Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133670
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 10 FEB 99
Serial Number: 139658
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 25 NOV 99
Calibration Due: 25 NOV 99
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40K	40K	40K	1.00
x1000	10K	10K	10K	1.00
x100	4K	4K	4K	1.00
x100	1K	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40K	40,080	40,080	1.00
4K	4010	4010	1.00
400	400	400	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	16,344 dpm	5620	(ncpm)	34.39
Beta (2π)	25,462 dpm	4499	(ncpm)	17.67

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139658.

Date of next calibration: 8 AUG 99

Performed By: Al Perrella
Reviewed By: [signature]
Report Number: 021099133670

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Detector Worksheet

Instrument Model: 2360 Serial Number: 133670

Model: 43-89 Serial Number: 139658

	Count time = 60 seconds							
High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
625	3855	429	9.6%	3	1326	0.08%	2	19
650	4868	343	5.6%	0	2441	0.00%	0	50
675	5433	331	4.1%	4	3357	0.12%	0	97
700	5460	360	3.6%	4	4278	0.07%	1	148
725	5620	502	4.3%	1	4735	0.02%	0	236
750	5784	1065	7.5%	5	5870	0.09%	0	554
775	6087	2093	11.7%	3	6773	0.04%	0	1140

Efficiency **Alpha: 34.39%** **Beta: 17.67%**

Background: **Alpha :** **0** **Beta:** **236**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133666
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 21 DEC 98
Serial Number: 139661
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 25 NOV 99
Calibration Due: 25 NOV 99
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV **Beta Window:** 30 mV **Alpha Threshold:** 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,155	40,155	1.00
4k	4,016	4,016	1.00
400	402	402	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity			Meter Indication		Efficiency (%)
Alpha (2π)	16,344	dpm	6,098	(ncpm)	37.31
Beta (2π)	25,414	dpm	4,882	(ncpm)	19.21

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139661.

Date of next calibration: 18 JUN 99

Performed By: Al Pereda Reviewed By: Burt Cummings

Report Number: 122198133666

Detector Worksheet

Instrument Model: 2360 Serial Number: 133666

Model: 43-89 Serial Number: 139661

Count time = 60 seconds

High Voltage	Alpha Source Alpha	Alpha Source Beta	Alpha Source xtalk	Beta Source Alpha	Beta Source Beta	Beta Source xtalk	Background Alpha	Background Beta
700	5451	355	4.8%	3	3526	0.06%	1	75
725	5851	369	3.8%	3	3909	0.08%	0	135
750	6098	486	3.5%	2	5139	0.04%	0	257
775	6282	858	5.5%	4	6035	0.07%	0	462
800	6493	1221	7.5%	2	6488	0.02%	1	640
825	6368	1971	12.0%	0	7043	0.00%	0	972
850	6354	3000	11.0%	5	8360	0.04%	2	1971

Efficiency **Alpha: 37.31%** **Beta: 19.21%**

Background: **Alpha :** **0** **Beta:** **257**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133661
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 21 DEC 98
Serial Number: 139117
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 25 NOV 99
Calibration Due: 25 NOV 99
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV Beta Window: 30 mV Alpha Threshold: 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,187	40,187	1.00
4k	4,019	4,019	1.00
400	402	402	1.00
100	100	100	1.00
40	41	41	.98

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	16,344 dpm	6,320	(ncpm)	38.67
Beta (2π)	25,414 dpm	5,053	(ncpm)	19.88

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139117.

Date of next calibration: 18 JUN 99

Performed By: Al Perella
Reviewed By: Bud Cummings
Report Number: 122198133661

Detector Worksheet

Instrument Model: 2360 Serial Number: 133661

Model: 43-89 Serial Number: 139117

Count time = 60 seconds

High Voltage	Alpha Source Alpha	Alpha Source Beta	Alpha Source xtalk	Beta Source Alpha	Beta Source Beta	Beta Source xtalk	Background Alpha	Background Beta
550	5202	327	4.9%	4	2810	0.11%	1	55
575	5880	371	4.2%	4	3983	0.10%	0	106
600	6320	421	3.2%	3	5259	0.06%	0	206
625	6445	911	6.6%	2	5939	0.03%	0	423
650	6376	2420	18.2%	7	6966	0.10%	0	821
675	6575	4496	26.8%	4	7909	0.05%	0	1532

Efficiency **Alpha: 38.67%** **Beta: 19.88%**

Background: **Alpha :** **0** **Beta:** **206**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133670
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 20 NOV 98
Serial Number: 139658
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 04 DEC 98
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 04 DEC 98
Source: P-420 Isotope: Pu-239 — Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV **Beta Window:** 30 mV **Alpha Threshold:** 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,098	40 098	1.00
4k	4010	4010	1.00
400	401	401	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	16,344 dpm	6016	(ncpm)	36.81
Beta (2π)	25,462 dpm	4823	(ncpm)	18.94

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139658. DATE of next calibration: 18 MAY 99.

Performed By: Al Perella
Reviewed By: [signature]
Report Number: 112098133670

Detector Worksheet

Instrument Model: 2360 Serial Number: 133670

Model: 43-89 Serial Number: 139658

Count time = 60 seconds

High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
575	2842	533	15.1%	2	939	0.21%	0	24
600	4191	394	7.7%	1	1770	0.00%	1	40
625	4931	368	5.7%	4	2876	0.14%	0	65
650	5577	463	5.2%	5	4040	0.12%	0	150
675	6016	693	6.1%	2	5109	0.04%	0	286
700	6226	1038	5.4%	7	5827	0.12%	0	643
725	6087	1995	9.5%	3	7222	0.03%	1	1224

Efficiency **Alpha: 36.81%** **Beta: 18.94%**

Background: **Alpha :** **0** **Beta:** **286**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 141308
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 20 NOV 98
Serial Number: 139659
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 04 DEC 98
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 04 DEC 98
Source: P-420 Isotope: Pu-239 — Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00
Digital Readout (Integrate/Scaler Mode)				
Applied (cpm)		Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k		39,959	39,959	1.00
4k		3996	3996	1.00
400		400	400	1.00
100		99	99	1.01
40		40	40	1.00

Source Activity	Meter Indication	Efficiency (%)
Alpha (2π) 16,344 dpm	6386 (ncpm)	39.07
Beta (2π) 25,462 dpm	4795 (ncpm)	18.83

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139659. DATE of NEXT CALIBRATION: 18 MAY 99.

Performed By: [signature]
Reviewed By: [signature]
Report Number: 112098141308

Detector Worksheet

Instrument Model: 2360 Serial Number: 141308

Model: 43-89 Serial Number: 139659

Count time = 60 seconds

High Voltage	Alpha Source Alpha	Alpha Source Beta	Alpha Source xtalk	Beta Source Alpha	Beta Source Beta	Beta Source xtalk	Background Alpha	Background Beta
550	2290	542	18.4%	1	780	0.13%	0	22
575	4593	509	9.2%	0	1789	0.00%	0	38
600	5562	400	5.7%	2	2939	0.07%	0	62
625	6179	446	4.8%	3	4046	0.07%	0	131
650	6386	465	3.1%	2	5048	0.04%	0	253
675	6431	1345	5.6%	5	5660	0.09%	0	907
700	6630	2040	7.8%	5	6100	0.08%	0	1360

Efficiency **Alpha: 39.07%** **Beta: 18.83%**

Background: **Alpha :** **0** **Beta:** **253**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133668
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 20 NOV 98
Serial Number: 136345
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 04 DEC 98
Calibration Due: 04 DEC 98
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	39,930	39930	1.00
4k	3993	3993	1.00
400	399	399	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	16,344 dpm	5969	(ncpm)	36.52
Beta (2π)	25,462 dpm	4497	(ncpm)	17.66

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 136345. DATE of next calibration: 18 MAY 99.

Performed By: Al Perella
Reviewed By: [signature]
Report Number: 112098/133668

Detector Worksheet

Instrument Model: 2360 Serial Number: 133668

Model: 43-89 Serial Number: 136345

Count time = 60 seconds

High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
625	2042	583	21.3%	0	500	0.00%	0	23
650	3610	444	10.1%	1	1268	0.08%	0	34
675	4701	362	6.3%	3	1985	0.15%	0	43
700	5642	339	4.4%	4	3027	0.10%	1	76
725	5821	355	3.9%	4	3788	0.11%	0	116
750	5969	510	3.5%	3	4782	0.06%	0	285
775	6092	1041	3.0%	6	5894	0.10%	0	824

Efficiency **Alpha: 36.52%** **Beta: 17.66%**

Background: **Alpha :** **0** **Beta:** **285**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133661
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 3 JUN 99
Serial Number: 139117
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: P-420 Isotope: Pu-239 — Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV Beta Window: 30 mV Alpha Threshold: 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,090	40,090	1.00
4k	4,010	4,010	1.00
400	401	401	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π) 16,344	dpm	6192	(ncpm)	37.89
Beta (2π) 25,151	dpm	5100	(ncpm)	20.28

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. As found readings were within specifications. No high voltage plateau performed. Calibrated with Probe SN: 139117.

Date of next calibration: 29 NOV 99

Performed By: M Perrella
Reviewed By: [signature]
Report Number: 060399133661

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133666
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 3 JUN 99
Serial Number: 139661
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: P-420 Isotope: Pu-239 — Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV Beta Window: 30 mV Alpha Threshold: 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,145	40,145	1.00
4k	4,009	4,009	1.00
400	402	402	1.00
100	100	100	1.00
40	41	41	.98

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	16,344 dpm	6216	(ncpm)	38.03
Beta (2π)	25,151 dpm	4725	(ncpm)	18.79

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. As found readings were within specifications. No high voltage plateau performed. Calibrated with Probe SN: 139661.

Date of next calibration: 29 NOV 99

Performed By: Al Perrelle
Reviewed By: [signature]
Report Number: 060399133666

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 141308
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 14 MAY 99
Serial Number: 139659
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 25 NOV 99
Calibration Due: 25 NOV 99
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	1K	1.00
x100	1k	1K	400	1.00
x10	400	400	100	1.00
x10	100	100	~~1400~~ 100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	39,970	39,970	1.00
4k	3,997	3,997	1.00
400	402	402	1.00
100	101	101	.99
40	41	41	.98

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π) 16,344	dpm	6100	(ncpm)	37.32
Beta (2π) 25,183	dpm	4782	(ncpm)	18.99

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 139659. As found Readings were within specifications. No high voltage Plateau performed.

Date of next calibration: 9 NOV 99.

Performed By: Al Perrelle

Reviewed By: Bert Lommy

Report Number: 051499141308

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133668
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 14 MAY 99
Serial Number: 136345
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: P-420 Isotope: Pu-239

Calibration Due: 25 NOV 99
Calibration Due: 25 NOV 99
Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,110	40,110	1.00
4k	4008	4008	1.00
400	401	401	1.00
100	99	99	1.01
40	41	41	.98

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π) 16,344	dpm	5882	(ncpm)	35.99
Beta (2π) 25,183	dpm	4350	(ncpm)	17.27

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 136345. As Found Readings were within specifications. No high voltage plateau performed.

Date of next calibration: 9 NOV 99.

Performed By: Al Perella

Reviewed By: Bert Lumming

Report Number: 051499136345

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133670
Detector Model: 43-89
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 17 JUN 99
Serial Number: 139658
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: P-420 Isotope: Pu-239 — Source: CS-11 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV Beta Window: 30 mV Alpha Threshold: 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	0	40K	1.00
x1000	10k	0	10K	1.00
x100	4k	0	4K	1.00
x100	1k	0	1K	1.00
x10	400	0	400	1.00
x10	100	0	100	1.00
x1	40	0	40	1.00
x1	10	0	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	0	40312	.99
4k	0	4026	.99
400	0	403	.99
100	0	100	1.00
40	0	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π) 16,344	dpm	6017	(ncpm)	36.81
Beta (2π) 25,259	dpm	4738	(ncpm)	18.76

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. *Replaced photomultiplier tube in detector model number 43-89, serial number 139658. Calibrated with Probe SN: 139658.

Date of next calibration: 13 DEC 99.

Performed By: Al Perrella Reviewed By: Brent Cummings

Report Number: 061799133670

Detector Worksheet

Instrument Model: 2360 Serial Number: 133670

Model: 43-89 Serial Number: 139658

Count time = 60 seconds

High Voltage	Alpha Source Alpha	Alpha Source Beta	Alpha Source xtalk	Beta Source Alpha	Beta Source Beta	Beta Source xtalk	Background Alpha	Background Beta
525	4158	392	7.6%	3	1553	0.13%	1	47
550	5142	337	4.9%	6	2969	0.20%	0	67
575	5658	385	4.2%	5	4120	0.10%	1	129
600	6017	624	6.2%	3	4952	0.06%	0	214
625	6177	1484	13.9%	6	5886	0.10%	0	418
650	6069	5026	35.1%	2	7443	0.03%	0	1135

Efficiency **Alpha: 36.81%** **Beta: 18.76%**

Background: **Alpha :** **0** **Beta:** **214**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 133663
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 23 NOV 98
Serial Number: 136362
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859
Volt/Ohm Meter Serial Number: 43859
Source: ES927 Isotope: Pu-238

Calibration Due: 04 DEC 98
Calibration Due: 04 DEC 98
Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00
Digital Readout (Integrate/Scaler Mode)				
Applied (cpm)		Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k		40,048	40,048	1.00
4k		4,004	4,004	1.00
400		401	401	1.00
100		100	100	1.00
40		40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	15,900 dpm	3761	(ncpm)	23.65
Beta (2π)	82,008 dpm	33013	(ncpm)	40.26

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 136362. DATE of NEXT CALIBRATION: ~~18 MAY 99~~ 21 MAY 99.

Performed By: Al Perelle
Reviewed By: Bud Cummings
Report Number: 112398133663

Detector Worksheet

Instrument Model: 2360 Serial Number: 133663
Model: 43-37-1 Serial Number: 136362

	Count time = 60 seconds							
High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
1700	2668	883	11.5%	2	30355	0.00%	2	476
1725	2718	824	8.9%	3	31815	0.00%	2	510
1750	3241	1207	8.6%	2	35408	0.00%	1	825
1775	3764	1399	7.3%	38	34037	0.10%	3	1024
1800	4212	1424	5.7%	172	31691	0.52%	6	1104
1825	4584	1531	7.2%	505	28691	1.69%	12	1092

Efficiency: **Alpha: 23.65%** **Beta: 40.26%**
Background: **Alpha: 3 cpm** **Beta: 1024 cpm**

Ludlum Model 2224-1
Calibration Data Sheet

Serial Number: 129468
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 30 NOV 98
Serial Number: 136363
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV **Beta Window:** 30 mV **Alpha Threshold:** 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40192	40192	1.00
4k	4018	4018	1.00
400	402	402	1.01
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	15,897 dpm	4241	(ncpm)	26.68
Beta (2π)	81,973 dpm	32203	(ncpm)	39.28

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 136363. DATE of NEXT CALIBRATION: 28 MAY 99.

Performed By: Al Perrelle
Reviewed By: Bert Lammers
Report Number: 113098129468

Detector Worksheet

Instrument Model: 2224-1 Serial Number: 129468
Model: 43-37-1 Serial Number: 136363

Count time = 60 seconds								
High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
1650	2463	711	12.7%	1	26234	0.00%	1	308
1675	2914	799	8.7%	3	30414	0.00%	4	477
1700	3224	933	9.0%	4	33696	0.00%	3	557
1725	3636	1098	7.1%	1	35251	0.00%	1	763
1750	4040	1328	6.9%	8	35047	0.01%	5	956
1775	4243	1398	6.4%	53	33239	0.15%	2	1036
1800	4746	1398	6.0%	335	29779	1.10%	4	1030
1825	5082	1319	3.8%	1006	25189	3.80%	11	1076

Efficiency **Alpha: 26.68%** **Beta: 39.28%**

Background: **Alpha :** **2** **Beta:** **1036**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 141313
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 23 NOV 98
Serial Number: 145076
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 04 DEC 98
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 04 DEC 98
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,039	40,039	1.00
4k	4003	4003	1.00
400	401	401	1.00
100	99	99	1.01
40	40	40	1.00

Source Activity			Meter Indication		Efficiency (%)
Alpha (2π)	15,900	dpm	3625	(ncpm)	22.80
Beta (2π)	82,008	dpm	33375	(ncpm)	40.70

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 145076. DATE of NEXT CALIBRATION: ~~18 MAY 99~~ 21 MAY 99.

Performed By: Al Perella
Reviewed By: [illegible]
Report Number: 112398 141313

Detector Worksheet

Instrument Model: 2360 Serial Number: 141313

Model: 43-37-1 Serial Number: 145076

Count time = 60 seconds

High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
1725	2230	980	12.3%	1	32677	-0.01%	3	585
1750	2854	1160	7.4%	0	36497	-0.01%	5	862
1775	3278	1382	7.9%	8	36161	0.02%	2	1013
1800	3628	1550	8.8%	55	34467	0.15%	3	1092
1825	4089	1523	7.2%	208	31740	0.64%	4	1117
1850	4427	1544	8.3%	1011	26778	3.56%	21	1046

Efficiency: **Alpha: 22.80%** **Beta: 40.70%**

Background: **Alpha: 3 cpm** **Beta: 1092 cpm**

Ludlum Model 2224-1
Calibration Data Sheet

Serial Number: 129447
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 30 NOV 98
Serial Number: 134334
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40430	40430	1.01
4k	4002	4002	1.00
400	402	402	1.01
100	100	100	1.00
40	40	40	1.00

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	15,897 dpm	4615	(ncpm)	29.03
Beta (2π)	81,973 dpm	33616	(ncpm)	41.01

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 134334. DATE of NEXT CALIBRATION: 28 MAY 99.

Performed By: Al Perrella
Reviewed By: [signature]
Report Number: 113098129447

Detector Worksheet

Instrument Model: 2224-1 Serial Number: 129447
Model: 43-37-1 Serial Number: 134334

Count time = 60 seconds								
High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
1625	2597	621	10.4%	3	24020	0.01%	1	286
1650	2942	802	10.9%	1	27547	-0.01%	4	395
1675	3219	839	9.0%	3	30904	0.01%	1	474
1700	3772	1008	7.5%	2	34025	0.00%	2	651
1725	4062	1178	7.0%	6	35473	0.01%	3	812
1750	4620	1333	6.7%	27	34551	0.06%	5	935
1775	4950	1436	6.3%	196	31608	0.60%	5	1036

Efficiency **Alpha: 29.03%** **Beta: 41.01%**

Background: **Alpha :** **5** **Beta:** **935**

Ludlum Model 2224-1
Calibration Data Sheet

Serial Number: 129447
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 19 APR 99
Serial Number: 134334
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV Beta Window: 30 mV Alpha Threshold: 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40200	40200	1.00
4k	4001	4001	1.00
400	401	401	1.00
100	100	100	1.00
40	40	40	1.00

Source Activity			Meter Indication		Efficiency (%)
Alpha (2π)	15,849	dpm	4,586	(ncpm)	28.94
Beta (2π)	81,275	dpm	32,295	(ncpm)	39.74

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. Calibrated with Probe SN: 134334. DATE OF NEXT CALIBRATION: 15 OCT 99.

Performed By: Al Perrella Reviewed By: [illegible]

Report Number: 041999129447

Detector Worksheet

Instrument Model: 2224-1 Serial Number: 129447
Model: 43-37-1 Serial Number: 134334

Count time = 60 seconds								
High	Alpha Source			Beta Source			Background	
Voltage	Alpha	Beta	xtalk	Alpha	Beta	xtalk	Alpha	Beta
1600	2437	667	13.2%	1	23221	0.00%	1	257
1625	2951	744	9.8%	1	28020	-0.01%	5	383
1650	3433	949	10.5%	3	33305	0.00%	2	488
1675	3889	1056	8.0%	2	35255	-0.01%	4	661
1700	4313	1253	7.1%	10	35270	0.01%	8	857
1725	4591	1412	7.1%	68	33282	0.19%	5	987
1750	4883	1479	6.3%	339	30038	1.09%	7	1077

Efficiency **Alpha: 28.94%** **Beta: 39.74%**

Background: **Alpha :** **5** **Beta:** **987**

Ludlum Model 2360
Calibration Data Sheet

Serial Number: 141313
Detector Model: 43-37-1
Detector Type: SCINTILLATION
Type Of Calibration: Electronic/Source

Date: 15 JUN 99
Serial Number: 145076
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 **mV** **Beta Window:** 30 **mV** **Alpha Threshold:** 120 **mV**

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,051	40,051	1.00
4k	4011	4,011	1.00
400	401	401	1.00
100	100	100	1.00
40	41	41	.98

Source Activity		Meter Indication		Efficiency (%)
Alpha (2π)	15,829 dpm	3789	(ncpm)	23.94
Beta (2π)	80,961 dpm	33209	(ncpm)	41.02

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. As found readings were within specifications. No high voltage plateau performed. Calibrated with Probe SN: 145076.

Date of next calibration: 11 DEC 99.

Performed By: Al Perrella
Reviewed By: [signature]
Report Number: 061599145076

Ludlum Model 2224-1
Calibration Data Sheet

Serial Number: 129468
Detector Model: 43-37-1
Detector Type: GAS FLOW PROPORTIONAL
Type Of Calibration: Electronic/Source

Date: 15 JUN 99
Serial Number: 136363
OUIC: W4GV91

Standards:
Pulser Serial Number: 43859 — Calibration Due: 25 NOV 99
Volt/Ohm Meter Serial Number: 43859 — Calibration Due: 25 NOV 99
Source: ES927 Isotope: Pu-238 — Source: H-045 Isotope: Cs-137

Calibration:
Beta Threshold: 3.5 mV **Beta Window:** 30 mV **Alpha Threshold:** 120 mV

Rate Meter				
Meter Range	Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
x1000	40k	40K	40K	1.00
x1000	10k	10K	10K	1.00
x100	4k	4K	4K	1.00
x100	1k	1K	1K	1.00
x10	400	400	400	1.00
x10	100	100	100	1.00
x1	40	40	40	1.00
x1	10	10	10	1.00

Digital Readout (Integrate/Scaler Mode)			
Applied (cpm)	Initial Reading (cpm)	Final Reading (cpm)	Correction Factor
40k	40,210	40,210	.99
4k	4,081	4,081	.98
400	402	402	1.00
100	101	101	.99
40	41	41	.98

Source Activity			Meter Indication		Efficiency (%)
Alpha (2π)	15,829	dpm	~~15~~ 4484	(ncpm)	28.33
Beta (2π)	80,961	dpm	30169	(ncpm)	37.26

Remarks:
This calibration is Traceable to the National Institute of Standards and Technology. Set up Response Test Range Prior to initial use. As found readings were within specifications. No high voltage plateau performed. Calibrated with Probe SN: 136363.

Date of next calibration: 11 DEC 99.

Performed By: Al Perrella — Reviewed By: [signature]

Report Number: 061599129468

EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 11/28/98
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**926**
Program Version	E600 V3.09
Calibration Date	12/30/97
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.9048
Lower Threshold Intercept	-0.0857 mV
Upper Threshold Slope	1.08
Upper Threshold Intercept	-0.5926 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723416**
Type	SPA-8
Calibration Date	11/28/98
Calibration Due Date	05/26/99
Dead Time	12.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0041 R/hr	3 .30%	Pass
0.0004 R/hr	0.0004 R/hr	9.69%	Pass
1.00E-04 R/hr	0.0001 R/hr	8.7%	Pass
4.00E-05 R/hr	3.67E-05 R/hr	8 .31%	Pass

Response Test Range: 11.24 - 16.86 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data: 0.0045, 0.00047, 0.0001, and 0.00004 R/hr respectively.

Date of next calibration: 26 MAY 99.

Performed By: M Pervella

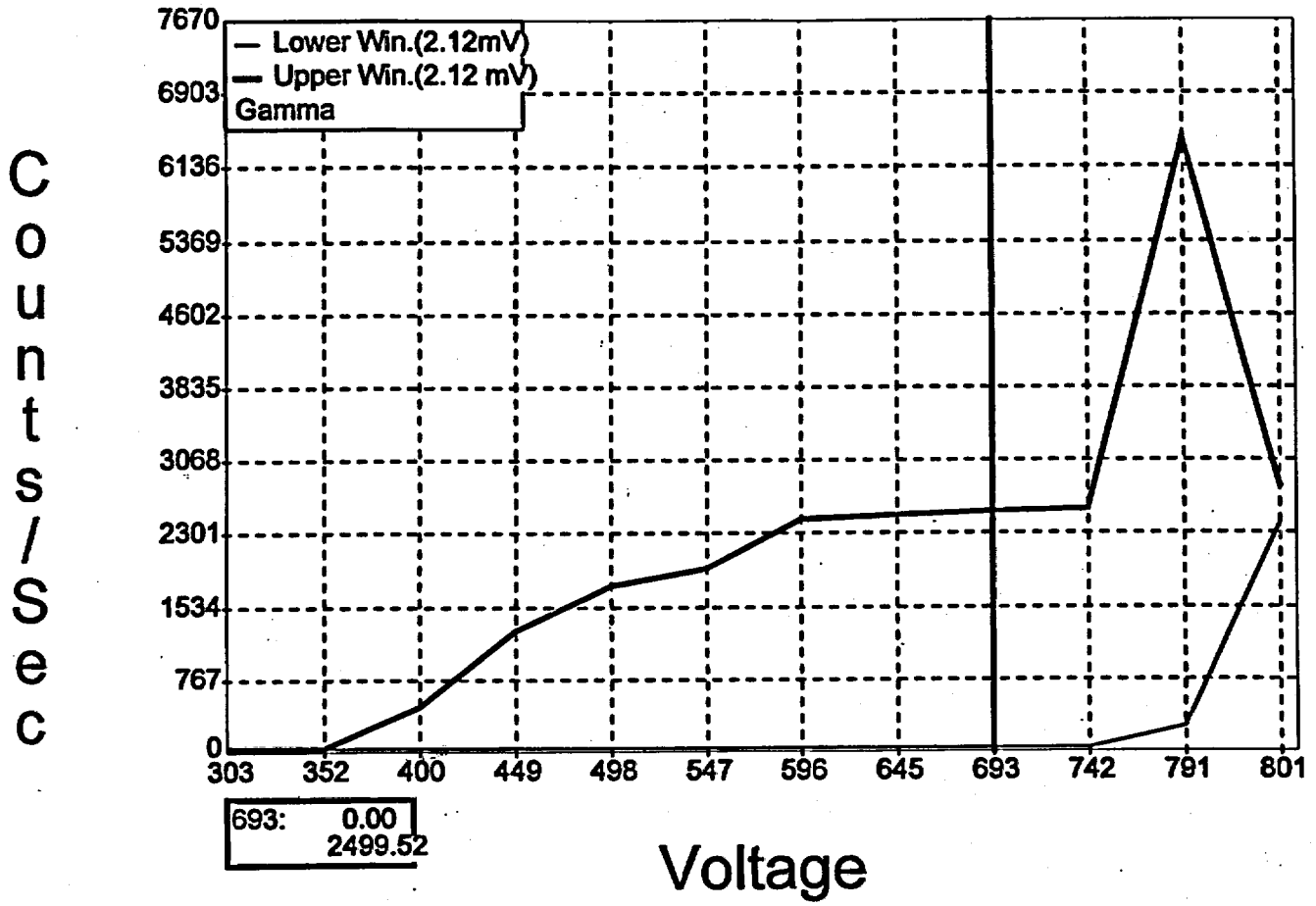
Reviewed By: [signature]

Report number: 112898723416

723416.GRF

SPA-8 723416
Voltage Plateau Curve

11/28/98



EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 11/12/98
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	02/17/98
Calibration Due Date	02/17/99
Scaler Precision	10%
Lower Threshold Slope	0.9048
Lower Threshold Intercept	-0.1524 mV
Upper Threshold Slope	0.9222
Upper Threshold Intercept	-0.7556 mV
Alarm Editing	Disabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Enabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723413**
Type	S-SPA-8
Calibration Date	11/12/98
Calibration Due Date	05/10/99
Dead Time	18.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0042 R/hr	4.73%	Pass
0.0004 R/hr	0.0004 R/hr	2.34%	Pass
1.00E-04 R/hr	9.22E-05 R/hr	-7.82%	Pass
4.00E-05 R/hr	4.14E-05 R/hr	3.47%	Pass

Response Test Range: 11.84 - 17.76 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data: 0.0042, 0.00043, 0.00011, and 0.000043 R/hr respectively.

Date of next calibration: 10 MAY 99.

Performed By: [signature]

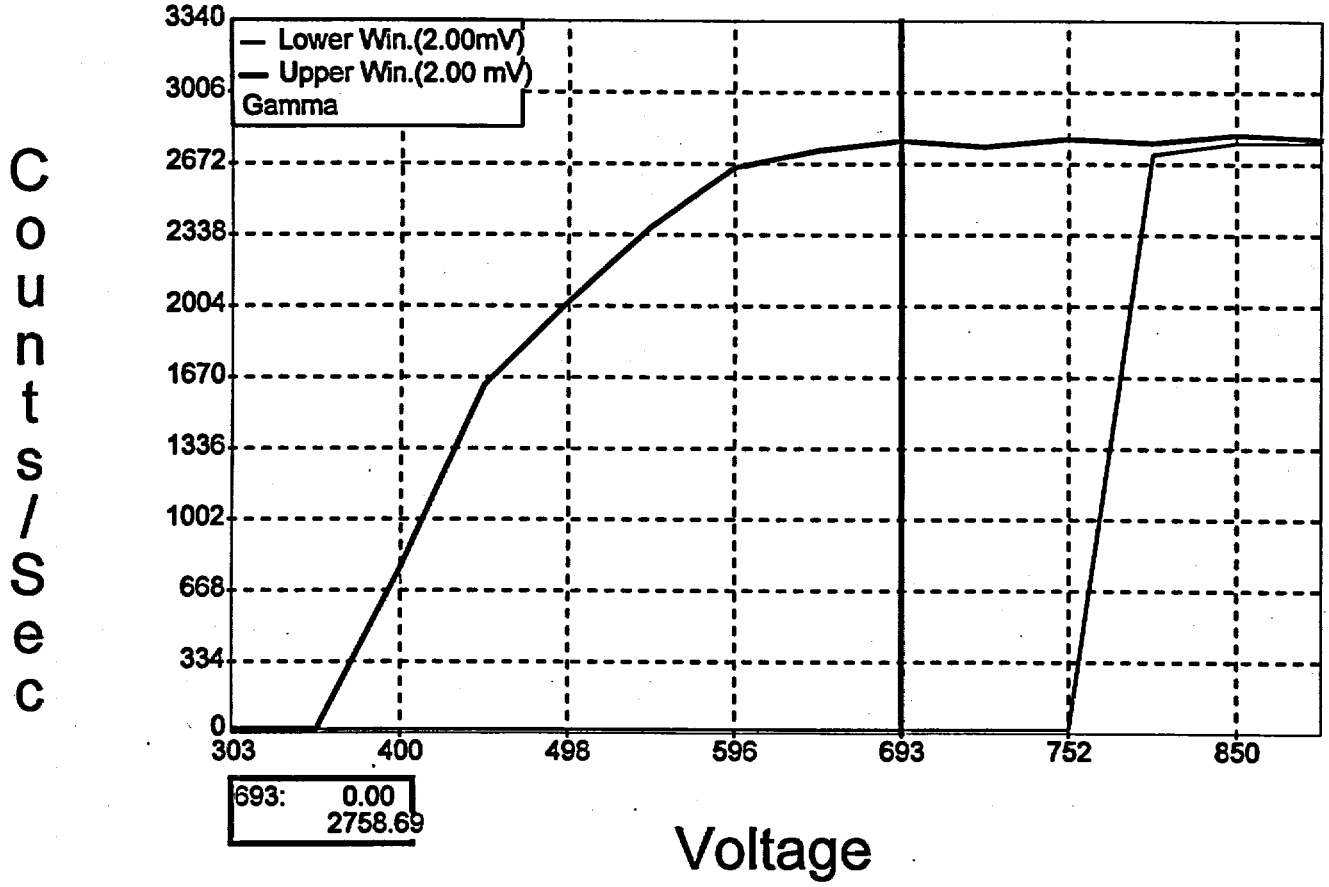
Reviewed By: [signature]

Report number: 11129872341 3

723413.GRF

SPA-8 723413
Voltage Plateau Curve

11/12/98



EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 11/12/98
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**926**
Program Version	E600 V3.09
Calibration Date	11/12/97
Calibration Due Date	12/11/98
Scaler Precision	10%
Lower Threshold Slope	0.9048
Lower Threshold Intercept	-0.0857 mV
Upper Threshold Slope	1.08
Upper Threshold Intercept	-0.5926 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**724038**
Type	SSPA-8
Calibration Date	11/12/98
Calibration Due Date	05/10/99
Dead Time	15.5 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0041 R/hr	2 .61%	Pass
0.0004 R/hr	0.0004 R/hr	0.6698%	Pass
1.00E-04 R/hr	9.18E-05 R/hr	-8.19%	Pass
4.00E-05 R/hr	4.25E-05 R/hr	0.35%	Pass

Response Test Range: 7.13 - 10.69 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data: 0.0043, 0.00042, 0.00011, and 0.000043 R/hr respectively.

Date of next calibration: 10 MAY 99.

Performed By: Al Perella

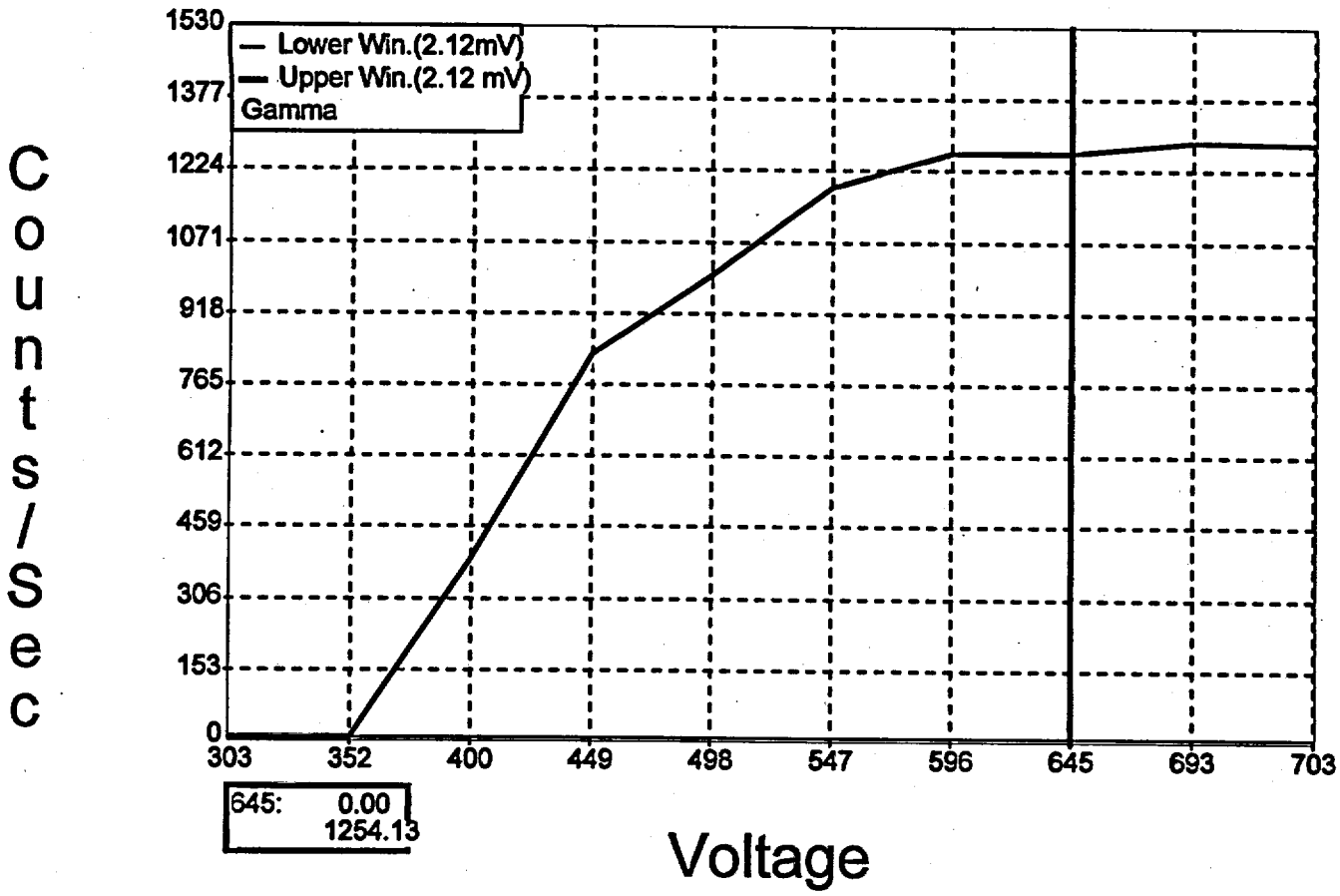
Reviewed By: Burt Cummings

Report number: 111298724038

724038.GRF

11/12/98

SPA-8 724038
Voltage Plateau Curve



EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 07/15/99
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	12/30/98
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.8718
Lower Threshold Intercept	-0.2205 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723412**
Type	S-SPA-8
Calibration Date	07/15/99
Calibration Due Date	01/10/00
Dead Time	22.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	576 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.16E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	576 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.16E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	576 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.16E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0041 R/hr	2 .96%	Pass
0.0004 R/hr	0.0004 R/hr	6.85%	Pass
1.00E-04 R/hr	9.19E-05 R/hr	-8.10%	Pass
4.00E-05 R/hr	3.88E-05 R/hr	3 .04%	Pass

Response Test Range: 8.92 - 13.38 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R.

Performed By: Al Perella

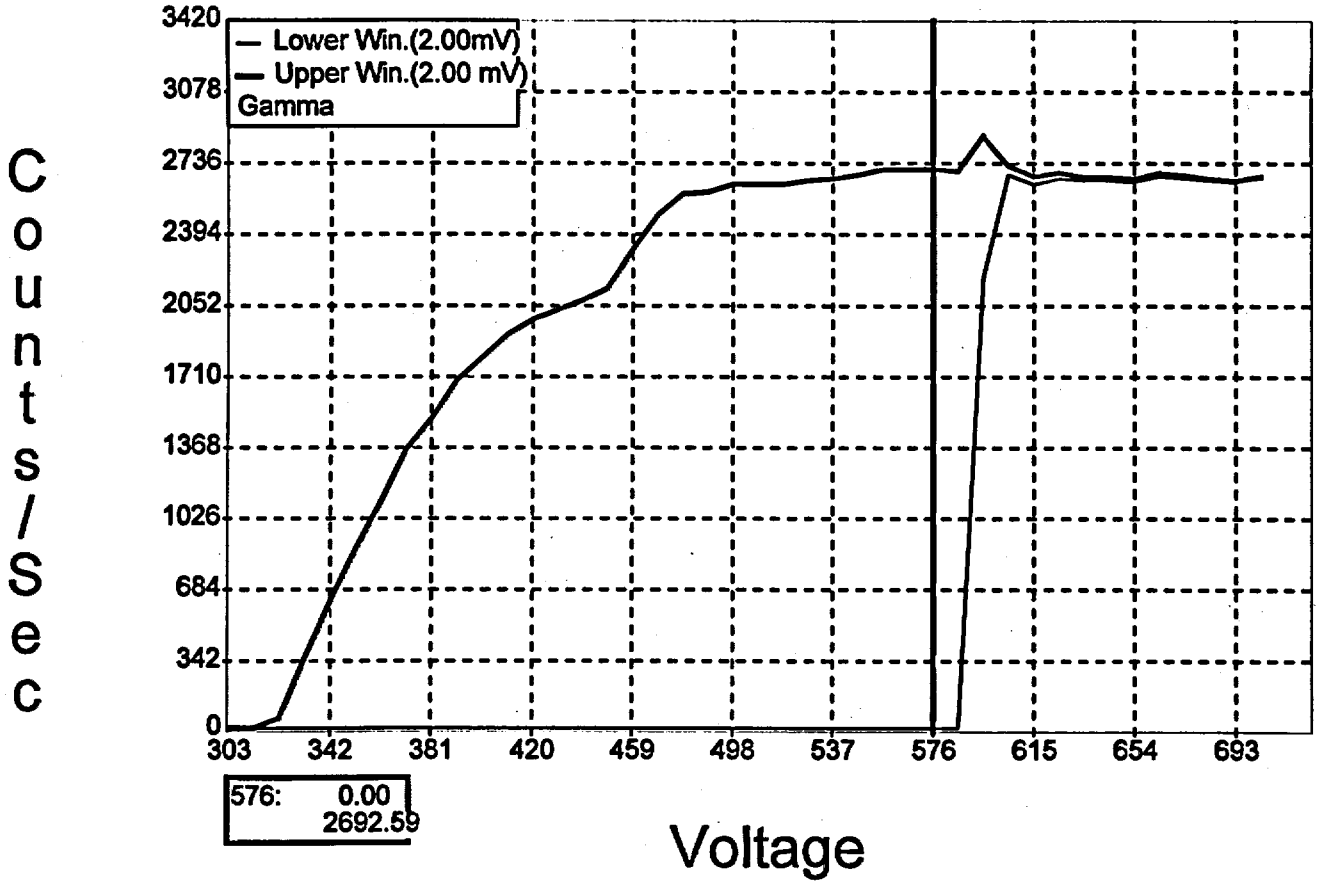
Reviewed By: Cy Dolly

Report number: 071599723412

723412.GRF

07/15/99

SPA-8 723412
Voltage Plateau Curve



EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 07/15/99
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	12/30/98
Calibration Due Date	12/30/00
Scaler Precision	10%
Lower Threshold Slope	0.8718
Lower Threshold Intercept	-0.2205 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723415**
Type	S-SPA-8
Calibration Date	07/15/99
Calibration Due Date	01/10/00
Dead Time	22.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	596 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.18E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	596 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	596 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0040 R/hr	1 .07%	Pass
0.0004 R/hr	0.0004 R/hr	3.42%	Pass
1.00E-04 R/hr	9.06E-05 R/hr	-9.37%	Pass
4.00E-05 R/hr	3.98E-05 R/hr	0 .5547%	Pass

Response Test Range: 8.13 - 12.20 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS -99R .

Performed By: Al Perrella

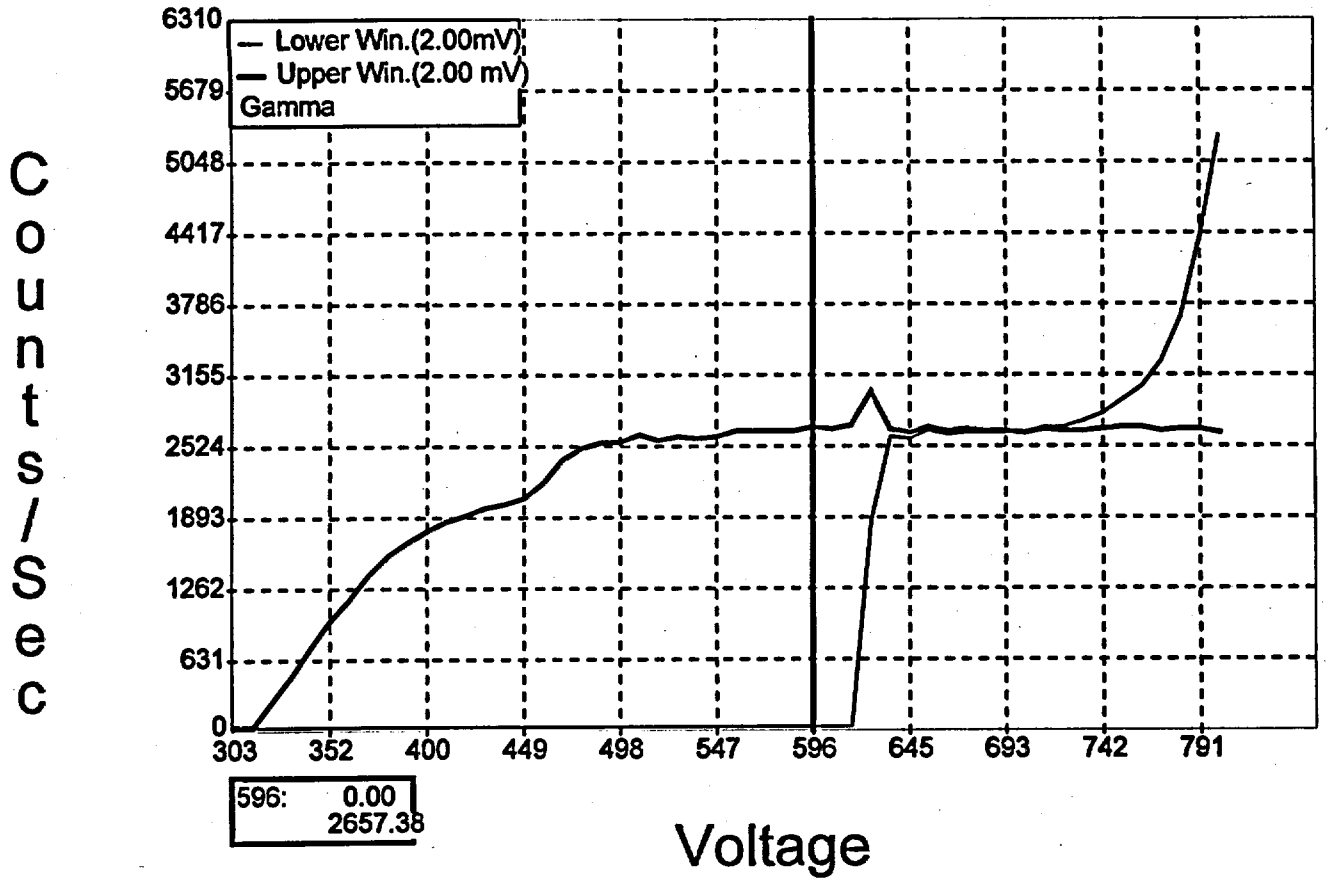
Reviewed By: CJ Holly

Report number: 071599723415

723415.GRF

07/15/99

SPA-8 723415
Voltage Plateau Curve



EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 05/11/99
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**926**
Program Version	E600 V3.09
Calibration Date	01/01/99
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.9048
Lower Threshold Intercept	-0.0857 mV
Upper Threshold Slope	1.08
Upper Threshold Intercept	-0.5926 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723416**
Type	S-SPA-8
Calibration Date	05/11/99
Calibration Due Date	11/06/99
Dead Time	12.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	10 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0040 R/hr	3.17%	Pass
0.0004 R/hr	0.0004 R/hr	6.54%	Pass
1.00E-04 R/hr	9.81E-05 R/hr	-1.93%	Pass
4.00E-05 R/hr	3.90E-05 R/hr	-2.61%	Pass

Response Test Range: 11.24 - 16.86 μR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data within specifications. No high voltage plateau performed.

Date of next calibration: 6 NOV 99.

Performed By: Al Perelle

Reviewed By: Bud Kennedy

Report number: 05119972341 6

EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 05/11/99
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**951**
Program Version	E600 V3.09
Calibration Date	12/01/98
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.8205
Lower Threshold Intercept	-0.1487 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Disabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**724038**
Type	SSPA-8
Calibration Date	05/11/99
Calibration Due Date	11/06/99
Dead Time	15.5 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	645 Vdc
Lower Threshold	2.12 mV
Upper Threshold	2.12 mV
Selected Window	Upper
Upper Cal. Constant	1.06E+10 counts/R
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0044 R/hr	9 .80%	Pass
0.0004 R/hr	0.0004 R/hr	8.73%	Pass
1.00E-04 R/hr	9.29E-05 R/hr	-7.14%	Pass
4.00E-05 R/hr	3.95E-05 R/hr	-1.17%	Pass

Response Test Range: 7.13 - 10.69 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data within specifications. No high voltage plateau performed.

Date of next calibration: 6 NOV 99.

Performed By: W Pevella

Reviewed By: Bud Lemming

Report number: 051199724038

EBERLINE SPA-8 CALIBRATIONIBRATION REPORT

Date: 05/11/99
Standard: Model 81
SN: 7140

OUIC: W4GV91
Isotope: Cs-137
Type of Calibration: Source

E-600 Serial Number	**1358**
Program Version	E600 V3.09
Calibration Date	12/31/98
Calibration Due Date	12/31/99
Scaler Precision	10%
Lower Threshold Slope	0.8810
Lower Threshold Intercept	-0.1905 mV
Upper Threshold Slope	0.9222
Upper Threshold Intercept	-0.8889 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**723413**
Type	S-SPA-8
Calibration Date	05/11/99
Calibration Due Date	11/06/99
Dead Time	18.0 usec
Surface Area	5.00 cm2
Max High Voltage	1500 Vdc
Overrange	45000 cps

Channel 1	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 2	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0
Channel 3	
Channel Type	Gamma
Rate Units	R/hr
Response Times	20,10,3 secs
High Voltage	693 Vdc
Lower Threshold	2.00 mV
Upper Threshold	2.00 mV
Selected Window	Upper
Upper Cal. Constant	1.00E+10 counts/R
Scaler Time	120 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.0

Gamma Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
0.0040 R/hr	0.0042 R/hr	6.24%	Pass
0.0004 R/hr	0.0004 R/hr	7.07%	Pass
1.00E-04 R/hr	9.28E-05 R/hr	-7.19%	Pass
4.00E-05 R/hr	4.07E-05 R/hr	1.74%	Pass

Response Test Range: 11.84 - 17.76 µR/hr (BKG CORRECTED)

Remarks:
This calibration is traceable to the National Institute of Standards and Technology.
Response tested with Cs-137, SN: CS-99R. As found data within specifications. No high voltage plateau performed.

Date of next calibration: 6 NOV 99.

Performed By: Al Perrella

Reviewed By: [signature]

Report number: 05119972341 3

EBERLINE SHP-380AB CALIBRATION REPORT

Date: 03/01/99 Detector SN: 579 Detector Type: Scintillation
Type of Calibration: Source OUIC: W4GV91

Standards:
Isotope: Pu-239 Model: AN/UDM-6 Serial Number: A0026
Isotope: Tc-99 Model: DNS-19 Serial Number: TC-01

E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	12/30/97
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.8718
Lower Threshold Intercept	-0.2205 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**579**
Type	SHP380AB
Calibration Date	03/01/99
Calibration Due Date	08/27/99
Dead Time	8.00 usec
Surface Area	100 cm2
Max High Voltage	1000 Vdc
Overrange	80000 cps

Channel 1	
Channel Type	Alpha
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	703 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Upper
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2323
Channel 2	
Channel Type	Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	703 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Lower
Lower Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2323
Channel 3	
Channel Type	Alpha/Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	703 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Both
Lower Cal. Constant	1.00 counts/count
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2323

Alpha Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
1.76E+05 cpm	1.73E+05 cpm	-1.79%	Pass
16361 cpm	17018 cpm	4.02%	Pass
1206 cpm	1146 cpm	-4.98%	Pass

Beta Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
1.13E+05 cpm	1.06E+05 cpm	-6.49%	Pass
10516 cpm	10103 cpm	-3.92%	Pass
2316 cpm	2218 cpm	-4.24%	Pass
1586 cpm	1493 cpm	-5.89%	Pass

EFFICIENCY: ALPHA: 28.93% BETA: 15.31%

Remarks:

This Calibration is Traceable to the National Institute of Standards and Technology.
Background values added to source activity for linearity test.
Background values: Alpha: 17 cpm Beta: 1476 cpm

Date of next calibration: 27 AUG 1999

Performed By: Al Perella

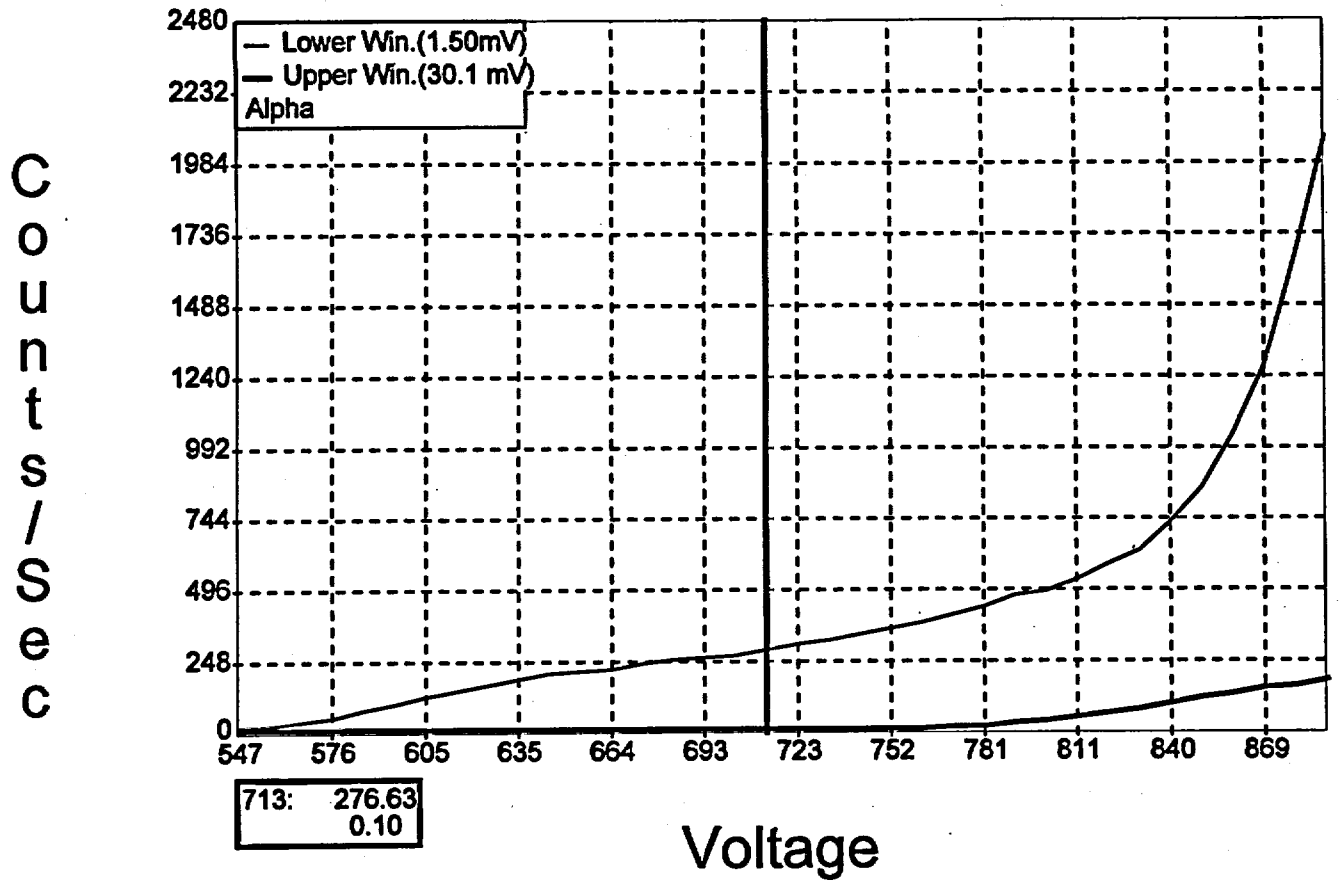
Reviewed By: [illegible]

Report Number: 030199579

579.GRF

SHP 380AB SN: 579
Voltage Plateau Curve

03/01/99



W-641

EBERLINE SHP-380AB CALIBRATION REPORT

Date: 02/26/99 Detector SN: 179 Detector Type: Scintillation
Type of Calibration: Source OUIC: W4GV91

Standards:
Isotope: Pu-239 Model: AN/UDM-6 Serial Number: A0026
Isotope: Tc-99 Model: DNS-19 Serial Number: TC-01

E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	12/30/97
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.8718
Lower Threshold Intercept	-0.2205 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**179**
Type	SHP380
Calibration Date	02/26/99
Calibration Due Date	08/24/99
Dead Time	8.00 usec
Surface Area	100 cm2
Max High Voltage	1000 Vdc
Overrange	80000 cps

Channel 1	
Channel Type	Alpha
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	732 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Upper
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2237
Channel 2	
Channel Type	Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	732 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Lower
Lower Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2237
Channel 3	
Channel Type	Alpha/Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	732 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Both
Lower Cal. Constant	1.00 counts/count
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2237

Alpha Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
1.76E+05 cpm	1.68E+05 cpm	-4.42%	Pass
16358 cpm	15661 cpm	-4.26%	Pass
1203 cpm	1119 cpm	-7.01%	Pass

Beta Channel Linearity Test Results - Pass Tolerance Plus/Minus 10.0%

Field	Response	%Error	Pass/Fail
1.14E+05 cpm	1.09E+05 cpm	-4.07%	Pass
10560 cpm	9698 cpm	-8.16%	Pass
2360 cpm	2161 cpm	-8.42%	Pass
1630 cpm	1648 cpm	1.08%	Pass

EFFICIENCY: ALPHA: 22.37% **BETA:** 16.45%

Remarks:

This Calibration is Traceable to the National Institute of Standards and Technology.
Background values added to source activity for linearity test.
Background values: Alpha: 14 cpm Beta: 1520 cpm

Date of next calibration: 24 AUG 1999

Performed By: Al Perella

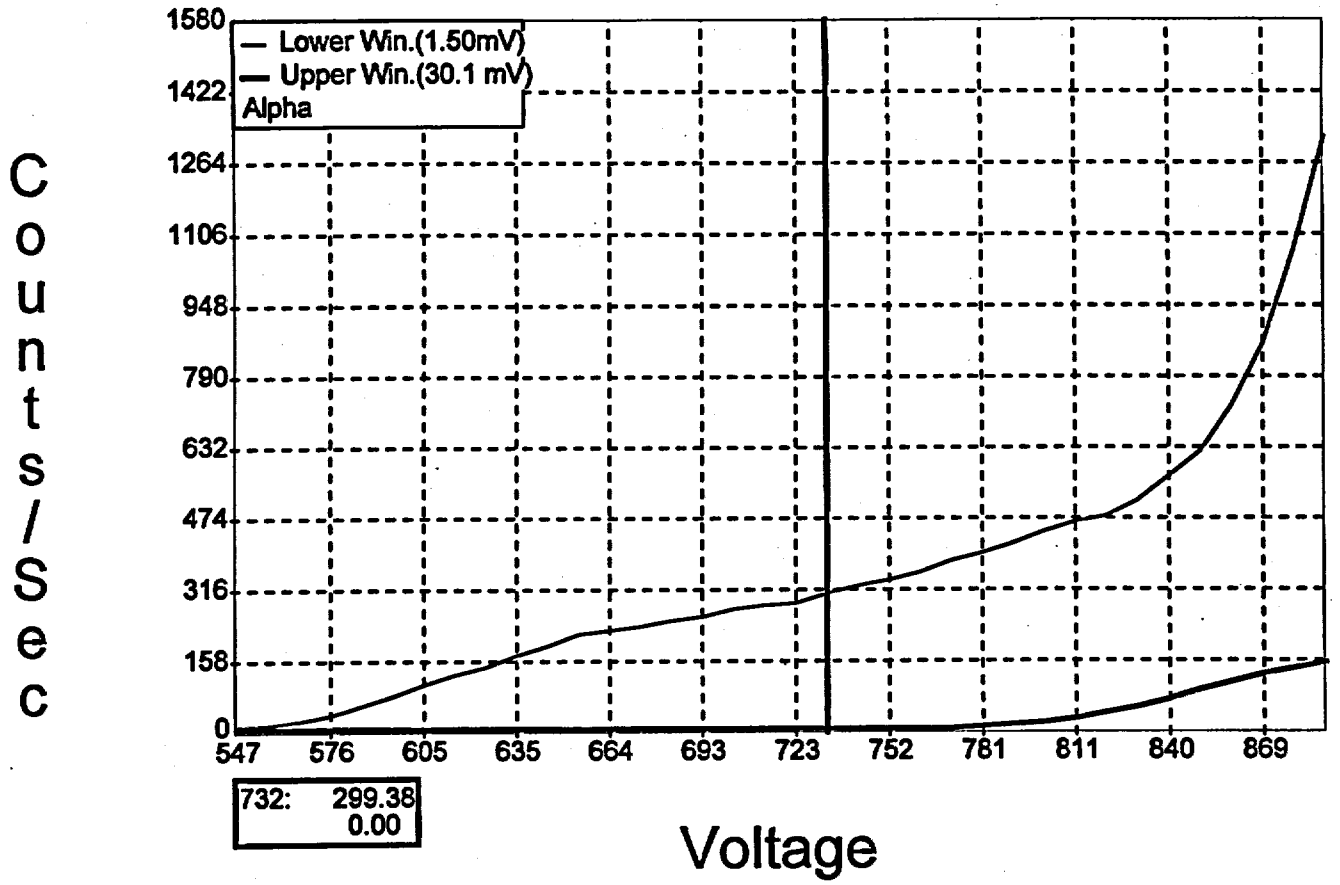
Reviewed By: Bush Cummings

Report Number: 022699179

179.GRF

SHP 380AB SN: 179
Voltage Plateau Curve

02/26/99



EBERLINE SHP-380AB CALIBRATION REPORT

Date: 02/26/99 Detector SN: 605 Detector Type: Scintillation
Type of Calibration: Source OUIC: W4GV91

Standards:
Isotope: Pu-239 Model: AN/UDM-6 Serial Number: A0026
Isotope: Tc-99 Model: DNS-19 Serial Number: TC-01

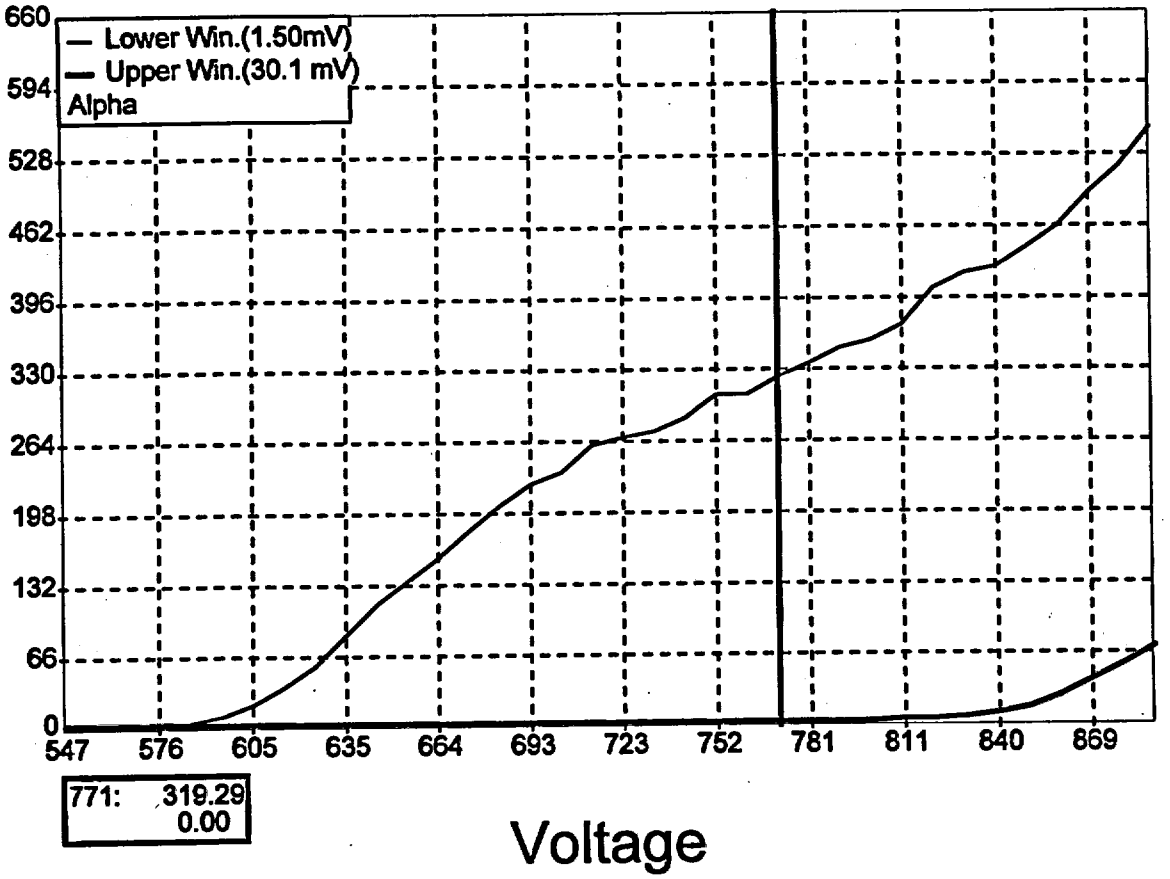
E-600 Serial Number	**921**
Program Version	E600 V3.09
Calibration Date	12/30/97
Calibration Due Date	12/30/99
Scaler Precision	10%
Lower Threshold Slope	0.8718
Lower Threshold Intercept	-0.2205 mV
Upper Threshold Slope	0.9741
Upper Threshold Intercept	-0.6963 mV
Alarm Editing	Enabled
Latching Alarms	Disabled
Auto Ranging	Enabled
Beep on Auto-Range	No
Ignore E-600 Cal. Date	Yes
Ignore Probe Cal. Date	No
Ratemeter Mode Support	Enabled
Integrate Mode Support	Disabled
Scaler Mode Support	Enabled
Peak Hold Mode Support	Disabled
Background Update Mode Support	Disabled
Log ID Source	Internal/Aux.
Star Key Ratemeter Function	Zero Display
Star Key Integrate Function	Zero Display
Scaler Display Units	Dose
Scaler Counting Mode	Fixed Time
Smart Probe Serial Number	**605**
Type	SHP380
Calibration Date	02/26/99
Calibration Due Date	08/24/99
Dead Time	8.00 usec
Surface Area	100 cm2
Max High Voltage	1000 Vdc
Overrange	80000 cps

Channel 1	
Channel Type	Alpha
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	771 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Upper
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2809
Channel 2	
Channel Type	Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	771 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Lower
Lower Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2809
Channel 3	
Channel Type	Alpha/Beta
Rate Units	cpm
Response Times	20,20,20 secs
High Voltage	771 Vdc
Lower Threshold	1.50 mV
Upper Threshold	30.1 mV
Selected Window	Both
Lower Cal. Constant	1.00 counts/count
Upper Cal. Constant	1.00 counts/count
Scaler Time	60 secs
Lower to Upper Crossover	0.0
Upper to Lower Crossover	0.2809

605.GRF

02/26/99

SHP 380AB SN: 605
Voltage Plateau Curve



NRC - Question B

Soil 9006

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.908	0.307	6.657	1.416	5.314	-2.852
S02	2.991	0.390	6.316	1.075	4.574	-3.592
S03	1.491	-1.110	3.403	-1.838	3.737	-4.429
S04	2.595	-0.006	4.459	-0.782	4.936	-3.230
S05	1.918	-0.683	2.295	-2.946	9.037	0.871
S06	2.051	-0.550	3.475	-1.766	3.770	-4.396
S07	1.340	-1.261	2.466	-2.775	5.957	-2.209
S08	1.960	-0.641	4.317	-0.924	7.813	-0.353
S09	2.185	-0.416	4.440	-0.801	8.530	0.364
S10	1.036	-1.565	2.046	-3.195	8.341	0.175

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9010

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.240	-0.361	4.158	-1.083	3.259	-4.907
S02	2.640	0.039	7.105	1.864	7.985	-0.181
S03	1.243	-1.358	4.304	-0.937	5.312	-2.854
S04	1.884	-0.717	3.315	-1.926	4.968	-3.198
S05	1.879	-0.722	5.543	0.302	6.420	-1.746
S06	1.407	-1.194	2.571	-2.670	4.011	-4.155
S07	2.274	-0.327	8.446	3.205	9.205	1.039
S08	2.429	-0.172	4.384	-0.857	5.158	-3.008
S09	1.990	-0.611	2.001	-3.240	6.062	-2.104
S10	2.736	0.135	4.410	-0.831	8.060	-0.106
S11	1.420	-1.181	6.253	1.012	7.470	-0.696
S12	1.197	-1.404	2.665	-2.576	7.761	-0.405
S13	1.244	-1.357	3.308	-1.933	7.121	-1.045
S14	2.455	-0.146	2.406	-2.835	6.953	-1.213
S15	1.503	-1.098	4.278	-0.963	5.415	-2.751
S16	2.181	-0.420	5.649	0.408	6.701	-1.465
S17	2.038	-0.563	15.226	9.985	7.459	-0.707
S18	2.278	-0.323	2.659	-2.582	3.540	-4.626
S19	3.836	1.235	9.851	4.610	6.552	-1.614
S20	2.955	0.354	7.260	2.019	4.372	-3.794

Alpha	Beta	Gamma
2.601	5.241	8.166

Enclosure 2

Encl 2

Contracts/Zone 3_4 data.xls

Soil 9010 (Cont'd)

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S21	4.935	2.334	21.410	16.169	6.151	-2.015
S22	1.623	-0.978	2.707	-2.534	7.140	-1.026
S23	5.895	3.294	16.316	11.075	6.675	-1.491
S24	0.850	-1.751	8.807	3.566	6.390	-1.776
S25	1.683	-0.918	2.630	-2.611	6.253	-1.913
S26	2.786	0.185	6.243	1.002	6.799	-1.367
S27	0.895	-1.706	2.775	-2.466	7.341	-0.825
S28	1.966	-0.635	9.145	3.904	5.056	-3.110
S29	1.606	-0.995	2.790	-2.451	7.656	-0.510
S30	0.625	-1.976	1.701	-3.540	7.630	-0.536
S17E	2.515	-0.086	2.139	-3.102	7.503	-0.663
S17N	3.976	1.375	4.091	-1.150	7.708	-0.458
S17R	3.489	0.888	3.324	-1.917	6.845	-1.321
S17S	2.941	0.340	2.497	-2.744	7.092	-1.074
S17W	2.787	0.186	4.659	-0.582	6.910	-1.256
S20E	1.288	-1.313	0.542	-4.699	4.407	-3.759
S20N	1.290	-1.311	1.534	-3.707	4.441	-3.725
S20R	1.899	-0.702	2.996	-2.245	3.186	-4.980
S20S	0.930	-1.671	0.599	-4.642	3.644	-4.522
S20W	1.839	-0.762	1.903	-3.338	3.127	-5.039
S21E	2.709	0.108	2.946	-2.295	6.812	-1.354
S21N	1.509	-1.092	1.566	-3.675	7.056	-1.110
S21R	0.523	-2.078	1.150	-4.091	6.618	-1.548
S21S	0.910	-1.691	3.133	-2.108	7.326	-0.840
S21W	1.310	-1.291	3.005	-2.236	5.679	-2.487
S23E	3.953	1.352	5.361	0.120	9.691	1.525
S23N	3.746	1.145	3.865	-1.376	9.052	0.886
S23R	3.992	1.391	3.781	-1.460	9.280	1.114
S23S	4.282	1.681	4.182	-1.059	1.033	-7.133
S23W	2.272	-0.329	2.995	-2.246	8.869	0.703

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9011

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	3.420	0.819	3.557	-1.684	7.469	-0.697
S02	0.419	-2.182	3.078	-2.163	6.720	-1.446
S03	2.448	-0.153	2.789	-2.452	5.986	-2.180
S04	2.773	0.172	7.640	2.399	8.528	0.362
S05	2.398	-0.203	3.265	-1.976	4.438	-3.728
S06	2.191	-0.410	3.909	-1.332	7.921	-0.245
S07	4.219	1.618	5.080	-0.161	5.160	-3.006
S08	1.469	-1.132	4.892	-0.349	6.284	-1.882
S09	1.795	-0.806	2.653	-2.588	6.005	-2.161
S10	2.665	0.064	2.730	-2.511	4.721	-3.445

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9011A

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.531	-0.070	10.809	5.568	8.499	0.333
S02	6.203	3.602	23.318	18.077	7.670	-0.496
S03	5.759	3.158	22.648	17.407	7.397	-0.769
S04	2.862	0.261	2.878	-2.363	7.657	-0.509
S05	4.703	2.102	17.367	12.126	9.929	1.763
S06	1.246	-1.355	2.309	-2.932	7.093	-1.073
S07	2.058	-0.543	4.287	-0.954	6.191	-1.975
S08	3.269	0.668	3.751	-1.490	1.001	-7.165
S09	0.457	-2.144	3.025	-2.216	9.885	1.719
S10	1.910	-0.691	5.578	0.337	7.912	-0.254
S11	3.069	0.468	7.274	2.033	9.262	1.096
S12	2.586	-0.015	7.238	1.997	5.829	-2.337
S13	3.617	1.016	9.182	3.941	9.857	1.691

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9032

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	1.471	-1.130	4.561	-0.680	6.920	-1.246
S02	1.474	-1.127	3.840	-1.401	8.523	0.357
S03	3.011	0.410	5.695	0.454	7.413	-0.753
S04	1.971	-0.630	3.679	-1.562	5.674	-2.492
S05	2.885	0.284	2.644	-2.597	6.420	-1.746
S06	1.019	-1.582	3.313	-1.928	5.317	-2.849
S07	2.355	-0.246	1.921	-3.320	6.637	-1.529
S08	2.109	-0.492	3.291	-1.950	8.485	0.319
S09	1.387	-1.214	3.176	-2.065	6.134	-2.032
S10	2.253	-0.348	3.882	-1.359	5.804	-2.362
S11	2.594	-0.007	4.074	-1.167	7.464	-0.702
S12	0.971	-1.630	3.086	-2.155	6.148	-2.018
S13	1.435	-1.166	2.667	-2.574	7.163	-1.003
S14	1.125	-1.476	3.585	-1.656	8.225	0.059
S15	1.774	-0.827	3.561	-1.680	6.229	-1.937
S16	2.527	-0.074	10.703	5.462	7.237	-0.929
S17	2.372	-0.229	8.270	3.029	1.266	-6.900
S18	0.948	-1.653	3.907	-1.334	5.552	-2.614
S19	2.085	-0.516	3.340	-1.901	8.293	0.127
S20	1.325	-1.276	3.903	-1.338	8.863	0.697
S21	2.022	-0.579	6.066	0.825	9.289	1.123
S22	1.947	-0.654	3.874	-1.367	6.094	-2.072
S23	0.501	-2.100	2.949	-2.292	5.386	-2.780
S24	1.809	-0.792	4.076	-1.165	7.478	-0.688
S25	1.432	-1.169	2.902	-2.339	6.509	-1.657
S26	3.114	0.513	6.172	0.931	1.664	-6.502
S27	2.068	-0.533	2.727	-2.514	5.686	-2.480
S28	1.656	-0.945	4.362	-0.879	6.424	-1.742
S29	1.959	-0.642	3.644	-1.597	7.399	-0.767
S30	0.888	-1.713	2.320	-2.921	6.016	-2.150
S31	0.766	-1.835	2.632	-2.609	7.807	-0.359
S32	1.468	-1.133	1.957	-3.284	6.323	-1.843
S33	0.947	-1.654	4.262	-0.979	9.949	1.783
S34	1.444	-1.157	3.248	-1.993	1.424	-6.742

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9036

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	3.647	1.046	21.844	16.603	6.861	-1.305
S02	0.067	-2.534	6.254	1.013	5.878	-2.288
S03	3.798	1.197	6.458	1,217	9.271	1.105
S04	2.110	-0.491	8.377	3.136	9.400	1.234
S05	2.783	0.182	10.122	4.881	1.057	-7.109
S06	5.467	2.866	21.786	16.545	8.478	0.312
S07	2.756	0.155	7.591	2.350	7.184	-0.982
S08	3.913	1.312	4.556	-0.685	1.134	-7.032
S09	4.488	1.887	6.504	1.263	1.160	-7.006
S10	1.235	-1.366	6.785	1.544	1.218	-6.948
S11	2.570	-0.031	5.573	0.332	5.665	-2.501
S12	2.081	-0.520	5.328	0.087	8.852	0.686
S13	2.110	-0.491	3.032	-2.209	7.159	-1.007
S14	3.637	1.036	21.253	16.012	1.550	-6.616
S15	5.578	2.977	18.480	13.239	4.104	-4.062
S16	2.416	-0.185	6.811	1.570	7.400	-0.766
S17	2.733	0.132	8.057	2.816	7.020	-1.146
S18	2.576	-0.025	5.589	0.348	2.305	-5.861
S19	2.984	0.383	4.544	-0.697	7.460	-0.706
S20	3.969	1.368	12.730	7.489	1.048	-7.118
S21	1.932	-0.669	7.977	2.736	8.924	0.758
S22	2.329	-0.272	7.833	2.592	1.077	-7.089
S23	2.227	-0.374	4.551	-0.690	1.091	-7.075
S24	7.250	4.649	15.700	10.459	6.958	-1.208
S25	2.452	-0.149	2.770	-2.471	7.807	-0.359
S26	0.735	-1.866	2.480	-2.761	1.014	-7.152
S27	1.780	-0.821	5.099	-0.142	1.046	-7.120
S28	2.774	0.173	2.784	-2.457	8.098	-0.068
S01E	2.222	-0.379	2.309	-2.932	6.225	-1.941
S01N	1.895	-0.706	2.111	-3.130	6.270	-1.896
S01R	1.412	-1.189	2.588	-2.653	5.753	-2.413
S01S	1.940	-0.661	4.902	-0.339	7.090	-1.076
S01W	2.554	-0.047	4.203	-1.038	6.433	-1.733
S05E	1.485	-1.116	1.531	-3.710	7.532	-0.634
S05N	1.995	-0.606	2.367	-2.874	8.246	0.080
S05R	3.712	1.111	5.628	0.387	6.812	-1.354

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9036 (Cont'd)

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S05S	1.747	-0.854	1.107	-4.134	5.672	-2.494
S05W	2.971	0.370	3.774	-1.467	7.154	-1.012
S06R	1.619	-0.982	1.746	-3.495	7.472	-0.694
S06W	1.780	-0.821	2.122	-3.119	6.257	-1.909
S14E	6.837	4.236	7.092	1.851	7.996	-0.170
S14N	1.685	-0.916	4.366	-0.875	7.153	-1.013
S14R	2.999	0.398	4.565	-0.676	6.925	-1.241
S14S	4.634	2.033	6.157	0.916	8.397	0.231
S14W	8.481	5.880	15.294	10.053	9.160	0.994
S15E	6.797	4.196	5.417	0.176	8.691	0.525
S15N	4.331	1.730	9.390	4.149	8.956	0.790
S15R	8.523	5.922	7.067	1.826	8.226	0.060
S15S	2.249	-0.352	6.014	0.773	8.525	0.359
S15W	10.055	7.454	9.678	4.437	7.645	-0.521
S20E	8.317	5.716	9.764	4.523	1.203	-6.963
S20N	4.902	2.301	6.022	0.781	7.536	-0.630
S20R	7.095	4.494	6.120	0.879	8.748	0.582
S20S	7.319	4.718	7.467	2.226	1.066	-7.100
S20W	4.416	1.815	4.615	-0.626	7.197	-0.969
S24E	5.988	3.387	7.968	2.727	8.599	0.433
S24N	3.947	1.346	3.724	-1.517	8.160	-0.006
S24R	5.794	3.193	6.319	1.078	7.369	-0.797
S24S	7.760	5.159	4.896	-0.345	9.260	1.094
S24W	6.714	4.113	6.136	0.895	8.842	0.676

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9037

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.528	-0.073	11.155	5.914	8.467	0.301
S02	4.592	1.991	17.958	12.717	9.960	1.794
S03	5.752	3.151	19.167	13.926	6.685	-1.481
S04	3.717	1.116	8.766	3.525	7.005	-1.161
S05	3.197	0.596	4.567	-0.674	5.517	-2.649
S06	3.321	0.720	14.475	9.234	6.040	-2.126

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9037 (Cont'd)

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S07	1.537	-1.064	3.440	-1.801	8.311	0.145
S08	2.081	-0.520	8.458	3.217	7.648	-0.518
S09	4.013	1.412	9.101	3.860	1.163	-7.003
S10	3.350	0.749	8.687	3.446	6.344	-1.822
S11	4.800	2.199	8.778	3.537	1.241	-6.925
S12	4.552	1.951	5.457	0.216	9.258	1.092
S13	4.229	1.628	8.192	2.951	8.987	0.821
S14	2.504	-0.097	6.068	0.827	6.939	-1.227
S15	3.069	0.468	4.839	-0.402	7.123	-1.043
S16	1.981	-0.620	7.782	2.541	9.404	1.238
S17	3.228	0.627	9.196	3.955	1.071	-7.095
S18	2.439	-0.162	6.947	1.706	9.479	1.313
S19	2.479	-0.122	5.213	-0.028	8.026	-0.140
S20	2.491	-0.110	4.755	-0.486	6.350	-1.816
S21	4.074	1.473	3.438	-1.803	8.304	0.138
S22	7.681	5.080	28.732	23.491	4.305	-3.861
S23	1.175	-1.426	4.680	-0.561	2.499	-5.667
S24	2.293	-0.308	4.201	-1.040	7.241	-0.925
S25	0.996	-1.605	4.731	-0.510	8.720	0.554
S26	2.634	0.033	5.591	0.350	7.307	-0.859
S27	1.530	-1.071	3.444	-1.797	8.964	0.798
S28	1.738	-0.863	7.393	2.152	8.208	0.042
S29	3.003	0.402	3.869	-1.372	7.618	-0.548
S30	0.273	-2.328	3.420	-1.821	5.661	-2.505

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9037D

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.534	-0.067	3.713	-1.528	3.808	-4.358
S02	1.922	-0.679	5.240	-0.001	6.126	-2.040
S03	3.165	0.564	6.135	0.894	7.188	-0.978
S04	2.406	-0.195	7.249	2.008	4.393	-3.773
S05	3.045	0.444	4.308	-0.933	7.659	-0.507
S06	2.393	-0.208	3.958	-1.283	6.961	-1.205

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9037D (Cont'd)

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S07	2.982	0.381	5.800	0.559	6.930	-1.236
S08	2.454	-0.147	5.474	0.233	7.759	-0.407
S09	1.778	-0.823	5.919	0.678	7.793	-0.373
S10	2.736	0.135	8.627	3.386	5.661	-2.505
S11	1.223	-1.378	4.874	-0.367	4.119	-4.047
S12	1.551	-1.050	3.695	-1.546	4.361	-3.805
S13	2.518	-0.083	6.917	1.676	4.045	-4.121
S14	2.456	-0.145	4.598	-0.643	3.925	-4.241
S15	3.961	1.360	9.761	4.520	8.744	0.578
S16	3.942	1.341	6.581	1.340	8.554	0.388

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9039

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	5.450	2.849	4.337	-0.904	7.426	-0.740
S02	4.018	1.417	4.035	-1.206	8.828	0.662
S03	4.454	1.853	12.543	7.302	7.385	-0.781
S04	2.460	-0.141	4.451	-0.790	7.841	-0.325
S05	6.909	4.308	8.960	3.719	1.469	-6.697
S06	2.319	-0.282	4.355	-0.886	6.085	-2.081
S07	3.090	0.489	6.123	0.882	7.620	-0.546
S08	4.294	1.693	12.454	7.213	1.216	-6.950
S09	4.090	1.489	5.959	0.718	7.919	-0.247
S10	2.683	0.082	4.246	-0.995	9.297	1.131
S11	3.034	0.433	3.714	-1.527	8.031	-0.135
S12	2.770	0.169	6.625	1.384	8.024	-0.142
S13	2.884	0.283	2.948	-2.293	4.092	-4.074
S14	1.250	-1.351	2.708	-2.533	4.869	-3.297
S15	1.675	-0.926	2.153	-3.088	4.867	-3.279
S16	1.805	-0.796	6.282	1.041	7.904	-0.262
S17	1.959	-0.642	3.311	-1.930	6.223	-1.943
S18	2.569	-0.032	2.480	-2.761	5.111	-3.055
S19	1.666	-0.935	2.218	-3.023	4.064	-4.102
S20	1.690	-0.911	1.741	-3.500	3.191	-4.975

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9039 (Cont'd)

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S21	1.986	-0.615	2.745	-2.496	5.936	-2.230
S22	2.141	-0.460	7.015	1.774	1.140	-7.026
S23	4.535	1.934	6.429	1.188	6.453	-1.713
S24	1.018	-1.583	1.591	-3.650	3.440	-4.726
S25	2.516	-0.085	7.913	2.672	7.185	-0.981
S26	1.464	-1.137	5.877	0.636	6.079	-2.087
S27	1.794	-0.807	5.269	0.028	9.161	0.995
S28	2.783	0.182	7.090	1.849	1.069	-7.097
S29	5.339	2.738	7.076	1.835	1.063	-7.103
S30	4.413	1.812	8.894	3.653	1.267	-6.899
S31	2.041	-0.560	3.962	-1.279	1.062	-7.104
S32	5.050	2.449	6.296	1.055	1.321	-6.845

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9040

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	1.961	-0.640	2.808	-2.433	8.446	0.280
S02	1.752	-0.849	2.328	-2.913	6.953	-1.213
S03	2.385	-0.216	6.460	1.219	5.735	-2.431
S04	1.903	-0.698	3.847	-1.394	5.914	-2.252
S05	2.640	0.039	5.563	0.322	9.624	1.458
S06	2.231	-0.370	4.375	-0.866	6.460	-1.706
S07	1.255	-1.346	2.995	-2.246	6.579	-1.587
S08	3.016	0.415	5.330	0.089	6.559	-1.607
S09	1.993	-0.608	3.005	-2.236	8.781	0.615
S10	2.674	0.073	3.433	-1.808	8.262	0.096

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9041

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	4.253	1.652	8.167	2.926	9.917	1.751
S02	4.605	2.004	12.425	7.184	2.891	-5.275
S03	5.209	2.608	6.496	1.255	5.092	-3.074
S04	1.259	-1.342	4.807	-0.434	9.995	1.829
S05	0.930	-1.671	4.764	-0.477	9.943	1.777
S06	14.432	11.831	25.642	20.401	7.737	-0.429
S07	3.909	1.308	11.597	6.356	1.137	-7.029
S08	9.429	6.828	20.910	15.669	1.145	-7.021
S09	9.288	6.687	19.320	14.079	1.121	-7.045
S10	3.127	0.526	5.932	0.691	1.042	-7.124

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9047

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	6.333	3.732	4.593	-0.648	7.811	-0.355
S02	4.218	1.617	4.760	-0.481	6.937	-1.229
S03	4.107	1.506	7.061	1.820	1.096	-7.070
S04	0.975	-1.626	4.397	-0.844	9.133	0.967
S05	2.457	-0.144	4.022	-1.219	6.318	-1.848
S06	1.198	-1.403	2.436	-2.805	2.111	-6.055
S07	4.170	1.569	2.611	-2.630	9.440	1.274
S08	4.008	1.407	4.383	-0.858	7.975	-0.191
S09	2.751	0.150	4.022	-1.219	8.660	0.494
S10	1.512	-1.089	2.569	-2.672	5.531	-2.635
S11	4.664	2.063	7.737	2.496	1.375	-6.791
S12	2.179	-0.422	2.504	-2.737	1.531	-6.635

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9049

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	3.518	0.917	5.460	0.219	1.476	-6.690
S02	2.352	-0.249	3.157	-2.084	1.146	-7.020
S03	2.641	0.040	4.792	-0.449	6.207	-1.959
S04	2.023	-0.578	3.808	-1.433	4.141	-4.025
S05	1.735	-0.866	2.436	-2.805	7.629	-0.537
S06	3.244	0.643	6.424	1.183	1.204	-6.962
S07	3.391	0.790	5.299	0.058	8.426	0.260
S08	1.367	-1.234	4.911	-0.330	1.227	-6.939
S09	3.615	1.014	4.809	-0.432	8.421	0.255
S10	1.117	-1.484	4.032	-1.209	9.418	1.252

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9051

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.737	0.136	3.434	-1.807	8.110	-0.056
S02	2.190	-0.411	3.704	-1.537	3.818	-4.348
S03	3.767	1.166	6.446	1.205	7.378	-0.788
S04	1.033	-1.568	4.178	-1.063	5.866	-2.300
S05	2.554	-0.047	10.952	5.711	1.141	-7.025
S06	2.683	0.082	5.028	-0.213	9.442	1.276
S07	2.785	0.184	4.284	-0.957	9.699	1.533
S08	3.715	1.114	7.511	2.270	6.419	-1.747
S09	2.257	-0.344	4.353	-0.888	1.942	-6.224
S10	1.373	-1.228	5.149	-0.092	1.854	-6.312
S11	4.284	1.683	5.889	0.648	1.123	-7.043
S12	2.563	-0.038	6.310	1.069	1.310	-6.856
S13	2.979	0.378	5.949	0.708	1.207	-6.959
S14	3.600	0.999	4.924	-0.317	8.519	0.353
S15	1.579	-1.022	3.218	-2.023	6.536	-1.630
S16	3.081	0.480	4.694	-0.547	6.850	-1.316
S17	1.469	-1.132	3.735	-1.506	8.162	-0.004

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9053

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	3.074	0.473	4.026	-1.215	9.135	0.969
S02	3.578	0.977	6.932	1.691	1.081	-7.085
S03	6.137	3.536	7.807	2.566	1.195	-6.971
S04	3.345	0.744	6.814	1.573	9.129	0.963
S05	2.224	-0.377	2.760	-2.481	5.947	-2.219
S06	2.672	0.071	4.545	-0.696	1.251	-6.915
S07	1.794	-0.807	3.734	-1.507	1.857	-6.309
S08	3.151	0.550	4.576	-0.665	1.115	-7.051
S09	1.786	-0.815	3.437	-1.804	7.462	-0.704
S10	5.265	2.664	3.888	-1.353	7.722	-0.444

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9105

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.291	-0.310	3.456	-1.785	7.414	-0.752
S02	2.210	-0.391	3.168	-2.073	8.076	-0.090
S03	2.718	0.117	4.340	-0.901	7.387	-0.779
S04	1.329	-1.272	2.249	-2.992	7.444	-0.722
S05	2.591	-0.010	5.261	0.020	7.366	-0.800
S06	1.355	-1.246	1.702	-3.539	7.805	-0.361
S07	3.217	0.616	1.887	-3.354	5.679	-2.487
S08	2.217	-0.384	2.921	-2.320	7.782	-0.384
S09	1.554	-1.047	4.607	-0.634	1.001	-7.165
S10	1.124	-1.477	2.681	-2.560	9.363	1.197

Alpha	Beta	Gamma
2.601	5.241	8.166

Soil 9400

Grid Number	Gross Alpha pCi/gm	Net Alpha pCi/gm	Gross Beta pCi/gm	Net Beta pCi/gm	Gross Gamma pCi/gm	Net Gamma pCi/gm
S01	2.916	0.315	5.454	0.213	9.000	0.834
S02	2.435	-0.166	4.997	-0.244	6.631	-1.535
S03	3.355	0.754	4.744	-0.497	9.851	1.685
S04	1.163	-1.438	4.167	-1.074	1.013	-7.153
S05	1.618	-0.983	2.539	-2.702	7.928	-0.238
S06	0.515	-2.086	4.100	-1.141	6.034	-2.132
S07	4.755	2.154	3.919	-1.322	7.598	-0.568
S08	2.371	-0.230	4.054	-1.187	6.452	-1.714
S09	4.562	1.961	3.948	-1.293	6.813	-1.353
S10	3.087	0.486	2.666	-2.575	7.182	-0.984
S11	2.556	-0.045	4.412	-0.829	6.421	-1.745
S12	2.032	-0.569	2.469	-2.772	6.753	-1.413
S13	1.797	-0.804	2.422	-2.819	6.958	-1.208
S14	1.047	-1.554	5.344	0.103	8.078	-0.088
S15	1.392	-1.209	2.187	-3.054	7.745	-0.421

Alpha	Beta	Gamma
2.601	5.241	8.166

September 22, 1999

Docket No.	030-05248 030-29741	License No.	29-01022-06 29-01022-14
Control No.	127060 127061		

Joseph M. Santarsiero
Acting Director, Safety Risk Management
Department of the Army
U.S. Army Communications Electronics Command
AMSEL-SF-RER
Ft. Monmouth, NJ 07703-5024

Dear Mr. Santarsiero:

This is in reference to your letter dated July 14, 1999, requesting to amend Nuclear Regulatory Commission License Nos. 29-01022-06 and 29-01022-14. In order to continue our review, we need the following additional information:

1. Table 1 on page 11 in Section 2 provides your release criteria. Row 1 provides your tritium release criterion which is listed as 2000 disintegrations per minute (dpm)/ 100 cm^2 removable. The NRC criterion for release for unrestricted use for removable tritium is 1000 dpm/ 100 cm^2. Please provide a revised release criterion for tritium.

2. Surveys were not performed of the upper walls and ceilings of affected areas. NUREG/CR-5849 methodology would normally require surveys to be performed of the upper walls and ceilings of affected areas, however there are cases where surveys would not be required. Please provide either a detailed justification why surveys would not be required or the surveys.

3. Item 7 of Section 2 listed on page 15 lists the main parking lot as non-impacted. Past experience at numerous decommissioning sites has demonstrated that parking lots regularly can become contaminated at sites where radiological work has been performed over an extended period of time. Please provide your justification for classifying the parking lot as non-impacted or alternatively you could provide surveys of the parking lot.

4. Your submittal provides descriptions of the instruments used and the regular checks performed on them. It however, did not provide the calibration data for these instruments. Please provide the calibration data for the instruments used during your surveys. Also provide all the data on the instruments that were used for the scans.

ML10

5. NUREG/CR-5849 methodology requires reclassification of unaffected areas to affected areas if contamination in excess of 25 percent of the guideline value is identified. Numerous examples where identified during the NRC review of data points in excess of 25 percent of the guideline values were reported for unaffected areas. Some examples are Building 9011D R27, Building 9013 R13, Building 9393 R12, and Building 9043 R025. Please explain your reasoning for this apparent deviation from NUREG/CR-5849 methodology.

6. NUREG/CR-5849 methodology requires a minimum of 30 random sample points for unaffected survey units. A significant fraction of your unaffected survey units have less than 30 samples. Also, the survey units for open land areas are not clearly defined. As presented they appear to also not contain 30 samples per survey unit. Please explain your reasoning for this apparent deviation from NUREG/CR-5849 methodology.

7. The surveys of Building 9053 showed that there was some residual contamination in the sink in room 103. Were any surveys or scans taken of the sink trap for that sink? If so, please include them with your response to this letter.

8. All of the soil data provided in this submittal is in gross form. Please convert this data to net results so that they may be more easily compared with the release criteria.

9. Your September 10, 1999, letter roughly defines an area which is to be excluded from this release request. Please provide a detailed description of the area to be excluded from the release, including a diagram in your response would be very helpful.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I Office and refer to Mail Control Nos. 127060 and 127061. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5256.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

Original signed by Steven W. Shaffer

Steve W. Shaffer
Health Physicist
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

Enclosures:
10 CFR Parts 19, 20, and 30
NUREG/CR-5849

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DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO
ATTENTION OF

September 10, 1999

Directorate of Safety
Risk Management

U. S. Nuclear Regulatory Commission
Region 1
Attention: Mail Control #127060
(Mr. Steven Shaffer)
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Dear Mr. Shaffer:

This refers to U.S. Nuclear Regulatory Commission (NRC) License Number 29-01022-06, Docket Number 030-05248, our letter of September 1, 1999, and to the September 8, 1999 telephone conversation between the undersigned and your Mr. Steven Shaffer.

To allow us to complete remediation efforts of the Zone 4A fenced compound, all Low Level Radioactive Waste (LLRW) will be moved onto Zone 4, on the asphalt area between the intersection of 6th Street and Avenues B and C. LLRW will be packaged in their shipping containers for ultimate disposal. We have submitted our amendment request to referenced NRC license, under separate cover, for authorization to temporary store LLRW at this location.

Based upon the above, we are requesting that you continue to review the Report, Radiological Status Survey of Buildings, Sewer System, and Soil in Survey Zone Three and Four at Evans Area, Fort Monmouth, New Jersey, provided to you on July 14, 1999.

We will address the aforementioned asphalt area, in an addendum to the above report, once the LLRW is shipped for disposal. The addendum to the report will follow shortly thereafter.

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127060
SEP 13 1999

If we can provide you with anything further in this matter our point of contact is Mr. Richard Lovell, or the undersigned, on Voice (732) 427-4427/3112; or Facsimile (732) 532-6403 or (732) 542-7161.

Sincerely,

Joseph M. Santarsiero

JOSEPH M. SANTARSIERO
Acting Director, Safety Risk
Management

Copy Furnished:

Commander, U.S. Army Materiel Command, ATTN: AMCSF-P,
5001 Eisenhower Avenue, Alexandria, Virginia 22333-0001

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO
ATTENTION OF

September 1, 1999

Directorate of Safety
Risk Management

U. S. Nuclear Regulatory Commission
Region 1
Attention: Mail Control #127060
(Mr. Steven Shaffer)
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Dear Mr. Shaffer:

This refers to U.S. Nuclear Regulatory Commission (NRC) License Number 29-01022-06, Docket Number 030-05248, and to the August 23, 1999 telephone conversation between Messrs. Craig Miller and Steven A. Horne, IceSolv Inc., contracted to the Directorate of Safety Risk Management, and your Mr. Steven Shaffer.

We are in the process of requesting an amendment to the above NRC license to allow for the temporary storage of Low Level Radioactive Waste (LLRW) accumulated as a result of remediation efforts in support of the Base Realignment and Closure (BRAC) activities of the Evans Area. The LLRW accumulated, i.e., construction debris, is to be stored outside of the Zone 4A fenced compound, in order to allow us the ability to complete final status surveys of Zone 4A.

We propose to place all LLRW into Zone 4, on a grass-covered field on the Northwest corner at the intersection of Avenue B and 6th Street. All LLRW will be packaged in their shipping containers for ultimate disposal.

Based upon the above, we are requesting that you continue to review the Report, Radiological Status Survey of Buildings, Sewer System, and Soil in Survey Zone Three and Four at Evans Area, Fort Monmouth, New Jersey.

127060
SEP - 7 1999

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We will address the above field located on the Northwest of the intersection of 6th Street and Avenue B, Zone 4, in an addendum to the above report, once the LLRW is shipped to its final disposal site. The addendum to the report will follow shortly thereafter. Please note that this field was originally classified as Non-impacted, and thus was not surveyed or addressed in the above report.

If we can provide you with anything further in this matter our point of contact is Mr. Richard Lovell, or the undersigned, on Voice (732) 427-4427/3112; or Facsimile (732) 532-6403 or (732) 542-7161.

Sincerely,

Joseph M. Santarsiero

JOSEPH M. SANTARSIERO
Acting Director, Safety Risk Management

Copy Furnished:

Commander, U.S. Army Materiel Command, ATTN: AMCSF-P, 5001 Eisenhower Avenue, Alexandria, Virginia 22333-0001

This is to acknowledge the receipt of your letter/application dated

7-14-99, and to inform you that the initial processing which includes an administrative review has been performed.

☒ Amend. 29-01022-06 There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

_____.

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned Mail Control Number 127060.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader