988	0.981543	0.007
BTC1119	D1	18	15	10047	1.26	37944.57082	1.474	7973	4437.75	1	19703.6	0.4046	0.4115	186.3	0.983	0.981543	0.002
BTC1119	D2	18	8	10112	1.26	37944.57285	1.918	8024	4437.75	1	19703.6	0.4072	0.4102	186.3	0.993	0.981543	0.011
BTC1119	D3	18	15	10084	1.24	37944.63609	1.883	8131	4437.75	1	19703.6	0.4127	0.4195	186.3	0.984	0.981543	0.002
BTC1119	D4	18	11	10046	1.26	37944.63922	1.769	7972	4437.75	1	19703.6	0.4046	0.4146	186.3	0.976	0.981543	-0.006
BTC1119	A1	19	12	10060	1.33	37944.53571	1.385	7563	4437.75	1	19703.6	0.3838	0.4035	214.9	0.951	0.97874	-0.027
BTC1119	A2	19	12	10040	1.34	37944.53806	1.386	7492	4437.75	1	19703.6	0.3802	0.4066	214.9	0.935	0.97874	-0.044
BTC1119	A3	19	11	10073	1.31	37944.54052	1.441	7688	4437.75	1	19703.6	0.3902	0.4132	214.9	0.944	0.97874	-0.035
BTC1119	A4	19	16	10053	1.34	37944.54299	1.406	7501	4437.75	1	19703.6	0.3807	0.4037	214.9	0.943	0.97874	-0.036
BTC1119	B1	19	13	10078	1.3	37944.54537	1.618	7751	4437.75	1	19703.6	0.3934	0.4204	214.9	0.936	0.97874	-0.043
BTC1119	B2	19	14	10029	1.28	37944.54756	1.511	7834	4437.75	1	19703.6	0.3976	0.4179	214.9	0.952	0.97874	-0.027
BTC1119	B3	19	7	10032	1.29	37944.54998	1.558	7776	4437.75	1	19703.6	0.3946	0.4253	214.9	0.928	0.97874	-0.051
BTC1119	B4	19	13	10035	1.3	37944.55233	1.608	7718	4437.75	1	19703.6	0.3917	0.4028	214.9	0.972	0.97874	-0.006
BTC1119	C1	19	16	10008	1.29	37944.55443	1.503	7757	4437.75	1	19703.6	0.3937	0.4175	214.9	0.943	0.97874	-0.036
BTC1119	C2	19	9	10031	1.31	37944.55706	1.503	7656	4437.75	1	19703.6	0.3886	0.4176	214.9	0.930	0.97874	-0.048
BTC1119	C3	19	12	10056	1.29	37944.55958	1.534	7794	4437.75	1	19703.6	0.3956	0.4191	214.9	0.944	0.97874	-0.035
BTC1119	C4	19	12	10087	1.31	37944.56475	1.472	7699	4437.75	1	19703.6	0.3907	0.4140	214.9	0.944	0.97874	-0.035
BTC1119	D1	19	15	10087	1.32	37944.56807	1.474	7641	4437.75	1	19703.6	0.3878	0.4115	214.9	0.942	0.97874	-0.036
BTC1119	D2	19	16	10047	1.29	37944.57083	1.918	7787	4437.75	1	19703.6	0.3952	0.4102	214.9	0.963	0.97874	-0.015
BTC1119	D3	19	19	10059	1.28	37944.57287	1.883	7857	4437.75	1	19703.6	0.3988	0.4195	214.9	0.951	0.97874	-0.028
BTC1119	D4	19	18	10017	1.31	37944.63613	1.769	7645	4437.75	1	19703.6	0.3880	0.4146	214.9	0.936	0.97874	-0.043

Beta Attenuation Calibration Worksheet - LB4100A B

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

Attenuation equation
*y=b*m^ax*

b	*1*
m	*0.9999*
a	*1*

min rel dev
max rel dev
limit

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Beta BKG	Beta cpm	Sr-90 Activity pCi/ml	Spike ml	Beta Activity dpm	Beta cpm/dpm	Detector Base Efficiency	Mass mg	Atten. Normalized to Zero Mass	Fitted Atten	abs dev
BTC1119	A1	20	15	10021	1.35	37944.53329	1.385	7422	4437.75	1	19703.6	0.3767	0.4035	218.2	0.934	0.978417	-0.045
BTC1119	A2	20	16	10065	1.33	37944.53571	1.386	7567	4437.75	1	19703.6	0.3840	0.4066	218.2	0.945	0.978417	-0.034
BTC1119	A3	20	19	10024	1.34	37944.53807	1.441	7480	4437.75	1	19703.6	0.3796	0.4132	218.2	0.919	0.978417	-0.060
BTC1119	A4	20	14	10038	1.33	37944.54054	1.406	7546	4437.75	1	19703.6	0.3830	0.4037	218.2	0.949	0.978417	-0.030
BTC1119	B1	20	5	10014	1.29	37944.54295	1.618	7762	4437.75	1	19703.6	0.3939	0.4204	218.2	0.937	0.978417	-0.041
BTC1119	B2	20	12	10110	1.31	37944.54538	1.511	7716	4437.75	1	19703.6	0.3916	0.4179	218.2	0.937	0.978417	-0.041
BTC1119	B3	20	17	10081	1.32	37944.54758	1.558	7636	4437.75	1	19703.6	0.3875	0.4253	218.2	0.911	0.978417	-0.067
BTC1119	B4	20	12	10062	1.34	37944.55001	1.608	7508	4437.75	1	19703.6	0.3810	0.4028	218.2	0.946	0.978417	-0.033
BTC1119	C1	20	14	10015	1.28	37944.55229	1.503	7823	4437.75	1	19703.6	0.3970	0.4175	218.2	0.951	0.978417	-0.028
BTC1119	C2	20	13	10053	1.32	37944.55446	1.503	7615	4437.75	1	19703.6	0.3865	0.4176	218.2	0.925	0.978417	-0.053
BTC1119	C3	20	9	10037	1.31	37944.55707	1.534	7661	4437.75	1	19703.6	0.3888	0.4191	218.2	0.928	0.978417	-0.051
BTC1119	C4	20	9	10057	1.3	37944.55959	1.472	7735	4437.75	1	19703.6	0.3926	0.4140	218.2	0.948	0.978417	-0.030
BTC1119	D1	20	17	10034	1.29	37944.56472	1.474	7777	4437.75	1	19703.6	0.3947	0.4115	218.2	0.959	0.978417	-0.019
BTC1119	D2	20	15	10115	1.3	37944.56807	1.918	7779	4437.75	1	19703.6	0.3948	0.4102	218.2	0.962	0.978417	-0.016
BTC1119	D3	20	20	10084	1.29	37944.57083	1.883	7816	4437.75	1	19703.6	0.3967	0.4195	218.2	0.946	0.978417	-0.033
BTC1119	D4	20	20	10037	1.31	37944.57288	1.769	7660	4437.75	1	19703.6	0.3888	0.4146	218.2	0.938	0.978417	-0.041

000129

Beta to Alpha Crosstalk Calibration Worksheet - LB4100A B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
EGB1118A	A1	1121	19	10178	1.28	11/18/03 10:34	14.8	7952	157.8	0	0.0019	0.0007	0.001	62.50%	1.98%
EGB1118A	A2	1121	20	10095	1.26	11/18/03 10:34	15.9	8012	159.6	0	0.0020	0.0007	0.001	64.67%	1.99%
EGB1118A	A3	1121	19	10098	1.24	11/18/03 10:34	15.3	8144	162.2	0	0.0019	0.0007	0.001	62.80%	1.99%
EGB1118A	A4	1121	21	10103	1.27	11/18/03 10:34	16.5	7955	158.5	0	0.0021	0.0007	0.001	66.32%	1.99%
EGB1118B	B1	1121	18	10025	1.21	11/18/03 10:40	14.9	8285	165.6	0	0.0018	0.0007	0.001	61.01%	2.00%
EGB1118B	B2	1121	21	10046	1.22	11/18/03 10:40	17.2	8234	164.5	0	0.0021	0.0007	0.001	66.51%	2.00%
EGB1118B	B3	1121	17	10142	1.21	11/18/03 10:40	14.0	8382	166.6	0	0.0017	0.0007	0.001	58.24%	1.99%
EGB1118B	B4	1121	18	10082	1.27	11/18/03 10:40	14.2	7939	158.3	0	0.0018	0.0007	0.001	60.79%	1.99%
EGB1118C	C1	1121	24	10121	1.23	11/18/03 10:59	19.5	8228	163.8	0	0.0024	0.0007	0.002	70.48%	1.99%
EGB1118C	C2	1121	23	10041	1.22	11/18/03 10:59	18.9	8230	164.5	0	0.0023	0.0007	0.002	69.44%	2.00%
EGB1118C	C3	1121	32	10076	1.22	11/18/03 10:59	26.2	8259	164.8	0	0.0032	0.0007	0.002	77.96%	2.00%
EGB1118C	C4	1121	19	10116	1.24	11/18/03 10:59	15.3	8158	162.4	0	0.0019	0.0007	0.001	62.73%	1.99%
EGB1118D	D1	1121	19	10055	1.24	11/18/03 11:05	15.3	8109	161.9	0	0.0019	0.0007	0.001	62.96%	2.00%
EGB1118D	D2	1121	27	10105	1.25	11/18/03 11:05	21.6	8084	161.1	0	0.0027	0.0007	0.002	73.80%	1.99%
EGB1118D	D3	1121	19	10086	1.22	11/18/03 11:05	15.6	8267	164.8	0	0.0019	0.0007	0.001	62.84%	1.99%
EGB1118D	D4	1121	14	10050	1.23	11/18/03 11:05	11.4	8171	163.1	0	0.0014	0.0007	0.001	49.75%	2.00%
BTC1119	A1	1	14	10076	1.25	11/19/03 12:44	11.2	8061	160.7	16.9	0.0014	0.000666	0.001	52.05%	1.99%
BTC1119	A2	1	27	10058	1.25	11/19/03 12:47	21.6	8046	160.7	16.9	0.0027	0.000666	0.002	75.18%	2.00%
BTC1119	A3	1	17	10030	1.23	11/19/03 12:51	13.8	8154	163.0	16.9	0.0017	0.000666	0.001	60.69%	2.00%
BTC1119	A4	1	18	10025	1.21	11/19/03 12:54	14.9	8285	165.6	16.9	0.0018	0.000666	0.001	62.90%	2.00%
BTC1119	B1	1	15	10099	1.17	11/19/03 12:58	12.8	8632	171.9	16.9	0.0015	0.000666	0.001	55.15%	1.99%
BTC1119	B2	1	14	10078	1.19	11/19/03 13:01	11.8	8469	168.8	16.9	0.0014	0.000666	0.001	52.04%	1.99%
BTC1119	B3	1	9	10076	1.22	11/19/03 13:05	7.4	8259	164.6	16.9	0.0009	0.000666	0.000	25.42%	1.99%
BTC1119	B4	1	12	10037	1.19	11/19/03 13:08	10.1	8434	168.5	16.9	0.0012	0.000666	0.001	44.28%	2.00%
BTC1119	C1	1	19	10032	1.2	11/19/03 13:11	15.8	8360	167.1	16.9	0.0019	0.000666	0.001	64.82%	2.00%
BTC1119	C2	1	15	10036	1.21	11/19/03 13:15	12.4	8294	165.7	16.9	0.0015	0.000666	0.001	55.43%	2.00%
BTC1119	C3	1	20	10130	1.21	11/19/03 13:18	16.5	8372	166.5	16.9	0.0020	0.000666	0.001	66.26%	1.99%
BTC1119	C4	1	13	10092	1.2	11/19/03 13:22	10.8	8410	167.5	16.9	0.0013	0.000666	0.001	48.28%	1.99%
BTC1119	D1	1	13	10049	1.2	11/19/03 13:25	10.8	8374	167.2	16.9	0.0013	0.000666	0.001	48.50%	2.00%
BTC1119	D2	1	23	10060	1.19	11/19/03 13:33	19.3	8454	168.8	16.9	0.0023	0.000666	0.002	70.86%	2.00%
BTC1119	D3	1	26	10043	1.21	11/19/03 13:37	21.5	8300	165.9	16.9	0.0026	0.000666	0.002	74.27%	2.00%
BTC1119	D4	1	23	10118	1.24	11/19/03 13:41	18.5	8160	162.4	16.9	0.0023	0.000666	0.002	70.69%	1.99%
BTC1119	A1	2	18	10024	1.27	11/19/03 15:23	14.2	7893	157.8	17.5	0.0018	0.000665	0.001	62.97%	2.00%
BTC1119	A2	2	20	10066	1.26	11/19/03 12:44	15.9	7989	159.4	17.5	0.0020	0.000665	0.001	66.53%	2.00%
BTC1119	A3	2	25	10086	1.26	11/19/03 12:47	19.8	8005	159.6	17.5	0.0025	0.000665	0.002	73.17%	1.99%

000130

Beta to Alpha Crosstalk Calibration Worksheet - LB4100A B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	A4	2	26	10027	1.25	11/19/03 12:51	20.8	8022	160.4	17.5	0.0026	0.000665	0.002	74.35%	2.00%
BTC1119	B1	2	20	10039	1.22	11/19/03 12:54	16.4	8229	164.4	17.5	0.0020	0.000665	0.001	66.62%	2.00%
BTC1119	B2	2	18	10114	1.23	11/19/03 12:58	14.6	8223	163.7	17.5	0.0018	0.000665	0.001	62.63%	1.99%
BTC1119	B3	2	9	10060	1.24	11/19/03 13:01	7.3	8113	161.8	17.5	0.0009	0.000665	0.000	25.67%	1.99%
BTC1119	B4	2	16	10073	1.26	11/19/03 13:05	12.7	7994	159.4	17.5	0.0016	0.000665	0.001	58.13%	1.99%
BTC1119	C1	2	20	10063	1.26	11/19/03 13:08	15.9	7987	159.4	17.5	0.0020	0.000665	0.001	66.54%	2.00%
BTC1119	C2	2	14	10105	1.23	11/19/03 13:11	11.4	8215	163.6	17.5	0.0014	0.000665	0.001	52.00%	1.99%
BTC1119	C3	2	21	10077	1.25	11/19/03 13:15	16.8	8062	160.8	17.5	0.0021	0.000665	0.001	68.09%	1.99%
BTC1119	C4	2	10	10065	1.25	11/19/03 13:18	8.0	8052	160.6	17.5	0.0010	0.000665	0.000	33.07%	1.99%
BTC1119	D1	2	13	10179	1.23	11/19/03 13:22	10.6	8276	164.2	17.5	0.0013	0.000665	0.001	47.93%	1.98%
BTC1119	D2	2	12	10082	1.26	11/19/03 13:25	9.5	8002	159.5	17.5	0.0012	0.000665	0.001	44.13%	1.99%
BTC1119	D3	2	22	10075	1.24	11/19/03 13:33	17.7	8125	162.1	17.5	0.0022	0.000665	0.002	69.55%	1.99%
BTC1119	D4	2	18	10099	1.27	11/19/03 13:38	14.2	7952	158.4	17.5	0.0018	0.000665	0.001	62.69%	1.99%
BTC1119	A1	4	19	10095	1.19	11/19/03 15:15	16.0	8483	169.0	40	0.0019	0.00062	0.001	67.06%	1.99%
BTC1119	A2	4	10	10063	1.19	11/19/03 15:20	8.4	8456	168.7	40	0.0010	0.00062	0.000	37.61%	1.99%
BTC1119	A3	4	18	10053	1.22	11/19/03 15:23	14.8	8240	164.5	40	0.0018	0.00062	0.001	65.37%	2.00%
BTC1119	A4	4	21	10088	1.2	11/19/03 12:44	17.5	8407	167.6	40	0.0021	0.00062	0.001	70.22%	1.99%
BTC1119	B1	4	10	10071	1.13	11/19/03 12:47	8.8	8912	177.7	40	0.0010	0.00062	0.000	37.56%	1.99%
BTC1119	B2	4	10	10069	1.16	11/19/03 12:51	8.6	8680	173.1	40	0.0010	0.00062	0.000	37.57%	1.99%
BTC1119	B3	4	9	10087	1.16	11/19/03 12:54	7.8	8696	173.2	40	0.0009	0.00062	0.000	30.51%	1.99%
BTC1119	B4	4	14	10168	1.18	11/19/03 12:58	11.9	8617	171.0	40	0.0014	0.00062	0.001	54.97%	1.98%
BTC1119	C1	4	15	10108	1.19	11/19/03 13:01	12.6	8494	169.1	40	0.0015	0.00062	0.001	58.22%	1.99%
BTC1119	C2	4	13	10163	1.18	11/19/03 13:05	11.0	8613	171.0	40	0.0013	0.00062	0.001	51.53%	1.99%
BTC1119	C3	4	15	10098	1.17	11/19/03 13:08	12.8	8631	171.9	40	0.0015	0.00062	0.001	58.26%	1.99%
BTC1119	C4	4	13	10087	1.17	11/19/03 13:11	11.1	8621	171.8	40	0.0013	0.00062	0.001	51.89%	1.99%
BTC1119	D1	4	12	10114	1.2	11/19/03 13:15	10.0	8428	167.7	40	0.0012	0.00062	0.001	47.74%	1.99%
BTC1119	D2	4	14	10065	1.15	11/19/03 13:18	12.2	8752	174.6	40	0.0014	0.00062	0.001	55.43%	1.99%
BTC1119	D3	4	18	10106	1.17	11/19/03 13:22	15.4	8638	172.0	40	0.0018	0.00062	0.001	65.19%	1.99%
BTC1119	D4	4	25	10022	1.17	11/19/03 13:25	21.4	8566	171.3	40	0.0025	0.00062	0.002	75.15%	2.00%
BTC1119	A1	3	15	10007	1.2	11/19/03 15:20	12.5	8339	166.8	40.1	0.0015	0.00062	0.001	58.65%	2.00%
BTC1119	A2	3	15	10114	1.22	11/19/03 15:23	12.3	8290	165.0	40.1	0.0015	0.00062	0.001	58.21%	1.99%
BTC1119	A3	3	20	10059	1.21	11/19/03 12:44	16.5	8313	165.9	40.1	0.0020	0.00062	0.001	68.83%	2.00%
BTC1119	A4	3	19	10064	1.21	11/19/03 12:47	15.7	8317	166.0	40.1	0.0019	0.00062	0.001	67.17%	2.00%
BTC1119	B1	3	12	10114	1.18	11/19/03 12:51	10.2	8571	170.6	40.1	0.0012	0.00062	0.001	47.76%	1.99%
BTC1119	B2	3	15	10099	1.17	11/19/03 12:54	12.8	8632	171.9	40.1	0.0015	0.00062	0.001	58.27%	1.99%

000131

Beta to Alpha Crosstalk Calibration Worksheet - LB4100~~A~~B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	B3	3	9	10104	1.18	11/19/03 12:58	7.6	8563	170.4	40.1	0.0009	0.00062	0.000	30.42%	1.99%
BTC1119	B4	3	4	10032	1.17	11/19/03 13:01	3.4	8574	171.2	40.1	0.0004	0.00062	0.000	-55.45%	2.00%
BTC1119	C1	3	17	10052	1.18	11/19/03 13:05	14.4	8519	170.1	40.1	0.0017	0.00062	0.001	63.35%	2.00%
BTC1119	C2	3	12	10075	1.18	11/19/03 13:08	10.2	8538	170.2	40.1	0.0012	0.00062	0.001	47.96%	1.99%
BTC1119	C3	3	13	10104	1.18	11/19/03 13:11	11.0	8563	170.5	40.1	0.0013	0.00062	0.001	51.83%	1.99%
BTC1119	C4	3	7	10152	1.18	11/19/03 13:15	5.9	8603	170.8	40.1	0.0007	0.00062	0.000	10.11%	1.99%
BTC1119	D1	3	8	10129	1.17	11/19/03 13:18	6.8	8657	172.1	40.1	0.0008	0.00062	0.000	21.53%	1.99%
BTC1119	D2	3	12	10092	1.19	11/19/03 13:22	10.1	8481	168.9	40.1	0.0012	0.00062	0.001	47.87%	1.99%
BTC1119	D3	3	20	10096	1.15	11/19/03 13:25	17.4	8779	174.9	40.1	0.0020	0.00062	0.001	68.71%	1.99%
BTC1119	D4	3	20	10113	1.18	11/19/03 13:33	16.9	8570	170.6	40.1	0.0020	0.00062	0.001	68.66%	1.99%
BTC1119	A1	5	15	10056	1.22	11/19/03 13:44	12.3	8243	164.5	61.8	0.0015	0.000576	0.001	61.36%	2.00%
BTC1119	A2	5	12	10015	1.24	11/19/03 15:15	9.7	8077	161.5	61.8	0.0012	0.000576	0.001	51.89%	2.00%
BTC1119	A3	5	20	10075	1.19	11/19/03 15:20	16.8	8466	168.9	61.8	0.0020	0.000576	0.001	70.96%	1.99%
BTC1119	A4	5	17	10035	1.21	11/19/03 15:23	14.0	8293	165.7	61.8	0.0017	0.000576	0.001	65.98%	2.00%
BTC1119	B1	5	14	10072	1.17	11/19/03 12:44	12.0	8609	171.7	61.8	0.0014	0.000576	0.001	58.53%	1.99%
BTC1119	B2	5	17	10086	1.19	11/19/03 12:47	14.3	8476	168.9	61.8	0.0017	0.000576	0.001	65.80%	1.99%
BTC1119	B3	5	13	10109	1.22	11/19/03 12:51	10.7	8286	164.9	61.8	0.0013	0.000576	0.001	55.18%	1.99%
BTC1119	B4	5	9	10033	1.21	11/19/03 12:54	7.4	8292	165.6	61.8	0.0009	0.000576	0.000	35.74%	2.00%
BTC1119	C1	5	18	10083	1.21	11/19/03 12:58	14.9	8333	166.1	61.8	0.0018	0.000576	0.001	67.71%	1.99%
BTC1119	C2	5	6	10041	1.2	11/19/03 13:01	5.0	8368	167.1	61.8	0.0006	0.000576	0.000	3.54%	2.00%
BTC1119	C3	5	14	10116	1.2	11/19/03 13:05	11.7	8430	167.7	61.8	0.0014	0.000576	0.001	58.35%	1.99%
BTC1119	C4	5	19	10053	1.2	11/19/03 13:08	15.8	8378	167.3	61.8	0.0019	0.000576	0.001	69.50%	2.00%
BTC1119	D1	5	18	10049	1.21	11/19/03 13:11	14.9	8305	165.8	61.8	0.0018	0.000576	0.001	67.82%	2.00%
BTC1119	D2	5	16	10077	1.18	11/19/03 13:15	13.6	8540	170.3	61.8	0.0016	0.000576	0.001	63.70%	1.99%
BTC1119	D3	5	26	10091	1.2	11/19/03 13:18	21.7	8409	167.6	61.8	0.0026	0.000576	0.002	77.63%	1.99%
BTC1119	D4	5	19	10069	1.21	11/19/03 13:22	15.7	8321	166.0	61.8	0.0019	0.000576	0.001	69.45%	2.00%
BTC1119	A1	6	19	10146	1.22	11/19/03 13:41	15.6	8316	165.3	64.2	0.0019	0.000572	0.001	69.48%	1.99%
BTC1119	A2	6	19	10079	1.21	11/19/03 13:44	15.7	8330	166.1	64.2	0.0019	0.000572	0.001	69.68%	1.99%
BTC1119	A3	6	20	10083	1.22	11/19/03 15:15	16.4	8265	164.8	64.2	0.0020	0.000572	0.001	71.18%	1.99%
BTC1119	A4	6	24	10025	1.21	11/19/03 15:20	19.8	8285	165.7	64.2	0.0024	0.000572	0.002	76.12%	2.00%
BTC1119	B1	6	10	10110	1.16	11/19/03 15:23	8.6	8716	173.4	64.2	0.0010	0.000572	0.000	42.21%	1.99%
BTC1119	B2	6	18	10010	1.18	11/19/03 12:44	15.3	8483	169.7	64.2	0.0018	0.000572	0.001	68.21%	2.00%
BTC1119	B3	6	13	10106	1.18	11/19/03 12:47	11.0	8564	170.5	64.2	0.0013	0.000572	0.001	55.56%	1.99%
BTC1119	B4	6	11	10150	1.18	11/19/03 12:51	9.3	8602	170.9	64.2	0.0011	0.000572	0.001	47.26%	1.99%
BTC1119	C1	6	16	10018	1.19	11/19/03 12:54	13.4	8418	168.4	64.2	0.0016	0.000572	0.001	64.21%	2.00%

000132

Beta to Alpha Crosstalk Calibration Worksheet - LB4100Aß

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	C2	6	12	10133	1.21	11/19/03 12:58	9.9	8374	166.5	64.2	0.0012	0.000572	0.001	51.73%	1.99%
BTC1119	C3	6	22	10130	1.19	11/19/03 13:01	18.5	8513	169.3	64.2	0.0022	0.000572	0.002	73.68%	1.99%
BTC1119	C4	6	9	10083	1.17	11/19/03 13:05	7.7	8618	171.7	64.2	0.0009	0.000572	0.000	35.96%	1.99%
BTC1119	D1	6	14	10089	1.2	11/19/03 13:08	11.7	8408	167.5	64.2	0.0014	0.000572	0.001	58.81%	1.99%
BTC1119	D2	6	23	10130	1.16	11/19/03 13:11	19.8	8733	173.7	64.2	0.0023	0.000572	0.002	74.82%	1.99%
BTC1119	D3	6	16	10129	1.18	11/19/03 13:15	13.6	8584	170.7	64.2	0.0016	0.000572	0.001	63.81%	1.99%
BTC1119	D4	6	29	10120	1.21	11/19/03 13:18	24.0	8364	166.5	64.2	0.0029	0.000572	0.002	80.05%	1.99%
BTC1119	A1	8	7	10013	1.16	11/19/03 13:33	6.0	8632	172.6	83.8	0.0007	0.000532	0.000	23.84%	2.00%
BTC1119	A2	8	18	10104	1.2	11/19/03 13:37	15.0	8420	167.7	83.8	0.0018	0.000532	0.001	70.11%	1.99%
BTC1119	A3	8	16	10107	1.18	11/19/03 13:41	13.6	8565	170.5	83.8	0.0016	0.000532	0.001	66.37%	1.99%
BTC1119	A4	8	22	10112	1.2	11/19/03 13:44	18.3	8427	167.8	83.8	0.0022	0.000532	0.002	75.53%	1.99%
BTC1119	B1	8	14	10063	1.12	11/19/03 15:15	12.5	8985	179.3	83.8	0.0014	0.000532	0.001	61.73%	2.00%
BTC1119	B2	8	20	10080	1.14	11/19/03 15:20	17.5	8842	176.3	83.8	0.0020	0.000532	0.001	73.17%	1.99%
BTC1119	B3	8	7	10068	1.18	11/19/03 15:23	5.9	8532	170.1	83.8	0.0007	0.000532	0.000	23.43%	1.99%
BTC1119	B4	8	12	10124	1.18	11/19/03 12:44	10.2	8580	170.6	83.8	0.0012	0.000532	0.001	55.08%	1.99%
BTC1119	C1	8	16	10077	1.17	11/19/03 12:47	13.7	8613	171.7	83.8	0.0016	0.000532	0.001	66.47%	1.99%
BTC1119	C2	8	8	10162	1.16	11/19/03 12:51	6.9	8760	173.9	83.8	0.0008	0.000532	0.000	32.37%	1.98%
BTC1119	C3	8	21	10077	1.15	11/19/03 12:54	18.3	8763	174.8	83.8	0.0021	0.000532	0.002	74.45%	1.99%
BTC1119	C4	8	5	10155	1.18	11/19/03 12:58	4.2	8606	170.8	83.8	0.0005	0.000532	0.000	-8.13%	1.99%
BTC1119	D1	8	12	10098	1.16	11/19/03 13:01	10.3	8705	173.4	83.8	0.0012	0.000532	0.001	55.20%	1.99%
BTC1119	D2	8	14	10147	1.16	11/19/03 13:05	12.1	8747	173.8	83.8	0.0014	0.000532	0.001	61.41%	1.99%
BTC1119	D3	8	22	10056	1.16	11/19/03 13:08	19.0	8669	173.1	83.8	0.0022	0.000532	0.002	75.66%	2.00%
BTC1119	D4	8	24	10138	1.19	11/19/03 13:11	20.2	8519	169.4	83.8	0.0024	0.000532	0.002	77.51%	1.99%
BTC1119	A1	7	13	10152	1.25	11/19/03 13:37	10.4	8122	161.3	85.1	0.0013	0.00053	0.001	58.63%	1.99%
BTC1119	A2	7	25	10088	1.25	11/19/03 13:41	20.0	8070	160.9	85.1	0.0025	0.00053	0.002	78.62%	1.99%
BTC1119	A3	7	19	10137	1.23	11/19/03 13:44	15.4	8241	163.9	85.1	0.0019	0.00053	0.001	71.73%	1.99%
BTC1119	A4	7	18	10073	1.23	11/19/03 15:15	14.6	8189	163.3	85.1	0.0018	0.00053	0.001	70.35%	1.99%
BTC1119	B1	7	16	10152	1.2	11/19/03 15:20	13.3	8460	168.1	85.1	0.0016	0.00053	0.001	66.38%	1.99%
BTC1119	B2	7	19	10075	1.2	11/19/03 15:23	15.8	8396	167.4	85.1	0.0019	0.00053	0.001	71.91%	1.99%
BTC1119	B3	7	9	10049	1.21	11/19/03 12:44	7.4	8305	165.8	85.1	0.0009	0.00053	0.000	40.84%	2.00%
BTC1119	B4	7	15	10106	1.21	11/19/03 12:47	12.4	8352	166.3	85.1	0.0015	0.00053	0.001	64.31%	1.99%
BTC1119	C1	7	16	10067	1.21	11/19/03 12:51	13.2	8320	166.0	85.1	0.0016	0.00053	0.001	66.67%	1.99%
BTC1119	C2	7	10	10107	1.24	11/19/03 12:54	8.1	8151	162.2	85.1	0.0010	0.00053	0.000	46.45%	1.99%
BTC1119	C3	7	16	10137	1.21	11/19/03 12:58	13.2	8378	166.5	85.1	0.0016	0.00053	0.001	66.43%	1.99%
BTC1119	C4	7	6	10122	1.24	11/19/03 13:01	4.8	8163	162.3	85.1	0.0006	0.00053	0.000	10.62%	1.99%

000133

Beta to Alpha Crosstalk Calibration Worksheet - LB4100A/B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	D1	7	13	10055	1.21	11/19/03 13:05	10.7	8310	165.9	85.1	0.0013	0.00053	0.001	59.02%	2.00%
BTC1119	D2	7	11	10109	1.21	11/19/03 13:08	9.1	8355	166.3	85.1	0.0011	0.00053	0.001	51.31%	1.99%
BTC1119	D3	7	21	10051	1.19	11/19/03 13:11	17.6	8446	168.7	85.1	0.0021	0.00053	0.002	74.64%	2.00%
BTC1119	D4	7	22	10083	1.23	11/19/03 13:15	17.9	8198	163.5	85.1	0.0022	0.00053	0.002	75.72%	1.99%
BTC1119	A1	9	11	10061	1.23	11/19/03 13:25	8.9	8180	163.2	103.9	0.0011	0.000492	0.001	54.98%	2.00%
BTC1119	A2	9	17	10177	1.26	11/19/03 13:33	13.5	8077	160.3	103.9	0.0017	0.000492	0.001	70.53%	1.98%
BTC1119	A3	9	20	10070	1.24	11/19/03 13:37	16.1	8121	162.0	103.9	0.0020	0.000492	0.001	75.22%	2.00%
BTC1119	A4	9	18	10112	1.25	11/19/03 13:41	14.4	8090	161.0	103.9	0.0018	0.000492	0.001	72.35%	1.99%
BTC1119	B1	9	16	10109	1.21	11/19/03 13:44	13.2	8355	166.3	103.9	0.0016	0.000492	0.001	68.90%	1.99%
BTC1119	B2	9	13	10131	1.2	11/19/03 15:15	10.8	8443	167.9	103.9	0.0013	0.000492	0.001	61.64%	1.99%
BTC1119	B3	9	17	10020	1.2	11/19/03 15:20	14.2	8350	167.0	103.9	0.0017	0.000492	0.001	70.99%	2.00%
BTC1119	B4	9	10	10039	1.22	11/19/03 15:23	8.2	8229	164.3	103.9	0.0010	0.000492	0.001	50.59%	2.00%
BTC1119	C1	9	13	10029	1.21	11/19/03 12:44	10.7	8288	165.6	103.9	0.0013	0.000492	0.001	62.03%	2.00%
BTC1119	C2	9	6	10163	1.23	11/19/03 12:47	4.9	8263	164.0	103.9	0.0006	0.000492	0.000	16.63%	1.98%
BTC1119	C3	9	21	10071	1.2	11/19/03 12:51	17.5	8393	167.4	103.9	0.0021	0.000492	0.002	76.40%	2.00%
BTC1119	C4	9	10	10031	1.22	11/19/03 12:54	8.2	8222	164.3	103.9	0.0010	0.000492	0.001	50.63%	2.00%
BTC1119	D1	9	13	10111	1.2	11/19/03 12:58	10.8	8426	167.7	103.9	0.0013	0.000492	0.001	61.72%	1.99%
BTC1119	D2	9	16	10076	1.21	11/19/03 13:01	13.2	8327	166.0	103.9	0.0016	0.000492	0.001	69.00%	1.99%
BTC1119	D3	9	21	10099	1.2	11/19/03 13:05	17.5	8416	167.7	103.9	0.0021	0.000492	0.002	76.33%	1.99%
BTC1119	D4	9	25	10103	1.22	11/19/03 13:08	20.5	8281	165.0	103.9	0.0025	0.000492	0.002	80.11%	1.99%
BTC1119	A1	10	14	10064	1.23	11/19/03 13:22	11.4	8182	163.2	105.7	0.0014	0.000489	0.001	64.88%	2.00%
BTC1119	A2	10	13	10086	1.23	11/19/03 13:25	10.6	8200	163.4	105.7	0.0013	0.000489	0.001	62.09%	1.99%
BTC1119	A3	10	18	10105	1.24	11/19/03 13:33	14.5	8149	162.3	105.7	0.0018	0.000489	0.001	72.57%	1.99%
BTC1119	A4	10	15	10063	1.22	11/19/03 13:37	12.3	8248	164.6	105.7	0.0015	0.000489	0.001	67.22%	2.00%
BTC1119	B1	10	18	10103	1.19	11/19/03 13:41	15.1	8490	169.1	105.7	0.0018	0.000489	0.001	72.58%	1.99%
BTC1119	B2	10	15	10043	1.2	11/19/03 13:44	12.5	8369	167.1	105.7	0.0015	0.000489	0.001	67.29%	2.00%
BTC1119	B3	10	10	10141	1.22	11/19/03 15:15	8.2	8312	165.2	105.7	0.0010	0.000489	0.000	50.45%	1.99%
BTC1119	B4	10	7	10026	1.21	11/19/03 15:20	5.8	8286	165.6	105.7	0.0007	0.000489	0.000	30.02%	2.00%
BTC1119	C1	10	14	10075	1.2	11/19/03 15:23	11.7	8396	167.4	105.7	0.0014	0.000489	0.001	64.84%	1.99%
BTC1119	C2	10	12	10072	1.23	11/19/03 12:44	9.8	8189	163.3	105.7	0.0012	0.000489	0.001	58.99%	1.99%
BTC1119	C3	10	20	10040	1.2	11/19/03 12:47	16.7	8367	167.2	105.7	0.0020	0.000489	0.002	75.47%	2.00%
BTC1119	C4	10	17	10105	1.23	11/19/03 12:51	13.8	8215	163.6	105.7	0.0017	0.000489	0.001	70.96%	1.99%
BTC1119	D1	10	19	10037	1.19	11/19/03 12:54	16.0	8434	168.5	105.7	0.0019	0.000489	0.001	74.19%	2.00%
BTC1119	D2	10	8	10118	1.19	11/19/03 12:58	6.7	8503	169.1	105.7	0.0008	0.000489	0.000	38.20%	1.99%
BTC1119	D3	10	19	10057	1.21	11/19/03 13:01	15.7	8312	165.9	105.7	0.0019	0.000489	0.001	74.14%	2.00%

000134

Beta to Alpha Crosstalk Calibration Worksheet - LB4100AB

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	D4	10	17	10055	1.21	11/19/03 13:05	14.0	8310	165.9	105.7	0.0017	0.000489	0.001	71.10%	2.00%
BTC1119	A1	12	11	10071	1.24	11/19/03 13:15	8.9	8122	162.0	124.2	0.0011	0.000452	0.001	58.65%	1.99%
BTC1119	A2	12	17	10065	1.25	11/19/03 13:18	13.6	8052	160.7	124.2	0.0017	0.000452	0.001	73.26%	2.00%
BTC1119	A3	12	25	10143	1.25	11/19/03 13:22	20.0	8114	161.3	124.2	0.0025	0.000452	0.002	81.68%	1.99%
BTC1119	A4	12	21	10095	1.26	11/19/03 13:25	16.7	8012	159.6	124.2	0.0021	0.000452	0.002	78.29%	1.99%
BTC1119	B1	12	15	10087	1.22	11/19/03 13:33	12.3	8268	164.8	124.2	0.0015	0.000452	0.001	69.63%	1.99%
BTC1119	B2	12	19	10126	1.23	11/19/03 13:37	15.4	8233	163.8	124.2	0.0019	0.000452	0.001	75.93%	1.99%
BTC1119	B3	12	8	10146	1.24	11/19/03 13:41	6.5	8182	162.5	124.2	0.0008	0.000452	0.000	42.73%	1.99%
BTC1119	B4	12	13	10061	1.24	11/19/03 13:44	10.5	8114	161.9	124.2	0.0013	0.000452	0.001	65.05%	2.00%
BTC1119	C1	12	15	10048	1.22	11/19/03 15:15	12.3	8236	164.5	124.2	0.0015	0.000452	0.001	69.75%	2.00%
BTC1119	C2	12	15	10100	1.22	11/19/03 15:20	12.3	8279	164.9	124.2	0.0015	0.000452	0.001	69.59%	1.99%
BTC1119	C3	12	10	10031	1.23	11/19/03 15:23	8.1	8155	162.9	124.2	0.0010	0.000452	0.001	54.70%	2.00%
BTC1119	C4	12	7	10010	1.24	11/19/03 12:44	5.6	8073	161.4	124.2	0.0007	0.000452	0.000	35.42%	2.00%
BTC1119	D1	12	19	10023	1.22	11/19/03 12:47	15.6	8216	164.3	124.2	0.0019	0.000452	0.001	76.18%	2.00%
BTC1119	D2	12	12	10033	1.24	11/19/03 12:51	9.7	8091	161.7	124.2	0.0012	0.000452	0.001	62.24%	2.00%
BTC1119	D3	12	12	10022	1.2	11/19/03 12:54	10.0	8352	166.9	124.2	0.0012	0.000452	0.001	62.28%	2.00%
BTC1119	D4	12	20	10067	1.23	11/19/03 12:58	16.3	8185	163.3	124.2	0.0020	0.000452	0.002	77.27%	2.00%
BTC1119	A1	11	10	10034	1.23	11/19/03 13:18	8.1	8158	163.0	124.8	0.0010	0.00045	0.001	54.81%	2.00%
BTC1119	A2	11	20	10084	1.26	11/19/03 13:22	15.9	8003	159.6	124.8	0.0020	0.00045	0.002	77.29%	1.99%
BTC1119	A3	11	21	10039	1.24	11/19/03 13:25	16.9	8096	161.8	124.8	0.0021	0.00045	0.002	78.47%	2.00%
BTC1119	A4	11	17	10145	1.25	11/19/03 13:33	13.6	8116	161.3	124.8	0.0017	0.00045	0.001	73.12%	1.99%
BTC1119	B1	11	10	10041	1.19	11/19/03 13:37	8.4	8438	168.5	124.8	0.0010	0.00045	0.001	54.78%	2.00%
BTC1119	B2	11	19	10057	1.21	11/19/03 13:41	15.7	8312	165.9	124.8	0.0019	0.00045	0.001	76.16%	2.00%
BTC1119	B3	11	4	10147	1.21	11/19/03 13:44	3.3	8386	166.5	124.8	0.0004	0.00045	0.000	-14.26%	1.99%
BTC1119	B4	11	13	10007	1.24	11/19/03 15:15	10.5	8070	161.5	124.8	0.0013	0.00045	0.001	65.33%	2.00%
BTC1119	C1	11	18	10127	1.21	11/19/03 15:20	14.9	8369	166.5	124.8	0.0018	0.00045	0.001	74.66%	1.99%
BTC1119	C2	11	9	10050	1.21	11/19/03 15:23	7.4	8306	165.8	124.8	0.0009	0.00045	0.000	49.71%	2.00%
BTC1119	C3	11	19	10078	1.24	11/19/03 12:44	15.3	8127	162.1	124.8	0.0019	0.00045	0.001	76.11%	1.99%
BTC1119	C4	11	11	10051	1.21	11/19/03 12:47	9.1	8307	165.8	124.8	0.0011	0.00045	0.001	58.85%	2.00%
BTC1119	D1	11	10	10090	1.24	11/19/03 12:51	8.1	8137	162.1	124.8	0.0010	0.00045	0.001	54.55%	1.99%
BTC1119	D2	11	15	10154	1.22	11/19/03 12:54	12.3	8323	165.3	124.8	0.0015	0.00045	0.001	69.51%	1.99%
BTC1119	D3	11	15	10072	1.23	11/19/03 12:58	12.2	8189	163.3	124.8	0.0015	0.00045	0.001	69.76%	1.99%
BTC1119	D4	11	13	10090	1.24	11/19/03 13:01	10.5	8137	162.1	124.8	0.0013	0.00045	0.001	65.04%	1.99%
BTC1119	A1	14	14	10095	1.24	11/19/03 13:08	11.3	8141	162.2	144.8	0.0014	0.00041	0.001	70.41%	1.99%
BTC1119	A2	14	16	10055	1.26	11/19/03 13:11	12.7	7980	159.3	144.8	0.0016	0.00041	0.001	74.21%	2.00%

000135

Beta to Alpha Crosstalk Calibration Worksheet - LB4100AB

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	A3	14	21	10078	1.25	11/19/03 13:15	16.8	8062	160.8	144.8	0.0021	0.00041	0.002	80.30%	1.99%
BTC1119	A4	14	14	10066	1.27	11/19/03 13:18	11.0	7926	158.1	144.8	0.0014	0.00041	0.001	70.49%	1.99%
BTC1119	B1	14	16	10183	1.25	11/19/03 13:22	12.8	8146	161.6	144.8	0.0016	0.00041	0.001	73.88%	1.98%
BTC1119	B2	14	9	10048	1.21	11/19/03 13:25	7.4	8304	165.8	144.8	0.0009	0.00041	0.000	54.18%	2.00%
BTC1119	B3	14	14	10084	1.23	11/19/03 13:33	11.4	8198	163.4	144.8	0.0014	0.00041	0.001	70.44%	1.99%
BTC1119	B4	14	19	10153	1.23	11/19/03 13:37	15.4	8254	164.0	144.8	0.0019	0.00041	0.001	78.07%	1.99%
BTC1119	C1	14	13	10079	1.23	11/19/03 13:41	10.6	8194	163.3	144.8	0.0013	0.00041	0.001	68.18%	1.99%
BTC1119	C2	14	10	10097	1.24	11/19/03 13:44	8.1	8143	162.2	144.8	0.0010	0.00041	0.001	58.56%	1.99%
BTC1119	C3	14	17	10125	1.22	11/19/03 15:15	13.9	8299	165.1	144.8	0.0017	0.00041	0.001	75.56%	1.99%
BTC1119	C4	14	11	10107	1.24	11/19/03 15:20	8.9	8151	162.2	144.8	0.0011	0.00041	0.001	62.29%	1.99%
BTC1119	D1	14	23	10111	1.25	11/19/03 15:23	18.4	8089	161.1	144.8	0.0023	0.00041	0.002	81.96%	1.99%
BTC1119	D2	14	10	10073	1.24	11/19/03 12:44	8.1	8123	162.0	144.8	0.0010	0.00041	0.001	58.66%	1.99%
BTC1119	D3	14	12	10170	1.23	11/19/03 12:47	9.8	8268	164.1	144.8	0.0012	0.00041	0.001	65.22%	1.98%
BTC1119	D4	14	23	10067	1.24	11/19/03 12:51	18.5	8119	162.0	144.8	0.0023	0.00041	0.002	82.04%	2.00%
BTC1119	A1	13	16	10048	1.26	11/19/03 13:11	12.7	7975	159.2	146.3	0.0016	0.000407	0.001	74.42%	2.00%
BTC1119	A2	13	12	10050	1.26	11/19/03 13:15	9.5	7976	159.2	146.3	0.0012	0.000407	0.001	65.88%	2.00%
BTC1119	A3	13	13	10104	1.27	11/19/03 13:18	10.2	7956	158.4	146.3	0.0013	0.000407	0.001	68.34%	1.99%
BTC1119	A4	13	21	10061	1.23	11/19/03 13:22	17.1	8180	163.3	146.3	0.0021	0.000407	0.002	80.48%	2.00%
BTC1119	B1	13	16	10095	1.21	11/19/03 13:25	13.2	8343	166.2	146.3	0.0016	0.000407	0.001	74.30%	1.99%
BTC1119	B2	13	21	10097	1.22	11/19/03 13:33	17.2	8276	164.9	146.3	0.0021	0.000407	0.002	80.41%	1.99%
BTC1119	B3	13	7	10092	1.21	11/19/03 13:37	5.8	8340	166.1	146.3	0.0007	0.000407	0.000	41.26%	1.99%
BTC1119	B4	13	12	10090	1.22	11/19/03 13:41	9.8	8270	164.8	146.3	0.0012	0.000407	0.001	65.74%	1.99%
BTC1119	C1	13	12	10106	1.23	11/19/03 13:44	9.8	8216	163.6	146.3	0.0012	0.000407	0.001	65.69%	1.99%
BTC1119	C2	13	20	10052	1.23	11/19/03 15:15	16.3	8172	163.2	146.3	0.0020	0.000407	0.002	79.52%	2.00%
BTC1119	C3	13	11	10130	1.23	11/19/03 15:20	8.9	8236	163.7	146.3	0.0011	0.000407	0.001	62.48%	1.99%
BTC1119	C4	13	10	10065	1.2	11/19/03 15:23	8.3	8388	167.3	146.3	0.0010	0.000407	0.001	59.00%	1.99%
BTC1119	D1	13	18	10019	1.23	11/19/03 12:44	14.6	8146	162.9	146.3	0.0018	0.000407	0.001	77.32%	2.00%
BTC1119	D2	13	16	10083	1.22	11/19/03 12:47	13.1	8265	164.7	146.3	0.0016	0.000407	0.001	74.33%	1.99%
BTC1119	D3	13	16	10085	1.2	11/19/03 12:51	13.3	8404	167.5	146.3	0.0016	0.000407	0.001	74.32%	1.99%
BTC1119	D4	13	27	10040	1.24	11/19/03 12:54	21.8	8097	161.8	146.3	0.0027	0.000407	0.002	84.85%	2.00%
BTC1119	A1	15	13	10035	1.28	11/19/03 13:05	10.2	7840	156.6	166.1	0.0013	0.000368	0.001	71.61%	2.00%
BTC1119	A2	15	9	10054	1.28	11/19/03 13:08	7.0	7855	156.7	166.1	0.0009	0.000368	0.001	58.91%	2.00%
BTC1119	A3	15	16	10016	1.24	11/19/03 13:11	12.9	8077	161.5	166.1	0.0016	0.000368	0.001	76.98%	2.00%
BTC1119	A4	15	11	10006	1.27	11/19/03 13:15	8.7	7879	157.6	166.1	0.0011	0.000368	0.001	66.54%	2.00%
BTC1119	B1	15	17	10089	1.22	11/19/03 13:18	13.9	8270	164.8	166.1	0.0017	0.000368	0.001	78.17%	1.99%

000136

Beta to Alpha Crosstalk Calibration Worksheet - LB4100AB

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	B2	15	21	10091	1.24	11/19/03 13:22	16.9	8138	162.2	166.1	0.0021	0.000368	0.002	82.33%	1.99%
BTC1119	B3	15	9	10087	1.23	11/19/03 13:25	7.3	8201	163.4	166.1	0.0009	0.000368	0.001	58.78%	1.99%
BTC1119	B4	15	16	10074	1.25	11/19/03 13:33	12.8	8059	160.7	166.1	0.0016	0.000368	0.001	76.84%	1.99%
BTC1119	C1	15	16	10148	1.26	11/19/03 13:37	12.7	8054	160.0	166.1	0.0016	0.000368	0.001	76.67%	1.99%
BTC1119	C2	15	13	10135	1.25	11/19/03 13:41	10.4	8108	161.2	166.1	0.0013	0.000368	0.001	71.33%	1.99%
BTC1119	C3	15	10	10095	1.27	11/19/03 13:44	7.9	7949	158.3	166.1	0.0010	0.000368	0.001	62.87%	1.99%
BTC1119	C4	15	7	10119	1.27	11/19/03 15:15	5.5	7968	158.5	166.1	0.0007	0.000368	0.000	46.83%	1.99%
BTC1119	D1	15	15	10107	1.25	11/19/03 15:20	12.0	8086	161.0	166.1	0.0015	0.000368	0.001	75.22%	1.99%
BTC1119	D2	15	13	10045	1.25	11/19/03 15:23	10.4	8036	160.5	166.1	0.0013	0.000368	0.001	71.58%	2.00%
BTC1119	D3	15	11	10041	1.25	11/19/03 12:44	8.8	8033	160.4	166.1	0.0011	0.000368	0.001	66.43%	2.00%
BTC1119	D4	15	15	10068	1.27	11/19/03 12:47	11.8	7928	158.1	166.1	0.0015	0.000368	0.001	75.31%	1.99%
BTC1119	A1	16	11	10082	1.28	11/19/03 13:01	8.6	7877	157.0	168.7	0.0011	0.000363	0.001	66.77%	1.99%
BTC1119	A2	16	20	10113	1.29	11/19/03 13:05	15.5	7840	156.1	168.7	0.0020	0.000363	0.002	81.67%	1.99%
BTC1119	A3	16	16	10032	1.27	11/19/03 13:08	12.6	7899	157.9	168.7	0.0016	0.000363	0.001	77.26%	2.00%
BTC1119	A4	16	15	10001	1.27	11/19/03 13:11	11.8	7875	157.6	168.7	0.0015	0.000363	0.001	75.82%	2.00%
BTC1119	B1	16	17	10050	1.24	11/19/03 13:15	13.7	8105	161.8	168.7	0.0017	0.000363	0.001	78.56%	2.00%
BTC1119	B2	16	19	10042	1.24	11/19/03 13:18	15.3	8098	161.8	168.7	0.0019	0.000363	0.002	80.84%	2.00%
BTC1119	B3	16	9	10032	1.27	11/19/03 13:22	7.1	7899	157.8	168.7	0.0009	0.000363	0.001	59.58%	2.00%
BTC1119	B4	16	20	10035	1.27	11/19/03 13:25	15.7	7902	157.9	168.7	0.0020	0.000363	0.002	81.81%	2.00%
BTC1119	C1	16	16	10035	1.28	11/19/03 13:33	12.5	7840	156.6	168.7	0.0016	0.000363	0.001	77.26%	2.00%
BTC1119	C2	16	18	10078	1.28	11/19/03 13:37	14.1	7873	157.0	168.7	0.0018	0.000363	0.001	79.70%	1.99%
BTC1119	C3	16	19	10122	1.26	11/19/03 13:41	15.1	8033	159.8	168.7	0.0019	0.000363	0.002	80.68%	1.99%
BTC1119	C4	16	16	10099	1.29	11/19/03 13:44	12.4	7829	155.9	168.7	0.0016	0.000363	0.001	77.11%	1.99%
BTC1119	D1	16	18	10111	1.28	11/19/03 15:16	14.1	7899	157.3	168.7	0.0018	0.000363	0.001	79.63%	1.99%
BTC1119	D2	16	13	10070	1.27	11/19/03 15:20	10.2	7929	158.1	168.7	0.0013	0.000363	0.001	71.91%	1.99%
BTC1119	D3	16	21	10060	1.24	11/19/03 15:23	16.9	8113	161.9	168.7	0.0021	0.000363	0.002	82.63%	2.00%
BTC1119	D4	16	20	10019	1.26	11/19/03 12:44	15.9	7952	159.0	168.7	0.0020	0.000363	0.002	81.84%	2.00%
BTC1119	A1	17	10	10090	1.27	11/19/03 12:58	7.9	7945	158.3	186	0.0010	0.000328	0.001	66.90%	1.99%
BTC1119	A2	17	17	10044	1.29	11/19/03 13:01	13.2	7786	155.5	186	0.0017	0.000328	0.001	80.62%	2.00%
BTC1119	A3	17	14	10094	1.29	11/19/03 13:05	10.9	7825	155.9	186	0.0014	0.000328	0.001	76.35%	1.99%
BTC1119	A4	17	19	10048	1.28	11/19/03 13:08	14.8	7850	156.8	186	0.0019	0.000328	0.002	82.65%	2.00%
BTC1119	B1	17	13	10152	1.24	11/19/03 13:11	10.5	8187	162.6	186	0.0013	0.000328	0.001	74.39%	1.99%
BTC1119	B2	17	15	10159	1.25	11/19/03 13:15	12.0	8127	161.4	186	0.0015	0.000328	0.001	77.79%	1.99%
BTC1119	B3	17	6	10017	1.25	11/19/03 13:18	4.8	8014	160.2	186	0.0006	0.000328	0.000	45.24%	2.00%
BTC1119	B4	17	10	10062	1.24	11/19/03 13:22	8.1	8115	161.9	186	0.0010	0.000328	0.001	67.00%	1.99%

000137

Beta to Alpha Crosstalk Calibration Worksheet - LB4100A B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	C1	17	15	10109	1.26	11/19/03 13:25	11.9	8023	159.7	186	0.0015	0.000328	0.001	77.89%	1.99%
BTC1119	C2	17	12	10078	1.25	11/19/03 13:33	9.6	8062	160.7	186	0.0012	0.000328	0.001	72.45%	1.99%
BTC1119	C3	17	20	10051	1.27	11/19/03 13:37	15.7	7914	158.0	186	0.0020	0.000328	0.002	83.52%	2.00%
BTC1119	C4	17	8	10053	1.24	11/19/03 13:41	6.5	8107	161.8	186	0.0008	0.000328	0.000	58.78%	2.00%
BTC1119	D1	17	15	10063	1.28	11/19/03 13:44	11.7	7862	156.9	186	0.0015	0.000328	0.001	78.00%	2.00%
BTC1119	D2	17	11	10103	1.24	11/19/03 15:15	8.9	8148	162.2	186	0.0011	0.000328	0.001	69.87%	1.99%
BTC1119	D3	17	16	10126	1.23	11/19/03 15:20	13.0	8233	163.8	186	0.0016	0.000328	0.001	79.24%	1.99%
BTC1119	D4	17	19	10046	1.25	11/19/03 15:23	15.2	8037	160.5	186	0.0019	0.000328	0.002	82.66%	2.00%
BTC1119	A1	18	12	10025	1.28	11/19/03 12:54	9.4	7832	156.5	186.3	0.0012	0.000327	0.001	72.65%	2.00%
BTC1119	A2	18	15	10119	1.27	11/19/03 12:58	11.8	7968	158.5	186.3	0.0015	0.000327	0.001	77.91%	1.99%
BTC1119	A3	18	20	10138	1.27	11/19/03 13:01	15.7	7983	158.7	186.3	0.0020	0.000327	0.002	83.40%	1.99%
BTC1119	A4	18	13	10044	1.26	11/19/03 13:05	10.3	7971	159.2	186.3	0.0013	0.000327	0.001	74.70%	2.00%
BTC1119	B1	18	14	10097	1.23	11/19/03 13:08	11.4	8209	163.5	186.3	0.0014	0.000327	0.001	76.39%	1.99%
BTC1119	B2	18	13	10090	1.26	11/19/03 13:11	10.3	8008	159.5	186.3	0.0013	0.000327	0.001	74.59%	1.99%
BTC1119	B3	18	9	10200	1.24	11/19/03 13:15	7.3	8226	163.0	186.3	0.0009	0.000327	0.001	62.89%	1.98%
BTC1119	B4	18	15	10040	1.26	11/19/03 13:18	11.9	7968	159.2	186.3	0.0015	0.000327	0.001	78.09%	2.00%
BTC1119	C1	18	15	10059	1.25	11/19/03 13:22	12.0	8047	160.6	186.3	0.0015	0.000327	0.001	78.04%	2.00%
BTC1119	C2	18	19	10106	1.27	11/19/03 13:25	15.0	7957	158.5	186.3	0.0019	0.000327	0.002	82.59%	1.99%
BTC1119	C3	18	14	10061	1.24	11/19/03 13:33	11.3	8114	161.9	186.3	0.0014	0.000327	0.001	76.47%	2.00%
BTC1119	C4	18	11	10080	1.25	11/19/03 13:37	8.8	8064	160.7	186.3	0.0011	0.000327	0.001	70.00%	1.99%
BTC1119	D1	18	15	10047	1.26	11/19/03 13:41	11.9	7974	159.2	186.3	0.0015	0.000327	0.001	78.07%	2.00%
BTC1119	D2	18	8	10112	1.26	11/19/03 13:44	6.3	8025	159.7	186.3	0.0008	0.000327	0.000	58.62%	1.99%
BTC1119	D3	18	15	10084	1.24	11/19/03 15:15	12.1	8132	162.1	186.3	0.0015	0.000327	0.001	77.99%	1.99%
BTC1119	D4	18	11	10046	1.26	11/19/03 15:20	8.7	7973	159.2	186.3	0.0011	0.000327	0.001	70.10%	2.00%
BTC1119	A1	19	12	10060	1.33	11/19/03 12:51	9.0	7564	150.9	214.9	0.0012	0.00027	0.001	77.35%	2.00%
BTC1119	A2	19	12	10040	1.34	11/19/03 12:54	9.0	7493	149.6	214.9	0.0012	0.00027	0.001	77.39%	2.00%
BTC1119	A3	19	11	10073	1.31	11/19/03 12:58	8.4	7689	153.3	214.9	0.0011	0.00027	0.001	75.26%	1.99%
BTC1119	A4	19	16	10053	1.34	11/19/03 13:01	11.9	7502	149.8	214.9	0.0016	0.00027	0.001	83.02%	2.00%
BTC1119	B1	19	13	10078	1.3	11/19/03 13:05	10.0	7752	154.5	214.9	0.0013	0.00027	0.001	79.05%	1.99%
BTC1119	B2	19	14	10029	1.28	11/19/03 13:08	10.9	7835	156.6	214.9	0.0014	0.00027	0.001	80.64%	2.00%
BTC1119	B3	19	7	10032	1.29	11/19/03 13:11	5.4	7777	155.3	214.9	0.0007	0.00027	0.000	61.28%	2.00%
BTC1119	B4	19	13	10035	1.3	11/19/03 13:15	10.0	7719	154.2	214.9	0.0013	0.00027	0.001	79.14%	2.00%
BTC1119	C1	19	16	10008	1.29	11/19/03 13:18	12.4	7758	155.2	214.9	0.0016	0.00027	0.001	83.10%	2.00%
BTC1119	C2	19	9	10031	1.31	11/19/03 13:22	6.9	7657	153.0	214.9	0.0009	0.00027	0.001	69.88%	2.00%
BTC1119	C3	19	12	10056	1.29	11/19/03 13:25	9.3	7795	155.6	214.9	0.0012	0.00027	0.001	77.36%	2.00%

000133

Beta to Alpha Crosstalk Calibration Worksheet - LB4100A B

Crosstalk equation
y=bx+m
b: -2.000E-06
m: 0.0007

Standard ID 514.1572.72
Cert Act (pCi/g) 4969.8
To 3/18/99
Act. at Ct. Date 4437.76
4437.75

File ID	Detector ID	w.o. 02-23-010 Sample ID	Alpha cnts	Beta cnts	Count Time min	TOD	Alpha cpm	Beta cpm	Composite 2s CntUnc CPM	Mass mg	Crosstalk a->b actual	Crosstalk a->b fitted	Crosstalk a->b abs dev	Crosstalk a->b %diff	Crosstalk Count Uncertainty
BTC1119	C4	19	12	10087	1.31	11/19/03 13:33	9.2	7700	153.4	214.9	0.0012	0.00027	0.001	77.29%	1.99%
BTC1119	D1	19	15	10087	1.32	11/19/03 13:38	11.4	7642	152.3	214.9	0.0015	0.00027	0.001	81.83%	1.99%
BTC1119	D2	19	16	10047	1.29	11/19/03 13:42	12.4	7788	155.5	214.9	0.0016	0.00027	0.001	83.03%	2.00%
BTC1119	D3	19	19	10059	1.28	11/19/03 13:44	14.8	7859	156.9	214.9	0.0019	0.00027	0.002	85.70%	2.00%
BTC1119	D4	19	18	10017	1.31	11/19/03 15:16	13.7	7647	152.9	214.9	0.0018	0.00027	0.002	84.96%	2.00%
BTC1119	A1	20	15	10021	1.35	11/19/03 12:47	11.1	7423	148.4	218.2	0.0015	0.000264	0.001	82.39%	2.00%
BTC1119	A2	20	16	10065	1.33	11/19/03 12:51	12.0	7568	151.0	218.2	0.0016	0.000264	0.001	83.42%	2.00%
BTC1119	A3	20	19	10024	1.34	11/19/03 12:54	14.2	7481	149.6	218.2	0.0019	0.000264	0.002	86.09%	2.00%
BTC1119	A4	20	14	10038	1.33	11/19/03 12:58	10.5	7547	150.8	218.2	0.0014	0.000264	0.001	81.10%	2.00%
BTC1119	B1	20	5	10014	1.29	11/19/03 13:01	3.9	7763	155.2	218.2	0.0005	0.000264	0.000	47.21%	2.00%
BTC1119	B2	20	12	10110	1.31	11/19/03 13:05	9.2	7718	153.6	218.2	0.0012	0.000264	0.001	77.79%	1.99%
BTC1119	B3	20	17	10081	1.32	11/19/03 13:08	12.9	7637	152.3	218.2	0.0017	0.000264	0.001	84.37%	1.99%
BTC1119	B4	20	12	10062	1.34	11/19/03 13:12	9.0	7509	149.8	218.2	0.0012	0.000264	0.001	77.90%	2.00%
BTC1119	C1	20	14	10015	1.28	11/19/03 13:15	10.9	7824	156.5	218.2	0.0014	0.000264	0.001	81.14%	2.00%
BTC1119	C2	20	13	10053	1.32	11/19/03 13:18	9.8	7616	152.0	218.2	0.0013	0.000264	0.001	79.62%	2.00%
BTC1119	C3	20	9	10037	1.31	11/19/03 13:22	6.9	7662	153.0	218.2	0.0009	0.000264	0.001	70.60%	2.00%
BTC1119	C4	20	9	10057	1.3	11/19/03 13:25	6.9	7736	154.4	218.2	0.0009	0.000264	0.001	70.54%	2.00%
BTC1119	D1	20	17	10034	1.29	11/19/03 13:33	13.2	7778	155.4	218.2	0.0017	0.000264	0.001	84.44%	2.00%
BTC1119	D2	20	15	10115	1.3	11/19/03 13:38	11.5	7781	154.8	218.2	0.0015	0.000264	0.001	82.22%	1.99%
BTC1119	D3	20	20	10084	1.29	11/19/03 13:42	15.5	7817	155.8	218.2	0.0020	0.000264	0.002	86.71%	1.99%
BTC1119	D4	20	20	10037	1.31	11/19/03 13:44	15.3	7662	153.1	218.2	0.0020	0.000264	0.002	86.77%	2.00%

000133

PROJECT LB4100-13

11/19/03
JE

Beta Attenuation Curve (Sr-90)
Sr-90 on ringed planchets

Benchsheet: 23010SR.XLS C.L. name: BTC1119

X / Q²	.0243	.0346	.0449	.0549	.0646	.0740	.0833	.0906	.0993	.1113	.1216	.1326	.1429	.1531	.1636	.1740	.1843	.1946	.2048	.2122
1	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
2	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3
3	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4
4	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
5	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
6	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8	7
7	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9	8
8	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10	9
9	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	10
10	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11
11	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12
12	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13
13	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14
14	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15
15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16
16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	20	19	18	17

12/1/03
Continued on Page
Read and Understood by

Dan Lenich 12/1/03
Signature Date

Julie Ellingson 12/1/03
Signature Date

265846

pg _____ a
(cont. from pg NA b)

Paragon Analytics, Inc.

Low Background Gas Flow Proportional Counter Log

Instrument: LB4100B

SOP 724 Rev 9

Date: 11/19/03

Instrument Background and Response Checklist

P-10 Supply	P-10 Flow
1 1000	A 0.1
2 0	B
	C
	D

Bkg.	Cal. File ID
Dr A	BKB1116W
Dr B	
Dr C	
Dr D	

Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On line	Det	DR 1	DR 2	DR Stat	cmnt	Bkg 1	Bkg 2	Bkg Stat	cmnt	On-line
1	JE		P		JE		P		✓	9	JE		P		JE		P		✓
2									✓	10									✓
3									✓	11									✓
4									✓	12									✓
5									✓	13					JE		P		✓
6									✓	14									✓
7									✓	15									✓
8									✓	16									✓

P = passes; R = Recount, H = high; L = low; W = weekly; α = Alpha; B = Beta; DR = Daily Response Check; Stat = Status; Det = Detector; Bkg = Background; OL = Offline; NP = Not Processed.

Runlog

Det	SmpID	Batch	Test	File ID	Cnt Dur. (minutes)	Start Time	Anal. Init.	Outp .Init.	Outp. Date	Cmnt Below
1-16	DR Checks	NA	NA	EFB1119	30	0914	JE	JE	11/19/03	NA
1-16	BKG Checks	NA	NA	BKB1119	60	0938	JE	JE	11/19/03	
1-16	BKG Checks	NA	NA	BKB1119A	60	1128	JE	JE	11/19/03	
1-16	6223010-1420	23010SR.XLS	Sr-90 Curve	ABTC1119	5/step	1243	JE	JE	11/19/03	

11/20/03

Reviewed by _____ Date 11/20/03

Form 780r6.frm (4/6/2001)

Comments:

Sr 90 Mass Attenuation Curve

Analyst: JRK
Prep. Date:S. 11/13/02
Prep. Date:C

Analytical Balance No:13
SOP Used:702 Rev15

Data Filename:
Count Date/Time:

W.O.#	Sample #	Gravimetric Aliquot Determination Tare PC (g)	Gross PC (g)	Solid Mass (g)	Remarks	CAR GRP	Pos Car No.	POS Ckd by
0223010	1	9.0609	9.0778	16.9	0.3 ml Salt Used			
0223010	2	9.0665	9.084	17.5	0.3 ml Salt Used			
0223010	3	9.0579	9.098	40.1	0.7 ml Salt Used			
0223010	4	9.0563	9.0963	40	0.7 ml Salt Used			
0223010	5	9.0778	9.1396	61.8	1.1 ml Salt Used			
0223010	6	9.1144	9.1786	64.2	1.1 ml Salt Used			
0223010	7	9.0731	9.1582	85.1	1.5 ml Salt Used			
0223010	8	9.059	9.1428	83.8	1.5 ml Salt Used			
0223010	9	9.0622	9.1661	103.9	1.9 ml Salt Used			
0223010	10	9.0717	9.1774	105.7	1.9 ml Salt Used			
0223010	11	9.0634	9.1882	124.8	2.3 ml Salt Used			
0223010	12	9.0671	9.1913	124.2	2.3 ml Salt Used			
0223010	13	9.0761	9.2224	146.3	2.7 ml Salt Used			
0223010	14	9.0851	9.2299	144.8	2.7 ml Salt Used			
0223010	15	9.0872	9.2533	166.1	3.1 ml Salt Used			
0223010	16	9.0635	9.2322	168.7	3.1 ml Salt Used			
0223010	17	9.0622	9.2482	186	3.5 ml Salt Used			
0223010	18	9.082	9.2683	186.3	3.5 ml Salt Used			
0223010	19	9.0549	9.2698	214.9	3.9 ml Salt Used			
0223010	20	9.0719	9.2901	218.2	3.9 ml Salt Used			

Std. No.	Std. Type	Spike Vol (ml)	Spike Act./ml
514.1572.72	Sr-90	1.0	11033.0

Spiked by: JRK 11/13/02
Spike Witness: NT 11/13/02
Reviewed by: 11/13/02

11/14/02.....10:42 AM

R/BENCH-SH/23010SR.XLS

Sr 90 Mass Attenuation Curve

DRAFT

Analyst: _____

Prep. Date:S. _____

Prep. Date:C

Analytical Balance No:13

SOP Used:702 Rev15

Data Filename: _____

Count Date/Time:

W.O.#	Sample #	Gravimetric Aliquot Determination Tare PC (g)	Gross PC (g)	Solid Mass (g)	Remarks	CAR GRP	Pos Car No.	POS Ckd by
0223010	1	9.0609		-9060.9	11/13 @ 1708			
0223010	1-D1	9.0665		-9066.5				
0223010	2	9.0579		-9057.9				
0223010	2-D1	9.0563		-9056.3				
0223010	3	9.0778		-9077.8				
0223010	2-D1	9.1144		-9114.4				
0223010	4	9.0731		-9073.1				
0223010	4-D1	9.059		-9059				
0223010	5	9.0622		-9062.2				
0223010	5-D1	9.0717		-9071.7				
0223010	6	9.0634		-9063.4				
0223010	6-D1	9.0671		-9067.1				
0223010	7	9.0761		-9076.1				
0223010	7-D1	9.0851		-9085.1				
0223010	8	9.0872		-9087.2				
0223010	8-D1	9.0635		-9063.5				
0223010	9	9.0622		-9062.2				
0223010	9-D1	9.082		-9082				
0223010	10	9.0549		-9054.9				
0223010	10-D1	9.0719		-9071.9				

Std. No.	Std. Type	Spike Vol (ml)	Spike Act./ml
514.1572.72	Sr-90	1.0	11033.0

Spiked by: RK 11/13/02

Spike Witness: NT 11/13/02

Paragon Analytics, Inc.

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH 0223010

TEST

246143 METHOD Sr 90 Mass Attenuation

SOP/REV (PREP) 702 R15

SOP/REV (ANAL)

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

JRK 11/14/02

JRK 11/14/02

Work order number 0223010 was used for a Sr90 mass attenuation curve. It was found that 10 mg of salt was approx. 0.3 ml of solution and 15 mg was approx. 0.4 ml. A range of 10 ringed planchets was created with 0.3 ml salt solution and increasing in 0.4 ml increments. A duplicate for each planchet was also created. Each planchet was spiked with approx. 11,000 dpm of Sr90 standard. The salt and Sr90 solution was converted to a nitric system with 5 ml concentrated nitric acid. It was then dried down and the steam bath and dissolved in 1N nitric acid. The samples where then transferred to the labeled planchets and dried down on the hot plate. The ringed planchets where then weighed and submitted for counting.

JRK 11/14/02

JRK 11/14/02

JRK 11/14/02

TECHNICIAN/ANALYST DATE 11/14/02

DEPARTMENT MANAGER DATE 11/14/02

FORM 302r5.FRM (04/30/01)

72
PROJECT 514.1572.72

Notebook No. _____
Continued From Page _____

Sr-90 Primary Standard

1) Transfer RSO# 514 (Analytics 57370-307) to a a 250 ml poly bottle & dilute to final conc. of approx 5000 pCi/ml. w/ 0.1 M HCl.

a) Ampule, full w/ beaker 36.5911 g (Bal 12)
Ampule, empty w/ beaker 31.7310
Net std. transferred 4.8601 g

b) 250 ml poly, empty 26.4116 g (Bal 12)
bottle w/ std, 0.1 M HCl 223.6 g (Bal 16)
Total diluted std mass 197.2 g

2) Density of 0.1 M HCl using 100 ml class A flask.

99.7100 g / 100 ml = .9971 g/ml.

3) Calculations

orig. std: $\left(\frac{3.757E4 \text{ dpm}}{5.02081 \text{ g}}\right)\left(\frac{60 \text{ s/m}}{2.22 \text{ dpm/pCi}}\right) = 202,239.4$ pCi/g

dil. std by mass $\frac{(202,239.4 \text{ pCi/g})(4.8601 \text{ g})}{(197.2 \text{ g})} = 4984.3$ pCi/g

dil std by vol (4984.3 pCi/g)(.9971 g/ml) = 4969.8 pCi/ml.

Ref Date = 3/18/99
Exp Date = 3/23/04

Verified 3/25/99 DCS

Continued on Page

Read and Understood By

Signed: [signature] Date: 3/23/99 Signed: [signature] Date: 3/24/99

ANALYTICS

DAE 514
rec'd 3-23-99

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.
Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

57370-307

Sr-90 5 mL Liquid in Flame Sealed Vial

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

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

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

ISOTOPE:	Sr-90
ACTIVITY (dps):	3.757 E+04
HALF-LIFE:	28.74 years
CALIBRATION DATE:	March 18, 1999 12:00 EST
TOTAL UNCERTAINTY:	4.0%
SYSTEMATIC:	3.5%
RANDOM:	0.5%

5.02081 grams of solution 30 ppm Sr carrier in 0.1M HCl.

P O NUMBER 22170, Item 2

SOURCE PREPARED BY: _____ for
M. D. Currie, Radiochemist

Q A APPROVED: _____ 3-18-99

STANDARD VERIFICATION FORM

Code #: 514.1572.72 Name of Standard: Sr 90 - Primary Std

Date: 3/24/99 Analyst: DCB / BP

Aliquot for verification: 3ea - 1ml std on a nylon planchet

Work up: Std. converted to HNO_3 matrix in glass beaker + quantitatively transferred to planchet. See attached benchsheet.

Expected activity and uncertainty: 4969.8 ± 198.8 pCi/ml

Results of Counting and counting uncertainty: 4821 ± 60.8 pCi/ml
(= 97.01 % of expected value)

Radiochemistry Technical Manager: David C Burns Date: 3/25/99

Radiochemistry QA Manager: [illegible] Date: 3/25/99

UUFM478
(2/2

Standard Verification for Sr 90

Analyst: KH
Prep. Date: 3/24/99
Prep. Date: 3/24/99

Data Filename: WAT0323A
Count Date/Time: 3/24/99

W.O.#	Sample #	Aliquot ML	Final Gross PC (g)	Final Solid Mass (mg)	Filtered or Unfiltered	Remarks	CAR GRP	Pos Car No.	POS Ckd by
99-15-019	1	1	NA	NA	NA			7	CM
99-15-019	2	1	NA	NA	NA			8	
99-15-019	3	1	NA	NA	NA			9	

Std. NO:	Std. type	Pipet Used	Vol. mL
514.1572.72	Sr-90	RS-009	1.0043

KH 3-30-99

Spike Witne BP 3/24/99
Reviewed b KH 3/24/99
Relinquishe KH 3/24/99
Received by: CM 3/24/99

PAI - Gross Alpha/Beta in Water Sample Analysis

Unit Type: LB4100/W
Counting Unit ID: Orange

Alpha efficiency logfile: AM241RNG
Alpha attenuation calibration: ATAM518R.XLD
Certainty level for MDA and flags: 95.00%
High Voltage Mode: Simultaneous

Beta Calibration Factors
Beta mM: 0.999056
polyn. a=>B xtalk A: 6.574E-06
polyn. a=>B xtalk B: -8.291E-04
polyn. a=>B xtalk C: 3.086E-01

Alpha mM 0.991587892
polyn. B=>a xtalk A: -2.353E-09
polyn. B=>a xtalk B: 3.880E-08
polyn. B=>a xtalk C: 7.064E-04

Beta efficiency logfile: SR90RNG
Beta attenuation calibration: AT520SRY.XLD
Application Revision: C
Application Version: PAI

Offsets per QASS 151168
alpha B= 1.00000
beta B= 1.00000

Data file name: WAT0323a
Batch ID: 15021std, 15
Count Duration (m): 10
Batch Ended: ########
Activity Units: pCi
Date of Bkg. Cal: 3/19/99

Rev. 6/2/98 rts

Det. ID	Sample ID	Count End Date & Time	Count Duration (min)	Resid. Mass (mg)	Sample Volume (g / L)	Alpha Activity				Beta Activity			Alpha Calibrations			Beta Calibrations		
						Gross CPM	Activity Concentration	2σ	MDC	Gross CPM	Activity Concentration	MDC	bkg CPM	effM	b=>a x-tlk (fract.)	bkg CPM	effM	a=>b x-tlk (fracL)
C1	99-15-019-03	3/24/99 14:27	10.00	0.0	0.0010	6.900	-185.271	4037.160	7271.774	9786.200	9615332.110	3184.991	0.0930	0.25678	0.00071	1.9480	0.45630	0.30861
A1	99-15-021-01	3/24/99 14:27	10.00	0.0	0.0010	2794.000	4950611.388	58077.031	2910.358	974.400	109585.582	43421.997	0.1810	0.25306	0.00071	2.3400	0.44941	0.30861
A2	99-15-021-02	3/24/99 14:27	10.00	0.0	0.0010	2811.300	5024686.758	58765.180	2978.879	1037.900	167552.471	43428.023	0.1670	0.25087	0.00071	1.9640	0.45063	0.30861
A3	99-15-021-03	3/24/99 14:27	10.00	0.0	0.0010	2806.700	4982226.619	58315.123	2902.748	1001.000	132409.235	43492.575	0.1530	0.25259	0.00071	2.0880	0.44963	0.30861
B3	99-15-019-01	3/24/99 14:28	10.00	0.0	0.0010	5.200	-3032.660	3944.621	7553.667	9550.300	9686761.655	3089.243	0.1080	0.24469	0.00071	1.9530	0.44204	0.30861
B4	99-15-019-02	3/24/99 14:28	10.00	0.0	0.0010	4.400	-4548.044	3702.056	7356.203	9693.000	9623989.176	2900.815	0.1200	0.25318	0.00071	1.8890	0.45159	0.30861

Average Am Act.= 4.986E+06 pCi/l
Average Am Unc.= 5.839E+04 pCi/l (2 sigma)

Expected Am Act.= 5.000E+06

Relative Recovey= 99.72%

Average Sr/Y Act.= 9.642E+06 pCi/l
Average Sr/Y Unc.= 6.079E+04 pCi/l (2 sigma)

Expected Sr/Y Act.= 9.940E+06

Relative Recovey= 97.01%

00149