20-FEB-07 10:52:25 R701193 MDM

TMA Corporation
Gross Alpha, Gross Beta Analysis
ABCALC V 1.05

8655-- 1 80
IQA2793-01

Reviewed BW Date 2/22/07

Counted 51.988- 7 on B1 for 400.00 min.

0.220	1	87.500 mg	87.500 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 105	GRB 105
Counts =	25.000	4769.000
Gross cpm =	0.062	11.922
Background =	0.053	1.173
Observed CPM =	0.010	10.749
Cross talk fac =	0.006	0.244
True CPM =	-0.052	10.762
Inst Std. Fac. =	1.046	1.013
Adjusted CPM =	-0.054	10.902
Eff (cpm/dpm) =	0.097	0.397
DPM of Aliquot =	-0.560	27.480
pCi /l =	-1.15	56.3
1 sigma % Err =	32.862	1.681
2 sigma % Err =	64.409	3.295
(1 sigma err) =	0.377	0.946
(2 sigma err) =	0.738	1.85
LTV (95 %) =	0.621	57.8
MDA (3.00) =	1.29	1.34
MDA (2.71) =	1.28	1.33
CRITICAL LEVEL =	0.568	0.651

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.818	7	0.053	1.173	0.00
SF	50.706	0	1.046	1.013	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
50.706	19-FEB-07 8:56	GAW 105	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 105	(93)2156 11	\ 300.0 min	-0.01
51.043	19-FEB-07 17:01	GAW 105	(80)8655 5	\ 1200.0 min	6.41

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.818	17-FEB-07 11:37	GRB 105	BK	\ 2553.4 min	0.00
50.736	19-FEB-07 9:39	GRB 105	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GRB 105	(93)2156 11	\ 300.0 min	-0.03

KY 2/22/07

Status: PASS

Source	LCS	LCS
Sample No.	2	2
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	51.987-07	51.987-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	7.1397	11.726
Error @ 2s (abs.)	0.552	0.459
Error @ 2s (%)	7.7	3.9
MDA	0.24288	0.46202
Result Units	PCI/SMPL	PCI/SMPL
Nuclide	Am241	Sr 90
Standard ID	R1-A	AA1-B-(15)
Qty (ml)	1.1	0.6
Activity (dpm)	22.49	27.31
Calib. Date	353.708-2005	306.500-1996
Half Life (days)	157900	10580
Decay Date	51.987-07	51.987-07
Added (pCi)	11.12	11.54
Added Error @ 2s (%)	4	4
F/A Ratio	0.642	1.016
F/A Ratio Error @ 2s (%)	9	6
LCL	0.60	0.80
LWL	0.73	0.87
UWL	1.27	1.13
UCL	1.40	1.20
Status	PASS	PASS
Flag	wl	

Initials/Date KG 2/22/07

60250

22-FEB-07 TMA Corporation 8655- 2 80
10:52:27 Gross Alpha, Gross Beta Analysis QC-LCS #60250
R7011193 ABCALC V 1.05
MCM Reviewed BEW Date 22207
Counted 51.988- 7 on B3 for 400.00 min.

1.00 smpl	62.500 mg	62.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 107	GRB 107
Counts =	752.000	5500.000
Gross cpm =	1.880	13.750
Background =	0.056	3.066
Observed CPM =	1.824	10.684
Cross talk fac =	0.006	0.231
True CPM =	1.764	10.276
Inst Std. Fac. =	1.042	1.024
Adjusted CPM =	1.838	10.523
Eff (cpm/dpm) =	0.116	0.404
DPM of Aliquot =	15.850	26.032
pCi /smpl =	7.14	11.7
1 sigma % Err =	3.944	1.995
2 sigma % Err =	7.731	3.911
(1 sigma err) =	0.282	0.234
(2 sigma err) =	0.552	0.459
LTV (95 %) =	7.60	12.1
MDA (3.00) =	0.243	0.462
MDA (2.71) =	0.240	0.461
CRITICAL LEVEL =	0.107	0.227

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.818	7	0.056	3.066	0.00
SF	50.706	0	1.042	1.024	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.818	17-FEB-07 11:37	GAW 107	BK	\ 2553.4 min	0.00
50.706	19-FEB-07 8:56	GAW 107	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 107	(93)2156 12	\ 300.0 min	0.02

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.818	17-FEB-07 11:37	GRB 107	BK	\ 2553.4 min	0.00
50.736	19-FEB-07 9:39	GRB 107	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GRB 107	(93)2156 12	\ 300.0 min	0.35

Kg 2/22/07

Status: PASS

Source	BLANK	BLANK
Sample No.	3	3
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	51.987-07	51.987-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	-0.097119 ✓	-0.021029 ✓
Error @ 2s (abs.)	0.114	0.153
Error @ 2s (%)	117.4	727.7
MDA	0.23416 ✓	0.26286 ✓
Result Units	PCI/SMPL	PCI/SMPL
Status	PASS ✓	PASS ✓
Flag		

Initials/Date KEJ 2/22/07

60251

22-FEB-07 TMA Corporation 8655- 3 80
10:52:29 Gross Alpha, Gross Beta Analysis QC-BLANK #60251
R7011193 ABCALC V 1.05
MCM Reviewed BW Date 2/22/07
Counted 51.988- 7 on C1 for 400.00 min.

1.00 smpl	63.100 mg	63.100 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	11.000	376.000
Gross cpm =	0.027	0.940
Background =	0.051	0.964
Observed CPM =	-0.023	-0.024
Cross talk fac =	0.006	0.232
True CPM =	-0.023	-0.019
Inst Std. Fac. =	1.064	1.015
Adjusted CPM =	-0.025	-0.019
Eff (cpm/dpm) =	0.115	0.404
DPM of Aliquot =	-0.216	-0.047
pCi /smpl =	-9.712E-02	-2.103E-02
1 sigma % Err =	59.890	371.253
2 sigma % Err =	117.384	727.655
(1 sigma err) =	5.816E-02	7.807E-02
(2 sigma err) =	0.114	0.153
LTV (95 %) =	9.597E-02	0.129
MDA (3.00) =	0.234	0.263
MDA (2.71) =	0.231	0.262
CRITICAL LEVEL =	0.103	0.128

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.819	7	0.051	0.964	0.00
SF	50.706	0	1.064	1.015	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
50.706	19-FEB-07 8:56	GAW 109	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 109	(93)2156 13	\ 300.0 min	5.32
51.043	19-FEB-07 17:01	GAW 109	(80)8655 1	\ 1200.0 min	-0.02

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.819	17-FEB-07 11:39	GRB 109	BK	\ 2553.0 min	0.00
50.736	19-FEB-07 9:39	GRB 109	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GRB 109	(93)2156 13	\ 300.0 min	20.28

KY 2/22/07

Status: PASS

Source	DUP	DUP	ORIGINAL	ORIGINAL
Sample No.	4	4	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	28.778-7	28.778-7	28.778-7	28.778-7
Separation Date #1				
Separation Date #2				
Count Date	51.987-07	51.987-07	51.987-07	51.987-07
Aliquot	0.22	0.22	0.22	0.22
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	-1.2963 ✓	55.85 ✓	-1.1461 ✓	56.265 ✓
Error @ 2s (abs.)	0.669	1.875	0.738	1.854
Error @ 2s (%)	51.6	3.4	64.4	3.3
MDA	1.2001 ✓	1.4584 ✓	1.2931 ✓	1.3383 ✓
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
RPD		1 ✓		
UCL	40.00	30.00		
RER				
Criterion	N ✓			
Status	PASS ✓	PASS ✓		
Flag				

Initials/Date KG 2/22/07

60252

22-FEB-07 TMA Corporation 8655- 4 80
10:52:30 Gross Alpha, Gross Beta Analysis QC-DUP#1 60252
R701193 ABCALC V 1.05
MDM Reviewed BW Date 2-22-07
Counted 51.988- 7 on C2 for 400.00 min.

0.220	1	88.400 mg	88.400 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	19.000	4845.000
Gross cpm =	0.047	12.113
Background =	0.044	1.398
Observed CPM =	0.003	10.715
Cross talk fac =	0.006	0.244
True CPM =	-0.057	10.729
Inst Std. Fac. =	1.058	1.008
Adjusted CPM =	-0.061	10.814
Eff (cpm/dpm) =	0.096	0.396
DPM of Aliquot =	-0.633	27.277
pCi /l =	-1.30	55.8
1 sigma % Err =	26.326	1.713
2 sigma % Err =	51.599	3.358
(1 sigma err) =	0.341	0.957
(2 sigma err) =	0.669	1.88
LTV (95 %) =	0.563	57.4
MDA (3.00) =	1.20	1.46
MDA (2.71) =	1.18	1.45
CRITICAL LEVEL =	0.521	0.711

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.819	7	0.044	1.398	0.00
SF	50.706	0	1.058	1.008	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
50.706	19-FEB-07 8:56	GAW 110	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 110	(93)2158 1	\ 300.0 min	0.14
51.043	19-FEB-07 17:01	GAW 110	(80)8655 2	\ 1200.0 min	1.83

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.819	17-FEB-07 11:39	GRB 110	BK	\ 2553.0 min	0.00
50.736	19-FEB-07 9:39	GRB 110	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GRB 110	(93)2158 1	\ 300.0 min	1.32

MY 2/22/07

Status: FAIL

Source	MS	MS	ORIGINAL	ORIGINAL
Sample No.	5	5	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	28.778-7	28.778-7	28.778-7	28.778-7
Separation Date #1				
Separation Date #2				
Count Date	51.987-07	51.987-07	51.987-07	51.987-07
Aliquot	0.22	0.22	0.22	0.22
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	146.53	158.52	-1.1461	56.265
Error @ 2s (abs.)	5.726	2.965	0.738	1.854
Error @ 2s (%)	3.9	1.9	64.4	3.3
MDA	0.94398	1.2189	1.2931	1.3383
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
Nuclide	Am241	Sr 90		
Standard ID	R1-A	AA1-B-(15)		
Qty (ml)	2.25	1.1		
Activity (dpm)	22.49	27.31		
Calib. Date	353.708-2005	306.500-1996		
Half Life (days)	157900	10580		
Decay Date	51.987-07	51.987-07		
Added (pCi)	22.75	21.15		
Added Error @ 2s (%)	4	4		
Spike Activity	32.237	34.874		
Original Activity	-0.252	12.378		
Activity Difference	32.489	22.496		
Error Difference	3.909	3.420		
F/A Ratio	1.428	1.064		
F/A Ratio Error @ 2s (%)	5.593	5.263		
LCL	0.60	0.80		
LWL	0.73	0.87		
UWL	1.27	1.13		
UCL	1.40	1.20		
Status	FAIL	PASS		
Flag	*H			

Initials/Date KY 2/22/07

60253

22-FEB-07 TMA Corporation B655- 5 80
10:52:32 Gross Alpha, Gross Beta Analysis QC-MS#1 60253
R701193 ABCALC V 1.05
MCM Reviewed BW Date 22207
Counted 51.988-- 7 on C3 for 400.00 min.

0.220	1	88.400 mg	88.400 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	2682.000	13263.000
Gross cpm =	6.705	33.158
Background =	0.025	0.966
Observed CPM =	6.680	32.192
Cross talk fac =	0.006	0.244
True CPM =	6.506	30.603
Inst Std. Fac. =	1.056	1.003
Adjusted CPM =	6.870	30.695
Eff (cpm/dpm) =	0.096	0.396
DPM of Aliquot =	71.565	77.421
pCi /l =	147.	159.
1 sigma % Err =	1.994	0.954
2 sigma % Err =	3.908	1.871
(1 sigma err) =	2.92	1.51
(2 sigma err) =	5.73	2.97
LTV (95 %) =	151.	161.
MDA (3.00) =	0.944	1.22
MDA (2.71) =	0.929	1.22
CRITICAL LEVEL =	0.593	0.591

9

2/22/17

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.819	7	0.025	0.966	0.00
SF	50.706	0	1.056	1.003	0.00

Previous 3 counts	Time	Detector	ID			Length	Cpm
50.706	19-FEB-07 8:56	GAW 111	SF		\	10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 111	(93)2158	2	\	300.0 min	0.18
51.043	19-FEB-07 17:01	GAW 111	(80)8655	3	\	1200.0 min	-0.01

Previous 3 counts	Time	Detector	ID			Length	Cpm
48.819	17-FEB-07 11:39	GRB 111	BK		\	2553.0 min	0.00
50.736	19-FEB-07 9:39	GRB 111	SF		\	10.0 min	0.00
50.799	19-FEB-07 11:10	GRB 111	(93)2158	2	\	300.0 min	1.22

Status: PASS

Source	MS	ORIGINAL
Sample No.	5	1
Analyte	GrAlph	GrAlph
Reference Date	28.778-7	28.778-7
Separation Date #1		
Separation Date #2		
Count Date	51.042-07	51.042-07
Aliquot	0.22	0.22
Aliquot Units	L	L
Yield	1	1
Result	136.7 ✓	-0.47347 ✓
Error @ 2s (abs.)	3.151	0.363
Error @ 2s (%)	2.3	76.7
MDA	0.71239	0.69534
Result Units	PCI/L ✓	PCI/L ✓
Nuclide	Am241	
Standard ID	R1-A	
Qty (ml)	2.25 ✓	
Activity (dpm)	22.49	
Calib. Date	353.708-2005	
Half Life (days)	157900	
Decay Date	51.042-07	
Added (pCi)	22.75 ✓	
Added Error @ 2s (%)	4	
Spike Activity	30.074	
Original Activity	-0.104	
Activity Difference	30.178	
Error Difference	2.313	
F/A Ratio	1.326 ✓	
F/A Ratio Error @ 2s (%)	4.620	
LCL	0.60	
LWL	0.73	
UWL	1.27	
UCL	1.40	
Status	PASS ✓	
Flag	wh ✓	



Initials/Date KY 2/20/07

60253

20-FEB-07 TMA Corporation 8655- 5 80
13:08:17 Gross Alpha, Gross Beta Analysis QC-MS#1 60253
R701193 ABCALC V 1.05
MCM Reviewed BW Date 2-2007
Counted 51.043- 7 on B1 for1200.00 min.

0.220	1	88.400 mg	88.400 mg
Aliquot		Sample Weight	Counted Weight

ALPHA

Instrument	=	GAW 105
Counts	=	7417.000
Gross cpm	=	6.181
Background	=	0.053
Observed CPM	=	6.128
Cross talk fac	=	0.000
True CPM	=	6.128
Inst Std. Fac.	=	1.046
Adjusted CPM	=	6.410
Eff (cpm/dpm)	=	0.096
DPM of Aliquot	=	66.765
pCi /l	=	137.
1 sigma % Err	=	1.176
2 sigma % Err	=	2.305
(1 sigma err)	=	1.61
(2 sigma err)	=	3.15
LTV (95 %)	=	139.
MDA (3.00)	=	0.712
MDA (2.71)	=	0.707
CRITICAL LEVEL	=	0.330

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	48.818	7	0.053	0.000	0.00
SF	50.706	0	1.046	0.000	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
48.818	17-FEB-07 11:37	GAW 105	BK	\ 2553.4 min	0.00
50.706	19-FEB-07 8:56	GAW 105	SF	\ 10.0 min	0.00
50.799	19-FEB-07 11:10	GAW 105	(93)2156 11	\ 300.0 min	-0.01

Previous 3 counts	Time	Detector	ID	Length	Cpm

Log not available for detector 0 at 51.043

MG 2/20/07

19-FEB-07 TMA Corporation 8655- 1 H DST
08:21:50 Tritium - LSC Calculations IQA2793-01
R701193 PLSC V 2.09
MCM Reviewed BW Date 2/19/07

Reference Time : 28.778- 7 (10:40 PST 28-JAN-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
4	44.227- 7	707.	150.00	4.71	3.76	245.83	0.245	Sample.
	Weighted Average			4.71	3.76		0.245	
4	49.513- 7	5972.	3.00	1990.67	1.29	241.05	0.245	Spike.
4	49.515- 7	5912.	3.00	1970.67	1.30	240.82	0.245	
4	49.517- 7	5901.	3.00	1967.00	1.30	241.56	0.245	
	Weighted Average			1976.06	0.75			
4	44.123- 7	669.	150.00	4.46	3.87	247.48	0.245	Blank.
	Weighted Average			4.46	3.87			

Eff. Eff = (1971.34+/-14.82)/(8213.25+/- 73.92) = 0.240 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.980

		Act Err (1 sigma)
Sample CPM	4.71 +/-	0.18
Background CPM	4.46 +/-	0.17
Net CPM	0.25 +/-	0.25

Yield (0.00 mG)	1.0000
Decay Corr (Sample)	0.99762
Decay Corr (Spike)	0.62034
Lambda(-d)	1.5454E-04
DPM of Aliquot	1.0580E+00
Aliquot	1.0000E-02 l
DPM/l	1.0580E+02
pCi /l	4.7657E+01
1 Sigma Error	97.62 %
pCi Err	4.6522E+01
2 Sigma Error	191.33 %
pCi Err	9.1182E+01
Limiting Value	1.2442E+02
Critical Level	7.5581E+01
MDA (2.71)	1.5424E+02
MDA (3.00)	1.5460E+02

MP 2/19/07

Status: PASS

Source	LCS
Sample No.	2
Analyte	H 3
Geometry	LC
Reference Date	
Separation Date #1	
Separation Date #2	
Count Date	44.123-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.1
Result	224.42
Error @ 2s (abs.)	13.793
Error @ 2s (%)	6.1
MDA	15.533
Result Units	PCI/SMPL
Nuclide	H 3
Standard ID	AE1-C-(3)
Qty (ml)	1.1
Activity (dpm)	595.2
Calib. Date	305.500-2002
Half Life (days)	4540
Decay Date	44.123-07
Added (pCi)	232.3
Added Error @ 2s (%)	4
F/A Ratio	0.966
F/A Ratio Error @ 2s (%)	7
LCL	0.80
LWL	0.87
UWL	1.13
UCL	1.20
Status	PASS
Flag	

Initials/Date KY 2/19/07

60250

19-FEB-07 TMA Corporation 8655- 2 H DST
08:21:52 Tritium - LSC Calculations QC-LCS #60250
R701193 PLSC V 2.09
MCM Reviewed BW Date 2-19-07

Reference Time : 44.123- 7 (18:57 PST 12-FEB-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
4	44.331- 7	2450.	150.00	16.33	2.02	246.78	0.245	Sample.
	Weighted Average			16.33	2.02		0.245	
4	49.519- 7	5934.	3.00	1978.00	1.30	242.28	0.245	Spike.
4	49.521- 7	5899.	3.00	1966.33	1.30	241.55	0.245	
4	49.523- 7	5931.	3.00	1977.00	1.30	241.12	0.245	
	Weighted Average			1973.76	0.75			
4	44.123- 7	669.	150.00	4.46	3.87	247.48	0.245	Blank.
	Weighted Average			4.46	3.87			

Eff = (1957.44+/-14.81)/(8213.24+/- 73.92) = 0.238 +/- 0.003 Eff.

Ratio (Internal Spike Eff vs Default Eff) = 0.973

		Act Err (1 sigma)
Sample CPM	16.33 +/-	0.33
Background CPM	4.46 +/-	0.17
Net CPM	11.87 +/-	0.37

Yield (10.00 mG)	0.1000
Decay Corr (Sample)	0.99997
Decay Corr (Spike)	0.62034
Lambda(-d)	1.5454E-04
DPM of Aliquot	4.9821E+02
Aliquot	1.0000E+00 smpl
DPM/smpl	4.9821E+02
pCi /smpl	2.2442E+02
1 Sigma Error	3.14 %
pCi Err	7.0373E+00
2 Sigma Error	6.15 %
pCi Err	1.3793E+01
Limiting Value	2.3603E+02
Critical Level	7.5939E+00
MDA (2.71)	1.5497E+01
MDA (3.00)	1.5533E+01

KY 2/19/07

Status: PASS

Source	BLANK
Sample No.	3
Analyte	H 3
Geometry	LC
Reference Date	
Separation Date #1	
Separation Date #2	
Count Date	44.123-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.1
Result	-1.4815
Error @ 2s (abs.)	8.812
Error @ 2s (%)	594.8
MDA	15.219
Result Units	PCI/SMPL
Status	PASS
Flag	

Initials/Date KY 2/19/07

60251

19-FEB-07 TMA Corporation 8655- 3 H DST
08:21:53 Tritium - LSC Calculations QC-BLANK #60251
R701193 PLSC V 2.09
MCM Reviewed BW Date 2.19.07

Reference Time : 44.123- 7 (18:57 PST 12-FEB-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
								Sample.
4	44.435- 7	657.	150.00	4.38	3.90	248.87	0.245	
	Weighted Average			4.38	3.90		0.245	
								Spike.
4	49.525- 7	6108.	3.00	2036.00	1.28	243.55	0.245	
4	49.527- 7	5986.	3.00	1995.33	1.29	243.22	0.245	
4	49.529- 7	5929.	3.00	1976.33	1.30	242.45	0.245	
	Weighted Average			2002.25	0.74			
								Blank.
4	44.123- 7	669.	150.00	4.46	3.87	247.48	0.245	
	Weighted Average			4.46	3.87			
								Eff.

Eff = (1997.87+/-14.92)/(8213.23+/- 73.92) = 0.243 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.993

		Act Err (1 sigma)
Sample CPM	4.38 +/-	0.17
Background CPM	4.46 +/-	0.17
Net CPM	-0.08 +/-	0.24

Yield (10.00 mG)	0.1000
Decay Corr (Sample)	0.99995
Decay Corr (Spike)	0.62033
Lambda(-d)	1.5454E-04
DPM of Aliquot	-3.2890E+00
Aliquot	1.0000E+00 smpl
DPM/smpl	-3.2890E+00
pCi /smpl	-1.4815E+00
1 Sigma Error	303.45 %
pCi Err	4.4957E+00
2 Sigma Error	594.77 %
pCi Err	8.8115E+00
Limiting Value	7.4179E+00
Critical Level	7.4403E+00
MDA (2.71)	1.5183E+01
MDA (3.00)	1.5219E+01

KY 2/19/07

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	H 3	H 3
Reference Date	28.778-7	28.778-7
Separation Date #1		
Separation Date #2		
Count Date	44.123-07	44.123-07
Aliquot	0.01	0.01
Aliquot Units	L	L
Yield	1	1
Result	32.856 ✓	47.657 ✓
Error @ 2s (abs.)	91.475	91.183
Error @ 2s (%)	278.4	191.3
MDA	155.78 ✓	154.6 ✓
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N ✓	
Status	PASS ✓	
Flag		

Initials/Date KJ 2/19/07

60252

19-FEB-07 08:21:55 R701193 MCM

TMA Corporation
Tritium - LSC Calculations
PLSC V 2.09

8655- 4 H DST
QC-DUP#1 60252

Reviewed BW Date 2-19-07

Reference Time : 28.778- 7 (10:40 PST 28-JAN-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
4	44.540- 7	695.	150.00	4.63	3.79	250.55	0.245	Sample.
	Weighted Average			4.63	3.79		0.245	
4	49.531- 7	5740.	3.00	1913.33	1.32	244.60	0.245	Spike.
4	49.533- 7	5937.	3.00	1979.00	1.30	244.46	0.245	
4	49.535- 7	5979.	3.00	1993.00	1.29	244.03	0.245	
	Weighted Average			1961.16	1.03			
4	44.123- 7	669.	150.00	4.46	3.87	247.48	0.245	Blank.
	Weighted Average			4.46	3.87			

Eff = (1956.52+/-20.27)/(8213.23+/- 73.92) = 0.238 +/- 0.003 Eff.

Ratio (Internal Spike Eff vs Default Eff) = 0.972

		Act Err (1 sigma)
Sample CPM	4.63 +/-	0.18
Background CPM	4.46 +/-	0.17
Net CPM	0.17 +/-	0.25

Yield (0.00 mG)	1.0000
Decay Corr (Sample)	0.99757
Decay Corr (Spike)	0.62033
Lambda(-d)	1.5454E-04
DPM of Aliquot	7.2940E-01
Aliquot	1.0000E-02 l
DPM/l	7.2940E+01
pCi /l	3.2856E+01
1 Sigma Error	142.05 %
pCi Err	4.6671E+01
2 Sigma Error	278.41 %
pCi Err	9.1476E+01
Limiting Value	1.0986E+02
Critical Level	7.6157E+01
MDA (2.71)	1.5541E+02
MDA (3.00)	1.5578E+02

Key 2/19/07

Status: PASS

Source	MS	ORIGINAL
Sample No.	5	1
Analyte	H 3	H 3
Reference Date	28.778-7	28.778-7
Separation Date #1		
Separation Date #2		
Count Date	44.123-07	44.123-07
Aliquot	0.04	0.01
Aliquot Units	L	L
Yield	0.2494	1
Result	19283 ✓	47.657 ✓
Error @ 2s (abs.)	414.579	91.183
Error @ 2s (%)	2.1	191.3
MDA	206.1	154.6
Result Units	PCI/L ✓	PCI/L ✓
Nuclide	H 3	
Standard ID	AE1-A-(7)	
Qty (ml)	0.1 ✓	
Activity (dpm)	23808	
Calib. Date	305.500-2002	
Half Life (days)	4540	
Decay Date	28.778-7 ✓	
Added (pCi)	846.5 ✓	
Added Error @ 2s (%)	4	
Spike Activity	771.320	
Original Activity	1.906	
Activity Difference	769.414	
Error Difference	2.207	
F/A Ratio	0.909 ✓	
F/A Ratio Error @ 2s (%)	4.568	
LCL	0.80	
LWL	0.87	
UWL	1.13	
UCL	1.20	
Status	PASS ✓	
Flag		

Initials/Date KY 2/19/07

60253

19-FEB-07 TMA Corporation 8655- 5 H DST
13:28:00 Tritium - LSC Calculations QC-MS#1 60253
R7011193 PLSC V 2.09
MCM Reviewed BW Date 2-9-07

Reference Time : 28.778- 7 (10:40 PST 28-JAN-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
4	44.687- 7	9283.	87.83	105.69	1.04	243.22	0.245	Sample.
	Weighted Average			105.69	1.04		0.245	
4	49.538- 7	6152.	3.00	2050.67	1.27	238.14	0.245	Spike.
4	49.540- 7	6155.	3.00	2051.67	1.27	238.35	0.245	
4	49.542- 7	6211.	3.00	2070.33	1.27	238.59	0.245	
	Weighted Average			2057.52	0.73			
4	44.123- 7	669.	150.00	4.46	3.87	247.48	0.245	Blank.
	Weighted Average			4.46	3.87			

Eff = (1951.90+/-15.16)/(8213.22+/- 73.92) = 0.238 +/- 0.003 Eff.

Ratio (Internal Spike Eff vs Default Eff) = 0.970

		Act Err (1 sigma)
Sample CPM	105.69 +/-	1.10
Background CPM	4.46 +/-	0.17
Net CPM	101.23 +/-	1.11
Yield (10.00 mG)	0.2494	
Decay Corr (Sample)	0.99754	
Decay Corr (Spike)	0.62033	
Lambda(-d)	1.5454E-04	
DPM of Aliquot	1.7123E+03	
Aliquot	4.0000E-02 l	
DPM/l	4.2808E+04	
pCi /l	1.9283E+04	
1 Sigma Error	1.10 %	
pCi Err	2.1152E+02	
2 Sigma Error	2.15 %	
pCi Err	4.1458E+02	
Limiting Value	1.9632E+04	
Critical Level	1.0001E+02	
MDA (2.71)	2.0547E+02	
MDA (3.00)	2.0610E+02	

MF 2/19/07

13-FEB-07 TMA Corporation 8655- 1 Sr
12:59:48 Beta Counting Data IQA2793-01
R701193 AUTOB V 2.08
MCM Reviewed BLL Date 2-13-07

Sr 90

Counter GRB 227
Length of count 100.0 Min.
Gross counts = 42.

Zero time 28.778 7
Separation time 40.698 7
0.003 CPM ON DAY 44.799 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 40.698 7 = 0.002 (Y/Sr eff ratio = 1.462)

Elapsed time (days) = 11.920
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 9.992E-01
Chemical yield (2)= 0.7983
PPT. correction (3)= 1.0307 (recovery = 14.29 mgs)
Aliquot (4)= 0.5000 l

Product (1X2X3X4) = 4.110678E-01

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
3.7109E-03	2.6780	9.9378E-03	2.7123E-01	2729.27 %

pCi /l	1 sigma	2 sigma
4.4765E-03	1.2218E-01	2.3946E-01

LTV 2.0607E-01

MDA (3.00) 4.9309E-01
MDA (2.71) 4.8874E-01
Lc 2.2465E-01

DPM OF ALIQUOT 4.969E-03

Saved answer = 4.969E-03 2729.27% (DPM of aliquot) (42280)

KL 2/14/07

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	40.900	GRB 225	50.00	46	0.46	36.7%	0.4660	1.0170	0
2.	43.815	GRB 202	100.00	40	0.05	176.9%	0.3510	1.0340	0
3.	44.799	GRB 227	100.00	42	0.00	3049.6%	0.4170	0.9950	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 225	EF SF	40.689	90447	10.0	1.024	0.985 - 1.045	1.017	0.9
GRB 202	EF SF	43.745	87511	10.0	1.035	1.004 - 1.064	1.034	0.1
GRB 227	EF SF	44.694	97602	10.0	1.005	0.964 - 1.024	0.995	1.1
GRB 225	BK BK	40.024	361	813.2	0.444	0.377 - 0.557	0.466	-0.8
GRB 202	BK BK	34.968	808	2370.3	0.341	0.300 - 0.439	0.351	-0.5
GRB 227	BK BK	40.024	363	813.2	0.446	0.324 - 0.504	0.417	1.1

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
40.689	9-FEB-07 8:32	GRB 225	SF		\	10.0 min	0.00
40.742	9-FEB-07 9:48	GRB 225	Sr 8538	1	\	88.0 min	73.15
40.814	9-FEB-07 11:32	GRB 225	Sr 7602	7	\	120.0 min	-0.14
40.774	9-FEB-07 10:34	GRB 202	Sr 7581	1	\	100.0 min	-0.02
43.745	12-FEB-07 9:52	GRB 202	SF		\	10.0 min	0.00
43.765	12-FEB-07 10:21	GRB 202	Tc 7596	2	\	50.0 min	-0.13
44.006	12-FEB-07 16:08	GRB 227	Y 8538	8	\	400.0 min	17.35
44.695	13-FEB-07 8:40	GRB 227	SF		\	10.0 min	0.00
44.784	13-FEB-07 10:48	GRB 227	Np 7725	2	\	14.0 min	34.21

Status: PASS

Source	LCS
Sample No.	2
Analyte	Sr 90
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	40.698-7
Count Date	40.698-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.8106
Result	12.785
Error @ 2s (abs.)	0.595
Error @ 2s (%)	4.7
MDA	0.22973
Result Units	PCI/SMPL
Nuclide	Sr 90
Standard ID	AA1-B-(15)
Qty (ml)	1.25
Activity (dpm)	27.31
Calib. Date	306.500-1996
Half Life (days)	10580
Decay Date	40.698-7
Added (pCi)	12.03
Added Error @ 2s (%)	4
F/A Ratio	1.063
F/A Ratio Error @ 2s (%)	6
LCL	0.80
LWL	0.87
UWL	1.13
UCL	1.20
Status	PASS
Flag	

Initials/Date KY 2/16/07

60250

15-FEB-07 TMA Corporation 8655- 2 Sr
15:37:27 Beta Counting Data QC-LCS #60250
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2-6-07

Sr 90

Counter GRB 227
Length of count 100.0 Min.
Gross counts = 1880.

Zero time 40.698 7
Separation time 40.698 7
18.309 CPM ON DAY 45.763 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 40.698 7 = 8.840 (Y/Sr eff ratio = 1.466)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.8106
PPT. correction (3)= 1.0289 (recovery = 14.51 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.340811E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.0598E+01	2.6780	2.8382E+01	6.7388E-01	2.37 %

pCi /smpl	1 sigma	2 sigma
1.2785E+01	3.0355E-01	5.9496E-01

LTV 1.3286E+01

MDA (3.00) 2.2973E-01
MDA (2.71) 2.2770E-01
Lc 1.0467E-01

DPM OF ALIQUOT 2.838E+01

KY 2/16/07

Counting Data

	GMT	Det		Min.	Counts	CPM	Error	BKG	SF	CF
1.	40.900	GRB	226	50.00	566	10.75	4.6%	0.6440	1.0070	0
2.	43.815	GRB	203	100.00	1633	16.59	2.6%	0.3450	1.0380	0
3.	44.799	GRB	228	100.00	1764	17.47	2.5%	0.3640	1.0110	0
4.	45.763	GRB	227	100.00	1880	18.31	2.4%	0.4170	0.9960	0
5.	46.951	GRB	201	50.00	927	19.07	3.4%	0.3960	1.0510	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 226	EF SF	40.689	93309	10.0	1.008	0.977 - 1.037	1.007	0.0
GRB 203	EF SF	43.745	90283	10.0	1.045	1.006 - 1.050	1.038	1.8
GRB 228	EF SF	44.694	92942	10.0	1.024	0.980 - 1.040	1.011	1.4
GRB 227	EF SF	45.722	98146	10.0	1.000	0.965 - 1.025	0.996	0.4
GRB 201	EF SF	46.747	83434	10.0	1.058	1.021 - 1.081	1.051	0.7
GRB 226	BK BK	40.024	546	813.2	0.671	0.546 - 0.726	0.644	1.2
GRB 203	BK BK	34.968	850	2370.3	0.359	0.300 - 0.442	0.345	0.4
GRB 228	BK BK	40.024	313	813.2	0.385	0.300 - 0.449	0.364	0.9
GRB 227	BK BK	40.024	363	813.2	0.446	0.324 - 0.504	0.417	1.1
GRB 201	BK BK	34.968	934	2370.3	0.394	0.314 - 0.497	0.396	-0.4

Counting Log(s)

Previous 3 counts	Time	Detector		ID				Length	Cpm
40.689	9-FEB-07 8:32	GRB	226	SF			\	10.0 min	0.00
40.742	9-FEB-07 9:48	GRB	226	Sr	8538	17	\	88.0 min	47.48
40.814	9-FEB-07 11:32	GRB	226	Sr	8862	11	\	120.0 min	0.06
40.774	9-FEB-07 10:34	GRB	203	Sr	7581	6	\	100.0 min	10.44
43.745	12-FEB-07 9:52	GRB	203	SF			\	10.0 min	0.00
43.765	12-FEB-07 10:21	GRB	203	Tc	7596	3	\	50.0 min	-0.15
44.006	12-FEB-07 16:08	GRB	228	Y	8538	17	\	400.0 min	12.18
44.695	13-FEB-07 8:40	GRB	228	SF			\	10.0 min	0.00
44.784	13-FEB-07 10:48	GRB	228	Np	7725	3	\	14.0 min	21.80
45.408	14-FEB-07 1:47	GRB	227	Ac	9681	2	\	150.0 min	0.05
45.512	14-FEB-07 4:17	GRB	227	Ac	9681	2	\	112.4 min	0.06
45.722	14-FEB-07 9:19	GRB	227	SF			\	10.0 min	0.00
46.040	14-FEB-07 16:57	GRB	201	Sr	4096	13	\	400.0 min	-0.04
46.747	15-FEB-07 9:55	GRB	201	SF			\	10.0 min	0.00
46.791	15-FEB-07 10:59	GRB	201	Np	8414	7A1	\	200.0 min	15.74

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Sr 90
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	40.698-7
Count Date	40.698-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.8318
Result	0.058266 ✓
Error @ 2s (abs.)	0.130
Error @ 2s (%)	223.9
MDA	0.25857 ✓
Result Units	PCI/SMPL
Status	PASS ✓
Flag	

Initials/Date KEJ 2/12/07

60251

12-FEB-07 TMA Corporation 8655- 3 Sr
13:31:18 Beta Counting Data QC-BLANK #60251
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2-12-07

Sr 90

Counter GRB 204
Length of count 100.0 Min.
Gross counts = 46.

Zero time 40.698 7
Separation time 40.698 7
0.075 CPM ON DAY 43.815 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 40.698 7 = 0.041 (Y/Sr eff ratio = 1.473)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.8318
PPT. correction (3)= 1.0260 (recovery = 14.89 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.534528E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
4.8301E-02	2.6780	1.2935E-01	1.4780E-01	114.26 %

pCi /smpl	1 sigma	2 sigma
5.8266E-02	6.6574E-02	1.3049E-01

LTV 1.6811E-01

MDA (3.00) 2.5857E-01
MDA (2.71) 2.5624E-01
Lc 1.1742E-01

DPM OF ALIQUOT 1.294E-01

Saved answer = 1.294E-01 114.26% (DPM of aliquot) (42296)

MY 2/5 2/12/07
MY 2/12/07

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	40.900	GRB 227	50.00	23	0.04	308.0%	0.4170	0.9940	0
2.	43.815	GRB 204	100.00	46	0.07	127.9%	0.3880	1.0400	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 227	EF SF	40.689	98769	10.0	0.993	0.965 - 1.025	0.994	-0.2
GRB 204	EF SF	43.745	68647	10.0	1.049	1.009 - 1.050	1.040	2.7
GRB 227	BK BK	40.024	363	813.2	0.446	0.324 - 0.504	0.417	1.1
GRB 204	BK BK	34.968	909	2370.3	0.383	0.304 - 0.484	0.388	-0.4

Counting Log(s)

Previous 3 counts	Time	Detector	ID		Length	Cpm
40.689	9-FEB-07 8:32	GRB 227	SF	\	10.0 min	0.00
40.742	9-FEB-07 9:48	GRB 227	Sr 7723 3	\	88.0 min	15.00
40.814	9-FEB-07 11:32	GRB 227	Sr 8862 12	\	120.0 min	0.08
40.774	9-FEB-07 10:34	GRB 204	Sr 7581 7	\	100.0 min	0.03
43.745	12-FEB-07 9:52	GRB 204	SF	\	10.0 min	0.00
43.765	12-FEB-07 10:21	GRB 204	Tc 7596 5	\	50.0 min	-0.13

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Sr 90	Sr 90
Reference Date	28.778-7	28.778-7
Separation Date #1		
Separation Date #2	40.698-7	40.698-7
Count Date	40.698-07	40.698-07
Aliquot	0.5	0.5
Aliquot Units	L	L
Yield	0.881	0.7983
Result	0.043498 ✓	0.0044765 ✓
Error @ 2s (abs.)	0.436	0.239
Error @ 2s (%)	1002.3	5349.6
MDA	0.93092 ✓	0.49309 ✓
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N ✓	
Status	PASS ✓	
Flag		

Initials/Date KBJ 2/14/07

60252

12-FEB-07 TMA Corporation 8655- 4 Sr
13:31:12 Deta Counting Data QC-DUP#1 60252
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2-12-07

Sr 90

Counter GRB 206
Length of count 50.0 Min.
Gross counts = 35.

Zero time 28.778 7
Separation time 40.698 7
0.030 CPM ON DAY 43.815 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 40.698 7 = 0.016 (Y/Sr eff ratio = 1.485)

Elapsed time (days) = 11.920
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 9.992E-01
Chemical yield (2)= 0.8810
PPT. correction (3)= 1.0209 (recovery = 15.77 mgs)
Aliquot (4)= 0.5000 1

Product (1X2X3X4) = 4.493456E-01

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
3.6059E-02	2.6780	9.6565E-02	4.9382E-01	511.39 %

pCi /l	1 sigma	2 sigma
4.3498E-02	2.2244E-01	4.3599E-01

LTV 4.1053E-01

MDA (3.00) 9.3092E-01
MDA (2.71) 9.2194E-01
Lc 4.1981E-01

DPM OF ALIQUOT 4.828E-02

Saved answer = 4.828E-02 511.39% (DPM of aliquot) (42302)

KY 2/14/07

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	40.900	GRB 228	50.00	14	-0.08	135.1%	0.3640	1.0100	0
2.	43.815	GRB 206	50.00	35	0.03	591.6%	0.6720	1.0550	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 228	EF SF	40.689	93903	10.0	1.013	0.980 - 1.040	1.010	0.3
GRB 206	EF SF	43.765	87686	10.0	1.055	1.025 - 1.085	1.055	0.0
GRB 228	BK BK	40.024	313	813.2	0.385	0.300 - 0.449	0.364	0.9
GRB 206	BK BK	34.968	1538	2370.6	0.649	0.590 - 0.770	0.672	-1.0

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
40.689	9-FEB-07 8:32	GRB 228	SF		\	10.0 min	0.00
40.742	9-FEB-07 9:48	GRB 228	Sr 7600	3	\	88.0 min	15.35
40.814	9-FEB-07 11:32	GRB 228	Sr 8862	13	\	120.0 min	10.34
43.746	12-FEB-07 9:54	GRB 206	SF		\	10.0 min	0.00
43.765	12-FEB-07 10:21	GRB 206	SF		\	10.0 min	0.00
43.795	12-FEB-07 11:04	GRB 206	Tc 7596	4	\	13.0 min	91.72

16-FEB-07 TMA Corporation 8655- 1 Ra
15:21:58 Ra226 calculation IQA2793-01
R701193 RADIUM V 1.03
MCM Reviewed BW Date 2-16-07

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	38.925 7
Ra226 -	1.1700E-06	2nd -	47.731 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
47.924	7	RN 13	21	62.3	0.230	0.107	0.996	0.107	89.2

Rn-222 decay from 2nd De-em to Count time =	0.9656
CPM @ 2nd De-emanation time =	0.1112
Cell # 5 Counting Efficiency =	2.4730
Radon-222 in cell @ 2nd De-emanation time =	0.0450
Rn-222 growth from 1st to 2nd De-em time =	0.7974
Ra226 DPM in the bubbler =	0.0564

Ra226 calculation

T-zero	28.778 7	
Delta T	18.953	(days)
Decay	9.9998E-01	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E-01 1	

	1 sigma		2 sigma	
dpm/l	dpm error	% error	dpm error	% error
5.6401E-01	5.0291E-01	89.17 %	9.8570E-01	174.77 %
pCi /l				
2.5406E-01	2.2654E-01		4.4401E-01	

7.8525E-01	7.7420E-01	3.3618E-01	6.2784E-01	42279
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 13	BK BK	47.061	106	923.0	0.115	0.071 - 0.127	0.100	1.7
RN 13	EF SF	47.716	10041	3.7	1.030	0.973 - 1.070	1.027	0.3
RN 13	BK BK5	46.733	28	122.0	0.230	0.079 - 0.298	0.193	1.1
RN 13	EF EF5	270.888	4861	101.6	2.473	2.228 - 2.512	2.387	2.2

Previous 3 counts	Time	Detector	ID		Length	Cpm
47.716	16-FEB-07 9:11	RN 13	SF	\	3.7 min	0.00
47.732	16-FEB-07 9:34	RN 13	BK	\	120.1 min	0.00
47.816	16-FEB-07 11:35	RN 13	BK	\	126.6 min	0.00

MY 2/19/07

Status: PASS

Source	LCS
Sample No.	2
Analyte	Ra226
Geometry	LC
Reference Date	
Separation Date #1	38.925-7
Separation Date #2	47.731-7
Count Date	47.924-07
Aliquot	1
Aliquot Units	SMPL
Yield	1
Result	5.8977 ✓
Error @ 2s (abs.)	0.262
Error @ 2s (%)	4.4
MDA	0.083843
Result Units	PCI/SMPL
Nuclide	Ra226
Standard ID	N1-A-(09)
Qty (ml)	0.5 ✓
Activity (dpm)	24.95
Calib. Date	252.708-1991
Half Life (days)	585500
Decay Date	47.731-7 ✓
Added (pCi)	5.582 ✓
Added Error @ 2s (%)	4
F/A Ratio	1.057 ✓
F/A Ratio Error @ 2s (%)	6
LCL	0.79
LWL	0.86
UWL	1.14
UCL	1.21
Status	PASS ✓
Flag	

Initials/Date KY 2/19/07

60250

16-FEB-07 TMA Corporation 8655- 2 Ra
15:22:01 Ra226 calculation QC-LCS #60250
R7011193 RADIUM V 1.03
MCM Reviewed BE Date 2-16-07

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	38.925 7
Ra226 -	1.1700E-06	2nd -	47.731 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
47.924	7	RN 9	2030	87.7	0.341	22.798	0.994	22.924	2.3

Rn-222 decay from 2nd De-em to Count time =	0.9656
CPM @ 2nd De-emanation time =	23.7406
Cell #25 Counting Efficiency =	2.2740
Radon-222 in cell @ 2nd De-emanation time =	10.4400
Rn-222 growth from 1st to 2nd De-em time =	0.7974
Ra226 DPM in the bubbler =	13.0930

Ra226 calculation

T-zero	47.731 7	
Delta T	0.000	(days)
Decay	1.0000E+00	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E+00	smpl

	1 sigma		2 sigma	
dpm/smpl	dpm error	% error	dpm error	% error
1.3093E+01	2.9711E-01	2.27 %	5.8233E-01	4.45 %
pCi /smpl				
5.8977E+00	1.3383E-01		2.6231E-01	

8.3843E-02	8.2988E-02	3.7579E-02	6.1186E+00	42286
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 9	BK BK	47.061	209	923.0	0.226	0.179 - 0.253	0.216	0.9
RN 9	EF SF	47.703	10033	3.6	1.011	0.962 - 1.036	1.000	1.0
RN 9	BK BK25	45.713	41	120.1	0.341	0.197 - 0.453	0.328	0.4
RN 9	EF EF25	313.940	4003	69.1	2.274	2.100 - 2.588	2.286	-0.2

Previous 3 counts	Time	Detector	ID	Length	Cpm
47.061	15-FEB-07 17:27	RN 9	BK	\ 923.0 min	0.00
47.703	16-FEB-07 8:52	RN 9	SF	\ 3.6 min	0.00
47.816	16-FEB-07 11:35	RN 9	BK	\ 126.6 min	0.00

ng 2/19/07

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Ra226
Geometry	LC
Reference Date	
Separation Date #1	38.925-7
Separation Date #2	47.731-7
Count Date	47.924-07
Aliquot	1
Aliquot Units	SMPL
Yield	1
Result	0.006282 ✓
Error @ 2s (abs.)	0.039
Error @ 2s (%)	621.5
MDA	0.077538 ✓
Result Units	PCI/SMPL
Status	PASS ✓
Flag	

Initials/Date KY 2/19/07

60251

16-FEB-07 TMA Corporation 8655- 3 Ra
15:21:51 Ra226 calculation QC-BLANK #60251
R701193 RADIUM V 1.03
MCM Reviewed BL Date 2-16-07

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	38.925 7
Ra226 =	1.1700E-06	2nd =	47.731 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
47.924	7	RN 10	9	52.1	0.148	0.025	0.997	0.025	317.1

Rn-222 decay from 2nd De-em to Count time =	0.9656
CPM @ 2nd De-emanation time =	0.0257
Cell #66 Counting Efficiency =	2.3120
Radon-222 in cell @ 2nd De-emanation time =	0.0111
Rn-222 growth from 1st to 2nd De-em time =	0.7974
Ra226 DPM in the bubbler =	0.0139

Ra226 calculation

T-zero	47.731 7	
Delta T	0.000	(days)
Decay	1.0000E+00	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E+00	smpl

	1 sigma		2 sigma	
dpm/smpl	dpm error	% error	dpm error	% error
1.3946E-02	4.4221E-02	317.09 %	8.6674E-02	621.49 %
pCi /smpl				
6.2820E-03	1.9920E-02		3.9042E-02	

7.7538E-02 (MDA(3.00)	7.6124E-02 (MDA(2.71)	3.1527E-02 (CL)	3.9149E-02 (LTV)	42295 (RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 10	BK BK	47.061	68	923.0	0.074	0.043 - 0.096	0.069	0.4
RN 10	EF SF	47.706	10006	3.6	1.039	1.008 - 1.068	1.039	0.0
RN 10	BK BK66	46.733	18	122.0	0.148	0.000 - 0.315	0.138	0.2
RN 10	EF EF66	317.938	4050	69.0	2.312	2.100 - 2.800	2.349	-0.6

Previous 3 counts	Time	Detector	ID		Length	Cpm
47.061	15-FEB-07 17:27	RN 10	BK	\	923.0 min	0.00
47.706	16-FEB-07 8:56	RN 10	SF	\	3.6 min	0.00
47.732	16-FEB-07 9:34	RN 10	BK	\	120.1 min	0.00

MK 2/19/07

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Ra226	Ra226
Reference Date	28.778-7	28.778-7
Separation Date #1	38.925-7	38.925-7
Separation Date #2	47.731-7	47.731-7
Count Date	47.924-07	47.924-07
Aliquot	0.1	0.1
Aliquot Units	L	L
Yield	1	1
Result	-0.048832	0.25406
Error @ 2s (abs.)	0.362	0.444
Error @ 2s (%)	741.5	174.8
MDA	0.74491	0.78525
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

Initials/Date MG 2/19/07

60252

16-FEB-07 TMA Corporation 8655- 4 Ra
15:21:54 Ra226 calculation QC-DUP#1 60252
R7011193 RADIUM V 1.03
MCM Reviewed BW Date 2-6-07

Decay Constants

Rn222 - 1.8129E-01
Ra226 - 1.1700E-06

De-emanation Times

1st - 38.925 7
2nd - 47.731 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
47.924	7	RN 11	10	62.3	0.180	-0.020	0.996	-0.020	378.3

Rn-222 decay from 2nd De-em to Count time = 0.9656
CPM @ 2nd De-emanation time = -0.0203
Cell #35 Counting Efficiency = 2.3500
Radon-222 in cell @ 2nd De-emanation time = -0.0086
Rn-222 growth from 1st to 2nd De-em time = 0.7974
Ra226 DPM in the bubbler = -0.0108

Ra226 calculation

T-zero 28.778 7
Delta T 18.953 (days)
Decay 9.9998E-01
Yield 1.0000 (0.00 mGs)
Aliquot 1.000E-01 1

dpm/l	1 sigma dpm error	1 sigma % error	2 sigma dpm error	2 sigma % error
-1.0841E-01	4.1011E-01	-378.31 %	8.0381E-01	-741.48 %

pCi /l

-4.8832E-02 (C) 1.8473E-01 3.6208E-01

7.4491E-01 (MDA(3.00)	7.3328E-01 (MDA(2.71)	3.1297E-01 (CL)	3.0481E-01 (LTV)	42301 (RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 11	BK BK	47.061	65	923.0	0.070	0.055 - 0.098	0.076	-0.9
RN 11	EF SF	47.710	10020	3.6	1.040	0.976 - 1.070	1.033	0.6
RN 11	BK BK35	46.733	22	122.0	0.180	0.006 - 0.286	0.157	0.7
RN 11	EF EF35	317.938	4037	67.7	2.350	2.139 - 2.636	2.382	-0.5

Previous 3 counts	Time	Detector	ID	Length	Cpm
47.061	15-FEB-07 17:27	RN 11	BK	\ 923.0 min	0.00
47.710	16-FEB-07 9:02	RN 11	SF	\ 3.6 min	0.00
47.732	16-FEB-07 9:34	RN 11	BK	\ 120.1 min	0.00

KY 2/19/07

Status: PASS

Source	MS	ORIGINAL
Sample No.	5	1
Analyte	Ra226	Ra226
Reference Date	28.778-7	28.778-7
Separation Date #1	38.925-7	38.925-7
Separation Date #2	47.731-7	47.731-7
Count Date	47.924-07	47.924-07
Aliquot	0.1	0.1
Aliquot Units	L	L
Yield	1	1
Result	120.72 ✓	0.25406 ✓
Error @ 2s (abs.)	4.319	0.444
Error @ 2s (%)	3.6	174.8
MDA	0.7568	0.78525
Result Units	PCI/L ✓	PCI/L ✓
Nuclide	Ra226	
Standard ID	N1-A-(09)	
Qty (ml)	1.1 ✓	
Activity (dpm)	24.95	
Calib. Date	252.708-1991	
Half Life (days)	585500	
Decay Date	28.778-7 ✓	
Added (pCi)	12.28 ✓	
Added Error @ 2s (%)	4	
Spike Activity	12.072	
Original Activity	0.025	
Activity Difference	12.047	
Error Difference	3.604	
F/A Ratio	0.981 ✓	
F/A Ratio Error @ 2s (%)	5.384	
LCL	0.80	
LWL	0.87	
UWL	1.13	
UCL	1.20	
Status	PASS ✓	
Flag		

Initials/Date KG 2/19/07

60253

16-FEB-07 TMA Corporation 8655- 5 Ra
15:21:56 Ra226 calculation QC-MS#1 60253
R701193 RADIUM V 1.03
MCM Reviewed BW Date 2-16-07

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	38.925 7
Ra226 =	1.1700E-06	2nd =	47.731 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
47.924	7	RN 12	3036	62.3	0.189	48.527	0.996	48.718	1.8

Rn-222 decay from 2nd De-em to Count time =	0.9656
CPM @ 2nd De-emanation time =	50.4528
Cell #20 Counting Efficiency =	2.3610
Radon-222 in cell @ 2nd De-emanation time =	21.3693
Rn-222 growth from 1st to 2nd De-em time =	0.7974
Ra226 DPM in the bubbler =	26.7995

Ra226 calculation

T-zero	28.778 7	
Delta T	18.953	(days)
Decay	9.9998E-01	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E-01 1	

	1 sigma		2 sigma	
dpm/l	dpm error	% error	dpm error	% error
2.6800E+02	4.8923E+00	1.83 %	9.5890E+00	3.58 %
pCi /l				
1.2072E+02	2.2037E+00		4.3193E+00	

7.5680E-01	7.4522E-01	3.1921E-01	1.2436E+02	42305
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 12	BK BK	47.061	89	923.0	0.096	0.062 - 0.123	0.093	0.4
RN 12	EF SF	47.713	10034	3.6	1.045	1.001 - 1.077	1.041	0.5
RN 12	BK BK20	46.733	23	122.0	0.189	0.024 - 0.283	0.151	0.8
RN 12	EF EF20	324.949	4108	79.4	2.361	2.100 - 2.523	2.304	0.9

Previous 3 counts	Time	Detector	ID	Length	Cpm
47.061	15-FEB-07 17:27	RN 12	BK	\ 923.0 min	0.00
47.713	16-FEB-07 9:06	RN 12	SF	\ 3.6 min	0.00
47.816	16-FEB-07 11:35	RN 12	BK	\ 126.6 min	0.00

KY 2/19/07

16-FEB-07 TMA Corporation 8655- 1 Ac
06:43:08 Beta Counting Data IQA2793-01
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2-16-07

Ac 228

Counter GRB 221
Length of count 0.0 Min.
Gross counts = 0.

Zero time 28.778 7
Separation time 46.764 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
46.894	0.	0.0	0.00	0.000	0.00		0.02	0.02

CPM corrected for decay to Sept. Time. : 0.0218

Elapsed time (days) = 17.986
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 9.941E-01
Chemical yield (2)= 0.7784
PPT. correction (3)= 1.1059 (recovery = 31.71 mgs)
Aliquot (4)= 1.800 1

Product (1X2X3X4) = 1.540280E+00

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
1.4157E-02	2.0790	2.9433E-02	1.0200E-01	346.55 %

pCi /l	1 sigma	2 sigma
1.3258E-02	4.5945E-02	9.0053E-02

LTV 8.9068E-02

1st point MDA (3.00) 2.5516E-01
MDA (2.71) 2.5317E-01
Lc 1.1767E-01

DPM OF ALIQUOT 5.298E-02

Saved answer = 5.298E-02 346.55% (DPM of aliquot) (42276)

MP 2/16/07

Weighted average of gross counting data 06:43:07 16-FEB-07
OTAIN V. 0.00

8655 - 1 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 46.894	Error
46.894	GRB 221	57	150.0	0.38	1.015	0.00	0.00	2255.9%
47.004	GRB 221	55	150.0	0.38	1.015	-0.01	-0.02	648.5%
47.110	GRB 221	56	150.0	0.38	1.015	0.00	-0.01	1836.7%
47.216	GRB 221	62	150.0	0.38	1.015	0.04	0.10	190.7%
47.322	GRB 221	75	150.0	0.38	1.015	0.14	0.46	59.6%
47.428	GRB 221	50	150.0	0.38	1.015	-0.05	-0.22	149.6%
47.533	GRB 221	27	72.2	0.38	1.015	0.00	-0.02	2846.2%
					Weighted average		0.02	346.6%

16-FEB-07 06:43:06 Counting Data Summary

8655- 1 Ac

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	46.894	GRB 221	150.00	57	0.00	2368.0%	0.3770	1.0150	0
2.	47.004	GRB 221	150.00	55	-0.01	681.4%	0.3770	1.0150	0
3.	47.110	GRB 221	150.00	56	0.00	1928.9%	0.3770	1.0150	0
4.	47.216	GRB 221	150.00	62	0.04	199.8%	0.3770	1.0150	0
5.	47.322	GRB 221	150.00	75	0.12	62.2%	0.3770	1.0150	0
6.	47.428	GRB 221	150.00	50	-0.04	157.6%	0.3770	1.0150	0
7.	47.533	GRB 221	72.19	27	0.00	3414.7%	0.3770	1.0150	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	EF SF	46.704	87168	10.0	1.023	0.984 - 1.044	1.015	0.9
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8
GRB 221	BK BK	37.013	297	823.0	0.361	0.300 - 0.472	0.377	-0.8

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
46.704	15-FEB-07 8:53	GRB 221	SF		\	10.0 min	0.00
46.756	15-FEB-07 10:08	GRB 221	Y 8538	1	\	68.0 min	7.66
46.806	15-FEB-07 11:20	GRB 221	Sr 7614	2	\	100.0 min	12.26
46.756	15-FEB-07 10:08	GRB 221	Y 8538	1	\	68.0 min	7.66
46.806	15-FEB-07 11:20	GRB 221	Sr 7614	2	\	100.0 min	12.26
46.894	15-FEB-07 13:27	GRB 221	Ac 8655	1	\	150.0 min	0.00
46.806	15-FEB-07 11:20	GRB 221	Sr 7614	2	\	100.0 min	12.26
46.894	15-FEB-07 13:27	GRB 221	Ac 8655	1	\	150.0 min	0.00
47.004	15-FEB-07 16:05	GRB 221	Ac 8655	1	\	150.0 min	-0.01
46.894	15-FEB-07 13:27	GRB 221	Ac 8655	1	\	150.0 min	0.00
47.004	15-FEB-07 16:05	GRB 221	Ac 8655	1	\	150.0 min	-0.01
47.110	15-FEB-07 18:38	GRB 221	Ac 8655	1	\	150.0 min	0.00
47.004	15-FEB-07 16:05	GRB 221	Ac 8655	1	\	150.0 min	-0.01
47.110	15-FEB-07 18:38	GRB 221	Ac 8655	1	\	150.0 min	0.00
47.216	15-FEB-07 21:11	GRB 221	Ac 8655	1	\	150.0 min	0.04

47.110	15-FEB-07	18:38	GRB	221	Ac 8655	1	\	150.0 min	0.00
47.216	15-FEB-07	21:11	GRB	221	Ac 8655	1	\	150.0 min	0.04
47.322	15-FEB-07	23:43	GRB	221	Ac 8655	1	\	150.0 min	0.13
47.216	15-FEB-07	21:11	GRB	221	Ac 8655	1	\	150.0 min	0.04
47.322	15-FEB-07	23:43	GRB	221	Ac 8655	1	\	150.0 min	0.13
47.428	16-FEB-07	2:16	GRB	221	Ac 8655	1	\	150.0 min	-0.04

Status: PASS

Source	LCS
Sample No.	2
Analyte	Ra228
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	46.764-7
Count Date	46.894-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.7359
Result	12.005 ✓
Error @ 2s (abs.)	0.685
Error @ 2s (%)	5.7
MDA	0.45968
Result Units	PCI/SMPL
Nuclide	Ra228
Standard ID	S1-B-(7)
Qty (ml)	1.5 ✓
Activity (dpm)	34.34
Calib. Date	016.708-2001
Half Life (days)	2100
Decay Date	46.764-7 ✓
Added (pCi)	11.15 ✓
Added Error @ 2s (%)	4
F/A Ratio	1.077 ✓
F/A Ratio Error @ 2s (%)	7
LCL	0.69
LWL	0.79
UWL	1.21
UCL	1.31
Status	PASS ✓
Flag	

Initials/Date KH 2/21/07

60250

21-FEB-07 TMA Corporation 8655- 2 Ac
15:26:18 Beta Counting Data QC-LCS #60250
R701193 AUTDB V 2.08
MCM Reviewed BW Date 2-21-07

Ac 228

Counter GRB 222
Length of count 0.0 Min.
Gross counts = 0.

Zero time 46.764 7
Separation time 46.764 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
46.894	0.	0.0	0.00	0.000	0.00		7.51	7.51

CPM corrected for decay to Sept. Time. : 10.6852

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.7359
PPT. correction (3)= 1.1327 (recovery = 29.98 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.335180E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.2819E+01	2.0790	2.6652E+01	7.7536E-01	2.91 %

pCi /smpl	1 sigma	2 sigma
1.2005E+01	3.4926E-01	6.8455E-01

LTV 1.2582E+01

1st point MDA (3.00) 4.5968E-01
MDA (2.71) 4.5600E-01
Lc 2.1153E-01

DPM OF ALIQUOT 2.665E+01

Saved answer = 2.665E+01 2.91% (DPM of aliquot) (45881)

KG 2/21/07

Weighted average of gross counting data 15:26:17 21-FEB-07
BTAIN V. 0.00

8655 - 2 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 46.894	Error
46.894	GRB 222	988	150.0	0.35	1.020	7.30	7.30	3.4%
47.004	GRB 222	723	150.0	0.35	1.020	5.23	7.05	4.1%
47.110	GRB 222	627	150.0	0.35	1.020	4.48	8.05	4.5%
47.216	GRB 222	501	150.0	0.35	1.020	3.50	8.38	5.2%
					Weighted average		7.51	2.9%

Error shown is 1.4 times that expected from counting statistics.

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	46.894	GRB 222	150.00	988	6.36	3.5%	0.3530	1.0200	0
2.	47.004	GRB 222	150.00	723	4.56	4.2%	0.3530	1.0200	0
3.	47.110	GRB 222	150.00	627	3.90	4.5%	0.3530	1.0200	0
4.	47.216	GRB 222	150.00	501	3.05	5.3%	0.3530	1.0200	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 222	EF SF	46.704	90041	10.0	1.028	0.987 - 1.050	1.020	0.9
GRB 222	EF SF	46.704	90041	10.0	1.028	0.987 - 1.050	1.020	0.9
GRB 222	EF SF	46.704	90041	10.0	1.028	0.987 - 1.050	1.020	0.9
GRB 222	EF SF	46.704	90041	10.0	1.028	0.987 - 1.050	1.020	0.9
GRB 222	BK BK	40.024	127	400.0	0.317	0.300 - 0.447	0.353	-2.1
GRB 222	BK BK	40.024	127	400.0	0.317	0.300 - 0.447	0.353	-2.1
GRB 222	BK BK	40.024	127	400.0	0.317	0.300 - 0.447	0.353	-2.1
GRB 222	BK BK	40.024	127	400.0	0.317	0.300 - 0.447	0.353	-2.1

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
46.704	15-FEB-07 8:53	GRB 222	SF		\	10.0 min	0.00
46.756	15-FEB-07 10:08	GRB 222	Y 8538	8	\	68.0 min	8.58
46.806	15-FEB-07 11:20	GRB 222	Sr 7605	8	\	100.0 min	0.13
46.756	15-FEB-07 10:08	GRB 222	Y 8538	8	\	68.0 min	8.58
46.806	15-FEB-07 11:20	GRB 222	Sr 7605	8	\	100.0 min	0.13
46.894	15-FEB-07 13:27	GRB 222	Ac 8655	2	\	150.0 min	6.36
46.806	15-FEB-07 11:20	GRB 222	Sr 7605	8	\	100.0 min	0.13
46.894	15-FEB-07 13:27	GRB 222	Ac 8655	2	\	150.0 min	6.36
47.004	15-FEB-07 16:05	GRB 222	Ac 8655	2	\	150.0 min	4.56
46.894	15-FEB-07 13:27	GRB 222	Ac 8655	2	\	150.0 min	6.36
47.004	15-FEB-07 16:05	GRB 222	Ac 8655	2	\	150.0 min	4.56
47.110	15-FEB-07 18:38	GRB 222	Ac 8655	2	\	150.0 min	3.90

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Ra228
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	46.764-7
Count Date	46.894-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.7685
Result	-0.099354 ✓
Error @ 2s (abs.)	0.161
Error @ 2s (%)	162.3
MDA	0.46092 ✓
Result Units	PCI/SMPL
Status	PASS ✓
Flag	

Initials/Date KY 2/16/07

60251

16-FEB-07 TMA Corporation 8655- 3 Ac
06:43:13 Beta Counting Data QC-BLANK #60251
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2/16/07

Ac 228

Counter GRB 223
Length of count 0.0 Min.
Gross counts = 0.

Zero time 46.764 7
Separation time 46.764 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CORRECTED CPM	
46.894	0.	0.0	0.00	0.000	0.00		-0.06	-0.06

CPM corrected for decay to Sept. Time. : -0.0907

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.7685
PPT. correction (3)= 1.1121 (recovery = 31.31 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.546985E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
-1.0609E-01	2.0790	-2.2057E-01	1.8267E-01	-82.82 %

pCi /smpl	1 sigma	2 sigma
-9.9354E-02	8.2282E-02	1.6127E-01

LTV 1.3577E-01

1st point MDA (3.00) 4.6092E-01
MDA (2.71) 4.5749E-01
Lc 2.1299E-01

DPM OF ALIQUOT -2.206E-01

Saved answer = -2.206E-01 -82.82% (DPM of aliquot) (42292)

KL 2/16/07

Weighted average of gross counting data 06:43:12 16-FEB-07
BTAIN V. 0.00

8655 - 3 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 46.894	Error
46.894	GRB 223	59	150.0	0.39	1.002	0.00	0.00	2081.1%
47.004	GRB 223	53	150.0	0.39	1.002	-0.04	-0.06	183.9%
47.110	GRB 223	57	150.0	0.39	1.002	-0.01	-0.02	687.3%
47.216	GRB 223	57	150.0	0.39	1.002	-0.01	-0.03	687.3%
47.322	GRB 223	42	150.0	0.39	1.002	-0.13	-0.40	57.9%
47.428	GRB 223	42	150.0	0.39	1.002	-0.13	-0.54	57.9%
47.533	GRB 223	19	72.2	0.39	1.002	-0.14	-0.77	60.2%
					Weighted average		-0.06	82.8%

Counting Data

	GMT	Det		Min.	Counts	CPM	Error	BKG	SF	CF
1.	46.894	GRB	223	150.00	59	0.00	2167.9%	0.3900	1.0020	0
2.	47.004	GRB	223	150.00	53	-0.04	192.0%	0.3900	1.0020	0
3.	47.110	GRB	223	150.00	57	-0.01	716.5%	0.3900	1.0020	0
4.	47.216	GRB	223	150.00	57	-0.01	716.5%	0.3900	1.0020	0
5.	47.322	GRB	223	150.00	42	-0.11	60.8%	0.3900	1.0020	0
6.	47.428	GRB	223	150.00	42	-0.11	60.8%	0.3900	1.0020	0
7.	47.533	GRB	223	72.19	19	-0.13	75.0%	0.3900	1.0020	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	EF SF	46.704	89203	10.0	1.015	0.970 - 1.030	1.002	1.5
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6
GRB 223	BK BK	44.006	162	400.0	0.405	0.300 - 0.478	0.390	0.6

Counting Log(s)

Previous 3 counts	Time	Detector		ID			Length	Cpm
46.704	15-FEB-07 8:53	GRB	223	SF		\	10.0 min	0.00
46.756	15-FEB-07 10:08	GRB	223	Np 8414	7	\	68.0 min	25.83
46.806	15-FEB-07 11:20	GRB	223	Sr 7605	9	\	100.0 min	0.08
46.756	15-FEB-07 10:08	GRB	223	Np 8414	7	\	68.0 min	25.83
46.806	15-FEB-07 11:20	GRB	223	Sr 7605	9	\	100.0 min	0.08
46.894	15-FEB-07 13:27	GRB	223	Ac 8655	3	\	150.0 min	0.00
46.806	15-FEB-07 11:20	GRB	223	Sr 7605	9	\	100.0 min	0.08
46.894	15-FEB-07 13:27	GRB	223	Ac 8655	3	\	150.0 min	0.00
47.004	15-FEB-07 16:05	GRB	223	Ac 8655	3	\	150.0 min	-0.04
46.894	15-FEB-07 13:27	GRB	223	Ac 8655	3	\	150.0 min	0.00
47.004	15-FEB-07 16:05	GRB	223	Ac 8655	3	\	150.0 min	-0.04
47.110	15-FEB-07 18:38	GRB	223	Ac 8655	3	\	150.0 min	-0.01
47.004	15-FEB-07 16:05	GRB	223	Ac 8655	3	\	150.0 min	-0.04
47.110	15-FEB-07 18:38	GRB	223	Ac 8655	3	\	150.0 min	-0.01
47.216	15-FEB-07 21:11	GRB	223	Ac 8655	3	\	150.0 min	-0.01

47.110	15-FEB-07	18:38	GRB	223	Ac	8655	3	\ 150.0 min	-0.01
47.216	15-FEB-07	21:11	GRB	223	Ac	8655	3	\ 150.0 min	-0.01
47.322	15-FEB-07	23:43	GRB	223	Ac	8655	3	\ 150.0 min	-0.11
47.216	15-FEB-07	21:11	GRB	223	Ac	8655	3	\ 150.0 min	-0.01
47.322	15-FEB-07	23:43	GRB	223	Ac	8655	3	\ 150.0 min	-0.11
47.428	16-FEB-07	2:16	GRB	223	Ac	8655	3	\ 150.0 min	-0.11

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Ra228	Ra228
Reference Date	28.778-7	28.778-7
Separation Date #1		
Separation Date #2	46.764-7	46.764-7
Count Date	46.894-07	46.894-07
Aliquot	1.8	1.8
Aliquot Units	L	L
Yield	0.7754	0.7784
Result	0.0062897	0.013258
Error @ 2s (abs.)	0.104	0.090
Error @ 2s (%)	1647.8	679.2
MDA	0.2511	0.25516
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

Initials/Date MY 2/16/07

60252

16-FEB-07 TMA Corporation 8655- 4 Ac
06:43:17 Beta Counting Data QC-DUP#1 60252
R701193 AUTOB V 2.08
MCM Reviewed BW Date 2/6/07

Ac 228

Counter GRB 224
Length of count 0.0 Min.
Gross counts = 0.

Zero time 28.778 7
Separation time 46.764 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
46.894	0.	0.0	0.00	0.000	0.00		0.01	0.01

CPM corrected for decay to Sept. Time. : 0.0103

Elapsed time (days) = 17.986
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 9.941E-01
Chemical yield (2)= 0.7754
PPT. correction (3)= 1.1078 (recovery = 31.59 mgs)
Aliquot (4)= 1.800 1

Product (1X2X3X4) = 1.537025E+00

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
6.7162E-03	2.0790	1.3963E-02	1.1739E-01	840.74 %

pCi /l	1 sigma	2 sigma
6.2897E-03	5.2879E-02	1.0364E-01

LTV 9.3541E-02

1st point MDA (3.00) 2.5110E-01
MDA (2.71) 2.4928E-01
Lc 1.1575E-01

DPM OF ALIQUOT 2.513E-02

Saved answer = 2.513E-02 840.74% (DPM of aliquot) (42298)

KH 2/16/07

Weighted average of gross counting data 06:43:16 16-FEB-07
BTAIN V. 0.00

8655 - 4 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 46.894	Error
46.894	GRB 224	73	150.0	0.37	1.006	0.14	0.14	61.3%
47.004	GRB 224	54	150.0	0.37	1.006	-0.01	-0.01	733.7%
47.110	GRB 224	43	150.0	0.37	1.006	-0.10	-0.17	75.6%
47.216	GRB 224	58	150.0	0.37	1.006	0.02	0.05	381.3%
47.322	GRB 224	50	150.0	0.37	1.006	-0.04	-0.13	181.3%
47.428	GRB 224	51	150.0	0.37	1.006	-0.03	-0.14	224.2%
47.533	GRB 224	19	72.2	0.37	1.006	-0.11	-0.64	70.8%
					Weighted average		0.01	840.7%

Error shown is 1.2 times that expected from counting statistics.

Counting Data

	GMT	Det		Min.	Counts	CPM	Error	BKG	SF	CF
1.	46.894	GRB	224	150.00	73	0.12	64.2%	0.3690	1.0060	0
2.	47.004	GRB	224	150.00	54	-0.01	774.6%	0.3690	1.0060	0
3.	47.110	GRB	224	150.00	43	-0.08	80.3%	0.3690	1.0060	0
4.	47.216	GRB	224	150.00	58	0.02	401.8%	0.3690	1.0060	0
5.	47.322	GRB	224	150.00	50	-0.04	191.9%	0.3690	1.0060	0
6.	47.428	GRB	224	150.00	51	-0.03	237.1%	0.3690	1.0060	0
7.	47.533	GRB	224	72.19	19	-0.11	88.4%	0.3690	1.0060	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	EF SF	46.704	97476	10.0	1.022	0.974 - 1.034	1.006	1.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8
GRB 224	BK BK	40.024	156	400.0	0.390	0.300 - 0.457	0.369	0.8

Counting Log(s)

Previous 3 counts	Time	Detector	ID				Length	Cpm
46.704	15-FEB-07 8:53	GRB 224	SF			\	10.0 min	0.00
46.756	15-FEB-07 10:08	GRB 224	Y	8538	7	\	68.0 min	6.52
46.806	15-FEB-07 11:20	GRB 224	Sr	7605	10	\	100.0 min	11.69
46.756	15-FEB-07 10:08	GRB 224	Y	8538	7	\	68.0 min	6.52
46.806	15-FEB-07 11:20	GRB 224	Sr	7605	10	\	100.0 min	11.69
46.894	15-FEB-07 13:27	GRB 224	Ac	8655	4	\	150.0 min	0.12
46.806	15-FEB-07 11:20	GRB 224	Sr	7605	10	\	100.0 min	11.69
46.894	15-FEB-07 13:27	GRB 224	Ac	8655	4	\	150.0 min	0.12
47.004	15-FEB-07 16:05	GRB 224	Ac	8655	4	\	150.0 min	-0.01
46.894	15-FEB-07 13:27	GRB 224	Ac	8655	4	\	150.0 min	0.12
47.004	15-FEB-07 16:05	GRB 224	Ac	8655	4	\	150.0 min	-0.01
47.110	15-FEB-07 18:38	GRB 224	Ac	8655	4	\	150.0 min	-0.08
47.004	15-FEB-07 16:05	GRB 224	Ac	8655	4	\	150.0 min	-0.01
47.110	15-FEB-07 18:38	GRB 224	Ac	8655	4	\	150.0 min	-0.08
47.216	15-FEB-07 21:11	GRB 224	Ac	8655	4	\	150.0 min	0.02

47.110	15-FEB-07	18:38	GRB	224	Ac 8655	4	\	150.0 min	-0.08
47.216	15-FEB-07	21:11	GRB	224	Ac 8655	4	\	150.0 min	0.02
47.322	15-FEB-07	23:43	GRB	224	Ac 8655	4	\	150.0 min	-0.04
47.216	15-FEB-07	21:11	GRB	224	Ac 8655	4	\	150.0 min	0.02
47.322	15-FEB-07	23:43	GRB	224	Ac 8655	4	\	150.0 min	-0.04
47.428	16-FEB-07	2:16	GRB	224	Ac 8655	4	\	150.0 min	-0.03

8655 ✓ SC-WLL

LOG-IN VERIFICATION 8655
09:08:58 22-FEB-07
Cust,set 0 0
Page 1

LOG-IN VERIFICATION
All samples
All planchets

RT 22227

CB# 6600 pg. 158
PB#6107 pg. 6

R701193 TA_IRVINE
TestAmerica - Irvin
17461 Derian Avenu

Pr Mgr.... MCM Rcvd... 01/31/07
Charge.... 00-000 Due.... 02/21/07
Chemist... Value... 0.
Created... 31-JAN-07 Billed.. 0.
Billing status.. open
Calc. units..... PCI /Unit alq Min Pri
0

PROJECT# IQA2793

Ra#7124 pg. 89

smp	elm	typ	mg rec	dpm rec Ash wgt	1st sep	2nd sep	aliquot		carr/ trac
1	Ac		31.71-0.0000	0.000 0	46.764-7		1.800-	1	# 1
	Ba	YLD	**** NOT LOGGED IN YET ****						
	H	DST	0.00 0.0000	0.000 0	0.000 0		1.0000E-021-		# 2
	Ra		0.00 0.0000	38.925-7	47.731-7		0.1000-	1	# 0
	Sr		14.29-0.0000	0.000 0	40.698-7		0.5000-	1	# 3
		80	87.50-0.0000	0.000 0	0.000 0		0.2200-	1	# 0
2	Ac		29.98-0.0000	0.000 0	46.764-7		1.000-	smpl	# 1
	Ba	YLD	**** NOT LOGGED IN YET ****						
	H	DST	10.00 100.0	0.000 0	0.000 0		1.000-	smpl	# 2
	Ra		0.00 0.0000	38.925-7	47.731-7		1.000-	smpl	# 0
	Sr		14.51-0.0000	0.000 0	40.698-7		1.000-	smpl	# 3
		80	62.50-0.0000	0.000 0	0.000 0		1.000-	smpl	# 0
3	Ac		31.31-0.0000	0.000 0	46.764-7		1.000-	smpl	# 1
	Ba	YLD	**** NOT LOGGED IN YET ****						
	H	DST	10.00 100.0	0.000 0	0.000 0		1.000-	smpl	# 2
	Ra		0.00 0.0000	38.925-7	47.731-7		1.000-	smpl	# 0
	Sr		14.89-0.0000	0.000 0	40.698-7		1.000-	smpl	# 3
		80	63.10-0.0000	0.000 0	0.000 0		1.000-	smpl	# 0
4	Ac		31.59-0.0000	0.000 0	46.764-7		1.800-	1	# 1
	Ba	YLD	**** NOT LOGGED IN YET ****						
	H	DST	0.00 0.0000	0.000 0	0.000 0		1.0000E-021-		# 2
	Ra		0.00 0.0000	38.925-7	47.731-7		0.1000-	1	# 0
	Sr		15.77-0.0000	0.000 0	40.698-7		0.5000-	1	# 3
		80	88.40-0.0000	0.000 0	0.000 0		0.2200-	1	# 0
5	H	DST	10.00 40.10	0.000 0	0.000 0		4.0000E-021-		# 2
	Ra		0.00 0.0000	38.925-7	47.731-7		0.1000-	1	# 0
	Sr		**** NOT LOGGED IN YET ****						
		80	88.40-0.0000	0.000 0	0.000 0		0.2200-	1	# 0

Carriers/Tracers used ------
1 1.000 mls of Y 0 E-D1-(03)0XAL9- @ 40.74 mg/ml
2 0.1000 mls of H @ 1.3240E+05 dpm/ml

3 1.000 mls of Sr O M-A1-(06) @ 17.90 mg/ml

6

701193

8655 WORK RECORD -

Date	Analysis	Proc. / Steps		Samp	Analyst	Remarks
1.31.07	VOL. RSV PH	DWP-007	ALL	1	AK	
-1-	[80]	DWP-121	7.1-7.2	1, 4	AK	
-11-	80, SR ALK	DWP-062	ALL	1, 4.5	AK	
"	FILTR'N	DWP-050		1	LS	Aliquots for Ac and La analysis have been filtered, filters digested and added to filtrate. LS 01/31
02.08.07	[80]	DWP 121 → 7.2 → END		1-5	DWP	

2.01.0:

8655-

8655-

NRDES - 828

701193 TEST AMERICA 7

2.01.07 8655 WATER Recd: 01.31.07
Due: 02.21.07

[SR], [80], [Ra], [Ac], Uff DWP

Cust ID To	FRACT	VOLUME RSV (L)	PH	ALIQ Sr(L)	ALIQ Ac(L)	ALIQ Ra(L)	ALIQ 80(L)
8655-1 IQA2793-01 01.28.07 10:40	3	11.0	~6	0.5L	1.8	0.1	0.220
-2 LCS							1.0 Savvy
-3 BLANK							1.0 Savvy
-4 Dup. #1 1.28.07 10:40				0.5L	1.8	0.1	0.220
-5 MS #1 1.28.07 10:40				—	—	0.1	0.220
DONE BY:		1/31 AK →		→	LS 1/31	→	1/31 AK

- Ba filtered d added 01/31

Recovery:

[80]

	G	T	N	DONE BY	CKD BY
8655-1	19.2888	19.2013	87.5	DVP 02.08.07	02-08-07
2	19.3258	19.2633	62.5		
3	19.3524	19.2893	63.1		
4	19.3303	19.2419	88.4		
5	19.2910	19.2026	88.4		

158
AC
2/1/07

8655 DUE: 2-21-07

TA IRVINE (Water)

IHDST, Sr, Ac, Ra)

#	CUST ID	T°	
1	IQA 2793-01	01-28-07	10:40
2	LCS	Sr NR 2-7-07 #60250 [RA] BM 02.07.07	H (DST) 2.12.07 JDA
3	Blank		
4	Dup #1		
5	MS #1 #60253 [RA] BM 02.07.07		

1 - 4

1 - 1

1 - 1

-07

8655

Tracers / Carrier

1-4 Sr Carrier 1.0 ml M-A1-(06) ~~ML~~ / TAC 02-07-07

1-4 2.0 mL Ba TAC 2.8.07

1-4 1.0 mL Y E-D1-(03) ~~OXAL~~ 9 TAC/TM 2.9.7 2.9.07

160

8655
Recovery
SV

	G	T	N	SEP Time	Done by	checked by
1	56.27	41.98	14.29	040698	02-09-07	02-09-07
2	55.66	41.15	14.51	↓	↓	↓
3	56.17	41.28	14.89			
4	57.16	41.39	15.77			

8655

H
(DST)

	FRACT.	VOLUME RECD (ML)	DISTILL (ML)	DISTILLATE (ML)	COUNT (ML)	ALIQ (L)	BAL	DONE BY	CHKD BY	UP
								MJA 02.12.07	BM 02.12.07	
8655 1	1	195.0	40.0	20.0	10.0	0.01OL				7
2			100.0	↓	↓	1.0 SMPL				
3			↓			↓				
4			40.0			0.01OL				
5			40.1	↓	↓	0.01OL	↓	↓	↓	

USED PICO FLUOR UT. TRACER 0.1 ML H-3 API-A (BT)

NPDES-1132

8655

Recovery

[AC]

	G	T	N	sep Time	Done by	Checked by
					TAE	BM
8655_1	74.43	42.72	31.71	046.764	2.11.07	2.11.07
2	73.94	43.96	29.98			
3	73.07	41.76	31.31			
4	75.35	43.76	31.59			

E BM 02.12.07

DWP

8655 WORK RECORD

DATE	Analysis	Proc/steps	Samples	Analyst
02.07.07	Rq	DWP881A (7.1)	1-5	BM
2.8.07	Ac	DWP894 7.1.1-7.1.2	1-4	TAC
02-09-07	SV	DWP 380 All	1-4	[illegible]
2.12.07	H(DST)	DWP 312 7.1 7.6	1-5	[illegible]
2.9.07	Ac	DWP894 7.1.3_7.1.5	1-4	TAC
2.15.07	AC	DWP894 7.1.6-end	1-4	TAC
02.16.07	Rq	DWP881A (7.2.1-7.5.3)	1-5	BM

NPDES 834

SAMPLE #	FIRST DM	SECOND DM	GMT ON	COUNT TIME	ALIQT UNIT	CELL #	BKG (cpm)	SYS #	RN #	GROSS (cpm)
02-02-07										
8538 - 4	033.955	043.735	043.903	87.05		20	0.15	4	12	17.07
13	↓	↓	↓	↓		29	0.12	5	13	15.43
14				107.26		62	0.22	6	14	17.23
LCS- 17				168.46	1.0 SMPL	33	0.36	1	9	23.71
BLK- 18	↓	↓	↓	87.05	↓	58	0.14	2	10	0.12
02.02.07										
2152 1	033.997	045.715	045.885	112.22		53	0.22	5	13	0.31
2	↓	↓	↓	↓		6	0.23	6	14	0.26
LCS- 3				146.23	1.0 SMPL	41	0.33	1	9	24.51
BLK- 4				70.26	↓	74	0.11	2	10	0.07
DUP#1- 5						35	0.10	3	11	0.21
MS#2- 6				↓		28	0.11	4	12	51.83
2153- 1				70.26		23	0.13	7	15	0.56
2	↓	045.735	045.957	94.23		42	0.18	2	10	0.34
2154- 1	033.973			↓		67	0.17	3	11	1.60
2	↓		↓	103.08		4	0.23	4	12	0.21
3			045.08914	83.47		18	0.18	5	13	0.37
2155- 1	↓	↓	045.937	94.23		47	0.17	7	15	0.31
02.05-07										
7602- 1	036.917	046.733	046.900	90.48		12	0.26	4	12	0.21
2	↓	↓	↓	↓		37	0.21	5	13	0.17
3						62	0.27	6	14	0.19
4						34	0.22	7	15	0.22
LCS- 5				↓	1.0 SMPL	1	0.38	1	9	47.92
BLK- 6				48.01	↓	10	0.11	2	10	0.25
DUP#1- 7	↓	↓	↓	90.48		43	0.24	3	11	0.24
02.07-07										
8655 - 1	038.925	047.731	047.905	62.32		5	0.23	5	13	0.34
LCS- 2				87.73	1.0 SMPL	25	0.34	1	9	23.14
BLK- 3				52.10	↓	66	0.15	2	10	0.17
DUP#1-4				62.32		35	0.18	3	11	0.16
MS#1-5	↓	↓	↓	↓		20	0.19	4	12	48.72

Section 2

Standards Certification &
Preparation Logs for Quality Control Samples

ANALYTICS

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

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

#410 Rec'd 12/21/05 K Trenton

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

72015A-207 Am^{241} R1

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):	3.768 E3
HALF-LIFE:	4.322 E2 years
CALIBRATION DATE:	December 19, 2005 12:00 EST 353.708 05
RELATIVE EXPANDED UNCERTAINTY (k=2):	2.0%

Impurities: γ-impurities <0.1%
α-impurities <0.1%

5.06320 grams 1M HCl solution.

P O NUMBER 00003035, Item 1

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

Q A APPROVED: 12-20-2005

Am-241 R1 in 1N HCL Prep'd 9/14/06

$5.03713 \times \frac{3768 dps}{5.063209} \times \frac{60 sec}{min} \times \frac{1}{100 mL} = 2249 \; dpm/mL \pm 1.0\%$ @ 353.708 05

K Trenton
v K. Yamamoto 9/14/06

NPDES - 837

9/14/06 RP

Prep of Am-241 RI

IB QC

Balanced Used #36

Gross wt 78.4395 g
Tare wt 73.4024 g
Net wt 5.0371 g

Procedure CT-T03 Rev 03 6/16/06

Tared a 100mL vol. flask + top. Opened Am-241 Analytics 7201SA-207 vial, Log 410 3.768 E3 dps in 5.06320g on Dec. 19, 2005 12:00 EST

Transferred Am 241 solution into the tared 100mL vol. flask, Weigh Am-241 sol., flask + top.

Diluted to mark with 1NHCL. Mixed. Trasferred to a 4oz PB.

$$5.0371\ g \times \frac{3768\ dps}{5.06320\ g} \times \frac{60\ sec}{min} \times \frac{1}{100\ mL} = 7249\ dpm/mL \pm 1.0\%$$ @ 353.708 05

K Prenton

✓ K. Yamamoto 9/14/06

9/15/06 RP — Verif of Am^{241} RI 1B QC

Pipetted into 3ea 50mL beakers;

0.1mL Am^{241} RI + 0.5mL Am^{243} JI

Cont'd Procedure CT-VAM-2 Rev03 6/16/06

1501499-501 R Brenton

9/15/06 RY — Prep of U^{232} F-QI-A-(08) 3

Transferred ~250mL U^{232} F-QI-A-(06)

into 8oz WM PB

18.04 dpm/mL ± 0.4 @ 076.766-06

R Brenton

9/18/06 RP — Prep of H^3 AFI-A-(05) BA

Transferred ~100mL H^3 AFI-A

into a 4oz WMPB.

1.324E5 dpm/mL ± 0.9% @ 246.708 98

R Brenton

10/27/06 RP

Prep of Sr^{90} AA1-B-(15) QC 1B

Procedure CT-T04 Rev 03 6/16/06

Pipetted 0.5mL ~0.50g of Sr^{90} AA1 13653 dpm/mL ± 0.4% into a 250mL vol. flask.

Added 1mL Sr M-A1 carrier 17.90 mg/mL +
1mL Y E-D1 " 15.23 "
into same vol. flask.
Diluted to mark with 0.1N HCl. Transferred to a 8oz WM PB.

27.31 dpm/mL ± 0.5% @ 306.500 96

R Brenton

10/20/06 RP

Prep of Am^{241} R1-A QC1B

Procedure CT-T04 Rev 03 6/16/06

Pipetted 2.5mL (2x1000mL + 500mL) = 2.55g of Am^{241} R1 2249 dpm/mL ± 1.0%

into a 250mL vol flask. Diluted to mark with 1N HCl. Transferred into 8oz WM PB.

22.49 dpm/mL ± 1.1% @ 353.708 05

R Brenton

Ky 11/2/06

Nycomed Amersham plc
Amersham Laboratories

#372 Recd 4/2/2001 R Brenton P.O. 8555

Certificate of calibration of absolutely standardised radioactive solution

UKAS CALIBRATION
0146

Sr^{90} AA1

ISSUED BY:	Nycomed Amersham plc Radiation & Radioactivity Calibration Laboratory Amersham Laboratories White Lion Road Amersham Buckinghamshire HP7 9LL	ISSUED FOR:	AEA Technology plc Isotrak 329 Harwell Didcot Oxfordshire OX11 OQJ

Sr^{90} 13653 dpm/m/± 0.4% @ 306.500-96 5/7/01 R Brenton
in 0.1NHCl carrier content 0.1899 $SrCO_3$ mg/m/ + 0.1580 mg/m/ Y_2O_3

Description

Principal radionuclide: Strontium-90

Daughter radionuclide: Yttrium-90

Product code: SIZ24 K. Yamamoto 5/7/01

Solution number: S6/11/196

Measurement

Reference time: **1200 GMT on 1 November 1996** 306.500-96

Radioactive concentration of strontium-90:	4.557	kilobecquerels per gram of solution
which is equivalent to:	123.2	nanocuries per gram of solution
Mass of solution:	5.0309	grams
Total activity of strontium-90:	22.93	kilobecquerels
which is equivalent to:	620	nanocuries

Method of measurement used:
4π efficiency tracing using a liquid scintillation counter.

Calibration date(s): 17 November 1996 to 30 November 1996
The calibration date is provided for added information only, and must not be confused with the reference date. It is the reference date that must be used in all calculations relating to the values of activity.

Uncertainty

Expanded uncertainty in the radioactive concentration quoted above: ± 0.88 %

Combined Type A uncertainty: ± 0.09 %

Combined Type B uncertainty: ± 0.43 %

Approved Signatory D A Tattam

Date of issue 20 March 2001

Nycomed Amersham

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

#372 Rec'd 4/26/01 R Preston Po 8555

Certificate of calibration of absolutely standardised radioactive solution

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

Radionuclidic Purity The estimated activities of any radioactive impurities found by high-resolution gamma ray spectrometry, or in any other examination of the solution, are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Other radionuclides 0.002(1) %

Chemical Composition 0.1M HCl containing 100 micrograms of strontium and 100 micrograms of yttrium per ml.

Physical Data Recommended half life: 29.12 ± 0.24 years (1 year = 365.25 days)

Strontium-90: 100% beta particle emission.
Yttrium-90: 100% beta particle emission. Half life 2.670 ± 0.004 days.

The activity of the yttrium-90 is equal to the activity of the strontium-90.

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

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

Tests made over a period of 2 years on standardised solutions of strontium-90 stored in glass ampoules have shown that loss of strontium-90 from solution is negligible other than by radioactive decay.

Expression of Uncertainties The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor **k** = 2.00, which for a *t*-distribution with $\nu_{eff} = \infty$ effective degrees of freedom corresponds to a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

10/27/06 RP

Prep of Sr^{90} AA1-B-(15) QC 1B

Procedure CT-T04 Rev 03 6/16/06

Pipetted 0.5mL ~0.50g of Sr^{90} AA1 13653 dpm/mL ± 0.4% into a 250mL vol. flask.

Added 1mL Sr M-A1 carrier 17.90 mg/mL +
1mL Y E-D1 " 15.23 "
into same vol. flask.
Diluted to mark with 0.1N HCl. Transferred to a 8oz WM PB.

27.31 dpm/mL ± 0.5% @ 306.500 96

R Brenton

10/27/06 RP

Prep of Am^{241} R1-A QC1B

Procedure CT-T04 Rev 03 6/16/06

Pipetted 2.5mL (2x1000mL + 500mL) = 2.55g of Am^{241} R1 2249 dpm/mL ± 1.0%

into a 250mL vol flask. Diluted to mark with 1N HCl. Transferred into 8oz WM PB.

22.49 dpm/mL ± 1.1% @ 353.708 05

R Brenton

Ky 11/2/06

NPDES - 843

4

3/8/06 RF

Prep + Standardization of Sr M-Al carrier

Procedure CT-CSr, Rev 02, 4/15/02

7.1 Weighed 100.0g $SrNO_3$ Strontium Nitrate
Fisher Certified ACS Lot 984987
Balance used #36

7.2 5mL aliquot used.

	1	2	3	4
3/6/06 Tare wt	13.4839 g	13.5283 g	13.7109 g	13.7597 g
"	13.4838	13.5283	13.7109	13.7597
Avg "	13.48385 g	13.5283 g	13.7109 g	13.7597 g
3/9/06 Gross wt	13.5733 g	13.6179 g	13.8015 g	13.8490 g
"	13.5734	13.6181	13.8015	13.8490
Avg "	13.57335 g	13.6180 g	13.8015 g	13.8490 g
	13.57335 g	13.6180 g	13.8015 g	13.8490 g
	13.48385	13.5283	13.7109	13.7597
Net wt	0.08950 g	0.0897 g	0.0906 g	0.0893 g

#3 rejected Using Chauvenet Criterion

Mean $\frac{89.50\ mg}{5mL} = 17.90\ mg/mL\ SrCO_3 \pm 0.13\%$ @ 067-06

R Brenton

✓ K Yamamoto 3/14/06

NPDES - 844

10/24/06 RP

Prep of Cs D-A6-(03) carrier 6

Transferred ~ 50mL Cs D-A6 carrier into a 4oz WM PB.

50.77 mg/mL ± 0.17% @ 180 05

A Brenton

11/14/06 RP

Prep of Sr M-A1-(06) BA

Transferred ~ ~~50~~ 1000mL of Sr M-A1 into a 32oz PB

17.90 mg/mL ± 0.1% @ 067 06

A Brenton

11/14/06 RP

Prep of Y E-D1-(03) BA

Transferred 500mL of Y E-D1 into a 16oz PB

40.74 mg/mL Y_{oxal} } ± 0.1% @ 171 06
15.23 mg/mL Y_2O_3 }

A Brenton

KL 12/6/06

Amersham plc
The Grove Centre

UKAS CALIBRATION
0146

[redacted]

#399 Rec'd 8/16/04, P.O. 1647 R Brenton

H^3AE1

ISSUED BY:	**Amersham plc** **Radiation & Radioactivity** **Calibration Laboratory** **The Grove Centre** **White Lion Road** **Amersham** **Buckinghamshire** **HP7 9LL**	**ISSUED FOR:**	**AEA Technology QSA GmbH** **Isotrak** **Gieselweg 1** **D-38110 Braunschweig** **Germany**

Description

Principal radionuclide:	Hydrogen-3 (tritium)	Product code:	TRY44
Chemical form:	Water	Batch:	134

Measurement

Reference time:	**1200 GMT on 1 November 2002**	305,500 02
Radioactive concentration of hydrogen-3:	49.73	kilobecquerels per gram of water
which is equivalent to:	1.344	microcuries per gram of water
or:	2.984×10^6	disintegrations per minute per gram of water

Method of measurement used:
This reference material was calibrated by direct comparison with a standard of tritium-labelled water obtained from the National Institute of Standards and Technology, USA.

Calibration date(s): 20 September 2002 to 23 September 2002
The calibration date is provided for added information only, and must not be confused with the reference date. It is the reference date that must be used in all calculations relating to the values of activity.

Uncertainty

Expanded uncertainty in the radioactive concentration quoted above: ± 1.3 %

H^3AE1 in H_2O

$4.9879\,g \times 2.984 \times 10^6 \frac{dpm}{g} \times \frac{1}{100\,mL} = 1.488 \times 10^5\ dpm/mL \pm 0.6\%$ @ 305,500 02

8/20/04 KP

R Brenton 8/20/04

Approved Signatory

Date of issue 29th March 2004 ✓ K. Yamamoto 8/20/04

Amersham

B D D Singleton

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National P[illegible] recognised national standards laboratories. This certificate may not be reproduced other th[illegible] or written approval of the issuing laborat[illegible]

[redacted]

#399 Rec'd 8/16/04 PO 1647 R Prentiss

UKAS ACCREDITED CALIBRATION LABORATORY No. 0146

H^3AE1

Purity No radioactive impurities were detected. (Impurities with a total activity greater than 0.001% of the activity of the tritium would have been detected).

Physical Data

Recommended half life:	12.33 ± 0.02 years	(1 year = 365.25 days)
Maximum beta energy of tritium:	18.6 keV	

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

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

The S.I. unit of radioactivity is the becquerel

1 becquerel (Bq)	=	1 nuclear transformation per second, therefore
1 Curie (Ci)	=	3.7×10^{10} becquerels exactly.

Useful conversion factors are:

1 microcurie (μCi)	=	3.7×10^{4} becquerels exactly.
1 kilobecquerel	=	27.027 nanocuries (nCi)

Expression of Uncertainties The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor **k** = 2.00, which for a *t*-distribution with $\nu_{eff} = \infty$ effective degrees of freedom corresponds to a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Unless indicated, all other uncertainties are expressed at the confidence level associated with one standard uncertainty.

The format used for the uncertainties in the values of radionuclidic purity is illustrated in the following examples;

6.5(21)	=	6.5 ± 2.1
6.54(21)	=	6.54 ± 0.21
6.543(21)	=	6.543 ± 0.021

8/20/04 RP

Prep of H^3 AE1 1A QC

Gross Wt 71.5396 g
Tare Wt 66.5517
Net Wt 4.9879 g

Balance Used
#2 Sartorius 1702

Procedure CT-T03 Rev02, 4/15/02
Tared a 100mL vol flask and top.
Opened H-3 vial Amersham K 6310, Log 399
2.984 ~~d~~ E6 dpm/g on 1 Nov 2002 1200 GMT.
8/20/04 RP

Transferred the solution into the tared vol. flask. Weighted the H-3 sol., vol. flask + top. Diluted to mark with D·I H_2O. Mixed. Transferred to 4oz. PB.

$4.9879\,g \times 2.984\,\cancel{10} \times 10^6 \frac{dpm}{g} \times \frac{1}{100\,mL} = 1.488 \times 10^5\ dpm/mL$
8/20/04 RP
$\pm 0.6\%$ @ 305.500 oz

R Brenton

K. Yamamoto 8/20/04

4/3/06 RT — Prep of Th^{229} C2-A-(24) — IC

Procedure CT-T04 Rev 02 4/15/02

Pipetted 0.7mL (500µL+200µL) ~0.70g of Th-229 C2 8415 dpm/mL ± 0.23% into a 500mL vol flask, Diluted to mark with 2N HNO_3, Transferred to 16 oz PB

11.78 dpm/mL ± 0.6% @ 032.833 02

R Preston

4/3/06 RT — Prep of H^3AE1-C-(3) — QC LB

Pipetted 1.0mL ~1.00g of H^3AE1 148800 dpm/mL ± 0.6% into a 250mL vol flask. Diluted to mark with D.I H_2O. Transferred to a 8oz WM PB

595.2 dpm/mL ± 0.7% @ 305.500 02

R Preston

KG 7/10/06

#408 R'd 9/26/05 P.O. 28 ? R Benton 10/4/05

National Institute of Standards & Technology

Certificate

H3 AF1

Standard Reference Material 4927F
Hydrogen-3 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive hydrogen-3, as water, in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains hydrogen-3 with a total activity of approximately 3.2 MBq. Hydrogen-3 decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. During the decay process no photons are emitted. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. There is no detectable external radiation. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains only distilled water. There is no chemical hazard. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least September 2008.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of the radioactivity.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, L.R. Karam, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas and M.P. Unterweger of the Radioactivity Group.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.W.L. Thomas.

Bert M. Coursey, Chief
Ionizing Radiation Division

Nancy M. Trahey, Chief
Standard Reference Materials Program

Gaithersburg, Maryland 20899
June 1999
Half-life and text revised October 2000

*Notes and references are on pages 5 and 6.

NPDES - 850

Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

H^3 AF1

PROPERTIES OF SRM 4927F

Certified values

Solution density	**(0.998± 0.002) g•mL^{-1} at 20.0 °C** [b]*
Radionuclide	**Hydrogen-3**
Reference time	**1200 EST, 3 September 1998** 246.708 98
Massic activity of the solution [c]	**634.7 kBq•g^{-1}**
Relative expanded uncertainty (k=2)	**0.72%** [d] [e]

Uncertified values

Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution mass	Approximately 5.0 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O ^3HHO	55 6×10^{-7}	1.00 1×10^{-8}
Radiological Properties:			
Radionuclidic impurities	None detected [f]		
Half lives used	Hydrogen-3: (4500 ± 8) d [g]		
Calibration method and measuring instrument(s)	4πß gas counting of SRM 4927E using the NIST length-compensated internal gas proportional counters and intercomparison of SRMs 4927E/4927F using two 4πß liquid-scintillation counting systems [h]		

H^3 AF1 in H_2O Prep'd 10/5/05

$4.9688\,g \times 634.7\,\frac{kBq}{g} \times \frac{60\,dpm}{Bq} \times 1000 \times \frac{1}{50\,mL} = 3.784E6\ dpm/mL \pm 0.4\%$ @ 246.708-98

10/5/05 [illegible]

✓ K. Yamamoto 10/5/05

*Notes and references are on pages 5 and 6.

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [i]	Relative Sensitivity Factor, $\lvert \partial y/\partial x_i \rvert \cdot (x_i/y)$ [j]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [k]
Massic count rate of SRM 4927E, corrected for background and decay [h]	Standard deviation of the mean for 23 sets of gas counting measurements (A)	0.18	1.0	0.18
Gram-mole measurements	Estimated (B)	0.20	1.0	0.20
Live-time [p]	Estimated (B)	0.10	1.0	0.10
Extrapolation of count-rate-versus-energy to zero energy	Estimated (B)	0.20	1.0	0.20
Half life of H-3	Standard uncertainty of the half life (A)	0.18 [m]	0.009 [n]	0.002
Liquid-scintillation intercomparison of SRM 4927F and SRM 4927E	Standard deviation of the mean for 7 sets of liquid-scintillation measurements (A)	0.06	1.0	0.06
Radionuclidic impurities	Limit of detection (B) [q]	100.	0.0005	0.05
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.36
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.72

*Notes and references are on pages 5 and 6.

H^3 AFI

NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	<0.1 (Not detectable)		

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic response is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] The estimated limit of detection for radionuclidic impurities is 300 $Bq \cdot g^{-1}$.

[g] The stated uncertainty is the standard uncertainty. See reference [5].

[h] Extensive gas-counting measurements were made on the SRM 4927E solution during 1998 and 1999. The SRM 4927F solution was intercompared with the SRM 4927E solution using liquid-scintillation counting.

[i] Relative standard uncertainty of the input quantity x_i.

[j] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[k] Relative component of combined standard uncertainty of output quantity y, rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated crystal-controlled oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of H-3)}•{(Bq of impurity)/(Bq of H-3)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] L.L. Lucas and M.P. Unterweger, *Comprehensive Review and Critical Evaluation of the Half-Life of Tritium*, J. Res. Natl. Inst. Stand. Technol. **105**, 541-549 (2000).

70

10/12/05 RP

Prep of H^3AFI-A IC QCspike

Procedure CT-T04, Rev 02 4/15/02

Pipetted 7mL (7x1000mL) 7.00g of H^3AFI, 3.784E6 dpm/mL ±0.4% into a 200mL vol. flask. Repeated. Transferred into a 16oz PB.

1.324E5 dpm/mL ±0.9% @ 246.708 98

R Brenton

10/13/05 Dilution check H^3AFI-A 1213 77-82

Pipetted into 3ea LSC Vials;

1213-77, 78, 79 0.1mL H^3AFI-A
1213-80, 81, 82 0.1mL H^3AFI
1213-316 Blank

Cont'd CT-VH-1, Rev 01, 4/15/02
Step 7.2

R Brenton

RY 10/18/05

10/4/06 RP — Prep of H^3 AFI-A-(06) IC Qcspike

Procedure CT-T04, Rev 03 6/16/06

Pipetted 17.5mL (15mL + 2x1000uL + 500uL) = 17.5g of H^3 AFI 3.784E6 dpm/mL ± 0.4% into a 500mL vol. flask. Diluted to mark with H_2O

Transferred to 16oz PB

1.324E5 dpm/mL ± 0.7% @ 246.708 98

RPrenton

10/4/06 RP — Dilution check H^3 AFI-A-(06)

1213 89-94

Pipetted into 3ea LSC Vials;

1213 89-91 0.1mL H^3 AFI-A-(06)
1213 91-93 0.1mL H^3 AFI
1213 318 Blank

Cont'd ~~CT-VH-~~ 10/4/06 RP CT-VH-1, Rev 02 6/16/06 Step 7.2

RPrenton

MP 10/16/06

12/7/06 RP — Prep of Th^{229} C2-A-(32) BA

Transferred 100mL Th^{229} C2-A-(29)
into a 4oz WM PB
11.78 dpm/mL ± 0.7% @ 032.833 06

R Brenton

12/14/06 RP — Prep of H^3 AFI-A-(07) BA

Transferred 100mL H^3 AFI-A-(06)
into a 4oz WM PB
1.324E5 dpm/mL ± 0.7% @ 246.708 98

R Brenton

12/14/06 RP — Prep of U^{232} F-QI-A-(10) BA

Transferred - 250mL U^{232} F-QI-A-(06)
into a 250mL WM PB.
18.04 dpm/mL ± 0.4% @ 076.766 06

Ruby Brenton

LK 12/19/06

#389 PO# 00000081 Rec'd 11/16/03 RBenton

National Institute of Standards & Technology

Certificate Ra^{226} NI

Standard Reference Material 4967
Radioactivity Standard

Radionuclide	Radium-226 (1)*
Source identification	SRM 4967
Source description	Liquid in a 5-mL, flame-sealed NIST borosilicate-glass ampoule (2)
Solution composition	Approximately 1.4 mol•L^{-1} HCl(3) containing 1.74 mg $BaCl_2$ per gram of solution(4) and Ra^{+2} (5)
Solution density	1.019 ± 0.001 g•mL^{-1} at 22 °C (6)
Solution mass	5.1167 ± 0.0027 g (7)
Radium-226 activity concentration	2729 Bq•g^{-1} (8)
Reference time	1200 EST 9 September 1991 252.708-91
Overall uncertainty	1.18 percent (9)
Half life	1600 ± 7 years (10)
Calibration method	NIST pressurized "4π"γ ionization chamber "A" calibrated with the national radium standards(11); and confirmatory measurements (12)

This standard reference material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Gaithersburg, MD
January 1992

William P. Reed, Chief
Standard Reference Materials Program

*Notes on back

Ra^{226} NI in 1.4M HCl
5.0800g x 2729 Bq/g x 60 dpm/Bq x 1/100mL = 8318 dpm/mL Ra^{226} ±0.4% @ 252.708-91
carrier content 0.0991 mg/mL $BaSO_4$
R Benton 1/20/03
K. Yamamoto 1/20/03

NPDES - 859

1/20/03 RP

Prep of Ra^{226} NI

113 R.C.

Gross wt. 73.8875 g
Tare wt. 68.8075
Net wt. 5.0800 g

Balance Used #2
Sartorius Model 1702

Tared a 100mL vol. flask a top. Opened Ra^{226} vial Nist SRM4967, Lot #389. 2729 Bq·g^{-1} on 1200 EST 9 Sept. 1991. Transferred Ra^{226} solution into tared vol. flask. Weighed Ra^{226} sol., flask + top. Diluted to mark with 1.4M HCl. Transferred 4oz P.B. Carrier content ~~0.088~~ 1/20/03 RP 0.0884 mg/mL $BaCl_2$ or 0.0991 mg/mL $BaSO_4$

$$5.0800\,g \times \frac{2729\,Bq}{g} \times \frac{60\,dpm}{Bq} \times \frac{1}{100\,mL} = 8318\,dpm/mL\ Ra^{226} \pm 0.4\%\ @\ 252.708\text{-}91$$

K Prenton

Calculations checked K. Yamamoto 1/20/03

1/20/03 RP

Prep of Ra^{226} NI-A

RC 1B

Pipetted 0.3mL (3x100µL) - 0.3055g of Ra^{226} NI, 8318 dpm/mL ± 0.4% into a 100mL vol. flask. Added 10mL of Ba H-B3 carrier 17.30 mg/mL $BaSO_4$ into same flask. Diluted to mark with 1.4M HCl. Transferred to 4oz WM P.B.

24.95 ~~mg~~ 1/20/03 RP dpm/mL Ra^{226} ± 0.7% @ 252.708-91

carrier content 0.002 mg/mL $BaSO_4$

K Prenton

NPDES - 860

7/25/06 RP

Verif of U Mix A3-(17) 1501 490-492

Pipetted into 3 ea 50mL beakers;
7.0mL U Mix A3-(17) and 0.5mL U^{232} I
Contd Procedure CT-C VU-4, Rev01 6/16/06
Septime 206.658-06 7/24/06 RP

R. Preston

7/26/07 RP

Prep of Ra^{226} NI-A-109) 1B QC

Procedure CT-T04. Rev 03 6/16/06
Pipetted 0.6mL (100mL+500mL) ~0.619 of
Ra^{226} NI 8318 dpm/mL ±0.4% into a 200mL
vol. flask. Added 20mL Ba H-B4 carrier
17.27mg/mL $BaSO_4$. Diluted to mark with 1.4M HCL.
Transferred To a 8oz WM PB.
24.95 dpm/mL ± 0.6% @ 252.708 9/

R. Preston

Ry 8/1/06

10/7/04
~~10/7/02~~
RP
10/7/04RP ~~Prod~~ Standardization of Ba H-B4 carrier IF

10/7/04RP Procedure CT-CBA, Rev 02, 4/15/02
7.2 Standardization: Balance used #2 Sartorius 1702
Aliquot taken from Ba H-B3. Prep see
Book C-3, pg 116, 11/25/98

	1	2	3	4
Tare wt	17.0842 g	17.2560 g	17.4847 g	17.5220 g
"	17.0842	17.2560	17.4847	17.5220
Aliq "	17.0842 g	17.2560 g	~~17.4847~~ g	17.5220 g

17.1709 g	17.3422 g	17.5709 g	17.6083 g
17.1708	17.3422	~~17.50~~	17.6083
17.17085 g	17.3422 g	17.5709	17.6083 g
17.08420	17.2560	~~17.4~~	17.5220
0.08665 g	0.0862 g	17.5709 g	0.0863 g
		17.4847	
		0.0862 g	

Mean $\frac{86.338 \text{ mg}}{5 \text{ mL}}$ = 17.27 mg/mL $BaSO_4$ ± 0.12 % 281 - ~~02~~ 04
10/7/04RP

R Brenton

K. Yamamoto 10/8/04

ANALYTICS #370 Rec'd 1/18/01 R Prenton

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

$Ra^{228}S1$

60867-207

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a calibrated master radionuclide solution source which was calibrated using a germanium gamma spectrometer system.

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

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

ISOTOPE:	Ra-228
ACTIVITY (dps):	3.845 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	January 16, 2001 12:00 EST D16.708-01
TOTAL UNCERTAINTY*:	5.1%
SYSTEMATIC:	3.6%
RANDOM:	1.5%

*99% Confidence Level

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

5.044433 grams 0.1M HCl solution with 50 ppm Ba carrier.

P O NUMBER 00008301, Item 1

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

Q A APPROVED: 2/12/01 RP [signature] 1/16/01

$Ra^{228}S1$ ~~Prod~~ Prep'd 2/12/01 in .1M HCl

$5.0061g \times \frac{3845\ dps}{5.044433g} \times \frac{60\ sec}{min} \times \frac{1}{100ml} = 2289\ dpm/ml\ Ra^{228} \pm 1.7\%$ @ D16.708-01

R Prenton 2/12/01

carrier content 0.0902 mg/ml $BaSO_4$ or 0.0531 mg/ml Ba^{0} K. Yamamoto 2/13/01

2/12/01 RP

Prep of Ra^{228} S1

Gross 74.2294 g
Tare 69.2233
Net 5.0061 g

Balance #2
Sotorius 1702

Tared a 100ml vol. flask + top. Openned Ra^{228} Analytics 60867-207 vial 3.845E3 (dps) @ Jan. 16, 2001 12:00 EST. Transferred Ra^{228} sol. into the tared vol. flask. Weighed vol. flask + top + Ra^{228} solution. Pipetted 0.5ml of Ba H-B2 carrier 17.20 mg/ml $BaSO_4$ into same vol. flask. Diluted to mark with 0.1M HCl. Transferred to a 4oz P.B. #370

$$5.0061\,g \times \frac{3845\ dps}{5.044433\,g} \times 60\ \frac{sec}{min}\ (2/12/01\ RP) \times \frac{1}{100\,ml} = 2289\ dpm/ml\ Ra^{228} \pm 1.7\%\ @\ 16.708\text{-}01$$

carrier content

$$\left[\left(\frac{0.5\,ml \times 17.20\,mg/ml\ BaSO_4}{1.69943\ BaSO_4/Ba}\right) + \left(\frac{5.0061\,g \times 25\,mg\,Ba^{\circ}}{5.044433\,g}\ (2/12/01\ RP)\right)\right] \times \frac{1}{100\,ml} = 0.0531\ mg/ml\ Ba^{\circ}$$

or

0.0902 mg/ml $BaSO_4$

R Preston

Calculations checked. K. Yamamoto 2/13/01

-11-06 TAC **Prep of Ra^{228} S1-B-(7)** IB @ C

Procedure CT-T04, Rev 02 4/15/02

Pipetted 3.75 mL (3x100 mL + 500 mL + 250 mL) ~ 3.73 g of Ra^{228} S1, 2289 dpm/mL ± 1.7% into a 250 mL Vol. Flask. Added 1.0 mL Ba H-B4 17.27 mg/mL $BaSO_4$ carrier into same Vol. Flask.
Diluted to mark with 0.1 N HCL, transferred to a 8oz WM PB

34.34 dpm/mL ± 1.8% @ 0.16.708-01
T. ALAWI.

4-12-06 TAC **Prep of Pu^{242} H-C2-(A)**

Procedure CT-T04, Rev 02, 4/15/02.

Pipetted 10 mL (11.31) g Pu^{242} H-C2 2284 dpm/mL ± 0.5% into 1000 mL Vol. Flask, Diluted to mark with 4 N HNO_3, Transferred to a 32 oz. P.B.

22.84 dpm/mL ± 0.5% @ 073.820-06
T. ALAWI

Prep of TH^{229} C2-A-(25)

4-12-06 Transferred 50 mL TH^{229} C2-A-(24) into a 20z WM PB

11.78 dpm/mL ± 0.6% @ 032.833-02
T. ALAWI

Ky 4/14/06

6/16/06 RP

~~Prep + Standardizaton of Y E-DI~~ carrier

Procedure CT-CY, Rev 03, 6-16-06

7.1 Weighed 53.75g Y_2O_3 Yttrium Oxide Aldrich Y_2O_3, Lot KN08813BY. Dissolved Balance used #36, 37 in 3500mL 1N HNO_3

7.2 5mL aliquot used

6/19/06 RP	1	2		
Tare wt	11.2528 g	11.4685 g	11.5162 g	11.9110 g
"	11.2528	11.4685	11.5163	11.9111
Avg "	11.2528 g	11.46858	11.51625 g	11.91105 g

6/20/06 RP				
Gross wt	11.3290 g	11.5445 g	11.5912 g	11.9871 g
	11.3291	~~11.55~~ 6/20/06 RP	11.5912	11.9871
Avg Gross	11.32905 g	11.5447	11.59129 g	11.9871 g
		11.5446 g		

Avg Gross	11.32905 g	11.54466 g	11.59120 g	11.98710 g
Avg Tare	11.25280	11.4685	11.51625	11.91105
Net	0.07625 g	0.0761 g	0.07495 g	0.07605 g

Sample #3 loss of ppt. Wt not used

Mean $\frac{76.133\text{ mg}}{5\text{ mL}}$ = 15.23 ~~mL~~ 6/20/06 RP mg/mL ± 0.1%

@ 171.000 06

R Brenton

K. Yamamoto

10/24/06 RP

Prep of Cs D-A6-(03) carrier 6

Transferred ~ 50mL Cs D-A6 carrier into a 4oz WM PB.

50.77 mg/mL ± 0.17 % @ 180 05

A Brenton

11/14/06 RP

Prep of Sr M-A1-(06) BA

Transferred ~ ~~50~~ 1000mL of Sr M-A1 into a 32oz PB

17.90 mg/mL ± 0.1 % @ 067 06

A Brenton

11/14/06 RP

Prep of Y E-D1-(03) BA

Transferred 500mL of Y E-D1 into a 16oz PB

40.74 mg/mL Yoxal } ± 0.1 % @ 171 06
15.23 mg/mL Y_2O_3 }

A Brenton

RP 12/6/06

Section 3

Instrument Calibration Information

EBERLINE SERVICES **ANALYTICAL SERVICES GROUP**

Richmond, CA Laboratory

Verification of Primary Calibration

Analysis GROSS A/B **Detector system** LB4000 **Date** 2-26-03

Type: 80/93

TLW No. of Primary calibration being verified: _____ **Date:** _____

Standard Solution used: Sr90 Z1, Am241 P1 **Prepared by:** RP

Reference Date: 182-708-95, 109-500-96 **Date:** 11-10-00

Preparation of secondary Solution(s):

Sample Preparation:

Counting Results:

Sample	Count GMT	Calculated Dpm ± 2σ error	Known Dpm	Ratio Found Dpm/ Known Dpm

See attached Summary:
For Gross Alpha, only the results from D drawers were used in the calculation. Data from sample # B and BR were not used, (unreliable data).
QAP-11 has a control limit of: 0.70 - 1.30 for GRA
0.80 - 1.20 for GRB

The results of the verification is within the warning limits.

CR 2-26-03

	α	β
Average Found/known ratio	0.912	0.998
	0.90	0.93
Acceptance limits (from RCP-00, section 7.5)	1.10	1.07

Attach all raw data sheets Verification: ☐outside limits ☐within limits

Prepared by: _____ 2-26-03 Q.A. Review: _____ 02-26-03

Signature Date Signature Date

Gross Alpha / Beta Verification

Am-241 = 1074 DPM @ 109.500 1996 lambda(-d) = 4.0291E-06

Sr-90 = 1186 DPM @ 182.708 1995 lambda(-d) = 6.8630E-05

SAMPLE	INST.ID	REGION	GMT	YR	DPM	DELTA	DECAY	DPM@TZ	F/A	WTSmg	ALPHA AVG	BETA AVG
1074-1	C1	BETA	20.697	2003	1950.06	2467.947	0.84419	1976.80	0.986	18.300		
1074-1	D2	BETA	27.869	2003	1893.32	2475.119	0.84378	1976.80	0.958	18.300		
1074-1	C1	BETA	30.874	2003	1959.57	2478.124	0.84360	1976.80	0.991	18.300		
1074-1	D3	BETA	31.861	2003	1963.10	2479.111	0.84419	1976.80	0.993	18.300		0.981
1074-2	C2	BETA	20.697	2003	1989.68	2467.947	0.99008	1976.80	1.007	29.400		
1074-2	D3	BETA	27.869	2003	1860.23	2475.119	0.99007	1976.80	0.941	29.400		
1074-2	D2	BETA	28.807	2003	1965.22	2476.057	0.99007	1976.80	0.994	29.400		
1074-2	C2	BETA	30.874	2003	1977.60	2478.124	1.00000	1976.80	1.000	29.400		0.985
1074-3	C3	BETA	20.697	2003	1987.18	2467.947	0.84419	1976.80	1.005	40.800		
1074-3	C3	BETA	30.874	2003	2003.12	2478.124	0.84360	1976.80	1.013	40.800		
1074-3	D3	BETA	34.867	2003	2004.16	2482.117	0.84337	1976.80	1.014	40.800		
1074-3	D3	BETA	37.653	2003	2001.45	2484.903	0.84321	1976.80	1.012	40.800		1.011
1074-4	C4	BETA	20.697	2003	2009.01	2467.947	0.84419	1976.80	1.016	53.500		
1074-4	C4	BETA	30.874	2003	2032.88	2478.124	0.84360	1976.80	1.028	53.500		
1074-4	D3	BETA	35.753	2003	1985.58	2483.003	0.84332	1976.80	1.004	53.500		
1074-4	D3	BETA	37.849	2003	2008.09	2485.099	0.84320	1976.80	1.016	53.500		1.016
1074-5	C1	ALPHA	20.778	2003	865.81	2468.028	0.99011	1074.00	0.806	18.400		
1074-5	C1	ALPHA	28.807	2003	865.81	2476.057	0.99007	1074.00	0.806	18.400	0.806	
1074-5	D3	ALPHA	31.764	2003	1021.03	2479.014	0.99006	1074.00	0.951	18.400		
1074-5	D3	ALPHA	34.686	2003	1014.95	2481.936	0.99005	1074.00	0.945	18.400	0.948 *	
1074-6	C2	ALPHA	20.778	2003	800.12	2468.028	0.99011	1074.00	0.745	29.800		
1074-6	C2	ALPHA	28.807	2003	799.06	2476.057	0.99007	1074.00	0.744	29.800	0.745	
1074-6	D3	ALPHA	34.768	2003	959.56	2482.018	0.99005	1074.00	0.893	29.800		
1074-6	D2	ALPHA	44.652	2003	921.68	2491.902	0.99001	1074.00	0.858	29.800	0.876 *	
1074-7	C3	ALPHA	20.778	2003	834.94	2468.028	0.99011	1074.00	0.777	48.700		
1074-7	C3	ALPHA	28.807	2003	820.85	2476.057	0.99007	1074.00	0.764	48.700	0.771	
1074-7	D3	ALPHA	35.853	2003	973.05	2483.103	0.99005	1074.00	0.906	48.700		
1074-7	D3	ALPHA	44.652	2003	985.79	2491.902	0.99001	1074.00	0.918	48.700	0.912 *	
1074-8	C4	ALPHA	20.778	2003	717.54	2468.028	0.84419	1074.00	0.668	58.200		
1074-8	C4	ALPHA	28.807	2003	704.05	2476.057	0.84372	1074.00	0.656	58.200	0.662	
1074-8	D3	ALPHA	37.920	2003	874.15	2485.170	0.84320	1074.00	0.814	58.200		
1074-8	D2	ALPHA	44.756	2003	825.49	2492.006	0.84280	1074.00	0.769	58.200	0.791	
1074-8	B1	ALPHA	45.792	2003	739.75	2493.042	0.84274	1074.00	0.689	49.900		
1074-8	D2	ALPHA	52.655	2003	740.27	2499.905	0.84234	1074.00	0.689	49.900	0.689	
1074-8	C1	ALPHA	50.656	2003	897.94	2497.906	0.84246	1074.00	0.836	49.900		
1074-8	D2	ALPHA	52.892	2003	863.68	2500.142	0.84233	1074.00	0.804	49.900	0.82	

Ave. 0.998 ± 1.8% CN 2/26/03

Ave. 0.912 ± 3.6% * CN 2/26/03

GROSS ALPHA/BETA VERIFICATION CALIBRATION - 2/2003

SAMPLE NO.	INST. ID	WTS. MG	SR-90 ADDED	BETA CPM	ALPHA CPM	BETA EFF.	ALPHA FR BETA	EFF USED	F/A-EFF
1074-1	C1	18.3	1976.8	802.681	0.860	0.4061	0.0011	0.418	0.9714
1074-1	D2	18.3	1976.8	780.973	1.343	0.3951	0.0017	0.418	0.9451
1074-1	C1	18.3	1976.8	805.117	1.378	0.4073	0.0017	0.418	0.9744
1074-1	D3	18.3	1976.8	804.744	0.241	0.4071	0.0003	0.418	0.9739
1074-2	C2	29.4	1976.8	812.030	2.115	0.4108	0.0026	0.414	0.9922
1074-2	D3	29.4	1976.8	757.040	0.390	0.3830	0.0005	0.414	0.9250
1074-2	D2	29.4	1976.8	804.780	1.560	0.4071	0.0019	0.414	0.9834
1074-2	C2	29.4	1976.8	807.589	2.196	0.4085	0.0027	0.414	0.9868
1074-3	C3	40.8	1976.8	813.073	0.720	0.4113	0.0009	0.411	1.0007
1074-3	C3	40.8	1976.8	819.593	0.719	0.4146	0.0009	0.411	1.0088
1074-3	D3	40.8	1976.8	807.820	0.183	0.4087	0.0002	0.411	0.9943
1074-3	D3	40.8	1976.8	807.580	0.446	0.4085	0.0006	0.411	0.9940
1074-4	C4	53.5	1976.8	811.754	0.692	0.4106	0.0009	0.407	1.0089
1074-4	C4	53.5	1976.8	820.582	0.697	0.4151	0.0008	0.407	1.0199
1074-4	D3	53.5	1976.8	792.721	0.199	0.4010	0.0003	0.407	0.9853
1074-4	D3	53.5	1976.8	802.520	0.306	0.4060	0.0004	0.407	0.9975

SAMPLE NO	INST. ID	WTS mg	Am-241 ADDED	ALPHA CPM	BETA CPM	ALPHA EFF	BETA FR. ALPHA	EFF. USED	F/A - EFF
1074-5	C1	18.4	1062	142.663	31.510	0.1343	0.2209	0.190	0.7070
1074-5	C1	18.4	1062	141.372	33.117	0.1331	0.2343	0.190	0.7006
1074-5	D3	18.4	1062	187.491	43.064	0.1765	0.2297	0.190	0.9292
1074-5	D3	18.4	1062	183.393	45.990	0.1727	0.2508	0.190	0.9089
1074-6	C2	29.8	1062	116.905	26.293	0.1101	0.2249	0.172	0.6400
1074-6	C2	29.8	1062	116.655	27.020	0.1098	0.2316	0.172	0.6386
1074-6	D3	29.8	1062	159.313	37.910	0.1500	0.2380	0.172	0.8722
1074-6	D2	29.8	1062	151.838	34.190	0.1430	0.2252	0.172	0.8312
1074-7	C3	48.7	1062	107.920	26.693	0.1016	0.2473	0.147	0.6913
1074-7	C3	48.7	1062	106.101	26.761	0.0999	0.2522	0.147	0.6796
1074-7	D3	48.7	1062	137.309	33.981	0.1293	0.2475	0.147	0.8795
1074-7	D3	48.7	1062	139.323	36.340	0.1312	0.2608	0.147	0.8924
1074-8	C4	58.2	1062	88.312	23.488	0.0832	0.2660	0.142	0.5856
1074-8	C4	58.2	1062	86.853	24.095	0.0818	0.2774	0.142	0.5759
1074-8	D3	58.2	1062	119.936	30.380	0.1129	0.2533	0.142	0.7953
1074-8	D2	58.2	1062	112.488	26.510	0.1059	0.2357	0.142	0.7459
1074-8R	B1	49.9	1062	93.749	24.961	0.0883	0.2663	0.145	0.6088
1074-8R	D2	49.9	1062	125.018	31.130	0.1177	0.2490	0.145	0.8119
1074-8R	C1	49.9	1062	92.132	25.278	0.0868	0.2744	0.145	0.5983
1074-8R	D2	49.9	1062	120.227	27.548	0.1132	0.2291	0.145	0.7807

Date: 1-13-03
To: Ruby Prenton/ Kats Yamamoto
From: Cesar Sangalang CS
Subj: Request for preparation of Calibration Standards of Group 1074 Gross Alpha/Beta

1074

Please prepare four (4) tubes each with about 1000 dpm of Sr-90 (soln. Sr-90 Z1) and another for tubes each with about 1000 dpm of Am-241 (soln. Am-241 P1).

Sample Nos. will be 1074-1 to 4 type "80" for Sr and 1074- 5 to 8 type "80" for Am .

I need to start with this work tomorrow, 1-14-03 with a projected finish date of 2-07-03

Thank you

Cesar

Verification
Book 2583 Pg 86
565- 572
Radiomatricts Prep

Page 101, BK # 2775 Calibration

β efficiency -
Counted in 2 diff. drawer C- Aluminized mylar
D-(Anodized) Gold in mylar.

2 counts on each drawer
4 count per samples.

Added 1186 dpm of Sr^{90} Z1
1074 dpm of Am^{241} P1

α efficiency -
β efficiency -
α from beta -
β from alpha -

Log Book Entry #	Group & Sample Number	Date	Analysis	Reg. by	Prep'd By	Check	Volume & ID of Tracer Added	Total Activity (dpm)	% 1 σ Error	Activity Date	Standard Wt. (g)	Standard Lot. (g)	Matrix	Container	When To	Additional Information or Comments
564	1000-213	10/18/02	Pu241	MWT	RP	✓	350uL Pu^{241} M1	284.97	0.548	336.708-95	0.39		1.65mL 2.0N HNO_3 +18mL Ultima Gold AB	LSC VIAL	MWT	Pu-241 Calib. check 10/18/02 R Brenton K. Yamamoto 2/14/03
565	1074-1	1/13/03	Type 80	CS	RP	✓	0.1mL Sr^{90} Z1	1186	Total 2/18/03 RP	182.708-95	0.10	0.37 0.5	10mL 1N HCl	50mL Pb/Lg Tube	CS	GRA, GRB Verification 1/13/03 R Brenton
566	2	"	"	"	RP	✓	0.1mL Sr^{90} Z1	1186		"	0.10	"				
567	3	"	"	"	RP	✓	0.1mL Sr^{90} Z1	1186		"	0.10	"				
568	4	"	"	"	RP	✓	0.1mL Sr^{90} Z1	1186		"	0.10	"				
569	5	"	"	"	RP	✓	1.0mL Am^{241} P1	1074		109.500-96	1.02	~~0.92~~ 1.0	2/15/03 RP			
570	6	"	"	"	RP	✓	1.0mL Am^{241} P1	1074		"	1.02	"				
571	7	"	"	"	RP	✓	1.0mL Am^{241} P1	1074		"	1.02	"				
572	8	"	"	"	RP	✓	1.0mL Am^{241} P1	1074		"	1.02	"				K. Yamamoto 2/14/03
3	1075-1	1/21/03	Rn^{222}	CS	RP		6.0mL Ra^{226} N1-A	149.7	~~0.7~~	252.708-91	6.13		6mL 1.4N HCl + 4mL H_2O = 10mL	LSC VIAL	CS	Rn^{222} Verification 1/21/03 R Brenton
4	2	"	"	"	RP		6.0mL Ra^{226} N1-A	149.7	~~0.7~~	"	6.13		"	"		1075-301
575	3	"	"	"	RP		6.0mL Ra^{226} N1-A	149.7	~~0.7~~ 1.0 2/18/03 RP	"	6.13		"	"		K. Yamamoto 2/14/03
576	1076-1	2/14/03	Sr^{90}	CS	RP	✓	200uL Sr^{90} Z1	2372	0.6	182.708-95	0.21		0.1N HNO_3	50mL Pb/Lg Tube	CS	Sr^{90} Verification 2/14/03 R Brenton each sample contains 0.0881 mg $SrCO_3$ 0.022 mg Y_2O_3
577	2	"	"	"	RP	✓						0.21				
578	3	"	"	"	RP	✓						0.21				
579	4	"	"	"	RP	✓						0.21				
580	5	"	"	"	RP	✓						0.21				
581	6	"	"	"	RP	✓						0.21				K. Yamamoto 2/14/03

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

REPORT OF TRACEABILITY Am-241 P1

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada

Radionuclide	Americium-241
Source identification	94030-1, prepared by EMSL
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.0 grams
Source composition	Americium-241 in 0.1 mol•L^{-1} HCl
Reference time	0700 EST April 18, 1996

	NIST DATA	EMSL DATA
Radioactivity concentration	3.574×10^2 Bq•g^{-1}	9.6 nanocuries/gram
Expanded uncertainty	0.46 percent (1,2)*	±2.75 percent (3)
Photon-emitting impurities	None observed (4)	None reported
Measuring instrument	2πα liquid-scintillation counter	Liquid-scintillation counter
Half life	432.2 ± 0.7 years (5)	
Difference from NIST		+0.06 percent (6)

For the Director,

J.M. Robin Hutchinson, Group Leader
Radioactivity Group
Physics Laboratory

Gaithersburg, MD 20899
November 1996

*Notes on next page

(over)

NPDES - 874

As guidance for the proper use of this Report, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the instrument systems and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

Am-241 P1

NOTES

(1) The uncertainty analysis methodology and nomenclature used for the reported uncertainties are based on uniform NIST guidelines and are compatible with those adopted by the principal international metrology standardization bodies [cf., B.N. Taylor and C.E. Kuyatt, *NIST Technical Note 1297* (1994)].

(2) The combined standard uncertainty, u_c = 0.23 percent, is the quadratic combination of the standard deviation (or standard deviation of the mean where appropriate), or approximations thereof, for the following component uncertainties:

a)	20 measurements on each of 5 samples	0.03 percent
b)	gravimetric	0.05 percent
c)	dead time	0.10 percent
d)	background	0.01 percent
e)	detection efficiency	0.20 percent

The expanded uncertainty, U = 0.46 percent, is obtained by multiplying u_c by a coverage factor of k = 2 and is assumed to provide an uncertainty interval of approximately 95 percent confidence.

(3) "Overall uncertainty" reported by EMSL.

(4) The limits of detection, as a percentage of the 59.5-keV photons emitted in the decay of americium-241, are:

0.02 percent between 63.5 and 1900 keV,

provided that the impurity photons are separated in energy by four keV or more from those emitted in the decay of americium-241.

(5) Evaluated Nuclear Structure Data File (ENSDF), September 1996.

(6) This result demonstrates the traceability of EMSL to NIST, for this measurement, to within five percent as specified in the appendix, Traceability Studies, of the EPA-NIST interagency agreement of April 1976, as amended.

For further information, please contact Jeffrey T. Cessna at 301-975-5539.

Source identification 94030-1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
P.O. BOX 93478 • LAS VEGAS, NV 89193-3478

#318
Rec'd 6/24/97
K. Yamamoto

Calibration Certificate

Am-241 P1

OFFICE OF
RESEARCH AND DEVELOPMENT

Description

Principal Radionuclide	Americium-241
Total Mass of this Solution	Approx. 5 grams
Total Activity	Approx. 48 nanocuries
Half-life	432.7 ± 0.5 years
Activity Concentration	9.6 nanocuries/gram
Date and Time of Standardization	April 18, 1996 0400 hours PST
Solution Number	109.500-96 94030-1

Measurement

Method of Measurement:

The activity of the dilution was measured using liquid scintillation.

The activity of the primary solution was measured using a liquid scintillation counter.

Activity of daughter radionuclide:

The principal activity was accompanied at the quoted time by less than:
[ ] of the daughter nuclide..... [ ]

Useful Life

We recommend that this solution should not be used after..... January, 2003

Am-241 P1 Prep'd 12/04/2001 in 1N HCl
5.0386 g x 9.6 nCi/g x 2220 dpm/nCi x 1/100 mL = 1074 dpm/mL ± 0.92% @ 109.500-96
R Brenton 12/4/01
K. Yamamoto 12/4/01

Purity:

The activities other than that of the principal nuclide and of its daughter nuclides were estimated to be:

(1) None stated	<		of the principal activity
(2)	<		of the principal activity
(3)	<		of the principal activity

The activities of the impurities are not included in the quoted figures of the principal activity.

Random Errors:

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.23 % .

The 99.7% confidence limits are given by t(sm) where t is obtained from the Student t factor for the degree of freedom (n-1), and is calculated to be ± 0.75 % .

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta, -\delta'$). These have been estimated not to exceed ± 2.0% .

The overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta, -\delta'$). The overall uncertainty is therefore calculated on the basis of + [t(sm) $+\delta$], - [t(sm) $+\delta'$] and is ± 2.75 % of the quoted radioactive concentration.

Decay Schemes:

This standardization is based on the following assumptions of the principal nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Americium-241 decays 100 percent by alpha emission.

Chemical Composition of Solution:

Carrier content per gram of solution:

Other components:

Preservative: 1.0 M HCl

Remarks:

Date Certificate Prepared April 26, 1996

Approval Signature [signature]

Revised 9/94

National Institute of Standards & Technology

Certificate

Sr^{90} 21

Standard Reference Material 4919H
Strontium-90 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive strontium-90 chloride, non-radioactive strontium chloride, non-radioactive yttrium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains strontium-90 with a total activity of approximately 20 kBq. Strontium-90 decays by beta-particle emission to yttrium-90, which also decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. The beta particles emitted from strontium-90 and yttrium-90 produce bremsstrahlung photons with energies up to 2 MeV. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 0.9 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least July 2005.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
December 1995

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

NPDES - 879

Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss. See also reference [4]*.

*Notes and references are on pages 5 and 6.

NOTES

$Sr^{90}ZJ$

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	15	<0.1	-

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the liquid-scintillation counting is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] The estimated limit of detection for alpha-particle-emitting impurities is:
0.05 $\alpha \cdot s^{-1} \cdot g^{-1}$ for energies between 3 and 12 MeV.

[g] Estimated limits of detection for photon-emitting impurities are:
0.04 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 40 and 507 keV and
0.004 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 515 and 1900 keV.

[h] The stated uncertainty is the standard uncertainty. See reference [5].

[i] Relative standard uncertainty of the input quantity x_i.

[j] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[k] Relative component of combined standard uncertainty of output quantity y, rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

[m] The live time is determined by counting the pulses from a gated crystal-controlled oscillator.

[n] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y) = \{$(response per Bq of impurity)/(response per Bq of Sr-90)$\} \cdot \{$(Bq of impurity)/(Bq of Sr-90)$\}$. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

[p] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[q] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$, multiplied by other sensitivity factors where appropriate.

[r] The relationship between the detection efficiency for Sr-90 and Y-90 and the detection efficiency for H-3 was computed using the CIEMAT/NIST method as embodied in the computer program EFFY4. See references [6, 7, 8]. The program computes the detection efficiency for each radionuclide based upon an assumed model. No estimate is made of the uncertainty associated with this model.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), July 1995.

[6] E. Garcia-Toraño and A. Grau Malonda, EFFY, A New Program to Compute the Counting Efficiency of Beta Particles in Liquid Scintillators, *Computer Phys. Comm.* **36** (1985) 307.

[7] A. Grau Malonda, E. Garcia-Toraño , and J.M. Los Arcos, Liquid-Scintillation Counting Efficiency as a Function of the Figure of Merit for Pure Beta-Particle Emitters, *Int. J. Appl. Radiat. Isot.* **36** (1985) 157.

[8] B.M. Coursey, W.B. Mann, A. Grau Malonda, E. Garcia-Toraño , J.M. Los Arcos, J.A.B. Gibson, and D. Reher, Standardization of Carbon-14 by 4πß Liquid Scintillation Efficiency Tracing with Hydrogen-3, *Appl. Radiat. Isot.* **37** (1986) 403.

PROPERTIES OF SRM 4919H
(Certified values are shown in bold type)

$Sr^{90}Z1$

Source identification number	NIST SRM 4919H		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.014 ± 0.002) g·mL^{-1} at 21.5 °C** [b]*		
Solution mass	Approximately 5.0 grams		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L^{-1})	Mass Fraction (g·g^{-1})
	H_2O HCl $SrCl_2$ YCl_3 $^{90}SrCl_2$	54 0.9 0.001 0.001 9×10^{-9}	0.96 0.04 0.0002 0.0002 1×10^{-9}
Radiological Properties:			
Radionuclide	**Strontium-90**		
Reference time	**1200 EST, 1 July 1995**		
Massic activity of the solution [c]	**4.010 kBq·g^{-1}**		
Relative expanded uncertainty (k=2)	**0.74%** [d] [e]		
Alpha-particle-emitting impurities	None detected [f]		
Photon-emitting impurities	None detected [g]		
Half lives used in the decay corrections	Hydrogen-3: (12.33 ± 0.06) a [h] Strontium-90: (28.78 ± 0.04) a [h] Yttrium-90: (64.10 ± 0.08) h [h]		
Beta-particle maximum energies used in the EFFY4 computations	Hydrogen-3: (18.594 ± 0.008) keV [h] Strontium-90: (546.0 ± 1.6) keV [h] Yttrium-90: (521 ± 3) keV [h] (2281.5 ± 2.5) keV [h]		
Calibration method	4πß liquid-scintillation counting. The Sr-90 plus Y-90 detection efficiency was calculated using the CIEMAT/NIST method with H-3 as the detection-efficiency monitor. [r]		

$Sr^{90}Z1$ in 1N HCL

$4.9313g \times 4.010 \frac{kBq}{g} \times 1000 \times \frac{60dpm}{Bq} \times \frac{1}{100ml} = 1.186E4 dpm/ml \pm$ ~~0.37~~ 0.38 % Sr^{90} @ 182.708 - 95 11/10/00 RP

*Notes and references are on pages 5 and 6.

carrier content ~~0.1132~~ 0.1907 mg/ml $SrCO_3$ + 0.1107 mg/ml Y_2O_3 11/10/00 RP

R Preston 11/10/00

K. Yamamoto 11/13/00

30-JAN-03 TMA Corporation 1074- 1 80
15:01:46 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS

Reviewed_____ Date_____

Counted 20.697- 3 on C1 for 100.00 min.

1.00 smpl	18.300 mg	18.300 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	90.000	80370.000
Gross cpm =	0.900	803.700
Background =	0.037	1.019
Observed CPM =	0.863	802.681
Cross talk fac =	0.006	0.209
True CPM =	-4.096	803.538
Inst Std. Fac. =	1.163	1.014
Adjusted CPM =	-4.764	814.787
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	-25.046	1950.059
pCi /smpl =	-11.3	878.
1 sigma % Err =	2.363	0.353
2 sigma % Err =	4.632	0.692
(1 sigma err) =	0.267	3.10
(2 sigma err) =	0.523	6.08
LTV (95 %) =	0.440	884.
MDA (3.00) =	0.283	0.538
MDA (2.71) =	0.276	0.535
CRITICAL LEVEL =	0.106	0.254

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.037	1.019	0.00
SF	20.633	0	1.163	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.738	17-JAN-03 9:42	GAW 109	(50)9025 1	\ 100.0 min	0.75
17.986	17-JAN-03 15:39	GAW 109	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 109	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.738	17-JAN-03 9:42	GRB 109	(50)9025 1	\ 100.0 min	12.57
17.986	17-JAN-03 15:39	GRB 109	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 109	SF	\ 10.0 min	0.00

30-JAN-03 TMA Corporation 1074- 1 80
15:01:47 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 27.869- 3 on D2 for 100.00 min

1.00 smpl	18.300 mg	18.300 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	138.000	78303.000
Gross cpm =	1.380	783.030
Background =	0.037	2.057
Observed CPM =	1.343	780.973
Cross talk fac =	0.006	0.209
True CPM =	-3.482	781.701
Inst Std. Fac. =	1.045	1.012
Adjusted CPM =	-3.638	791.082
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	-19.128	1893.323
pCi /smpl =	-8.62	853.
1 sigma % Err =	3.419	0.358
2 sigma % Err =	6.701	0.703
(1 sigma err) =	0.295	3.06
(2 sigma err) =	0.577	5.99
LTV (95 %) =	0.486	858.
MDA (3.00) =	0.283	0.751
MDA (2.71) =	0.276	0.748
CRITICAL LEVEL =	0.106	0.360

1 Count

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	25.006	3	0.037	2.057	0.00
SF	27.619	0	1.045	1.012	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.620	27-JAN-03 6:52	GAW 114	SF \	10.0 min	0.00
27.664	27-JAN-03 7:56	GAW 114	(93)2158 14 \	100.0 min	9.48
27.756	27-JAN-03 10:08	GAW 114	(93)7426 16 \	100.0 min	8.17

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.633	27-JAN-03 7:11	GRB 114	SF \	10.0 min	0.00
27.664	27-JAN-03 7:56	GRB 114	(93)2158 14 \	100.0 min	25.28
27.756	27-JAN-03 10:08	GRB 114	(93)7426 16 \	100.0 min	21.12

30-JAN-03 TMA Corporation 1074- 1 80
15:01:47 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 30.874- 3 on C1 for 100.00 min.

1.00 smpl	18.300 mg	18.300 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	142.000	80616.000
Gross cpm =	1.420	806.160
Background =	0.042	1.043
Observed CPM =	1.378	805.117
Cross talk fac =	0.006	0.209
True CPM =	-3.596	805.869
Inst Std. Fac. =	1.165	1.016
Adjusted CPM =	-4.189	818.763
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	-22.023	1959.574
pCi /smpl =	-9.92	883.
1 sigma % Err =	3.363	0.353
2 sigma % Err =	6.591	0.691
(1 sigma err) =	0.334	3.11
(2 sigma err) =	0.654	6.10
LTV (95 %) =	0.550	888.
MDA (3.00) =	0.297	0.544
MDA (2.71) =	0.290	0.541
CRITICAL LEVEL =	0.113	0.257

2 counts done

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	29.937	3	0.042	1.043	0.00
SF	30.616	0	1.165	1.016	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.616	30-JAN-03 6:47	GAW 109	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GAW 109	(50)9035 1 \	100.0 min	0.82
30.867	30-JAN-03 12:48	GAW 109	(50)9035 1 \	6.0 min	0.73

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.626	30-JAN-03 7:01	GRB 109	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GRB 109	(50)9035 1 \	100.0 min	20.30
30.867	30-JAN-03 12:48	GRB 109	(50)9035 1 \	6.0 min	24.17

31-JAN-03 TMA Corporation 1074- 1 80
14:04:24 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 31.861- 3 on D3 for 100.00 min.

1.00 smpl	18.300 mg	18.300 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	29.000	20626.000
Gross cpm =	0.290	806.260
Background =	0.049	1.516
Observed CPM =	0.241	804.744
Cross talk fac =	0.006	0.209
True CPM =	-4.732	805.734
Inst Std. Fac. =	1.035	1.018
Adjusted CPM =	-4.898	820.237
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	-25.748	1963.102
pCi /smpl =	-11.6	884.
1 sigma % Err =	1.230	0.353
2 sigma % Err =	2.412	0.691
(1 sigma err) =	0.143	3.12
(2 sigma err) =	0.280	6.11
LTV (95 %) =	0.235	889.
MDA (3.00) =	0.315	0.650
MDA (2.71) =	0.308	0.646
CRITICAL LEVEL =	0.122	0.309

2nd Count Done (D)

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	30.966	3	0.049	1.516	0.00
SF	31.614	0	1.035	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.966	30-JAN-03 15:11	GAW 115	BK	\ 929.7 min	0.00
31.614	31-JAN-03 6:44	GAW 115	SF	\ 10.0 min	0.00
31.764	31-JAN-03 10:20	GAW 115	(80)1074 5	\ 100.0 min	194.10

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.966	30-JAN-03 15:11	GRB 115	BK	\ 929.7 min	0.00
31.625	31-JAN-03 7:00	GRB 115	SF	\ 10.0 min	0.00
31.764	31-JAN-03 10:20	GRB 115	(80)1074 5	\ 100.0 min	43.83

30-JAN-03 TMA Corporation 1074- 2 80
15:01:49 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 20.697- 3 on C2 for 100.00 min.

1.00 smpl	29.400 mg	29.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	217.000	81414.000
Gross cpm =	2.170	814.140
Background =	0.055	1.637
Observed CPM =	2.115	812.503
Cross talk fac =	0.006	0.215
True CPM =	-2.840	813.113
Inst Std. Fac. =	1.176	1.014
Adjusted CPM =	-3.340	824.496
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	-19.370	1989.682
pCi /smpl =	-8.73	896.
1 sigma % Err =	5.252	0.351
2 sigma % Err =	10.293	0.688
(1 sigma err) =	0.458	3.15
(2 sigma err) =	0.898	6.17
LTV (95 %) =	0.756	901.
MDA (3.00) =	0.363	0.679
MDA (2.71) =	0.356	0.676
CRITICAL LEVEL =	0.143	0.324

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.055	1.637	0.00
SF	20.633	0	1.176	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.617	17-JAN-03 6:48	GAW 110	SF	\ 10.0 min	0.00
17.986	17-JAN-03 15:39	GAW 110	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 110	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.631	17-JAN-03 7:08	GRB 110	SF	\ 10.0 min	0.00
17.986	17-JAN-03 15:39	GRB 110	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 110	SF	\ 10.0 min	0.00

27-JAN-03 TMA Corporation 1074- 2 80
14:38:12 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 27.869- 3 on D3 for 100.00 min.

1.00 smpl	29.400 mg	29.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	46.000	75955.000
Gross cpm =	0.460	759.550
Background =	0.070	1.746
Observed CPM =	0.390	757.804
Cross talk fac =	0.006	0.215
True CPM =	-4.234	758.713
Inst Std. Fac. =	1.037	1.016
Adjusted CPM =	-4.390	770.852
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	-25.460	1860.228
pCi /smpl =	-11.5	838.
1 sigma % Err =	1.720	0.364
2 sigma % Err =	3.370	0.713
(1 sigma err) =	0.197	3.05
(2 sigma err) =	0.387	5.97
LTV (95 %) =	0.325	843.
MDA (3.00) =	0.400	0.701
MDA (2.71) =	0.392	0.697
CRITICAL LEVEL =	0.161	0.335

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	25.006	3	0.070	1.746	0.00
SF	27.619	0	1.037	1.016	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.620	27-JAN-03 6:52	GAW 115	SF \	10.0 min	0.00
27.664	27-JAN-03 7:56	GAW 115	(93)7426 15 \	100.0 min	1.59
27.756	27-JAN-03 10:08	GAW 115	(93)8035 4 \	100.0 min	4.05

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.633	27-JAN-03 7:11	GRB 115	SF \	10.0 min	0.00
27.664	27-JAN-03 7:56	GRB 115	(93)7426 15 \	100.0 min	2.32
27.756	27-JAN-03 10:08	GRB 115	(93)8035 4 \	100.0 min	10.41

30-JAN-03 IMA Corporation 1074- 2 80
15:01:50 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 28.807- 3 on D2 for 100.00 min.

1.00 smpl	29.400 mg	29.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	159.000	80684.000
Gross cpm =	1.590	806.840
Background =	0.030	2.060
Observed CPM =	1.560	804.780
Cross talk fac =	0.006	0.215
True CPM =	-3.349	805.499
Inst Std. Fac. =	1.043	1.011
Adjusted CPM =	-3.493	814.360
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	-20.255	1965.220
pCi /smpl =	-9.12	885.
1 sigma % Err =	3.801	0.353
2 sigma % Err =	7.449	0.692
(1 sigma err) =	0.347	3.13
(2 sigma err) =	0.680	6.13
LTV (95 %) =	0.572	890.
MDA (3.00) =	0.289	0.758
MDA (2.71) =	0.281	0.755
CRITICAL LEVEL =	0.105	0.364

2 count dmw

(D)

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	27.957	3	0.030	2.060	0.00
SF	28.606	0	1.043	1.011	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.957	27-JAN-03 14:58	GAW 114	BK	\ 927.7 min	0.00
28.606	28-JAN-03 6:32	GAW 114	SF	\ 10.0 min	0.00
28.652	28-JAN-03 7:38	GAW 114	(88)9033 2	\ 100.0 min	4.31

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.869	27-JAN-03 12:51	GRB 114	(80)1074 1	\ 100.0 min	790.00
27.957	27-JAN-03 14:58	GRB 114	BK	\ 927.7 min	0.00
28.616	28-JAN-03 6:47	GRB 114	SF	\ 10.0 min	0.00

30-JAN-03 TMA Corporation 1074- 2 80
15:01:51 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 30.874- 3 on C2 for 100.00 min.

1.00 smpl	29.400 mg	29.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	224.000	80924.000
Gross cpm =	2.240	809.240
Background =	0.044	1.651
Observed CPM =	2.196	807.589
Cross talk fac =	0.006	0.215
True CPM =	-2.729	808.175
Inst Std. Fac. =	1.177	1.014
Adjusted CPM =	-3.212	819.489
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	-18.628	1977.599
pCi /smpl =	-8.39	891.
1 sigma % Err =	5.938	0.352
2 sigma % Err =	10.854	0.691
(1 sigma err) =	0.465	3.14
(2 sigma err) =	0.911	6.15
LTV (95 %) =	0.767	896.
MDA (3.00) =	0.333	0.682
MDA (2.71) =	0.326	0.679
CRITICAL LEVEL =	0.128	0.325

2 counts done

C

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	29.937	3	0.044	1.651	0.00
SF	30.616	0	1.177	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.616	30-JAN-03 6:47	GAW 110	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GAW 110	(50)9035 2 \	100.0 min	0.94
30.867	30-JAN-03 12:48	GAW 110	(50)9035 2 \	6.0 min	1.52

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.626	30-JAN-03 7:01	GRB 110	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GRB 110	(50)9035 2 \	100.0 min	18.21
30.867	30-JAN-03 12:48	GRB 110	(50)9035 2 \	6.0 min	17.59

30-JAN-03 TMA Corporation 1074- 3 80
15:01:52 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 20.697- 3 on C3 for 100.00 min.

1.00 smpl	40.800 mg	40.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	75.000	81424.000
Gross cpm =	0.750	814.240
Background =	0.030	1.167
Observed CPM =	0.720	813.073
Cross talk fac =	0.006	0.220
True CPM =	-4.176	813.993
Inst Std. Fac. =	1.136	1.003
Adjusted CPM =	-4.744	816.435
Eff (cpm/dpm) =	0.157	0.411
DPM of Aliquot =	-30.289	1987.176
pCi /smpl =	-13.6	895.
1 sigma % Err =	2.115	0.351
2 sigma % Err =	4.145	0.688
(1 sigma err) =	0.289	3.14
(2 sigma err) =	0.566	6.15
LTV (95 %) =	0.476	900.
MDA (3.00) =	0.318	0.584
MDA (2.71) =	0.310	0.580
CRITICAL LEVEL =	0.116	0.276

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.030	1.167	0.00
SF	20.633	0	1.136	1.003	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.836	17-JAN-03 12:03	GAW 111	(50)9025 3	\ 24.0 min	0.40
17.986	17-JAN-03 15:39	GAW 111	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 111	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.836	17-JAN-03 12:03	GRB 111	(50)9025 3	\ 24.0 min	6.18
17.986	17-JAN-03 15:39	GRB 111	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 111	SF	\ 10.0 min	0.00

30-JAN-03 TMA Corporation 1074- 3 80
15:01:53 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 30.874- 3 on CS for 100.00 min.

1.00 smpl	40.800 mg	40.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	75.000	82078.000
Gross cpm =	0.750	820.780
Background =	0.031	1.187
Observed CPM =	0.719	819.593
Cross talk fac =	0.006	0.220
True CPM =	-4.216	820.522
Inst Std. Fac. =	1.136	1.003
Adjusted CPM =	-4.789	822.984
Eff (cpm/dpm) =	0.157	0.411
DPM of Aliquot =	-30.582	2003.115
pCi /smpl =	-13.8	902.
1 sigma % Err =	2.096	0.349
2 sigma % Err =	4.109	0.685
(1 sigma err) =	0.289	3.15
(2 sigma err) =	0.566	6.18
LTV (95 %) =	0.476	908.
MDA (3.00) =	0.322	0.588
MDA (2.71) =	0.313	0.585
CRITICAL LEVEL =	0.118	0.278

2 counts done

©

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	29.937	3	0.031	1.187	0.00
SF	30.616	0	1.136	1.003	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.616	30-JAN-03 6:47	GAW 111	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GAW 111	(50)9035 3 \	100.0 min	0.67
30.867	30-JAN-03 12:48	GAW 111	(50)9035 3 \	6.0 min	1.10

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.626	30-JAN-03 7:01	GRB 111	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GRB 111	(50)9035 3 \	100.0 min	17.98
30.867	30-JAN-03 12:48	GRB 111	(50)9035 3 \	6.0 min	17.04

CS Reviewed_____ Date_____

Counted 34.867- 3 on D3 for 100.00 min.

1.00 smpl	40.800 mg	40.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	25.000	80936.000
Gross cpm =	0.250	809.360
Background =	0.067	1.540
Observed CPM =	0.183	807.820
Cross talk fac =	0.006	0.220
True CPM =	-4.682	808.852
Inst Std. Fac. =	1.035	1.018
Adjusted CPM =	-4.846	823.411
Eff (cpm/dpm) =	0.157	0.411
DPM of Aliquot =	-30.941	2004.155
pCi /smpl =	-13.9	903.
1 sigma % Err =	1.203	0.352
2 sigma % Err =	2.357	0.690
(1 sigma err) =	0.168	3.18
(2 sigma err) =	0.329	6.23
LTV (95 %) =	0.277	908.
MDA (3.00) =	0.432	0.666
MDA (2.71) =	0.424	0.662
CRITICAL LEVEL =	0.173	0.317

2nd Count done

D

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	31.942	3	0.067	1.540	0.00
SF	34.615	0	1.035	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
34.615	3-FEB-03 6:45	GAW 115	SF \	10.0 min	0.00
34.686	3-FEB-03 8:27	GAW 115	(80)1074 5 \	100.0 min	192.99
34.762	3-FEB-03 10:17	GAW 115	(80)1074 6 \	100.0 min	164.95

Previous 3 counts	Time	Detector	ID	Length	Cpm
34.636	3-FEB-03 7:15	GRB 115	SF \	10.0 min	0.00
34.686	3-FEB-03 8:27	GRB 115	(80)1074 5 \	100.0 min	46.82
34.762	3-FEB-03 10:17	GRB 115	(80)1074 6 \	100.0 min	38.59

05-FEB-03 TMA Corporation 1074- 3 80
09:43:43 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 37.653- 3 on D3 for 100.00 min.

1.00 smpl	40.800 mg	40.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	50.000	80909.000
Gross cpm =	0.500	809.090
Background =	0.054	1.510
Observed CPM =	0.446	807.580
Cross talk fac =	0.006	0.220
True CPM =	-4.417	808.553
Inst Std. Fac. =	1.036	1.017
Adjusted CPM =	-4.576	822.299
Eff (cpm/dpm) =	0.157	0.411
DPM of Aliquot =	-29.219	2001.448
pCi /smpl =	-13.2	902.
1 sigma % Err =	1.685	0.352
2 sigma % Err =	3.303	0.690
(1 sigma err) =	0.222	3.17
(2 sigma err) =	0.435	6.22
LTV (95 %) =	0.366	907.
MDA (3.00) =	0.397	0.659
MDA (2.71) =	0.389	0.656
CRITICAL LEVEL =	0.156	0.314

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	36.943	3	0.054	1.510	0.00
SF	37.605	0	1.036	1.017	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
36.943	5-FEB-03 14:37	GAW 115	BK \	949.8 min	0.00
37.605	6-FEB-03 6:31	GAW 115	SF \	10.0 min	0.00
37.648	6-FEB-03 7:33	GAW 115	(80)1074 7 \	1.0 min	158.43

Previous 3 counts	Time	Detector	ID	Length	Cpm
36.943	5-FEB-03 14:37	GRB 115	BK \	949.8 min	0.00
37.618	6-FEB-03 6:49	GRB 115	SF \	10.0 min	0.00
37.648	6-FEB-03 7:33	GRB 115	(80)1074 7 \	1.0 min	36.08

30-JAN-03 TMA Corporation 1074- 4 80
15:01:54 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 20.697- 3 on C4 for 100.00 min.

1.00 smpl	53.500 mg	53.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 112	GRB 112
Counts =	74.000	81327.000
Gross cpm =	0.740	813.270
Background =	0.048	1.516
Observed CPM =	0.692	811.754
Cross talk fac =	0.006	0.227
True CPM =	-4.124	812.689
Inst Std. Fac. =	1.155	1.006
Adjusted CPM =	-4.763	817.565
Eff (cpm/dpm) =	0.141	0.407
DPM of Aliquot =	-33.695	2009.006
pCi /smpl =	-15.2	905.
1 sigma % Err =	2.153	0.351
2 sigma % Err =	4.219	0.688
(1 sigma err) =	0.327	3.18
(2 sigma err) =	0.640	6.23
LTV (95 %) =	0.539	910.
MDA (3.00) =	0.420	0.667
MDA (2.71) =	0.411	0.664
CRITICAL LEVEL =	0.163	0.318

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.048	1.516	0.00
SF	20.633	0	1.155	1.006	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.836	17-JAN-03 12:03	GAW 112	(50)9025 4	\ 24.0 min	0.52
17.986	17-JAN-03 15:39	GAW 112	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 112	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.836	17-JAN-03 12:03	GRB 112	(50)9025 4	\ 24.0 min	5.72
17.986	17-JAN-03 15:39	GRB 112	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 112	SF	\ 10.0 min	0.00

30-JAN-03 TMA Corporation 1074- 4 80
15:01:55 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 30.874- 3 on C4 for 100.00 min.

1.00 smpl	53.500 mg	53.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 112	GRB 112
Counts =	75.000	82210.000
Gross cpm =	0.750	822.100
Background =	0.053	1.518
Observed CPM =	0.697	820.582
Cross talk fac =	0.006	0.227
True CPM =	-4.171	821.528
Inst Std. Fac. =	1.154	1.007
Adjusted CPM =	-4.813	827.278
Eff (cpm/dpm) =	0.141	0.407
DPM of Aliquot =	-34.052	2032.875
pCi /smpl =	-15.3	916.
1 sigma % Err =	2.148	0.349
2 sigma % Err =	4.211	0.685
(1 sigma err) =	0.330	3.20
(2 sigma err) =	0.646	6.27
LTV (95 %) =	0.544	921.
MDA (3.00) =	0.437	0.667
MDA (2.71) =	0.428	0.664
CRITICAL LEVEL =	0.171	0.318

2 Count Is done

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	29.937	3	0.053	1.518	0.00
SF	30.616	0	1.154	1.007	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.616	30-JAN-03 6:47	GAW 112	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GAW 112	(50)9035 4 \	100.0 min	0.99
30.867	30-JAN-03 12:48	GAW 112	(50)9035 4 \	6.0 min	1.28

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.626	30-JAN-03 7:01	GRB 112	SF \	10.0 min	0.00
30.678	30-JAN-03 8:16	GRB 112	(50)9035 4 \	100.0 min	17.23
30.867	30-JAN-03 12:48	GRB 112	(50)9035 4 \	6.0 min	14.25

CS Reviewed_____ Date_____

Counted 35.753- 3 on D3 for 100.00 min.

1.00 smpl	53.500 mg	53.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	25.000	79426.000
Gross cpm =	0.250	794.260
Background =	0.051	1.539
Observed CPM =	0.199	792.721
Cross talk fac =	0.006	0.227
True CPM =	-4.504	793.742
Inst Std. Fac. =	1.036	1.018
Adjusted CPM =	-4.666	808.030
Eff (cpm/dpm) =	0.141	0.407
DPM of Aliquot =	-33.014	1985.575
pCi /smpl =	-14.9	894.
1 sigma % Err =	1.218	0.355
2 sigma % Err =	2.387	0.697
(1 sigma err) =	0.181	3.18
(2 sigma err) =	0.355	6.23
LTV (95 %) =	0.299	900.
MDA (3.00) =	0.430	0.672
MDA (2.71) =	0.421	0.669
CRITICAL LEVEL =	0.168	0.320

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	34.947	3	0.051	1.539	0.00
SF	35.623	0	1.036	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
35.623	4-FEB-03 6:57	GAW 115	SF \	10.0 min	0.00
35.650	4-FEB-03 7:36	GAW 115	(80)1074 6 \	1.0 min	155.36
35.655	4-FEB-03 7:43	GAW 115	(80)9036 3 \	100.0 min	4.76

Previous 3 counts	Time	Detector	ID	Length	Cpm
35.633	4-FEB-03 7:11	GRB 115	SF \	10.0 min	0.00
35.650	4-FEB-03 7:36	GRB 115	(80)1074 6 \	1.0 min	42.21
35.655	4-FEB-03 7:43	GRB 115	(80)9036 3 \	100.0 min	12.82

06-FEB-03 TMA Corporation 1074- 4 80
13:49:45 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 37.849- 3 on D3 for 100.00 min.

1.00 smpl	53.500 mg	53.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	36.000	80403.000
Gross cpm =	0.360	804.030
Background =	0.054	1.510
Observed CPM =	0.306	802.520
Cross talk fac =	0.006	0.227
True CPM =	-4.455	803.530
Inst Std. Fac. =	1.036	1.017
Adjusted CPM =	-4.616	817.190
Eff (cpm/dpm) =	0.141	0.407
DPM of Aliquot =	-32.654	2008.085
pCi /smpl =	-14.7	905.
1 sigma % Err =	1.444	0.353
2 sigma % Err =	2.831	0.692
(1 sigma err) =	0.212	3.19
(2 sigma err) =	0.416	6.26
LTV (95 %) =	0.351	910.
MDA (3.00) =	0.440	0.666
MDA (2.71) =	0.431	0.662
CRITICAL LEVEL =	0.173	0.317

2nd Count done

D

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	36.943	3	0.054	1.510	0.00
SF	37.605	0	1.036	1.017	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
37.605	6-FEB-03	6:31	GAW 115 SF \	10.0 min	0.00
37.648	6-FEB-03	7:33	GAW 115 (80)1074 7 \	1.0 min	158.43
37.654	6-FEB-03	7:41	GAW 115 (80)1074 3 \	100.0 min	0.46

Previous 3 counts	Time	Detector	ID	Length	Cpm
37.618	6-FEB-03	6:49	GRB 115 SF \	10.0 min	0.00
37.648	6-FEB-03	7:33	GRB 115 (80)1074 7 \	1.0 min	36.08
37.654	6-FEB-03	7:41	GRB 115 (80)1074 3 \	100.0 min	821.08

20-JAN-03 TMA Corporation 1074- 5 80
12:57:06 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 20.778- 3 on C1 for 100.00 min.

1.00 smpl	18.400 mg	18.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	14270.000	3257.000
Gross cpm =	142.700	32.570
Background =	0.037	1.019
Observed CPM =	142.663	31.551
Cross talk fac =	0.006	0.209
True CPM =	142.652	1.708
Inst Std. Fac. =	1.163	1.014
Adjusted CPM =	165.905	1.732
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	873.036	4.146
pCi /smpl =	393.	1.87
1 sigma % Err =	0.838	33.930
2 sigma % Err =	1.642	66.503
(1 sigma err) =	3.29	0.634
(2 sigma err) =	6.46	1.24
LTV (95 %) =	399.	2.91
MDA (3.00) =	0.283	0.538
MDA (2.71) =	0.276	0.535
CRITICAL LEVEL =	0.106	0.254

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.037	1.019	0.00
SF	20.633	0	1.163	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GAW 109	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 109	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GAW 109	(80)1074 1	\ 100.0 min	1.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GRB 109	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 109	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GRB 109	(80)1074 1	\ 100.0 min	814.16

28-JAN-03 TMA Corporation 1074- 5 80
13:51:50 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04
CS Reviewed_____ Date_____
Counted 28.807- 3 on C1 for 100.00 min.

1.00 smpl	18.400 mg	18.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	14140.000	3417.000
Gross cpm =	141.400	34.170
Background =	0.028	1.053
Observed CPM =	141.372	33.117
Cross talk fac =	0.006	0.209
True CPM =	141.350	3.547
Inst Std. Fac. =	1.164	1.016
Adjusted CPM =	164.532	3.603
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	865.810	8.625
pCi /smpl =	390.	3.88
1 sigma % Err =	0.841	16.734
2 sigma % Err =	1.649	32.799
(1 sigma err) =	3.28	0.650
(2 sigma err) =	6.43	1.27
LTV (95 %) =	395.	4.96
MDA (3.00) =	0.256	0.547
MDA (2.71) =	0.249	0.544
CRITICAL LEVEL =	9.242E-02	0.258

2 Counts Prior

C

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	27.957	3	0.028	1.053	0.00
SF	28.606	0	1.164	1.016	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GAW 109	(80) 903 16	\ 10.0 min	1.35
27.957	27-JAN-03 14:58	GAW 109	BK	\ 927.5 min	0.00
28.606	28-JAN-03 6:32	GAW 109	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GRB 109	(80) 903 16	\ 10.0 min	4.32
27.957	27-JAN-03 14:58	GRB 109	BK	\ 927.5 min	0.00
28.616	28-JAN-03 6:47	GRB 109	SF	\ 10.0 min	0.00

03-FEB-03 TMA Corporation 1074- 5 80
10:26:10 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 31.764- 3 on D3 for 100.00 min.

1.00 smpl	18.400 mg	18.400 mg
Aliquot	Sample Weight	Counted Weight

1st count

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	18754.000	4458.000
Gross cpm =	187.540	44.580
Background =	0.049	1.516
Observed CPM =	187.491	43.064
Cross talk fac =	0.006	0.209
True CPM =	187.467	3.846
Inst Std. Fac. =	1.035	1.018
Adjusted CPM =	194.029	3.915
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	1021.031	9.371
pCi /smpl =	460.	4.22
1 sigma % Err =	0.731	17.654
2 sigma % Err =	1.432	34.601
(1 sigma err) =	3.36	0.745
(2 sigma err) =	6.59	1.46
LTV (95 %) =	465.	5.45
MDA (3.00) =	0.315	0.650
MDA (2.71) =	0.308	0.647
CRITICAL LEVEL =	0.122	0.309

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	30.966	3	0.049	1.516	0.00
SF	31.614	0	1.035	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.861	30-JAN-03 12:39	GAW 115	(80)1075 5 \	100.0 min	191.94
30.966	30-JAN-03 15:11	GAW 115	BK \	929.7 min	0.00
31.614	31-JAN-03 6:44	GAW 115	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
30.861	30-JAN-03 12:39	GRB 115	(80)1075 5 \	100.0 min	46.51
30.966	30-JAN-03 15:11	GRB 115	BK \	929.7 min	0.00
31.625	31-JAN-03 7:00	GRB 115	SF \	10.0 min	0.00

03-FEB-03 TMA Corporation 1074- 5 80
10:26:11 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 34.686- 3 on D3 for 100.00 min

1.00 smpl	18.400 mg	18.400 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	18646.000	4753.000
Gross cpm =	186.460	47.530
Background =	0.067	1.540
Observed CPM =	186.393	45.990
Cross talk fac =	0.006	0.209
True CPM =	186.350	7.006
Inst Std. Fac. =	1.035	1.018
Adjusted CPM =	192.872	7.132
Eff (cpm/dpm) =	0.190	0.418
DPM of Aliquot =	1014.945	17.070
pCi /smpl =	457.	7.69
1 sigma % Err =	0.733	9.999
2 sigma % Err =	1.436	19.598
(1 sigma err) =	3.35	0.769
(2 sigma err) =	6.57	1.51
LTV (95 %) =	463.	8.96
MDA (3.00) =	0.356	0.654
MDA (2.71) =	0.350	0.651
CRITICAL LEVEL =	0.143	0.312

2nd count Done

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	31.942	3	0.067	1.540	0.00
SF	34.615	0	1.035	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
31.861	31-JAN-03 12:39	GAW 115	(80)1074 1	\ 100.0 min	0.25
31.942	31-JAN-03 14:36	GAW 115	BK	\ 3838.3 min	0.00
34.615	3-FEB-03 6:45	GAW 115	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
31.861	31-JAN-03 12:39	GRB 115	(80)1074 1	\ 100.0 min	819.14
31.942	31-JAN-03 14:36	GRB 115	BK	\ 3838.3 min	0.00
34.636	3-FEB-03 7:15	GRB 115	SF	\ 10.0 min	0.00

CS Reviewed_____ Date_____
Counted 20.778- 3 on C2 for 100.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	11696.000	2793.000
Gross cpm =	116.960	27.930
Background =	0.055	1.637
Observed CPM =	116.905	26.293
Cross talk fac =	0.006	0.215
True CPM =	116.898	1.172
Inst Std. Fac. =	1.176	1.014
Adjusted CPM =	137.472	1.188
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	800.120	2.868
pCi /smpl =	360.	1.29
1 sigma % Err =	0.925	46.409
2 sigma % Err =	1.814	90.962
(1 sigma err) =	3.34	0.600
(2 sigma err) =	6.54	1.18
LTV (95 %) =	366.	2.28
MDA (3.00) =	0.365	0.680
MDA (2.71) =	0.357	0.676
CRITICAL LEVEL =	0.143	0.324

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.055	1.637	0.00
SF	20.633	0	1.176	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GAW 110	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 110	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GAW 110	(80)1074 2	\ 100.0 min	2.49

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GRB 110	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 110	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GRB 110	(80)1074 2	\ 100.0 min	823.70

28-JAN-03 TMA Corporation 1074- 6 80
13:51:52 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 28.807- 3 on C2 for 100.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

2 counts done

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	11671.000	2868.000
Gross cpm =	116.710	28.680
Background =	0.055	1.660
Observed CPM =	116.655	27.020
Cross talk fac =	0.006	0.215
True CPM =	116.643	1.953
Inst Std. Fac. =	1.177	1.014
Adjusted CPM =	137.289	1.981
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	799.056	4.781
pCi /smpl =	360.	2.15
1 sigma % Err =	0.926	28.198
2 sigma % Err =	1.816	55.268
(1 sigma err) =	3.33	0.607
(2 sigma err) =	6.54	1.19
LTV (95 %) =	365.	3.16
MDA (3.00) =	0.365	0.684
MDA (2.71) =	0.357	0.681
CRITICAL LEVEL =	0.143	0.326

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	27.957	3	0.055	1.660	0.00
SF	28.606	0	1.177	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GAW 110	(80) 903 17 \	10.0 min	0.35
27.957	27-JAN-03 14:58	GAW 110	BK \	927.5 min	0.00
28.606	28-JAN-03 6:32	GAW 110	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GRB 110	(80) 903 17 \	10.0 min	0.35
27.957	27-JAN-03 14:58	GRB 110	BK \	927.5 min	0.00
28.616	28-JAN-03 6:47	GRB 110	SF \	10.0 min	0.00

CS Reviewed_____ Date_____

Counted 34.762- 3 on D3 for 100.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	15938.000	3945.000
Gross cpm =	159.380	39.450
Background =	0.067	1.540
Observed CPM =	159.313	37.910
Cross talk fac =	0.006	0.215
True CPM =	159.291	3.678
Inst Std. Fac. =	1.035	1.018
Adjusted CPM =	164.866	3.745
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	959.560	9.039
pCi /smpl =	432.	4.07
1 sigma % Err =	0.793	17.405
2 sigma % Err =	1.554	34.114
(1 sigma err) =	3.43	0.709
(2 sigma err) =	6.72	1.39
LTV (95 %) =	438.	5.24
MDA (3.00) =	0.394	0.660
MDA (2.71) =	0.387	0.657
CRITICAL LEVEL =	0.158	0.314

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	31.942	3	0.067	1.540	0.00
SF	34.615	0	1.035	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
31.942	31-JAN-03 14:36	GAW 115	BK	\ 3838.3 min	0.00
34.615	3-FEB-03 6:45	GAW 115	SF	\ 10.0 min	0.00
34.686	3-FEB-03 8:27	GAW 115	(80)1074 5	\ 100.0 min	192.99

Previous 3 counts	Time	Detector	ID	Length	Cpm
31.942	31-JAN-03 14:36	GRB 115	BK	\ 3838.3 min	0.00
34.636	3-FEB-03 7:15	GRB 115	SF	\ 10.0 min	0.00
34.686	3-FEB-03 8:27	GRB 115	(80)1074 5	\ 100.0 min	46.82

04-FEB-03 TMA Corporation 1074- 6 80
08:15:15 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 35.650- 3 on D3 for 1.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	150.000	43.000
Gross cpm =	150.000	43.000
Background =	0.051	1.539
Observed CPM =	149.949	41.461
Cross talk fac =	0.006	0.215
True CPM =	149.893	9.249
Inst Std. Fac. =	1.036	1.018
Adjusted CPM =	155.289	9.416
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	903.819	22.728
pCi /smpl =	407.	10.2
1 sigma % Err =	8.172	72.156
2 sigma % Err =	16.018	141.426
(1 sigma err) =	33.3	7.39
(2 sigma err) =	65.2	14.5
LTV (95 %) =	462.	22.4
MDA (3.00) =	10.6	9.53
MDA (2.71) =	9.86	9.22
CRITICAL LEVEL =	1.38	3.14

2nd Count Done D

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	34.947	3	0.051	1.539	0.00
SF	35.623	0	1.036	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
34.867	3-FEB-03 12:48	GAW 115	(80)1074 3 \	100.0 min	0.19
34.947	3-FEB-03 14:43	GAW 115	BK \	953.9 min	0.00
35.623	4-FEB-03 6:57	GAW 115	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
34.867	3-FEB-03 12:48	GRB 115	(80)1074 3 \	100.0 min	822.35
34.947	3-FEB-03 14:43	GRB 115	BK \	953.9 min	0.00
35.633	4-FEB-03 7:11	GRB 115	SF \	10.0 min	0.00

13-FEB-03 TMA Corporation 1074- 6 80
10:20:11 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 44.652- 3 on D2 for 100.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	15189.000	3663.000
Gross cpm =	151.890	36.630
Background =	0.052	2.440
Observed CPM =	151.838	34.190
Cross talk fac =	0.006	0.215
True CPM =	151.828	1.562
Inst Std. Fac. =	1.043	1.012
Adjusted CPM =	158.357	1.581
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	921.678	3.816
pCi /smpl =	415.	1.72
1 sigma % Err =	0.812	40.015
2 sigma % Err =	1.591	78.430
(1 sigma err) =	3.37	0.688
(2 sigma err) =	6.61	1.35
LTV (95 %) =	421.	2.85
MDA (3.00) =	0.357	0.822
MDA (2.71) =	0.349	0.819
CRITICAL LEVEL =	0.139	0.396

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	43.940	3	0.052	2.440	0.00
SF	44.610	0	1.043	1.012	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
43.622	12-FEB-03 6:55	GAW 114	SF	\ 10.0 min	0.00
43.940	12-FEB-03 14:33	GAW 114	BK	\ 962.3 min	0.00
44.611	13-FEB-03 6:39	GAW 114	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
43.640	12-FEB-03 7:21	GRB 114	SF	\ 10.0 min	0.00
43.940	12-FEB-03 14:33	GRB 114	BK	\ 962.3 min	0.00
44.620	13-FEB-03 6:52	GRB 114	SF	\ 10.0 min	0.00

20-JAN-03 TMA Corporation 1074- 7 80
12:57:07 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 20.778- 3 on C3 for 100.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	10795.000	2813.000
Gross cpm =	107.950	28.130
Background =	0.030	1.167
Observed CPM =	107.920	26.963
Cross talk fac =	0.006	0.224
True CPM =	107.904	2.755
Inst Std. Fac. =	1.136	1.003
Adjusted CPM =	122.578	2.763
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	834.935	6.766
pCi /smpl =	376.	3.05
1 sigma % Err =	0.963	19.648
2 sigma % Err =	1.888	38.510
(1 sigma err) =	3.62	0.599
(2 sigma err) =	7.10	1.17
LTV (95 %) =	382.	4.04
MDA (3.00) =	0.339	0.587
MDA (2.71) =	0.330	0.584
CRITICAL LEVEL =	0.124	0.278

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.030	1.167	0.00
SF	20.633	0	1.136	1.003	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GAW 111	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 111	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GAW 111	(80)1074 3	\ 100.0 min	0.82

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GRB 111	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 111	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GRB 111	(80)1074 3	\ 100.0 min	815.46

28-JAN-03 TMA Corporation 1074- 7 80
13:51:54 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 28.807- 3 on C3 for 100.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	10613.000	2795.000
Gross cpm =	106.130	27.950
Background =	0.029	1.189
Observed CPM =	106.101	26.761
Cross talk fac =	0.006	0.224
True CPM =	106.083	2.961
Inst Std. Fac. =	1.136	1.003
Adjusted CPM =	120.511	2.970
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	820.850	7.272
pCi /smpl =	370.	3.28
1 sigma % Err =	0.971	18.229
2 sigma % Err =	1.904	35.729
(1 sigma err) =	3.59	0.597
(2 sigma err) =	7.04	1.17
LTV (95 %) =	376.	4.26
MDA (3.00) =	0.335	0.592
MDA (2.71) =	0.326	0.589
CRITICAL LEVEL =	0.122	0.280

2 Counts, Done

C

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	27.957	3	0.029	1.189	0.00
SF	28.606	0	1.136	1.003	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GAW 111	(80) 903 18	\ 10.0 min	0.42
27.957	27-JAN-03 14:58	GAW 111	BK	\ 927.5 min	0.00
28.606	28-JAN-03 6:32	GAW 111	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GRB 111	(80) 903 18	\ 10.0 min	0.42
27.957	27-JAN-03 14:58	GRB 111	BK	\ 927.5 min	0.00
28.616	28-JAN-03 6:47	GRB 111	SF	\ 10.0 min	0.00

10-FEB-03 TMA Corporation 1074- 7 80
10:46:23 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04
CS Reviewed_____ Date_____
Counted 35.853- 3 on D3 for 100.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	13796.000	3552.000
Gross cpm =	137.960	35.520
Background =	0.051	1.539
Observed CPM =	137.909	33.981
Cross talk fac =	0.006	0.224
True CPM =	137.891	3.045
Inst Std. Fac. =	1.036	1.018
Adjusted CPM =	142.855	3.100
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	973.047	7.591
pCi /smpl =	438.	3.42
1 sigma % Err =	0.852	19.991
2 sigma % Err =	1.670	39.182
(1 sigma err) =	3.73	0.684
(2 sigma err) =	7.32	1.34
LTV (95 %) =	444.	4.55
MDA (3.00) =	0.414	0.669
MDA (2.71) =	0.405	0.666
CRITICAL LEVEL =	0.161	0.319

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	34.947	3	0.051	1.539	0.00
SF	35.623	0	1.036	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
35.650	4-FEB-03	7:36	GAW 115 (80)1074 6 \	1.0 min	155.36
35.655	4-FEB-03	7:43	GAW 115 (80)9036 3 \	100.0 min	4.76
35.753	4-FEB-03	10:04	GAW 115 (80)1074 4 \	100.0 min	0.21

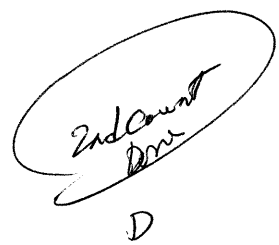
Previous 3 counts	Time	Detector	ID	Length	Cpm
35.650	4-FEB-03	7:36	GRB 115 (80)1074 6 \	1.0 min	42.21
35.655	4-FEB-03	7:43	GRB 115 (80)9036 3 \	100.0 min	12.82
35.753	4-FEB-03	10:04	GRB 115 (80)1074 4 \	100.0 min	807.07

06-FEB-03 TMA Corporation 1074- 7 80
09:43:41 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 37.648- 3 on D3 for 1.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	153.000	37.000
Gross cpm =	153.000	37.000
Background =	0.054	1.510
Observed CPM =	152.946	35.490
Cross talk fac =	0.006	0.224
True CPM =	152.939	1.178
Inst Std. Fac. =	1.036	1.017
Adjusted CPM =	158.445	1.198
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	1079.236	2.934
pCi /smpl =	486.	1.32
1 sigma % Err =	8.089	526.731
2 sigma % Err =	15.855	1032.393
(1 sigma err) =	39.3	6.96
(2 sigma err) =	77.1	13.6
LTV (95 %) =	551.	12.8
MDA (3.00) =	12.5	9.61
MDA (2.71) =	11.6	9.29
CRITICAL LEVEL =	1.66	3.16



QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	36.943	3	0.054	1.510	0.00
SF	37.605	0	1.036	1.017	0.00

Previous 3 counts	Time	Detector	ID		Length	Cpm
36.614	5-FEB-03 6:44	GAW 115	SF	\	10.0 min	0.00
36.943	5-FEB-03 14:37	GAW 115	BK	\	949.8 min	0.00
37.605	6-FEB-03 6:31	GAW 115	SF	\	10.0 min	0.00

Previous 3 counts	Time	Detector	ID		Length	Cpm
36.658	5-FEB-03 7:47	GRB 115	SF	\	10.0 min	0.00
36.943	5-FEB-03 14:37	GRB 115	BK	\	949.8 min	0.00
37.618	6-FEB-03 6:49	GRB 115	SF	\	10.0 min	0.00

13-FEB-03 TMA Corporation 1074- 7 80
10:20:13 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 44.652- 3 on D3 for 100.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	13939.000	3784.000
Gross cpm =	139.390	37.840
Background =	0.067	1.500
Observed CPM =	139.323	36.340
Cross talk fac =	0.006	0.224
True CPM =	139.293	5.090
Inst Std. Fac. =	1.039	1.017
Adjusted CPM =	144.725	5.176
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	985.785	12.674
pCi /smpl =	444.	5.71
1 sigma % Err =	0.848	12.323
2 sigma % Err =	1.662	24.154
(1 sigma err) =	3.76	0.704
(2 sigma err) =	7.38	1.38
LTV (95 %) =	450.	6.87
MDA (3.00) =	0.461	0.661
MDA (2.71) =	0.452	0.658
CRITICAL LEVEL =	0.185	0.315

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	43.940	3	0.067	1.500	0.00
SF	44.610	0	1.039	1.017	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
43.759	12-FEB-03 10:12	GAW 115	(93)8034 1 \	100.0 min	1.43
43.940	12-FEB-03 14:33	GAW 115	BK \	962.3 min	0.00
44.611	13-FEB-03 6:39	GAW 115	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
43.759	12-FEB-03 10:12	GRB 115	(93)8034 1 \	100.0 min	2.99
43.940	12-FEB-03 14:33	GRB 115	BK \	962.3 min	0.00
44.620	13-FEB-03 6:52	GRB 115	SF \	10.0 min	0.00

CS Reviewed_____ Date_____

Counted 20.778- 3 on C4 for 100.00 min.

1.00 smpl	52.800 mg	52.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 112	GRB 112
Counts =	8836.000	2500.000
Gross cpm =	88.360	25.000
Background =	0.048	1.516
Observed CPM =	88.312	23.484
Cross talk fac =	0.006	0.226
True CPM =	88.291	3.495
Inst Std. Fac. =	1.155	1.006
Adjusted CPM =	101.976	3.516
Eff (cpm/dpm) =	0.142	0.407
DPM of Aliquot =	717.537	8.635
pCi /smpl =	323.	3.89
1 sigma % Err =	1.065	14.734
2 sigma % Err =	2.087	28.879
(1 sigma err) =	3.44	0.573
(2 sigma err) =	6.75	1.12
LTV (95 %) =	329.	4.84
MDA (3.00) =	0.418	0.667
MDA (2.71) =	0.409	0.663
CRITICAL LEVEL =	0.162	0.317

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	17.986	3	0.048	1.516	0.00
SF	20.633	0	1.155	1.006	0.00

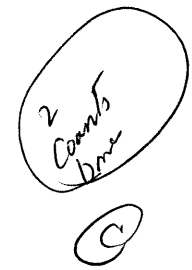
Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GAW 112	BK	\ 3774.4 min	0.00
20.633	20-JAN-03 7:11	GAW 112	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GAW 112	(80)1074 4	\ 100.0 min	0.80

Previous 3 counts	Time	Detector	ID	Length	Cpm
17.986	17-JAN-03 15:39	GRB 112	BK	\ 3774.4 min	0.00
20.648	20-JAN-03 7:33	GRB 112	SF	\ 10.0 min	0.00
20.697	20-JAN-03 8:43	GRB 112	(80)1074 4	\ 100.0 min	816.62

28-JAN-03 TMA Corporation 1074- 8 80
13:51:55 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04
CS Reviewed_____ Date_____
Counted 28.807- 3 on C4 for 100.00 min.

1.00 smpl	52.800 mg	52.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 112	GRB 112
Counts =	8662.000	2562.000
Gross cpm =	86.620	25.620
Background =	0.037	1.525
Observed CPM =	86.583	24.095
Cross talk fac =	0.006	0.226
True CPM =	86.556	4.499
Inst Std. Fac. =	1.156	1.007
Adjusted CPM =	100.059	4.530
Eff (cpm/dpm) =	0.142	0.407
DPM of Aliquot =	704.047	11.126
pCi /smpl =	317.	5.01
1 sigma % Err =	1.075	11.581
2 sigma % Err =	2.108	22.700
(1 sigma err) =	3.41	0.580
(2 sigma err) =	6.69	1.14
LTV (95 %) =	323.	5.97
MDA (3.00) =	0.379	0.668
MDA (2.71) =	0.369	0.665
CRITICAL LEVEL =	0.142	0.318



QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	27.957	3	0.037	1.525	0.00
SF	28.606	0	1.156	1.007	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GAW 112	(80) 903 19 \	10.0 min	0.41
27.957	27-JAN-03 14:58	GAW 112	BK \	927.5 min	0.00
28.606	28-JAN-03 6:32	GAW 112	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
27.798	27-JAN-03 11:09	GRB 112	(80) 903 19 \	10.0 min	2.59
27.957	27-JAN-03 14:58	GRB 112	BK \	927.5 min	0.00
28.616	28-JAN-03 6:47	GRB 112	SF \	10.0 min	0.00

CS Reviewed_____ Date_____

Counted 37.920- 3 on D3 for 100.00 min.

1.00 smpl	52.800 mg	52.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	11999.000	3189.000
Gross cpm =	119.990	31.890
Background =	0.054	1.510
Observed CPM =	119.936	30.380
Cross talk fac =	0.006	0.226
True CPM =	119.917	3.231
Inst Std. Fac. =	1.036	1.017
Adjusted CPM =	124.234	3.286
Eff (cpm/dpm) =	0.142	0.407
DPM of Aliquot =	874.147	8.070
pCi /smpl =	394.	3.64
1 sigma % Err =	0.914	17.888
2 sigma % Err =	1.791	35.060
(1 sigma err) =	3.60	0.650
(2 sigma err) =	7.05	1.27
LTV (95 %) =	400.	4.71
MDA (3.00) =	0.438	0.665
MDA (2.71) =	0.428	0.662
CRITICAL LEVEL =	0.172	0.317

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	36.943	3	0.054	1.510	0.00
SF	37.605	0	1.036	1.017	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
37.648	6-FEB-03	7:33	GAW 115	(80)1074 7 \ 1.0 min	158.43
37.654	6-FEB-03	7:41	GAW 115	(80)1074 3 \ 100.0 min	0.46
37.849	6-FEB-03	12:22	GAW 115	(80)1074 4 \ 100.0 min	0.32

Previous 3 counts	Time	Detector	ID	Length	Cpm
37.648	6-FEB-03	7:33	GRB 115	(80)1074 7 \ 1.0 min	36.08
37.654	6-FEB-03	7:41	GRB 115	(80)1074 3 \ 100.0 min	821.08
37.849	6-FEB-03	12:22	GRB 115	(80)1074 4 \ 100.0 min	815.94

10:17:00 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 38.748- 3 on D3 for 2.29 min.

1.00 smpl	52.800 mg	52.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	269.000	83.000
Gross cpm =	117.467	36.245
Background =	0.071	1.512
Observed CPM =	117.396	34.733
Cross talk fac =	0.006	0.226
True CPM =	117.348	8.165
Inst Std. Fac. =	1.037	1.018
Adjusted CPM =	121.690	8.312
Eff (cpm/dpm) =	0.142	0.407
DPM of Aliquot =	856.246	20.414
pCi /smpl =	386.	9.20
1 sigma % Err =	6.105	49.730
2 sigma % Err =	11.966	97.472
(1 sigma err) =	23.5	4.57
(2 sigma err) =	46.2	8.96
LTV (95 %) =	425.	16.7
MDA (3.00) =	6.75	5.63
MDA (2.71) =	6.35	5.49
CRITICAL LEVEL =	1.30	2.09

2nd Count Done

D

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	38.133	3	0.071	1.512	0.00
SF	38.724	0	1.037	1.018	0.00

Previous 3 counts	Time	Detector	ID		Length	Cpm
38.134	6-FEB-03 19:12	GAW 115	BK	\	685.8 min	0.00
38.612	7-FEB-03 6:41	GAW 115	SF	\	10.0 min	0.00
38.724	7-FEB-03 9:22	GAW 115	SF	\	10.0 min	0.00

Previous 3 counts	Time	Detector	ID		Length	Cpm
38.624	7-FEB-03 6:58	GRB 115	SF	\	10.0 min	0.00
38.654	7-FEB-03 7:41	GRB 115	SF	\	10.0 min	0.00
38.688	7-FEB-03 8:30	GRB 115	SF	\	10.0 min	0.00

13-FEB-03 TMA Corporation 1074- 8 80
12:22:16 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 44.756- 3 on D2 for 100.00 min.

1.00 smpl	52.800 mg	52.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	11254.000	2895.000
Gross cpm =	112.540	28.950
Background =	0.052	2.440
Observed CPM =	112.488	26.510
Cross talk fac =	0.006	0.226
True CPM =	112.482	1.044
Inst Std. Fac. =	1.043	1.012
Adjusted CPM =	117.319	1.057
Eff (cpm/dpm) =	0.142	0.407
DPM of Aliquot =	825.489	2.595
pCi /smpl =	372.	1.17
1 sigma % Err =	0.943	53.659
2 sigma % Err =	1.849	105.172
(1 sigma err) =	3.51	0.627
(2 sigma err) =	6.88	1.23
LTV (95 %) =	378.	2.20
MDA (3.00) =	0.431	0.837
MDA (2.71) =	0.422	0.834
CRITICAL LEVEL =	0.168	0.403

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	43.940	3	0.052	2.440	0.00
SF	44.610	0	1.043	1.012	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
44.611	13-FEB-03 6:39	GAW 114	SF \	10.0 min	0.00
44.652	13-FEB-03 7:38	GAW 114	(93)1074 6 \	100.0 min	158.39
44.652	13-FEB-03 7:38	GAW 114	(80)1074 6 \	100.0 min	158.39

Previous 3 counts	Time	Detector	ID	Length	Cpm
44.620	13-FEB-03 6:52	GRB 114	SF \	10.0 min	0.00
44.652	13-FEB-03 7:38	GRB 114	(93)1074 6 \	100.0 min	34.61
44.652	13-FEB-03 7:38	GRB 114	(80)1074 6 \	100.0 min	34.61

CS Reviewed_____ Date_____
Counted 50.656- 3 on B1 for 100.00 min.

1.00 smpl	49.900 mg	49.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 105	GRB 105
Counts =	9377.000	2649.000
Gross cpm =	93.770	26.490
Background =	0.021	1.529
Observed CPM =	93.749	24.961
Cross talk fac =	0.006	0.225
True CPM =	93.726	3.877
Inst Std. Fac. =	1.147	1.024
Adjusted CPM =	107.504	3.970
Eff (cpm/dpm) =	0.145	0.408
DPM of Aliquot =	739.751	9.731
pCi /smpl =	333.	4.38
1 sigma % Err =	1.033	13.652
2 sigma % Err =	2.025	26.758
(1 sigma err) =	3.44	0.598
(2 sigma err) =	6.75	1.17
LTV (95 %) =	339.	5.37
MDA (3.00) =	0.302	0.668
MDA (2.71) =	0.293	0.665
CRITICAL LEVEL =	0.105	0.318

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	49.916	3	0.021	1.529	0.00
SF	50.610	0	1.147	1.024	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.918	14-FEB-03 14:01	GAW 105	BK	\ 5342.8 min	0.00
49.916	18-FEB-03 13:59	GAW 105	BK	\ 995.9 min	0.00
50.610	19-FEB-03 6:38	GAW 105	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.918	14-FEB-03 14:01	GRB 105	BK	\ 5342.8 min	0.00
49.916	18-FEB-03 13:59	GRB 105	BK	\ 995.9 min	0.00
50.626	19-FEB-03 7:01	GRB 105	SF	\ 10.0 min	0.00

CS Reviewed_____ Date_____

Counted 45.792- 3 on D2 for 100.00 min.

1.00 smpl	49.900 mg	49.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	12507.000	3357.000
Gross cpm =	125.070	33.570
Background =	0.052	2.440
Observed CPM =	125.018	31.130
Cross talk fac =	0.006	0.225
True CPM =	125.000	3.011
Inst Std. Fac. =	1.044	1.012
Adjusted CPM =	130.500	3.047
Eff (cpm/dpm) =	0.145	0.408
DPM of Aliquot =	897.994	7.468
pCi /smpl =	405.	3.36
1 sigma % Err =	0.895	19.928
2 sigma % Err =	1.754	39.059
(1 sigma err) =	3.62	0.670
(2 sigma err) =	7.09	1.31
LTV (95 %) =	410.	4.47
MDA (3.00) =	0.422	0.835
MDA (2.71) =	0.413	0.832
CRITICAL LEVEL =	0.165	0.402

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	43.940	3	0.052	2.440	0.00
SF	45.607	0	1.044	1.012	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.654	14-FEB-03 7:41	GAW 114	(93)7437 5 \	100.0 min	8.50
45.751	14-FEB-03 10:01	GAW 114	(80) 903 44 \	10.0 min	0.36
45.783	14-FEB-03 10:47	GAW 114	(80) 903 53 \	10.0 min	0.15

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.654	14-FEB-03 7:41	GRB 114	(93)7437 5 \	100.0 min	21.47
45.751	14-FEB-03 10:01	GRB 114	(80) 903 44 \	10.0 min	0.36
45.783	14-FEB-03 10:47	GRB 114	(80) 903 53 \	10.0 min	0.97

14-FEB-03 TMA Corporation 1074- 8R1 80
13:32:36 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____

Counted 45.792- 3 on D2 for 100.00 min.

1.00 smpl	49.900 mg	49.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	12507.000	3357.000
Gross cpm =	125.070	33.570
Background =	0.052	2.440
Observed CPM =	125.018	31.130
Cross talk fac =	0.006	0.225
True CPM =	125.000	3.011
Inst Std. Fac. =	1.044	1.012
Adjusted CPM =	130.500	3.047
Eff (cpm/dpm) =	0.145	0.408
DPM of Aliquot =	897.994	7.468
pCi /smpl =	405.	3.36
1 sigma % Err =	0.895	19.928
2 sigma % Err =	1.754	39.059
(1 sigma err) =	3.62	0.670
(2 sigma err) =	7.09	1.31
LTV (95 %) =	410.	4.47
MDA (3.00) =	0.422	0.835
MDA (2.71) =	0.413	0.832
CRITICAL LEVEL =	0.165	0.402

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	43.940	3	0.052	2.440	0.00
SF	45.607	0	1.044	1.012	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.654	14-FEB-03 7:41	GAW 114	(93)7437 5 \	100.0 min	8.50
45.751	14-FEB-03 10:01	GAW 114	(80) 903 44 \	10.0 min	0.36
45.783	14-FEB-03 10:47	GAW 114	(80) 903 53 \	10.0 min	0.15

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.654	14-FEB-03 7:41	GRB 114	(93)7437 5 \	100.0 min	21.47
45.751	14-FEB-03 10:01	GRB 114	(80) 903 44 \	10.0 min	0.36
45.783	14-FEB-03 10:47	GRB 114	(80) 903 53 \	10.0 min	0.97

CS Reviewed_____ Date_____
Counted 52.655- 3 on C1 for 100.00 min.

1.00 smpl	49.900 mg	49.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	9219.000	2631.000
Gross cpm =	92.190	26.310
Background =	0.058	1.032
Observed CPM =	92.132	25.278
Cross talk fac =	0.006	0.225
True CPM =	92.105	4.559
Inst Std. Fac. =	1.168	1.018
Adjusted CPM =	107.578	4.641
Eff (cpm/dpm) =	0.145	0.408
DPM of Aliquot =	740.267	11.374
pCi /smpl =	333.	5.12
1 sigma % Err =	1.043	11.470
2 sigma % Err =	2.044	22.480
(1 sigma err) =	3.48	0.588
(2 sigma err) =	6.82	1.15
LTV (95 %) =	339.	6.09
MDA (3.00) =	0.440	0.555
MDA (2.71) =	0.431	0.551
CRITICAL LEVEL =	0.174	0.261

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	52.114	3	0.058	1.032	0.00
SF	52.615	0	1.168	1.018	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
51.900	20-FEB-03 13:36	GAW 109	(93)2001 1 \	300.0 min	0.08
52.114	20-FEB-03 18:44	GAW 109	BK \	718.4 min	0.00
52.615	21-FEB-03 6:45	GAW 109	SF \	10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
51.900	20-FEB-03 13:36	GRB 109	(93)2001 1 \	300.0 min	0.28
52.114	20-FEB-03 18:44	GRB 109	BK \	718.4 min	0.00
52.626	21-FEB-03 7:01	GRB 109	SF \	10.0 min	0.00

23-FEB-03 TMA Corporation 1074- 8R1 80
08:58:07 Gross Alpha, Gross Beta Analysis CALIBRATION Std.
ABCALC V 1.04

CS Reviewed_____ Date_____
Counted 52.892- 3 on D2 for 100.00 min.

1.00 smpl	49.900 mg	49.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	12027.000	3002.000
Gross cpm =	120.270	30.020
Background =	0.043	2.472
Observed CPM =	120.227	27.548
Cross talk fac =	0.006	0.225
True CPM =	120.224	0.504
Inst Std. Fac. =	1.044	1.009
Adjusted CPM =	125.514	0.508
Eff (cpm/dpm) =	0.145	0.408
DPM of Aliquot =	863.683	1.245
pCi /smpl =	389.	0.561
1 sigma % Err =	0.912	113.186
2 sigma % Err =	1.788	221.845
(1 sigma err) =	3.55	0.635
(2 sigma err) =	6.96	1.24
LTV (95 %) =	395.	1.61
MDA (3.00) =	0.392	0.840
MDA (2.71) =	0.383	0.837
CRITICAL LEVEL =	0.150	0.404

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	52.114	3	0.043	2.472	0.00
SF	52.617	0	1.044	1.009	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
52.114	20-FEB-03 18:44	GAW 114	BK	\ 718.5 min	0.00
52.617	21-FEB-03 6:48	GAW 114	SF	\ 10.0 min	0.00
52.656	21-FEB-03 7:44	GAW 114	(93)2000 4	\ 300.0 min	4.38

Previous 3 counts	Time	Detector	ID	Length	Cpm
52.114	20-FEB-03 18:44	GRB 114	BK	\ 718.5 min	0.00
52.626	21-FEB-03 7:01	GRB 114	SF	\ 10.0 min	0.00
52.656	21-FEB-03 7:44	GRB 114	(93)2000 4	\ 300.0 min	10.40

CS Reviewed_____ Date_____

Counted 50.656- 3 on D2 for 100.00 min.

1.00 smpl	29.800 mg	29.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	15119.000	3552.000
Gross cpm =	151.190	35.520
Background =	0.055	2.486
Observed CPM =	151.135	33.034
Cross talk fac =	0.006	0.215
True CPM =	151.132	0.556
Inst Std. Fac. =	1.045	1.010
Adjusted CPM =	157.933	0.561
Eff (cpm/dpm) =	0.172	0.414
DPM of Aliquot =	919.206	1.355
pCi /smpl =	414.	0.610
1 sigma % Err =	0.814	110.916
2 sigma % Err =	1.595	217.396
(1 sigma err) =	3.37	0.677
(2 sigma err) =	6.60	1.33
LTV (95 %) =	420.	1.73
MDA (3.00) =	0.365	0.830
MDA (2.71) =	0.357	0.827
CRITICAL LEVEL =	0.143	0.399

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	49.916	3	0.055	2.486	0.00
SF	50.610	0	1.045	1.010	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.918	14-FEB-03 14:01	GAW 114	BK	\ 5342.9 min	0.00
49.916	18-FEB-03 13:59	GAW 114	BK	\ 995.9 min	0.00
50.610	19-FEB-03 6:38	GAW 114	SF	\ 10.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
45.918	14-FEB-03 14:01	GRB 114	BK	\ 5342.9 min	0.00
49.916	18-FEB-03 13:59	GRB 114	BK	\ 995.9 min	0.00
50.622	19-FEB-03 6:55	GRB 114	SF	\ 10.0 min	0.00

CS Reviewed_____ Date_____
Counted 50.728- 3 on D2 for 100.00 min.

1.00 smpl	48.700 mg	48.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 114	GRB 114
Counts =	13006.000	3332.000
Gross cpm =	130.060	33.320
Background =	0.055	2.486
Observed CPM =	130.005	30.834
Cross talk fac =	0.006	0.224
True CPM =	129.995	1.670
Inst Std. Fac. =	1.045	1.010
Adjusted CPM =	135.845	1.686
Eff (cpm/dpm) =	0.147	0.408
DPM of Aliquot =	925.298	4.129
pCi /smpl =	417.	1.86
1 sigma % Err =	0.877	35.840
2 sigma % Err =	1.720	70.246
(1 sigma err) =	3.66	0.667
(2 sigma err) =	7.17	1.31
LTV (95 %) =	423.	2.96
MDA (3.00) =	0.427	0.842
MDA (2.71) =	0.418	0.839
CRITICAL LEVEL =	0.168	0.405

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	49.916	3	0.055	2.486	0.00
SF	50.610	0	1.045	1.010	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
49.916	18-FEB-03 13:59	GAW 114	BK	\ 995.9 min	0.00
50.610	19-FEB-03 6:38	GAW 114	SF	\ 10.0 min	0.00
50.656	19-FEB-03 7:44	GAW 114	(80)1074 6	\ 100.0 min	157.90

Previous 3 counts	Time	Detector	ID	Length	Cpm
49.916	18-FEB-03 13:59	GRB 114	BK	\ 995.9 min	0.00
50.622	19-FEB-03 6:55	GRB 114	SF	\ 10.0 min	0.00
50.656	19-FEB-03 7:44	GRB 114	(80)1074 6	\ 100.0 min	33.36

Notes on this Revision June 12, 1997

This revision incorporates the following changes:

1.) The data for the MEW counters shown in Table 6 was in error in the original document. It consisted of a duplicate of the LBG data by mistake. The correct data is shown in this revision. This is a documentation change only, as the correct data was placed in the computer files for actual data calculation.

2.) As noted in Section 6, a small change was made to the LBG efficiency in January of 1996. This change slightly affected the Y90/SR90 efficiency ratio table shown in Table 5. The correct Y90/Sr90 Eff ratio data for this change was shown in the original version of this calibration, however the actual computer spline-fit file in use was not changed to incorporate this revision. The difference in the data used and the revised data is very small (1.4% or less), however for documentation purposes, this file was changed as of this revision to reflect exactly the data shown. From this date forward, the data will be calculated with the file data as shown in Table 5.

The Y90/Sr90 Efficiency Ratio spline table in use prior to this revision (9/27/95 to 6/12/97) is shown below:

LBG Y90/Sr90 Efficiency Ratio (27-SEP-95)
3.30 AREA
LBG

mg/CM2	Y/Sr Eff Ratio
0.76	1.231
1.52	1.249
2.27	1.301
3.03	1.354
3.79	1.403
4.55	1.442
5.30	1.483
6.06	1.519
6.82	1.556
7.58	1.586
8.33	1.611
9.09	1.634
9.85	1.655
10.61	1.676
11.36	1.693
12.12	1.712
12.88	1.732
13.64	1.750
14.39	1.768
15.15	1.787
15.91	1.810

1.0 Introduction

This calibration was initiated to provide the primary calibration for ^{90}Sr counting on the LBG, MEW and LB4100 beta counter systems.

The calibration was performed to accomplish the following objectives:

a. Determine the absolute counting efficiency for ^{90}Sr mounted as $SrCO_3$ on a 1" nylon planchet at the standard sample thickness of 6.0 mg/cm^2.

b. Determine the ^{90}Sr relative counting efficiency as a function of sample weight.

c. Determine the ratio of ^{90}Y to ^{90}Sr counting efficiencies in the $SrCO_3$ mount.

d. Compare the newly determined calibration data with the previous calibration.

2.0 Radioactivity Standards

A ^{90}Sr standard solution 2454-4 was obtained from the EPA-EMSL in February of 1994 (see calibration certificate in Appendix B. This vial contained 5.02 nCi/g of ^{89}Sr in 4.9652 grams for a total activity of 54,991.4 dpm of ^{90}Sr at the reference time of 04:00 PST February 11, 1994. The Sr and Y carrier contents were 100 ug/ml each. To prepare the dilute solution, the contents of the vial were transferred to a tared 25-ml volumetric flask with lid and weighed. 100 lambda of Sr carrier K-A1 (36.28 mg/ml $SrCO_3$) and 200 lambda of Yttrium carrier D-G1 (15.18 mg/ml Y_2O_3) were pipetted into the flask. The solution was brought up to the 25-ml mark with 0.1M HCl and transferred to a 1 ounce poly bottle. The activity at the reference time was calculated as follows:

4.9793g x 5.02 nCi/g x 2220 dpm/nCi x 1/25 ml = 2220 dpm ^{90}Sr/ml $\pm$ 0.8%.

The carrier concentration was calculated as follows:

[(4.9793g x 0.1 mg Sr/g x 1.68489 $SrCO_3$/Sr) + (0.1 ml x 36.28 mg $SrCO_3$/ml)] x 1/25ml = 0.1787 mg/ml $SrCO_3$.

[(4.9793g x 0.1 mg Y/g x 1.26994 Y_2O_3/Y) + (0.2 ml x 15.18 mg Y_2O_3/ml)] x 1/25ml = 0.1467 mg/ml Y_2O_3.

The resulting solution was designated U1.

3.0 Preparation of Counting Standards

Sixteen standards of various weights ranging from 1.57 mg to 50.44 mg were prepared by adding increasing amounts of Strontium carrier to 1 ml aliquots of the U1 stock solution. These samples were labeled group 1037, samples 1 to 16. The procedure for the preparation of the standards is detailed in the copy of the lab book sections shown in Appendix C.

4.0 Counting and Calculation

Each sample was counted sixteen times on each of the MEW, LBG and GRB counting systems over a period of three weeks. The MEW counts were identified as samples 101 through 116, the LBG counts were identified as 201 through 216, while the GRB readings were designated 301 through 316. All data was corrected for daily standard factor and instrument background.

The data from each sample was processed through the computer program TPBBI which is a modification of a program to reduce ^{210}Pb-^{210}Bi decay/growth data. The program performs a linear least squares fit of the counting data, resolving an initial count rate at the separation time, which is due to ^{90}Sr only, and an equilibrium count rate, which is due to a combination of the 90Sr plus the equilibrium ^{90}Y component. The output of the program is shown in Appendix A.

Tables 1, 2 and 3 show the summary of the counting data and the calculations of efficiencies and RCE (relative counting efficiency) values. The first five columns show the sample I.D., sample weight in mg, sample thickness in mg/cm$_2$ (assuming 3.3 cm^2 area), the Sr-Y separation time, and the gravimetric chemical yield. The next three columns are the computed Sr count rate at the separation time, the total equilibrium cpm and the net ^{90}Y cpm at separation time (computed as total equilibrium cpm minus the ^{90}Sr cpm at the separation time). The ^{90} Sr dpm at the separation time was calculated by decaying the certified activity from the reference time of the standard to the separation time with the ^{90}Sr half life. These values are shown in the next column headed ^{90} Sr Dpm @ SepTme". The ^{90}Sr and ^{90} Y efficiencies are calculated as the respective count rates at separation time divided by the known activities at separation time and are shown in the next two columns. The 12th column is the ratio of the ^{90}Y to ^{90}Sr efficiencies.

The ^{90}Sr efficiencies are graphically represented in Figures 1, 2 and 3 while the ^{90} Y/^{90} Sr efficiency ratios are plotted as a function of sample weight in Figures 4, 5 and 6. Smooth curves were drawn through the data points as shown and are defined by the data in Tables 4, 5 and 6. To calculate the standard efficiency at 6.0 mg/cm^2, the tabular data was interpolated between the 5.30 mg/cm^2 and the 6.06 mg/cm^2 values for the LBG system and between 4.55 mg/cm^2 and 6.06 mg/cm^2 for the MEW and GRB apparatus. The resulting ^{90}Sr efficiencies were 37.06% for the MEW counter, 36.52% for LBG detectors and 37.34% for the GRB system.

The compound data points for the RCE values in Tables 1, 2 and 3 were then derived by dividing the efficiency values by the standard efficiencies and are shown in columns 13 and 14. This RCE data was plotted as a function of sample thickness in Figures 7, 8 and 9. The smooth curves through these plots are defined in Tables 4, 5 and 6. A lookup table for ^{90}Sr RCE values is shown in Tables 7, 8 and 9.

5.0 Comparison to Previous Calibration

This was the initial Sr90 calibration for the LB4100 counters.

^{90}Sr efficiency - A calibration curve for ^{90}Sr was last produced in August of 1991. That testing was performed for LBG counters only. The standard efficiency for ^{90}Sr at 6.0 mg/cm^2 for LBG detectors was computed to be 39.13% in 1991. The new standard efficiency of 36.52% signifies a decrease of 6.7%. This downward shift in comparison with the previous calibration is approximately the same for all weights between 0 and 60 mg. This change is within the acceptance guidelines defined in RCP-00.

^{90}Y/^{90}Sr Efficiency ratio - The new ^{90}Y/^{90}Sr Efficiency ratio tended to run between 5 and 7 percent higher than the 1991 figures for the LBG detectors. This trend is true for all weights up to 60 mg with the exception of the region between 5 and 15 mg where the current results were equal to or 5 to 7 percent less than those of the previous calibration. The gap also substantially widened below 3.3 mg. This point represents a recovery of approximately 10% chemical yield based on a typical Sr carrier addition of 34 mg and the region below this point is out of the useful range of analysis. The new data is therefore in good agreement with the old data over the useful range.

6.0 Summary of Results

For ^{90}Sr mounted as $SrCO_3$ on a 1" nylon planchet, the following calibration results were obtained for the GRB, LBG and MEW beta counters:

1. The standard efficiencies are determined to be 37.06% for the MEW, 36.52% for the LBG counters and 37.34% for the GRB systems. The P-Factors are determined to be 2.698 for the MEW, 2.738 for the LBG and 2.678 for the GRB detectors.

2. A new relative counting efficiency curve has been generated.

3. New curves defining the ^{90}Y/^{90}Sr counting efficiency ratio for each system have been generated. The LBG data is in good agreement with the prior results.

4. The ^{90}Sr counting efficiency as a function of sample weight is nominally 5% lower that the data from the 1991 calibration.

Note: Between the dates 9/5/95 and 1/22/96, a value for the Sr90 efficiency for LBG was used as 37.04% (P-factor=2.700). On 1/22/96, a re-evaluation of the fit of the efficiency curve changed the efficiency by 1.4% to 36.52% (P=2.738). There was no significant impact on previously reported data based on this small change.

Table 1. Counting and Calculation Data - GRB Counters

CAL 1037 Sr90 8/15/95

Sr90 dpm @ Tz	2220
Tz	11-Feb-94
Sr90 Lambda	6.863E-05

Y90 Std Eff @6.0	Sr90 Std Eff @6.0
57.436	37.3398

GRB (counted as samples 301-316)

Sample	Weight	Mg/cm2	SepTme	Yield	Sr CPM@ SepTme	Total CPM@ Equilib	Y CPM@ Equilib	Sr90 Dpm @ SepTme	Sr90 %Eff	Y90 %Eff	Y/Sr Ratio	Y90 RCE	Sr90 RCE
301	1.57	0.48	27-Apr-95	0.7879	713.10	1616.34	903.24	2154.0	42.0	53.2	1.267	0.927	1.125
302	3.63	1.10	27-Apr-95	0.9536	805.97	1867.08	1061.11	2154.0	39.2	51.7	1.317	0.899	1.051
303	6.98	2.12	27-Apr-95	0.9388	824.63	1936.42	1111.79	2154.0	40.8	55.0	1.348	0.957	1.092
304	11.32	3.43	27-Apr-95	1.0233	856.50	2036.20	1179.70	2154.0	38.9	53.5	1.377	0.932	1.041
305	14.28	4.33	27-Apr-95	0.9720	807.61	1937.95	1130.34	2154.0	38.6	54.0	1.400	0.940	1.033
306	17.64	5.35	27-Apr-95	0.9630	767.28	1985.96	1218.68	2154.0	37.0	58.8	1.588	1.023	0.991
307	21.03	6.37	27-Apr-95	0.9582	769.80	1910.27	1140.47	2154.0	37.3	55.3	1.482	0.962	0.999
308	24.24	7.35	27-Apr-95	0.9478	739.69	1936.55	1196.86	2154.0	36.2	58.6	1.618	1.021	0.970
309	27.41	8.31	27-Apr-95	0.9386	738.57	1895.57	1157.00	2154.0	36.5	57.2	1.567	0.996	0.978
310	34.06	10.32	27-Apr-95	0.9342	700.68	1876.04	1175.36	2154.0	34.8	58.4	1.677	1.017	0.933
311	37.86	11.47	27-Apr-95	0.9445	686.31	1880.22	1193.91	2154.0	33.7	58.7	1.740	1.022	0.903
312	38.42	11.64	27-Apr-95	0.8789	670.85	1761.92	1091.07	2154.0	35.4	57.6	1.626	1.003	0.949
313	45.48	13.78	27-Apr-95	0.8923	572.66	1711.65	1138.99	2154.0	29.8	59.3	1.989	1.032	0.798
314	52.97	16.05	27-Apr-95	0.9097	619.78	1730.33	1110.55	2154.0	31.6	56.7	1.792	0.987	0.847
315	50.00	15.15	27-Apr-95	0.7636	562.70	1455.62	892.92	2154.0	34.2	54.3	1.587	0.945	0.916
316	50.44	15.28	27-Apr-95	0.6934	477.84	1303.78	825.94	2154.0	32.0	55.3	1.728	0.963	0.857

Table 2. Counting and Calculation Data - LBG Counters

CAL 1037 Sr90 8/1/95

		Y90 Std Eff @6.0	Sr90 Std Eff @6.0
Sr90 dpm @ Tz	2220		
Tz	11-Feb-94		
Sr90 Lambda	6.863E-05		
		56.15	36.52

LBG (counted as samples 201-216)

Sample	Weight	Mg/cm2	SepTme	Yield	Sr CPM@ SepTme	Total CPM@ Equilib	Y CPM@ Equilib	Sr90 Dpm @ SepTme	Sr90 %Eff	Y90 %Eff	Y/Sr Ratio	Y90 RCE	Sr90 RCE
201	1.57	0.48	27-Apr-95	0.7879	687.28	1556.81	869.53	2154.0	40.5	51.2	1.265	0.912	1.109
202	3.63	1.10	27-Apr-95	0.9536	796.81	1781.62	984.81	2154.0	38.8	47.9	1.236	0.854	1.062
203	6.98	2.12	27-Apr-95	0.9388	802.04	1839.63	1037.59	2154.0	39.7	51.3	1.294	0.914	1.086
204	11.32	3.43	27-Apr-95	1.0233	805.51	1938.24	1132.73	2154.0	36.5	51.4	1.406	0.915	1.001
205	14.28	4.33	27-Apr-95	0.972	723.33	1878.05	1154.72	2154.0	34.5	55.2	1.596	0.982	0.946
206	17.64	5.35	27-Apr-95	0.963	737.43	1930.42	1192.99	2154.0	35.6	57.5	1.618	1.024	0.973
207	21.03	6.37	27-Apr-95	0.9582	731.63	1865.03	1133.40	2154.0	35.4	54.9	1.549	0.978	0.971
208	24.24	7.35	27-Apr-95	0.9478	746.63	1858.56	1111.93	2154.0	36.6	54.5	1.489	0.970	1.001
209	27.41	8.31	27-Apr-95	0.9386	678.91	1824.40	1145.49	2154.0	33.6	56.7	1.687	1.009	0.920
210	34.06	10.32	27-Apr-95	0.9342	639.39	1813.75	1174.36	2154.0	31.8	58.4	1.837	1.039	0.870
211	37.86	11.47	27-Apr-95	0.9445	691.39	1840.50	1149.11	2154.0	34.0	56.5	1.662	1.006	0.931
212	38.42	11.64	27-Apr-95	0.8789	662.89	1715.75	1052.86	2154.0	35.0	55.6	1.588	0.990	0.959
213	45.48	13.78	27-Apr-95	0.8923	566.70	1670.30	1103.60	2154.0	29.5	57.4	1.947	1.023	0.807
214	52.97	16.05	27-Apr-95	0.9097	607.17	1679.40	1072.23	2154.0	31.0	54.7	1.766	0.975	0.848
215	50.00	15.15	27-Apr-95	0.7636	545.14	1424.99	879.85	2154.0	33.1	53.5	1.614	0.953	0.908
216	50.44	15.28	27-Apr-95	0.6934	439.74	1275.42	835.68	2154.0	29.4	56.0	1.900	0.996	0.806

Table 3. Counting and Calculation Data - MEW Counter

CAL 1037 Sr90 8/15/95

Sr90 dpm @ Tz 2220
Tz 11-Feb-94
Sr90 Lambda 6.863E-05

Y90 Std Eff @6.0	Sr90 Std Eff @6.0
54.304	37.0557

MEW (counted as samples 101-116)

Sample	Weight	Mg/cm2	SepTme	Yield	Sr CPM@ SepTme	Total CPM@ Equilib	Y CPM@ Equilib	Sr90 Dpm @ SepTme	Sr90 %Eff	Y90 %Eff	Y/Sr Ratio	Y90 RCE	Sr90 RCE
101	1.57	0.48	27-Apr-95	0.7879	676.68	1605.54	928.86	2154.0	39.9	54.7	1.373	1.008	1.076
102	3.63	1.10	27-Apr-95	0.9536	798.22	1848.67	1050.45	2154.0	38.9	51.1	1.316	0.942	1.049
103	6.98	2.12	27-Apr-95	0.9388	776.24	1890.29	1114.05	2154.0	38.4	55.1	1.435	1.015	1.036
104	11.32	3.43	27-Apr-95	1.0233	887.02	1990.44	1103.42	2154.0	40.2	50.1	1.244	0.922	1.086
105	14.28	4.33	27-Apr-95	0.9720	792.02	1895.51	1103.49	2154.0	37.8	52.7	1.393	0.971	1.021
106	17.64	5.35	27-Apr-95	0.9630	774.12	1926.03	1151.91	2154.0	37.3	55.5	1.488	1.023	1.007
107	21.03	6.37	27-Apr-95	0.9582	774.91	1882.74	1107.83	2154.0	37.5	53.7	1.430	0.988	1.013
108	24.24	7.35	27-Apr-95	0.9478	740.65	1899.56	1158.91	2154.0	36.3	56.8	1.565	1.045	0.979
109	27.41	8.31	27-Apr-95	0.9386	680.34	1856.79	1176.45	2154.0	33.7	58.2	1.729	1.072	0.908
110	34.06	10.32	27-Apr-95	0.9342	661.42	1828.32	1166.90	2154.0	32.9	58.0	1.764	1.068	0.887
111	37.86	11.47	27-Apr-95	0.9445	640.79	1832.15	1191.36	2154.0	31.5	58.6	1.859	1.078	0.850
112	38.42	11.64	27-Apr-95	0.8789	601.63	1718.02	1116.39	2154.0	31.8	59.0	1.856	1.086	0.858
113	45.48	13.78	27-Apr-95	0.8923	610.63	1656.83	1046.20	2154.0	31.8	54.4	1.713	1.002	0.857
114	52.97	16.05	27-Apr-95	0.9097	569.82	1684.50	1114.68	2154.0	29.1	56.9	1.956	1.048	0.785
115	50.00	15.15	27-Apr-95	0.7636	528.80	1422.54	893.74	2154.0	32.2	54.3	1.690	1.001	0.868
116	50.44	15.28	27-Apr-95	0.6934	448.45	1270.59	822.14	2154.0	30.0	55.0	1.833	1.014	0.810

Table 4. ^{90}Sr and ^{90}Y Spline Data For Smooth Curve Definition - GRB Counters

mg/cm2	Y90 %Eff	Sr90 %Eff	Y90/ Sr90 Ratio	Y90 RCE	Sr90 RCE
0.30	51.7	41.20	1.255	0.9001	1.1034
0.61	52.0	41.00	1.268	0.9054	1.0980
0.91	52.3	40.80	1.282	0.9106	1.0927
1.21	52.6	40.60	1.296	0.9158	1.0873
1.52	53.0	40.40	1.312	0.9228	1.0820
1.82	53.3	40.20	1.326	0.9280	1.0766
2.12	53.6	40.00	1.340	0.9332	1.0712
2.42	54.0	39.80	1.357	0.9402	1.0659
2.73	54.4	39.60	1.374	0.9471	1.0605
3.03	54.7	39.40	1.388	0.9524	1.0552
3.33	55.1	39.20	1.406	0.9593	1.0498
3.64	55.4	39.00	1.421	0.9646	1.0445
3.94	55.8	38.80	1.438	0.9715	1.0391
4.24	56.2	38.60	1.456	0.9785	1.0337
4.55	56.5	38.30	1.475	0.9837	1.0257
6.06	57.4	37.30	1.539	0.9994	0.9989
9.09	58.1	35.50	1.637	1.0116	0.9507
12.12	57.5	33.30	1.727	1.0011	0.8918
15.15	56.8	31.30	1.815	0.9889	0.8382
18.18	56.0	29.40	1.905	0.9750	0.7874
21.21	55.2	27.50	2.007	0.9611	0.7365

Table 5. ^{90}Sr and ^{90}Y Spline Data For Smooth Curve Definition - LBG counters

mg/cm2	Y90 %Eff	Sr90 %Eff	Y90/ Sr90 Ratio	Y90 RCE	Sr90 RCE
0.76	48.0	39.73	1.208	0.8549	1.0878
1.52	49.6	39.26	1.263	0.8833	1.0751
2.27	51.4	38.80	1.325	0.9154	1.0625
3.03	52.8	38.34	1.377	0.9403	1.0498
3.79	54.0	37.88	1.426	0.9617	1.0371
4.55	54.8	37.41	1.465	0.9760	1.0244
5.30	55.6	36.95	1.505	0.9902	1.0118
6.00	56.1	36.52	1.536	0.9991	1.0001
6.06	56.2	36.49	1.540	1.0009	0.9991
6.82	56.8	36.02	1.577	1.0116	0.9864
8.33	57.2	35.10	1.630	1.0187	0.9610
9.09	57.2	34.63	1.652	1.0187	0.9484
9.85	57.1	34.17	1.671	1.0169	0.9357
10.61	57.0	33.71	1.691	1.0151	0.9230
11.36	56.7	33.25	1.706	1.0098	0.9103
12.12	56.5	32.78	1.723	1.0062	0.8977
12.88	56.3	32.32	1.742	1.0027	0.8850
13.64	56.0	31.86	1.758	0.9973	0.8723
14.39	55.7	31.39	1.774	0.9920	0.8596
15.15	55.4	30.93	1.791	0.9866	0.8469
15.91	55.2	30.47	1.812	0.9831	0.8343
16.67	55.0	30.00	1.833	0.9795	0.8216
17.42	54.8	29.54	1.855	0.9760	0.8089

Note: The Sr90 RCE table defines a straight line and is actually defined in the ASCII file used for calculations as:

mg/cm^2	Sr90 RCE
0.00	1.1000
17.42	0.8089

Table 6. ^{90}Sr and ^{90}Y Spline Data For Smooth Curve Definition - MEW Counter

mg/cm2	Y90 %Eff	Sr90 %Eff	Y90/ Sr90 Ratio	Y90 RCE	Sr90 RCE
0.30	46.0	38.00	1.211	0.8876	1.0255
0.61	50.0	38.30	1.305	0.9023	1.0336
0.91	52.0	38.60	1.347	0.9171	1.0417
1.21	52.8	38.90	1.357	0.9318	1.0498
1.52	53.1	39.10	1.358	0.9465	1.0552
1.82	53.3	39.20	1.360	0.9613	1.0579
2.12	53.4	39.30	1.359	0.9760	1.0606
2.42	53.6	39.40	1.360	0.9907	1.0633
2.73	53.7	39.50	1.359	1.0055	1.0660
3.03	53.8	39.50	1.362	1.0202	1.0660
3.33	53.9	39.45	1.366	1.0239	1.0646
3.64	54.0	39.30	1.374	1.0275	1.0606
3.94	54.1	39.10	1.384	1.0349	1.0552
4.24	54.2	38.80	1.397	1.0368	1.0471
4.55	54.3	38.40	1.414	1.0404	1.0363
6.06	54.4	37.00	1.470	1.0312	0.9985
9.09	58.8	34.50	1.704	1.0515	0.9310
12.12	57.2	32.10	1.782	1.0533	0.8663
15.15	55.4	29.80	1.859	1.0496	0.8042
18.18	54.2	27.90	1.943	1.0460	0.7529
21.21	53.7	25.80	2.081	1.0202	0.6962
24.24	53.3	23.60	2.258	0.9815	0.6369
27.27	52.9	21.40	2.472	0.9741	0.5775

Note - This page is revised from the original calibration document dated August, 1995. See Revision Note for details.

Table 7. Lookup Table for New ^{90}Sr RCE Values - GRB counters

Planchet area = 3.30 sq cm
T = Sample thickness in mg/sq cm

T	PPT	T	PPT	T	PPT	T	PPT
0.00	1.1078	6.86	0.9854	13.71	0.8631	20.57	0.7468
0.15	1.1054	7.01	0.9830	13.86	0.8605	20.72	0.7442
0.30	1.1029	7.16	0.9806	14.02	0.8578	20.87	0.7417
0.46	1.1005	7.31	0.9781	14.17	0.8551	21.03	0.7391
0.61	1.0980	7.47	0.9757	14.32	0.8525	21.18	0.7365
0.76	1.0950	7.62	0.9733	14.47	0.8498	21.33	0.7340
0.91	1.0919	7.77	0.9709	14.63	0.8472	21.48	0.7314
1.07	1.0894	7.92	0.9685	14.78	0.8445	21.64	0.7288
1.22	1.0869	8.08	0.9661	14.93	0.8418	21.79	0.7263
1.37	1.0844	8.23	0.9637	15.08	0.8392	21.94	0.7237
1.52	1.0819	8.38	0.9612	15.24	0.8365	22.09	0.7211
1.68	1.0789	8.53	0.9588	15.39	0.8340	22.24	0.7186
1.83	1.0759	8.68	0.9564	15.54	0.8314	22.40	0.7160
1.98	1.0733	8.84	0.9540	15.69	0.8289	22.55	0.7135
2.13	1.0707	8.99	0.9516	15.85	0.8263	22.70	0.7109
2.29	1.0677	9.14	0.9490	16.00	0.8237	22.85	0.7083
2.44	1.0647	9.29	0.9460	16.15	0.8212	23.01	0.7058
2.59	1.0623	9.45	0.9431	16.30	0.8186	23.16	0.7032
2.74	1.0598	9.60	0.9401	16.46	0.8160	23.31	0.7006
2.89	1.0573	9.75	0.9371	16.61	0.8135	23.46	0.6981
3.05	1.0547	9.90	0.9342	16.76	0.8109	23.62	0.6955
3.20	1.0516	10.06	0.9312	16.91	0.8083	23.77	0.6929
3.35	1.0486	10.21	0.9282	17.06	0.8058	23.92	0.6904
3.50	1.0462	10.36	0.9253	17.22	0.8032	24.07	0.6878
3.66	1.0437	10.51	0.9223	17.37	0.8006	24.23	0.6852
3.81	1.0412	10.67	0.9193	17.52	0.7981	24.38	0.6827
3.96	1.0386	10.82	0.9164	17.67	0.7955	24.53	0.6801
4.11	1.0355	10.97	0.9134	17.83	0.7930	24.68	0.6776
4.27	1.0323	11.12	0.9104	17.98	0.7904	24.83	0.6750
4.42	1.0284	11.27	0.9075	18.13	0.7878	24.99	0.6724
4.57	1.0246	11.43	0.9045	18.28	0.7853	25.14	0.6699
4.72	1.0219	11.58	0.9015	18.44	0.7827	25.29	0.6673
4.88	1.0192	11.73	0.8986	18.59	0.7801	25.44	0.6647
5.03	1.0165	11.88	0.8956	18.74	0.7776	25.60	0.6622
5.18	1.0137	12.04	0.8926	18.89	0.7750	25.75	0.6596
5.33	1.0110	12.19	0.8898	19.05	0.7724	25.90	0.6570
5.49	1.0083	12.34	0.8871	19.20	0.7699	26.05	0.6545
5.64	1.0056	12.49	0.8845	19.35	0.7673	26.21	0.6519
5.79	1.0028	12.65	0.8818	19.50	0.7647	26.36	0.6493
5.94	1.0001	12.80	0.8791	19.65	0.7622	26.51	0.6468
6.09	0.9975	12.95	0.8765	19.81	0.7596	26.66	0.6442
6.25	0.9950	13.10	0.8738	19.96	0.7571	26.82	0.6416
6.40	0.9926	13.26	0.8711	20.11	0.7545	26.97	0.6391
6.55	0.9902	13.41	0.8685	20.26	0.7519	27.12	0.6365
6.70	0.9878	13.56	0.8658	20.42	0.7494	27.27	0.6340

Table 8. Lookup Table for New ^{90}Sr RCE Values - LBG counters

Planchet area = 3.30 sq cm
T = Sample thickness in mg/sq cm

T	PPT	T	PPT	T	PPT	T	PPT
0.00	1.1000	4.57	1.0234	9.14	0.9468	13.71	0.8701
0.10	1.0983	4.67	1.0217	9.24	0.9451	13.81	0.8684
0.20	1.0966	4.77	1.0200	9.34	0.9434	13.92	0.8667
0.30	1.0949	4.88	1.0183	9.45	0.9417	14.02	0.8650
0.41	1.0932	4.98	1.0166	9.55	0.9400	14.12	0.8633
0.51	1.0915	5.08	1.0149	9.65	0.9383	14.22	0.8616
0.61	1.0898	5.18	1.0132	9.75	0.9365	14.32	0.8599
0.71	1.0881	5.28	1.0115	9.85	0.9348	14.42	0.8582
0.81	1.0864	5.38	1.0098	9.95	0.9331	14.53	0.8565
0.91	1.0847	5.49	1.0081	10.06	0.9314	14.63	0.8548
1.02	1.0830	5.59	1.0064	10.16	0.9297	14.73	0.8531
1.12	1.0813	5.69	1.0047	10.26	0.9280	14.83	0.8514
1.22	1.0796	5.79	1.0030	10.36	0.9263	14.93	0.8497
1.32	1.0779	5.89	1.0012	10.46	0.9246	15.03	0.8480
1.42	1.0762	5.99	0.9995	10.56	0.9229	15.13	0.8463
1.52	1.0745	6.09	0.9978	10.67	0.9212	15.24	0.8446
1.63	1.0728	6.20	0.9961	10.77	0.9195	15.34	0.8429
1.73	1.0711	6.30	0.9944	10.87	0.9178	15.44	0.8412
1.83	1.0694	6.40	0.9927	10.97	0.9161	15.54	0.8395
1.93	1.0677	6.50	0.9910	11.07	0.9144	15.64	0.8378
2.03	1.0659	6.60	0.9893	11.17	0.9127	15.74	0.8361
2.13	1.0642	6.70	0.9876	11.27	0.9110	15.85	0.8344
2.23	1.0625	6.81	0.9859	11.38	0.9093	15.95	0.8327
2.34	1.0608	6.91	0.9842	11.48	0.9076	16.05	0.8310
2.44	1.0591	7.01	0.9825	11.58	0.9059	16.15	0.8293
2.54	1.0574	7.11	0.9808	11.68	0.9042	16.25	0.8276
2.64	1.0557	7.21	0.9791	11.78	0.9025	16.35	0.8259
2.74	1.0540	7.31	0.9774	11.88	0.9008	16.46	0.8242
2.84	1.0523	7.41	0.9757	11.99	0.8991	16.56	0.8225
2.95	1.0506	7.52	0.9740	12.09	0.8974	16.66	0.8208
3.05	1.0489	7.62	0.9723	12.19	0.8957	16.76	0.8191
3.15	1.0472	7.72	0.9706	12.29	0.8940	16.86	0.8174
3.25	1.0455	7.82	0.9689	12.39	0.8923	16.96	0.8157
3.35	1.0438	7.92	0.9672	12.49	0.8906	17.06	0.8140
3.45	1.0421	8.02	0.9655	12.60	0.8889	17.17	0.8123
3.56	1.0404	8.13	0.9638	12.70	0.8872	17.27	0.8106
3.66	1.0387	8.23	0.9621	12.80	0.8855	17.37	0.8089
3.76	1.0370	8.33	0.9604	12.90	0.8838	17.47	0.8071
3.86	1.0353	8.43	0.9587	13.00	0.8821	17.57	0.8054
3.96	1.0336	8.53	0.9570	13.10	0.8804	17.67	0.8037
4.06	1.0319	8.63	0.9553	13.20	0.8787	17.78	0.8020
4.16	1.0302	8.74	0.9536	13.31	0.8770	17.88	0.8003
4.27	1.0285	8.84	0.9519	13.41	0.8753	17.98	0.7986
4.37	1.0268	8.94	0.9502	13.51	0.8736	18.08	0.7969
4.47	1.0251	9.04	0.9485	13.61	0.8718	18.18	0.7952

Table 9. Lookup Table for New ^{90}Sr RCE Values - MEW counter

Planchet area = 3.30 sq cm
T = Sample thickness in mg/sq cm

T	PPT	T	PPT	T	PPT	T	PPT
0.00	1.0173	6.86	0.9804	13.71	0.8334	20.57	0.7079
0.15	1.0212	7.01	0.9770	13.86	0.8303	20.72	0.7050
0.30	1.0251	7.16	0.9737	14.02	0.8272	20.87	0.7022
0.46	1.0291	7.31	0.9703	14.17	0.8241	21.03	0.6994
0.61	1.0330	7.47	0.9669	14.32	0.8209	21.18	0.6966
0.76	1.0401	7.62	0.9635	14.47	0.8178	21.33	0.6936
0.91	1.0470	7.77	0.9602	14.63	0.8147	21.48	0.6906
1.07	1.0480	7.92	0.9568	14.78	0.8116	21.64	0.6876
1.22	1.0492	8.08	0.9534	14.93	0.8085	21.79	0.6846
1.37	1.0521	8.23	0.9501	15.08	0.8054	21.94	0.6815
1.52	1.0550	8.38	0.9467	15.24	0.8025	22.09	0.6785
1.68	1.0560	8.53	0.9433	15.39	0.7999	22.24	0.6755
1.83	1.0571	8.68	0.9400	15.54	0.7973	22.40	0.6725
1.98	1.0586	8.84	0.9366	15.69	0.7947	22.55	0.6695
2.13	1.0601	8.99	0.9332	15.85	0.7921	22.70	0.6665
2.29	1.0617	9.14	0.9299	16.00	0.7894	22.85	0.6634
2.44	1.0632	9.29	0.9266	16.15	0.7868	23.01	0.6604
2.59	1.0646	9.45	0.9234	16.30	0.7842	23.16	0.6574
2.74	1.0660	9.60	0.9201	16.46	0.7816	23.31	0.6544
2.89	1.0660	9.75	0.9168	16.61	0.7790	23.46	0.6514
3.05	1.0659	9.90	0.9135	16.76	0.7764	23.62	0.6484
3.20	1.0649	10.06	0.9103	16.91	0.7738	23.77	0.6453
3.35	1.0637	10.21	0.9070	17.06	0.7711	23.92	0.6423
3.50	1.0618	10.36	0.9037	17.22	0.7685	24.07	0.6393
3.66	1.0597	10.51	0.9005	17.37	0.7659	24.23	0.6363
3.81	1.0572	10.67	0.8972	17.52	0.7633	24.38	0.6333
3.96	1.0544	10.82	0.8939	17.67	0.7607	24.53	0.6303
4.11	1.0504	10.97	0.8907	17.83	0.7581	24.68	0.6274
4.27	1.0461	11.12	0.8874	17.98	0.7555	24.83	0.6244
4.42	1.0407	11.27	0.8841	18.13	0.7528	24.99	0.6214
4.57	1.0355	11.43	0.8809	18.28	0.7501	25.14	0.6185
4.72	1.0316	11.58	0.8776	18.44	0.7473	25.29	0.6155
4.88	1.0278	11.73	0.8743	18.59	0.7445	25.44	0.6125
5.03	1.0240	11.88	0.8711	18.74	0.7416	25.60	0.6096
5.18	1.0201	12.04	0.8678	18.89	0.7388	25.75	0.6066
5.33	1.0163	12.19	0.8646	19.05	0.7360	25.90	0.6036
5.49	1.0125	12.34	0.8615	19.20	0.7332	26.05	0.6007
5.64	1.0086	12.49	0.8584	19.35	0.7304	26.21	0.5977
5.79	1.0048	12.65	0.8552	19.50	0.7276	26.36	0.5947
5.94	1.0010	12.80	0.8521	19.65	0.7247	26.51	0.5918
6.09	0.9972	12.95	0.8490	19.81	0.7219	26.66	0.5888
6.25	0.9939	13.10	0.8459	19.96	0.7191	26.82	0.5858
6.40	0.9905	13.26	0.8428	20.11	0.7163	26.97	0.5829
6.55	0.9871	13.41	0.8396	20.26	0.7135	27.12	0.5799
6.70	0.9838	13.56	0.8365	20.42	0.7107	27.27	0.5769

Figure 1. ^{90}Sr Efficiency - GRB counters

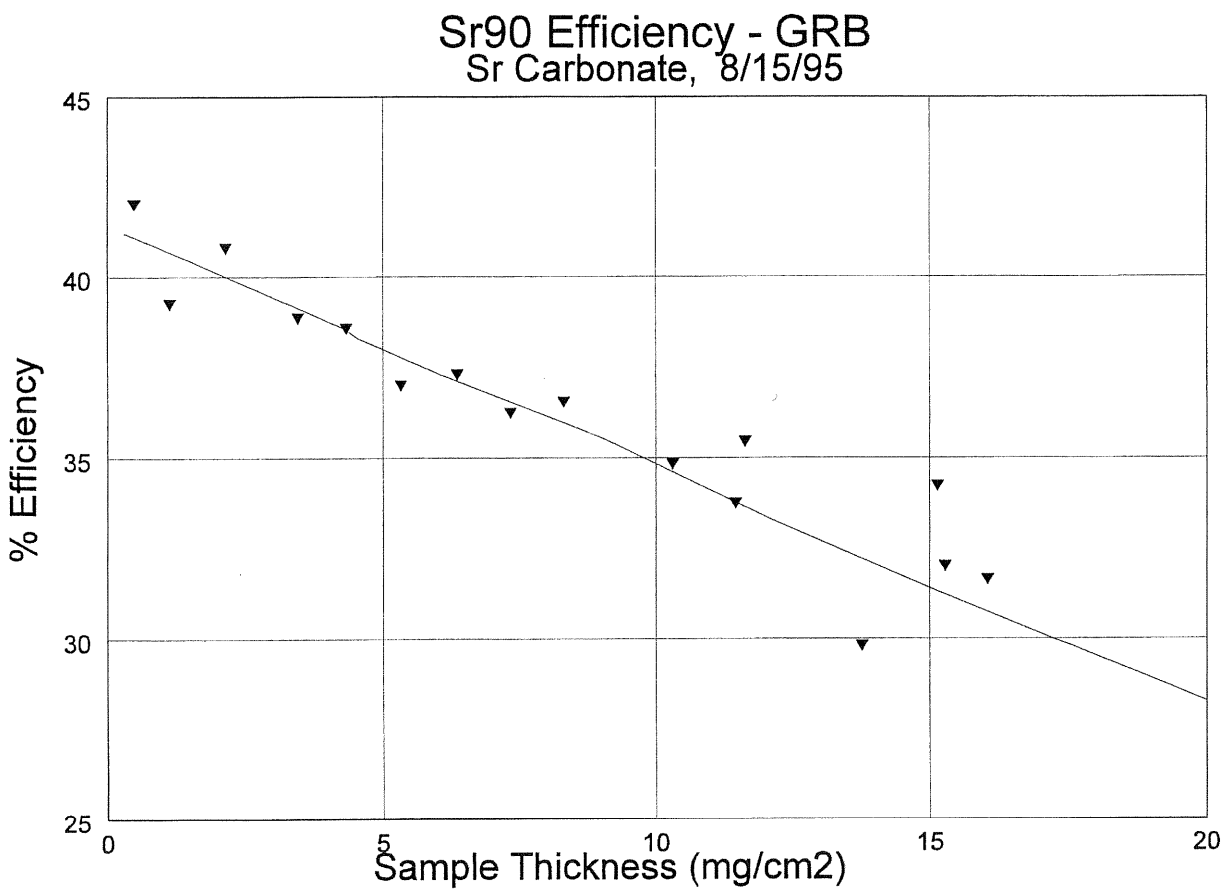


Figure 2. ^{90}Sr Efficiency - LBG counters

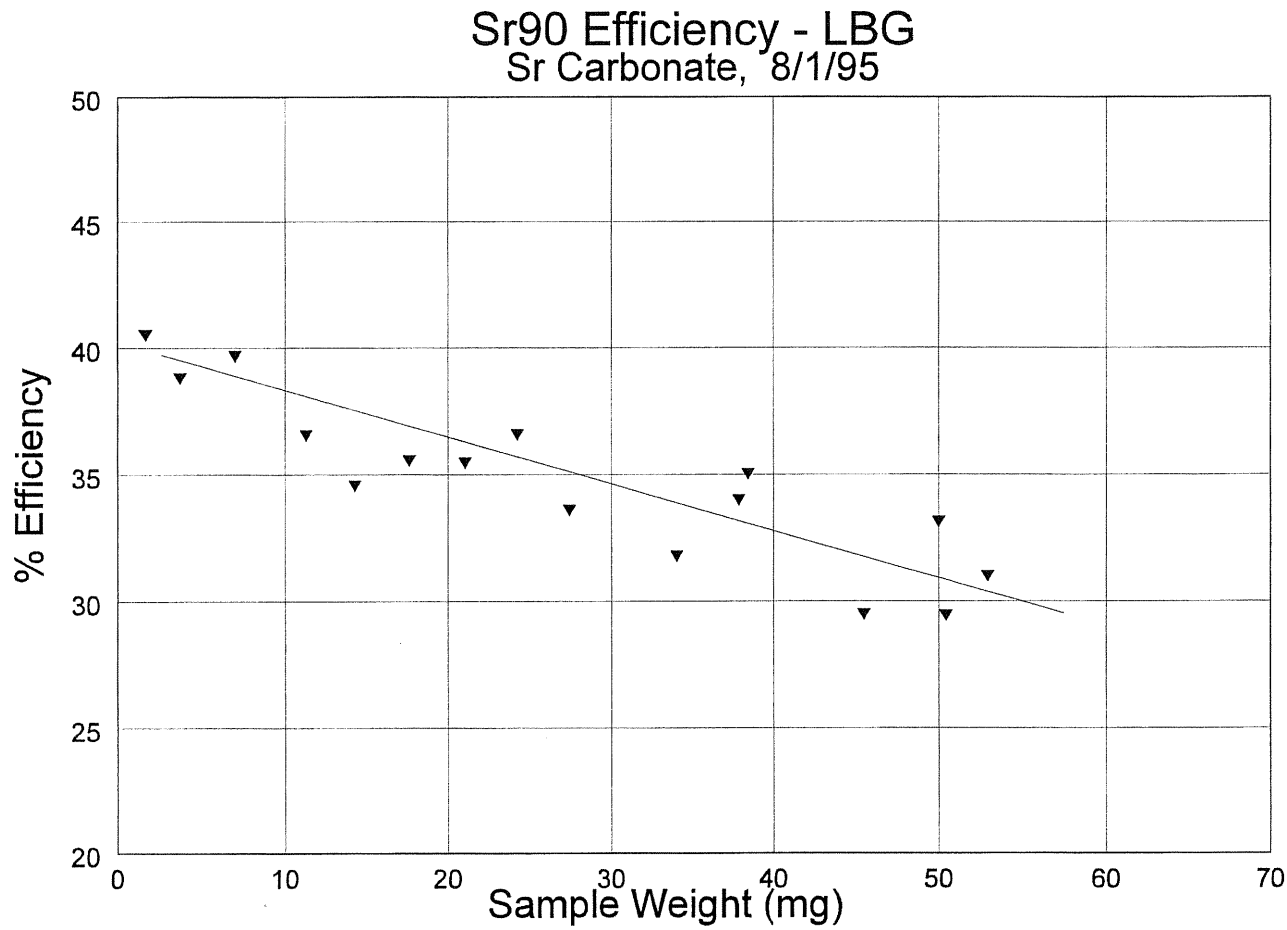


Figure 3. ^{90}Sr Efficiency - MEW counter

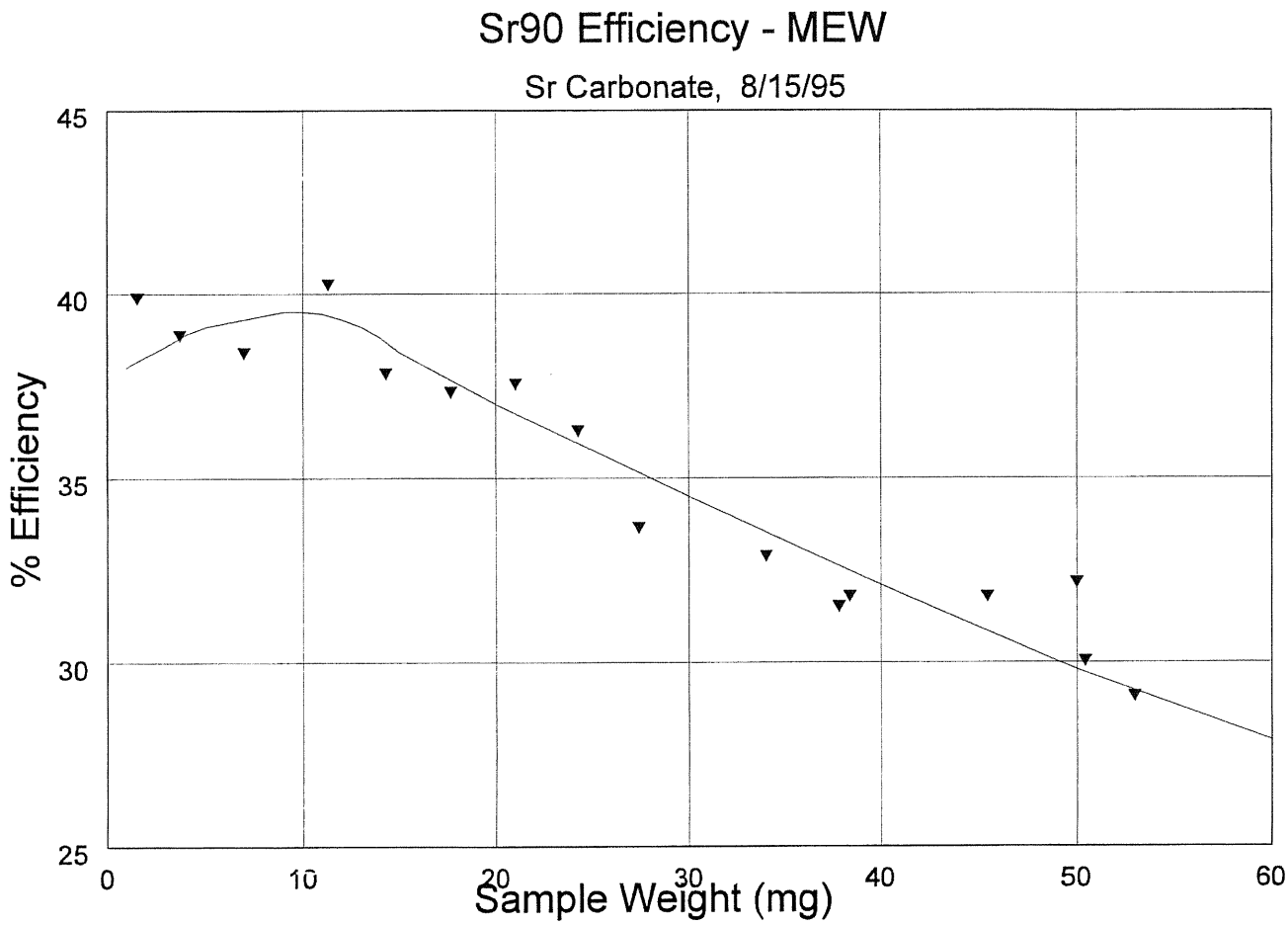


Figure 4. $^{90}Y/^{90}Sr$ Efficiency Ratio in Sr Carbonate - GRB counters

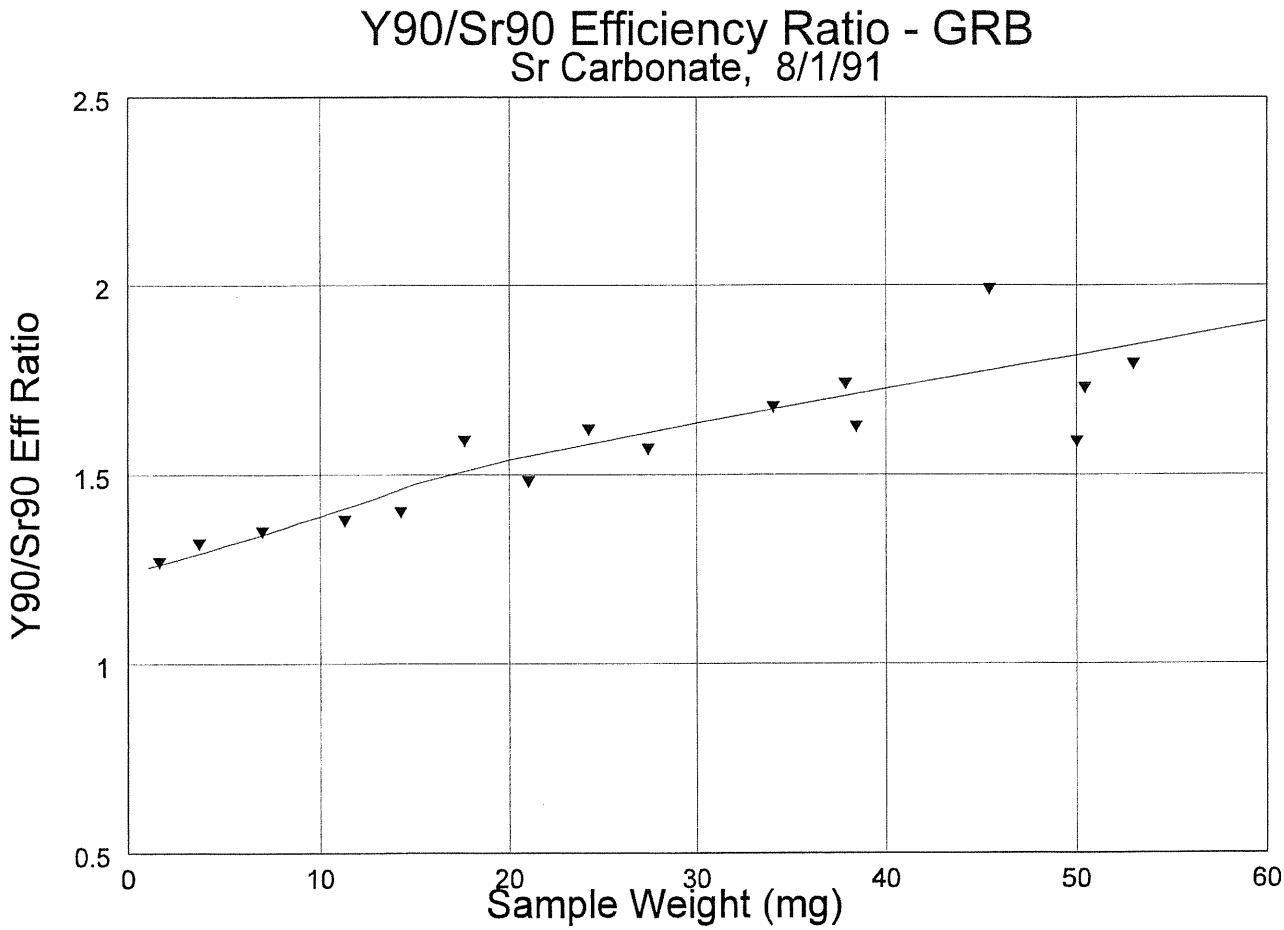


Figure 5. $^{90}Y/^{90}Sr$ Efficiency Ratio in Sr Carbonate - LBG counters

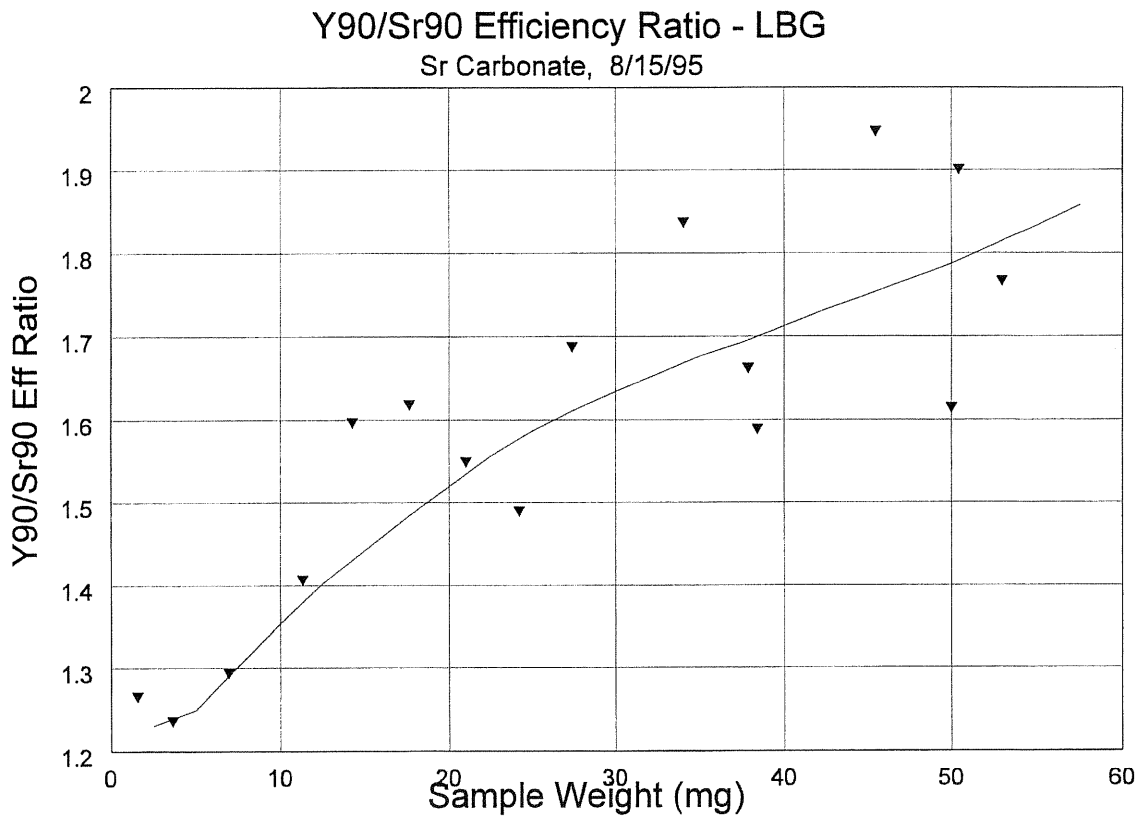


Figure 6. $^{90}Y/^{90}Sr$ Efficiency Ratio in Sr Carbonate - MEW counter

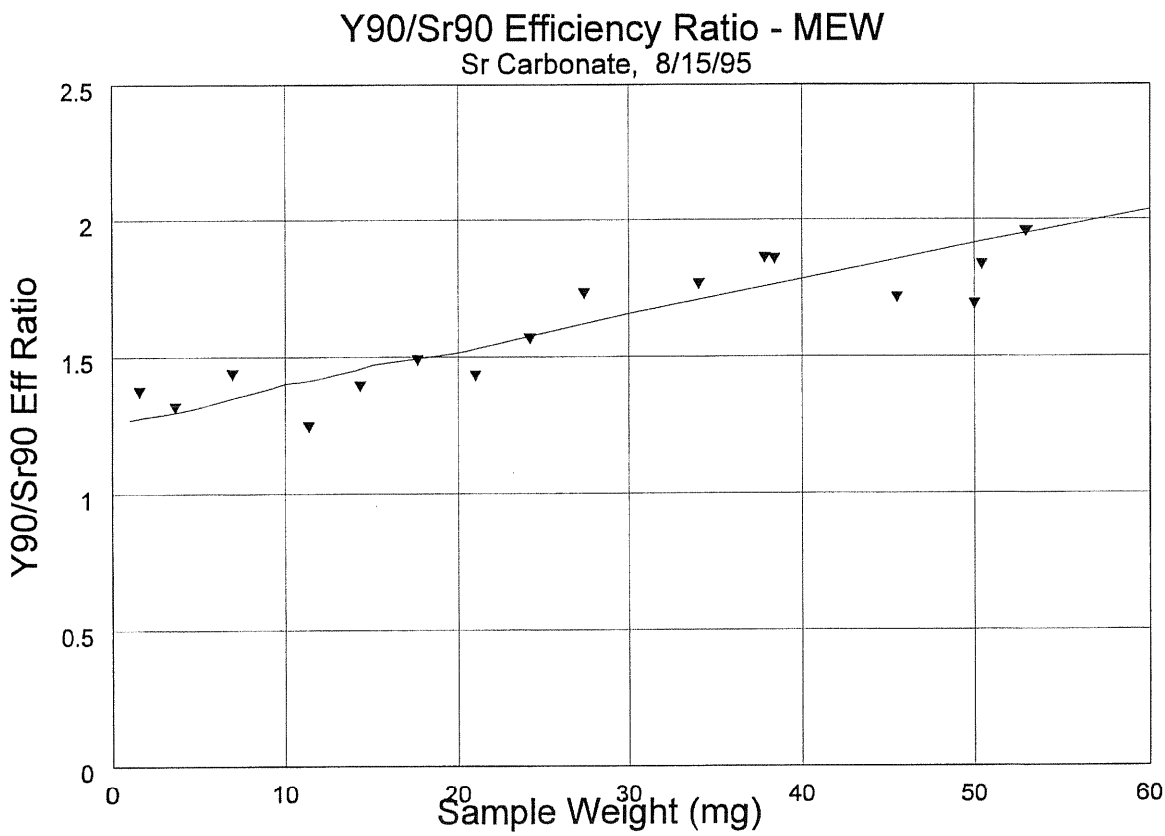


Figure 7. ^{90}Sr Relative Counting Efficiency - GRB counters

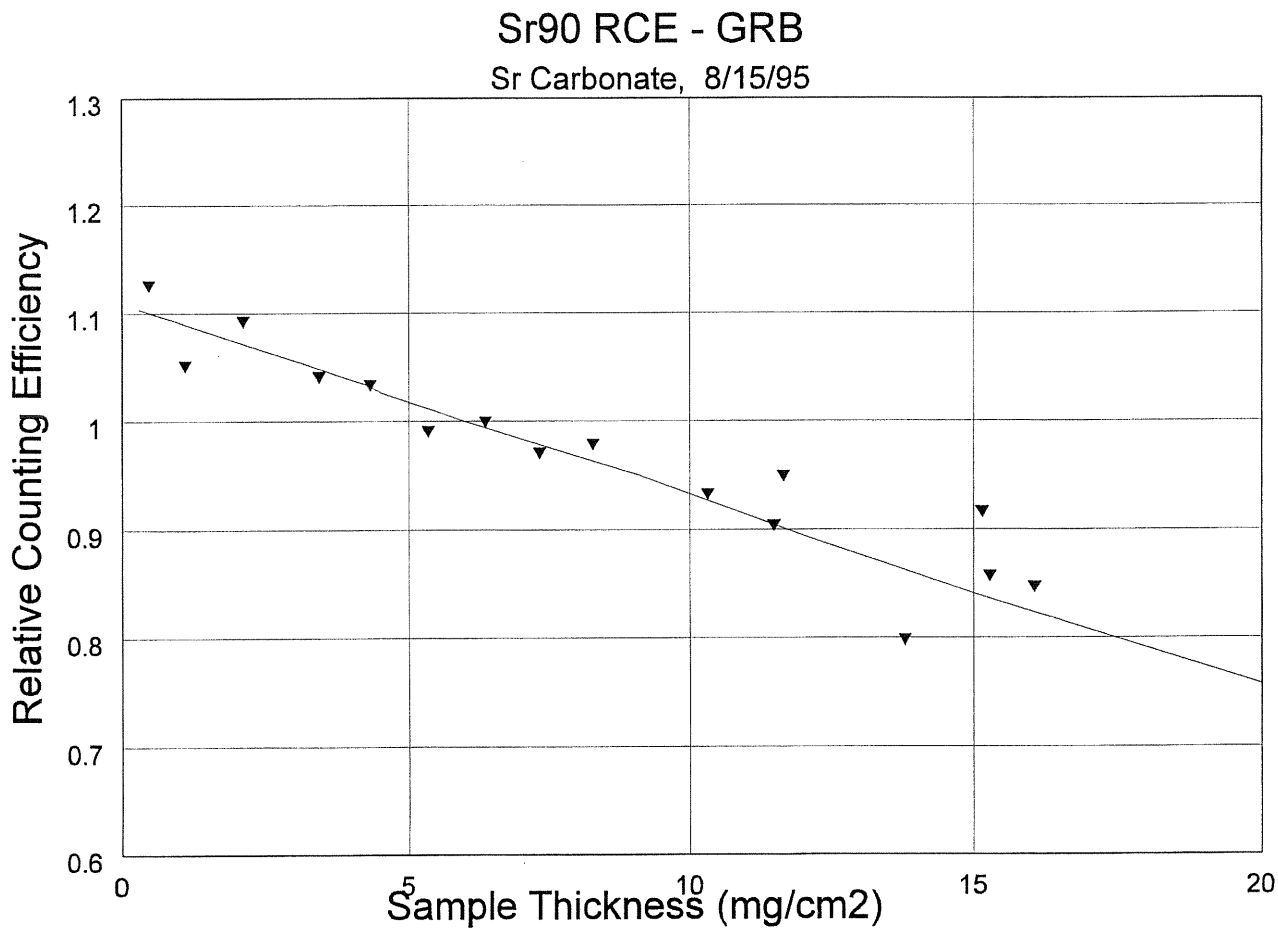


Figure 8. **^{90}Sr Relative Counting Efficiency - LBG counters**

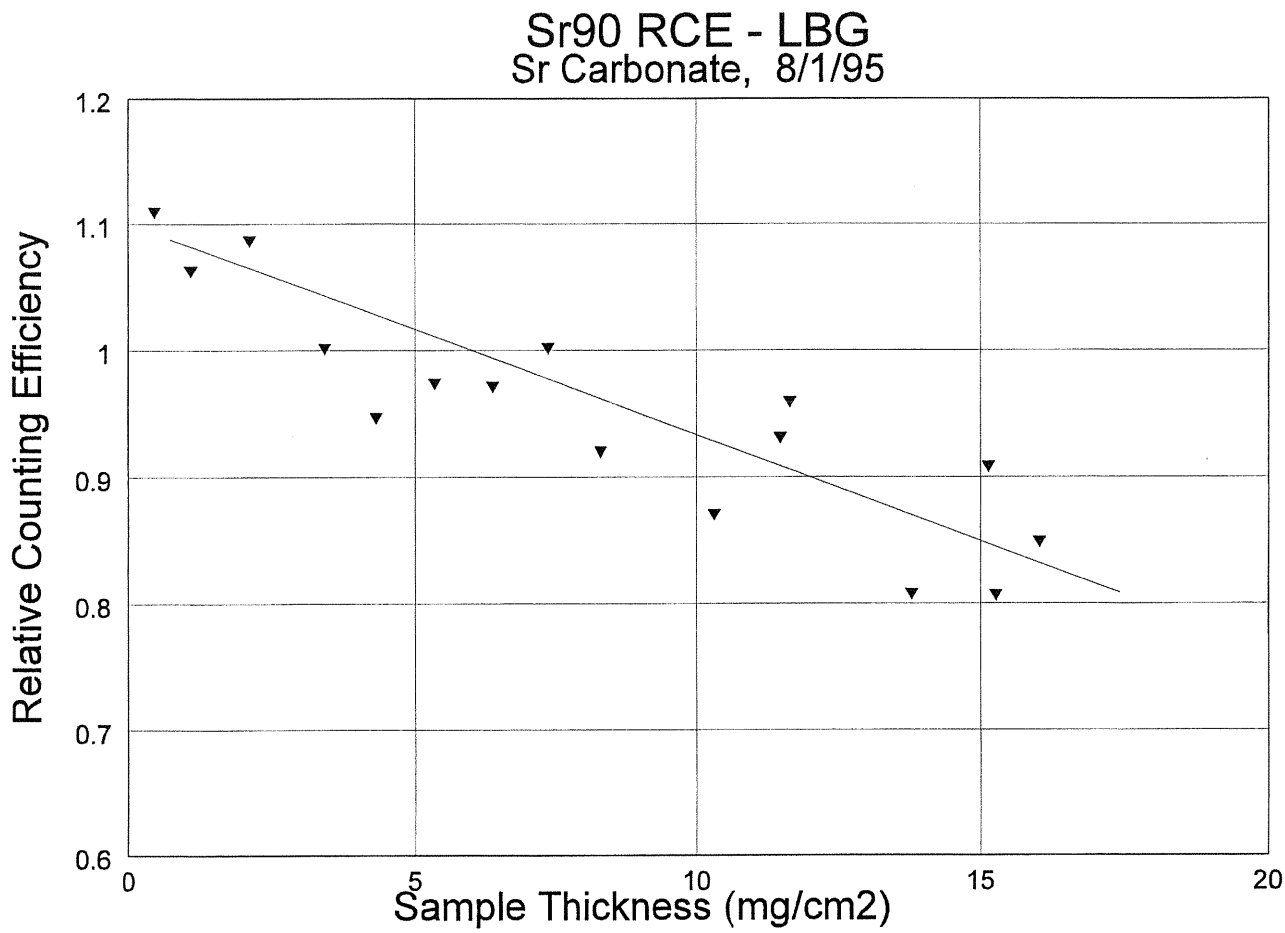
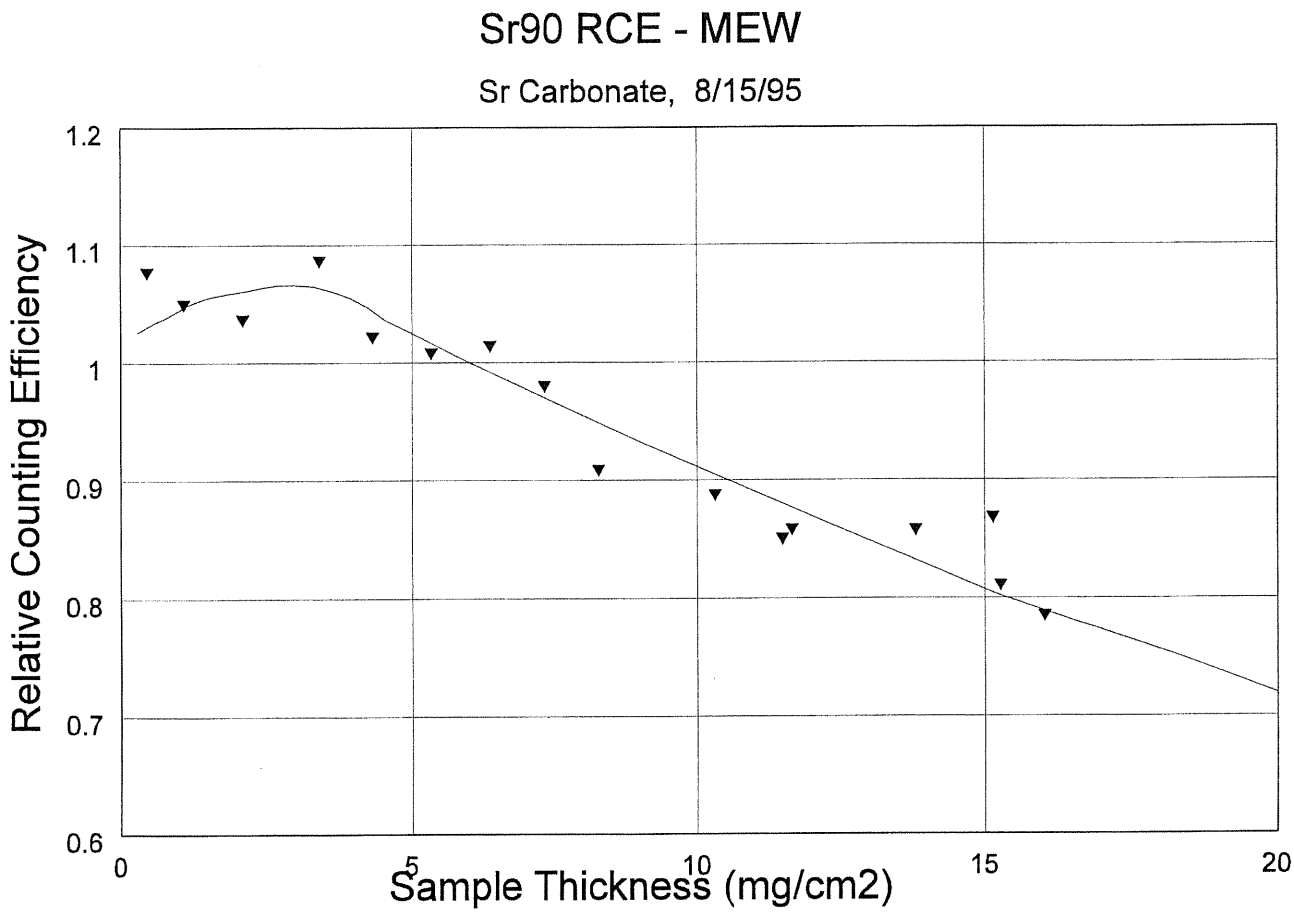


Figure 9. ^{90}Sr Relative Counting Efficiency - MEW counter



Appendix A. Counting/Calculation Data Sheets

26-JUN-95 TMA Corporation 1037-201 Sr
15:52:43 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

OMT LBG 20 min

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.810	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1534.02	2.94 Percent	Corr. coefficient=	0.990
CPM at sep time=	695.55	4.07 Percent	Chi square prob.=	0.000

	CPM	ERROR		
1 Points rejected				
Equilibrium CPM=	1556.81	2.97 Percent	Corr. coefficient=	0.987
CPM at sep time=	687.28 ✓	4.13 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.810	0.755	18006	21.96	15	842.23	843.46	-0.146	0.96	1.0000
124.142	6.087	13786	10.29	16	1386.07	1377.91	0.592	0.83	0.3441
127.096	9.041	16187	11.14	15	1491.61	1473.72	1.214	0.66	0.3096
130.208	12.153	17640	11.51	4	1527.44	1519.77	0.505	0.86	0.2975
131.252	13.197	15949	10.39	4	1529.89	1528.56	0.087	0.98	0.2883
132.226	14.171	17425	11.91	16	1519.54	1534.88	-0.999	0.71	0.3063
133.221	15.166	15810	10.30	4	1534.41	1539.87	-0.354	0.90	0.2864
133.927	15.872	15625	10.53	15	1530.65	1542.70	-0.781	0.78	0.2920
135.741	17.686	22346	16.29	3	1415.22	1548.01	-8.578	0.00	*********

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8655	
PPT. correction	(3)=	1.0561	(recovery = 1.570 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.799322E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.7692E+03	2.7470	4.8601E+03	1.4430E+02	2.97 %

LTV 5.0982E+03

9th point MDA 3.1901E+00

26-JUN-95 TMA Corporation 1037-202 Sr
15:52:57 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.287	95

First fit	CPM	ERROR	
Equilibrium CPM=	1754.49	2.19 Percent	Corr. coefficient= 0.977
CPM at sep time=	804.47	2.39 Percent	Chi square prob.= 0.000

1 Points rejected	CPM	ERROR	
Equilibrium CPM=	1781.62	1.99 Percent	Corr. coefficient= 0.970
CPM at sep time=	796.81	2.43 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.287	0.232	11498	13.70	4	869.75	855.52	1.663	0.57	1.0000
118.810	0.755	20427	21.97	16	961.74	973.69	-1.227	0.64	0.9601
119.804	1.749	19115	17.12	15	1148.23	1157.17	-0.772	0.77	0.6602
123.022	4.967	19430	13.37	4	1509.36	1510.70	-0.089	0.97	0.3857
125.234	7.179	0	24.28	4	1626.35	1629.20	-0.175	0.94	0.3867
126.224	8.169	17685	10.93	15	1662.65	1663.60	-0.057	0.98	0.3084
127.096	9.041	18223	11.14	16	1694.14	1687.51	0.393	0.89	0.3006
131.252	13.197	17661	10.39	15	1746.72	1749.62	-0.166	0.95	0.2793
132.274	14.219	17928	10.71	16	1738.66	1757.08	-1.048	0.70	0.2846
133.252	15.197	19268	12.59	3	1577.43	1762.58	-10.505	0.00	********
133.935	15.880	17313	10.20	16	1766.37	1765.67	0.039	0.99	0.2735
135.741	17.686	29295	16.30	4	1802.08	1771.65	1.718	0.51	0.2937

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	1.0006	
PPT. correction	(3)=	1.0498	(recovery = 3.630 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 1.011189E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.7619E+03	2.7470	4.8400E+03	9.6445E+01	1.99 %

LTV 4.9991E+03

12th point MDA 3.0897E+00

26-JUN-95 TMA Corporation 1037-203 Sr
15:53:10 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

#

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.287	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1824.37	1.94 Percent	Corr. coefficient=	0.978
CPM at sep time=	806.24	2.45 Percent	Chi square prob.=	0.000

	CPM	ERROR		
1 Points rejected				
Equilibrium CPM=	1839.63	1.97 Percent	Corr. coefficient=	0.972
CPM at sep time=	802.04	2.47 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.287	0.232	11515	13.70	15	863.37	863.90	-0.061	0.98	1.0000
118.799	0.744	14246	14.88	15	983.52	985.42	-0.193	0.95	0.8216
119.804	1.749	19568	17.12	16	1182.43	1181.71	0.061	0.98	0.6223
123.151	5.096	16004	10.47	15	1572.21	1563.52	0.555	0.84	0.3325
124.142	6.087	16103	10.29	4	1625.38	1626.15	-0.047	0.99	0.3133
126.224	8.169	18582	10.93	16	1759.03	1715.29	2.550	0.36	0.2774
129.083	11.028	21509	12.87	15	1717.36	1780.45	-3.543	0.17	0.3011
130.219	12.164	19634	10.65	4	1837.50	1795.55	2.336	0.40	0.2529
131.252	13.197	18069	10.39	16	1801.11	1805.92	-0.266	0.92	0.2628
133.229	15.174	0	19.48	4	1832.67	1819.47	0.726	0.78	0.2932
133.896	15.841	10701	6.52	(3)	1693.34	1822.66	-7.095	0.01	********
135.741	17.686	28476	16.30	15	1803.95	1829.13	-1.376	0.59	0.2922

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9620	
PPT. correction	(3)=	1.0396	(recovery = 6.980 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.627197E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.9109E+03	2.7470	5.2492E+03	1.0365E+02	1.97 %

LTV 5.4202E+03

10th point MDA 3.0227E+00

26-JUN-95 15:53:23 | TMA Corporation | 1037-204 Sr
Pb210 Least Squares Analysis | LBG SR90 PRIMARY CAL
PBBI V 1.04

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.287	95

First fit	CPM	ERROR	
Equilibrium CPM=	1919.76	1.91 Percent	Corr. coefficient= 0.980
CPM at sep time=	810.87	2.49 Percent	Chi square prob.= 0.000

1 Points rejected	CPM	ERROR	
Equilibrium CPM=	1938.24	1.95 Percent	Corr. coefficient= 0.974
CPM at sep time=	805.51	2.52 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.287	0.232	11763	13.70	16	888.10	873.04	1.725	0.56	1.0000
118.799	0.744	14500	14.88	16	1008.00	1005.71	0.228	0.94	0.8261
119.804	1.749	19410	17.11	3	1175.97	1220.00	-3.609	0.16	0.6578
123.151	5.096	16871	10.47	16	1667.20	1636.81	1.856	0.51	0.3150
124.142	6.087	17463	10.29	15	1747.32	1705.18	2.471	0.38	0.2887
125.252	7.197	17900	10.81	4	1719.88	1763.54	-2.475	0.35	0.3014
127.096	9.041	19196	11.14	4	1788.07	1830.00	-2.291	0.38	0.2838
129.083	11.028	23718	12.87	16	1908.66	1873.63	1.870	0.48	0.2623
130.208	12.153	21368	11.51	15	1907.77	1889.98	0.941	0.73	0.2550
132.235	14.180	0	42.89	4	1916.34	1909.81	0.342	0.88	0.3254
133.221	15.166	19166	10.30	15	1914.06	1916.16	-0.110	0.97	0.2465
133.901	15.846	19250	11.13	3	1784.47	1919.74	-7.046	0.00	********

Elapsed time (days) =	440.555	
Lambda =	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=	9.627E-01	
Chemical yield (2)=	1.0401	
PPT. correction (3)=	1.0263	(recovery = 11.32 mgs)
Aliquot (4)=	1.000	smpl

Product (1X2X3X4) = 1.027612E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.8862E+03	2.7470	5.1813E+03	1.0091E+02	1.95 %

LTV 5.3478E+03

10th point MDA 1.8433E+00

26-JUN-95 TMA Corporation 1037-205 Sr
15:53:36 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.826	95

First fit	CPM	ERROR	
Equilibrium CPM=	1844.42	3.12 Percent	Corr. coefficient= 0.989
CPM at sep time=	738.11	3.87 Percent	Chi square prob.= 0.000

1 Points rejected	CPM	ERROR	
Equilibrium CPM=	1878.05	2.62 Percent	Corr. coefficient= 0.985
CPM at sep time=	723.33	3.98 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.826	0.771	10225	11.55	3	917.61	933.78	-1.731	0.55	1.0000
119.818	1.763	21675	19.01	16	1179.53	1148.65	2.688	0.32	0.7483
124.150	6.095	17539	11.21	4	1625.03	1640.98	-0.972	0.72	0.3742
127.104	9.049	23823	13.89	15	1760.75	1767.96	-0.408	0.88	0.3424
130.208	12.153	20505	11.52	16	1843.45	1828.86	0.798	0.77	0.3023
131.261	13.206	19154	10.37	4	1840.98	1840.62	0.019	0.99	0.2920
132.226	14.171	21180	11.91	15	1829.23	1848.92	-1.065	0.69	0.3085
133.221	15.166	18371	10.30	16	1852.58	1855.54	-0.160	0.95	0.2915
133.893	15.838	19350	10.38	4	1872.94	1859.15	0.742	0.79	0.2841
135.753	17.698	27687	17.07	3	1673.43	1866.39	-10.338	0.00	********

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9840	
PPT. correction	(3)=	1.0173	(recovery = 14.28 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.636774E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.9488E+03	2.7470	5.3534E+03	1.4026E+02	2.62 %

LTV 5.5849E+03

10th point MDA 2.8321E+00

26-JUN-95 TMA Corporation 1037-206 Sr
15:53:50 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.826	95

First fit	CPM	ERROR		
Equilibrium CPM=	1930.42	2.54 Percent	Corr. coefficient=	0.992
CPM at sep time=	737.43	3.98 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.826	0.771	10831	11.55	15	963.33	954.86	0.887	0.76	1.0000
119.818	1.763	21286	19.00	3	1161.34	1176.85	-1.318	0.62	0.8371
123.036	4.981	31345	20.39	4	1596.66	1603.63	-0.435	0.86	0.4847
124.150	6.095	18342	11.21	16	1692.92	1685.50	0.440	0.87	0.3789
125.260	7.205	22077	13.00	4	1763.89	1746.84	0.976	0.72	0.3665
126.233	8.178	18737	10.75	15	1791.10	1787.79	0.185	0.95	0.3392
127.104	9.049	24791	13.89	16	1848.49	1816.68	1.751	0.51	0.3427
129.092	11.037	21132	11.82	15	1837.19	1862.52	-1.360	0.61	0.3325
132.266	14.211	20400	10.57	4	1929.45	1900.63	1.516	0.58	0.2946
133.229	15.174	0	19.49	16	1880.93	1907.24	-1.379	0.58	0.3580
133.935	15.880	18746	10.19	15	1897.83	1911.10	-0.694	0.80	0.3027
135.753	17.698	32667	17.07	4	1918.90	1918.38	0.027	0.99	0.3335

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9724	
PPT. correction (3)=		1.0070	(recovery = 17.64 mgs)
Aliquot (4)=		1.000	smpl
Product (1X2X3X4)	=	9.427378E-01	

C-zero	P-factor		dpm/smpl	1 sigma dpm error	percent sigma
2.0477E+03	2.7470		5.6250E+03	1.4294E+02	2.54 %
		LTV	5.8608E+03		
		10th point MDA	3.1119E+00		

26-JUN-95 15:54:02 | TMA Corporation | 1037-207 Sr
Pb210 Least Squares Analysis | LBG SR90 PRIMARY CAL
PBBI V 1.04

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.783	95

First fit	CPM	ERROR	
Equilibrium CPM=	1865.03	2.43 Percent	Corr. coefficient= 0.989
CPM at sep time=	731.63	3.64 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.783	0.728	18273	20.42	15	919.24	928.53	-1.001	0.71	1.0000
119.818	1.763	21370	19.00	4	1168.03	1149.10	1.648	0.54	0.6483
123.158	5.103	22690	14.98	15	1557.93	1564.10	-0.394	0.88	0.3681
126.233	8.178	18111	10.75	16	1743.14	1729.52	0.787	0.77	0.2785
130.229	12.174	29136	15.73	4	1846.16	1817.03	1.603	0.54	0.2739
131.261	13.206	18372	10.37	16	1834.86	1828.29	0.359	0.90	0.2524
132.266	14.211	18512	10.57	15	1801.48	1836.73	-1.919	0.47	0.2615
133.243	15.188	21516	11.78	4	1825.94	1843.07	-0.929	0.73	0.2607
133.927	15.872	18732	10.54	16	1849.52	1846.64	0.156	0.95	0.2503
135.753	17.698	30590	17.08	15	1849.39	1853.59	-0.226	0.93	0.2803

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9661	
PPT. correction	(3)=	0.9967	(recovery = 21.03 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.269671E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0120E+03	2.7470	5.5269E+03	1.3453E+02	2.43 %

LTV 5.7489E+03

10th point MDA 3.5591E+00

26-JUN-95 TMA Corporation 1037-208 Sr
15:54:16 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.783	95

First fit	CPM	ERROR	
Equilibrium CPM=	1830.32	2.63 Percent	Corr. coefficient= 0.987
CPM at sep time=	760.63	3.59 Percent	Chi square prob.= 0.000

1 Points rejected	CPM	ERROR	
Equilibrium CPM=	1858.56	2.64 Percent	Corr. coefficient= 0.983
CPM at sep time=	746.63	3.70 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.783	0.728	18610	20.50	16	939.01	939.80	-0.084	0.98	1.0000
119.818	1.763	21397	19.00	15	1158.14	1156.19	0.169	0.95	0.6792
123.158	5.103	22865	14.98	16	1579.22	1563.32	1.017	0.70	0.3724
124.150	6.095	17862	11.21	15	1640.52	1630.28	0.629	0.82	0.3233
125.269	7.214	16733	10.58	4	1642.68	1687.82	-2.674	0.32	0.3183
127.104	9.049	23131	13.89	4	1728.01	1752.55	-1.400	0.59	0.3124
129.092	11.037	20755	11.82	16	1818.56	1795.28	1.297	0.63	0.2744
131.261	13.206	18462	10.37	15	1929.49	1822.52	0.383	0.89	0.2620
133.252	15.197	23326	12.59	4	1852.20	1837.07	0.824	0.76	0.2675
133.909	15.854	16976	10.47	3	1672.84	1840.43	-9.106	0.00	********

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9545	
PPT. correction (3)=		0.9869	(recovery = 24.24 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 9.068174E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0495E+03	2.7470	5.6301E+03	1.4878E+02	2.64 %

LTV 5.8756E+03

9th point MDA 4.1512E+00

26-JUN-95 TMA Corporation 1037-209 Sr
15:54:28 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.826	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1824.40	2.61 Percent	Corr. coefficient=	0.990
CPM at sep time=	678.91	4.14 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.826	0.771	10049	11.55	16	899.93	887.67	1.380	0.65	1.0000
119.833	1.778	14758	14.18	3	1078.84	1103.33	-2.220	0.42	0.7832
124.160	6.105	0	23.09	4	1612.74	1590.08	1.425	0.58	0.4349
127.115	9.060	21986	13.13	15	1719.02	1715.49	0.206	0.94	0.3412
130.219	12.164	18291	10.65	16	1778.72	1775.73	0.168	0.95	0.3054
131.269	13.214	19566	10.92	4	1785.84	1787.34	-0.084	0.98	0.3022
132.235	14.180	0	42.89	15	1787.75	1795.64	-0.440	0.85	0.4012
133.229	15.174	0	19.48	15	1804.93	1802.14	0.155	0.95	0.3424
133.901	15.846	19916	11.13	4	1797.80	1805.69	-0.437	0.87	0.3009

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9444	
PPT. correction	(3)=	0.9772	(recovery = 27.41 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.884331E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0535E+03	2.7470	5.6410E+03	1.4698E+02	2.61 %

LTV 5.8835E+03

7th point MDA 2.3330E+00

26-JUN-95 TMA Corporation 1037-210 Sr
15:54:43 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.908	95

First fit	CPM	ERROR	
Equilibrium CPM=	1789.10	3.10 Percent	Corr. coefficient= 0.992
CPM at sep time=	653.92	4.54 Percent	Chi square prob.= 0.000

1 Points rejected	CPM	ERROR	
Equilibrium CPM=	1813.75	2.56 Percent	Corr. coefficient= 0.989
CPM at sep time=	639.39	4.26 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.908	0.853	12678	15.34	3	856.62	873.95	-1.983	0.48	1.0000
119.833	1.778	15150	14.18	4	1109.50	1074.51	3.257	0.26	0.6285
123.051	4.996	17561	12.26	4	1487.67	1493.08	-0.362	0.89	0.3640
124.160	6.105	0	23.10	15	1582.13	1573.53	0.547	0.83	0.3781
125.277	7.222	29768	19.19	4	1611.15	1633.93	-1.394	0.58	0.3526
126.247	8.192	28376	17.18	15	1697.26	1673.93	1.393	0.59	0.3129
127.115	9.060	21946	13.13	16	1731.04	1702.10	1.700	0.53	0.2842
129.101	11.046	22459	13.51	15	1708.26	1747.08	-2.222	0.39	0.2924
130.229	12.174	27081	15.73	16	1783.02	1764.01	1.078	0.68	0.2815
133.243	15.188	20479	11.78	16	1805.68	1791.00	0.820	0.76	0.2571
133.943	15.888	30094	17.67	15	1756.93	1794.79	-2.109	0.40	0.2963
135.767	17.712	24762	15.70	3	1627.23	1801.94	-9.695	0.00	********

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9388	
PPT. correction	(3)=	0.9569	(recovery = 34.06 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.648351E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0972E+03	2.7470	5.7611E+03	1.4754E+02	2.56 %

LTV 6.0045E+03

12th point MDA 3.3172E+00

26-JUN-95 15:55:01 | TMA Corporation | 1037-211 Sr
Pb210 Least Squares Analysis | LBG SR90 PRIMARY CAL
PBSI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.908	95

	CPM	ERROR	
First fit			
Equilibrium CPM=	1840.50	2.57 Percent	Corr. coefficient= 0.992
CPM at sep time=	691.39	4.09 Percent	Chi square prob. = 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.908	0.853	13812	15.35	15	924.32	920.91	0.370	0.90	1.0000
119.833	1.778	15217	14.19	16	1109.34	1117.14	-0.698	0.80	0.7167
123.178	5.123	16313	10.82	15	1550.72	1536.86	0.902	0.75	0.3728
125.278	7.223	29545	18.30	15	1662.24	1664.58	-0.141	0.96	0.3759
126.247	8.192	28030	17.18	16	1688.09	1703.69	-0.916	0.72	0.3611
129.101	11.046	23239	13.51	16	1781.49	1775.26	0.350	0.89	0.3105
130.242	12.187	0	22.43	4	1815.75	1792.03	1.324	0.60	0.3326
131.269	13.214	18839	10.92	16	1786.72	1803.33	-0.921	0.73	0.2929
132.226	14.171	21501	11.91	4	1804.75	1811.51	-0.373	0.89	0.2917
133.909	15.854	18919	10.47	4	1815.46	1821.77	-0.346	0.90	0.2795
135.767	17.712	28775	15.71	4	1836.58	1828.94	0.418	0.87	0.3025

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9487	
PPT. correction	(3)=	0.9453	(recovery = 37.86 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.633354E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1318E+03	2.7470	5.8562E+03	1.5036E+02	2.57 %

LTV 6.1043E+03

7th point MDA 3.3447E+00

26-JUN-95 TMA Corporation 1037-212 Sr
15:55:15 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.908	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1715.75	2.59 Percent	Corr. coefficient=	0.991
CPM at sep time=	662.89	4.04 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.908	0.853	12943	15.35	16	872.14	873.18	-0.120	0.97	1.0000
119.833	1.778	14464	14.19	15	1048.19	1052.98	-0.455	0.87	0.7128
123.178	5.123	15360	10.83	16	1467.36	1437.55	2.074	0.46	0.3713
125.278	7.223	27694	18.31	16	1564.88	1554.57	0.663	0.80	0.3787
127.115	9.060	20172	13.13	4	1594.14	1615.66	-1.332	0.61	0.3388
130.258	12.203	0	23.01	4	1687.12	1671.53	0.933	0.71	0.3449
131.269	13.214	17817	10.92	15	1676.60	1681.70	-0.303	0.91	0.2951
132.274	14.219	18270	10.70	4	1706.93	1689.52	1.031	0.71	0.2824
133.243	15.188	19301	11.78	15	1685.29	1695.35	-0.594	0.82	0.2984
133.943	15.888	28929	17.68	16	1702.77	1698.75	0.236	0.93	0.3238
135.767	17.712	25460	15.71	15	1673.41	1705.16	-1.862	0.47	0.3246

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8825	
PPT. correction	(3)=	0.9436	(recovery = 38.42 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.016442E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1403E+03	2.7470	5.8794E+03	1.5228E+02	2.59 %

LTV 6.1306E+03

6th point MDA 3.5476E+00

26-JUN-95 TMA Corporation 1037-213 Sr
15:55:29 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBEI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.920	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1670.30	2.58 Percent	Corr. coefficient=	0.991
CPM at sep time=	566.70	4.53 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.920	0.865	10923	14.72	3	769.08	789.85	-2.629	0.36	1.0000
119.843	1.788	14094	14.40	4	1016.35	977.42	3.983	0.17	0.6192
124.182	6.127	19008	13.20	15	1482.52	1445.64	2.551	0.36	0.3144
127.125	9.070	19430	13.03	15	1530.76	1565.65	-2.229	0.40	0.2961
129.113	11.058	18789	11.83	15	1632.04	1607.84	1.505	0.58	0.2584
130.242	12.187	0	22.43	16	1634.76	1623.75	0.678	0.79	0.2994
131.279	13.224	0	28.53	4	1598.89	1634.75	-2.194	0.36	0.3243
132.235	14.180	0	42.89	16	1633.75	1642.60	-0.539	0.82	0.3369
133.252	15.197	20010	12.59	16	1650.77	1648.97	0.109	0.97	0.2581

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8954	
PPT. correction	(3)=	0.9220	(recovery = 45.48 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 7.948105E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.1015E+03	2.7470	5.7728E+03	1.4902E+02	2.58 %

LTV 6.0187E+03

8th point MDA 2.4045E+00

26-JUN-95 TMA Corporation 1037-214 Sr
15:55:45 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.920	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1679.40	2.89 Percent	Corr. coefficient=	0.995
CPM at sep time=	607.17	4.98 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.920	0.865	11902	14.74	15	829.39	823.96	0.660	0.82	1.0000
123.061	5.006	27608	21.44	4	1337.33	1387.62	-3.624	0.14	0.4836
124.182	6.127	18810	13.20	16	1474.31	1461.13	0.902	0.74	0.3619
125.292	7.237	0	23.79	4	1514.91	1515.93	-0.068	0.98	0.3959
126.260	8.205	18202	11.91	15	1570.41	1552.12	1.178	0.67	0.3151
127.125	9.070	20020	13.03	16	1591.20	1577.73	0.854	0.75	0.3159
129.113	11.058	18763	11.83	16	1642.58	1618.71	1.474	0.59	0.2915
131.279	13.224	0	28.54	16	1640.18	1644.87	-0.285	0.91	0.3552
133.252	15.197	20148	12.59	15	1646.04	1658.68	-0.762	0.77	0.2946
133.918	15.863	18276	11.10	4	1654.17	1661.97	-0.469	0.86	0.2809
135.780	17.725	0	63.17	15	1682.03	1668.70	0.799	0.73	0.3839

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9125	
PPT. correction	(3)=	0.8992	(recovery = 52.97 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 7.899066E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1261E+03	2.7470	5.8403E+03	1.6899E+02	2.89 %

LTV 6.1192E+03

11th point MDA 2.0042E+00

26-JUN-95 TMA Corporation 1037-215 Sr
15:55:57 Pb210 Least Squares Analysis LBG SR90 PRIMARY CAL
PBBI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.920	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1399.34	2.99 Percent	Corr. coefficient=	0.990
CPM at sep time=	560.35	4.14 Percent	Chi square prob.=	0.000

	CPM	ERROR		
1 Points rejected				
Equilibrium CPM=	1424.99	2.84 Percent	Corr. coefficient=	0.987
CPM at sep time=	545.14	4.32 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.920	0.865	10346	14.74	16	725.90	723.03	0.397	0.89	1.0000
119.843	1.788	12177	14.40	15	869.47	872.58	-0.356	0.90	0.7309
123.186	5.131	12609	10.91	15	1188.57	1192.98	-0.370	0.90	0.3954
124.182	6.127	15706	13.20	4	1235.68	1245.88	-0.818	0.77	0.3920
125.292	7.237	29706	23.79	15	1285.46	1290.85	-0.417	0.87	0.4224
126.260	8.205	15365	11.91	16	1334.68	1320.54	1.071	0.70	0.3333
129.121	11.066	18303	13.61	15	1381.79	1375.30	0.472	0.86	0.3249
130.297	12.242	18155	12.97	4	1395.03	1388.37	0.480	0.86	0.3129
132.266	14.211	14344	10.57	16	1409.40	1403.02	0.455	0.87	0.2938
133.918	15.863	14929	11.10	16	1399.52	1410.68	-0.791	0.77	0.3016
135.780	17.725	0	63.17	3	1289.85	1416.20	-8.922	0.00	********

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.7656	
PPT. correction (3)=		0.9082	(recovery = 50.00 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 6.694534E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1286E+03	2.7470	5.8472E+03	1.6587E+02	2.84 %

LTV 6.1209E+03

11th point MDA 1.9215E+00

26-JUN-95 15:56:11 | TMA Corporation | 1037-216 Sr
Pb210 Least Squares Analysis | LBG SR90 PRIMARY CAL
PBBI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on LBG

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.931	95

First fit	CPM	ERROR	
Equilibrium CPM=	1275.42	2.54 Percent	Corr. coefficient= 0.993
CPM at sep time=	439.74	4.42 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.931	0.876	11573	19.90	3	602.65	610.91	-1.353	0.64	1.0000
119.843	1.788	10613	14.40	16	762.24	750.74	1.532	0.61	0.6075
123.186	5.131	11299	10.92	16	1070.35	1055.06	1.450	0.62	0.3143
124.192	6.137	12606	11.75	4	1114.12	1105.72	0.759	0.79	0.3007
125.292	7.237	26689	23.79	16	1160.56	1148.02	1.092	0.68	0.3369
127.125	9.070	14930	13.03	4	1188.79	1196.18	-0.618	0.82	0.2773
129.121	11.066	16276	13.61	16	1238.36	1228.23	0.825	0.77	0.2615
130.219	12.164	12992	10.65	15	1253.38	1239.92	1.085	0.71	0.2382
131.279	13.224	0	28.54	15	1233.57	1248.51	-1.197	0.63	0.3140
132.274	14.219	12858	10.71	15	1234.69	1254.60	-1.587	0.57	0.2449
133.918	15.863	13498	11.10	15	1254.26	1261.83	-0.600	0.83	0.2412
135.780	17.725	0	63.17	4	1259.32	1267.08	-0.613	0.79	0.3468

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.6951	
PPT. correction (3)=		0.9069	(recovery = 50.44 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 6.069112E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1015E+03	2.7470	5.7728E+03	1.4688E+02	2.54 %

LTV 6.0152E+03

12th point MDA 2.3858E+00

26-JUN-95 15:57:45 | TMA Corporation | Pb210 Least Squares Analysis | PBBI V 1.04 | 1037-316 Sr GRB SR90 PRIMARY CAL

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1303.78	2.65 Percent	Corr. coefficient= 0.992
CPM at sep time=	477.84	4.29 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	13047	20.00	216	659.79	650.43	1.439	0.62	1.0000
119.987	1.932	16214	20.50	208	796.76	804.52	-0.964	0.73	0.7288
121.769	3.714	9761	10.00	201	983.47	989.13	-0.572	0.85	0.4094
122.740	4.685	15546	15.00	201	1044.25	1059.34	-1.424	0.61	0.4193
124.619	6.564	0	100.00	201	1142.24	1154.84	-1.091	0.63	0.5203
125.763	7.708	11920	10.00	203	1185.65	1192.21	-0.550	0.85	0.2981
126.975	8.920	18427	15.00	204	1228.05	1222.36	0.465	0.87	0.3164
129.062	11.007	12390	10.00	213	1254.64	1256.40	-0.140	0.96	0.2724
132.658	14.603	0	30.00	206	1278.92	1285.18	-0.487	0.85	0.3486
135.628	17.573	0	30.00	207	1288.39	1295.17	-0.524	0.83	0.3426
136.608	18.553	0	30.00	215	1348.27	1297.10	3.945	0.13	0.3159
136.983	18.928	0	30.00	210	1299.07	1297.72	0.104	0.97	0.3374

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.6951	
PPT. correction	(3)=	0.9069	(recovery = 50.44 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 6.069112E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1482E+03	0.0000	0.0000E-01	0.0000E-01	2.65 %

LTV 0.0000E-01

5th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-315 Sr
15:57:30 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1455.62	2.90 Percent	Corr. coefficient=	0.994
CPM at sep time=	562.70	4.68 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	14925	20.00	215	750.33	749.28	0.140	0.96	1.0000
121.724	3.669	11019	10.00	216	1113.63	1111.46	0.196	0.95	0.4152
123.800	5.745	12289	10.00	201	1238.29	1254.85	-1.319	0.64	0.3469
124.619	6.564	0	100.00	202	1297.26	1294.61	0.205	0.93	0.5109
125.763	7.708	13352	10.00	202	1338.82	1335.01	0.286	0.92	0.3034
126.975	8.920	20353	15.00	203	1349.70	1367.61	-1.310	0.62	0.3346
129.062	11.007	14110	10.00	204	1410.58	1404.40	0.440	0.88	0.2774
129.633	11.578	0	30.00	206	1412.71	1411.54	0.083	0.97	0.3634
130.631	12.576	0	30.00	211	1432.71	1421.60	0.782	0.75	0.3524
132.606	14.551	0	30.00	212	1445.73	1435.25	0.731	0.77	0.3474
132.658	14.603	0	30.00	205	1432.24	1435.52	-0.228	0.93	0.3536
133.853	15.798	22436	15.69	210	1436.70	1440.86	-0.289	0.91	0.3042

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.7656	
PPT. correction (3)	=	0.9082	(recovery = 50.00 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 6.694534E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1743E+03	0.0000	0.0000E-01	0.0000E-01	2.90 %

LTV 0.0000E-01

4th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-314 Sr
15:57:13 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1730.33	2.50 Percent	Corr. coefficient=	0.993
CPM at sep time=	619.78	4.18 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	17087	20.00	214	859.03	851.84	0.843	0.76	1.0000
119.987	1.932	20808	20.50	206	1039.96	1059.03	-1.801	0.49	0.7259
121.724	3.669	13197	10.00	215	1325.91	1302.29	1.814	0.53	0.3894
123.800	5.745	14709	10.00	216	1488.17	1480.62	0.510	0.86	0.3205
124.619	6.564	0	100.00	203	1507.50	1530.07	-1.475	0.51	0.4853
126.975	8.920	24540	15.00	202	1642.16	1620.86	1.314	0.62	0.3002
128.739	10.684	0	30.00	208	1661.21	1661.17	0.003	1.00	0.3405
129.633	11.578	0	30.00	207	1664.57	1675.49	-0.652	0.79	0.3392
130.631	12.576	0	30.00	210	1698.76	1688.01	0.637	0.80	0.3271
131.629	13.574	0	30.00	212	1694.85	1697.67	-0.166	0.95	0.3287
132.606	14.551	0	30.00	211	1701.56	1704.98	-0.201	0.93	0.3254
132.658	14.603	0	30.00	204	1710.96	1705.32	0.331	0.89	0.3224

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9125	
PPT. correction (3)=		0.8992	(recovery = 52.97 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 7.899066E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1905E+03	0.0000	0.0000E-01	0.0000E-01	2.50 %

LTV 0.0000E-01

5th point MDA 0.0000E-01

26-JUN-95
15:56:58

TMA Corporation
Pb210 Least Squares Analysis
PSBI V 1.04

1037-313 Sr
GRB SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	119.987	95

First fit	CPM	ERROR	
Equilibrium CPM=	1711.65	4.07 Percent	Corr. coefficient= 0.997
CPM at sep time=	572.66	7.63 Percent	Chi square prob. = 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
119.987	1.932	20337	20.50	205	1013.53	1023.16	-0.942	0.72	1.0000
121.724	3.669	12691	10.00	214	1276.27	1272.65	0.284	0.92	0.5477
122.740	4.685	20737	15.00	214	1388.93	1374.57	1.045	0.70	0.5306
123.800	5.745	14767	10.00	215	1482.22	1455.55	1.832	0.52	0.4243
124.619	6.564	0	100.00	204	1510.66	1506.26	0.292	0.90	0.6375
125.763	7.708	15477	10.00	216	1567.43	1557.80	0.618	0.83	0.3866
126.975	8.920	23806	15.00	201	1597.74	1599.38	-0.103	0.97	0.4155
128.739	10.684	0	30.00	207	1619.50	1640.73	-1.294	0.59	0.4701
130.631	12.576	0	30.00	209	1687.85	1668.25	1.175	0.63	0.4370
131.629	13.574	0	30.00	211	1667.74	1678.16	-0.621	0.80	0.4449
132.606	14.551	0	30.00	210	1679.07	1685.66	-0.391	0.87	0.4402
132.658	14.603	0	30.00	203	1667.60	1686.01	-1.092	0.65	0.4447

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.8954	
PPT. correction (3)	=	0.9220	(recovery = 45.48 mgs)
Aliquot (4)	=	1.000	smpl
Product (1X2X3X4)	=	7.948105E-01	

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1535E+03	0.0000	0.0000E-01	0.0000E-01	4.07 %

LTV	0.0000E-01
5th point MDA	0.0000E-01

26-JUN-95 TMA Corporation 1037-312 Sr
15:56:43 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1761.92	2.63 Percent	Corr. coefficient=	0.991
CPM at sep time=	670.85	4.06 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	17846	20.00	212	902.58	898.84	0.417	0.88	1.0000
119.987	1.932	22339	20.43	204	1094.12	1102.39	-0.750	0.78	0.7174
121.724	3.669	13327	10.00	212	1348.27	1341.38	0.514	0.86	0.4124
122.740	4.685	21258	15.00	213	1428.07	1439.02	-0.761	0.77	0.4174
123.800	5.745	15132	10.00	214	1518.81	1516.59	0.146	0.96	0.3358
124.619	6.564	0	100.00	205	1570.80	1565.17	0.360	0.87	0.4898
125.763	7.708	16198	10.00	215	1630.75	1614.54	1.004	0.72	0.2975
128.739	10.684	0	30.00	206	1675.37	1693.98	-1.099	0.65	0.3658
129.751	11.696	16844	10.00	201	1697.45	1709.58	-0.710	0.80	0.2777
130.631	12.576	0	30.00	208	1722.88	1720.35	0.147	0.95	0.3466
131.629	13.574	0	30.00	210	1732.49	1729.83	0.154	0.95	0.3432
132.606	14.551	0	30.00	209	1748.81	1737.02	0.679	0.78	0.3379

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.8825	
PPT. correction (3)	=	0.9436	(recovery = 38.42 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 8.016442E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1979E+03	0.0000	0.0000E-01	0.0000E-01	2.63 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-311 Sr
15:56:26 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1880.22	2.56 Percent	Corr. coefficient= 0.992
CPM at sep time=	686.31	4.12 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	18798	20.00	211	938.42	935.79	0.281	0.92	1.0000
119.987	1.932	23754	20.42	203	1157.06	1158.52	-0.126	0.96	0.6971
121.724	3.669	13952	10.00	210	1407.35	1420.05	-0.894	0.75	0.4112
122.740	4.685	22845	15.00	212	1539.33	1526.89	0.815	0.76	0.3932
123.800	5.745	15964	10.00	213	1610.30	1611.77	-0.091	0.97	0.3265
124.619	6.564	0	100.00	206	1658.94	1664.93	-0.360	0.87	0.4744
125.763	7.708	17112	10.00	214	1719.31	1718.95	0.021	0.99	0.2914
128.739	10.684	0	30.00	205	1787.04	1805.87	-1.043	0.66	0.3487
129.633	11.578	0	30.00	204	1817.05	1821.27	-0.232	0.92	0.3372
130.631	12.576	0	30.00	207	1821.98	1834.73	-0.695	0.77	0.3359
131.629	13.574	0	30.00	209	1854.62	1845.11	0.516	0.83	0.3259
132.606	14.551	0	30.00	216	1888.18	1852.98	1.900	0.44	0.3152

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.9487	
PPT. correction (3)	=	0.9453	(recovery = 37.86 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 8.633354E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1779E+03	0.0000	0.0000E-01	0.0000E-01	2.56 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

26-JUN-95 16:05:31 | TMA Corporation | 1037-310 Sr
Pb210 Least Squares Analysis | GRB SR90 PRIMARY CAL
PBBI V 1.04

CS | Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1876.04	2.53 Percent	Corr. coefficient=	0.992
CPM at sep time=	700.68	4.02 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	18747	20.00	210	945.38	946.29	-0.096	0.97	1.0000
119.987	1.932	23629	20.42	202	1160.24	1165.56	-0.456	0.86	0.7022
121.724	3.669	14161	10.00	209	1445.38	1423.02	1.572	0.58	0.3983
122.773	4.718	0	31.00	205	1533.31	1531.66	0.108	0.96	0.4685
123.800	5.745	25253	15.76	212	1619.55	1611.90	0.475	0.86	0.3676
124.619	6.564	0	100.00	207	1655.33	1664.09	-0.526	0.81	0.4804
128.739	10.684	0	30.00	204	1789.15	1802.85	-0.760	0.75	0.3504
129.633	11.578	0	30.00	203	1789.72	1818.01	-1.556	0.52	0.3499
130.631	12.576	0	30.00	206	1832.92	1831.25	0.091	0.97	0.3369
131.629	13.574	0	30.00	208	1825.72	1841.48	-0.855	0.72	0.3381
132.606	14.551	0	30.00	215	1900.76	1849.22	2.787	0.26	0.3141
133.853	15.798	28857	15.69	201	1855.31	1856.61	-0.070	0.98	0.2887

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9388	
PPT. correction	(3)=	0.9569	(recovery = 34.06 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.648351E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1692E+03	0.0000	0.0000E-01	0.0000E-01	2.53 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-309 Sr
16:05:18 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1895.57	2.61 Percent	Corr. coefficient=	0.991
CPM at sep time=	738.57	3.96 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	19294	20.00	209	984.50	980.33	0.425	0.88	1.0000
119.987	1.932	24257	20.42	201	1196.97	1196.18	0.066	0.98	0.7120
121.724	3.669	14091	10.00	208	1419.87	1449.62	-2.052	0.46	0.4375
122.740	4.685	23179	15.00	210	1560.31	1553.16	0.461	0.86	0.4148
123.814	5.759	29389	18.00	204	1632.31	1636.54	-0.259	0.92	0.3989
124.619	6.564	0	100.00	208	1685.26	1686.93	-0.099	0.96	0.4967
125.763	7.708	17469	10.00	212	1767.44	1739.28	1.619	0.56	0.3008
128.739	10.684	0	30.00	203	1817.35	1823.52	-0.338	0.89	0.3639
129.633	11.578	0	30.00	202	1844.87	1838.44	0.350	0.89	0.3546
130.631	12.576	0	30.00	205	1838.11	1851.48	-0.722	0.76	0.3578
131.629	13.574	0	30.00	207	1862.78	1861.54	0.066	0.98	0.3485
132.606	14.551	0	30.00	214	1879.93	1869.16	0.576	0.81	0.3429

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9444	
PPT. correction	(3)=	0.9772	(recovery = 27.41 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.884331E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1336E+03	0.0000	0.0000E-01	0.0000E-01	2.61 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1936.55	2.62 Percent	Corr. coefficient= 0.991
CPM at sep time=	739.69	4.02 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	20086	20.00	208	1011.84	989.78	2.228	0.42	1.0000
119.948	1.893	24736	21.50	216	1162.78	1205.78	-3.567	0.16	0.7988
121.724	3.669	14610	10.00	207	1472.29	1475.24	-0.200	0.94	0.4328
122.740	4.685	23759	15.00	209	1615.16	1582.34	2.074	0.44	0.4118
123.800	5.745	26015	15.76	210	1666.81	1667.57	-0.046	0.99	0.3933
124.619	6.564	0	100.00	209	1720.89	1720.72	0.010	1.00	0.5030
125.763	7.708	17657	10.00	211	1761.62	1774.88	-0.747	0.78	0.3171
126.975	8.920	27269	15.00	212	1841.15	1818.57	1.241	0.64	0.3263
128.739	10.684	0	30.00	202	1873.21	1862.02	0.601	0.80	0.3630
129.633	11.578	0	30.00	201	1860.64	1877.45	-0.896	0.71	0.3677
130.631	12.576	0	30.00	204	1887.19	1890.94	-0.198	0.93	0.3578
131.629	13.574	0	30.00	206	1902.96	1901.35	0.085	0.97	0.3541

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9545	
PPT. correction	(3)=	0.9869	(recovery = 24.24 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.068174E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1355E+03	0.0000	0.0000E-01	0.0000E-01	2.62 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-307 Sr
16:04:53 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR		
Equilibrium CPM=	1910.27	2.60 Percent	Corr. coefficient=	0.991
CPM at sep time=	769.80	3.84 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	20230	20.00	207	1020.21	1008.11	1.200	0.66	1.0000
119.948	1.893	25513	21.50	215	1192.20	1213.93	-1.790	0.49	0.7741
121.724	3.669	14380	10.00	206	1473.51	1470.69	0.191	0.95	0.4404
122.740	4.685	23521	15.00	208	1581.68	1572.75	0.568	0.83	0.4321
124.619	6.564	0	100.00	210	1697.22	1704.61	-0.434	0.85	0.5231
125.763	7.708	17243	10.00	210	1737.70	1756.22	-1.055	0.70	0.3302
126.975	8.920	27340	15.00	211	1820.30	1797.85	1.248	0.64	0.3366
128.739	10.684	0	30.00	201	1824.32	1839.25	-0.812	0.74	0.3865
130.631	12.576	0	30.00	203	1873.57	1866.81	0.362	0.88	0.3674
131.629	13.574	0	30.00	205	1878.16	1876.73	0.076	0.97	0.3670
132.606	14.551	0	30.00	202	1891.02	1884.24	0.360	0.88	0.3617
132.660	14.605	0	30.00	212	1891.14	1884.61	0.347	0.89	0.3621

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9661	
PPT. correction (3)=		0.9967	(recovery = 21.03 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 9.269671E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0608E+03	0.0000	0.0000E-01	0.0000E-01	2.60 %

LTV 0.0000E-01

5th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-306 Sr
16:04:41 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1985.96	2.58 Percent	Corr. coefficient=	0.991
CPM at sep time=	767.28	3.93 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	20279	20.00	206	1038.87	1021.94	1.657	0.54	1.0000
119.948	1.893	25925	21.50	214	1212.60	1241.87	-2.357	0.36	0.7725
121.724	3.669	14577	10.00	205	1489.42	1516.24	-1.768	0.52	0.4441
122.740	4.685	24525	15.00	207	1649.32	1625.29	1.478	0.58	0.4127
123.801	5.746	17067	10.00	208	1721.56	1712.01	0.558	0.84	0.3450
125.763	7.708	18095	10.00	209	1843.43	1821.34	1.213	0.66	0.3074
126.975	8.920	27917	15.00	210	1875.62	1865.83	0.525	0.84	0.3288
129.062	11.007	19314	10.00	215	1946.47	1916.05	1.588	0.56	0.2789
129.633	11.578	0	30.00	212	1920.97	1925.79	-0.250	0.92	0.3619
130.631	12.576	0	30.00	202	1939.65	1939.52	0.007	1.00	0.3549
131.629	13.574	0	30.00	204	1938.96	1950.12	-0.572	0.81	0.3551
132.606	14.551	0	30.00	201	1934.46	1958.15	-1.210	0.61	0.3570

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8104	
PPT. correction	(3)=	1.0070	(recovery = 17.64 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 7.856148E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.5279E+03	0.0000	0.0000E-01	0.0000E-01	2.58 %

LTV 0.0000E-01

12th point MDA 0.0000E-01

26-JUN-95 16:04:28 | TMA Corporation | 1037-305 Sr
Pb210 Least Squares Analysis | GRB SR90 PRIMARY CAL
PBBI V 1.04

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1937.95	2.93 Percent	Corr. coefficient= 0.993
CPM at sep time=	807.61	4.33 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	20560	20.00	205	1051.29	1043.81	0.717	0.79	1.0000
121.724	3.669	14811	10.00	204	1482.16	1502.28	-1.339	0.63	0.4547
122.740	4.685	23080	15.00	206	1576.69	1603.43	-1.668	0.52	0.4580
123.801	5.746	16819	10.00	207	1696.64	1683.86	0.759	0.79	0.3614
124.619	6.564	0	100.00	212	1740.94	1734.12	0.393	0.86	0.5235
125.763	7.708	17645	10.00	208	1776.35	1785.27	-0.499	0.86	0.3337
126.975	8.920	26966	15.00	209	1831.43	1826.53	0.268	0.92	0.3512
129.062	11.007	18287	10.00	214	1842.89	1873.11	-1.613	0.55	0.3132
129.633	11.578	0	30.00	211	1880.40	1882.14	-0.093	0.97	0.3835
130.631	12.576	0	30.00	201	1885.84	1894.88	-0.477	0.84	0.3821
131.629	13.574	0	30.00	203	1912.70	1904.71	0.420	0.86	0.3715
132.658	14.603	0	30.00	215	1961.99	1912.50	2.588	0.30	0.3553

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.9840	
PPT. correction (3)	=	1.0173	(recovery = 14.28 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 9.636774E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.0110E+03	0.0000	0.0000E-01	0.0000E-01	2.93 %

LTV 0.0000E-01

5th point MDA 0.0000E-01

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	2036.20	2.64 Percent	Corr. coefficient=	0.990
CPM at sep time=	856.50	3.72 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	21960	20.00	204	1099.78	1103.01	-0.293	0.91	1.0000
119.948	1.893	28085	21.50	212	1321.54	1315.91	0.427	0.87	0.7382
121.724	3.669	15967	10.00	203	1588.33	1581.50	0.432	0.88	0.4386
122.740	4.685	24802	15.00	205	1689.50	1687.07	0.144	0.96	0.4408
123.801	5.746	17177	10.00	206	1761.92	1771.01	-0.514	0.85	0.3700
125.763	7.708	18437	10.00	207	1856.21	1876.85	-1.100	0.68	0.3363
126.976	8.921	28630	15.00	208	1921.52	1919.95	0.082	0.97	0.3499
129.062	11.007	19662	10.00	201	1979.53	1968.53	0.559	0.84	0.3008
129.633	11.578	0	30.00	210	2003.78	1977.96	1.305	0.59	0.3720
130.631	12.576	0	30.00	216	1939.61	1991.25	-2.594	0.27	0.3951
131.629	13.574	0	30.00	202	2011.16	2001.51	0.482	0.84	0.3691
132.658	14.603	0	30.00	214	2033.66	2009.64	1.195	0.62	0.3619

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)^(1)	=	9.627E-01	
Chemical yield	(2)=	1.0401	
PPT. correction	(3)=	1.0263	(recovery = 11.32 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 1.027612E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.9815E+03	0.0000	0.0000E-01	0.0000E-01	2.64 %

LTV 0.0000E-01

11th point MDA 0.0000E-01

26-JUN-95
16:04:03

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-303 Sr
GRB SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

	CPM	ERROR	
First fit			
Equilibrium CPM=	1936.42	2.91 Percent	Corr. coefficient= 0.993
CPM at sep time=	824.63	4.25 Percent	Chi square prob. = 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	21343	20.00	203	1061.43	1056.95	0.424	0.88	1.0000
121.724	3.669	15083	10.00	202	1512.44	1507.90	0.301	0.91	0.4501
122.740	4.685	24027	15.00	204	1599.78	1607.39	-0.473	0.86	0.4544
123.801	5.746	16165	10.00	205	1651.72	1686.50	-2.062	0.45	0.3890
125.763	7.708	17296	10.00	206	1770.67	1786.25	-0.872	0.75	0.3452
126.976	8.921	27106	15.00	207	1821.13	1826.86	-0.314	0.90	0.3624
129.062	11.007	18690	10.00	212	1892.88	1872.65	1.080	0.69	0.3066
129.633	11.578	0	30.00	209	1899.90	1881.53	0.976	0.69	0.3867
131.629	13.574	0	30.00	201	1873.27	1903.73	-1.600	0.50	0.3961
132.606	14.551	0	30.00	208	1903.57	1911.05	-0.391	0.87	0.3846
132.658	14.603	0	30.00	213	1934.43	1911.39	1.205	0.62	0.3738
133.853	15.798	30168	15.67	216	1951.77	1918.05	1.758	0.50	0.3241

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9620	
PPT. correction	(3)=	1.0396	(recovery = 6.980 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.627197E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.0114E+03	0.0000	0.0000E-01	0.0000E-01	2.91 %

LTV 0.0000E-01

9th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-302 Sr
16:03:51 Pb210 Least Squares Analysis GRB SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1867.08	2.74 Percent	Corr. coefficient= 0.989
CPM at sep time=	805.97	3.74 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	20491	20.00	202	1027.24	1027.70	-0.044	0.99	1.0000
119.948	1.893	26356	21.50	210	1236.48	1219.19	1.418	0.59	0.7365
121.724	3.669	14171	10.00	201	1428.00	1458.09	-2.063	0.46	0.4687
122.740	4.685	23676	15.00	203	1570.12	1553.04	1.100	0.68	0.4422
123.800	5.745	16236	10.00	204	1623.18	1628.48	-0.325	0.91	0.3755
124.619	6.564	0	100.00	215	1625.26	1675.73	-3.012	0.17	0.5751
125.763	7.708	17122	10.00	205	1744.39	1723.74	1.198	0.67	0.3335
126.976	8.921	25761	15.00	206	1759.89	1762.51	-0.148	0.95	0.3643
129.062	11.007	18304	10.00	211	1828.02	1806.20	1.208	0.66	0.3059
132.606	14.551	0	30.00	207	1844.78	1842.86	0.104	0.97	0.3838
132.658	14.603	0	30.00	208	1858.05	1843.18	0.806	0.74	0.3790
133.853	15.798	28971	15.67	213	1868.68	1849.53	1.035	0.69	0.3298

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	1.0006	
PPT. correction	(3)=	1.0498	(recovery = 3.630 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 1.011189E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.8464E+03	0.0000	0.0000E-01	0.0000E-01	2.74 %

LTV 0.0000E-01

6th point MDA 0.0000E-01

NPDES-980

28-JUN-95
16:03:37

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-301 Sr
GRB SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	118.951	95

First fit	CPM	ERROR	
Equilibrium CPM=	1616.34	2.75 Percent	Corr. coefficient= 0.989
CPM at sep time=	713.10	2.71 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
118.951	0.896	17662	20.00	201	889.73	901.84	-1.343	0.62	1.0000
119.948	1.893	22935	21.50	209	1088.69	1064.85	2.239	0.41	0.7192
121.724	3.669	12512	10.00	213	1264.49	1268.20	-0.292	0.92	0.4489
122.740	4.685	19996	15.00	202	1336.68	1349.03	-0.915	0.73	0.4568
123.800	5.745	14271	10.00	203	1419.58	1413.24	0.448	0.88	0.3671
125.763	7.708	15203	10.00	204	1521.40	1494.33	1.812	0.53	0.3267
126.976	8.921	22571	15.00	205	1529.98	1527.33	0.173	0.95	0.3621
129.062	11.007	15824	10.00	210	1596.24	1564.52	2.027	0.48	0.3016
129.635	11.580	0	30.00	215	1528.79	1571.76	-2.734	0.25	0.4205
132.606	14.551	0	30.00	206	1593.39	1595.72	-0.773	0.75	0.3960
132.658	14.603	0	30.00	207	1596.27	1596.00	0.017	0.99	0.3887
133.853	15.798	25027	15.68	212	1611.65	1601.41	0.640	0.81	0.3335

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.8655	
PPT. correction (3)=		1.0561	(recovery = 1.570 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 8.799322E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.8369E+03	0.0000	0.0000E-01	0.0000E-01	2.75 %

LTV 0.0000E-01

11th point MDA 0.0000E-01

26-JUN-95 TMA Corporation 1037-101 Sr
13:56:48 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.651	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1605.54	10.19 Percent	Corr. coefficient=	0.999
CPM at sep time=	676.68	16.13 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.651	4.596	0	24.75	19	1315.21	1324.47	-0.699	0.78	1.0000
123.807	5.752	16167	10.78	19	1414.23	1397.08	1.228	0.67	0.7117
124.791	6.736	16349	10.65	19	1447.99	1444.07	0.272	0.92	0.6812
125.774	7.719	18829	12.04	19	1475.38	1480.45	-0.343	0.90	0.6832
126.724	8.669	17367	10.85	19	1510.41	1507.78	0.174	0.95	0.6373
128.828	10.773	17388	10.61	19	1546.76	1548.92	-0.140	0.96	0.6080
129.751	11.696	0	27.95	19	1561.30	1561.06	0.016	0.99	0.7547
130.767	12.712	16875	10.22	19	1558.59	1571.31	-0.810	0.77	0.5937
131.801	13.746	17022	10.02	19	1603.93	1579.37	1.555	0.59	0.5621
132.731	14.676	17638	10.54	19	1579.82	1584.99	-0.326	0.91	0.5853
134.015	15.960	16772	10.01	19	1581.79	1590.81	-0.567	0.84	0.5754
135.753	17.698	28331	16.77	19	1594.96	1596.17	-0.075	0.98	0.6500

Elapsed time (days)	=	440.555
Lambda	=	8.626E-05 Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01
Chemical yield	(2)=	0.8655
PPT. correction	(3)=	1.0561 (recovery = 1.570 mgs)
Aliquot	(4)=	1.000 smpl

Product (1X2X3X4) = 8.799322E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.8246E+03	2.7470	5.0122E+03	5.1064E+02	10.19 %

LTV 5.8548E+03

7th point MDA 1.3247E+01

26-JUN-95 TMA Corporation 1037-102 Sr
13:57:03 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.768	95

First fit	CPM	ERROR		
Equilibrium CPM=	1848.67	8.78 Percent	Corr. coefficient=	0.999
CPM at sep time=	798.22	13.56 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.768	3.713	12353	8.04	19	1450.41	1448.31	0.145	0.96	1.0000
123.815	5.760	21075	12.37	19	1608.44	1613.44	-0.310	0.91	0.9517
124.799	6.744	21401	12.15	19	1663.41	1666.47	-0.183	0.95	0.8937
125.783	7.728	0	24.08	19	1712.91	1707.69	0.305	0.90	0.9951
126.731	8.676	19042	10.36	19	1736.40	1738.31	-0.110	0.97	0.7947
128.836	10.781	25498	13.49	19	1786.01	1784.79	0.068	0.98	0.8112
129.772	11.717	27961	14.65	19	1803.63	1798.58	0.281	0.92	0.8136
130.775	12.720	0	18.16	19	1815.86	1810.07	0.320	0.90	0.8447
131.809	13.754	0	18.40	19	1816.16	1819.16	-0.165	0.95	0.8469
132.738	14.683	20989	10.94	19	1813.18	1825.47	-0.673	0.80	0.7485
134.007	15.952	19853	10.24	19	1832.40	1831.98	0.023	0.99	0.7220
135.767	17.712	29390	15.08	19	1842.06	1838.11	0.215	0.93	0.7894

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	1.0006	
PPT. correction (3)	=	1.0498	(recovery = 3.630 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 1.011189E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.8282E+03	2.7470	5.0221E+03	4.4088E+02	8.78 %

LTV 5.7496E+03

9th point MDA 1.3471E+01

26-JUN-95 TMA Corporation 1037-104 Sr
13:57:32 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.815	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1990.44	8.81 Percent	Corr. coefficient=	0.998
CPM at sep time=	887.02	13.20 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.815	3.760	14031	8.40	19	1578.03	1575.01	0.192	0.95	1.0000
123.835	5.780	18565	10.02	19	1750.36	1744.57	0.331	0.91	0.8826
124.817	6.762	24306	12.89	19	1781.70	1799.95	-1.014	0.70	0.9153
125.813	7.758	32702	16.77	19	1843.01	1843.40	-0.022	0.99	0.9185
126.756	8.701	0	18.42	19	1875.04	1875.35	-0.017	0.99	0.9096
128.853	10.798	22858	11.15	19	1938.23	1923.62	0.760	0.78	0.7616
129.791	11.736	0	20.98	19	1948.40	1938.11	0.531	0.83	0.8727
130.797	12.742	0	27.45	19	1943.14	1950.16	-0.360	0.88	0.9235
131.892	13.837	28754	13.93	19	1951.77	1960.09	-0.425	0.87	0.7951
132.756	14.701	26268	12.65	19	1963.56	1966.18	-0.133	0.96	0.7686
133.994	15.939	16614	7.95	19	1976.19	1972.84	0.170	0.95	0.6712
135.909	17.854	0	20.48	19	1982.15	1979.75	0.121	0.96	0.8421

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	1.0401	
PPT. correction	(3)=	1.0263	(recovery = 11.32 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 1.027612E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.9370E+03	2.7470	5.3208E+03	4.6863E+02	8.81 %

LTV 6.0941E+03

8th point MDA 1.1068E+01

26-JUN-95 TMA Corporation 1037-105 Sr
13:57:46 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.821	95

First fit	CPM	ERROR		
Equilibrium CPM=	1895.51	7.70 Percent	Corr. coefficient=	0.999
CPM at sep time=	792.02	12.19 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.821	3.766	0	60.59	19	1475.58	1482.64	-0.476	0.84	1.0000
123.890	5.835	27451	15.58	19	1663.86	1653.23	0.643	0.81	0.6206
124.826	6.771	30832	16.91	19	1722.34	1705.52	0.986	0.71	0.5954
125.869	7.814	0	23.13	19	1745.86	1750.67	-0.274	0.91	0.6222
126.769	8.714	30305	16.05	19	1784.12	1780.77	0.188	0.94	0.5527
128.862	10.807	19603	10.21	19	1814.41	1828.83	-0.789	0.77	0.4786
129.806	11.751	21842	11.13	19	1854.89	1843.33	0.627	0.82	0.4715
130.878	12.823	31724	16.25	19	1845.21	1856.02	-0.583	0.82	0.5223
131.902	13.847	0	21.14	19	1861.49	1865.25	-0.202	0.94	0.5444
132.774	14.719	23559	11.82	19	1884.19	1871.36	0.686	0.80	0.4661
133.986	15.931	20835	10.47	19	1881.15	1877.88	0.174	0.95	0.4528
135.924	17.869	19823	10.02	19	1870.05	1884.85	-0.785	0.77	0.4520

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9840	
PPT. correction (3)=		1.0173	(recovery = 14.28 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 9.636774E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.9670E+03	2.7470	5.4032E+03	4.1628E+02	7.70 %

LTV 6.0901E+03

9th point MDA 1.3123E+01

26-JUN-95
13:57:58

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-106 Sr
MEW SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.863	95

First fit	CPM	ERROR	
Equilibrium CPM=	1926.03	7.84 Percent	Corr. coefficient= 0.999
CPM at sep time=	774.12	12.93 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.863	3.808	0	54.66	19	1501.17	1499.49	0.112	0.96	1.0000
123.901	5.846	17765	10.10	19	1660.98	1673.72	-0.761	0.78	0.5823
124.894	6.839	20009	10.83	19	1745.43	1731.07	0.830	0.76	0.5451
125.886	7.831	26542	14.09	19	1779.90	1775.37	0.255	0.92	0.5640
126.781	8.726	20561	10.80	19	1799.01	1806.57	-0.419	0.88	0.5170
128.907	10.852	0	19.67	19	1855.16	1857.29	-0.115	0.96	0.5656
129.814	11.759	25349	12.93	19	1853.02	1871.68	-0.997	0.71	0.5146
130.890	12.835	30993	15.48	19	1892.70	1884.93	0.412	0.87	0.5177
131.917	13.862	22104	10.91	19	1915.45	1894.54	1.104	0.69	0.4651
132.783	14.728	24051	12.03	19	1890.00	1900.88	-0.572	0.83	0.4882
133.978	15.923	20740	10.34	19	1896.22	1907.58	-0.596	0.83	0.4666
135.931	17.876	31682	15.53	19	1928.80	1914.92	0.724	0.78	0.5010

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9724	
PPT. correction (3)=		1.0070	(recovery = 17.64 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 9.427378E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0430E+03	2.7470	5.6122E+03	4.3997E+02	7.84 %

LTV 6.3381E+03

12th point MDA 1.4666E+01

26-JUN-95 TMA Corporation 1037-107 Sr
13:58:11 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.901	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1882.74	8.28 Percent	Corr. coefficient=	0.999
CPM at sep time=	774.91	13.40 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.901	3.846	0	22.98	19	1470.01	1475.39	-0.365	0.89	1.0000
123.908	5.853	18081	10.31	19	1656.05	1640.53	0.946	0.74	0.6646
124.902	6.847	21429	12.00	19	1686.59	1695.65	-0.534	0.84	0.6713
125.896	7.841	0	24.11	19	1751.98	1738.35	0.784	0.76	0.7379
126.789	8.734	20137	10.79	19	1763.28	1768.09	-0.272	0.92	0.6041
128.921	10.866	19512	10.18	19	1811.29	1816.82	-0.304	0.91	0.5677
129.824	11.769	20975	10.82	19	1832.13	1830.60	0.084	0.98	0.5659
130.901	12.846	0	22.81	19	1834.95	1843.35	-0.456	0.85	0.6715
131.925	13.870	0	18.71	19	1869.60	1852.54	0.921	0.72	0.6231
132.792	14.737	0	18.10	19	1854.06	1858.62	-0.246	0.92	0.6279
133.971	15.916	21210	10.88	19	1842.57	1864.97	-1.201	0.66	0.5611
135.942	17.887	0	20.86	19	1882.82	1872.09	0.573	0.82	0.6296

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)=		9.627E-01	
Chemical yield (2)=		0.9661	
PPT. correction (3)=		0.9967	(recovery = 21.03 mgs)
Aliquot (4)=		1.000	smpl

Product (1X2X3X4) = 9.269671E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.0311E+03	2.7470	5.5794E+03	4.6220E+02	8.28 %

LTV 6.3420E+03

12th point MDA 1.2794E+01

26-JUN-95 TMA Corporation 1037-108 Sr
13:58:23 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.917	95

First fit	CPM	ERROR		
Equilibrium CPM=	1899.56	8.80 Percent	Corr. coefficient= 0.999	
CPM at sep time=	740.65	15.05 Percent	Chi square prob.= 0.000	

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.917	3.862	17775	11.34	19	1479.97	1474.76	0.354	0.90	1.0000
123.916	5.861	21818	12.46	19	1653.49	1646.76	0.409	0.88	0.8475
124.910	6.855	17985	10.03	19	1693.61	1704.21	-0.622	0.82	0.7663
125.913	7.858	24400	13.32	19	1730.48	1749.04	-1.061	0.69	0.7966
126.797	8.742	0	49.94	19	1779.40	1780.29	-0.050	0.98	0.9822
128.928	10.873	19380	10.01	19	1829.72	1830.72	-0.055	0.98	0.6706
129.831	11.776	21709	11.15	19	1840.18	1845.11	-0.267	0.92	0.6837
130.917	12.862	0	26.33	19	1869.55	1858.54	0.592	0.81	0.8062
131.938	13.883	28348	14.38	19	1863.39	1868.06	-0.250	0.92	0.7130
132.804	14.749	0	17.39	19	1884.75	1874.41	0.552	0.83	0.7301
133.964	15.909	20487	10.30	19	1880.25	1880.94	-0.037	0.99	0.6448
135.957	17.902	20268	10.11	19	1895.19	1888.46	0.356	0.90	0.6329

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9545	
PPT. correction	(3)=	0.9869	(recovery = 24.24 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.068174E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.0948E+03	2.7470	5.7543E+03	5.0628E+02	8.80 %

LTV 6.5896E+03

5th point MDA 1.0919E+01

26-JUN-95 TMA Corporation 1037-109 Sr
13:58:35 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04

CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.926	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1856.79	8.52 Percent	Corr. coefficient=	0.999
CPM at sep time=	680.34	15.47 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.926	3.871	23448	15.50	19	1427.86	1426.72	0.080	0.98	1.0000
123.925	5.870	22970	13.51	19	1605.11	1600.79	0.270	0.92	0.7872
124.918	6.863	28228	16.13	19	1652.59	1659.01	-0.387	0.88	0.7819
125.923	7.868	26024	14.46	19	1699.91	1704.40	-0.263	0.92	0.7246
126.832	8.777	19569	10.61	19	1742.45	1736.39	0.349	0.90	0.6403
128.935	10.880	32320	17.16	19	1779.64	1787.08	-0.417	0.87	0.6961
129.899	11.844	0	17.98	19	1799.20	1802.52	-0.184	0.94	0.6899
130.936	12.881	27478	14.36	19	1808.33	1815.31	-0.385	0.88	0.6490
131.953	13.898	20326	10.41	19	1845.49	1824.93	1.127	0.68	0.5769
132.817	14.762	24576	12.72	19	1826.05	1831.33	-0.288	0.91	0.6192
133.944	15.889	32150	16.53	19	1838.28	1837.80	0.027	0.99	0.6517
135.964	17.909	25665	13.11	19	1850.36	1845.54	0.261	0.92	0.6097

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9444	
PPT. correction	(3)=	0.9772	(recovery = 27.41 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.884331E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0900E+03	2.7470	5.7411E+03	4.8896E+02	8.52 %

LTV 6.5479E+03

11th point MDA 1.5502E+01

26-JUN-95 TMA Corporation 1037-110 Sr
15:29:24 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.954	95

	CPM	ERROR	
First fit			
Equilibrium CPM=	1828.32	8.54 Percent	Corr. coefficient= 0.999
CPM at sep time=	661.42	15.71 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.954	3.899	26194	17.52	19	1411.00	1404.91	0.434	0.87	1.0000
123.935	5.880	18914	11.37	19	1570.15	1575.01	-0.309	0.91	0.7416
124.930	6.875	0	20.84	19	1637.03	1632.84	0.257	0.92	0.8007
125.933	7.878	21508	12.30	19	1651.26	1677.53	-1.566	0.56	0.6945
126.840	8.785	19320	10.65	19	1713.60	1709.15	0.260	0.93	0.6265
128.948	10.893	18640	10.01	19	1759.35	1759.37	-0.001	1.00	0.5886
129.953	11.898	26861	14.33	19	1771.12	1775.23	-0.231	0.93	0.6390
130.947	12.892	18919	10.04	19	1780.58	1787.29	-0.375	0.89	0.5770
131.961	13.906	20323	10.66	19	1801.63	1796.79	0.270	0.92	0.5748
132.872	14.817	0	22.96	19	1812.31	1803.46	0.491	0.85	0.6812
133.956	15.901	20054	10.38	19	1825.94	1809.53	0.907	0.74	0.5576
135.974	17.919	0	18.71	19	1814.34	1817.20	-0.157	0.95	0.6513

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9388	
PPT. correction	(3)=	0.9569	(recovery = 34.06 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.648351E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.1141E+03	2.7470	5.8074E+03	4.9584E+02	8.54 %

LTV 6.6255E+03

10th point MDA 1.3691E+01

26-JUN-95 TMA Corporation 1037-111 Sr
15:29:43 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.668	95

First fit	CPM	ERROR	
Equilibrium CPM=	1832.15	9.82 Percent	Corr. coefficient= 0.999
CPM at sep time=	640.79	18.76 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.668	4.613	0	26.59	19	1475.82	1473.29	0.172	0.95	1.0000
123.943	5.888	0	21.64	19	1570.05	1574.30	-0.270	0.92	0.8569
124.944	6.889	19625	11.30	19	1639.92	1633.12	0.416	0.88	0.6769
125.974	7.919	23712	13.37	19	1674.97	1679.85	-0.290	0.91	0.6823
126.847	8.792	19245	10.68	19	1702.06	1710.70	-0.505	0.85	0.6251
128.955	10.900	18775	10.06	19	1763.31	1761.89	0.081	0.98	0.5785
129.963	11.908	23785	12.57	19	1788.02	1778.08	0.559	0.84	0.5994
130.953	12.898	27550	14.59	19	1784.31	1790.34	-0.337	0.90	0.6243
131.969	13.914	0	27.99	19	1801.42	1800.07	0.075	0.98	0.7051
132.888	14.833	0	19.43	19	1800.95	1806.86	-0.327	0.90	0.6556
133.935	15.880	21466	11.11	19	1826.08	1812.87	0.729	0.79	0.5596
136.015	17.960	23455	12.20	19	1816.93	1820.91	-0.219	0.93	0.5784

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9487	
PPT. correction	(3)=	0.9453	(recovery = 37.86 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.633354E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1222E+03	2.7470	5.8296E+03	5.7271E+02	9.82 %

LTV 6.7746E+03

9th point MDA 1.2650E+01

26-JUN-95
15:30:15

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-112 Sr
MEW SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.688	95

First fit	CPM	ERROR	
Equilibrium CPM=	1718.02	10.97 Percent	Corr. coefficient= 0.999
CPM at sep time=	601.63	21.02 Percent	Chi square prob.= 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.688	4.633	10122	6.95	19	1374.28	1382.89	-0.622	0.84	0.9286
123.958	5.903	17143	10.89	19	1485.13	1477.10	0.544	0.85	0.9391
124.953	6.898	28335	17.39	19	1537.73	1532.05	0.371	0.89	1.0000
125.984	7.929	24923	14.95	19	1573.65	1575.69	-0.130	0.96	0.9254
126.870	8.815	18084	10.64	19	1604.63	1604.89	-0.016	1.00	0.8171
128.962	10.907	21012	12.07	19	1643.88	1652.30	-0.510	0.85	0.8115
129.972	11.917	31354	17.59	19	1683.57	1667.48	0.965	0.71	0.8547
130.964	12.909	22124	12.35	19	1692.10	1678.94	0.784	0.77	0.7765
131.988	13.933	25498	14.40	19	1672.37	1688.07	-0.930	0.72	0.8243
132.902	14.847	0	31.99	19	1694.21	1694.43	-0.013	1.00	0.9552
133.918	15.863	20693	11.59	19	1686.41	1699.87	-0.791	0.77	0.7680
136.024	17.969	18286	10.09	19	1711.97	1707.51	0.261	0.93	0.7204

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8825	
PPT. correction	(3)=	0.9436	(recovery = 38.42 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 8.016442E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1431E+03	2.7470	5.8871E+03	6.4565E+02	10.97 %

LTV 6.9525E+03

10th point MDA 1.2439E+01

26-JUN-95
15:30:42

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-113 Sr
MEW SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.692	95

First fit	CPM	ERROR		
Equilibrium CPM=	1656.83	9.90 Percent	Corr. coefficient=	0.999
CPM at sep time=	610.63	17.95 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.692	4.637	0	38.63	19	1340.73	1343.99	-0.242	0.92	1.0000
123.966	5.911	22154	14.47	19	1444.04	1431.60	0.869	0.75	0.7048
124.965	6.910	16592	10.70	19	1462.78	1482.99	-1.362	0.62	0.6341
125.994	7.939	16496	10.03	19	1552.30	1523.73	1.875	0.51	0.5623
126.878	8.823	29632	18.03	19	1551.19	1551.10	0.006	1.00	0.6568
128.971	10.916	18540	11.08	19	1579.56	1595.38	-0.992	0.72	0.5615
129.985	11.930	18266	10.79	19	1598.24	1609.60	-0.706	0.80	0.5462
130.973	12.918	20084	11.80	19	1607.01	1620.29	-0.820	0.76	0.5547
131.999	13.944	0	38.60	19	1629.26	1628.90	0.022	0.99	0.7010
132.924	14.869	0	33.12	19	1642.48	1634.85	0.467	0.85	0.6725
133.927	15.872	19428	11.12	19	1649.95	1639.86	0.616	0.82	0.5215
136.031	17.976	19182	10.96	19	1652.84	1647.00	0.355	0.90	0.5178

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.8954	
PPT. correction	(3)=	0.9220	(recovery = 45.48 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 7.948105E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.0846E+03	2.7470	5.7263E+03	5.6690E+02	9.90 %

LTV 6.6617E+03

9th point MDA 1.1638E+01

26-JUN-95 TMA Corporation 1037-114 Sr
15:31:02 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.719	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1684.50	10.62 Percent	Corr. coefficient=	0.999
CPM at sep time=	569.82	21.02 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.719	4.664	16139	11.32	19	1345.03	1352.70	-0.568	0.84	0.9352
123.976	5.921	18645	12.10	19	1453.44	1445.10	0.577	0.84	0.8346
124.973	6.918	0	35.78	19	1509.01	1500.08	0.595	0.81	1.0000
126.002	7.947	16437	10.09	19	1537.42	1542.99	-0.361	0.90	0.7198
126.891	8.836	0	31.92	19	1570.46	1572.37	-0.122	0.96	0.9108
128.979	10.924	21872	12.76	19	1618.42	1619.18	-0.047	0.99	0.7034
129.992	11.937	19273	11.16	19	1630.72	1634.28	-0.218	0.94	0.6696
130.981	12.926	28321	16.26	19	1644.82	1645.67	-0.051	0.98	0.7267
132.026	13.971	28668	16.38	19	1652.84	1654.89	-0.124	0.96	0.7218
132.948	14.893	0	26.44	19	1665.07	1661.22	0.232	0.93	0.7904
133.909	15.854	19526	11.07	19	1665.89	1666.33	-0.026	0.99	0.6440
136.040	17.985	17855	10.08	19	1672.97	1674.05	-0.064	0.98	0.6228

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01	
Chemical yield (2)	=	0.9125	
PPT. correction (3)	=	0.8992	(recovery = 52.97 mgs)
Aliquot (4)	=	1.000	smpl

Product (1X2X3X4) = 7.899066E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
2.1325E+03	2.7470	5.8581E+03	6.2199E+02	10.62 %

LTV 6.8843E+03

10th point MDA 1.3914E+01

26-JUN-95
15:31:24

TMA Corporation
Pb210 Least Squares Analysis
PBBI V 1.04

1037-115 Sr
MEW SR90 PRIMARY CAL

CS

Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	122.728	95

First fit	CPM	ERROR	
Equilibrium CPM=	1422.54	11.28 Percent	Corr. coefficient= 0.999
CPM at sep time=	528.80	20.36 Percent	Chi square prob. = 0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
122.728	4.673	12439	10.12	19	1157.71	1157.10	0.053	0.99	1.0000
123.985	5.930	13030	10.01	19	1225.71	1231.00	-0.430	0.88	0.9053
124.998	6.943	15094	11.13	19	1277.62	1275.31	0.181	0.95	0.8723
126.157	8.102	27680	19.72	19	1322.85	1313.65	0.700	0.79	0.9592
126.914	8.859	14290	10.09	19	1334.87	1333.00	0.140	0.96	0.7861
128.988	10.933	16663	11.55	19	1360.03	1370.29	-0.749	0.79	0.7930
130.001	11.946	20058	13.76	19	1374.37	1382.38	-0.579	0.83	0.8183
130.993	12.938	26813	18.28	19	1383.06	1391.51	-0.607	0.82	0.8710
132.038	13.983	14990	10.00	19	1413.72	1398.87	1.062	0.71	0.7114
132.966	14.911	18500	12.43	19	1403.61	1403.94	-0.024	0.99	0.7673
133.901	15.846	16125	10.77	19	1412.04	1407.95	0.291	0.92	0.7288
136.047	17.992	20992	13.99	19	1415.14	1414.18	0.068	0.98	0.7815

Elapsed time (days)	=	440.555
Lambda	=	8.626E-05 Reciprocal days
exp(-lambda X t) (1)	=	9.627E-01
Chemical yield (2)	=	0.7656
PPT. correction (3)	=	0.9082 (recovery = 50.00 mgs)
Aliquot (4)	=	1.000 smpl

Product (1X2X3X4) = 6.694534E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.1249E+03	2.7470	5.8372E+03	6.5846E+02	11.28 %

LTV 6.9237E+03

8th point MDA 2.0853E+01

26-JUN-95 TMA Corporation 1037-116 Sr
15:31:48 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.938	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1270.59	7.85 Percent	Corr. coefficient=	0.999
CPM at sep time=	448.45	14.58 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.938	3.883	24598	23.81	19	970.72	971.20	-0.049	0.99	1.0000
122.756	4.701	15821	14.43	19	1031.19	1028.27	0.284	0.92	0.7854
123.993	5.938	0	53.45	19	1094.31	1095.44	-0.104	0.97	0.9589
125.006	6.951	20518	17.08	19	1130.19	1135.50	-0.468	0.86	0.7040
126.186	8.131	13517	10.85	19	1172.58	1171.09	0.128	0.97	0.5792
126.921	8.866	0	38.94	19	1193.66	1188.58	0.427	0.86	0.7727
128.997	10.942	15058	11.67	19	1214.97	1222.63	-0.626	0.83	0.5578
130.010	11.955	0	50.76	19	1236.86	1233.85	0.244	0.92	0.7601
131.006	12.951	0	49.08	19	1240.35	1242.21	-0.150	0.95	0.7518
132.045	13.990	31075	23.41	19	1250.38	1248.87	0.121	0.96	0.6386
132.975	14.920	22244	16.67	19	1257.04	1253.52	0.281	0.92	0.5819
133.893	15.838	14955	11.23	19	1254.47	1257.13	-0.211	0.94	0.5223

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.6951	
PPT. correction	(3)=	0.9069	(recovery = 50.44 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 6.069112E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
2.0935E+03	2.7470	5.7509E+03	4.5117E+02	7.85 %

LTV 6.4953E+03

9th point MDA 1.3821E+01

1037 Raw Counting Data, page 1

1037-101 GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.122.651	MEW	19	24.75	34512	1315.49	0.5%	14.3470	0.9532	0
2.123.807	MEW	19	10.78	16167	1413.81	0.8%	14.1859	0.9517	0
3.124.791	MEW	19	10.65	16349	1447.56	0.8%	14.1176	0.9517	0
4.125.774	MEW	19	12.04	18829	1474.96	0.7%	14.0997	0.9517	0
5.126.724	MEW	19	10.85	17367	1510.40	0.8%	14.0840	0.9520	0
6.128.828	MEW	19	10.61	17388	1546.67	0.8%	14.0838	0.9519	0
7.129.751	MEW	19	27.95	46231	1561.21	0.5%	14.0348	0.9519	0
8.130.767	MEW	19	10.22	16875	1558.50	0.8%	14.0031	0.9519	0
9.131.801	MEW	19	10.02	17022	1603.54	0.8%	14.0027	0.9518	0
10.132.731	MEW	19	10.54	17638	1579.44	0.8%	13.9554	0.9518	0
11.134.015	MEW	19	10.01	16772	1581.41	0.8%	13.9776	0.9518	0
12.135.753	MEW	19	16.77	28331	1594.78	0.6%	14.0064	0.9519	0

1037-102 GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.768	MEW	19	8.04	12353	1450.71	0.9%	14.5005	0.9532	0
2.123.815	MEW	19	12.37	21075	1607.96	0.7%	14.1859	0.9517	0
3.124.799	MEW	19	12.15	21401	1662.92	0.7%	14.1176	0.9517	0
4.125.783	MEW	19	24.08	43666	1712.41	0.5%	14.0997	0.9517	0
5.126.731	MEW	19	10.36	19042	1736.39	0.7%	14.0840	0.9520	0
6.128.836	MEW	19	13.49	25498	1785.90	0.6%	14.0838	0.9519	0
7.129.772	MEW	19	14.65	27961	1803.52	0.6%	14.0348	0.9519	0
8.130.775	MEW	19	18.16	34893	1815.76	0.5%	14.0031	0.9519	0
9.131.809	MEW	19	18.40	35360	1815.73	0.5%	14.0027	0.9518	0
10.132.738	MEW	19	10.94	20989	1812.74	0.7%	13.9554	0.9518	0
11.134.007	MEW	19	10.24	19853	1831.96	0.7%	13.9776	0.9518	0
12.135.767	MEW	19	15.08	29390	1841.85	0.6%	14.0064	0.9519	0

1037-103 GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.774	MEW	19	57.40	89430	1471.28	0.3%	14.5005	0.9532	0
2.123.824	MEW	19	14.61	25260	1631.98	0.6%	14.1859	0.9517	0
3.124.808	MEW	19	13.13	23411	1683.49	0.7%	14.1176	0.9517	0
4.125.800	MEW	19	17.80	33164	1759.79	0.6%	14.0997	0.9517	0
5.126.739	MEW	19	24.23	45382	1769.65	0.5%	14.0840	0.9520	0
6.128.846	MEW	19	10.84	21111	1840.51	0.7%	14.0838	0.9519	0
7.129.782	MEW	19	13.12	25466	1834.37	0.6%	14.0348	0.9519	0
8.130.788	MEW	19	11.70	22819	1843.29	0.7%	14.0031	0.9519	0
9.131.823	MEW	19	21.27	41994	1865.78	0.5%	14.0027	0.9518	0
10.132.746	MEW	19	12.99	25563	1859.71	0.6%	13.9554	0.9518	0
11.134.000	MEW	19	10.00	19912	1881.86	0.7%	13.9776	0.9518	0
12.135.898	MEW	19	15.84	31254	1864.85	0.6%	14.0064	0.9519	0

1037-104 GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.815	MEW	19	8.40	14031	1578.36	0.9%	14.5005	0.9532	0
2.123.835	MEW	19	10.02	18565	1749.84	0.7%	14.1859	0.9517	0
3.124.817	MEW	19	12.89	24306	1781.17	0.6%	14.1176	0.9517	0
4.125.813	MEW	19	16.77	32702	1842.47	0.6%	14.0997	0.9517	0
5.126.756	MEW	19	18.42	36539	1875.03	0.5%	14.0840	0.9520	0
6.128.853	MEW	19	11.15	22858	1938.12	0.7%	14.0838	0.9519	0
7.129.791	MEW	19	20.98	43233	1948.29	0.5%	14.0348	0.9519	0
8.130.797	MEW	19	27.45	56413	1943.03	0.4%	14.0031	0.9519	0
9.131.892	MEW	19	13.93	28754	1951.30	0.6%	14.0027	0.9518	0
10.132.756	MEW	19	12.65	26268	1963.09	0.6%	13.9554	0.9518	0
11.133.994	MEW	19	7.95	16614	1975.72	0.8%	13.9776	0.9518	0
12.135.909	MEW	19	20.48	42928	1981.93	0.5%	14.0064	0.9519	0

1037-105 GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.821	MEW	19	60.59	94693	1475.88	0.3%	14.5005	0.9532	0
2.123.890	MEW	19	15.58	27451	1663.37	0.6%	14.1859	0.9517	0
3.124.826	MEW	19	16.91	30832	1721.83	0.6%	14.1176	0.9517	0
4.125.869	MEW	19	23.13	42744	1745.36	0.5%	14.0997	0.9517	0
5.126.769	MEW	19	16.05	30305	1784.11	0.6%	14.0840	0.9520	0
6.128.862	MEW	19	10.21	19603	1814.31	0.7%	14.0838	0.9519	0

7.129.806	MEW	19	11.13	21842	1854.78	0.7%	14.0348	0.9519	0
8.130.878	MEW	19	16.25	31724	1845.10	0.6%	14.0031	0.9519	0
9.131.902	MEW	19	21.14	41632	1861.04	0.5%	14.0027	0.9518	0
10.132.774	MEW	19	11.82	23559	1883.74	0.7%	13.9554	0.9518	0
11.133.986	MEW	19	10.47	20835	1880.69	0.7%	13.9776	0.9518	0
12.135.924	MEW	19	10.02	19823	1869.84	0.7%	14.0064	0.9519	0

1037-106

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.863	MEW	19	54.66	86893	1501.48	0.3%	14.5005	0.9532	0
2.123.901	MEW	19	10.10	17765	1660.49	0.8%	14.1859	0.9517	0
3.124.894	MEW	19	10.83	20009	1744.91	0.7%	14.1176	0.9517	0
4.125.886	MEW	19	14.09	26542	1779.39	0.6%	14.0997	0.9517	0
5.126.781	MEW	19	10.80	20561	1799.00	0.7%	14.0840	0.9520	0
6.128.907	MEW	19	19.67	38608	1855.06	0.5%	14.0838	0.9519	0
7.129.814	MEW	19	12.93	25349	1852.91	0.6%	14.0348	0.9519	0
8.130.890	MEW	19	15.48	30993	1892.59	0.6%	14.0031	0.9519	0
9.131.917	MEW	19	10.91	22104	1914.99	0.7%	14.0027	0.9518	0
10.132.783	MEW	19	12.03	24051	1889.55	0.7%	13.9554	0.9518	0
11.133.978	MEW	19	10.34	20740	1895.76	0.7%	13.9776	0.9518	0
12.135.931	MEW	19	15.53	31682	1928.58	0.6%	14.0064	0.9519	0

1037-107

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.901	MEW	19	22.98	35780	1470.31	0.5%	14.5005	0.9532	0
2.123.908	MEW	19	10.31	18081	1655.56	0.8%	14.1859	0.9517	0
3.124.902	MEW	19	12.00	21429	1686.10	0.7%	14.1176	0.9517	0
4.125.896	MEW	19	24.11	44710	1751.48	0.5%	14.0997	0.9517	0
5.126.789	MEW	19	10.79	20137	1763.27	0.7%	14.0840	0.9520	0
6.128.921	MEW	19	10.18	19512	1811.18	0.7%	14.0838	0.9519	0
7.129.824	MEW	19	10.82	20975	1832.02	0.7%	14.0348	0.9519	0
8.130.901	MEW	19	22.81	44285	1834.84	0.5%	14.0031	0.9519	0
9.131.925	MEW	19	18.71	37006	1869.15	0.5%	14.0027	0.9518	0
10.132.792	MEW	19	18.10	35503	1853.61	0.5%	13.9554	0.9518	0
11.133.971	MEW	19	10.88	21210	1842.12	0.7%	13.9776	0.9518	0
12.135.942	MEW	19	20.86	41548	1882.61	0.5%	14.0064	0.9519	0

1037-108

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.917	MEW	19	11.34	17775	1480.28	0.8%	14.5005	0.9532	0
2.123.916	MEW	19	12.46	21818	1653.00	0.7%	14.1859	0.9517	0
3.124.910	MEW	19	10.03	17985	1693.11	0.8%	14.1176	0.9517	0
4.125.913	MEW	19	13.32	24400	1729.98	0.6%	14.0997	0.9517	0
5.126.797	MEW	19	49.94	94047	1779.39	0.3%	14.0840	0.9520	0
6.128.928	MEW	19	10.01	19380	1829.62	0.7%	14.0838	0.9519	0
7.129.831	MEW	19	11.15	21709	1840.07	0.7%	14.0348	0.9519	0
8.130.917	MEW	19	26.33	52076	1869.44	0.4%	14.0031	0.9519	0
9.131.938	MEW	19	14.38	28348	1862.94	0.6%	14.0027	0.9518	0
10.132.804	MEW	19	17.39	34671	1884.29	0.5%	13.9554	0.9518	0
11.133.964	MEW	19	10.30	20487	1879.80	0.7%	13.9776	0.9518	0
12.135.957	MEW	19	10.11	20268	1894.97	0.7%	14.0064	0.9519	0

1037-109

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.121.926	MEW	19	15.50	23448	1428.15	0.7%	14.5005	0.9532	0
2.123.925	MEW	19	13.51	22970	1604.63	0.7%	14.1859	0.9517	0
3.124.918	MEW	19	16.13	28228	1652.10	0.6%	14.1176	0.9517	0
4.125.923	MEW	19	14.46	26024	1699.42	0.6%	14.0997	0.9517	0
5.126.832	MEW	19	10.61	19569	1742.45	0.7%	14.0840	0.9520	0
6.128.935	MEW	19	17.16	32320	1779.53	0.6%	14.0838	0.9519	0
7.129.899	MEW	19	17.98	34233	1799.09	0.5%	14.0348	0.9519	0
8.130.936	MEW	19	14.36	27478	1808.23	0.6%	14.0031	0.9519	0
9.131.953	MEW	19	10.41	20326	1845.05	0.7%	14.0027	0.9518	0
10.132.817	MEW	19	12.72	24576	1825.61	0.6%	13.9554	0.9518	0
11.133.944	MEW	19	16.53	32150	1837.84	0.6%	13.9776	0.9518	0
12.135.964	MEW	19	13.11	25665	1850.16	0.6%	14.0064	0.9519	0

1037-110

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF

1.121.954	MEW	19	17.52	26194	1411.30	0.6%	14.5005	0.9532	0
2.123.935	MEW	19	11.37	18914	1569.68	0.7%	14.1859	0.9517	0
3.124.930	MEW	19	20.84	36130	1636.54	0.5%	14.1176	0.9517	0
4.125.933	MEW	19	12.30	21508	1650.79	0.7%	14.0997	0.9517	0
5.126.840	MEW	19	10.65	19320	1713.59	0.7%	14.0840	0.9520	0
6.128.948	MEW	19	10.01	18640	1759.25	0.7%	14.0838	0.9519	0
7.129.953	MEW	19	14.33	26861	1771.02	0.6%	14.0348	0.9519	0
8.130.947	MEW	19	10.04	18919	1780.48	0.7%	14.0031	0.9519	0
9.131.961	MEW	19	10.66	20323	1801.20	0.7%	14.0027	0.9518	0
10.132.872	MEW	19	22.96	44029	1811.87	0.5%	13.9554	0.9518	0
11.133.956	MEW	19	10.38	20054	1825.50	0.7%	13.9776	0.9518	0
12.135.974	MEW	19	18.71	35920	1814.14	0.5%	14.0064	0.9519	0

1037-111 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.122.668	MEW	19	26.59	41559	1476.13	0.5%	14.3470	0.9532	0
2.123.943	MEW	19	21.64	35996	1569.59	0.5%	14.1859	0.9517	0
3.124.944	MEW	19	11.30	19625	1639.44	0.7%	14.1176	0.9517	0
4.125.974	MEW	19	13.37	23712	1674.49	0.7%	14.0997	0.9517	0
5.126.847	MEW	19	10.68	19245	1702.06	0.7%	14.0840	0.9520	0
6.128.955	MEW	19	10.06	18775	1763.21	0.7%	14.0838	0.9519	0
7.129.963	MEW	19	12.57	23785	1787.91	0.7%	14.0348	0.9519	0
8.130.953	MEW	19	14.59	27550	1784.21	0.6%	14.0031	0.9519	0
9.131.969	MEW	19	27.99	53356	1800.99	0.4%	14.0027	0.9518	0
10.132.888	MEW	19	19.43	37028	1800.52	0.5%	13.9554	0.9518	0
11.133.935	MEW	19	11.11	21466	1825.64	0.7%	13.9776	0.9518	0
12.136.015	MEW	19	12.20	23455	1816.72	0.7%	14.0064	0.9519	0

1037-112 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.122.688	MEW	19	6.95	10122	1374.57	1.0%	14.3470	0.9532	0
2.123.958	MEW	19	10.89	17143	1484.69	0.8%	14.1859	0.9517	0
3.124.953	MEW	19	17.39	28335	1537.28	0.6%	14.1176	0.9517	0
4.125.984	MEW	19	14.95	24923	1573.19	0.6%	14.0997	0.9517	0
5.126.870	MEW	19	10.64	18084	1604.63	0.8%	14.0840	0.9520	0
6.128.962	MEW	19	12.07	21012	1643.78	0.7%	14.0838	0.9519	0
7.129.972	MEW	19	17.59	31354	1683.47	0.6%	14.0348	0.9519	0
8.130.964	MEW	19	12.35	22124	1692.00	0.7%	14.0031	0.9519	0
9.131.988	MEW	19	14.40	25498	1671.97	0.6%	14.0027	0.9518	0
10.132.902	MEW	19	31.99	57377	1693.81	0.4%	13.9554	0.9518	0
11.133.918	MEW	19	11.59	20693	1686.01	0.7%	13.9776	0.9518	0
12.136.024	MEW	19	10.09	18286	1711.77	0.7%	14.0064	0.9519	0

1037-113 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.122.692	MEW	19	38.63	54901	1341.01	0.4%	14.3470	0.9532	0
2.123.966	MEW	19	14.47	22154	1443.61	0.7%	14.1859	0.9517	0
3.124.965	MEW	19	10.70	16592	1462.35	0.8%	14.1176	0.9517	0
4.125.994	MEW	19	10.03	16496	1551.85	0.8%	14.0997	0.9517	0
5.126.878	MEW	19	18.03	29632	1551.18	0.6%	14.0840	0.9520	0
6.128.971	MEW	19	11.08	18540	1579.47	0.7%	14.0838	0.9519	0
7.129.985	MEW	19	10.79	18266	1598.15	0.7%	14.0348	0.9519	0
8.130.973	MEW	19	11.80	20084	1606.91	0.7%	14.0031	0.9519	0
9.131.999	MEW	19	38.60	66601	1628.87	0.4%	14.0027	0.9518	0
10.132.924	MEW	19	33.12	57604	1642.09	0.4%	13.9554	0.9518	0
11.133.927	MEW	19	11.12	19428	1649.56	0.7%	13.9776	0.9518	0
12.136.031	MEW	19	10.96	19182	1652.66	0.7%	14.0064	0.9519	0

1037-114 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.122.719	MEW	19	11.32	16139	1345.31	0.8%	14.3470	0.9532	0
2.123.976	MEW	19	12.10	18645	1453.01	0.7%	14.1859	0.9517	0
3.124.973	MEW	19	35.78	57220	1508.57	0.4%	14.1176	0.9517	0
4.126.002	MEW	19	10.09	16437	1536.98	0.8%	14.0997	0.9517	0
5.126.891	MEW	19	31.92	53106	1570.45	0.4%	14.0840	0.9520	0
6.128.979	MEW	19	12.76	21872	1618.33	0.7%	14.0838	0.9519	0
7.129.992	MEW	19	11.16	19273	1630.62	0.7%	14.0348	0.9519	0
8.130.981	MEW	19	16.26	28321	1644.73	0.6%	14.0031	0.9519	0

9.132.026	MEW	19	16.38	28668	1652.45	0.6%	14.0027	0.9518	0	
10.132.948	MEW	19	26.44	46613	1664.66	0.5%	13.9554	0.9518	0	
11.133.909	MEW	19	11.07	19526	1665.49	0.7%	13.9776	0.9518	0	
12.136.040	MEW	19	10.08	17855	1672.78	0.8%	14.0064	0.9519	0	

1037-115 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.122.728	MEW	19	10.12	12439	1157.95	0.9%	14.3470	0.9532	0	
2.123.985	MEW	19	10.01	13030	1225.35	0.9%	14.1859	0.9517	0	
3.124.998	MEW	19	11.13	15094	1277.24	0.8%	14.1176	0.9517	0	
4.126.157	MEW	19	19.72	27680	1322.47	0.6%	14.0997	0.9517	0	
5.126.914	MEW	19	10.09	14290	1334.86	0.8%	14.0840	0.9520	0	
6.128.988	MEW	19	11.55	16663	1359.95	0.8%	14.0838	0.9519	0	
7.130.001	MEW	19	13.76	20058	1374.29	0.7%	14.0348	0.9519	0	
8.130.993	MEW	19	18.28	26813	1382.98	0.6%	14.0031	0.9519	0	
9.132.038	MEW	19	10.00	14990	1413.38	0.8%	14.0027	0.9518	0	
10.132.966	MEW	19	12.43	18500	1403.27	0.7%	13.9554	0.9518	0	
11.133.901	MEW	19	10.77	16125	1411.70	0.8%	13.9776	0.9518	0	
12.136.047	MEW	19	13.99	20992	1414.98	0.7%	14.0064	0.9519	0	

1037-116 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.121.938	MEW	19	23.81	24598	970.92	0.7%	14.5005	0.9532	0	
2.122.756	MEW	19	14.43	15821	1031.41	0.8%	14.3470	0.9532	0	
3.123.993	MEW	19	53.45	62198	1093.98	0.4%	14.1859	0.9517	0	
4.125.006	MEW	19	17.08	20518	1129.85	0.7%	14.1176	0.9517	0	
5.126.186	MEW	19	10.85	13517	1172.25	0.9%	14.0997	0.9517	0	
6.126.921	MEW	19	38.94	49373	1193.65	0.5%	14.0840	0.9520	0	
7.128.997	MEW	19	11.67	15058	1214.90	0.8%	14.0838	0.9519	0	
8.130.010	MEW	19	50.76	66661	1236.79	0.4%	14.0348	0.9519	0	
9.131.006	MEW	19	49.08	64633	1240.28	0.4%	14.0031	0.9519	0	
10.132.045	MEW	19	23.41	31075	1250.08	0.6%	14.0027	0.9518	0	
11.132.975	MEW	19	16.67	22244	1256.73	0.7%	13.9554	0.9518	0	
12.133.893	MEW	19	11.23	14955	1254.17	0.8%	13.9776	0.9518	0	
13.136.058	MEW	19	11.49	15593	1278.48	0.8%	14.0064	0.9519	0	

1037-201 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.287	LBG	3	13.69	9009	682.02	1.1%	0.4134	1.0370	0	*HELD*
2.118.810	LBG	15	21.96	18006	842.29	0.7%	0.6587	1.0281	0	
3.123.022	LBG	3	13.37	15926	1234.75	0.8%	0.4134	1.0369	0	*HELD*
4.124.142	LBG	16	10.29	13786	1385.58	0.9%	0.5480	1.0346	0	
5.125.234	LBG	3	24.28	30939	1319.10	0.6%	0.4134	1.0355	0	*HELD*
6.127.096	LBG	15	11.14	16187	1491.65	0.8%	0.6587	1.0270	0	
7.129.072	LBG	3	14.13	19081	1391.51	0.7%	0.4212	1.0308	0	*HELD*
8.130.208	LBG	4	11.51	17640	1526.95	0.8%	0.5420	0.9967	0	
9.131.252	LBG	4	10.39	15949	1529.40	0.8%	0.5420	0.9967	0	
10.132.226	LBG	16	11.91	17425	1518.90	0.8%	0.5530	1.0386	0	
11.133.221	LBG	4	10.30	15810	1533.76	0.8%	0.5420	0.9996	0	
12.133.927	LBG	15	10.53	15625	1531.18	0.8%	0.6643	1.0324	0	
13.135.741	LBG	3	16.29	22346	1415.71	0.7%	0.4228	1.0324	0	

1037-202 Sr

GMT	Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.287	LBG	4	13.70	11498	869.65	0.9%	0.5561	1.0369	0	
2.118.810	LBG	16	21.97	20427	961.65	0.7%	0.5480	1.0349	0	
3.119.804	LBG	15	17.12	19115	1148.75	0.7%	0.6587	1.0295	0	
4.123.022	LBG	4	13.37	19430	1508.74	0.7%	0.5498	1.0386	0	
5.124.142	LBG	3	10.29	14462	1454.94	0.8%	0.4134	1.0355	0	*HELD*
6.125.234	LBG	4	24.28	38019	1625.85	0.5%	0.5498	1.0387	0	
7.126.224	LBG	15	10.93	17685	1662.80	0.8%	0.6587	1.0281	0	
8.127.096	LBG	16	11.14	18223	1694.60	0.7%	0.5480	1.0363	0	
9.129.083	LBG	3	12.86	20079	1608.97	0.7%	0.4212	1.0308	0	*HELD*
10.130.208	LBG	3	11.51	17877	1597.95	0.7%	0.4212	1.0291	0	*HELD*
11.131.252	LBG	15	10.39	17661	1746.96	0.8%	0.6643	1.0281	0	
12.132.274	LBG	16	10.71	17928	1737.93	0.7%	0.5530	1.0386	0	
13.133.252	LBG	3	12.59	19268	1577.05	0.7%	0.4212	1.0308	0	
14.133.935	LBG	16	10.20	17313	1766.09	0.8%	0.5530	1.0408	0	
15.135.741	LBG	4	16.30	29295	1801.78	0.6%	0.5509	1.0028	0	

1037-203 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.287	LBG 15	13.70	11515	863.05	0.9%	0.6587	1.0276	0	
2.118.799	LBG 15	14.88	14246	983.60	0.8%	0.6587	1.0281	0	
3.119.804	LBG 16	17.12	19568	1182.96	0.7%	0.5480	1.0355	0	
4.123.151	LBG 15	10.47	16004	1572.92	0.8%	0.6587	1.0295	0	
5.124.142	LBG 4	10.29	16103	1624.87	0.8%	0.5498	1.0387	0	
6.125.252	LBG 3	10.81	16506	1580.74	0.8%	0.4134	1.0355	0	*HELD*
7.126.224	LBG 16	10.93	18582	1759.71	0.7%	0.5480	1.0354	0	
8.127.096	LBG 3	11.13	17515	1625.32	0.8%	0.4134	1.0331	0	*HELD*
9.129.083	LBG 15	12.87	21509	1717.60	0.7%	0.6643	1.0281	0	
10.130.219	LBG 4	10.65	19634	1836.91	0.7%	0.5420	0.9967	0	
11.131.252	LBG 16	10.39	18069	1800.91	0.7%	0.5530	1.0359	0	
12.132.226	LBG 3	11.92	19393	1676.53	0.7%	0.4212	1.0308	0	*HELD*
13.133.229	LBG 4	19.48	35711	1831.90	0.5%	0.5420	0.9996	0	
14.133.896	LBG 3	6.52	10701	1693.48	1.0%	0.4212	1.0321	0	
15.135.741	LBG 15	16.30	28476	1804.57	0.6%	0.6713	1.0334	0	

1037-204 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.287	LBG 16	13.70	11763	887.76	0.9%	0.5480	1.0346	0	
2.118.799	LBG 16	14.88	14500	1007.90	0.8%	0.5480	1.0349	0	
3.119.804	LBG 3	17.11	19410	1175.90	0.7%	0.4134	1.0369	0	
4.123.151	LBG 16	10.47	16871	1667.95	0.8%	0.5480	1.0355	0	
5.124.142	LBG 15	10.29	17463	1748.16	0.8%	0.6587	1.0305	0	
6.125.252	LBG 4	10.81	17900	1719.35	0.7%	0.5498	1.0387	0	
7.126.224	LBG 3	10.92	16874	1598.59	0.8%	0.4134	1.0348	0	*HELD*
8.127.096	LBG 4	11.14	19196	1787.27	0.7%	0.5498	1.0375	0	
9.129.083	LBG 16	12.87	23718	1908.45	0.6%	0.5530	1.0359	0	
10.130.208	LBG 15	11.51	21368	1908.04	0.7%	0.6643	1.0281	0	
11.131.252	LBG 3	10.39	16869	1670.41	0.8%	0.4212	1.0291	0	*HELD*
12.132.235	LBG 4	42.89	82215	1915.53	0.3%	0.5420	0.9996	0	
13.133.221	LBG 15	10.30	19166	1914.81	0.7%	0.6643	1.0294	0	
14.133.901	LBG 3	11.13	19250	1784.62	0.7%	0.4212	1.0321	0	

1037-205 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.826	LBG 3	11.55	10225	917.70	1.0%	0.4134	1.0371	0	
2.119.818	LBG 16	19.01	21675	1180.06	0.7%	0.5480	1.0355	0	
3.123.036	LBG 3	20.38	28376	1443.35	0.6%	0.4134	1.0369	0	*HELD*
4.124.150	LBG 4	11.21	17539	1624.53	0.8%	0.5498	1.0387	0	
5.125.260	LBG 3	12.98	19514	1556.37	0.7%	0.4134	1.0355	0	*HELD*
6.127.104	LBG 15	13.89	23823	1760.80	0.6%	0.6587	1.0270	0	
7.129.092	LBG 3	11.82	18660	1626.83	0.7%	0.4212	1.0308	0	*HELD*
8.130.208	LBG 16	11.52	20505	1843.25	0.7%	0.5530	1.0359	0	
9.131.261	LBG 4	10.37	19154	1840.39	0.7%	0.5420	0.9967	0	
10.132.226	LBG 15	11.91	21180	1829.94	0.7%	0.6643	1.0294	0	
11.133.221	LBG 16	10.30	18371	1851.80	0.7%	0.5530	1.0386	0	
12.133.893	LBG 4	10.38	19350	1872.43	0.7%	0.5420	1.0047	0	
13.135.753	LBG 3	17.07	27687	1674.01	0.6%	0.4228	1.0324	0	

1037-206 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.826	LBG 15	11.55	10831	963.40	1.0%	0.6587	1.0281	0	
2.119.818	LBG 3	19.00	21286	1161.28	0.7%	0.4134	1.0369	0	
3.123.036	LBG 4	20.39	31345	1596.00	0.6%	0.5498	1.0386	0	
4.124.150	LBG 16	11.21	18342	1692.32	0.7%	0.5480	1.0346	0	
5.125.260	LBG 4	13.00	22077	1763.34	0.7%	0.5498	1.0387	0	
6.126.233	LBG 15	10.75	18737	1791.26	0.7%	0.6587	1.0281	0	
7.127.104	LBG 16	13.89	24791	1849.00	0.6%	0.5480	1.0363	0	
8.129.092	LBG 15	11.82	21132	1837.45	0.7%	0.6643	1.0281	0	
9.130.219	LBG 3	10.65	17713	1711.17	0.8%	0.4212	1.0291	0	*HELD*
10.131.261	LBG 3	10.37	16878	1674.52	0.8%	0.4212	1.0291	0	*HELD*
11.132.266	LBG 4	10.57	20400	1928.63	0.7%	0.5420	0.9996	0	
12.133.229	LBG 16	19.49	35294	1880.14	0.5%	0.5530	1.0386	0	
13.133.935	LBG 15	10.19	18746	1898.48	0.7%	0.6643	1.0324	0	
14.135.753	LBG 4	17.07	32667	1918.58	0.6%	0.5509	1.0028	0	

1037-207 Sr PRFD

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF	
1.118.783	LBG 15	20.42	18273	919.31	0.7%	0.6587	1.0281	0	
2.119.818	LBG 4	19.00	21370	1167.55	0.7%	0.5498	1.0386	0	
3.123.158	LBG 15	14.98	22690	1558.64	0.7%	0.6587	1.0295	0	
4.124.150	LBG 3	11.20	16311	1507.65	0.8%	0.4134	1.0355	0	*HELD*
5.125.269	LBG 3	10.58	16317	1596.61	0.8%	0.4134	1.0355	0	*HELD*
6.126.233	LBG 16	10.75	18111	1743.82	0.7%	0.5480	1.0354	0	
7.127.104	LBG 3	13.89	22065	1640.69	0.7%	0.4134	1.0331	0	*HELD*
8.129.062	LBG 3	14.65	23338	1641.63	0.7%	0.4212	1.0308	0	*HELD*
9.130.229	LBG 4	15.73	29136	1845.57	0.6%	0.5420	0.9967	0	
10.131.261	LBG 16	10.37	18372	1834.65	0.7%	0.5530	1.0359	0	
11.132.266	LBG 15	10.57	18512	1802.19	0.7%	0.6643	1.0294	0	
12.133.243	LBG 4	11.78	21516	1825.17	0.7%	0.5420	0.9996	0	
13.133.927	LBG 16	10.54	18732	1849.23	0.7%	0.5530	1.0408	0	
14.135.753	LBG 15	17.08	30590	1850.03	0.6%	0.6713	1.0334	0	

1037-208 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.783	LBG 16	20.50	18610	938.92	0.7%	0.5480	1.0349	0	
2.119.818	LBG 15	19.00	21397	1158.66	0.7%	0.6587	1.0295	0	
3.123.158	LBG 16	14.98	22865	1579.94	0.7%	0.5480	1.0355	0	
4.124.150	LBG 15	11.21	17862	1641.31	0.7%	0.6587	1.0305	0	
5.125.269	LBG 4	10.58	16733	1642.17	0.8%	0.5498	1.0387	0	
6.126.233	LBG 3	10.75	16789	1615.69	0.8%	0.4134	1.0348	0	*HELD*
7.127.104	LBG 4	13.89	23131	1727.23	0.7%	0.5498	1.0375	0	
8.129.092	LBG 16	11.82	20755	1818.36	0.7%	0.5530	1.0359	0	
9.130.229	LBG 3	15.73	24944	1631.49	0.6%	0.4212	1.0291	0	*HELD*
10.131.261	LBG 15	10.37	18462	1829.75	0.7%	0.6643	1.0281	0	
11.132.235	LBG 3	42.88	68890	1655.55	0.4%	0.4212	1.0308	0	*HELD*
12.133.252	LBG 4	12.59	23326	1851.41	0.7%	0.5420	0.9996	0	
13.133.909	LBG 3	10.47	16976	1672.98	0.8%	0.4212	1.0321	0	

1037-209 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.826	LBG 16	11.55	10049	899.84	1.0%	0.5480	1.0349	0	
2.119.833	LBG 3	14.18	14758	1078.78	0.8%	0.4134	1.0369	0	
3.123.051	LBG 3	12.26	16506	1395.64	0.8%	0.4134	1.0369	0	*HELD*
4.124.160	LBG 4	23.09	35853	1612.24	0.5%	0.5498	1.0387	0	
5.125.277	LBG 3	19.18	27763	1498.49	0.6%	0.4134	1.0355	0	*HELD*
6.127.115	LBG 15	13.13	21986	1719.07	0.7%	0.6587	1.0270	0	
7.129.101	LBG 3	13.51	21303	1624.92	0.7%	0.4212	1.0308	0	*HELD*
8.130.219	LBG 16	10.65	18291	1778.53	0.7%	0.5530	1.0359	0	
9.131.269	LBG 4	10.92	19566	1785.27	0.7%	0.5420	0.9967	0	
10.132.235	LBG 15	42.89	74544	1788.45	0.4%	0.6643	1.0294	0	
11.133.229	LBG 15	19.48	34182	1805.64	0.5%	0.6643	1.0294	0	
12.133.901	LBG 4	11.13	19916	1797.32	0.7%	0.5420	1.0047	0	

1037-210 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.908	LBG 3	15.34	12678	856.70	0.9%	0.4134	1.0371	0	
2.119.833	LBG 4	14.18	15150	1109.04	0.8%	0.5498	1.0386	0	
3.123.051	LBG 4	12.26	17561	1487.06	0.8%	0.5498	1.0386	0	
4.124.160	LBG 15	23.10	35498	1582.89	0.5%	0.6587	1.0305	0	
5.125.277	LBG 4	19.19	29768	1610.65	0.6%	0.5498	1.0387	0	
6.126.247	LBG 15	17.18	28376	1697.41	0.6%	0.6587	1.0281	0	
7.127.115	LBG 16	13.13	21946	1731.51	0.7%	0.5480	1.0363	0	
8.129.101	LBG 15	13.51	22459	1708.50	0.7%	0.6643	1.0281	0	
9.130.229	LBG 16	15.73	27081	1782.82	0.6%	0.5530	1.0359	0	
10.131.269	LBG 3	10.92	17059	1607.22	0.8%	0.4212	1.0291	0	*HELD*
11.132.266	LBG 3	10.57	16552	1613.66	0.8%	0.4212	1.0308	0	*HELD*
12.133.243	LBG 16	11.78	20479	1804.92	0.7%	0.5530	1.0386	0	
13.133.943	LBG 15	17.67	30094	1757.53	0.6%	0.6643	1.0324	0	
14.135.767	LBG 3	15.70	24762	1627.79	0.6%	0.4228	1.0324	0	

1037-211 Sr

GMT	Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.118.908	LBG 15	15.35	13812	924.39	0.9%	0.6587	1.0281	0
2.119.833	LBG 16	14.19	15217	1109.84	0.8%	0.5480	1.0355	0

3.123.178	LBG	15	10.82	16313	1551.42	0.8%	0.6587	1.0295	0
4.124.160	LBG	3	23.09	32916	1475.77	0.6%	0.4134	1.0355	0 *HELD*
5.125.278	LBG	15	18.30	29545	1663.04	0.6%	0.6587	1.0305	0
6.126.247	LBG	16	17.18	28030	1688.74	0.6%	0.5480	1.0354	0
7.127.115	LBG	3	13.12	20343	1601.42	0.7%	0.4134	1.0331	0 *HELD*
8.129.101	LBG	16	13.51	23239	1781.29	0.7%	0.5530	1.0359	0
9.130.242	LBG	4	22.43	40862	1815.17	0.5%	0.5420	0.9967	0
10.131.269	LBG	16	10.92	18839	1786.52	0.7%	0.5530	1.0359	0
11.132.226	LBG	4	11.91	21501	1803.98	0.7%	0.5420	0.9996	0
12.133.221	LBG	3	10.30	16832	1683.99	0.8%	0.4212	1.0308	0 *HELD*
13.133.909	LBG	4	10.47	18919	1814.97	0.7%	0.5420	1.0047	0
14.135.767	LBG	4	15.71	28775	1836.27	0.6%	0.5509	1.0028	0

1037-212

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.118.908	LBG	16	15.35	12943	872.05	0.9%	0.5480	1.0349	0
2.119.833	LBG	15	14.19	14464	1048.67	0.8%	0.6587	1.0295	0
3.123.178	LBG	16	10.83	15360	1468.02	0.8%	0.5480	1.0355	0
4.124.182	LBG	3	13.19	17780	1395.45	0.8%	0.4134	1.0355	0 *HELD*
5.125.278	LBG	16	18.31	27694	1564.33	0.6%	0.5480	1.0346	0
6.126.247	LBG	3	16.89	23945	1466.61	0.6%	0.4134	1.0348	0 *HELD*
7.127.115	LBG	4	13.13	20172	1593.42	0.7%	0.5498	1.0375	0
8.129.113	LBG	3	11.82	17684	1541.72	0.8%	0.4212	1.0308	0 *HELD*
9.130.258	LBG	4	23.01	38950	1686.58	0.5%	0.5420	0.9967	0
10.131.269	LBG	15	10.92	17817	1676.83	0.7%	0.6643	1.0281	0
11.132.274	LBG	4	10.70	18270	1706.21	0.7%	0.5420	0.9996	0
12.133.243	LBG	15	11.78	19301	1685.95	0.7%	0.6643	1.0294	0
13.133.943	LBG	16	17.68	28929	1702.50	0.6%	0.5530	1.0408	0
14.135.767	LBG	15	15.71	25460	1673.99	0.6%	0.6713	1.0334	0

1037-213

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.118.920	LBG	3	14.72	10923	769.15	1.0%	0.4134	1.0371	0
2.119.843	LBG	4	14.40	14094	1015.93	0.8%	0.5498	1.0386	0
3.123.061	LBG	3	21.44	24787	1198.39	0.6%	0.4134	1.0369	0 *HELD*
4.124.182	LBG	15	13.20	19008	1483.23	0.7%	0.6587	1.0305	0
5.125.292	LBG	3	23.79	31907	1388.41	0.6%	0.4134	1.0355	0 *HELD*
6.127.125	LBG	15	13.03	19430	1530.80	0.7%	0.6587	1.0270	0
7.129.113	LBG	15	11.83	18789	1632.27	0.7%	0.6643	1.0281	0
8.130.242	LBG	16	22.43	35406	1634.59	0.5%	0.5530	1.0359	0
9.131.279	LBG	4	28.53	45769	1598.38	0.5%	0.5420	0.9967	0
10.132.235	LBG	16	42.89	67465	1633.06	0.4%	0.5530	1.0386	0
11.133.252	LBG	16	12.59	20010	1650.07	0.7%	0.5530	1.0386	0
12.133.918	LBG	3	11.10	16681	1550.58	0.8%	0.4212	1.0321	0 *HELD*

1037-214

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.118.920	LBG	15	14.74	11902	829.46	0.9%	0.6587	1.0281	0
2.119.843	LBG	3	14.40	13442	967.53	0.9%	0.4134	1.0369	0 *HELD*
3.123.061	LBG	4	21.44	27608	1336.78	0.6%	0.5498	1.0386	0
4.124.182	LBG	16	13.20	18810	1473.79	0.7%	0.5480	1.0346	0
5.125.292	LBG	4	23.79	34700	1514.44	0.5%	0.5498	1.0387	0
6.126.260	LBG	15	11.91	18202	1570.55	0.7%	0.6587	1.0281	0
7.127.125	LBG	16	13.03	20020	1591.63	0.7%	0.5480	1.0363	0
8.129.113	LBG	16	11.83	18763	1642.40	0.7%	0.5530	1.0359	0
9.130.242	LBG	3	22.41	32174	1477.06	0.6%	0.4212	1.0291	0 *HELD*
10.131.279	LBG	16	28.54	45200	1640.00	0.5%	0.5530	1.0359	0
11.132.274	LBG	3	10.70	15150	1458.99	0.8%	0.4212	1.0308	0 *HELD*
12.133.252	LBG	15	12.59	20148	1646.69	0.7%	0.6643	1.0294	0
13.133.918	LBG	4	11.10	18276	1653.73	0.7%	0.5420	1.0047	0
14.135.780	LBG	15	63.17	102902	1682.61	0.3%	0.6713	1.0334	0

1037-215

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF
1.118.920	LBG	16	14.74	10346	725.83	1.0%	0.5480	1.0349	0
2.119.843	LBG	15	14.40	12177	869.86	0.9%	0.6587	1.0295	0
3.123.186	LBG	15	10.91	12609	1189.11	0.9%	0.6587	1.0295	0
4.124.182	LBG	4	13.20	15706	1235.30	0.8%	0.5498	1.0387	0
5.125.292	LBG	15	23.79	29706	1286.08	0.6%	0.6587	1.0305	0

6.126.260	LBG	16	11.91	15365	1335.20	0.8%	0.5480	1.0354	0	
7.127.125	LBG	3	13.03	15555	1232.86	0.8%	0.4134	1.0331	0	*HELD*
8.129.121	LBG	15	13.61	18303	1381.99	0.7%	0.6643	1.0281	0	
9.130.297	LBG	4	12.97	18155	1394.58	0.7%	0.5420	0.9967	0	
10.131.279	LBG	3	28.50	34750	1254.36	0.5%	0.4212	1.0291	0	*HELD*
11.132.266	LBG	16	10.57	14344	1408.81	0.8%	0.5530	1.0386	0	
12.133.229	LBG	3	19.48	24191	1279.59	0.6%	0.4212	1.0308	0	*HELD*
13.133.918	LBG	16	11.10	14929	1399.30	0.8%	0.5530	1.0408	0	
14.135.780	LBG	3	63.17	78980	1290.29	0.4%	0.4228	1.0324	0	

1037-216

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.931	LBG	3	19.90	11573	602.71	0.9%	0.4134	1.0371	0	
2.119.843	LBG	16	14.40	10613	762.59	1.0%	0.5480	1.0355	0	
3.123.186	LBG	16	10.92	11299	1070.84	0.9%	0.5480	1.0355	0	
4.124.192	LBG	4	11.75	12606	1113.78	0.9%	0.5498	1.0387	0	
5.125.292	LBG	16	23.79	26689	1160.15	0.6%	0.5480	1.0346	0	
6.126.260	LBG	3	11.90	12043	1046.81	0.9%	0.4134	1.0348	0	*HELD*
7.127.125	LBG	4	13.03	14930	1188.25	0.8%	0.5498	1.0375	0	
8.129.121	LBG	16	13.61	16276	1238.23	0.8%	0.5530	1.0359	0	
9.130.219	LBG	15	10.65	12992	1253.56	0.9%	0.6643	1.0281	0	
10.131.279	LBG	15	28.54	34266	1233.74	0.5%	0.6643	1.0281	0	
11.132.274	LBG	15	10.71	12858	1235.18	0.9%	0.6643	1.0294	0	
12.133.243	LBG	3	11.78	13222	1156.49	0.9%	0.4212	1.0308	0	*HELD*
13.133.918	LBG	15	11.10	13498	1254.70	0.9%	0.6643	1.0324	0	
14.135.780	LBG	4	63.17	79348	1259.11	0.4%	0.5509	1.0028	0	

1037-301

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	201	20.00	17662	889.92	0.8%	0.4304	1.0082	0	
2.119.948	GRB	209	21.50	22935	1088.37	0.7%	0.4447	1.0207	0	
3.121.724	GRB	213	10.00	12512	1264.69	0.9%	0.4671	1.0112	0	
4.122.740	GRB	202	15.00	19996	1336.93	0.7%	0.3807	1.0032	0	
5.123.800	GRB	203	10.00	14271	1419.83	0.8%	0.3894	0.9952	0	
6.124.619	GRB	216	100.00	135515	1371.57	0.3%	0.3776	1.0124	0	*HELD*
7.125.763	GRB	204	10.00	15203	1520.73	0.8%	0.4161	1.0006	0	
8.126.976	GRB	205	15.00	22571	1529.31	0.7%	0.3323	1.0166	0	
9.129.062	GRB	210	10.00	15824	1595.52	0.8%	0.3974	1.0085	0	
10.129.635	GRB	215	30.00	45511	1528.81	0.5%	0.3792	1.0080	0	
11.130.631	GRB	213	30.00	42302	1426.77	0.5%	0.4653	1.0122	0	*HELD*
12.132.606	GRB	206	30.00	46266	1583.05	0.5%	0.4345	1.0268	0	
13.132.658	GRB	207	30.00	47614	1595.77	0.5%	0.3881	1.0057	0	
14.133.853	GRB	212	15.68	25027	1611.73	0.6%	0.4189	1.0101	0	
15.136.610	GRB	211	30.00	48928	1625.33	0.5%	0.5621	0.9969	0	
16.136.984	GRB	214	30.00	48517	1633.93	0.5%	0.4480	1.0106	0	
17.137.651	GRB	208	30.00	48564	1629.13	0.5%	0.4979	1.0067	0	

1037-302

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	202	20.00	20491	1027.44	0.7%	0.3803	1.0032	0	
2.119.948	GRB	210	21.50	26356	1236.61	0.6%	0.4049	1.0091	0	
3.121.724	GRB	201	10.00	14171	1428.04	0.8%	0.4332	1.0080	0	
4.122.740	GRB	203	15.00	23676	1570.35	0.7%	0.3894	0.9951	0	
5.123.800	GRB	204	10.00	16236	1623.47	0.8%	0.4161	1.0002	0	
6.124.619	GRB	215	100.00	161917	1626.05	0.2%	0.3840	1.0045	0	
7.125.763	GRB	205	10.00	17122	1743.92	0.8%	0.3307	1.0187	0	
8.126.976	GRB	206	15.00	25761	1759.64	0.6%	0.4307	1.0249	0	
9.129.062	GRB	211	10.00	18304	1827.82	0.7%	0.5523	0.9989	0	
10.129.635	GRB	216	30.00	51442	1736.72	0.4%	0.3860	1.0131	0	*HELD*
11.130.631	GRB	214	30.00	48566	1630.37	0.5%	0.4404	1.0074	0	*HELD*
12.132.606	GRB	207	30.00	55025	1844.21	0.4%	0.3881	1.0057	0	
13.132.658	GRB	208	30.00	55314	1857.71	0.4%	0.4996	1.0078	0	
14.133.853	GRB	213	15.67	28971	1869.47	0.6%	0.4720	1.0114	0	
15.135.628	GRB	209	30.00	55653	1885.53	0.4%	0.4661	1.0167	0	
16.136.610	GRB	212	30.00	55728	1873.18	0.4%	0.4215	1.0086	0	

1037-303

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	203	20.00	21343	1061.28	0.7%	0.3891	0.9949	0	

2.121.724	GRB	202	10.00	15083	1512.81	0.8%	0.3807	1.0032	0	
3.122.740	GRB	204	15.00	24027	1600.38	0.6%	0.4161	0.9994	0	
4.123.801	GRB	205	10.00	16165	1652.36	0.8%	0.3307	1.0224	0	
5.124.619	GRB	214	100.00	158202	1588.24	0.3%	0.4449	1.0042	0	*HELD*
6.125.763	GRB	206	10.00	17296	1771.34	0.8%	0.4295	1.0244	0	
7.126.976	GRB	207	15.00	27106	1821.91	0.6%	0.3889	1.0084	0	
8.129.062	GRB	212	10.00	18690	1891.96	0.7%	0.4135	1.0125	0	
9.129.633	GRB	209	30.00	55948	1900.54	0.4%	0.4570	1.0193	0	
10.130.631	GRB	215	30.00	54208	1821.03	0.4%	0.3792	1.0080	0	*HELD*
11.131.629	GRB	201	30.00	55765	1873.89	0.4%	0.4258	1.0083	0	
12.132.606	GRB	208	30.00	56669	1903.23	0.4%	0.4996	1.0078	0	
13.132.658	GRB	213	30.00	57302	1933.99	0.4%	0.4653	1.0128	0	
14.133.853	GRB	216	15.67	30168	1952.65	0.6%	0.3891	1.0145	0	
15.135.628	GRB	210	30.00	57325	1920.85	0.4%	0.4048	1.0055	0	
16.137.651	GRB	211	30.00	57975	1927.39	0.4%	0.5621	0.9976	0	

1037-304

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	204	20.00	21960	1099.64	0.7%	0.4154	1.0019	0	
2.119.948	GRB	212	21.50	28085	1321.10	0.6%	0.4141	1.0117	0	
3.121.724	GRB	203	10.00	15967	1588.05	0.8%	0.3894	0.9948	0	
4.122.740	GRB	205	15.00	24802	1689.81	0.6%	0.3366	1.0222	0	
5.123.801	GRB	206	10.00	17177	1761.31	0.8%	0.4295	1.0256	0	
6.124.619	GRB	213	100.00	160095	1614.18	0.3%	0.4652	1.0086	0	*HELD*
7.125.763	GRB	207	10.00	18437	1857.11	0.7%	0.3899	1.0075	0	
8.126.976	GRB	208	15.00	28630	1921.47	0.6%	0.4997	1.0070	0	
9.129.062	GRB	201	10.00	19662	1980.19	0.7%	0.4297	1.0073	0	
10.129.633	GRB	210	30.00	59589	2002.87	0.4%	0.3971	1.0085	0	
11.130.631	GRB	216	30.00	57453	1940.23	0.4%	0.3860	1.0133	0	
12.131.629	GRB	202	30.00	60166	2010.35	0.4%	0.3837	1.0026	0	
13.132.658	GRB	214	30.00	60599	2034.01	0.4%	0.4404	1.0072	0	
14.133.853	GRB	215	15.67	33277	2143.67	0.5%	0.3759	1.0096	0	
15.135.628	GRB	211	30.00	60934	2024.82	0.4%	0.5642	0.9972	0	
16.136.610	GRB	209	30.00	60510	2048.82	0.4%	0.4684	1.0160	0	

1037-305

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	205	20.00	20560	1051.30	0.7%	0.3436	1.0230	0	
2.119.948	GRB	213	21.50	24566	1154.88	0.6%	0.4630	1.0112	0	*HELD*
3.121.724	GRB	204	10.00	14811	1482.70	0.8%	0.4161	1.0014	0	
4.122.740	GRB	206	15.00	23080	1577.34	0.7%	0.4311	1.0254	0	
5.123.801	GRB	207	10.00	16819	1697.31	0.8%	0.3899	1.0094	0	
6.124.619	GRB	212	100.00	172241	1741.53	0.2%	0.4153	1.0113	0	
7.125.763	GRB	208	10.00	17645	1776.48	0.8%	0.4958	1.0071	0	
8.126.975	GRB	209	15.00	26966	1830.80	0.6%	0.4525	1.0187	0	
9.129.062	GRB	214	10.00	18287	1842.14	0.7%	0.4402	1.0076	0	
10.129.633	GRB	211	30.00	56485	1880.19	0.4%	0.5565	0.9989	0	
11.130.631	GRB	201	30.00	56139	1885.49	0.4%	0.4258	1.0078	0	
12.131.629	GRB	203	30.00	57681	1911.78	0.4%	0.3850	0.9945	0	
13.132.658	GRB	215	30.00	58520	1962.17	0.4%	0.3792	1.0061	0	
14.133.853	GRB	202	15.69	30506	1948.13	0.6%	0.3880	1.0022	0	
15.135.628	GRB	212	30.00	57929	1949.96	0.4%	0.4161	1.0101	0	
16.136.608	GRB	216	30.00	58331	1970.88	0.4%	0.3892	1.0138	0	
17.137.651	GRB	210	30.00	58064	1943.71	0.4%	0.4022	1.0045	0	

1037-306

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	206	20.00	20279	1038.74	0.7%	0.4208	1.0249	0	
2.119.948	GRB	214	21.50	25925	1212.82	0.6%	0.4474	1.0062	0	
3.121.724	GRB	205	10.00	14577	1489.65	0.8%	0.3366	1.0222	0	
4.122.740	GRB	207	15.00	24525	1649.16	0.6%	0.3914	1.0089	0	
5.123.801	GRB	208	10.00	17067	1721.58	0.8%	0.4958	1.0090	0	
6.124.619	GRB	211	100.00	175234	1750.32	0.2%	0.5486	0.9992	0	*HELD*
7.125.763	GRB	209	10.00	18095	1843.47	0.7%	0.4448	1.0190	0	
8.126.975	GRB	210	15.00	27917	1875.24	0.6%	0.3954	1.0078	0	
9.129.062	GRB	215	10.00	19314	1946.50	0.7%	0.3815	1.0080	0	
10.129.633	GRB	212	30.00	56902	1920.04	0.4%	0.4155	1.0125	0	
11.130.631	GRB	202	30.00	58085	1940.46	0.4%	0.3837	1.0024	0	
12.131.629	GRB	204	30.00	58123	1939.02	0.4%	0.4112	1.0010	0	
13.132.606	GRB	201	30.00	57586	1934.18	0.4%	0.4258	1.0079	0	

14.132.658	GRB	216	30.00	58994	1993.97	0.4%	0.3860	1.0142	0	
15.133.853	GRB	203	15.69	30927	1961.92	0.6%	0.3868	0.9955	0	

1037-307

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	207	20.00	20230	1020.46	0.7%	0.3855	1.0092	0	
2.119.948	GRB	215	21.50	25513	1192.16	0.6%	0.3855	1.0050	0	
3.121.724	GRB	206	10.00	14380	1473.87	0.8%	0.4311	1.0252	0	
4.122.740	GRB	208	15.00	23521	1581.95	0.7%	0.4961	1.0092	0	
5.123.800	GRB	209	15.76	26405	1709.33	0.6%	0.4448	1.0205	0	*HELD*
6.124.619	GRB	210	100.00	168081	1696.84	0.2%	0.3958	1.0098	0	
7.125.763	GRB	210	10.00	17243	1737.73	0.8%	0.3958	1.0080	0	
8.126.975	GRB	211	15.00	27340	1819.43	0.6%	0.5470	0.9985	0	
9.128.739	GRB	201	30.00	54362	1824.33	0.4%	0.4297	1.0070	0	
10.129.635	GRB	214	30.00	51962	1744.77	0.4%	0.4404	1.0076	0	*HELD*
11.130.631	GRB	203	30.00	56501	1872.73	0.4%	0.3850	0.9946	0	
12.131.629	GRB	205	30.00	55577	1877.32	0.4%	0.3352	1.0135	0	
13.132.606	GRB	202	30.00	56629	1891.60	0.4%	0.3837	1.0023	0	
14.132.660	GRB	212	30.00	56185	1891.72	0.4%	0.4155	1.0103	0	
15.133.853	GRB	204	15.69	29593	1891.31	0.6%	0.4061	1.0030	0	
16.135.628	GRB	213	30.00	54978	1853.07	0.4%	0.4730	1.0114	0	
17.136.984	GRB	216	30.00	58198	1970.76	0.4%	0.3892	1.0161	0	

1037-308

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	208	20.00	20086	1011.98	0.7%	0.4904	1.0081	0	
2.119.948	GRB	216	21.50	24736	1163.05	0.6%	0.3870	1.0112	0	
3.121.724	GRB	207	10.00	14610	1472.43	0.8%	0.3914	1.0081	0	
4.122.740	GRB	209	15.00	23759	1615.94	0.6%	0.4448	1.0205	0	
5.123.800	GRB	210	15.76	26015	1666.43	0.6%	0.3958	1.0098	0	
6.124.619	GRB	209	100.00	168759	1721.72	0.2%	0.4448	1.0205	0	
7.125.763	GRB	211	10.00	17657	1762.25	0.8%	0.5486	0.9984	0	
8.126.975	GRB	212	15.00	27269	1840.57	0.6%	0.4127	1.0127	0	
9.128.739	GRB	202	30.00	55984	1872.43	0.4%	0.3837	1.0036	0	
10.129.633	GRB	201	30.00	55444	1861.26	0.4%	0.4258	1.0073	0	
11.130.631	GRB	204	30.00	56685	1887.25	0.4%	0.4166	0.9990	0	
12.131.629	GRB	206	30.00	55601	1903.67	0.4%	0.4345	1.0274	0	
13.132.606	GRB	203	30.00	57389	1903.50	0.4%	0.3850	0.9952	0	
14.135.628	GRB	214	30.00	56953	1912.18	0.4%	0.4480	1.0075	0	
15.136.610	GRB	205	30.00	56935	1925.93	0.4%	0.3364	1.0150	0	
16.136.984	GRB	215	30.00	59405	2006.53	0.4%	0.3768	1.0135	0	

1037-309

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	209	20.00	19294	984.66	0.7%	0.4470	1.0212	0	
2.119.987	GRB	201	20.42	24257	1197.01	0.6%	0.4338	1.0080	0	
3.121.724	GRB	208	10.00	14091	1420.44	0.8%	0.4961	1.0084	0	
4.122.740	GRB	210	15.00	23179	1559.96	0.7%	0.4035	1.0098	0	
5.123.814	GRB	204	18.00	29389	1632.60	0.6%	0.4161	1.0002	0	
6.124.619	GRB	208	100.00	167072	1685.28	0.2%	0.4958	1.0090	0	
7.125.763	GRB	212	10.00	17469	1766.91	0.8%	0.4153	1.0117	0	
8.126.975	GRB	213	15.00	24354	1640.35	0.6%	0.4568	1.0106	0	*HELD*
9.128.739	GRB	203	30.00	54806	1817.63	0.4%	0.3869	0.9952	0	
10.129.633	GRB	202	30.00	55192	1844.95	0.4%	0.3837	1.0030	0	
11.130.631	GRB	205	30.00	54285	1837.65	0.4%	0.3352	1.0157	0	
12.131.629	GRB	207	30.00	55617	1863.36	0.4%	0.3881	1.0053	0	
13.132.606	GRB	214	30.00	56019	1880.25	0.4%	0.4404	1.0072	0	
14.132.660	GRB	211	30.00	56083	1863.39	0.4%	0.5565	0.9971	0	
15.135.628	GRB	215	30.00	56212	1891.38	0.4%	0.3768	1.0096	0	
16.136.610	GRB	206	30.00	55390	1894.65	0.4%	0.4347	1.0264	0	
17.137.651	GRB	216	30.00	57044	1931.67	0.4%	0.3892	1.0161	0	

1037-310

GMT	Sr Det	Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	210	20.00	18747	945.32	0.7%	0.4021	1.0089	0	
2.119.987	GRB	202	20.42	23629	1160.52	0.7%	0.3791	1.0032	0	
3.121.724	GRB	209	10.00	14161	1444.95	0.8%	0.4448	1.0207	0	
4.122.773	GRB	205	31.00	46520	1533.59	0.5%	0.3366	1.0222	0	
5.123.800	GRB	212	15.76	25253	1620.10	0.6%	0.4153	1.0113	0	

6.124.619	GRB	207	100.00	164096	1655.99	0.2%	0.3899	1.0094	0	
7.125.763	GRB	213	10.00	16465	1662.23	0.8%	0.4568	1.0098	0	*HELD*
8.126.975	GRB	214	15.00	24056	1612.44	0.6%	0.4436	1.0057	0	*HELD*
9.128.739	GRB	204	30.00	53687	1789.78	0.4%	0.4163	1.0004	0	
10.129.633	GRB	203	30.00	53973	1789.99	0.4%	0.3850	0.9952	0	
11.130.631	GRB	206	30.00	53555	1832.71	0.4%	0.4345	1.0269	0	
12.131.629	GRB	208	30.00	54406	1825.33	0.4%	0.4996	1.0068	0	
13.132.606	GRB	215	30.00	56694	1900.93	0.4%	0.3792	1.0061	0	
14.133.853	GRB	201	15.69	28857	1855.46	0.6%	0.4322	1.0091	0	
15.135.628	GRB	216	30.00	55656	1881.63	0.4%	0.3892	1.0145	0	

1037-311

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	211	20.00	18798	938.64	0.7%	0.5420	0.9992	0	
2.119.987	GRB	203	20.42	23754	1156.86	0.6%	0.3917	0.9948	0	
3.121.724	GRB	210	10.00	13952	1407.50	0.8%	0.4035	1.0091	0	
4.122.740	GRB	212	15.00	22845	1539.86	0.7%	0.4153	1.0113	0	
5.123.800	GRB	213	10.00	15964	1609.59	0.8%	0.4652	1.0086	0	
6.124.619	GRB	206	100.00	161733	1658.37	0.2%	0.4295	1.0256	0	
7.125.763	GRB	214	10.00	17112	1719.63	0.8%	0.4436	1.0052	0	
8.126.975	GRB	215	15.00	25267	1695.71	0.6%	0.3840	1.0069	0	*HELD*
9.128.739	GRB	205	30.00	52725	1786.27	0.4%	0.3308	1.0166	0	
10.129.633	GRB	204	30.00	54524	1817.08	0.4%	0.4166	1.0000	0	
11.130.631	GRB	207	30.00	54345	1821.15	0.4%	0.3881	1.0055	0	
12.131.629	GRB	209	30.00	54615	1854.54	0.4%	0.4570	1.0190	0	
13.132.606	GRB	216	30.00	55875	1888.53	0.4%	0.3860	1.0142	0	
14.132.658	GRB	201	30.00	54554	1832.32	0.4%	0.4258	1.0079	0	
15.133.866	GRB	201	10.10	18401	1837.99	0.7%	0.4322	1.0091	0	
16.135.628	GRB	202	30.00	55893	1866.76	0.4%	0.3904	1.0022	0	
17.136.610	GRB	208	30.00	55473	1860.72	0.4%	0.4979	1.0066	0	

1037-312

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	212	20.00	17846	902.32	0.7%	0.4177	1.0117	0	
2.119.987	GRB	204	20.43	22339	1094.52	0.7%	0.4154	1.0014	0	
3.121.724	GRB	212	10.00	13327	1347.83	0.9%	0.4153	1.0117	0	
4.122.740	GRB	213	15.00	21258	1427.97	0.7%	0.4671	1.0079	0	
5.123.800	GRB	214	10.00	15132	1519.13	0.8%	0.4449	1.0042	0	
6.124.619	GRB	205	100.00	153732	1571.41	0.3%	0.3307	1.0224	0	
7.125.763	GRB	215	10.00	16198	1630.98	0.8%	0.3840	1.0071	0	
8.126.975	GRB	216	15.00	23772	1604.63	0.6%	0.3805	1.0128	0	*HELD*
9.128.739	GRB	206	30.00	49048	1675.12	0.5%	0.4286	1.0249	0	
10.129.751	GRB	201	10.00	16844	1697.13	0.8%	0.4258	1.0078	0	
11.130.631	GRB	208	30.00	51342	1722.20	0.4%	0.4996	1.0066	0	
12.131.629	GRB	210	30.00	51523	1732.61	0.4%	0.3971	1.0091	0	
13.132.606	GRB	209	30.00	51601	1748.90	0.4%	0.4570	1.0171	0	
14.132.658	GRB	202	30.00	51505	1720.41	0.4%	0.3837	1.0023	0	
15.135.628	GRB	203	30.00	52333	1736.24	0.4%	0.3896	0.9955	0	
16.136.610	GRB	207	30.00	51111	1713.66	0.4%	0.3998	1.0061	0	
17.136.983	GRB	211	30.00	52246	1736.87	0.4%	0.5621	0.9976	0	

1037-313

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	213	20.00	16724	844.55	0.8%	0.4589	1.0105	0	*HELD*
2.119.987	GRB	205	20.50	20337	1013.68	0.7%	0.3400	1.0222	0	
3.121.724	GRB	214	10.00	12691	1276.50	0.9%	0.4457	1.0062	0	
4.122.740	GRB	214	15.00	20737	1388.91	0.7%	0.4457	1.0050	0	
5.123.800	GRB	215	10.00	14767	1482.94	0.8%	0.3840	1.0045	0	
6.124.619	GRB	204	100.00	151108	1510.93	0.3%	0.4161	1.0002	0	
7.125.763	GRB	216	10.00	15477	1566.68	0.8%	0.3805	1.0125	0	
8.126.975	GRB	201	15.00	23806	1597.75	0.6%	0.4332	1.0070	0	
9.128.739	GRB	207	30.00	48211	1620.20	0.5%	0.3880	1.0084	0	
10.130.631	GRB	209	30.00	49705	1687.98	0.4%	0.4570	1.0191	0	
11.131.629	GRB	211	30.00	50149	1668.37	0.4%	0.5565	0.9984	0	
12.132.606	GRB	210	30.00	50034	1678.96	0.4%	0.3971	1.0069	0	
13.132.658	GRB	203	30.00	50291	1668.02	0.4%	0.3850	0.9952	0	
14.133.853	GRB	208	15.67	26445	1698.46	0.6%	0.4988	1.0067	0	
15.135.628	GRB	206	30.00	49693	1700.18	0.4%	0.4329	1.0267	0	
16.136.612	GRB	202	30.00	50976	1702.08	0.4%	0.3904	1.0019	0	
17.136.983	GRB	212	30.00	50633	1700.79	0.4%	0.4215	1.0080	0	

1037-314

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	214	20.00	17087	859.34	0.8%	0.4483	1.0064	0	
2.119.987	GRB	206	20.50	20808	1040.21	0.7%	0.4282	1.0252	0	
3.121.724	GRB	215	10.00	13197	1325.87	0.9%	0.3835	1.0050	0	
4.122.740	GRB	215	15.00	21516	1441.34	0.7%	0.3835	1.0051	0	*HELD*
5.123.800	GRB	216	10.00	14709	1488.76	0.8%	0.3776	1.0124	0	
6.124.619	GRB	203	100.00	151546	1507.76	0.3%	0.3894	0.9952	0	
7.125.763	GRB	201	10.00	15338	1545.18	0.8%	0.4332	1.0077	0	*HELD*
8.126.975	GRB	202	15.00	24540	1641.48	0.6%	0.3807	1.0036	0	
9.128.739	GRB	208	30.00	49505	1661.17	0.4%	0.5008	1.0070	0	
10.129.633	GRB	207	30.00	49651	1663.77	0.4%	0.3881	1.0055	0	
11.130.631	GRB	210	30.00	50520	1698.12	0.4%	0.3971	1.0086	0	
12.131.629	GRB	212	30.00	50255	1694.05	0.4%	0.4155	1.0115	0	
13.132.606	GRB	211	30.00	51217	1701.67	0.4%	0.5565	0.9971	0	
14.132.658	GRB	204	30.00	51290	1710.90	0.4%	0.4112	1.0010	0	
15.133.853	GRB	209	15.69	26512	1717.41	0.6%	0.4655	1.0167	0	
16.135.628	GRB	205	30.00	50298	1700.42	0.4%	0.3370	1.0144	0	
17.136.608	GRB	213	30.00	49931	1682.96	0.4%	0.4730	1.0115	0	
18.137.651	GRB	214	30.00	52039	1752.58	0.4%	0.4480	1.0106	0	

1037-315

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	215	20.00	14925	750.52	0.8%	0.3940	1.0063	0	
2.119.987	GRB	207	20.50	18013	885.40	0.7%	0.3914	1.0081	0	*HELD*
3.121.724	GRB	216	10.00	11019	1113.90	1.0%	0.3822	1.0112	0	
4.122.740	GRB	216	15.00	18062	1218.35	0.7%	0.3822	1.0121	0	*HELD*
5.123.800	GRB	201	10.00	12289	1237.97	0.9%	0.4332	1.0077	0	
6.124.619	GRB	202	100.00	129376	1297.03	0.3%	0.3807	1.0028	0	
7.125.763	GRB	202	10.00	13352	1339.07	0.9%	0.3807	1.0032	0	
8.126.975	GRB	203	15.00	20353	1349.91	0.7%	0.3894	0.9952	0	
9.129.062	GRB	204	10.00	14110	1410.60	0.8%	0.4163	1.0000	0	
10.129.633	GRB	206	30.00	41280	1413.22	0.5%	0.4345	1.0274	0	
11.130.631	GRB	211	30.00	43041	1432.37	0.5%	0.5565	0.9988	0	
12.132.606	GRB	212	30.00	42955	1446.17	0.5%	0.4155	1.0103	0	
13.132.658	GRB	205	30.00	42384	1431.70	0.5%	0.3352	1.0136	0	
14.133.853	GRB	210	15.69	22436	1437.35	0.7%	0.4039	1.0055	0	
15.135.628	GRB	208	30.00	43075	1444.98	0.5%	0.4966	1.0067	0	
16.136.608	GRB	214	30.00	43349	1455.49	0.5%	0.4480	1.0076	0	
17.136.983	GRB	209	30.00	43372	1468.29	0.5%	0.4684	1.0159	0	

1037-316

GMT	Sr Det		Min.	Counts	CPM	Error	BKG	SF	PRFD CF	
1.118.951	GRB	216	20.00	13047	659.55	0.9%	0.3879	1.0116	0	
2.119.987	GRB	208	20.50	16214	797.08	0.8%	0.4860	1.0084	0	
3.121.769	GRB	201	10.00	9761	983.50	1.0%	0.4332	1.0080	0	
4.122.740	GRB	201	15.00	15546	1043.92	0.8%	0.4332	1.0077	0	
5.123.800	GRB	202	10.00	10974	1100.11	1.0%	0.3807	1.0028	0	*HELD*
6.124.619	GRB	201	100.00	113361	1141.94	0.3%	0.4332	1.0077	0	
7.125.763	GRB	203	10.00	11920	1185.80	0.9%	0.3894	0.9951	0	
8.126.975	GRB	204	15.00	18427	1228.48	0.7%	0.4161	1.0004	0	
9.129.062	GRB	213	10.00	12390	1254.50	0.9%	0.4615	1.0129	0	
10.130.631	GRB	212	30.00	37999	1281.46	0.5%	0.4155	1.0120	0	*HELD*
11.132.658	GRB	206	30.00	37372	1278.65	0.5%	0.4345	1.0268	0	
12.135.628	GRB	207	30.00	38433	1287.90	0.5%	0.3936	1.0056	0	
13.136.608	GRB	215	30.00	40059	1347.96	0.5%	0.3768	1.0098	0	
14.136.983	GRB	210	30.00	38829	1299.68	0.5%	0.4022	1.0045	0	
15.137.651	GRB	205	30.00	38007	1283.89	0.5%	0.3364	1.0137	0	

Appendix B. Calibration Certificate for Standard Solution

2 11

Sr^{90} 41

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Strontium-90 — Half-life: 28.6 years

Nominal activity: 25 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 2454-4

Measurement Activity of principal radionuclide

Activity per gram of this solution

5.02 nano curies of Strontium-90

at 0400 hours PST on February 11, 1994 042.500-94

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

5.02 nano curies Per gram

of the daughter nuclide Yttrium-90

Total mass of this solution

Approx. 5.0 grams

Method of measurement

The activity of the primary solution was measured by four pi efficiency tracing.

The activity of the dilution was measured by liquid scintillation counting.

Rec'd 10/24/94 RP

Useful Life

This radionuclide has decayed through 0.3 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after December 1999

Sr^{90} in .1M HCl

$4.9793g \times \frac{5.02\,nCi}{g} \times \frac{2220\,dpm}{nCi} \times \frac{1}{25ml} = 2220\,dpm/ml \pm 0.8\%$ @ 042.500-94

R Preston 4/27/95

carrier content .1787 mg/ml $SrCO_3$, .1467 mg/ml Y_2O_3

Calculations checked K. Yamamoto 4/27/95

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1) others	less than ~~equal to~~	0.01 %	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.2 %

(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta - \delta'$). These have been estimated not to exceed

+ 2.1 % or - 2.1 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta$, $-\delta'$)
The overall uncertainty is therefore calculated on the basis of + $[t(sm) + \delta]$, - $[t(sm) + \delta']$
and is + 2.5 % , - 2.5 % of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Strontium-90 decays 100 percent by beta emission to yttrium-90. Yttrium-90 decays also by beta emission.

Chemical Composition of Solution

Carrier content per gram of solution:

100 micrograms strontium

100 micrograms yttrium

Other components:

0.1 M HCl

Preservative:

Remarks

Date Certificate Prepared February 14, 1994

Approval Signature George Dilbeck

Appendix C. Preparation of Standards

Sr^{90} Primary calibration

4/27/95 GROUP # 1037

Smpl #	ml of Carrier added	RECOVERY GRWT (mg)	TWT (mg)	NWT (mg)	SEP. TIME
1037 - 1	0.5 ml K-A1-B	42.09	40.52	1.57	118.055.95
2	1.0	42.81	39.18	3.63	
3	2.0	46.37	39.39	6.98	
4	3.0	51.12	39.80	11.32	
5	4.0	54.60	40.32	14.28	
6	5.0	56.75	39.11	17.64	
7	0.6 mL K-A1-(2)	61.15	40.12	21.03	
8	0.7	62.97	38.73	24.24	
9	0.8	68.02	40.61	27.41	
10	1.0	73.63	39.57	34.06	
11	1.1	78.11	40.25	37.86	
12	1.2	77.77	39.35	38.42	
13	1.4	83.50	38.02	45.48	
14	1.6	92.40	39.43	52.97	
15	1.8	89.20	39.20	50.00	
16	2.0	88.83	38.39	50.44	

mg/mL of $SrCO_3$ in U1 Sr^{90} Activity is 0.1787 mg

Carriers - K-A1-B, 3.628 mg/mL $SrCO_3$ ± 0.26% 333.000.94

K-A1-(2) 36.28 mg/mL $SrCO_3$ ± 0.13% 333.000.94

Pipet used for pipetting Carrier

LSC-3 - Calibra, 200 ul capacity. calibrated on 4/4/95

DST-2 Calibra, 1000 ul Capacity " " "

NPDES - 1013

4/27/95
RP

Prep of Sr^{90} U1

Gross wt. 26.5818 g
Tare wt 21.6025
4.9793 g

Balance A
Met. H10

Tared a 25ml vol. flask + top. Opened Eppa vial, Sr^{90} 2454-1, 5.02 nCi/g @ 0400 PST Feb. 11, 1994. Transferred Sr^{90} solution into the flask. Weighed Sr^{90} sol., flask and top. Pippetted 100ml Sr carrier K-A1 36.28 mg/ml $SrCO_3$ and 200 ml Y carrier D-G1 15.18 mg/ml Y_2O_3 into the same flask. Diluted to mark with .1M HCl. Transferred to a 1oz. P.B..

$$4.9793\,g \times 5.02\,\frac{nCi}{g} \times 2220\,\frac{dpm}{nCi} \times \frac{1}{25ml} = 2220\,dpm/ml \pm .8\%$$
@ 042.500-94

Carrier content

$$\left[\left(4.9793\,g \times .1\,\frac{mg\,Sr}{g} \times 1.68489\,\frac{SrCO_3}{Sr}\right) + \left(.1ml \times 36.28\,\frac{mg\,SrCO_3}{ml}\right)\right] \times \frac{1}{25ml} = .1787\ mg/ml\ SrCO_3$$

$$\left[\left(4.9793\,g \times .1\,\frac{mg\,Y}{g} \times 1.26994\,\frac{Y_2O_3}{Y}\right) + \left(.2ml \times 15.18\,\frac{mg\,Y_2O_3}{ml}\right)\right] \times \frac{1}{25ml} = .1467\ mg/ml\ Y_2O_3$$

R Preston

Calculations checked. K. Yamamoto 4/27/95

3/23/95 RP

Nb carrier prep for sample

Pippetted 1ml Nb DI. 14.31mg/ml Nb_2O_5 into a 50ml poly tube for sample 3954-1, gave to E. Bandoma.

R Brenton

4/10/95 RP

Prep Sr carrier K-Al-(2)

Transferred ~50mls of Sr K-Al into a 2oz P.B..

36.28 mg/ml $SrCO_3$ ± 1.13% @ 333.000-94

R Brenton

~~Prep of K-Al-B1~~ 4/10/95 RP

4/10/95 RP

Prep of Sr carrier K-Al-B

4/10/95 RP

Pippetted 5mls of Sr carrier K-Al into a 50ml vol. flask. Diluted to mark with .1N HNO_3. Transfer to a 2oz. P.B..

3.628 mg/ml $SrCO_3$ ± 1.26% @ 333.000-94 4/10/95 RP

R Brenton

Log Book Entry No.	TMA/Richmond Number	Date	Nuclide	Requested By	Prep'd By	Checked	Volume & I.D. of Tracer Added	Total Activity (dpm)	% 1σ Error	Activity Date	Spike Wt. (g)	Matrix	Container	Given to	Additional Information or Comment
41	1037-9	4/27/95	Sr90	CS	RP	✓	1ml Sr90 U1	2220.	0.9	42,500-94	1.00	.1 N HCl	50ml Poly Tube	CS	Sr90 Prim. Calib. Carrier content total .1787mg SrCO3 .1467mg Y2-O3
42	10	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.01	"	"	"	
43	11	"	Sr90	"	RP	✓	1ml Sr90 U1	2220. ~~2200.~~ KY 4/27/95	0.9	"	1.00	"	"	"	
44	12	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.00	"	"	"	
45	13	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.00	"	"	"	
46	14	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.00	"	"	"	
47	15	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.00	"	"	"	
48	16	"	Sr90	"	RP	✓	1ml Sr90 U1	2220.	0.9	"	1.00	"	"	"	

3 L , bk 58

Log Book Entry No.	TMA/Richmond Number	Date	Nuclide	Requested By	Prep'd By	Checked	Volume and I.D. of Tracer Added	Total Activity (dpm)	% 1σ Error	Activity Date	Spike Wt. (g)	Matrix	Container	Given to	Additional Information or Comment
22	~~1036~~ 4/10/95 RP 1037 - 6	4/10/95	Sr^{90}	CS	RP	✓	4ml Sr^{90} Tl	2220.	1.0	~~4.00~~ 4/10/95 RP 42,500-94	4.01	.1N HCl	50ml Poly Tube	CS	Sr^{90} Primary Calibration carrier content total .7508 mg $SrCO_3$ .6328 mg Y_2O_3
23	7	"	Sr^{90}	"	RP	✓	4ml Sr^{9} Tl	2220.	"	"	4.00	"	"	"	
24	8	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
25	9	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
26	10	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
27	11	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	0.8	"	3.99	"	40ml Glass	"	Used 4ml glass pipet eppendorf taken out of service
28	12	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	3.99	"	"	"	
29	13	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	3.99	"	"	"	
30	14	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
31	15	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
32	16	"	Sr^{90}	"	RP	✓	4ml Sr^{90} Tl	2220.	"	"	4.00	"	"	"	
	Log Book entries 17-32 Problems in chemistry Replaced with the next entries														
33	1037 - 1	4/27/95	Sr^{90}	CS	RP	✓	1ml Sr^{90} Ul	2220.	0.9	42,500-94	1.01	.1N HCl	50ml Poly Tube	CS	Sr^{90} Prim. Calib carrier content total .1787 mg $SrCO_3$ .1467 mg Y_2O_3
34	2	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.01	"	"	"	
35	3	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.01	"	"	"	
36	4	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.01	"	"	"	
37	5	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.00	"	"	"	
38	6	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.00	"	"	"	
39	7	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.01	"	"	"	
40	8	"	Sr^{90}	"	RP	✓	1ml Sr^{90} Ul	2220.	0.9	"	1.00	"	"	"	

26-JUN-95 TMA Corporation 1037-103 Sr
13:57:17 Pb210 Least Squares Analysis MEW SR90 PRIMARY CAL
PBBI V 1.04
CS Reviewed_____ Date_____

** NOTE - This is actually Sr-Y data for cpm only **

Counted on MEW

Zero time	42.500	94
Separation time	118.055	95
GMT at first count	121.774	95

	CPM	ERROR		
First fit				
Equilibrium CPM=	1890.29	7.60 Percent	Corr. coefficient=	0.999
CPM at sep time=	776.24	12.23 Percent	Chi square prob.=	0.000

GMT	ET	CTS	CTTM	CTR	CPM	CLC CPM	PCOFF	PROB	WT
121.774	3.719	0	57.40	19	1470.97	1468.23	0.186	0.94	1.0000
123.824	5.769	25260	14.61	19	1632.46	1641.45	-0.548	0.84	0.6330
124.808	6.753	23411	13.13	19	1683.99	1697.52	-0.797	0.77	0.5836
125.800	7.745	0	17.80	19	1760.29	1741.35	1.088	0.68	0.5809
126.739	8.684	0	24.23	19	1769.66	1773.64	-0.224	0.93	0.6143
128.846	10.791	21111	10.84	19	1840.62	1822.70	0.983	0.72	0.4756
129.782	11.727	25466	13.12	19	1834.48	1837.30	-0.153	0.95	0.5025
130.788	12.733	22819	11.70	19	1843.39	1849.47	-0.329	0.90	0.4840
131.823	13.768	0	21.27	19	1866.23	1859.12	0.383	0.88	0.5439
132.746	14.691	25563	12.99	19	1860.15	1865.74	-0.299	0.91	0.4892
134.000	15.945	19912	10.00	19	1882.32	1872.56	0.521	0.85	0.4477
135.898	17.843	31254	15.84	19	1865.06	1879.46	-0.766	0.77	0.5107

Elapsed time (days)	=	440.555	
Lambda	=	8.626E-05	Reciprocal days
exp(-lambda X t)	(1)=	9.627E-01	
Chemical yield	(2)=	0.9620	
PPT. correction	(3)=	1.0396	(recovery = 6.980 mgs)
Aliquot	(4)=	1.000	smpl

Product (1X2X3X4) = 9.627197E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	1 sigma percent sigma
1.9635E+03	2.7470	5.3937E+03	4.0976E+02	7.60 %

LTV 6.0698E+03

9th point MDA 1.3120E+01

NPDES - 1018

EBERLINE SERVICES **ANALYTICAL SERVICES GROUP**

Richmond, CA Laboratory

Implementation of Primary Calibration

R2228/5

Nuclide Ac 228 Date 7/7/01 Calibration Title AC228PGRB0701

Detectors GRB 201-232

	Date:	By:
Place P-factor(s) in Constants file	7-7-1	MT

List P-Factor(s) 3.175

Create RCE Curve File(s)	7-7-1	MT

List File name(s): AC228GRB.PPT

Other (list)

Place Documentation in Calibration files	06.12.03	LGJ
Update Calibration Log	06.12.03	LGJ

Comments:

Ac-228 Primary Calibration

00-May-2001

AC228PGRB0701

A primary calibration for Ac-228 was performed in early 2001 by taking 16 aliquots of Ra-228 (stock # R1-A and adding various amounts of Y oxalate with 9 hydrates (stock # E-A2-(07)) so as to generate an efficiency curve between 1 and 75 mgs. (see attachment 1; 'planchet Log-In sheet').

Each planchet produced by following procedure XX-000 was counted on several of the beta counters in the Eberline Services LB4110 Gross Beta detector system over a 24 hour period. (see attachment 2: 'raw counting data').

The results of the counting produced a series of results (table 1) that was used to generate a relative efficiency curve (figure I). These results were normalized to 12.00 mg/cm2 assuming an area of 3.30 cm2. (see table 2) to produce a PPT curve (see figure II) with a normalized efficiency of 0.315.

In keeping with the practice at Eberline Services of using P-factors one was calculated (1.0 / 0.315) = 3.175.

Using the results of table 2 a table of PPT vs correction factors was generated. These were placed into the DEC data base to be used by Eberline Services Spline table lookup routines (see table 3).

The above P-factor and Spline table were put into effect on 07-July-2001.

The following attachments are attached at the end of this summary:

A. Copy of QA departments notebooks for standardizations of Ra-228 stock # R1-A and Y stock # E-A2-(07).

B. Copy of Laboratory planchet Log_in sheets about the preparation of the planchets.

C. Raw counting data.

D. Copy of spread sheets used to generate the Spline table.

Thermo NUtech Richmond

PLANCHET LOG-IN

Originator: A Chu 1/31/01

Notebook Ref: _____

Logged by: GB 1-31-01

Date: _____

GROUP	SAMPLE	ELM	TYPE	GEO	AMOUNT COUNTED	AMOUNT RECOV.	1ST SEP TIME	FINAL SEP TIME	ALIQUOT & UNITS	Carrier/Tracer #mLs.	Elm.	Iso.	I.D.
1067	25	Ac			3.98		29.733	31.774	1.0 sample	0.20	Y		E-A2-(07)
	26				7.56					0.30			
	27				11.78					0.40			
	28				15.23					0.50			
	29				19.54					0.60			
	30				24.15					0.70			
	31				29.09					0.80			
	32				31.40					0.90			
	33				31.98					1.0			
	34				40.66					1.2			
	35				51.84					1.4			
	36				58.92					1.6			
	37				66.78					1.8			
↓	38				75.68		↓	↓	↓	2.0	↓		↓
		↓											

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NPDES - 1021

TS-91
Rev.1, 1/23/96

AC-228 Calibration 1067 25-38

LB4110 1" Nylon Planchet with yttrium oxalate mount

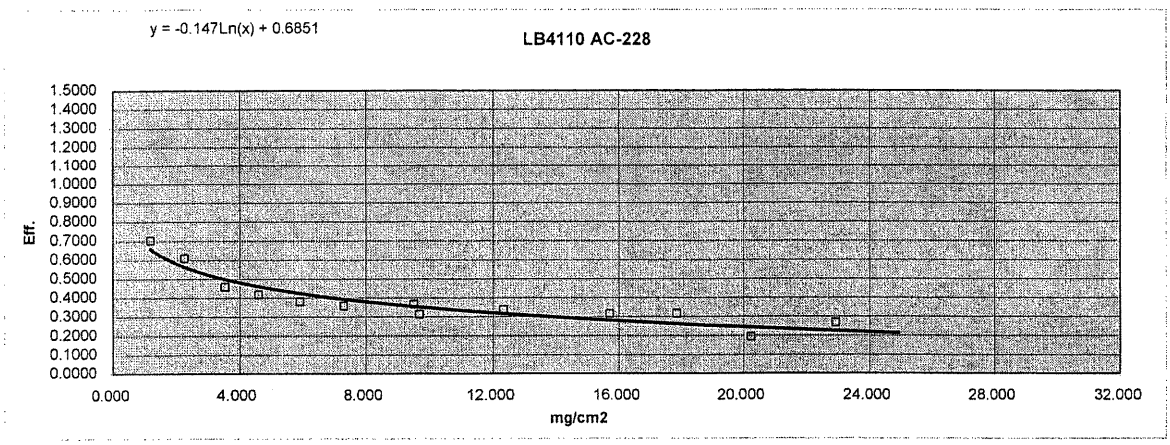
TRACER: Ra-228; R1-A-14

Tzero = 189.708 2000

DPM/ML 71.01 LAMBDA = 3.30E-04 (5.75 YEARS)

MG/ML 40.15

Gram Rcvd	mG/cm2	mL carrier	SAMPLE	Tc	CPM	DELTA	DECAY	Yield	CZERO	EFF	PPT
3.98	1.206	0.200	25	31.774	23.070	208.066	0.93363	0.49564	49.9	0.7021	
7.56	2.291	0.300	26	31.774	25.274	208.066	0.93363	0.62765	43.1	0.6074	
11.78	3.570	0.400	27	31.774	22.300	208.066	0.93363	0.73350	32.6	0.4586	1.467454
15.23	4.615	0.500	28	31.774	21.010	208.066	0.93363	0.75866	29.7	0.4177	1.336672
19.54	5.921	0.600	29	31.774	20.435	208.066	0.93363	0.81112	27.0	0.3800	1.216007
24.15	7.318	0.700	30	31.774	20.324	208.066	0.93363	0.85928	25.3	0.3568	1.141651
31.40	9.515	0.900	32	31.774	20.980	208.066	0.93363	0.86896	25.9	0.3642	1.165375
31.98	9.691	1.000	33	31.774	16.503	208.066	0.93363	0.79651	22.2	0.3125	1.000072
40.66	12.321	1.200	34	31.774	18.841	208.066	0.93363	0.84392	23.9	0.3367	1.077576
51.84	15.709	1.400	35	31.774	19.194	208.066	0.93363	0.92226	22.3	0.3139	1.004546
58.92	17.855	1.600	36	31.774	19.229	208.066	0.93363	0.91719	22.5	0.3162	1.011947
66.78	20.236	1.800	37	31.774	11.833	208.066	0.93363	0.92403	13.7	0.1932	
75.68	22.933	2.000	38	31.774	16.647	208.066	0.93363	0.94247	18.9	0.2664	



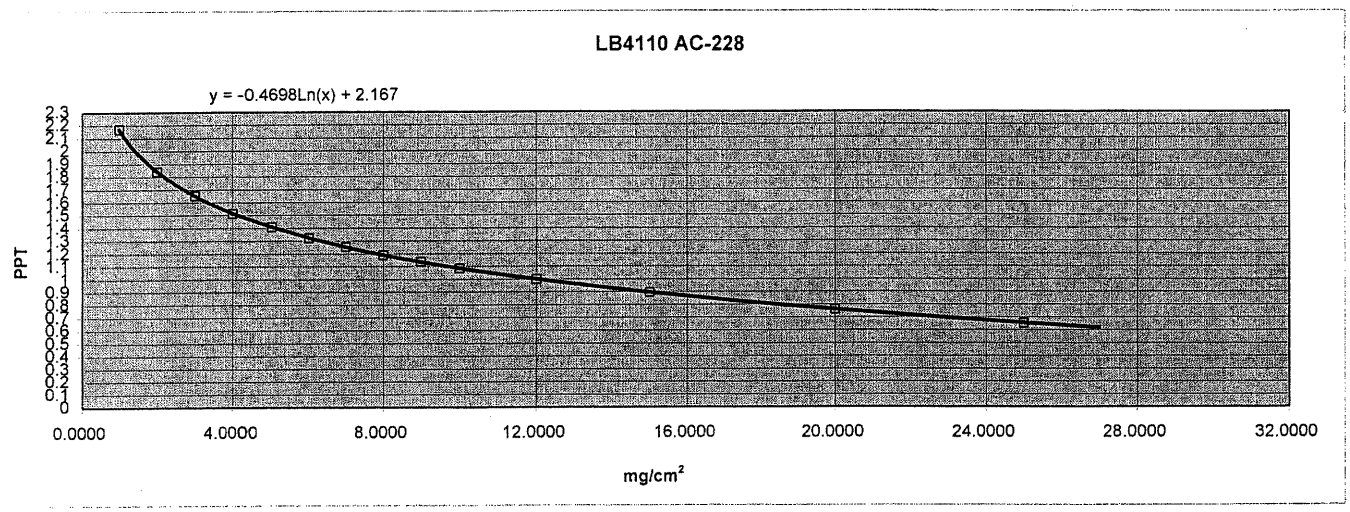
Log Book entry	Group+Sample Number	Date	Anaybis	Req By	Prep By	✓	Volume ID of Standard	Total Activity DPM
424	1067- 1	11/27/00	Ac 228	CS	LP	✓	1.0ml / Ra^{228} RI-A	71.01 ~~71.09~~ Kg 11/27/00
425	2		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01 ~~71.09~~ Kg 11/27/00
426	3		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
427	4		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
428	5		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
429	6		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
430	7		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
431	8		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
432 11/28/00 RP	9		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
~~433~~ 433	10		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
434	11		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01
435	12		Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A	71.01 Kg 11/27/00
436	1067- 13	12/1/00	Ac 228	CS	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
437	14	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
438	15	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
439	16	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
440	17	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
441	18	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
442	19	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
443	20	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
444	21	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
445	22	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
446	23	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
447	24	"	Ac 228	"	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01 Kg 12/4/00
448	1067- 25	1/24/01	Ac 228	CS	RP	✓	1.0ml / Ra^{228} RI-A-(4)	71.01
449	26	"		"	RP	✓		71.01
450	27	"		"	RP	✓		71.01
451	28	"		"	RP	✓		71.01
452	29	"		"	RP	✓		71.01
453	30	"		"	RP	✓		71.01
454	31	"		"	RP	✓		71.01
455	32	"		"	RP	✓		71.01
456	33	"		"	RP	✓		71.01
457	34	"		"	RP	✓		71.01
								Kg 2/5/01

% 1σ error	Activity Date	Standard Wt (g)	Matrix	Container	Given To	Comments
1.8	189.708-00	1.01	.1M HCl	50ml Poly Tube	Bay Lab	Ac^{228} curie D.D895 mg Am/BaSO4
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
1.8	189.708-00	1.01	.1M HCl	50ml Poly Tube	Bay Lab	Ac^{228} 2: HzO oxlate
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.00	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.00	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
1.8	189.708-00	1.01	.1M HCl	50ml Poly Tube		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		
"	"	1.01	"	"		

NPDES - 1023

Logbook Entry	Group + Sample Number	Date	Analysis	Req By	Prep By	✓	Volume + IDoC Standard	Total Activity DPM	% 0- error	Activity Date	Std Wts	Matrix	Container	Filter No.	Comments
	~~107~~ 11240101														
458	10671-35	1/24/01	Ac 228	CS	RP	✓	1.0mL Ra^{228} RFA (4)	71.01	1.8	189.708-00	1.01	– 1M HCl	50mL Poly Tube		
459	36	"		"	RP	✓		71.01	"	"	1.01				
460	37	"		"	RP	✓		71.01	"	"	1.01				
461	38	"		"	RP	✓		71.01	"	"	1.01				
								KJ 2/5/01							

mg/cm2	PPT	Eff.
0.0000		
1.0000	2.168	0.683
2.0000	1.841	0.58
3.0000	1.651	0.52
4.0000	1.514	0.477
5.0000	1.41	0.444
6.0000	1.323	0.417
7.0000	1.254	0.395
8.0000	1.19	0.375
9.0000	1.137	0.358
10.0000	1.086	0.342
12.0000	1	0.315
15.0000	0.895	0.282
20.0000	0.759	0.239
25.0000	0.654	0.206



02-FEB-01 TMA Corporation 1067- 25 Ac
09:19:13 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-01

Ac 228

Counter GRB 217
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.136	0.	0.0	0.00	0.000	0.00		8.64	8.64

CPM corrected for decay to Sept. Time. : 23.0697

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 1.3258
PPT. correction (3)= 0.9700 (recovery = 3.980 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 1.285977E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.7939E+01	1.8280	3.2793E+01	9.7470E-01	2.97 %

LTV 3.4401E+01

1st point MDA 1.3384E+00

DPM OF ALIQUOT 3.279E+01

Saved answer = 3.279E+01 2.97% (DPM of aliquot) (28516)

1067 - 25 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.136	Error
32.136	GRB 217	838	100.0	0.37	1.021	8.97	8.97	3.7%
32.208	GRB 217	381	60.0	0.37	1.021	6.45	7.84	5.5%
32.258	GRB 217	381	60.0	0.37	1.021	6.45	8.98	5.5%
32.740	GRB 217	182	100.0	0.37	1.021	1.62	8.34	9.8%
32.828	GRB 221	160	100.0	0.38	1.014	1.35	8.84	11.1%
					Weighted average		8.64	3.0%

Error shown is 1.2 times that expected from counting statistics.

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR
8.9675E+00 8.9675E+00 3.2818E-01 8.6369E+00 2.5671E-01 2.9723E+00
8.9675E+00 8.9675E+00 3.2818E-01 8.6369E+00 2.5671E-01 2.9723E+00

06-FEB-01 TMA [illegible] 1067- 26 Ac
13:10:05 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed AK Date 2-6-01

Ac 228

Counter GRB 218
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.136	0.	0.0	0.00	0.000	0.00		9.46	9.46

CPM corrected for decay to Sept. Time. : 25.2742

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 1.6789
PPT. correction (3)= 0.9965 (recovery = 7.560 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 1.672989E+00

C-zero	P-factor		dpm/smpl	1 sigma dpm error	percent sigma
1.5107E+01	1.8280		2.7616E+01	6.5148E-01	2.36 %
		LTV	2.8691E+01		
		1st point MDA	9.8384E-01		

DPM OF ALIQUOT 2.762E+01

Saved answer = 2.762E+01 2.36% (DPM of aliquot) (29365)

(P)

1067 - 26 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.136	Error
32.136	GRB	218	901	100.0	0.35	1.005	9.55	9.55	3.5%
32.208	GRB	218	463	60.0	0.35	1.005	7.83	9.52	4.9%
32.258	GRB	218	409	60.0	0.35	1.005	6.87	9.57	5.3%
32.740	GRB	218	207	100.0	0.35	1.005	1.90	9.76	8.7%
32.828	GRB	222	144	100.0	0.35	1.006	1.21	7.89	11.6%
						Weighted average		9.46	2.4%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

9.5481E+00	9.5481E+00	3.3423E-01	9.4623E+00	2.2322E-01	2.3591E+00
9.5481E+00	9.5481E+00	3.3423E-01	9.4623E+00	2.2322E-01	2.3591E+00

01-FEB-01 TMA Corporation 1067- 27 Ac
23:31:53 Beta Counting Data
R011183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-01

Ac 228

Counter GRB 219
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.136	0.	0.0	0.00	0.000	0.00		8.35	8.35

CPM corrected for decay to Sept. Time. : 22.3003

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 1.9620
PPT. correction (3)= 1.0050 (recovery = 11.78 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 1.971835E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.1309E+01	1.8280	2.0674E+01	5.2447E-01	2.54 %

LTV 2.1539E+01 (P)

1st point MDA 8.5999E-01

DPM OF ALIQUOT 2.067E+01

Saved answer = 2.067E+01 2.54% (DPM of aliquot) (28159)

1067 - 27 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.136	Error
32.136	GRB	219	803	100.0	0.37	1.012	8.51	8.51	3.7%
32.208	GRB	219	410	60.0	0.37	1.012	6.92	8.41	5.3%
32.258	GRB	219	343	60.0	0.37	1.012	5.72	7.97	5.8%
32.740	GRB	219	172	100.0	0.37	1.012	1.50	7.73	10.2%
32.856	GRB	207	156	100.0	0.36	1.047	1.38	9.74	11.0%
33.210	GRB	231	74	100.0	0.41	1.026	0.37	6.91	29.7%
						Weighted average		8.35	2.5%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

8.5065E+00	8.5065E+00	3.1846E-01	8.3489E+00	2.1180E-01	2.5369E+00
8.5065E+00	8.5065E+00	3.1846E-01	8.3489E+00	2.1180E-01	2.5369E+00

01-FEB-01 TMA Corporation 1067- 28 Ac
23:32:43 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-1

Ac 228

Counter GRB 220
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
32.136	0.	0.0	0.00	0.000	0.00		7.87	7.87

CPM corrected for decay to Sept. Time. : 21.0095

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.0293
PPT. correction (3)= 1.0032 (recovery = 15.23 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.035715E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.0320E+01	1.8280	1.8866E+01	4.9387E-01	2.62 %

LTV 1.9681E+01 (P)

1st point MDA 8.0734E-01

DPM OF ALIQUOT 1.887E+01

Saved answer = 1.887E+01 2.62% (DPM of aliquot) (28160)

1067 - 28 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.136	Error
32.136	GRB 220	782	100.0	0.35	1.007	8.25	8.25	3.8%
32.208	GRB 220	367	60.0	0.35	1.007	6.14	7.47	5.6%
32.258	GRB 220	343	60.0	0.35	1.007	5.72	7.96	5.8%
32.740	GRB 220	164	100.0	0.35	1.007	1.43	7.35	10.4%
32.856	GRB 208	134	100.0	0.47	1.037	0.99	6.95	14.9%
33.210	GRB 232	67	100.0	0.36	1.024	0.34	6.34	30.3%
					Weighted average		7.87	2.6%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

8.2545E+00	8.2545E+00	3.1242E-01	7.8656E+00	2.0591E-01	2.6178E+00
8.2545E+00	8.2545E+00	3.1242E-01	7.8656E+00	2.0591E-01	2.6178E+00

02-FEB-01 TMA Corporation 1067- 29 Ac
15:33:19 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed_____ Date_____

Ac 228

Counter GRB 221
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.113	0.	0.0	0.00	0.000	0.00		8.14	8.14

CPM corrected for decay to Sept. Time. : 20.4348

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.1697
PPT. correction (3)= 1.0002 (recovery = 19.54 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.170007E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
9.4169E+00	1.8280	1.7214E+01	4.6224E-01	2.69 %

LTV 1.7977E+01

1st point MDA 7.4959E-01

DPM OF ALIQUOT 1.721E+01

Saved answer = 1.721E+01 2.69% (DPM of aliquot) (28161)

1067 - 29 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.113	Error
32.113	GRB 221	771	100.0	0.38	1.014	8.15	8.15	3.8%
32.208	GRB 221	357	60.0	0.38	1.014	5.97	7.72	5.7%
32.257	GRB 221	347	60.0	0.38	1.014	5.79	8.56	5.8%
32.741	GRB 221	185	100.0	0.38	1.014	1.63	8.96	9.8%
33.213	GRB 202	60	100.0	0.36	1.039	0.27	5.35	37.5%
33.783	GRB 217	31	60.0	0.38	1.021	0.15	13.72	75.7%
					Weighted average		8.14	2.7%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR
8.1495E+00 8.1495E+00 3.1317E-01 8.1433E+00 2.1867E-01 2.6853E+00
8.1495E+00 8.1495E+00 3.1317E-01 8.1433E+00 2.1867E-01 2.6853E+00

02-FEB-01 TMA Corporation 1067- 30 Ac
15:33:52 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed_____ Date_____

Ac 228

Counter GRB 222
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.113	0.	0.0	0.00	0.000	0.00		8.10	8.10

CPM corrected for decay to Sept. Time. : 20.3242

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.2985
PPT. correction (3)= 0.9960 (recovery = 24.15 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.289378E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
8.8776E+00	1.8280	1.6228E+01	4.3225E-01	2.66 %

LTV 1.6941E+01

1st point MDA 6.7203E-01

DPM OF ALIQUOT 1.623E+01

Saved answer = 1.623E+01 2.66% (DPM of aliquot) (28162)

1067 - 30 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.113	Error
32.113	GRB 222	761	100.0	0.35	1.006	8.02	8.02	3.8%
32.208	GRB 222	368	60.0	0.35	1.006	6.16	7.97	5.6%
32.257	GRB 222	343	60.0	0.35	1.006	5.71	8.45	5.8%
32.741	GRB 222	166	100.0	0.35	1.006	1.45	7.97	10.3%
33.213	GRB 203	78	100.0	0.34	1.039	0.50	9.86	22.3%
33.783	GRB 218	23	60.0	0.36	1.005	0.03	2.40	373.2%
					Weighted average		8.10	2.7%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

8.0167E+00	8.0167E+00	3.0794E-01	8.0992E+00	2.1573E-01	2.6636E+00
8.0167E+00	8.0167E+00	3.0794E-01	8.0992E+00	2.1573E-01	2.6636E+00

02-FEB-01 TMA Corporation 1067- 31 Ac
15:34:24 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed_____ Date_____

Ac 228

Counter GRB 223
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
32.113	0.	0.0	0.00	0.000	0.00		7.25	7.25

CPM corrected for decay to Sept. Time. : 18.2036

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.4226
PPT. correction (3)= 0.9875 (recovery = 29.09 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.392218E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
7.6095E+00	1.8280	1.3910E+01	3.9871E-01	2.87 %

LTV 1.4568E+01

1st point MDA 6.7919E-01

DPM OF ALIQUOT 1.391E+01

Saved answer = 1.391E+01 2.87% (DPM of aliquot) (28173)

1067 - 31 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.113	Error
32.113	GRB 223	703	100.0	0.39	1.012	7.38	7.38	4.1%
32.208	GRB 223	354	60.0	0.39	1.012	5.90	7.64	5.7%
32.257	GRB 223	278	60.0	0.39	1.012	4.55	6.72	6.6%
32.741	GRB 223	162	100.0	0.39	1.012	1.37	7.53	11.0%
33.213	GRB 204	58	100.0	0.42	1.040	0.18	3.64	56.7%
33.783	GRB 219	17	60.0	0.36	1.012	-0.09	-8.03	100.9%
					Weighted average		7.25	2.9%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR
7.3772E+00 7.3772E+00 2.9886E-01 7.2542E+00 2.0793E-01 2.8663E+00
7.3772E+00 7.3772E+00 2.9886E-01 7.2542E+00 2.0793E-01 2.8663E+00

02-FEB-01 TMA Corporation 1067- 32 Ac
15:32:46 Beta Counting Data
RO111183 AUTOB V 2.07
ACC

Reviewed_____ Date_____

Ac 228

Counter GRB 224
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
32.113	0.	0.0	0.00	0.000	0.00		8.36	8.36

CPM corrected for decay to Sept. Time. : 20.9804

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.3244
PPT. correction (3)= 0.9808 (recovery = 31.40 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.279861E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
9.2025E+00	1.8280	1.6822E+01	4.4022E-01	2.62 %

LTV 1.7548E+01

1st point MDA 6.8591E-01

DPM OF ALIQUOT 1.682E+01

Saved answer = 1.682E+01 2.62% (DPM of aliquot) (28174)

1067 - 32 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.113	Error
32.113	GRB	224	783	100.0	0.36	1.000	8.19	8.19	3.8%
32.208	GRB	224	396	60.0	0.36	1.000	6.60	8.54	5.4%
32.257	GRB	224	346	60.0	0.36	1.000	5.71	8.45	5.8%
32.741	GRB	224	179	100.0	0.36	1.000	1.56	8.60	9.9%
33.337	GRB	203	226	400.0	0.34	1.039	0.33	9.10	25.1%
33.758	GRB	221	34	60.0	0.38	1.014	0.19	16.93	59.2%
						Weighted average		8.36	2.6%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR
8.1917E+00 8.1917E+00 3.1074E-01 8.3607E+00 2.1879E-01 2.6169E+00
8.1917E+00 8.1917E+00 3.1074E-01 8.3607E+00 2.1879E-01 2.6169E+00

01-FEB-01 TMA Corporation 1067- 33 Ac
19:14:21 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed QK Date 2-2-1

Ac 228

Counter GRB 229
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.112	0.	0.0	0.00	0.000	0.00		6.59	6.59

CPM corrected for decay to Sept. Time. : 16.5033

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.1306
PPT. correction (3)= 0.9791 (recovery = 31.98 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.086031E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
7.9113E+00	1.8280	1.4462E+01	4.2415E-01	2.93 %

LTV 1.5162E+01 (P)

1st point MDA 7.9542E-01

DPM OF ALIQUOT 1.446E+01

Saved answer = 1.446E+01 2.93% (DPM of aliquot) (28175)

1067 - 33 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.112	Error
32.112	GRB 229	635	100.0	0.40	1.025	6.70	6.70	4.3%
32.208	GRB 229	297	60.0	0.40	1.025	4.94	6.41	6.4%
32.257	GRB 229	266	60.0	0.40	1.025	4.38	6.49	6.8%
32.740	GRB 229	143	100.0	0.40	1.025	1.16	6.37	12.5%
32.829	GRB 217	123	100.0	0.37	1.021	0.96	6.70	14.0%
32.852	GRB 229	127	100.0	0.40	1.025	0.98	7.30	14.1%
					Weighted average		6.59	2.9%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

6.6960E+00	6.6960E+00	2.8839E-01	6.5945E+00	1.9340E-01	2.9328E+00
6.6960E+00	6.6960E+00	2.8839E-01	6.5945E+00	1.9340E-01	2.9328E+00

01-FEB-01 TMA Corporation 1067- 34 Ac
19:15:04 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-1

Ac 228

Counter GRB 230
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.112	0.	0.0	0.00	0.000	0.00		7.53	7.53

CPM corrected for decay to Sept. Time. : 18.8406

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.2574
PPT. correction (3)= 0.9349 (recovery = 40.66 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.110421E+00

C-zero	P-factor		dpm/smpl	1 sigma dpm error	percent sigma
8.9274E+00	1.8280		1.6319E+01	5.5090E-01	3.38 %
		LTV	1.7228E+01		
		1st point MDA	7.3940E-01		

DPM OF ALIQUOT 1.632E+01

Saved answer = 1.632E+01 3.38% (DPM of aliquot) (28191)

1067 - 34 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.112	Error
32.112	GRB	230	744	100.0	0.36	1.011	7.86	7.86	3.9%
32.208	GRB	230	317	60.0	0.36	1.011	5.27	6.84	6.1%
32.257	GRB	230	332	60.0	0.36	1.011	5.54	8.21	5.9%
32.740	GRB	230	147	100.0	0.35	1.011	1.24	6.83	11.5%
32.629	GRB	218	130	100.0	0.35	1.005	1.05	7.33	12.8%
32.852	GRB	230	115	100.0	0.35	1.011	0.89	6.61	14.4%
						Weighted average		7.53	3.4%

Error shown is 1.3 times that expected from counting statistics.

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

7.8580E+00	7.8580E+00	3.0626E-01	7.5284E+00	2.5414E-01	3.3758E+00
7.8580E+00	7.8580E+00	3.0626E-01	7.5284E+00	2.5414E-01	3.3758E+00

01-FEB-01 TMA Corporation 1067- 35 Ac
19:15:47 Beta Counting Data
RO11183 AUTOB V 2.07
ACC

Reviewed AK Date 2-2-1

Ac 228

Counter GRB 231
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.112	0.	0.0	0.00	0.000	0.00		7.67	7.67

CPM corrected for decay to Sept. Time. : 19.1941

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.4669
PPT. correction (3)= 0.8705 (recovery = 51.84 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.147527E+00

C-zero	P-factor		dpm/smpl	1 sigma dpm error	percent sigma
8.9378E+00	1.8280		1.6338E+01	4.4208E-01	2.71 %
		LTV	1.7068E+01		
		1st point MDA	7.8925E-01		

DPM OF ALIQUOT 1.634E+01

Saved answer = 1.634E+01 2.71% (DPM of aliquot) (28192)

1067 - 35 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.112	Error
32.112	GRB	231	727	100.0	0.41	1.026	7.72	7.72	4.0%
32.208	GRB	231	358	60.0	0.41	1.026	6.03	7.82	5.7%
32.257	GRB	231	321	60.0	0.41	1.026	5.36	7.94	6.1%
32.740	GRB	231	147	100.0	0.41	1.026	1.20	6.58	12.3%
32.829	GRB	219	148	100.0	0.37	1.012	1.23	8.64	11.7%
32.852	GRB	231	113	100.0	0.41	1.026	0.81	6.06	16.2%
						Weighted average		7.67	2.7%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR
7.7179E+00 7.7179E+00 3.0864E-01 7.6697E+00 2.0753E-01 2.7058E+00
7.7179E+00 7.7179E+00 3.0864E-01 7.6697E+00 2.0753E-01 2.7058E+00

01-FEB-01 TMA Corporation 1067- 36 Ac
19:16:30 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed ak Date 2-2-1

Ac 228

Counter GRB 232
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.112	0.	0.0	0.00	0.000	0.00		7.68	7.68

CPM corrected for decay to Sept. Time. : 19.2292

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.4534
PPT. correction (3)= 0.8298 (recovery = 58.92 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 2.035712E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
9.4459E+00	1.8280	1.7267E+01	4.6107E-01	2.67 %

LTV 1.8028E+01

1st point MDA 7.8451E-01

DPM OF ALIQUOT 1.727E+01

Saved answer = 1.727E+01 2.67% (DPM of aliquot) (28193)

1067 - 36 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det		Cnts	Min.	Bkg	S.F.	CPM	CPM @ 32.112	Error
32.112	GRB	232	734	100.0	0.36	1.024	7.84	7.84	3.9%
32.208	GRB	232	364	60.0	0.36	1.024	6.18	8.01	5.6%
32.257	GRB	232	290	60.0	0.36	1.024	4.84	7.17	6.4%
32.740	GRB	232	140	100.0	0.36	1.024	1.16	6.40	12.2%
32.829	GRB	220	134	100.0	0.35	1.007	1.09	7.66	12.4%
32.852	GRB	232	146	100.0	0.36	1.024	1.23	9.18	11.7%
						Weighted average		7.68	2.7%

CRATE1, DCPM1, ERR1, AVCPM, AVERR, AVPERR

7.8377E+00	7.8377E+00	3.0832E-01	7.6837E+00	2.0517E-01	2.6702E+00
7.8377E+00	7.8377E+00	3.0832E-01	7.6837E+00	2.0517E-01	2.6702E+00

02-FEB-01 TMA Corporation 1067- 37 Ac
08:07:14 Beta Counting Data
RO11183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-01

Ac 228

Counter GRB 207
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
32.122	0.	0.0	0.00	0.000	0.00		4.60	4.60

CPM corrected for decay to Sept. Time. : 11.8328

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.4717
PPT. correction (3)= 0.7845 (recovery = 66.78 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 1.939060E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
6.1023E+00	1.8280	1.1155E+01	4.1194E-01	3.69 %

LTV 1.1835E+01

1st point MDA 8.5695E-01

DPM OF ALIQUOT 1.116E+01

Saved answer = 1.116E+01 3.69% (DPM of aliquot) (28194)

02-FEB-01 TMA Corporation 1067- 38 Ac
08:08:14 Beta Counting Data
R011183 AUTOB V 2.07
ACC Reviewed AK Date 2-2-01

Ac 228

Counter GRB 208
Length of count 0.0 Min.
Gross counts = 0.

Zero time 31.774 1
Separation time 31.774 1

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
32.122	0.	0.0	0.00	0.000	0.00		6.47	6.47

CPM corrected for decay to Sept. Time. : 16.6470

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 2.5210
PPT. correction (3)= 0.7333 (recovery = 75.68 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 1.848555E+00

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
9.0054E+00	1.8280	1.6462E+01	5.1993E-01	3.16 %

LTV 1.7320E+01

1st point MDA 1.0136E+00

DPM OF ALIQUOT 1.646E+01

Saved answer = 1.646E+01 3.16% (DPM of aliquot) (28195)

Reviewed_____ Date_____

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	262.724 6
Ra226 -	1.1700E-06	2nd -	270.697 6

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
270.888	6	RN 13	4861	101.6	0.190	47.659	0.994	47.965	1.4

Rn-222 decay from 2nd De-em to Count time = 0.9660
CPM @ 2nd De-emanation time = 49.6547
Rn-222 growth from 1st to 2nd De-em time = 0.7643
Ra-226 decay (tracer date to 2nd De-em) = 0.9941

Efficiency Determination for Cell # 5

Tracer used : Ra226 M1-A-(06)
Amount used : 1.0 mLs
DPM per mL : 26.42 +/- 1.8 %
Standardization Date : 1.500 93

Cell # 5 Efficiency = 2.473 +/- 0.057
@ 270.888 6

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 13	BK BK	270.022	64	930.0	0.069	0.055 - 0.130	0.090	-1.9
RN 13	EF SF	270.681	10036	3.7	1.028	0.992 - 1.052	1.023	0.6
RN 13	BK BK5	255.709	23	120.8	0.190	0.104 - 0.251	0.181	0.5
RN 13	EF EF5	270.888	4861	101.6	2.473	2.228 - 2.512	2.387	2.2

Previous 3 counts	Time	Detector	ID	Length	Cpm
269.835	26-SEP-06 13:02	RN 13	BK	\ 151.8 min	0.00
270.022	26-SEP-06 17:31	RN 13	BK	\ 930.0 min	0.00
270.681	27-SEP-06 9:20	RN 13	SF	\ 3.7 min	0.00

Reviewed ____ Date ____

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	265.696 6
Ra226 -	1.1700E-06	2nd -	313.769 6

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
313.940	6	RN 9	4003	69.1	0.318	57.646	0.996	57.897	1.6

Rn-222 decay from 2nd De-em to Count time = 0.9695
CPM @ 2nd De-emanation time = 59.7198
Rn-222 growth from 1st to 2nd De-em time = 0.9998
Ra-226 decay (tracer date to 2nd De-em) = 0.9941

Efficiency Determination for Cell #25

Tracer used : Ra226 M1-A-(06)
Amount used : 1.0 mLs
DPM per mL : 26.42 +/- 1.8 %
Standardization Date : 1.500 93

Cell #25 Efficiency = 2.274 +/- 0.055
@ 313.940 6

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 9	BK BK	313.040	187	940.9	0.199	0.135 - 0.270	0.202	-0.2
RN 9	EF SF	313.694	10025	3.6	1.003	0.990 - 1.050	1.018	-1.6
RN 9	BK BK25	312.919	41	129.1	0.318	0.133 - 0.500	0.319	0.0
RN 9	EF EF25	313.940	4003	69.1	2.274	2.100 - 2.588	2.286	-0.2

Previous 3 counts	Time	Detector	ID	Length	Cpm
312.919	8-NOV-06 14:03	RN 9	BK	\ 129.1 min	0.00
313.040	8-NOV-06 16:57	RN 9	BK	\ 940.9 min	0.00
313.694	9-NOV-06 8:39	RN 9	SF	\ 3.6 min	0.00

Reviewed_____ Date_____

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	313.769 6
Ra226 -	1.1700E-06	2nd -	324.770 6

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
324.949	6	RN 12	4108	79.4	0.103	51.602	0.995	51.861	1.6

Rn-222 decay from 2nd De-em to Count time =	0.9681
CPM @ 2nd De-emanation time =	53.5715
Rn-222 growth from 1st to 2nd De-em time =	0.8639
Ra-226 decay (tracer date to 2nd De-em) =	0.9941

Efficiency Determination for Cell #20

Tracer used :	Ra226 M1-A-(06)
Amount used :	1.0 mLs
DPM per mL :	26.42 +/- 1.8 %
Standardization Date :	1.500 93
Cell #20 Efficiency =	2.361 +/- 0.056
@ 324.949 6	

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 12	BK BK	321.047	86	931.1	0.092	0.062 - 0.110	0.086	0.8
RN 12	EF SF	324.715	10067	3.7	1.061	1.012 - 1.080	1.059	0.1
RN 12	BK BK20	311.728	13	126.4	0.103	0.053 - 0.282	0.157	-1.7
RN 12	EF EF20	324.949	4108	79.4	2.361	2.100 - 2.523	2.304	0.9

Previous 3 counts	Time	Detector	ID	Length	Cpm
324.715	20-NOV-06 9:09	RN 12	SF	\ 3.7 min	0.00
324.738	20-NOV-06 9:42	RN 12	BK	\ 120.6 min	0.00
324.824	20-NOV-06 11:46	RN 12	BK	\ 128.5 min	0.00

NPDES - 1054

Reviewed #### Date ########

Decay Constants		De-emanation Times		
Rn222 -	1.8129E-01	1st -	270.697	6
Ra226 -	1.1700E-06	2nd -	317.765	6

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
317.938	6	RN 11	4037	67.7	0.072	59.550	0.996	59.804	1.6

Rn-222 decay from 2nd De-em to Count time =	0.9691
CPM @ 2nd De-emanation time =	61.7091
Rn-222 growth from 1st to 2nd De-em time =	0.9998
Ra-226 decay (tracer date to 2nd De-em) =	0.9941

Efficiency Determination for Cell #35

Tracer used :	Ra226 Mi-A-(06)
Amount used :	1.0 mLs
DPM per mL :	26.42 +/- 1.8 %
Standardization Date :	1.500 93
Cell #35 Efficiency =	2.350 +/- 0.056
@ 317.938 6	

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 11	BK BK	314.056	50	869.2	0.058	0.019 - 0.089	0.056	0.3
RN 11	EF SF	317.699	10043	3.7	1.066	1.032 - 1.070	1.062	1.5
RN 11	BK BK35	303.822	9	124.6	0.072	0.049 - 0.193	0.113	-2.0
RN 11	EF EF35	317.938	4037	67.7	2.350	2.139 - 2.636	2.382	-0.5

Previous 3 counts	Time	Detector	ID	Length	Cpm
314.693	10-NOV-06 8:37	RN 11	BK	\ 121.4 min	0.00
314.886	10-NOV-06 13:15	RN 11	Ra 137 789	\ 63.8 min	133.28
317.699	13-NOV-06 8:46	RN 11	SF	\ 3.7 min	0.00

NPDES - 1055

Reviewed #### Date ########

Decay Constants		De-emanation Times		
Rn222 -	1.8129E-01	1st -	270.697	6
Ra226 -	1.1700E-06	2nd -	317.765	6

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
317.938	6	RN 10	4050	69.0	0.111	58.593	0.996	58.848	1.6

Rn-222 decay from 2nd De-em to Gount time =	0.9691
CPM @ 2nd De-emanation time =	60.7227
Rn-222 growth from 1st to 2nd De-em time =	0.9998
Ra-226 decay (tracer date to 2nd De-em) =	0.9941

Efficiency Determination for Cell #66

Tracer used :	Ra226 M1-A-(06)
Amount used :	1.0 mLs
DPM per mL :	26.42 +/- 1.8 %
Standardization Date :	1.500 93
Cell #66 Efficiency =	2.312 +/- 0.055
@ 317.938 6	

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 10	BK BK	314.056	55	869.2	0.063	0.033 - 0.100	0.066	-0.3
RN 10	EF SF	317.697	10046	3.7	1.069	1.026 - 1.070	1.057	2.8
RN 10	BK BK66	311.728	14	126.4	0.111	0.000 - 0.280	0.116	-0.3
RN 10	EF EF66	317.938	4050	69.0	2.312	2.100 - 2.800	2.349	-0.6

Previous 3 counts		Time	Detector	ID			Length	Cpm
314.663	10-NOV-06	7:54	RN 10	SF		\	3.7 min	0.00
314.886	10-NOV-06	13:15	RN 10	Ra	137 788	\	70.1 min	128.24
317.697	13-NOV-06	8:43	RN 10	SF		\	3.7 min	0.00

APPENDIX G

Section 19

EBERLINE SERVICES REPORT

March 26, 2007

EBERLINE SERVICES

March 26, 2007

Ms. Michele Chamberlin
Project Manager
Del Mar Analytical
17461 Derian Avenue, Suite 100
Irvine, CA 92614

Reference: Eberline Services NELAP Cert #01120CA (exp. 01/31/08)

Dear Ms. Chamberlin:

Enclosed is a Level IV data package (on CD) for the water samples in the following Test America, Inc. Projects, the associated Eberline Services work orders are also specified:

Test America Project #	Eberline Work Order	Sample Receipt Date
IQB2021	R702121-8656	02/21/07
IQB2022	R702122-8657	02/21/07
IQB2023	R702123-8658	02/21/07
IQB2024	R702124-8659	02/21/07
IQC0154	R703026-8660	03/03/07
IQC0289	R703047-8661	03/06/07

The samples were analyzed according to the accompanying Test America Inc. Subcontract Order Forms. The requested analyses for the sample in Test America project IQB2022 were gross alpha/gross beta (EPA900.0), tritium (H-3, EPA906.0), and strontium-90 (Sr-90, EPA905.0), Ra-226 (EPA903.1), and Ra-228 (EPA904.0). The requested analysis for all other projects was gross alpha. The samples were not filtered prior to analysis; all aliquots, except tritium, were prepared for analysis within 5 days of collection. Samples from projects IQB2021, IQB2022, IQB2023, and IQB2024 were analyzed in a common preparation batch, while samples IQC0154 and IQC0289 were analyzed in a different common preparation batch. The batch QC LCS's, blank analyses, duplicate analyses, and matrix spike results were all within the control limits defined in Eberline Services Quality Control Procedures Manual. Analyses that involve the yielding of an analytical tracer or carrier, such as Sr-90 and Ra-228, do not require matrix spike analyses to be performed. No problems were encountered during the analyses. A copy of this report (on CD) was mailed to Ms. Elizabeth Wessling, 12269 E. Vassar Dr., Aurora CO 80014.

Please call me if you have any questions concerning this report.

Regards,

Melissa Mannion
Senior Program Manager

MCM/njv

Enclosure: Level IV Report on CD

Analytical Services
2030 Wright Avenue
P.O. Box 4040
Richmond, California 94804-0040
(510) 235-2633 Fax (510) 235-0438
Toll Free (800) 841-5487
www.eberlineservices.com
NPDES - 1058

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Section 1

Chain-of-Custody & Sample Receipt Information
Analysis Results
Sample Analysis Raw Data
Aliquot Information

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQB2021

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

Project Location: California

Standard TAT is requested unless specific due date is requested => **Due Date:** 3 WK TAT **Initials:** MC

Analysis	Expiration	Comments
Sample ID: IQB2021-01 Water	**Sampled: 02/19/07 09:30**	
EDD + Level 4	03/19/07 09:30	
Gross Alpha-O	08/18/07 09:30	* DONT FILTER, 900.0,RESULT>15 pCi/L,run Rad 226&228
Gross Beta-O	08/18/07 09:30	* DONT FILTER, 900.0,RESULT>50 pCi/L,run Rad 226&228
Radium, Combined-O	02/19/08 09:30	HOLD for G A&B results; EPA 903.1&904.0,NO FILTER
Strontium 90-O	02/19/08 09:30	* HOLD for Ra 226&228 results,EPA 905.0, DONT FILTER
Tritium-O	02/19/08 09:30	HOLD for Ra 226&228 results,EPA 906.0, DONT FILTER

Containers Supplied:

2.5 gal Poly (IQB2021-01S)
40 ml Amber Voa Vial (IQB2021-01T)
40 ml Amber Voa Vial (IQB2021-01U)
40 ml Amber Voa Vial (IQB2021-01V)

* 5day hold time MC

SAMPLE INTEGRITY:

All containers intact: ☑ Yes ☐ No
Custody Seals Present: ☐ Yes ☑ No
Sample labels/COC agree: ☑ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☑ No
Samples Received On Ice:: ☐ Yes ☑ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
[signature]	2/20/07		[signature]	02/21/07	9:00

Released By	Date	Time	Received By	Date	Time

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

12/21/07

Client: TEST AMERICA City IRVINE State CA

Date/Time received 12/21/07 9:17 CoC No. 182021

Container I.D. No. ICE CHEST Requested TAT (Days) 21 P.O. Received Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [X]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is:	Wet [ ]	Dry [X]	
6	Number of samples in shipping container: 1	Sample Matrix: W		
7	Number of containers per sample: 4	(Or see CoC:)		
8	Samples are in correct container	Yes [X]	No [ ]	
9	Paperwork agrees with samples?	Yes [X]	No [ ]	

10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [X]
11. Samples are: In good condition [X] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [X] pH _____ Preservative _____
13. Describe any anomalies:

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date _____
15. Inspected by _____ Date: 12/21/07 Time: 10:15

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. _____ Calibration date _____

Alpha Meter Ser. No. _____ Calibration date _____

Beta/Gamma Meter Ser. No. _____ Calibration date _____

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQB2022

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

Project Location: California

Standard TAT is requested unless specific due date is requested => **Due Date:** 3 WK TAT **Initials:** MC

Analysis	Expiration	Comments
Sample ID: IQB2022-01 Water	**Sampled: 02/19/07 12:00**	
EDD + Level 4	03/19/07 12:00	
Gross Alpha-O	08/18/07 12:00	EPA 900.0, DONT FILTER, 5 day HT!, sub to Eberline
Gross Beta-O	08/18/07 12:00	EPA 900.0, DONT FILTER, 5 day HT!, sub to Eberline
Radium, Combined-O	02/19/08 12:00	EPA 903.1&904.0, DONT FILTER,5 day HT sub=Eberline
Strontium 90-O	02/19/08 12:00	EPA 905.0, DONT FILTER, 5 day HT, sub=Eberline
Tritium-O	02/19/08 12:00	EPA 906.0

Containers Supplied:

2.5 gal Poly (IQB2022-01S)
40 ml Amber Voa Vial (IQB2022-01T)
40 ml Amber Voa Vial (IQB2022-01U)
40 ml Amber Voa Vial (IQB2022-01V)

SAMPLE INTEGRITY:

All containers intact: ☑ Yes ☐ No
Custody Seals Present: ☒ Yes ☑ No
Sample labels/COC agree: ☑ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☒ No
Samples Received On Ice:: ☐ Yes ☒ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
[signature]	2/20/07		[signature]	02/21/07	9:07

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NPDES - 1063

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

JK 2/21/07

Client: TEST AMERICA City IRVINE State CA

Date/Time received 2/21/07 9:10 CoC No. IQB2022

Container I.D. No. 16 CHEST Requested TAT (Days) 21 P.O. Received Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [X]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is	Wet [ ]	Dry [X]	
6	Number of samples in shipping container 1	Sample Matrix W		
7	Number of containers per sample 4	(Or see CoC)		
8	Samples are in correct container	Yes [X]	No [ ]	
9	Paperwork agrees with samples?	Yes [X]	No [ ]	
10	Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ]	Appropriate sample labels [X]		
11	Samples are: In good condition [X] Leaking [ ] Broken Container [ ]	Missing [ ]		
12	Samples are: Preserved [ ] Not preserved [X] pH _____	Preservative _____		
13	Describe any anomalies:			
14	Was P.M. notified of any anomalies?	Yes [ ]	No [ ]	Date _____
15	Inspected by _____	Date 02/21/07	Time 10:15	

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. _____ Calibration date _____

Alpha Meter Ser. No. _____ Calibration date _____

Beta/Gamma Meter Ser. No. _____ Calibration date _____

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQB2023

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

8658

Project Location: California

Standard TAT is requested unless specific due date is requested => **Due Date:** BACK TAT **Initials:** MC

Analysis	Expiration	Comments
Sample ID: IQB2023-01 Water	**Sampled: 02/19/07 11:15**	
EDD + Level 4	03/19/07 11:15	
Gross Alpha-O	08/18/07 11:15	*DONT FILTER, 900.0,RESULT>15 pCi/L,run Rad 226&228
Gross Beta-O	08/18/07 11:15	*DONT FILTER, 900.0,RESULT>50 pCi/L,run Rad 226&228
Radium, Combined-O	02/19/08 11:15	HOLD for G A&B results; EPA 903.1&904.0,NO FILTER
Strontium 90-O	02/19/08 11:15	HOLD for Ra 226&228 results,EPA 905.0, DONT FILTER
Tritium-O	02/19/08 11:15	HOLD for Ra 226&228 results,EPA 906.0, DONT FILTER

Containers Supplied:
2.5 gal Poly (IQB2023-01S)
40 ml Amber Voa Vial (IQB2023-01T)
40 ml Amber Voa Vial (IQB2023-01U)
40 ml Amber Voa Vial (IQB2023-01V)

* 5 day HT MC

SAMPLE INTEGRITY:

All containers intact: ☑ Yes ☐ No
Custody Seals Present: ☐ Yes ☑ No
Sample labels/COC agree: ☑ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☑ No
Samples Received On Ice:: ☐ Yes ☑ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
[signature]	2/20/07		[signature]	02/21/07	9:00

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

2/21/07 MC

Client: TEST AMERICA City IRVINE State CA

Date/Time received 02/21/07 9:00 CoC No. 16B2023

Container I.D. No. ~~WG~~ WG GUEST Requested TAT (Days) 21 P.O. Received Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [N]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is	Wet [ ]	Dry [X]	
6	Number of samples in shipping container 1	Sample Matrix W		
7	Number of containers per sample 4	(Or see CoC)		
8	Samples are in correct container	Yes [X]	No [ ]	
9	Paperwork agrees with samples?	Yes [X]	No [ ]	
10	Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ]	Appropriate sample labels [X]		
11	Samples are: In good condition [ ] Leaking [X] Broken Container [ ]	Missing [ ]		
12	Samples are: Preserved [ ] Not preserved [ ] pH _____	Preservative _____		
13	Describe any anomalies: LEAKING - REMAINING VOL. IS MORE OR LESS HALF THE CONTENT.			
14	Was P.M. notified of any anomalies?	Yes [ ]	No [ ]	Date _____
15	Inspected by _____	Date 02/21/07	Time 10:15	

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. _____ Calibration date _____

Alpha Meter Ser. No. _____ Calibration date _____

Beta/Gamma Meter Ser. No. _____ Calibration date _____

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQB2024

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

Project Location: California

21659

Standard TAT is requested unless specific due date is requested => **Due Date:** 3wk TAT **Initials:** MC

Analysis	Expiration	Comments
Sample ID: IQB2024-01 Water	**Sampled: 02/19/07 10:15**	
EDD + Level 4	03/19/07 10:15	
Gross Alpha-O	08/18/07 10:15	* DONT FILTER, 900.0,RESULT>15 pCi/L,run Rad 226&228
Gross Beta-O	08/18/07 10:15	* DONT FILTER, 900.0,RESULT>50 pCi/L,run Rad 226&228
Radium, Combined-O	02/19/08 10:15	HOLD for G A&B results; EPA 903.1&904.0,NO FILTER
Strontium 90-O	02/19/08 10:15	HOLD for Ra 226&228 results,EPA 905.0, DONT FILTER
Tritium-O	02/19/08 10:15	HOLD for Ra 226&228 results,EPA 906.0, DONT FILTER

Containers Supplied:
2.5 gal Poly (IQB2024-01R)
40 ml Amber Voa Vial (IQB2024-01S)
40 ml Amber Voa Vial (IQB2024-01T)
40 ml Amber Voa Vial (IQB2024-01U)

* 5day Hold time MC

SAMPLE INTEGRITY:

All containers intact: ☑ Yes ☐ No
Custody Seals Present: ☐ Yes ☑ No
Sample labels/COC agree: ☑ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☑ No
Samples Received On Ice:: ☐ Yes ☑ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
	2/20/07			02/21/07	9:07
Released By	Date	Time	Received By	Date	Time

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

JK 2/21/07

Client: TEST AMERICA City IRVINE State CA

Date/Time received 02/21/07 9:50 CoC No. IQB 2024

Container I.D. No. DRUM / TEST TEST Requested TAT (Days) 21 P.O. Received Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [X]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is	Wet [ ]	Dry [X]	
6	Number of samples in shipping container 1	Sample Matrix W		
7	Number of containers per sample 4	(Or see CoC ____)		
8	Samples are in correct container	Yes [X]	No [ ]	
9	Paperwork agrees with samples?	Yes [X]	No [ ]	

10 Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [X]

11 Samples are: In good condition [X] Leaking [ ] Broken Container [ ] Missing [ ]

12 Samples are: Preserved [ ] Not preserved [X] pH ____ Preservative ____

13 Describe any anomalies:

14 Was P.M. notified of any anomalies? Yes [ ] No [ ] Date ____

15 Inspected by [signature] Date 02/21/07 Time 10:15

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. ____ Calibration date ____

Alpha Meter Ser. No. ____ Calibration date ____

Beta/Gamma Meter Ser. No. ____ Calibration date ____

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQC0154

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

Project Location: California

Standard TAT is requested unless specific due date is requested => Due Date:_____ Initials:_____

Analysis	Expiration	Comments
Sample ID: IQC0154-01 Water	**Sampled: 03/01/07 11:15**	
Gross Alpha-O	08/28/07 11:15	DONT FILTER, 900.0,RESULT>15 pCi/L,run Rad 226&228
Gross Beta-O	08/28/07 11:15	DONT FILTER, 900.0,RESULT>50 pCi/L,run Rad 226&228
Level 4 + EDD-OUT	03/29/07 11:15	Excel EDD email to pm,Include Std logs for Lvl IV
Radium, Combined-O	02/29/08 11:15	HOLD for G A&B results; EPA 903.1&904.0,NO FILTER
Strontium 90-O	02/29/08 11:15	HOLD for Ra 226&228 results,EPA 905.0, DONT FILTER
Tritium-O	02/29/08 11:15	HOLD for Ra 226&228 results,EPA 906.0, DONT FILTER

Containers Supplied:

2.5 gal Poly (IQC0154-01S)
40 ml Amber Voa Vial (IQC0154-01T)
40 ml Amber Voa Vial (IQC0154-01U)
40 ml Amber Voa Vial (IQC0154-01V)

SAMPLE INTEGRITY:

All containers intact: ☐ Yes ☐ No
Sample labels/COC agree: ☐ Yes ☐ No
Samples Received On Ice:: ☐ Yes ☐ No
Custody Seals Present: ☐ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☐ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
[signature]	3/2/07		[signature]	03/03/07	—
Released By	Date	Time	Received By	Date	Time

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

3/5/07

Client: TEST AMERICA City: IRVINE State: CA

Date/Time received: 03/03/07 CoC No.: IQC 0154

Container I.D. No.: IE CHEST Requested TAT (Days): STD P.O. Received: Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [Y]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is	Wet [ ]	Dry [X]	
6	Number of samples in shipping container: 1	Sample Matrix: W		
7	Number of containers per sample: 4	(Or see CoC:)		
8	Samples are in correct container	Yes [X]	No [ ]	
9	Paperwork agrees with samples?	Yes [X]	No [ ]	

10 Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [Y]

11 Samples are: In good condition [X] Leaking [ ] Broken Container [ ] Missing [ ]

12 Samples are: Preserved [ ] Not preserved [X] pH _____ Preservative _____

13 Describe any anomalies.

14 Was P.M. notified of any anomalies? Yes [ ] No [ ] Date _____

15 Inspected by _____ Date: 03/05/07 Time: 8:00

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. _____ Calibration date _____

Alpha Meter Ser. No. _____ Calibration date _____

Beta/Gamma Meter Ser. No. _____ Calibration date _____

TestAmerica
ANALYTICAL TESTING CORPORATION

SUBCONTRACT ORDER - PROJECT # IQC0289

SENDING LABORATORY:

TestAmerica - Irvine, CA
17461 Derian Avenue. Suite 100
Irvine, CA 92614
Phone: (949) 261-1022
Fax: (949) 260-3297
Project Manager: Michele Chamberlin

RECEIVING LABORATORY:

Eberline Services - SUB
2030 Wright Avenue
Richmond, CA 94804
Phone :(510) 235-2633
Fax: (510) 235-0438

Project Location: California

Standard TAT is requested unless specific due date is requested => Due Date:_____ Initials:_____

Analysis	Expiration	Comments
Sample ID: IQC0289-01 Water	**Sampled: 03/02/07 11:45**	
Gross Alpha-O	08/29/07 11:45	DONT FILTER, 900.0,RESULT>15 pCi/L,run Rad 226&228
Gross Beta-O	08/29/07 11:45	DONT FILTER, 900.0,RESULT>50 pCi/L,run Rad 226&228
Level 4 + EDD-OUT	03/30/07 11:45	Excel EDD email to pm,Include Std logs for Lvl IV
Radium, Combined-O	03/01/08 11:45	HOLD for G A&B results; EPA 903.1&904.0,NO FILTER
Strontium 90-O	03/01/08 11:45	HOLD for Ra 226&228 results,EPA 905.0, DONT FILTER
Tritium-O	03/01/08 11:45	HOLD for Ra 226&228 results,EPA 906.0, DONT FILTER

Containers Supplied:

2.5 gal Poly (IQC0289-01S)
40 ml Amber Voa Vial (IQC0289-01T)
40 ml Amber Voa Vial (IQC0289-01U)
40 ml Amber Voa Vial (IQC0289-01V)

SAMPLE INTEGRITY:

All containers intact: ☐ Yes ☐ No
Custody Seals Present: ☐ Yes ☐ No
Sample labels/COC agree: ☐ Yes ☐ No
Samples Preserved Properly: ☐ Yes ☐ No
Samples Received On Ice:: ☐ Yes ☐ No
Samples Received at (temp): _____

Released By	Date	Time	Received By	Date	Time
Edward R	3/5/07			03/06/07	9:15
Released By	Date	Time	Received By	Date	Time

EBERLINE

RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

Client: TEST AMERICA City IRVINE State CA

Date/Time received 03/06/07 9:15 SDG No. IQC 0289

Container I.D. No. IE CHEST Requested TAT (Days) _____ P.O. Received Yes [ ] No [ ]

INSPECTION

1	Custody seals on shipping container intact?	Yes [X]	No [ ]	N/A [ ]
2	Custody seals on shipping container dated & signed?	Yes [X]	No [ ]	N/A [ ]
3	Custody seals on sample containers intact?	Yes [ ]	No [ ]	N/A [X]
4	Custody seals on sample containers dated & signed?	Yes [ ]	No [ ]	N/A [X]
5	Packing material is:	Wet [ ]	Dry [X]	
6	Number of samples in shipping container: 1	Sample Matrix: W		
7	Number of containers per sample: 4	(Or see CoC _____)		
8	Samples are in correct container	Yes [Y]	No [ ]	
9	Paperwork agrees with samples?	Yes [Y]	No [ ]	
10	Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ]	Appropriate sample labels [X]		
11	Samples are: In good condition [Y] Leaking [ ] Broken Container [ ]	Missing [ ]		
12	Samples are: Preserved [ ] Not preserved [Y] pH _____	Preservative _____		
13	Describe any anomalies:			
14	Was P.M. notified of any anomalies?	Yes [ ]	No [ ]	Date _____
15	Inspected by _____	Date 03/06/07	Time 9:31	

Customer Sample No.	cpm	mR/hr	Wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. _____ Calibration date _____

Alpha Meter Ser. No. _____ Calibration date _____

Beta/Gamma Meter Ser. No. _____ Calibration date _____

Eberline Services

ANALYSIS RESULTS

SDG 8656
Work Order R702121-01
Received Date 02/21/07

Client TA IRVINE
Contract PROJECT# IQB2021
Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQB2021-01	8656-001	02/19/07	03/08/07	GrossAlpha	1.86 ± 0.73	pCi/L	0.87
			03/08/07	Gross Beta	3.33 ± 0.64	pCi/L	0.89

Certified by
Report Date 03/23/07
Page 1

Eberline Services

ANALYSIS RESULTS

SDG 8657
Work Order R702122-01
Received Date 02/21/07

Client TA IRVINE
Contract PROJECT# IQB2022
Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQB2022-01	8657-001	02/19/07	03/08/07	GrossAlpha	-0.192 ± 0.44	pCi/L	0.698
			03/08/07	Gross Beta	24.3 ± 1.1	pCi/L	1.04
			03/12/07	Ra-228	0.051 ± 0.15	pCi/L	0.413
			03/01/07	H-3	-113 ± 92	pCi/L	159
			03/06/07	Ra-226	-0.200 ± 0.41	pCi/L	0.878
			03/02/07	Sr-90	-0.064 ± 0.30	pCi/L	0.738

Certified by
Report Date 03/23/07
Page 1

Eberline Services

QC RESULTS

SDG 8657 | Client TA IRVINE
Work Order R702122-01 | Contract PROJECT# IQB2022
Received Date 02/21/07 | Matrix WATER

Lab Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
LCS						
8657-002	GrossAlpha	8.17 ± 0.65	pCi/Smpl	10.1	0.318	81% recovery
	Gross Beta	9.76 ± 0.37	pCi/Smpl	9.60	0.277	102% recovery
	Ra-228	9.35 ± 0.51	pCi/Smpl	8.84	0.85	106% recovery
	H-3	210 ± 14	pCi/Smpl	211	16.3	100% recovery
	Ra-226	5.19 ± 0.24	pCi/Smpl	5.02	0.087	103% recovery
	Sr-90	9.80 ± 0.54	pCi/Smpl	9.61	0.277	102% recovery
BLANK						
8657-003	GrossAlpha	-0.364 ± 0.15	pCi/Smpl	NA	0.348	<MDA
	Gross Beta	-0.091 ± 0.15	pCi/Smpl	NA	0.269	<MDA
	Ra-228	-0.372 ± 0.28	pCi/Smpl	NA	0.771	<MDA
	H-3	-4.70 ± 9.6	pCi/Smpl	NA	16.4	<MDA
	Ra-226	0.007 ± 0.040	pCi/Smpl	NA	0.077	<MDA
	Sr-90	0.038 ± 0.15	pCi/Smpl	NA	0.344	<MDA

DUPLICATES

Sample ID	Nuclide	Results ± 2σ	MDA
8657-004	GrossAlpha	-0.302 ± 0.53	0.882
	Gross Beta	27.3 ± 1.3	1.47
	Ra-228	-0.024 ± 0.21	0.426
	H-3	-69.3 ± 95	162
	Ra-226	-0.021 ± 0.38	0.756
	Sr-90	-0.104 ± 0.28	0.723

ORIGINALS

Sample ID	Results ± 2σ	MDA	RPD	3σ (Tot)	Eval
8657-001	-0.192 ± 0.44	0.698	-	0	satis.
	24.3 ± 1.1	1.04	12	44	satis.
	0.051 ± 0.15	0.413	-	0	satis.
	-113 ± 92	159	-	0	satis.
	-0.200 ± 0.41	0.878	-	0	satis.
	-0.064 ± 0.30	0.738	-	0	satis.

SPIKED SAMPLE

Sample ID	Nuclide	Results ± 2σ	MDA
8657-005	GrossAlpha	77.4 ± 6.8	1.9
	Gross Beta	95.0 ± 4.0	2.0
	H-3	15600 ± 300	168
	Ra-226	105 ± 4.4	0.863

ORIGINAL SAMPLE

Sample ID	Results ± 2σ	MDA	Added	%Recv
8657-001	-0.192 ± 0.44	0.698	70.8	110
	24.3 ± 1.1	1.04	70.4	100
	-113 ± 92	159	16500	95
	-0.200 ± 0.41	0.878	112	94

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Eberline Services

ANALYSIS RESULTS

SDG 8658 | Client TA IRVINE
Work Order R702123-01 | Contract PR0JECT# IQB2023
Received Date 02/21/07 | Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQB2023-01	8658-001	02/19/07	03/08/07	GrossAlpha	-0.901 ± 1.5	pCi/L	2.5
			03/08/07	Gross Beta	63.8 ± 2.8	pCi/L	2.2

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Eberline Services

ANALYSIS RESULTS

SDG 8659
Work Order R702124-01
Received Date 02/21/07

Client TA IRVINE
Contract PROJECT# IQB2024
Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQB2024-01	8659-001	02/19/07	03/10/07	GrossAlpha	0.236 ± 1.0	pCi/L	1.6
			03/10/07	Gross Beta	26.8 ± 1.6	pCi/L	1.5

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Eberline Services

ANALYSIS RESULTS

SDG 8660
Work Order R703026-01
Received Date 03/03/07

Client TA IRVINE
Contract PROJECT# IQC0154
Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQC0154-01	8660-001	03/01/07	03/12/07	GrossAlpha	2.49 ± 2.8	pCi/L	3.45
			03/12/07	Gross Beta	212 ± 5.9	pCi/L	3.65

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Eberline Services

QC RESULTS

SDG 8660 | Client TA IRVINE
Work Order R703026-01 | Contract PROJECT# IQC0154
Received Date 03/03/07 | Matrix WATER

Lab Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
LCS						
8660-002	GrossAlpha	7.82 ± 0.58	pCi/Smpl	11.1	0.239	70% recovery
	Gross Beta	9.62 ± 0.44	pCi/Smpl	9.60	0.459	100% recovery
BLANK						
8660-003	GrossAlpha	-0.163 ± 0.11	pCi/Smpl	NA	0.240	<MDA
	Gross Beta	-0.076 ± 0.15	pCi/Smpl	NA	0.262	<MDA

DUPLICATES				ORIGINALS					
Sample ID	Nuclide	Results ± 2σ	MDA	Sample ID	Results ± 2σ	MDA	RPD	3σ (Tot)	Eval
8660-004	GrossAlpha	-1.41 ± 2.3	3.24	8660-001	2.49 ± 2.8	3.45	-	0	satis.
	Gross Beta	210 ± 5.9	3.91		212 ± 5.9	3.65	1	43	satis.

SPIKED SAMPLE				ORIGINAL SAMPLE				
Sample ID	Nuclide	Results ± 2σ	MDA	Sample ID	Results ± 2σ	MDA	Added	%Recv
8660-005	GrossAlpha	335 ± 14	2.88	8660-001	2.49 ± 2.8	3.45	284	117
	Gross Beta	488 ± 8.7	3.31		212 ± 5.9	3.65	264	105

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Eberline Services

ANALYSIS RESULTS

SDG 8661
Work Order R703047-01
Received Date 03/06/07

Client TA IRVINE
Contract PROJECT# IQC0289
Matrix WATER

Client Sample ID	Lab Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IQC0289-01	8661-001	03/02/07	03/12/07	GrossAlpha	-5.81 ± 2.7	pCi/L	4.48
			03/12/07	Gross Beta	294 ± 7.5	pCi/L	4.22

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09-MAR-07 TMA Corporation 8656- 1 80
06:22:13 Gross Alpha, Gross Beta Analysis IQB2021-01
R702121 ABCALC V 1.05
MCM Reviewed BW Date 3-8-07
Counted 67.954- 7 on C1 for 400.00 min.

0.300	1	71.300 mg	71.300 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	75.000	754.000
Gross cpm =	0.187	1.885
Background =	0.056	0.978
Observed CPM =	0.132	0.907
Cross talk fac =	0.006	0.236
True CPM =	0.126	0.877
Inst Std. Fac. =	1.063	1.014
Adjusted CPM =	0.134	0.889
Eff (cpm/dpm) =	0.108	0.402
DPM of Aliquot =	1.238	2.215
pCi /l =	1.86	3.33
1 sigma % Err =	19.518	9.644
2 sigma % Err =	38.255	18.903
(1 sigma err) =	0.363	0.321
(2 sigma err) =	0.711	0.629
LTV (95 %) =	2.46	3.86
MDA (3.00) =	0.865	0.888
MDA (2.71) =	0.855	0.885
CRITICAL LEVEL =	0.382	0.431

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	66.039	7	0.056	0.978	0.00
SF	67.692	0	1.063	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.692	8-MAR-07 8:36	GAW 109	SF \	10.0 min	0.00
67.765	8-MAR-07 10:21	GAW 109	(30D)9684 3 \	100.0 min	4.60
67.876	8-MAR-07 13:01	GAW 109	(93)7734 2 \	100.0 min	0.25

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.708	8-MAR-07 8:59	GRB 109	SF \	10.0 min	0.00
67.765	8-MAR-07 10:21	GRB 109	(30D)9684 3 \	100.0 min	14.40
67.876	8-MAR-07 13:01	GRB 109	(93)7734 2 \	100.0 min	0.67

09-MAR-07 TMA Corporation 8657- 1 80
06:22:14 Gross Alpha, Gross Beta Analysis IQB2022-01
R702122 ABCALC V 1.05
MCM Reviewed BW Date 3807
Counted 67.954- 7 on C2 for 400.00 min.

0.300 1	60.900 mg	60.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	26.000	3148.000
Gross cpm =	0.065	7.870
Background =	0.041	1.376
Observed CPM =	0.024	6.494
Cross talk fac =	0.006	0.230
True CPM =	-0.014	6.497
Inst Std. Fac. =	1.059	1.008
Adjusted CPM =	-0.015	6.549
Eff (cpm/dpm) =	0.117	0.405
DPM of Aliquot =	-0.128	16.182
pCi /l =	-0.192	24.3
1 sigma % Err =	114.939	2.340
2 sigma % Err =	225.281	4.586
(1 sigma err) =	0.221	0.569
(2 sigma err) =	0.432	1.11
LTV (95 %) =	0.364	25.2
MDA (3.00) =	0.698	1.04
MDA (2.71) =	0.689	1.04
CRITICAL LEVEL =	0.302	0.507

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	66.039	7	0.041	1.376	0.00
SF	67.692	0	1.059	1.008	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.692	8-MAR-07 8:36	GAW 110	SF \	10.0 min	0.00
67.765	8-MAR-07 10:21	GAW 110	(30D)9684 4 \	100.0 min	0.17
67.876	8-MAR-07 13:01	GAW 110	(93)7734 5 \	100.0 min	5.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.708	8-MAR-07 8:59	GRB 110	SF \	10.0 min	0.00
67.765	8-MAR-07 10:21	GRB 110	(30D)9684 4 \	100.0 min	1.00
67.876	8-MAR-07 13:01	GRB 110	(93)7734 5 \	100.0 min	9.09

MY 3/9/07
and
MY 3/15/07
and
MY 3/19/07

NPDES - 1082

Status: PASS

Source	LCS	LCS
Sample No.	2	2
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	68.066-07	68.066-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	8.1664	9.7647
Error @ 2s (abs.)	0.632	0.364
Error @ 2s (%)	7.7	3.7
MDA	0.31783	0.27664
Result Units	PCI/SMPL	PCI/SMPL
Nuclide	Am241	Sr 90
Standard ID	R1-A	AA1-B-(15)
Qty (ml)	1	0.5
Activity (dpm)	22.49	27.31
Calib. Date	353.708-2005	306.500-1996
Half Life (days)	157900	10580
Decay Date	68.066-07	68.066-07
Added (pCi)	10.11	9.604
Added Error @ 2s (%)	4	4
F/A Ratio	0.808	1.017
F/A Ratio Error @ 2s (%)	9	5
LCL	0.60	0.80
LWL	0.73	0.87
UWL	1.27	1.13
UCL	1.40	1.20
Status	PASS	PASS
Flag		

Initials/Date KY 3/9/07

60404

09-MAR-07 TMA Corporation 8657- 2 80
06:22:20 Gross Alpha, Gross Beta Analysis QC-LCS #60404
R702122 ABCALC V 1.05
MCM Reviewed BW Date 3807
Counted 68.066- 7 on C1 for 400.00 min.

1.00 smpl	63.800 mg	63.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 209	GRB 209
Counts =	790.000	4152.000
Gross cpm =	1.975	10.380
Background =	0.100	1.070
Observed CPM =	1.875	9.310
Cross talk fac =	0.006	0.232
True CPM =	1.823	8.887
Inst Std. Fac. =	1.142	0.985
Adjusted CPM =	2.082	8.754
Eff (cpm/dpm) =	0.115	0.404
DPM of Aliquot =	18.129	21.678
pCi /smpl =	8.17	9.76
1 sigma % Err =	3.951	1.904
2 sigma % Err =	7.744	3.731
(1 sigma err) =	0.323	0.186
(2 sigma err) =	0.632	0.364
LTV (95 %) =	8.70	10.1
MDA (3.00) =	0.318	0.277
MDA (2.71) =	0.315	0.276
CRITICAL LEVEL =	0.145	0.134

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	61.100	7	0.100	1.070	0.00
SF	67.755	0	1.142	0.985	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GAW 209	(80)8924 10 \	100.0 min	0.06
67.902	8-MAR-07 13:38	GAW 209	(59)8461 1 \	100.0 min	-0.05
67.979	8-MAR-07 15:29	GAW 209	(59)8461 10 \	100.0 min	-0.05

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GRB 209	(80)8924 10 \	100.0 min	1.03
67.902	8-MAR-07 13:38	GRB 209	(59)8461 1 \	100.0 min	0.29
67.979	8-MAR-07 15:29	GRB 209	(59)8461 10 \	100.0 min	0.11

MY 3/9/07

Status: FAIL

Source	BLANK	BLANK
Sample No.	3	3
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	68.066-07	68.066-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	-0.36372	-0.090588
Error @ 2s (abs.)	0.151	0.148
Error @ 2s (%)	41.4	163.4
MDA	0.34798	0.26916
Result Units	PCI/SMPL	PCI/SMPL
Status	FAIL	PASS
Flag	*L	

Initials/Date KLP 3/9/07

60405

09-MAR-07 TMA Corporation 8657- 3 80
06:22:21 Gross Alpha, Gross Beta Analysis QC-BLANK #60405
R702122 ABCALC V 1.05
MCM Reviewed BW Date 3-8-07
Counted 68.066- 7 on C2 for 400.00 min.

1.00 smpl	63.300 mg	63.300 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 210	GRB 210
Counts =	12.000	363.000
Gross cpm =	0.030	0.908
Background =	0.123	1.012
Observed CPM =	-0.093	-0.104
Cross talk fac =	0.006	0.232
True CPM =	-0.093	-0.083
Inst Std. Fac. =	1.006	0.978
Adjusted CPM =	-0.093	-0.081
Eff (cpm/dpm) =	0.115	0.404
DPM of Aliquot =	-0.807	-0.201
pCi /smpl =	-0.364	-9.059E-02
1 sigma % Err =	21.140	83.392
2 sigma % Err =	41.435	163.448
(1 sigma err) =	7.689E-02	7.554E-02
(2 sigma err) =	0.151	0.148
LTV (95 %) =	0.127	0.125
MDA (3.00) =	0.348	0.269
MDA (2.71) =	0.345	0.268
CRITICAL LEVEL =	0.160	0.131

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	67.053	7	0.123	1.012	0.00
SF	67.755	0	1.006	0.978	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GAW 210	(80)8924 11 \	100.0 min	0.04
67.902	8-MAR-07 13:38	GAW 210	(59)8461 2 \	100.0 min	-0.04
67.979	8-MAR-07 15:29	GAW 210	(59)8461 11 \	100.0 min	-0.11

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GRB 210	(80)8924 11 \	100.0 min	1.07
67.902	8-MAR-07 13:38	GRB 210	(59)8461 2 \	100.0 min	0.22
67.979	8-MAR-07 15:29	GRB 210	(59)8461 11 \	100.0 min	0.23

KY 3/9/07

Status: PASS

Source	DUP	DUP	ORIGINAL	ORIGINAL
Sample No.	4	4	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	50.834-7	50.834-7	50.834-7	50.834-7
Separation Date #1				
Separation Date #2				
Count Date	68.066-07	68.066-07	67.953-07	67.953-07
Aliquot	0.3	0.3	0.3	0.3
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	-0.30233	27.284	-0.19195	24.297
Error @ 2s (abs.)	0.520	1.280	0.432	1.114
Error @ 2s (%)	172.0	4.7	225.3	4.6
MDA	0.88155	1.4669	0.69847	1.0396
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
RPD		12		
UCL	40.00	30.00		
RER				
Criterion	N			
Status	PASS	PASS		
Flag				

Initials/Date KY 3/9/07

60406

09-MAR-07 TMA Corporation 8657- 4 80
06:22:22 Gross Alpha, Gross Beta Analysis QC-DUP#1 60406
R702122 ABCALC V 1.05
MCM Reviewed BW Date 3807
Counted 68.066- 7 on D1 for 400.00 min.

0.300	1	59.800 mg	59.800 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 213	GRB 213
Counts =	37.000	4142.000
Gross cpm =	0.093	10.355
Background =	0.071	2.788
Observed CPM =	0.021	7.567
Cross talk fac =	0.006	0.230
True CPM =	-0.023	7.572
Inst Std. Fac. =	1.034	0.972
Adjusted CPM =	-0.024	7.360
Eff (cpm/dpm) =	0.118	0.405
DPM of Aliquot =	-0.201	18.171
pCi /l =	-0.302	27.3
1 sigma % Err =	87.766	2.394
2 sigma % Err =	172.022	4.692
(1 sigma err) =	0.265	0.653
(2 sigma err) =	0.520	1.28
LTV (95 %) =	0.438	28.4
MDA (3.00) =	0.882	1.47
MDA (2.71) =	0.872	1.46
CRITICAL LEVEL =	0.394	0.721

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	67.055	7	0.071	2.788	0.00
SF	67.753	0	1.034	0.972	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GAW 213	(80)8924 14 \	100.0 min	1.91
67.902	8-MAR-07 13:38	GAW 213	(59)8461 3 \	100.0 min	0.05
67.979	8-MAR-07 15:29	GAW 213	(59)8461 12 \	100.0 min	-0.03

Previous 3 counts	Time	Detector	ID	Length	Cpm
67.791	8-MAR-07 10:59	GRB 213	(80)8924 14 \	100.0 min	9.00
67.902	8-MAR-07 13:38	GRB 213	(59)8461 3 \	100.0 min	0.52
67.979	8-MAR-07 15:29	GRB 213	(59)8461 12 \	100.0 min	-0.03

Ky 3/9/07

Status: PASS

Source	MS	MS	ORIGINAL	ORIGINAL
Sample No.	5	5	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	50.834-7	50.834-7	50.834-7	50.834-7
Separation Date #1				
Separation Date #2				
Count Date	75.851-07	75.851-07	67.953-07	67.953-07
Aliquot	0.3	0.3	0.3	0.3
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	77.414	95.002	-0.19195	24.297
Error @ 2s (abs.)	6.648	3.968	0.432	1.114
Error @ 2s (%)	8.6	4.2	225.3	4.6
MDA	1.8574	1.9905	0.69847	1.0396
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
Nuclide	Am241	Sr 90		
Standard ID	R1-A	AA1-B-(15)		
Qty (ml)	2.1	1.1		
Activity (dpm)	22.49	27.31		
Calib. Date	353.708-2005	306.500-1996		
Half Life (days)	157900	10580		
Decay Date	75.851-07	75.851-07		
Added (pCi)	21.23	21.12		
Added Error @ 2s (%)	4	4		
Spike Activity	23.223	28.486		
Original Activity	-0.058	7.289		
Activity Difference	23.281	21.197		
Error Difference	8.585	5.831		
F/A Ratio	1.096	1.004		
F/A Ratio Error @ 2s (%)	9.471	7.071		
LCL	0.60	0.80		
LWL	0.73	0.87		
UWL	1.27	1.13		
UCL	1.40	1.20		
Status	PASS	PASS		
Flag				

Initials/Date KG 3/19/07

60407

16-MAR-07 TMA Corporation 8657- 5R1 80
15:33:34 Gross Alpha, Gross Beta Analysis QC-MS#1 60407
R702122 ARCALC V 1.05
MCM Reviewed: BW Date 3/19/07
Counted 75.851- 7 on B1 for 100.00 min.

0.300	1	68.500 mg	68.500 mg
Aliquot		Sample Weight	Counted Weight

	ALPHA	-BETA
Instrument =	GAW 105	GRB 105
Counts =	565.000	2763.000
Gross cpm =	5.650	27.630
Background =	0.053	1.172
Observed CPM =	5.597	26.458
Cross talk fac =	0.006	0.234
True CPM =	5.450	25.181
Inst Std. Fac. =	1.048	1.011
Adjusted CPM =	5.712	25.458
Eff (cpm/dpm) =	0.111	0.402
DPM of Aliquot =	51.557	63.271
pCi /l =	77.4	95.0
1 sigma % Err =	4.381	2.131
2 sigma %-Err =	8.588	4.177
(1 sigma err) =	3.39	2.02
(2 sigma err) =	6.65	3.97
LTV (95 %) =	83.0	98.3
MDA (3.00) =	1.86	1.99
MDA (2.71) =	1.82	1.98
CRITICAL LEVEL =	0.727	0.941

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	72.985	7	0.053	1.172	0.00
SF	75.681	0	1.048	1.011	0.00

Previous 3 counts	Time	Detector	ID			Length	Cpm
75.029	15-MAR-07 17:41	GAW 105	(72H)9694	4	\	400.0 min	0.05
75.681	16-MAR-07 9:20	GAW 105	SF		\	10.0 min	0.00
75.761	16-MAR-07 11:15	GAW 105	(91)9638	3	\	100.0 min	1.53

Previous 3 counts	Time	Detector	ID			Length	Cpm
75.029	15-MAR-07 17:41	GRB 105	(72H)9694	4	\	400.0 min	0.44
75.70[illegible]	16-MAR-07 [illegible]	GRB 105	SF		\	10.0 min	0.00
75.761	16-MAR-07 11:15	GRB 105	(91)9638	3	\	100.0 min	10.35

KY 3/19/07

08-MAR-07 TMA Corporation 8657- 1 H DST
08:50:52 Tritium - LSC Calculations IQB2022-01
R702122 PLSC V 2.09
MCM Reviewed BW Date 3807

Reference Time : 50.834- 7 (12:00 PST 19-FEB-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
								Sample.
4	61.031- 7	641.	150.00	4.27	3.95	247.45	0.245	
	Weighted Average			4.27	3.95		0.245	
								Spike.
4	67.201- 7	5994.	3.00	1998.00	1.29	247.12	0.245	
4	67.203- 7	5882.	3.00	1960.67	1.30	247.18	0.245	
4	67.205- 7	6084.	3.00	2028.00	1.28	247.95	0.245	
	Weighted Average			1995.17	0.80			
								Blank.
4	60.926- 7	732.	150.00	4.88	3.70	244.79	0.245	
	Weighted Average			4.88	3.70			
								Eff.

Eff = (1990.90+/-15.93)/(8190.83+/- 73.72) = 0.243 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.992

		Act Err (1 sigma)
Sample CPM	4.27 +/-	0.17
Background CPM	4.88 +/-	0.18
Net CPM	-0.61 +/-	0.25

Yield (0.00 mG)	1.0000
Decay Corr (Sample)	0.99843
Decay Corr (Spike)	0.61864
Lambda(-d)	1.5454E-04
DPM of Aliquot	-2.4998E+00
Aliquot	1.0000E-02 l
DPM/l	-2.4998E+02
pCi /l	-1.1261E+02
1 Sigma Error	40.72 %
pCi Err	4.5852E+01
2 Sigma Error	79.81 %
pCi Err	8.9869E+01
Limiting Value	7.5655E+01
Critical Level	7.8006E+01
MDA (2.71)	1.5903E+02
MDA (3.00)	1.5939E+02

MY 3/8/07

Status: PASS

Source	LCS
Sample No.	2
Analyte	H 3
Geometry	LC
Reference Date	
Separation Date #1	
Separation Date #2	
Count Date	60.926-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.1
Result	209.88
Error @ 2s (abs.)	13.882
Error @ 2s (%)	6.6
MDA	16.335
Result Units	PCI/SMPL
Nuclide	H 3
Standard ID	AE1-C-(3)
Qty (ml)	1
Activity (dpm)	595.2
Calib. Date	305.500-2002
Half Life (days)	4540
Decay Date	60.926-07
Added (pCi)	210.6
Added Error @ 2s (%)	4
F/A Ratio	0.997
F/A Ratio Error @ 2s (%)	8
LCL	0.80
LWL	0.87
UWL	1.13
UCL	1.20
Status	PASS
Flag	

(K)

Initials/Date KH 3/8/07

60404

08-MAR-07 TMA Corporation 8657- 2 H DST
09:50:54 Tritium - LSC Calculations QC-LCS #60404
9702122 PCLSC V 2.09
MCM Reviewed BW Date 3-8-07

Reference Time : 60.926- 7 (14:13 PST 1-MAR-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
4	61.135- 7	2387.	150.00	15.91	2.05	244.32	0.245	Sample.
	Weighted Average			15.91	2.05		0.245	
4	67.207- 7	5932.	3.00	1977.33	1.30	242.14	0.245	Spike.
4	67.209- 7	5945.	3.00	1981.67	1.30	242.69	0.245	
4	67.211- 7	5728.	3.00	1909.33	1.32	243.24	0.245	
	Weighted Average			1955.54	0.99			
4	60.926- 7	732.	150.00	4.88	3.70	244.79	0.245	Blank.
	Weighted Average			4.88	3.70			

Eff = (1939.64+/-19.35)/(8190.82+/- 73.72) = 0.237 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.967

		Act Err (1 sigma)
Sample CPM	15.91 +/-	0.33
Background CPM	4.88 +/-	0.18
Net CPM	11.03 +/-	0.37

Yield (10.00 mG)	0.1000
Decay Corr (Sample)	0.99997
Decay Corr (Spike)	0.61364
Lambda(-d)	1.5454E-04
DPM of Aliquot	4.6594E+02
Aliquot	1.0000E+00 smpl
DPM/smpl	4.6594E+02
pCi /smpl	2.0988E+02
1 Sigma Error	3.37 %
pCi Err	7.0825E+00
2 Sigma Error	6.61 %
pCi Err	1.3882E+01
Limiting Value	2.2157E+02
Critical Level	7.9944E+00
MDA (2.71)	1.6298E+01
MDA (3.00)	1.6335E+01

MY 3/8/07

Status: PASS

Source	BLANK
Sample No.	3
Analyte	H 3
Geometry	LC
Reference Date	
Separation Date #1	
Separation Date #2	
Count Date	60.926-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.1
Result	-4.7028
Error @ 2s (abs.)	9.411
Error @ 2s (%)	200.1
MDA	16.372
Result Units	PCI/SMPL
Status	PASS
Flag	

Initials/Date KY 3/8/07

60405

08-MAR-07 TMA Corporation 8657- 3 H DST
08:50:55 Tritium - LSC Calculations QC-BLANK #60405
R702122 PLSC V 2.09
MCM Reviewed BW Date 3807

Reference Time : 60.926- 7 (14:13 PST 1-MAR-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
								Sample.
4	61.239- 7	695.	150.00	4.63	3.79	246.14	0.245	
	Weighted Average			4.63	3.79		0.245	
								Spike.
4	67.213- 7	5823.	3.00	1941.00	1.31	242.81	0.245	
4	67.215- 7	5861.	3.00	1953.67	1.31	245.10	0.245	
4	67.217- 7	5776.	3.00	1925.33	1.32	245.05	0.245	
	Weighted Average			1939.93	0.76			
								Blank.
4	60.926- 7	732.	150.00	4.88	3.70	244.79	0.245	
	Weighted Average			4.88	3.70			
								Eff.

Eff = (1935.30+/-14.68)/(8190.81+/- 73.72) = 0.236 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.964

		Act Err (1 sigma)
Sample CPM	4.63 +/-	0.18
Background CPM	4.88 +/-	0.18
Net CPM	-0.25 +/-	0.25

Yield (10.00 mG)	0.1000
Decay Corr (Sample)	0.99995
Decay Corr (Spike)	0.61864
Lambda(-d)	1.5454E-04
DPM of Aliquot	-1.0440E+01
Aliquot	1.0000E+00 smpl
DPM/smpl	-1.0440E+01
pCi /smpl	-4.7028E+00
1 Sigma Error	102.10 %
pCi Err	4.8014E+00
2 Sigma Error	200.11 %
pCi Err	9.4107E+00
Limiting Value	7.9223E+00
Critical Level	8.0125E+00
MDA (2.71)	1.6335E+01
MDA (3.00)	1.6372E+01

MCM 3/8/07

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	H 3	H 3
Reference Date	50.834-7	50.834-7
Separation Date #1		
Separation Date #2		
Count Date	60.926-07	60.926-07
Aliquot	0.01	0.01
Aliquot Units	L	L
Yield	1	1
Result	-69.29	-112.61
Error @ 2s (abs.)	92.688	89.870
Error @ 2s (%)	133.8	79.8
MDA	162.28	159.39
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

(4)

Initials/Date MY 3/8/07

60406

08-MAR-07 TMA Corporation 8657- 4 H DST
08:50:57 Tritium - LSC Calculations QC-DUP#1 60406
R7021122 PLSC V 2.09
MCM Reviewed BW Date 3807

Reference Time : 50.834- 7 (12:00 PST 19-FEB-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
								Sample.
4	61.343- 7	677.	150.00	4.51	3.84	245.59	0.245	
	Weighted Average			4.51	3.84		0.245	
								Spike.
4	67.219- 7	5778.	3.00	1926.00	1.32	246.64	0.245	
4	67.222- 7	5903.	3.00	1967.67	1.30	245.93	0.245	
4	67.224- 7	5963.	3.00	1987.67	1.29	245.54	0.245	
	Weighted Average			1960.11	0.76			
								Blank.
4	60.926- 7	732.	150.00	4.88	3.70	244.79	0.245	
	Weighted Average			4.88	3.70			
								Eff.

Eff = (1955.59+/-14.91)/(8190.81+/- 73.72) = 0.239 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.975

		Act Err (1 sigma)
Sample CPM	4.51 +/-	0.17
Background CPM	4.88 +/-	0.18
Net CPM	-0.37 +/-	0.25

Yield (0.00 mG)	1.0000
Decay Corr (Sample)	0.99838
Decay Corr (Spike)	0.61864
Lambda(-d)	1.5454E-04
DPM of Aliquot	-1.5382E+00
Aliquot	1.0000E-02 l
DPM/l	-1.5382E+02
pCi /l	-6.9290E+01
1 Sigma Error	68.25 %
pCi Err	4.7290E+01
2 Sigma Error	133.77 %
pCi Err	9.2687E+01
Limiting Value	7.8028E+01
Critical Level	7.9418E+01
MDA (2.71)	1.6191E+02
MDA (3.00)	1.6228E+02

MY 3/8/07

Status: PASS

Source	MS	ORIGINAL
Sample No.	5	1
Analyte	H 3	H 3
Reference Date	50.834-7	50.834-7
Separation Date #1		
Separation Date #2		
Count Date	60.926-07	60.926-07
Aliquot	0.05	0.01
Aliquot Units	L	L
Yield	0.1996	1
Result	15614	-112.61
Error @ 2s (abs.)	296.215	89.870
Error @ 2s (%)	1.9	79.8
MDA	167.9	159.39
Result Units	PCI/L	PCI/L
Nuclide	H 3	
Standard ID	AE1-A-(7)	
Qty (ml)	0.1	
Activity (dpm)	23808	
Calib. Date	305.500-2002	
Half Life (days)	4540	
Decay Date	50.834-7	
Added (pCi)	843.7	
Added Error @ 2s (%)	4	
Spike Activity	780.700	
Original Activity	-5.630	
Activity Difference	786.331	
Error Difference	1.968	
F/A Ratio	0.932	
F/A Ratio Error @ 2s (%)	4.458	
LCL	0.80	
LWL	0.87	
UWL	1.13	
UCL	1.20	
Status	PASS	
Flag		

Initials/Date MY 3/8/07

60407

08-MAR-07 TMA Corporation 8657- 5 H DST
08:50:58 Tritium - LSC Calculations QC-MS#1 60407
R702122 PLSC - V 2.09
MGM Reviewed BW Date 3-8-07

Reference Time : 50.834- 7 (12:00 PST 19-FEB-07)

Det	Count GMT	Counts	Time	CPM	% Err	TSIE	Eff	
								Sample.
4	61.447- 7	12710.	150.00	84.73	0.89	243.15	0.245	
	Weighted Average			84.73	0.89		0.245	
								Spike.
4	67.226- 7	5920.	3.00	1973.33	1.30	242.33	0.245	
4	67.228- 7	5979.	3.00	1993.00	1.29	241.85	0.245	
4	67.230- 7	5908.	3.00	1969.33	1.30	242.82	0.245	
	Weighted Average			1978.50	0.75			
								Blank.
4	60.926- 7	732.	150.00	4.88	3.70	244.79	0.245	
	Weighted Average			4.88	3.70			
								Eff.

Eff = (1893.84+/-14.85)/(8190.80+/- 73.72) = 0.231 +/- 0.003

Ratio (Internal Spike Eff vs Default Eff) = 0.944

		Act Err (1 sigma)
Sample CPM	84.73 +/-	0.75
Background CPM	4.88 +/-	0.18
Net CPM	79.85 +/-	0.77

Yield (10.00 mG)	0.1996
Decay Corr (Sample)	0.99836
Decay Corr (Spike)	0.61864
Lambda(-d)	1.5454E-04
DPM of Aliquot	1.7331E+03
Aliquot	5.0000E-02 l
DPM/l	3.4662E+04
pCi /l	1.5614E+04
1 Sigma Error	0.97 %
pCi Err	1.5113E+02
2 Sigma Error	1.90 %
pCi Err	2.9621E+02
Limiting Value	1.5863E+04
Critical Level	8.2173E+01
MDA (2.71)	1.6753E+02
MDA (3.00)	1.6790E+02

MG 3/8/07

07-MAR-07 TMA Corporation 8657- 1 Sr
11:38:32 Beta Counting Data IQB2022-01
R702122 AUTOR V 2.08
MCM Reviewed BW Date 3/7/07

Sr 90

Counter GRB 201
Length of count 50.0 Min.
Gross counts = 18.

Zero time 50.834 7
Separation time 61.667 7
-0.044 CPM ON DAY 65.792 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 61.667 7 = -0.022 (Y/Sr eff ratio = 1.469)

Elapsed time (days) = 10.833
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 9.993E-01
Chemical yield (2)= 0.8196
PPT. correction (3)= 1.0277 (recovery = 14.67 mgs)
Aliquot (4)= 0.5000 l

Product (1X2X3X4) = 4.208135E-01

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
-5.2668E-02	2.6780	-1.4105E-01	-3.3558E-01	237.92 %

pCi /l	1 sigma	2 sigma
-6.3534E-02	1.5116E-01	2.9627E-01

LTV 2.4942E-01

MDA (3.00)	7.3818E-01
MDA (2.71)	7.2913E-01
Lc	3.2335E-01

DPM OF ALIQUOT -7.052E-02

Saved answer = -7.052E-02 -237.92% (DPM of aliquot) (45903)

KF 3/7/07

Counting Data

	GMT	Det		Min.	Counts	CPM	Error	BKG	SF	CF
1.	64.876	GRB	206	50.00	32	-0.02	806.2%	0.6600	1.0640	0
2.	65.792	GRB	201	50.00	18	-0.04	300.9%	0.4010	1.0620	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 206	EF SF	64.742	88153	10.0	1.050	1.036 - 1.096	1.064	-1.6
GRB 201	EF SF	65.731	84125	10.0	1.050	1.031 - 1.095	1.062	-1.3
GRB 206	BK BK	61.076	479	773.2	0.620	0.573 - 0.753	0.660	-1.5
GRB 201	BK BK	59.069	323	800.0	0.404	0.311 - 0.491	0.401	0.1

Counting Log(s)

Previous 3 counts	Time	Detector		ID			Length	Cpm
61.901	2-MAR-07 13:37	GRB	206	Sr 8866	8	\	120.0 min	-0.10
64.742	5-MAR-07 9:48	GRB	206	SF		\	10.0 min	0.00
64.797	5-MAR-07 11:07	GRB	206	Tc 7610	1	\	50.0 min	-0.06
64.797	5-MAR-07 11:07	GRB	201	Ac 7610	3	\	200.0 min	4.92
65.731	6-MAR-07 9:32	GRB	201	SF		\	10.0 min	0.00
65.790	6-MAR-07 10:57	GRB	201	Sr 7612	1	\	1.0 min	1993.21

Status: PASS

Source	LCS
Sample No.	2
Analyte	Sr 90
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	61.667-7
Count Date	61.667-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.819
Result	9.7988
Error @ 2s (abs.)	0.527
Error @ 2s (%)	5.4
MDA	0.27667
Result Units	PCI/SMPL
Nuclide	Sr 90
Standard ID	AA1-B-(15)
Qty (ml)	1
Activity (dpm)	27.31
Calib. Date	306.500-1996
Half Life (days)	10580
Decay Date	61.667-7
Added (pCi)	9.608
Added Error @ 2s (%)	4
F/A Ratio	1.020
F/A Ratio Error @ 2s (%)	7
LCL	0.80
LWL	0.87
UWL	1.13
UCL	1.20
Status	PASS
Flag	



Initials/Date KY 3/12/07

60404

09-MAR-07 TMA Corporation 8657- 2 Sr
12:42:37 Beta Counting Data QC-LCS #60404
R702122 AUTOB V 2.08
MCM Reviewed BW Date 3907

Sr 90

Counter GRB 206
Length of count 100.0 Min.
Gross counts = 1510.

Zero time 61.667 7
Separation time 61.667 7
15.293 CPM ON DAY 68.799 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 61.667 7 = 6.837 (Y/Sr eff ratio = 1.468)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.8190
PPT. correction (3)= 1.0278 (recovery = 14.66 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.417429E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
8.1230E+00	2.6780	2.1753E+01	5.9735E-01	2.75 %

pCi /smpl	1 sigma	2 sigma
9.7988E+00	2.6908E-01	5.2739E-01

LTV 1.0243E+01

MDA (3.00) 2.7667E-01
MDA (2.71) 2.7468E-01
Lc 1.2840E-01

DPM OF ALIQUOT 2.175E+01

Saved answer = 2.175E+01 2.75% (DPM of aliquot) (45909)

MG 3/12/07

09-MAR-07 12:42:38 Counting Data Summary
8657- 2 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	64.876	GRB 207	50.00	689	14.14	4.0%	0.4010	1.0570	0
2.	65.792	GRB 202	50.00	669	13.53	4.0%	0.3480	1.0380	0
3.	66.787	GRB 222	50.00	755	15.07	3.8%	0.3560	1.0220	0
4.	67.779	GRB 201	50.00	755	15.57	3.8%	0.4010	1.0590	0
5.	68.799	GRB 206	100.00	1510	15.29	2.7%	0.6590	1.0590	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 207	EF SF	64.742	86331	10.0	1.049	1.022 - 1.093	1.057	-0.7
GRB 202	EF SF	65.731	87083	10.0	1.040	1.008 - 1.068	1.038	0.1
GRB 222	EF SF	66.691	90339	10.0	1.024	0.991 - 1.050	1.022	0.3
GRB 201	EF SF	67.744	84153	10.0	1.049	1.026 - 1.097	1.059	-1.0
GRB 206	EF SF	68.725	87730	10.0	1.055	1.031 - 1.091	1.059	-0.6
GRB 207	BK BK	61.076	310	773.2	0.401	0.310 - 0.490	0.401	0.0
GRB 202	BK BK	59.069	264	800.0	0.330	0.300 - 0.444	0.348	-1.3
GRB 222	BK BK	66.027	285	803.4	0.355	0.300 - 0.447	0.356	-0.1
GRB 201	BK BK	67.055	348	808.5	0.430	0.309 - 0.489	0.401	1.0
GRB 206	BK BK	67.055	543	808.5	0.672	0.570 - 0.750	0.659	0.4

Counting Log(s)

Previous 3 counts	Time	Detector	ID	Length	Cpm
61.778	2-MAR-07 10:40	GRB 207	Ac 7610 3 \	150.0 min	2.60
64.742	5-MAR-07 9:48	GRB 207	SF \	10.0 min	0.00
64.797	5-MAR-07 11:07	GRB 207	Tc 7610 3 \	50.0 min	91.17
64.797	5-MAR-07 11:07	GRB 202	Tc(BLK)3741 2\	200.0 min	0.49
65.731	6-MAR-07 9:32	GRB 202	SF \	10.0 min	0.00
65.790	6-MAR-07 10:57	GRB 202	Sr 7612 2 \	1.0 min	10909.36
66.027	6-MAR-07 16:38	GRB 222	BK \	803.4 min	0.00
66.691	7-MAR-07 8:35	GRB 222	SF \	10.0 min	0.00
66.754	7-MAR-07 10:05	GRB 222	Np 7731 5 \	37.0 min	11.82
66.790	7-MAR-07 10:57	GRB 201	Sr 9638 1 \	300.0 min	0.30
67.055	7-MAR-07 17:19	GRB 201	BK \	808.5 min	0.00
67.744	8-MAR-07 9:51	GRB 201	SF \	10.0 min	0.00
67.940	8-MAR-07 14:33	GRB 206	Np 8414 5 \	200.0 min	30.91
68.081	8-MAR-07 17:56	GRB 206	Sr 8868 3 \	120.0 min	0.16
68.725	9-MAR-07 9:23	GRB 206	SF \	10.0 min	0.00

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Sr 90
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	61.667-7
Count Date	61.667-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.814
Result	0.038348
Error @ 2s (abs.)	0.149
Error @ 2s (%)	387.3
MDA	0.34429
Result Units	PCI/SMPL
Status	PASS
Flag	

Initials/Date KY 3/7/07

60405

06-MAR-07 TMA Corporation 8657- 3 Sr
11:38:35 Beta Counting Data QC-BLANK #60405
R702122 AUTOB V 2.08
MCM Reviewed BV Date 3707

Sr 90

Counter GRB 203
Length of count 50.0 Min.
Gross counts = 20.

Zero time 61.667 7
Separation time 61.667 7
0.052 CPM ON DAY 65.792 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
D = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 61.667 7 = 0.027 (Y/Sr eff ratio = 1.467)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.8140
PPT. correction (3)= 1.0285 (recovery = 14.57 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 8.371482E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
3.1790E-02	2.6780	8.5132E-02	1.6824E-01	197.63 %

pCi /smpl	1 sigma	2 sigma
3.8348E-02	7.5785E-02	1.4854E-01

LTV 1.6339E-01

MDA (3.00) 3.4429E-01
MDA (2.71) 3.3981E-01
Lc 1.4950E-01

DPM OF ALIQUOT 8.513E-02

Saved answer = 8.513E-02 197.63% (DPM of aliquot) (45915)

MY 3/7/07

06-MAR-07 11:38:36 Counting Data Summary
0657- 3 Sr

Counting Data

	GMT	Det		Min.	Counts	CPM	Error	BKG	SF	CF
1.	64.848	GRB	217	50.00	21	0.02	640.3%	0.4000	1.0150	0
2.	65.792	GRB	203	50.00	20	0.05	244.9%	0.3500	1.0450	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 217	EF SF	64.695	86832	10.0	1.017	0.985 - 1.045	1.015	0.2
GRB 203	EF SF	65.731	90151	10.0	1.046	1.015 - 1.050	1.045	0.8
GRB 217	BK BK	61.774	1569	4048.2	0.388	0.301 - 0.494	0.400	-0.3
GRB 203	BK BK	59.069	253	800.0	0.316	0.300 - 0.447	0.350	-2.0

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
64.695	5-MAR-07 8:40	GRB 217	SF		\	10.0 min	0.00
64.763	5-MAR-07 10:18	GRB 217	Np 7731	2	\	9.0 min	24.06
64.811	5-MAR-07 11:27	GRB 217	Tc 7610	4	\	50.0 min	0.12
64.797	5-MAR-07 11:07	GRB 203	Tc 3741	2	\	200.0 min	0.43
65.731	6-MAR-07 9:32	GRB 203	SF		\	10.0 min	0.00
65.790	6-MAR-07 10:57	GRB 203	Sr 7612	3	\	1.0 min	11512.31

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Sr 90	Sr 90
Reference Date	50.834-7	50.834-7
Separation Date #1		
Separation Date #2	61.667-7	61.667-7
Count Date	61.667-07	61.667-07
Aliquot	0.5	0.5
Aliquot Units	L	L
Yield	0.8095	0.8196
Result	-0.10455	-0.063534
Error @ 2s (abs.)	0.279	0.296
Error @ 2s (%)	266.8	466.3
MDA	0.72265	0.73818
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

Initials/Date KY 3/7/07

60406

06-MAR-07 TMA Corporation 8657- 4 Sr
11:38:38 Beta Counting Data QC-DUP#1 60406
R702122 AUTOB V 2.08
MCM Reviewed BW Date 3/7/07

Sr 90

Counter GRB 204
Length of count 50.0 Min.
Gross counts = 16.

Zero time 50.834 7
Separation time 61.667 7
-0.071 CPM ON DAY 65.792 7

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)
FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 61.667 7 = -0.036 (Y/Sr eff ratio = 1.465)

Elapsed time (days) = 10.833
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1)= 9.993E-01
Chemical yield (2)= 0.8095
PPT. correction (3)= 1.0291 (recovery = 14.49 mgs)
Aliquot (4)= 0.5000 l

Product (1X2X3X4) = 4.162195E-01

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
-8.6667E-02	2.6780	-2.3209E-01	-3.1593E-01	136.12 %

pCi /l	1 sigma	2 sigma
-1.0455E-01	1.4231E-01	2.7893E-01

LTV 2.3481E-01

MDA (3.00) 7.2265E-01
MDA (2.71) 7.1364E-01
Lc 3.1591E-01

DPM OF ALIQUOT -1.160E-01

Saved answer = -1.160E-01 -136.12% (DPM of aliquot) (45921)

KG 3/7/07

06-MAR-07 11:38:39

Counting Data Summary
8657- 4 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	64.848	GRB 218	50.00	20	-0.03	513.8%	0.4250	1.0070	0
2.	65.792	GRB 204	50.00	16	-0.07	175.0%	0.3880	1.0410	0

Quality Control Summary

Detector	Continuing Calibr	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 218	EF SF	64.695	89795	10.0	1.008	0.977 - 1.037	1.007	0.1
GRB 204	EF SF	65.731	69905	10.0	1.030	1.013 - 1.050	1.041	-1.3
GRB 218	BK BK	61.774	1791	4048.2	0.442	0.300 - 0.557	0.425	0.4
GRB 204	BK BK	59.069	320	800.0	0.400	0.300 - 0.479	0.388	0.4

Counting Log(s)

Previous 3 counts	Time	Detector	ID			Length	Cpm
64.695	5-MAR-07 8:40	GRB 218	SF		\	10.0 min	0.00
64.763	5-MAR-07 10:18	GRB 218	Np 7731	2	\	9.0 min	22.52
64.811	5-MAR-07 11:27	GRB 218	Tc 7610	5	\	50.0 min	-0.03
64.797	5-MAR-07 11:07	GRB 204	Sr 8865	4	\	200.0 min	0.69
65.731	6-MAR-07 9:32	GRB 204	SF		\	10.0 min	0.00
65.790	6-MAR-07 10:57	GRB 204	Sr 7612	7	\	1.0 min	2121.78

06-MAR-07 TMA Corporation 8657- 1 Ra
15:29:23 Ra226 calculation IQB2022-01
R702122 RADIUM V 1.03
MCM Reviewed BW Date 3707

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	57.906 7
Ra226 =	1.1700E-06	2nd =	65.737 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
65.933	7	RN 13	8	60.0	0.207	-0.074	0.996	-0.074	102.2

Rn-222 decay from 2nd De-em to Count time =	0.9651
CPM @ 2nd De-emanation time =	-0.0767
Cell #29 Counting Efficiency =	2.2750
Radon-222 in cell @ 2nd De-emanation time =	-0.0337
Rn-222 growth from 1st to 2nd De-em time =	0.7582
Ra226 DPM in the bubbler =	-0.0444

Ra226 calculation

T-zero	50.834 7	
Delta T	14.903	(days)
Decay	9.9998E-01	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E-01 1	

	1 sigma		2 sigma	
dpm/l	dpm error	% error	dpm error	% error
-4.4447E-01	4.5403E-01	-102.15 %	8.8991E-01	-200.22 %
pCi /l				
-2.0021E-01	2.0452E-01		4.0086E-01	

8.7750E-01	8.6438E-01	3.7167E-01	3.3746E-01	45902
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 13	BK BK	65.064	93	940.9	0.099	0.064 - 0.133	0.100	0.0
RN 13	EF SF	65.732	10052	3.6	1.012	0.973 - 1.049	1.010	0.1
RN 13	BK BK29	64.833	25	120.8	0.207	0.037 - 0.261	0.157	1.6
RN 13	EF EF29	265.881	4698	81.5	2.275	2.100 - 2.652	2.339	-0.9

Previous 3 counts	Time	Detector	ID	Length	Cpm
65.064	5-MAR-07 17:32	RN 13	BK	\ 940.9 min	0.00
65.732	6-MAR-07 9:34	RN 13	SF	\ 3.6 min	0.00
65.748	6-MAR-07 9:57	RN 13	BK	\ 137.7 min	0.00

KY 3/7/07

Status: PASS

Source	LCS
Sample No.	2
Analyte	Ra226
Geometry	LC
Reference Date	
Separation Date #1	57.906-7
Separation Date #2	65.737-7
Count Date	65.933-07
Aliquot	1
Aliquot Units	SMPL
Yield	1
Result	5.1878
Error @ 2s (abs.)	0.237
Error @ 2s (%)	4.6
MDA	0.087417
Result Units	PCI/SMPL
Nuclide	Ra226
Standard ID	N1-A-(09)
Qty (ml)	0.45
Activity (dpm)	24.95
Calib. Date	252.708-1991
Half Life (days)	585500
Decay Date	65.737-7
Added (pCi)	5.024
Added Error @ 2s (%)	4
F/A Ratio	1.033
F/A Ratio Error @ 2s (%)	6
LCL	0.79
LWL	0.86
UWL	1.14
UCL	1.21
Status	PASS
Flag	

Initials/Date KY 3/7/07

60404

06-MAR-07 TMA Corporation 8657- 2 Ra
15:29:25 Ra226 calculation QC-LCS #60404
R702122 RADIUM V 1.03
MCM Reviewed BW Date 3-7-07

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	57.906 7
Ra226 =	1.1700E-06	2nd =	65.737 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
65.933	7	RN 9	1949	100.2	0.393	19.060	0.994	19.180	2.3

Rn-222 decay from 2nd De-em to Count time =	0.9651
CPM @ 2nd De-emanation time =	19.8742
Cell # 1 Counting Efficiency =	2.2760
Radon-222 in cell @ 2nd De-emanation time =	8.7321
Rn-222 growth from 1st to 2nd De-em time =	0.7582
Ra226 DPM in the bubbler =	11.5169

Ra226 calculation

T-zero	65.737 7	
Delta T	0.000	(days)
Decay	1.0000E+00	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E+00	smpl

	1 sigma		2 sigma	
dpm/smpl	dpm error	% error	dpm error	% error
1.1517E+01	2.6893E-01	2.34 %	5.2710E-01	4.58 %
pCi /smpl				
5.1878E+00	1.2114E-01		2.3743E-01	

8.7417E-02 (MDA(3.00)	8.6630E-02 (MDA(2.71)	3.9719E-02 (CL)	5.3877E+00 (LTV)	45908 (RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 9	BK BK	65.064	188	940.9	0.200	0.180 - 0.258	0.220	-1.5
RN 9	EF SF	65.718	10011	3.6	1.002	0.973 - 1.033	1.003	-0.1
RN 9	BK BK1	61.742	48	122.1	0.393	0.124 - 0.500	0.351	1.1
RN 9	EF EF1	268.917	4206	72.9	2.276	2.100 - 2.616	2.310	-0.6

Previous 3 counts	Time	Detector	ID		Length	Cpm
65.064	5-MAR-07 17:32	RN 9	BK	\	940.9 min	0.00
65.718	6-MAR-07 9:13	RN 9	SF	\	3.6 min	0.00
65.845	6-MAR-07 12:16	RN 9	BK	\	121.5 min	0.00

Ky 3/7/07

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Ra226
Geometry	LC
Reference Date	
Separation Date #1	57.906-7
Separation Date #2	65.737-7
Count Date	65.933-07
Aliquot	1
Aliquot Units	SMPL
Yield	1
Result	0.0070217
Error @ 2s (abs.)	0.039
Error @ 2s (%)	561.7
MDA	0.076921
Result Units	PCI/SMPL
Status	PASS
Flag	

Initials/Date KY 3/7/07

60405

06-MAR-07 TMA Corporation 8657-- 3 Ra
15:29:14 Ra226 calculation QC-BLANK #60405
R702122 RADIUM V 1.03
MCM Reviewed BW Date 3/7/07

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	57.906 7
Ra226 =	1.1700E-06	2nd =	65.737 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
65.933	7	RN 10	11	60.0	0.157	0.026	0.996	0.026	286.6

Rn-222 decay from 2nd De-em to Count time =	0.9651
CPM @ 2nd De-emanation time =	0.0273
Cell #66 Counting Efficiency =	2.3120
Radon-222 in cell @ 2nd De-emanation time =	0.0118
Rn-222 growth from 1st to 2nd De-em time =	0.7582
Ra226 DPM in the bubbler =	0.0156

Ra226 calculation

T-zero	65.737 7	
Delta T	0.000	(days)
Decay	1.0000E+00	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E+00	smpl

	1 sigma		2 sigma	
dpm/smpl	dpm error	% error	dpm error	% error
1.5588E-02	4.4675E-02	286.59 %	8.7563E-02	561.73 %
pCi /smpl				
7.0217E-03	2.0124E-02		3.9443E-02	

7.6921E-02	7.5630E-02	3.1850E-02	4.0226E-02	45914
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 10	BK BK	65.064	55	940.9	0.058	0.049 - 0.096	0.070	-1.8
RN 10	EF SF	65.722	10015	3.7	1.052	1.008 - 1.070	1.041	1.2
RN 10	BK BK66	64.833	19	120.8	0.157	0.006 - 0.247	0.132	0.8
RN 10	EF EF66	317.938	4050	69.0	2.312	2.100 - 2.800	2.349	-0.6

Previous 3 counts	Time	Detector	ID		Length	Cpm
65.064	5-MAR-07 17:32	RN 10	BK	\	940.9 min	0.00
65.722	6-MAR-07 9:19	RN 10	SF	\	3.7 min	0.00
65.748	6-MAR-07 9:57	RN 10	BK	\	137.7 min	0.00

MJ 3/7/07

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Ra226	Ra226
Reference Date	50.834-7	50.834-7
Separation Date #1	57.906-7	57.906-7
Separation Date #2	65.737-7	65.737-7
Count Date	65.933-07	65.933-07
Aliquot	0.1	0.1
Aliquot Units	L	L
Yield	1	1
Result	-0.021075	-0.20021
Error @ 2s (abs.)	0.374	0.401
Error @ 2s (%)	1775.8	200.2
MDA	0.75577	0.8775
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

Initials/Date MY 3/7/07

60406

08-MAR-07 TMA Corporation 8657- 4 Ra
15:29:17 Ra226 calculation QC-DUP#1 60406
R702122 RADIUM V 1.03
MCM Reviewed BW Date 3-7-07

Decay Constants		De-emanation Times	
Rn222 -	1.8129E-01	1st -	57.906 7
Ra226 -	1.1700E-06	2nd -	65.737 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
65.933	7	RN 11	11	60.0	0.192	-0.009	0.996	-0.009	906.0

Rn-222 decay from 2nd De-em to Count time =	0.9651
CPM @ 2nd De-emanation time =	-0.0091
Cell #43 Counting Efficiency =	2.5590
Radon-222 in cell @ 2nd De-emanation time =	-0.0035
Rn-222 growth from 1st to 2nd De-em time =	0.7582
Ra226 DPM in the bubbler =	-0.0047

Ra226 calculation

T-zero	50.834 7	
Delta T	14.903	(days)
Decay	9.9998E-01	
Yield	1.0000	(0.00 mOs)
Aliquot	1.000E-01 1	

	1 sigma		2 sigma	
dpm/l	dpm error	% error	dpm error	% error
-4.6787E-02	4.2389E-01	-905.99 %	8.3082E-01	-1775.74 %
pCi /l				
-2.1075E-02	1.9094E-01		3.7424E-01	

7.5577E-01	7.4411E-01	3.1822E-01	3.1505E-01	45920
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 11	BK BK	65.064	57	940.9	0.061	0.057 - 0.092	0.073	-2.3
RN 11	EF SF	65.725	10031	3.6	1.033	0.992 - 1.070	1.034	0.0
RN 11	BK BK43	60.740	25	130.5	0.192	0.035 - 0.308	0.181	0.4
RN 11	EF EF43	339.924	4870	80.5	2.559	2.100 - 2.635	2.357	2.2

Previous 3 counts	Time	Detector	ID	Length	Cpm
65.064	5-MAR-07 17:32	RN 11	BK	\ 940.9 min	0.00
65.725	6-MAR-07 9:23	RN 11	SF	\ 3.6 min	0.00
65.748	6-MAR-07 9:57	RN 11	BK	\ 137.7 min	0.00

Key 3/7/07

Status: PASS

Source	MS	ORIGINAL
Sample No.	5	1
Analyte	Ra226	Ra226
Reference Date	50.834-7	50.834-7
Separation Date #1	57.906-7	57.906-7
Separation Date #2	65.737-7	65.737-7
Count Date	65.933-07	65.933-07
Aliquot	0.1	0.1
Aliquot Units	L	L
Yield	1	1
Result	104.9	-0.20021
Error @ 2s (abs.)	4.262	0.401
Error @ 2s (%)	4.1	200.2
MDA	0.86319	0.8775
Result Units	PCI/L	PCI/L
Nuclide	Ra226	
Standard ID	N1-A-(09)	
Qty (ml)	1	
Activity (dpm)	24.95	
Calib. Date	252.708-1991	
Half Life (days)	585500	
Decay Date	50.834-7	
Added (pCi)	11.16	
Added Error @ 2s (%)	4	
Spike Activity	10.490	
Original Activity	-0.020	
Activity Difference	10.510	
Error Difference	4.073	
F/A Ratio	0.941	
F/A Ratio Error @ 2s (%)	5.709	
LCL	0.80	
LWL	0.87	
UWL	1.13	
UCL	1.20	
Status	PASS	
Flag		

Initials/Date KY 3/7/07

60407

06-MAR-07 TMA Corporation 8657-- 5 Ra
15:29:20 Ra226 calculation QC-MS#1 60407
R702122 RADIUM V 1.03
MCM Reviewed BW Date 3-7-07

Decay Constants		De-emanation Times	
Rn222 =	1.8129E-01	1st =	57.906 7
Ra226 =	1.1700E-06	2nd =	65.737 7

GMT	YR	Det	Cnts	Min.	Bkg	Net CPM	Decay durng cntg	CPM	(1 sig) %
65.933	7	RN 12	2364	60.0	0.206	39.181	0.996	39.329	2.1

Rn-222 decay from 2nd De-em to Count time =	0.9651
CPM @ 2nd De-emanation time =	40.7516
Cell #52 Counting Efficiency =	2.3080
Radon-222 in cell @ 2nd De-emanation time =	17.6567
Rn-222 growth from 1st to 2nd De-em time =	0.7582
Ra226 DPM in the bubbler =	23.2876

Ra226 calculation

T-zero	50.834 7	
Delta T	14.903	(days)
Decay	9.9998E-01	
Yield	1.0000	(0.00 mGs)
Aliquot	1.000E-01 1	

	1 sigma		2 sigma	
dpm/l	dpm error	% error	dpm error	% error
2.3288E+02	4.8275E+00	2.07 %	9.4618E+00	4.06 %
pCi /l				
1.0490E+02	2.1745E+00		4.2621E+00	

8.6319E-01	8.5025E-01	3.6547E-01	1.0849E+02	45924
(MDA(3.00)	(MDA(2.71)	(CL)	(LTV)	(RECORD)

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
RN 12	BK BK	65.064	95	940.9	0.101	0.068 - 0.119	0.095	0.8
RN 12	EF SF	65.728	10029	3.6	1.034	1.001 - 1.064	1.032	0.1
RN 12	BK BK52	58.743	25	121.2	0.206	0.065 - 0.275	0.169	1.0
RN 12	EF EF52	325.006	4094	83.7	2.308	2.100 - 2.528	2.272	0.5

Previous 3 counts	Time	Detector	ID		Length	Cpm
65.729	6-MAR-07 9:29	RN 12	SF	\	3.6 min	0.00
65.748	6-MAR-07 9:57	RN 12	BK	\	137.7 min	0.00
65.845	6-MAR-07 12:16	RN 12	BK	\	121.5 min	0.00

my 3/7/07

13-MAR-07 TMA Corporation 8657- 1 Ac
07:40:45 Beta Counting Data IQB2022-01
R702122 AUTOB V 2.08
MCM Reviewed BW Date 3/13/07

Ac 228

Counter GRB 217
Length of count 0.0 Min.
Gross counts = 0.

Zero time 50.834 7
Separation time 71.754 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
71.975	0.	0.0	0.00	0.000	0.00		0.04	0.04

CPM corrected for decay to Sept. Time. : 0.0676

Elapsed time (days) = 20.920
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 9.931E-01
Chemical yield (2)= 0.5520
PPT. correction (3)= 1.2668 (recovery = 22.49 mgs)
Aliquot (4)= 1.800 1

Product (1X2X3X4) = 1.250071E+00

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
5.4074E-02	2.0790	1.1242E-01	1.6864E-01	150.01 %

pCi /l	1 sigma	2 sigma
5.0639E-02	7.5964E-02	1.4889E-01

LTV 1.7598E-01

1st point MDA (3.00) 4.1270E-01
MDA (2.71) 4.0956E-01
Lc 1.9079E-01

DPM OF ALIQUOT 2.024E-01

Saved answer = 2.024E-01 150.01% (DPM of aliquot) (45899)

MG 3/13/07

Weighted average of gross counting data 07:40:44 13-MAR-07
BTAIN V. 0.00

8657 - 1 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 71.975	Error
71.975	GRB 217	61	150.0	0.40	1.015	0.01	0.01	730.1%
72.080	GRB 217	67	150.0	0.40	1.015	0.06	0.08	145.8%
72.185	GRB 217	61	150.0	0.40	1.015	0.01	0.02	730.1%
72.289	GRB 217	54	150.0	0.40	1.015	-0.04	-0.10	184.7%
72.394	GRB 217	73	150.0	0.40	1.015	0.10	0.33	82.8%
72.498	GRB 217	34	73.7	0.40	1.015	0.07	0.29	142.9%
					Weighted average		0.04	150.0%

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	71.975	GRB 217	150.00	61	0.01	757.2%	0.3970	1.0150	0
2.	72.080	GRB 217	150.00	67	0.05	151.0%	0.3970	1.0150	0
3.	72.185	GRB 217	150.00	61	0.01	757.2%	0.3970	1.0150	0
4.	72.289	GRB 217	150.00	54	-0.04	192.0%	0.3970	1.0150	0
5.	72.394	GRB 217	150.00	73	0.09	85.6%	0.3970	1.0150	0
6.	72.498	GRB 217	73.65	34	0.07	167.0%	0.3970	1.0150	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	EF SF	71.640	86702	10.0	1.018	0.985 - 1.045	1.015	0.3
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2
GRB 217	BK BK	70.606	494	1349.9	0.366	0.312 - 0.492	0.397	-1.2

Counting Log(s)

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.693	12-MAR-07 9:37	GRB 217	Tc(BLK)8414 1\	100.0 min	-0.05
71.874	12-MAR-07 13:58	GRB 217	Np 7737 1 \	25.0 min	44.44
71.954	12-MAR-07 15:53	GRB 217	Y 3741 1 \	20.0 min	2156.95
71.874	12-MAR-07 13:58	GRB 217	Np 7737 1 \	25.0 min	44.44
71.954	12-MAR-07 15:53	GRB 217	Y 3741 1 \	20.0 min	2156.95
71.975	12-MAR-07 16:23	GRB 217	Ac 8657 1 \	150.0 min	0.01
71.954	12-MAR-07 15:53	GRB 217	Y 3741 1 \	20.0 min	2156.95
71.975	12-MAR-07 16:23	GRB 217	Ac 8657 1 \	150.0 min	0.01
72.080	12-MAR-07 18:55	GRB 217	Ac 8657 1 \	150.0 min	0.05
71.975	12-MAR-07 16:23	GRB 217	Ac 8657 1 \	150.0 min	0.01
72.080	12-MAR-07 18:55	GRB 217	Ac 8657 1 \	150.0 min	0.05
72.185	12-MAR-07 21:26	GRB 217	Ac 8657 1 \	150.0 min	0.01
72.080	12-MAR-07 18:55	GRB 217	Ac 8657 1 \	150.0 min	0.05
72.185	12-MAR-07 21:26	GRB 217	Ac 8657 1 \	150.0 min	0.01
72.289	12-MAR-07 23:56	GRB 217	Ac 8657 1 \	150.0 min	-0.04
72.185	12-MAR-07 21:26	GRB 217	Ac 8657 1 \	150.0 min	0.01
72.289	12-MAR-07 23:56	GRB 217	Ac 8657 1 \	150.0 min	-0.04
72.394	13-MAR-07 2:27	GRB 217	Ac 8657 1 \	150.0 min	0.09

Status: PASS

Source	LCS
Sample No.	2
Analyte	Ra228
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	71.754-7
Count Date	71.974-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.4467
Result	9.353
Error @ 2s (abs.)	0.500
Error @ 2s (%)	5.4
MDA	0.8518
Result Units	PCI/SMPL
Nuclide	Ra228
Standard ID	S1-B-(7)
Qty (ml)	1.2
Activity (dpm)	34.34
Calib. Date	016.708-2001
Half Life (days)	2100
Decay Date	71.754-7
Added (pCi)	8.844
Added Error @ 2s (%)	4
F/A Ratio	1.058
F/A Ratio Error @ 2s (%)	7
LCL	0.69
LWL	0.79
UWL	1.21
UCL	1.31
Status	PASS
Flag	

Initials/Date KJ 3/21/07

60404

20-MAR-07 TMA Corporation 8657- 2 Ac
14:29:15 Beta Counting Data QC-LCS #60404
R702122 AUTOB V 2.08
MCM Reviewed BW Date 3/20/07

Ac 228

Counter GRB 218
Length of count 0.0 Min.
Gross counts = 0.

Zero time 71.754 7
Separation time 71.754 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED CPM
71.975	0.	0.0	0.00	0.000	0.00		4.74	4.74

CPM corrected for decay to Sept. Time. : 8.6433

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.4467
PPT. correction (3)= 1.3652 (recovery = 18.20 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 6.098750E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.4172E+01	2.0790	2.9464E+01	1.2356E+00	4.19 %

pCi /smpl	1 sigma	2 sigma
1.3272E+01	5.5657E-01	1.0909E+00

LTV 1.4190E+01

1st point MDA (3.00) 8.5180E-01
MDA (2.71) 8.4564E-01
Lc 3.9443E-01

DPM OF ALIQUOT 2.946E+01

Saved answer = 2.946E+01 4.19% (DPM of aliquot) (446)

P pCi = 93530 ± 2550, 2.73%

ky 3/21/07

Weighted average of gross counting data 14:29:15 20-MAR-07
BTAIN V. 0.00

8657 - 2 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 71.975	Error
71.975	GRB 218	629	150.0	0.41	1.008	4.38	4.38	4.6%
72.080	GRB 218	499	150.0	0.41	1.008	3.38	4.49	5.4%
72.185	GRB 218	425	150.0	0.41	1.008	2.80	4.96	6.0%
72.289	GRB 218	371	150.0	0.41	1.008	2.39	5.60	6.7%
72.394	GRB 218	300	150.0	0.41	1.008	1.84	5.74	7.9%
74.702	GRB 206	380	150.0	0.66	1.053	2.27	3710.84	8.1%
75.856	GRB 223	396	150.0	0.39	1.012	2.61	97987.54	6.3%
79.730	GRB 217	500	150.0	0.39	1.016	3.43	**********	5.3%
					Weighted average		4.74	4.2%

Error shown is 1.6 times that expected from counting statistics.

20-MAR-07 14:29:14

3.81
-2.99
.82

Counting Data Summary
8657- 2 Ac

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	71.975	GRB 218	150.00	629	3.81	4.6%	0.4100	1.0080	0
2.	72.080	GRB 218	150.00	499	2.94	5.4%	0.4100	1.0080	0
3.	72.185	GRB 218	150.00	425	2.44	6.1%	0.4100	1.0080	0
4.	72.289	GRB 218	150.00	371	2.08	6.7%	0.4100	1.0080	0
5.	72.394	GRB 218	150.00	300	1.60	8.0%	0.4100	1.0080	0
6.	74.702	GRB 206	150.00	380	1.97	7.8%	0.6590	1.0530	0
7.	75.856	GRB 223	150.00	396	2.27	6.3%	0.3930	1.0120	0
8.	79.730	GRB 217	150.00	500	2.99	5.4%	0.3890	1.0160	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 218	EF SF	71.640	89417	10.0	1.013	0.978 - 1.038	1.008	0.5
GRB 206	EF SF	74.658	88105	10.0	1.050	1.024 - 1.084	1.053	-0.3
GRB 223	EF SF	75.677	89575	10.0	1.011	0.982 - 1.042	1.012	-0.1
GRB 217	EF SF	79.658	87499	10.0	1.009	0.987 - 1.047	1.016	-0.8
GRB 218	BK BK	70.606	547	1349.9	0.405	0.300 - 0.529	0.410	-0.2
GRB 218	BK BK	70.606	547	1349.9	0.405	0.300 - 0.529	0.410	-0.2
GRB 218	BK BK	70.606	547	1349.9	0.405	0.300 - 0.529	0.410	-0.2
GRB 218	BK BK	70.606	547	1349.9	0.405	0.300 - 0.529	0.410	-0.2
GRB 218	BK BK	70.606	547	1349.9	0.405	0.300 - 0.529	0.410	-0.2
GRB 206	BK BK	70.610	896	1344.4	0.666	0.569 - 0.749	0.659	0.2
GRB 223	BK BK	74.000	324	788.4	0.411	0.300 - 0.480	0.393	0.7
GRB 217	BK BK	78.989	324	817.8	0.396	0.300 - 0.478	0.389	0.3

Counting Log(s)

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.693	12-MAR-07 9:37	GRB 218	Tc 8414 12 \	100.0 min	0.06
71.874	12-MAR-07 13:58	GRB 218	Np 7737 2 \	25.0 min	43.77
71.954	12-MAR-07 15:53	GRB 218	Y 3741 2 \	20.0 min	93.07
71.874	12-MAR-07 13:58	GRB 218	Np 7737 2 \	25.0 min	43.77
71.954	12-MAR-07 15:53	GRB 218	Y 3741 2 \	20.0 min	93.07
71.975	12-MAR-07 16:23	GRB 218	Ac 8657 2 \	150.0 min	3.81
71.954	12-MAR-07 15:53	GRB 218	Y 3741 2 \	20.0 min	93.07
71.975	12-MAR-07 16:23	GRB 218	Ac 8657 2 \	150.0 min	3.81
72.080	12-MAR-07 18:55	GRB 218	Ac 8657 2 \	150.0 min	2.94
71.975	12-MAR-07 16:23	GRB 218	Ac 8657 2 \	150.0 min	3.81
72.080	12-MAR-07 18:55	GRB 218	Ac 8657 2 \	150.0 min	2.94
72.185	12-MAR-07 21:26	GRB 218	Ac 8657 2 \	150.0 min	2.44

8657- 2 Ac

72.080	12-MAR-07	18:55	GRB	218	Ac	8657	2	\	150.0 min	2.94
72.185	12-MAR-07	21:26	GRB	218	Ac	8657	2	\	150.0 min	2.44
72.289	12-MAR-07	23:56	GRB	218	Ac	8657	2	\	150.0 min	2.08
72.759	13-MAR-07	11:12	GRB	206	Tc	8414	3	\	400.0 min	0.07
73.685	14-MAR-07	9:26	GRB	206	SF			\	10.0 min	0.00
74.658	15-MAR-07	8:47	GRB	206	SF			\	10.0 min	0.00
75.499	16-MAR-07	4:58	GRB	223	Ac	9638	3	\	150.0 min	0.79
75.604	16-MAR-07	7:29	GRB	223	Ac	9638	3	\	62.4 min	0.82
75.677	16-MAR-07	9:14	GRB	223	SF			\	10.0 min	0.00
78.989	19-MAR-07	16:44	GRB	217	BK			\	817.8 min	0.00
79.563	20-MAR-07	6:30	GRB	217	Sr	7744	1	\	10.0 min	1380.64
79.658	20-MAR-07	8:47	GRB	217	SF			\	10.0 min	0.00

Status: PASS

Source	BLANK
Sample No.	3
Analyte	Ra228
Geometry	NY
Reference Date	
Separation Date #1	
Separation Date #2	71.754-7
Count Date	71.974-07
Aliquot	1
Aliquot Units	SMPL
Yield	0.5916
Result	-0.37177
Error @ 2s (abs.)	0.273
Error @ 2s (%)	73.5
MDA	0.7711
Result Units	PCI/SMPL
Status	PASS
Flag	

Initials/Date KLY 3/13/07

60405

13-MAR-07 | TMA Corporation | 8657- 3 Ac
07:40:48 | Beta Counting Data | QC-BLANK #60405
R702122 | AUTOB V 2.08
MCM | Reviewed BW Date 3-13-07

Ac 228

Counter GRB 219
Length of count 0.0 Min.
Gross counts = 0.

Zero time 71.754 7
Separation time 71.754 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
71.975	0.	0.0	0.00	0.000	0.00		-0.16	-0.16

CPM corrected for decay to Sept. Time. : -0.2899

Elapsed time (days) = 0.000
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 1.000E+00
Chemical yield (2)= 0.5916
PPT. correction (3)= 1.2346 (recovery = 24.10 mgs)
Aliquot (4)= 1.000 smpl

Product (1X2X3X4) = 7.303388E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
-3.9698E-01	2.0790	-8.2532E-01	3.0930E-01	-37.48 %

pCi /smpl	1 sigma	2 sigma
-3.7177E-01 (P)	1.3932E-01	2.7307E-01

LTV 2.2988E-01

1st point MDA (3.00) 7.7110E-01
MDA (2.71) 7.6573E-01
Lc 3.5880E-01

DPM OF ALIQUOT -8.253E-01

Saved answer = -8.253E-01 -37.48% (DPM of aliquot) (45911)

MY 3/13/07

Weighted average of gross counting data 07:40:47 13-MAR-07
BTAIN V. 0.00

8657 - 3 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 71.975	Error
71.975	GRB 219	56	150.0	0.47	1.027	-0.11	-0.11	78.6%
72.080	GRB 219	57	150.0	0.47	1.027	-0.10	-0.14	84.8%
72.185	GRB 219	58	150.0	0.47	1.027	-0.10	-0.17	92.1%
72.289	GRB 219	48	150.0	0.47	1.027	-0.18	-0.41	48.9%
72.394	GRB 219	62	150.0	0.47	1.027	-0.07	-0.20	138.3%
72.498	GRB 219	32	73.7	0.47	1.027	-0.04	-0.16	275.9%
					Weighted average		-0.16	37.5%

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	71.975	GRB 219	150.00	56	-0.10	78.3%	0.4690	1.0270	0
2.	72.080	GRB 219	150.00	57	-0.09	84.5%	0.4690	1.0270	0
3.	72.185	GRB 219	150.00	58	-0.08	91.7%	0.4690	1.0270	0
4.	72.289	GRB 219	150.00	48	-0.15	48.7%	0.4690	1.0270	0
5.	72.394	GRB 219	150.00	62	-0.06	137.8%	0.4690	1.0270	0
6.	72.498	GRB 219	73.65	32	-0.04	320.9%	0.4690	1.0270	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	EF SF	71.640	90724	10.0	1.040	0.995 - 1.050	1.027	1.7
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6
GRB 219	BK BK	70.606	580	1349.9	0.430	0.388 - 0.572	0.469	-1.6

Counting Log(s)

Previous 3 counts	Time	Detector	ID		Length	Cpm
71.640	12-MAR-07 8:21	GRB 219	SF	\	10.0 min	0.00
71.693	12-MAR-07 9:37	GRB 219	Sr 8868 5	\	100.0 min	14.84
71.874	12-MAR-07 13:58	GRB 219	Np 7737 3	\	25.0 min	40.83
71.693	12-MAR-07 9:37	GRB 219	Sr 8868 5	\	100.0 min	14.84
71.874	12-MAR-07 13:58	GRB 219	Np 7737 3	\	25.0 min	40.83
71.975	12-MAR-07 16:23	GRB 219	Ac 8657 3	\	150.0 min	-0.10
71.874	12-MAR-07 13:58	GRB 219	Np 7737 3	\	25.0 min	40.83
71.975	12-MAR-07 16:23	GRB 219	Ac 8657 3	\	150.0 min	-0.10
72.080	12-MAR-07 18:55	GRB 219	Ac 8657 3	\	150.0 min	-0.09
71.975	12-MAR-07 16:23	GRB 219	Ac 8657 3	\	150.0 min	-0.10
72.080	12-MAR-07 18:55	GRB 219	Ac 8657 3	\	150.0 min	-0.09
72.185	12-MAR-07 21:26	GRB 219	Ac 8657 3	\	150.0 min	-0.08
72.080	12-MAR-07 18:55	GRB 219	Ac 8657 3	\	150.0 min	-0.09
72.185	12-MAR-07 21:26	GRB 219	Ac 8657 3	\	150.0 min	-0.08
72.289	12-MAR-07 23:56	GRB 219	Ac 8657 3	\	150.0 min	-0.15
72.185	12-MAR-07 21:26	GRB 219	Ac 8657 3	\	150.0 min	-0.08
72.289	12-MAR-07 23:56	GRB 219	Ac 8657 3	\	150.0 min	-0.15
72.394	13-MAR-07 2:27	GRB 219	Ac 8657 3	\	150.0 min	-0.06

Status: PASS

Source	DUP	ORIGINAL
Sample No.	4	1
Analyte	Ra228	Ra228
Reference Date	50.834-7	50.834-7
Separation Date #1		
Separation Date #2	71.754-7	71.754-7
Count Date	71.974-07	71.974-07
Aliquot	1.8	1.8
Aliquot Units	L	L
Yield	0.5091	0.552
Result	-0.023957	0.050639
Error @ 2s (abs.)	0.206	0.149
Error @ 2s (%)	858.5	294.0
MDA	0.42619	0.4127
Result Units	PCI/L	PCI/L
RPD		
UCL	20.00	
RER		
Criterion	N	
Status	PASS	
Flag		

Initials/Date KL 3/13/07

60406

13-MAR-07
07:40:51
R702122
MCM

TMA Corporation
Beta Counting Data
AUTOB V 2.08

8657- 4 Ac
QC-DUP#1 60406

Reviewed BCW Date 3/13/07

Ac 228

Counter GRB 220
Length of count 0.0 Min.
Gross counts = 0.

Zero time 50.834 7
Separation time 71.754 7

GMT TIME	GROSS COUNT	COUNTING TIME	TOTAL CPM	BKGD	NET CPM	CPM	ADJUSTED CPM	CORRECTED
71.975	0.	0.0	0.00	0.000	0.00		-0.02	-0.02

CPM corrected for decay to Sept. Time. : -0.0303

Elapsed time (days) = 20.920
Lambda = 3.300E-04 Reciprocal days
exp(-lambda X t) (1)= 9.931E-01
Chemical yield (2)= 0.5091
PPT. correction (3)= 1.3033 (recovery = 20.74 mgs)
Aliquot (4)= 1.800 1

Product (1X2X3X4) = 1.186100E+00

C-zero	P-factor	dpm/l	1 sigma dpm error	percent sigma
-2.5582E-02	2.0790	-5.3185E-02	2.3295E-01	-438.00 %

pCi /l		1 sigma	2 sigma
-2.3957E-02	(e)	1.0493E-01	2.0567E-01

LTV 1.7314E-01

1st point MDA (3.00) 4.2619E-01
MDA (2.71) 4.2288E-01
Lc 1.9662E-01

DPM OF ALIQUOT -9.573E-02

Saved answer = -9.573E-02 -438.00% (DPM of aliquot) (45917)

Ky 3/13/07

Weighted average of gross counting data 07:40:50 13-MAR-07
BTAIN V. 0.00

8657 - 4 Ac

Ac228 (lambda = 2.714E+00)
Corrected for decay during counting

GMT	Det	Cnts	Min.	Bkg	S.F.	CPM	CPM @ 71.975	Error
71.975	GRB 220	76	150.0	0.38	1.017	0.15	0.15	57.8%
72.080	GRB 220	49	150.0	0.38	1.017	-0.06	-0.08	124.5%
72.185	GRB 220	52	150.0	0.38	1.017	-0.04	-0.07	204.7%
72.289	GRB 220	54	150.0	0.38	1.017	-0.02	-0.05	351.8%
72.394	GRB 220	39	150.0	0.38	1.017	-0.14	-0.43	51.8%
72.498	GRB 220	20	73.7	0.38	1.017	-0.12	-0.48	70.6%
					Weighted average		-0.02	438.0%

Error shown is 1.4 times that expected from counting statistics.

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	71.975	GRB 220	150.00	76	0.13	60.2%	0.3790	1.0170	0
2.	72.080	GRB 220	150.00	49	-0.05	131.1%	0.3790	1.0170	0
3.	72.185	GRB 220	150.00	52	-0.03	215.1%	0.3790	1.0170	0
4.	72.289	GRB 220	150.00	54	-0.02	369.4%	0.3790	1.0170	0
5.	72.394	GRB 220	150.00	39	-0.12	54.8%	0.3790	1.0170	0
6.	72.498	GRB 220	73.65	20	-0.11	87.5%	0.3790	1.0170	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	EF SF	71.640	70405	10.0	1.023	0.986 - 1.046	1.017	0.6
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1
GRB 220	BK BK	70.606	477	1349.9	0.353	0.300 - 0.475	0.379	-1.1

Counting Log(s)

Previous 3 counts	Time	Detector	ID		Length	Cpm
71.640	12-MAR-07 8:21	GRB 220	SF	\	10.0 min	0.00
71.693	12-MAR-07 9:37	GRB 220	Sr 8870 5	\	100.0 min	16.02
71.874	12-MAR-07 13:58	GRB 220	Np 7737 4	\	25.0 min	44.51
71.693	12-MAR-07 9:37	GRB 220	Sr 8870 5	\	100.0 min	16.02
71.874	12-MAR-07 13:58	GRB 220	Np 7737 4	\	25.0 min	44.51
71.975	12-MAR-07 16:23	GRB 220	Ac 8657 4	\	150.0 min	0.13
71.874	12-MAR-07 13:58	GRB 220	Np 7737 4	\	25.0 min	44.51
71.975	12-MAR-07 16:23	GRB 220	Ac 8657 4	\	150.0 min	0.13
72.080	12-MAR-07 18:55	GRB 220	Ac 8657 4	\	150.0 min	-0.05
71.975	12-MAR-07 16:23	GRB 220	Ac 8657 4	\	150.0 min	0.13
72.080	12-MAR-07 18:55	GRB 220	Ac 8657 4	\	150.0 min	-0.05
72.185	12-MAR-07 21:26	GRB 220	Ac 8657 4	\	150.0 min	-0.03
72.080	12-MAR-07 18:55	GRB 220	Ac 8657 4	\	150.0 min	-0.05
72.185	12-MAR-07 21:26	GRB 220	Ac 8657 4	\	150.0 min	-0.03
72.289	12-MAR-07 23:56	GRB 220	Ac 8657 4	\	150.0 min	-0.02
72.185	12-MAR-07 21:26	GRB 220	Ac 8657 4	\	150.0 min	-0.03
72.289	12-MAR-07 23:56	GRB 220	Ac 8657 4	\	150.0 min	-0.02
72.394	13-MAR-07 2:27	GRB 220	Ac 8657 4	\	150.0 min	-0.12

13-MAR-07 TMA Corporation 8660- 1 80
07:41:11 Gross Alpha, Gross Beta Analysis IQC0154-01
R703026 ABCALC V 1.05
MCM Reviewed BW Date 3/13/07
Counted 71.995- 7 on B1 for 400.00 min.

8.000E-021	70.600 mg	70.600 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 105	GRB 105
Counts =	79.000	6437.000
Gross cpm =	0.198	16.093
Background =	0.065	1.181
Observed CPM =	0.133	14.912
Cross talk fac =	0.006	0.235
True CPM =	0.046	14.901
Inst Std. Fac. =	1.048	1.013
Adjusted CPM =	0.048	15.094
Eff (cpm/dpm) =	0.109	0.402
DPM of Aliquot =	0.442	37.574
pCi /l =	2.49 (F)	212. (C)
1 sigma % Err =	55.702	1.395
2 sigma % Err =	109.177	2.733
(1 sigma err) =	1.39	2.95
(2 sigma err) =	2.72	5.78
LTV (95 %) =	4.78	216.
MDA (3.00) =	3.45	3.65
MDA (2.71) =	3.41	3.64
CRITICAL LEVEL =	1.53	1.77

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.065	1.181	0.00
SF	71.654	0	1.048	1.013	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 105	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 105	(30D)9685 2 \	100.0 min	1.37
71.822	12-MAR-07 12:43	GAW 105	(59)8461 19 \	100.0 min	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 105	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 105	(30D)9685 2 \	100.0 min	8.66
71.822	12-MAR-07 12:43	GRB 105	(59)8461 19 \	100.0 min	0.10

kg 3/13/07

Status: PASS

Source	LCS	LCS
Sample No.	2	2
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	71.994-07	71.994-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	7.8152	9.6145
Error @ 2s (abs.)	0.569	0.431
Error @ 2s (%)	7.3	4.5
MDA	0.23933	0.45887
Result Units	PCI/SMPL	PCI/SMPL
Nuclide	Am241	Sr 90
Standard ID	R1-A	AA1-B-(15)
Qty (ml)	1.1	0.5
Activity (dpm)	22.49	27.31
Calib. Date	353.708-2005	306.500-1996
Half Life (days)	157900	10580
Decay Date	71.994-07	71.994-07
Added (pCi)	11.12	9.601
Added Error @ 2s (%)	4	4
F/A Ratio	0.703	1.001
F/A Ratio Error @ 2s (%)	8	6
LCL	0.60	0.80
LWL	0.73	0.87
UWL	1.27	1.13
UCL	1.40	1.20
Status	PASS	PASS
Flag	wl	

Initials/Date KY 3/13/07

60536

13-MAR-07 TMA Corporation 8660- 2 80
07:41:13 Gross Alpha, Gross Beta Analysis QC-LCS 60536
R703026 ABCALC V 1.05
MCM Reviewed BW Date 3/13/07
Counted 71.995- 7 on B3 for 400.00 min.

1.00 smpl	60.500 mg	60.500 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 107	GRB 107
Counts =	826.000	4779.000
Gross cpm =	2.065	11.948
Background =	0.056	3.033
Observed CPM =	2.009	8.915
Cross talk fac =	0.006	0.230
True CPM =	1.959	8.463
Inst Std. Fac. =	1.042	1.021
Adjusted CPM =	2.042	8.641
Eff (cpm/dpm) =	0.118	0.405
DPM of Aliquot =	17.350	21.344
pCi /smpl =	7.82	9.61
1 sigma % Err =	3.717	2.287
2 sigma % Err =	7.285	4.482
(1 sigma err) =	0.290	0.220
(2 sigma err) =	0.569	0.431
LTV (95 %) =	8.29	9.98
MDA (3.00) =	0.239	0.459
MDA (2.71) =	0.237	0.458
CRITICAL LEVEL =	0.106	0.226

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.056	3.033	0.00
SF	71.654	0	1.042	1.021	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 107	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 107	(30D)9685 3 \	100.0 min	-0.03
71.822	12-MAR-07 12:43	GAW 107	(59)8461 20 \	100.0 min	-0.02

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 107	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 107	(30D)9685 3 \	100.0 min	-0.02
71.822	12-MAR-07 12:43	GRB 107	(59)8461 20 \	100.0 min	0.03

MY 3/13/07

Status: PASS

Source	BLANK	BLANK
Sample No.	3	3
Analyte	GrAlph	GrBeta
Geometry	ST	ST
Reference Date		
Separation Date #1		
Separation Date #2		
Count Date	71.994-07	71.994-07
Aliquot	1	1
Aliquot Units	SMPL	SMPL
Yield	1	1
Result	-0.16303	-0.075502
Error @ 2s (abs.)	0.107	0.150
Error @ 2s (%)	65.5	199.2
MDA	0.23972	0.2622
Result Units	PCI/SMPL	PCI/SMPL
Status	PASS	PASS
Flag		

Initials/Date KEY 3/13/07

60537

13-MAR-07 TMA Corporation 8660- 3 80
07:41:14 Gross Alpha, Gross Beta Analysis QC-BLANK 60537
R703026 ABCALC V 1.05
MCM Reviewed PW Date 3-13-07
Counted 71.995- 7 on C1 for 400.00 min.

1.00 smpl	61.800 mg	61.800 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 109	GRB 109
Counts =	6.000	354.000
Gross cpm =	0.015	0.885
Background =	0.055	0.961
Observed CPM =	-0.040	-0.076
Cross talk fac =	0.006	0.231
True CPM =	-0.040	-0.067
Inst Std. Fac. =	1.065	1.014
Adjusted CPM =	-0.042	-0.068
Eff (cpm/dpm) =	0.117	0.404
DPM of Aliquot =	-0.362	-0.168
pCi /smpl =	-0.163	-7.550E-02
1 sigma % Err =	33.399	101.614
2 sigma % Err =	65.463	199.164
(1 sigma err) =	5.445E-02	7.672E-02
(2 sigma err) =	0.107	0.150
LTV (95 %) =	8.984E-02	0.127
MDA (3.00) =	0.240	0.262
MDA (2.71) =	0.237	0.261
CRITICAL LEVEL =	0.106	0.127

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.055	0.961	0.00
SF	71.654	0	1.065	1.014	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 109	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 109	(59)8461 15 \	100.0 min	0.01
71.822	12-MAR-07 12:43	GAW 109	(59)8461 21 \	100.0 min	-0.03

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 109	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 109	(59)8461 15 \	100.0 min	0.04
71.822	12-MAR-07 12:43	GRB 109	(59)8461 21 \	100.0 min	0.03

KY 3/13/07

Status: PASS

Source	DUP	DUP	ORIGINAL	ORIGINAL
Sample No.	4	4	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	60.802-7	60.802-7	60.802-7	60.802-7
Separation Date #1				
Separation Date #2				
Count Date	71.994-07	71.994-07	71.994-07	71.994-07
Aliquot	0.08	0.08	0.08	0.08
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	-1.4134	210.36	2.4889	211.57
Error @ 2s (abs.)	2.228	5.812	2.717	5.783
Error @ 2s (%)	157.6	2.8	109.2	2.7
MDA	3.2374	3.909	3.4483	3.6466
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
RPD		1		
UCL	40.00	30.00		
RER				
Criterion	N			
Status	PASS	PASS		
Flag				

Initials/Date MG 3/13/07

60538

13-MAR-07 TMA Corporation 8660- 4 80
07:41:16 Gross Alpha, Gross Beta Analysis QC-DUP#1 60538
R703026 ABCALC V 1.05
MCM Reviewed BW Date 3/30/07
Counted 71.995- 7 on C2 for 400.00 min.

8.000E-021	69.900 mg	69.900 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 110	GRB 110
Counts =	47.000	6496.000
Gross cpm =	0.117	16.240
Background =	0.057	1.364
Observed CPM =	0.060	14.876
Cross talk fac =	0.006	0.235
True CPM =	-0.026	14.882
Inst Std. Fac. =	1.059	1.009
Adjusted CPM =	-0.028	15.016
Eff (cpm/dpm) =	0.110	0.402
DPM of Aliquot =	-0.251	37.360
pCi /l =	-1.41	210.
1 sigma % Err =	80.409	1.410
2 sigma % Err =	157.602	2.763
(1 sigma err) =	1.14	2.97
(2 sigma err) =	2.23	5.81
LTV (95 %) =	1.88	215.
MDA (3.00) =	3.24	3.91
MDA (2.71) =	3.20	3.90
CRITICAL LEVEL =	1.43	1.91

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.057	1.364	0.00
SF	71.654	0	1.059	1.009	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 110	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 110	(93)8641 28 \	100.0 min	-0.05
71.822	12-MAR-07 12:43	GAW 110	(59)8461 22 \	100.0 min	-0.01

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 110	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 110	(93)8641 28 \	100.0 min	-0.20
71.822	12-MAR-07 12:43	GRB 110	(59)8461 22 \	100.0 min	0.33

Kg 3/13/07

Status: PASS

Source	MS	MS	ORIGINAL	ORIGINAL
Sample No.	5	5	1	1
Analyte	GrAlph	GrBeta	GrAlph	GrBeta
Reference Date	60.802-7	60.802-7	60.802-7	60.802-7
Separation Date #1				
Separation Date #2				
Count Date	71.994-07	71.994-07	71.994-07	71.994-07
Aliquot	0.08	0.08	0.08	0.08
Aliquot Units	L	L	L	L
Yield	1	1	1	1
Result	335.33	487.71	2.4889	211.57
Error @ 2s (abs.)	13.564	8.488	2.717	5.783
Error @ 2s (%)	4.0	1.7	109.2	2.7
MDA	2.879	3.3116	3.4483	3.6466
Result Units	PCI/L	PCI/L	PCI/L	PCI/L
Nuclide	Am241	Sr 90		
Standard ID	R1-A	AA1-B-(15)		
Qty (ml)	2.25	1.1		
Activity (dpm)	22.49	27.31		
Calib. Date	353.708-2005	306.500-1996		
Half Life (days)	157900	10580		
Decay Date	71.994-07	71.994-07		
Added (pCi)	22.75	21.12		
Added Error @ 2s (%)	4	4		
Spike Activity	26.826	39.017		
Original Activity	0.199	16.926		
Activity Difference	26.627	22.091		
Error Difference	4.156	3.719		
F/A Ratio	1.170	1.046		
F/A Ratio Error @ 2s (%)	5.768	5.462		
LCL	0.60	0.80		
LWL	0.73	0.87		
UWL	1.27	1.13		
UCL	1.40	1.20		
Status	PASS	PASS		
Flag				

(F)

Initials/Date KEJ 3/13/07

60539

13-MAR-07 TMA Corporation 8660- 5 80
07:41:17 Gross Alpha, Gross Beta Analysis QC-MS#1 60539
R703026 ABCALC V 1.05
MCM Reviewed BW Date 3.13.07
Counted 71.995- 7 on C3 for 400.00 min.

8.000E-021	70.700 mg	70.700 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 111	GRB 111
Counts =	2556.000	14883.000
Gross cpm =	6.390	37.208
Background =	0.043	0.968
Observed CPM =	6.347	36.240
Cross talk fac =	0.006	0.235
True CPM =	6.145	34.793
Inst Std. Fac. =	1.056	1.000
Adjusted CPM =	6.489	34.793
Eff (cpm/dpm) =	0.109	0.402
DPM of Aliquot =	59.555	86.617
pCi /l =	335.	488.
1 sigma % Err =	2.064	0.888
2 sigma % Err =	4.045	1.740
(1 sigma err) =	6.92	4.33
(2 sigma err) =	13.6	8.49
LTV (95 %) =	347.	495.
MDA (3.00) =	2.88	3.31
MDA (2.71) =	2.84	3.30
CRITICAL LEVEL =	1.25	1.61

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.043	0.968	0.00
SF	71.654	0	1.056	1.000	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 111	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 111	(59)8641 16 \	100.0 min	0.03
71.822	12-MAR-07 12:43	GAW 111	(59)8461 23 \	100.0 min	0.06

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 111	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 111	(59)8641 16 \	100.0 min	0.08
71.822	12-MAR-07 12:43	GRB 111	(59)8461 23 \	100.0 min	0.37

kg 3/13/07

13-MAR-07 TMA Corporation 8661- 1 80
07:41:10 Gross Alpha, Gross Beta Analysis IQC0289-01
R703047 ABCALC V 1.05
MCM Reviewed BEV Date 3-8-07
Counted 71.995- 7 on D3 for 400.00 min.

7.000E-021	86.600 mg	86.600 mg
Aliquot	Sample Weight	Counted Weight

	ALPHA	BETA
Instrument =	GAW 115	GRB 115
Counts =	33.000	7487.000
Gross cpm =	0.083	18.718
Background =	0.067	1.185
Observed CPM =	0.016	17.533
Cross talk fac =	0.006	0.243
True CPM =	-0.084	17.553
Inst Std. Fac. =	1.040	1.033
Adjusted CPM =	-0.088	18.132
Eff (cpm/dpm) =	0.097	0.397
DPM of Aliquot =	-0.903	45.675
pCi /l =	-5.81	294.
1 sigma % Err =	22.894	1.271
2 sigma % Err =	44.873	2.491
(1 sigma err) =	1.33	3.74
(2 sigma err) =	2.61	7.32
LTV (95 %) =	2.20	300.
MDA (3.00) =	4.48	4.22
MDA (2.71) =	4.43	4.21
CRITICAL LEVEL =	2.00	2.06

QC Summary

QC	GMT	YR	ALPHA	BETA	TIME
BKG	70.597	7	0.067	1.185	0.00
SF	71.654	0	1.040	1.033	0.00

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.654	12-MAR-07 8:41	GAW 115	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GAW 115	(30D)9685 5 \	100.0 min	0.03
71.822	12-MAR-07 12:43	GAW 115	(59)8460 5 \	100.0 min	0.13

Previous 3 counts	Time	Detector	ID	Length	Cpm
71.666	12-MAR-07 8:59	GRB 115	SF \	10.0 min	0.00
71.738	12-MAR-07 10:42	GRB 115	(30D)9685 5 \	100.0 min	0.65
71.822	12-MAR-07 12:43	GRB 115	(59)8460 5 \	100.0 min	0.72

LOG-IN VERIFICATION
All samples
All planchets

RT
3.9-7

PB# 6107 pg. 20

R702121 TA_IRVINE
TestAmerica - Irvin
17461 Derian Avenu

PROJECT# IQB2021

Pr Mgr.... MCM Rcvd... 02/21/07
Charge.... 00-000 Due.... 03/14/07
Chemist... Value... 0.
Created... 22-FEB-07 Billed.. 0.
Billing status.. open
Calc. units..... PCI /Unit alq Min Pri
/ 0

smp	elm	typ	mg rec	dpm rec Ash wgt	1st sep	2nd sep	aliquot	carr/ trac
1		80	71.30	0.0000	0.000 0	0.000 0	0.3000 - 1	# 0

Carriers/Tracers used ------

AC-2?

8657

LOG-IN VERIFICATION 8657
10:12:34 19-MAR-07
Cust. set 0 0
Page 1

RT
3.19.7

CB# 6104 Pg. 6
PB# 6107 Pg. 20

LOG-IN VERIFICATION
All samples
All planchets

R702122 TA_IRVINE
TestAmerica - Irvin
17461 Derian Avenu

PROJECT# IQB2022

Pr Mgr.... MCM Rcvd... 02/21/07
Charge.... 00-000 Due.... 03/14/07
Chemist... Value... 0.
Created... 22-FEB-07 Billed.. 0.
Billing status.. open
Calc. units..... PCI /Unit alq Min Pri
0

Ra #7124 Pg. 92

smp	elm	typ	mg rec	dpm rec Ash wgt	1st sep	2nd sep	aliquot	carr/ trac
1	Ac		22.49	0.0000	0.000 0	71.754 7	1.800 1	# 1
	H	DST	0.00	0.0000	0.000 0	0.000 0	1.0000E-021	# 2
	Ra		0.00	0.0000	57.906 7	65.737 7	0.1000 1	# 0
	Sr		14.67	0.0000	0.000 0	61.667 7	0.5000 1	# 3
		80	60.90	0.0000	0.000 0	0.000 0	0.3000 1	# 0
2	Ac		18.20	0.0000	0.000 0	71.754 7	1.000 smpl	# 1
	H	DST	10.00	100.0	0.000 0	0.000 0	1.000 smpl	# 2
	Ra		0.00	0.0000	57.906 7	65.737 7	1.000 smpl	# 0
	Sr		14.66	0.0000	0.000 0	61.667 7	1.000 smpl	# 3
		80	63.80	0.0000	0.000 0	0.000 0	1.000 smpl	# 0
3	Ac		24.10	0.0000	0.000 0	71.754 7	1.000 smpl	# 1
	H	DST	10.00	100.0	0.000 0	0.000 0	1.000 smpl	# 2
	Ra		0.00	0.0000	57.906 7	65.737 7	1.000 smpl	# 0
	Sr		14.57	0.0000	0.000 0	61.667 7	1.000 smpl	# 3
		80	63.30	0.0000	0.000 0	0.000 0	1.000 smpl	# 0
4	Ac		20.74	0.0000	0.000 0	71.754 7	1.800 1	# 1
	H	DST	0.00	0.0000	0.000 0	0.000 0	1.0000E-021	# 2
	Ra		0.00	0.0000	57.906 7	65.737 7	0.1000 1	# 0
	Sr		14.49	0.0000	0.000 0	61.667 7	0.5000 1	# 3
		80	59.80	0.0000	0.000 0	0.000 0	0.3000 1	# 0
5	H	DST	10.00	50.10	0.000 0	0.000 0	5.0000E-021	# 2
	Ra		0.00	0.0000	57.906 7	65.737 7	0.1000 1	# 0
		80	59.80	0.0000	0.000 0	0.000 0	0.3000 1	# 0
R1		80	68.50	0.0000	0.000 0	0.000 0	0.3000 1	# 0

Carriers/Tracers used -----

# 1	1.000	mls of	Y	0	E-D1-(03)[illegible]XAL9	@ 40.74 mg/ml
# 2	0.1000	mls of	H	3	AF1-A-(07)	@ 1.3240E+05 dpm/ml
# 3	1.000	mls of	Sr	0	M-A1-(06)	@ 17.90 mg/ml

8658

LOG-IN VERIFICATION 8658
10:46:47 12-MAR-07
Cust, set 0 0
Page 1

LOG-IN VERIFICATION
All samples
All planchets

pct
3127

PB # 6107 pg. 20

R702123 TA_IRVINE
TestAmerica - Irvin
17461 Derian Avenu

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/ 0

smp	elm	typ	mg rec	dpm rec Ash wgt	1st sep	2nd sep	aliquot	carr/ trac
1		80	90.90	0.0000	0.000 0	0.000 0	0.1200 — 1	# 0

Carriers/Tracers used -----