

## Survey Unit 5-554B2, Class 1

alpha eff.	beta eff.
0.3559	0.2437

Sample Count Time (min)	Background Count Time (min)
1.0	20.0

alpha eff.	beta eff.
0.3487	0.1815

Sample Count Time (min)	Background Count Time (min)
1.0	20.0

alpha eff.	beta eff.
0.3588	0.2849

Sample Count Time (min)	Background Count Time (min)
1.0	20.0

Survey Unit 5-554B2													
ID	Date	Background Counts		Sample Counts		Background cpm		Sample cpm		Sample (dpm/100 cm <sup>2</sup> )			
		alpha	beta	alpha	beta	alpha	beta	alpha	beta	alpha	beta		
1	554-B2 - 1	11/6/2007	3	619	0	27	0.2	31.0	0.00	27	-0.4	-22	
2	554-B2 - 2	11/6/2007	3	619	2	33	0.2	31.0	2.00	33	5.3	11	
3	554-B2 - 3	11/6/2007	3	619	3	26	0.2	31.0	3.00	26	8.2	-27	
4	554-B2 - 4	11/6/2007	3	619	0	27	0.2	31.0	0.00	27	-0.4	-22	
5	554-B2 - 5	11/6/2007	3	619	0	32	0.2	31.0	0.00	32	-0.4	6	
6	554-B2 - 6	11/6/2007	3	619	0	36	0.2	31.0	0.00	36	-0.4	28	
7	554-B2 - 7	11/6/2007	3	619	0	27	0.2	31.0	0.00	27	-0.4	-22	
8	554-B2 - 8	11/6/2007	3	619	0	20	0.2	31.0	0.00	20	-0.4	-60	
9	554-B2 - 9	11/6/2007	3	619	0	28	0.2	31.0	0.00	28	-0.4	-16	
10	554-B2 - 10	11/6/2007	3	619	0	39	0.2	31.0	0.00	39	-0.4	44	
11	554-B2 - 11	11/6/2007	3	619	0	30	0.2	31.0	0.00	30	-0.4	-5	
12	554-B2 - 12	11/6/2007	3	619	0	33	0.2	31.0	0.00	33	-0.4	11	
13	554-B2 - 13	11/6/2007	3	619	0	35	0.2	31.0	0.00	35	-0.4	22	
14	554-B2 - 14	11/6/2007	3	619	0	30	0.2	31.0	0.00	30	-0.4	-5	
15	554-B2 - 15	11/6/2007	3	619	0	35	0.2	31.0	0.00	35	-0.4	22	
16	554-B2 - 16	11/6/2007	3	619	0	25	0.2	31.0	0.00	25	-0.4	-33	
17	554-B2 - 17	11/6/2007	3	619	0	34	0.2	31.0	0.00	34	-0.4	17	
											Mean	0.4	-3.0
											Median	-0.4	-5.2
											SD	2.4	26.6
											Minimum	-0.4	-60.3
											Maximum	8.2	44.4

## Survey Unit 5-554V, Class 1

Instrument and Survey Information - Spring 2007 Survey

alpha eff.	beta eff.
0.3559	0.2437

Sample Count Time (min)	1.0
Background Count Time (min)	20.0

Instrument and Survey Information - Fall 2007 Survey

alpha eff.	beta eff.
0.3487	0.1815

Sample Count Time (min)	Background Count Time (min)
1.0	20.0

Instrument and Survey Information - Spring 2008 Survey

alpha eff.	beta eff.
0.3588	0.2849

Sample Count Time (min)	Background Count Time (min)
1.0	20.0

Removable Limit	20
alpha dpm/100 cm <sup>2</sup>	

Removable Limit beta dpm/100 cm <sup>2</sup>	200
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# Survey Unit 5-554V

Survey Count 3-554V

	ID	Date	Background Counts		Sample Counts		Background cpm		Sample cpm		Sample (dpm/100 cm <sup>2</sup> )		
			alpha	beta	alpha	beta	alpha	beta	alpha	beta	alpha	beta	
1	5-554V-1	3/22/2007	1	787	0	35	0.1	39.4	0.00	35	-0.1	-18	
2	5-554V-2	3/22/2007	1	787	1	33	0.1	39.4	1.00	33	2.7	-26	
3	5-554V-3	3/22/2007	1	787	0	37	0.1	39.4	0.00	37	-0.1	-10	
4	5-554V-4	3/22/2007	1	787	0	30	0.1	39.4	0.00	30	-0.1	-38	
5	5-554V-5	3/22/2007	1	787	0	42	0.1	39.4	0.00	42	-0.1	11	
6	5-554V-6	3/22/2007	1	787	0	30	0.1	39.4	0.00	30	-0.1	-38	
7	5-554V-7	3/22/2007	1	787	1	43	0.1	39.4	1.00	43	2.7	15	
8	5-554V-8	3/22/2007	1	787	0	33	0.1	39.4	0.00	33	-0.1	-26	
9	5-554V-9	3/22/2007	1	787	0	37	0.1	39.4	0.00	37	-0.1	-10	
10	5-554V-10	3/22/2007	1	787	0	36	0.1	39.4	0.00	36	-0.1	-14	
11	5-554V-11	3/22/2007	1	787	0	29	0.1	39.4	0.00	29	-0.1	-42	
12	5-554V-12	3/22/2007	1	787	0	32	0.1	39.4	0.00	32	-0.1	-30	
13	5-554V-13	3/22/2007	1	787	1	35	0.1	39.4	1.00	35	2.7	-18	
14	5-554V-14	3/22/2007	1	787	0	41	0.1	39.4	0.00	41	-0.1	7	
15	5-554V-15	3/22/2007	1	787	1	26	0.1	39.4	1.00	26	2.7	-55	
16	5-554V-16	3/22/2007	1	787	0	48	0.1	39.4	0.00	48	-0.1	35	
17	5-554V-17	3/22/2007	1	787	0	41	0.1	39.4	0.00	41	-0.1	7	
18	5-554V-18	3/22/2007	1	787	0	36	0.1	39.4	0.00	36	-0.1	-14	
19	5-554V-19	3/22/2007	1	787	0	34	0.1	39.4	0.00	34	-0.1	-22	
											Mean	0.5	-15.0
											Median	-0.1	-17.8
											SD	1.2	22.5
											Minimum	-0.1	-54.8
											Maximum	2.7	35.5

# Survey Unit 5-559G, Class 1

## Instrument and Survey Information - Spring 2007 Survey

alpha eff.	beta eff.
0.3559	0.2437

Sample Count Time (min)	1.0
Background Count Time (min)	20.0

alpha eff.	beta eff.
0.3487	0.1815

Sample Count Time (min)	1.0	Background Count Time (min)	20.0
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Instrument and Survey Information	alpha eff.	beta eff.
	0.3588	0.2849

2008 Survey	
Sample Count Time (min)	Background Count Time (min)
1.0	20.0

Removable Limit	20
alpha dpm/100 cm <sup>2</sup>	

Removable Limit beta dpm/100 cm <sup>2</sup>	200
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**Survey Unit 5-559G**

	ID	Date	Background Counts		Sample Counts		Background cpm		Sample cpm		Sample (dpm/100 cm <sup>2</sup> )	
			alpha	beta	alpha	beta	alpha	beta	alpha	beta	alpha	beta
1	5-559G-1	4/2/2008	9	1615	0	63	0.5	80.8	0.00	63	-1.3	-62
2	5-559G-2	4/2/2008	9	1615	0	59	0.5	80.8	0.00	59	-1.3	-76
3	5-559G-3	4/2/2008	9	1615	0	82	0.5	80.8	0.00	82	-1.3	4
4	5-559G-4	4/2/2008	9	1615	0	65	0.5	80.8	0.00	65	-1.3	-55
5	5-559G-5	4/2/2008	9	1615	0	88	0.5	80.8	0.00	88	-1.3	25
6	5-559G-6	4/2/2008	9	1615	1	45	0.5	80.8	1.00	45	1.5	-125
7	5-559G-7	4/2/2008	9	1615	0	78	0.5	80.8	0.00	78	-1.3	-10
8	5-559G-8	4/2/2008	9	1615	0	68	0.5	80.8	0.00	68	-1.3	-45
9	5-559G-9	4/2/2008	9	1615	1	77	0.5	80.8	1.00	77	1.5	-13
10	5-559G-10	4/2/2008	9	1615	0	82	0.5	80.8	0.00	82	-1.3	4
11	5-559G-11	4/2/2008	9	1615	0	61	0.5	80.8	0.00	61	-1.3	-69
12	5-559G-12	4/2/2008	9	1615	1	58	0.5	80.8	1.00	58	1.5	-80
13	5-559G-13	4/2/2008	9	1615	0	66	0.5	80.8	0.00	66	-1.3	-52
14	5-559G-14	4/2/2008	9	1615	1	72	0.5	80.8	1.00	72	1.5	-31
15	5-559G-15	4/2/2008	9	1615	0	55	0.5	80.8	0.00	55	-1.3	-90
16	5-559G-16	4/2/2008	9	1615	1	70	0.5	80.8	1.00	70	1.5	-38
17	5-559G-17	4/2/2008	9	1615	0	72	0.5	80.8	0.00	72	-1.3	-31

# Material Specific Background Measurements for Systematic Point Comparison

Instrument / Probe	Square Cinder Block (SC)	Cinder Block (CB)	Asbestos Floor Tile (AT)	Composite Floor Tile (CP)	Metal (ME)	Brick (BR)	Ceramic Floor Tile (CF)	Ceramic Wall Tile (CW)	Ceiling Tile (CT)
Ludlum 2224 / 43-68	2	1	2	1	2	2	1	14	0
183048 / PR161781	2	1	2	1	1	0	1	14	0
	1	3	3	2	0	1	1	10	2
	1	1	0	0	1	0	1	7	1
	0	0	5	0	2	0	1	7	0
	N/A	0	2	0	1	N/A	N/A	N/A	4
	N/A	1	1	2	0	N/A	N/A	N/A	1
	N/A	2	0	1	0	N/A	N/A	N/A	1
	N/A	1	0	0	0	N/A	N/A	N/A	4
	N/A	1	3	0	0	N/A	N/A	N/A	2
Mean	1.2	1.1	1.8	0.7	0.7	0.6	1.0	10.4	1.5
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	1.0	7.0	0.0
Maximum	2.0	3.0	5.0	2.0	2.0	2.0	1.0	14.0	4.0
Std Dev (cpm, 1s)	0.8	0.9	1.6	0.8	0.8	0.9	0.0	3.5	1.5

Background Summary

Material	Bkg. Avg. cpm
SC	1.2
CB	1.1
AT	1.8
CP	0.7
ME	0.7
BR	0.6
CF	1.0

Measured Beta Background Count Rates for Various Surfaces

All values reported in counts per minute (cpm)

Instrument / Probe	Square Cinder Block (SC)	Cinder Block (CB)	Asbestos Floor Tile (AT)	Composite Floor Tile (CP)	Metal (ME)	Brick (BR)	Ceramic Floor Tile (CF)	Ceramic Wall Tile (CW)	Ceiling Tile (CT)
Ludlum 2224 / 43-68	298	231	166	176	140	220	284	380	283
183048 / PR161781	305	236	170	155	125	208	286	368	285
	280	239	173	184	132	207	268	381	288
	287	206	187	149	162	228	305	390	271
	296	246	135	193	124	231	269	360	269
	N/A	233	181	202	119	N/A	N/A	N/A	308
	N/A	221	202	181	159	N/A	N/A	N/A	338
	N/A	213	170	172	151	N/A	N/A	N/A	297
	N/A	212	166	168	137	N/A	N/A	N/A	312
	N/A	202	159	181	129	N/A	N/A	N/A	288
Mean	293.2	223.9	170.9	176.1	137.8	218.8	282.4	375.8	293.9
Minimum	280.0	202.0	135.0	149.0	119.0	207.0	268.0	360.0	269.0
Maximum	305.0	246.0	202.0	202.0	162.0	231.0	305.0	390.0	338.0
Std Dev (cpm, 1s)	9.8	15.1	17.7	16.1	15.0	11.1	15.1	11.8	20.8

Background Summary

Material	Bkg. Avg. cpm
SC	296.0
CB	223.9
AT	170.9
CP	176.1

Measured Alpha Background Count Rates for Various Surfaces

All values reported in counts per minute (cpm)

Instrument / Probe	Bare Concrete (BC)	Cinder Block (CB)	Asbestos Floor Tile (AT)	Steel (ST)	Ceramic Floor Tile (CF)	Ceramic Wall Tile (CW)	Ceiling Tile (CT)
Ludlum 2360 / 43-68 193667 / PR120548	1	0	1	1	1	0	0
	2	0	2	1	2	2	0
	1	0	1	1	0	2	3
	1	1	1	0	0	1	3
	2	1	0	0	2	3	2
Mean	1.4	0.4	1.0	0.6	1.0	1.6	1.6
Minimum	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	2.0	1.0	2.0	1.0	2.0	3.0	3.0
Std Dev (cpm, 1s)	0.5	0.5	0.7	0.5	1.0	1.1	1.5

Background Summary

Material	Bkg. Avg. cpm
BC	1.4
CB	0.4
AT	1.0
ST	0.6
CF	1.0

Measured Beta Background Count Rates for Various Surfaces

All values reported in counts per minute (cpm)

Instrument / Probe	Bare Concrete (BC)	Cinder Block (CB)	Asbestos Floor Tile (AT)	Steel (ST)	Ceramic Floor Tile (CF)	Ceramic Wall Tile (CW)	Ceiling Tile (CT)
Ludlum 2360 / 43-68 193667 / PR120548	228	198	149	117	262	313	278
	216	218	142	118	282	361	247
	231	219	132	142	302	374	239
	193	224	133	106	290	318	285
	201	215	161	126	255	384	283
Mean	213.8	214.8	143.4	121.8	278.2	350.0	266.4
Minimum	193.0	198.0	132.0	106.0	255.0	313.0	239.0
Maximum	231.0	224.0	161.0	142.0	302.0	384.0	285.0
Std Dev (cpm, 1s)	16.6	9.9	12.1	13.3	19.5	32.6	21.7

Background Summary

Material	Bkg. Avg. cpm
BC	213.8
CB	214.8
AT	143.4
ST	121.8
CF	278.2

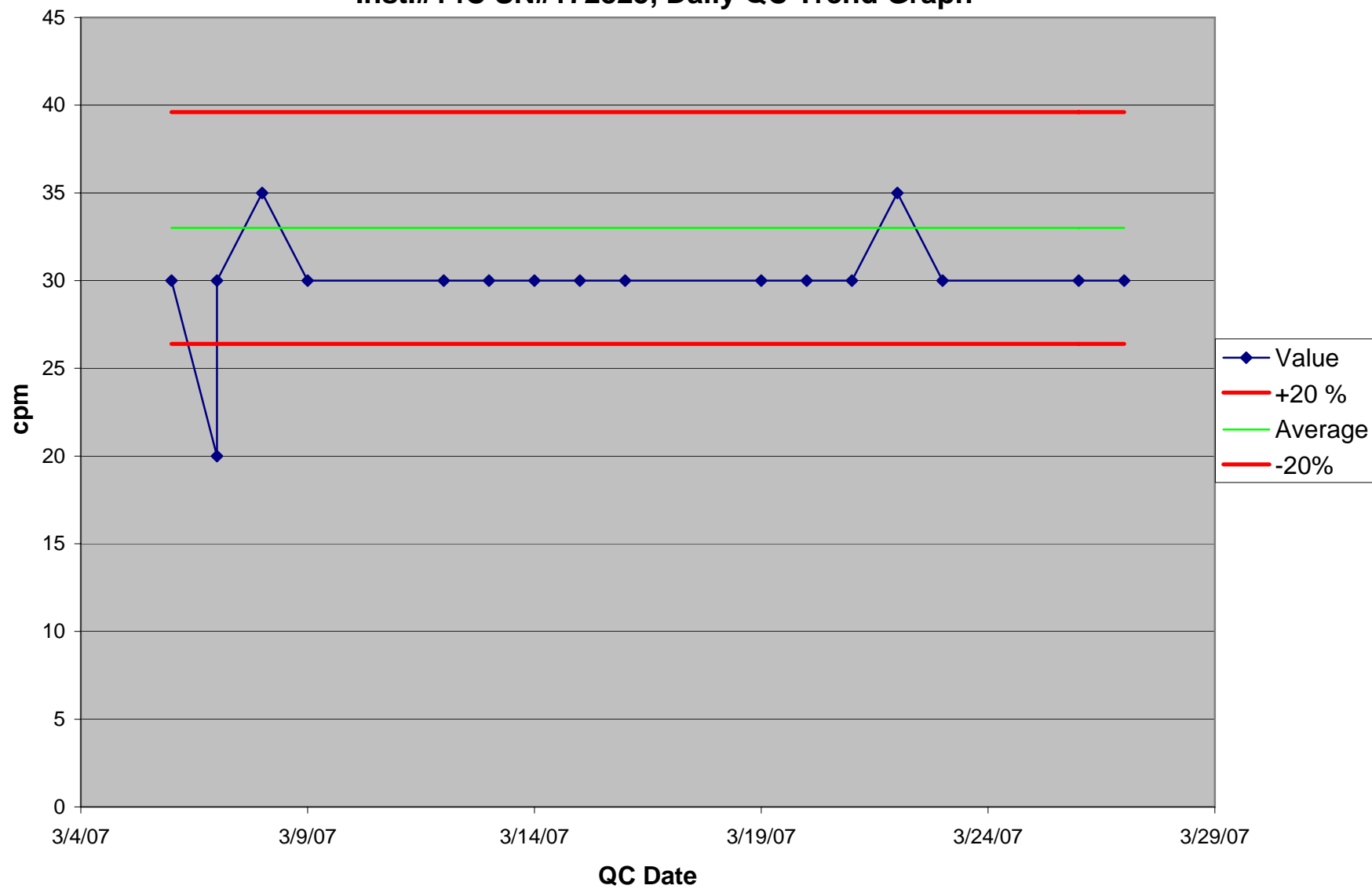


**APPENDIX E**  
**QA/QC RECORDS**

Inst.#14C SN#172825 BKG		
QC Daily Source		
Date	Result (cpm)	P/F
3/6/2007	30	Pass
3/7/2007	20	Fail
3/7/2007	30	Pass
3/8/2007	35	Pass
3/9/2007	30	Pass
3/12/2007	30	Pass
3/13/2007	30	Pass
3/14/2007	30	Pass
3/15/2007	30	Pass
3/16/2007	30	Pass
3/19/2007	30	Pass
3/20/2007	30	Pass
3/21/2007	30	Pass
3/22/2007	35	Pass
3/23/2007	30	Pass
3/26/2007	30	Pass
3/27/2007	30	Pass

Inst.#14C SN#172825 BKG	
Initial Source Readings	
Date	Result (cpm)
3/5/2007	20
3/5/2007	30
3/5/2007	20
3/5/2007	30
3/5/2007	30
3/5/2007	50
3/5/2007	40
3/5/2007	30
3/5/2007	40
3/5/2007	40
	Average
	33

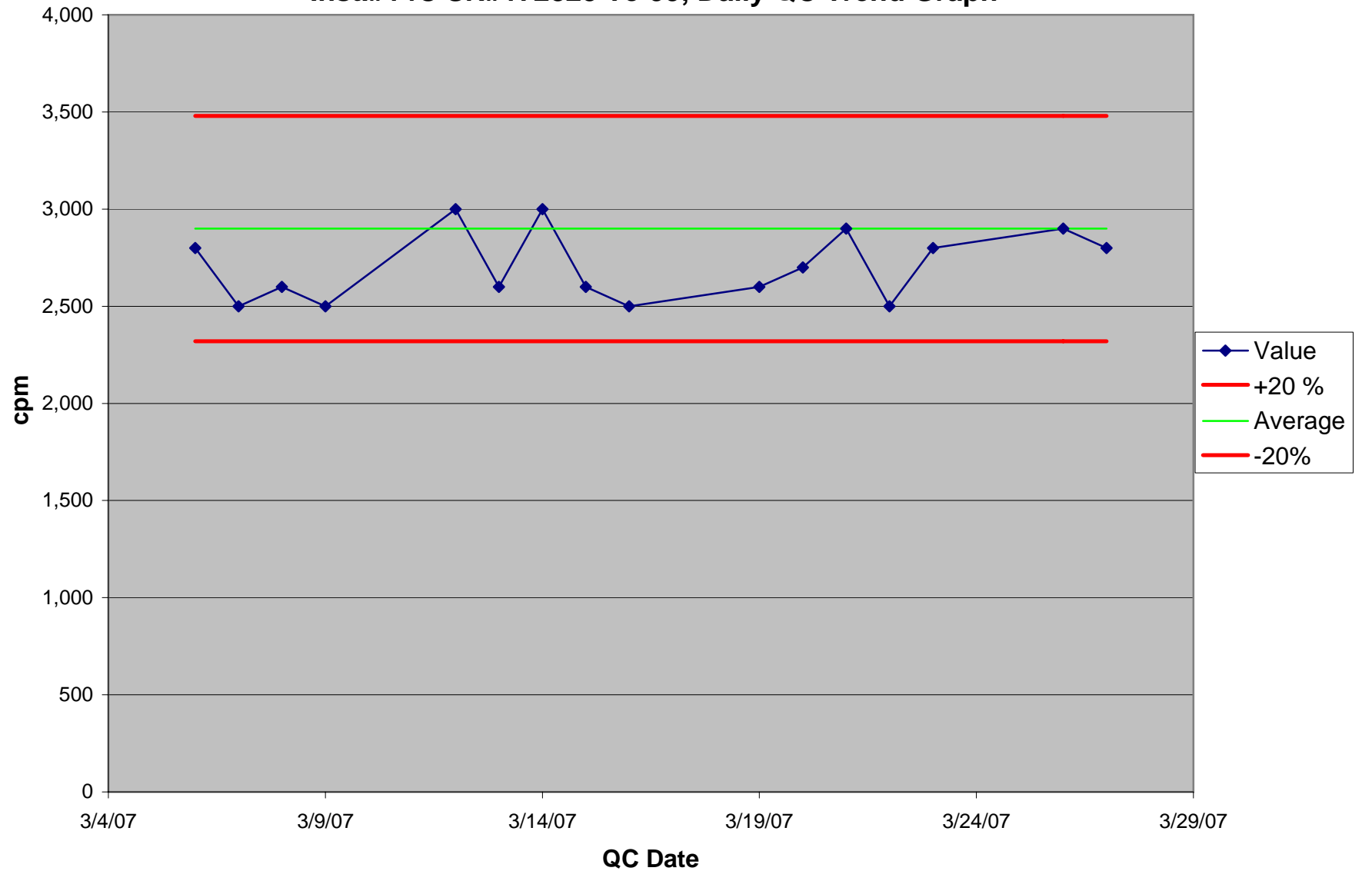
Inst.#14C SN#172825, Daily QC Trend Graph



Inst.#14C SN#172825 Tc-99		
QC Daily Source		
Date	Result (cpm)	P/F
3/6/2007	2,800	Pass
3/7/2007	2,500	Pass
3/8/2007	2,600	Pass
3/9/2007	2,500	Pass
3/12/2007	3,000	Pass
3/13/2007	2,600	Pass
3/14/2007	3,000	Pass
3/15/2007	2,600	Pass
3/16/2007	2,500	Pass
3/19/2007	2,600	Pass
3/20/2007	2,700	Pass
3/21/2007	2,900	Pass
3/22/2007	2,500	Pass
3/23/2007	2,800	Pass
3/26/2007	2,900	Pass
3/27/2007	2,800	Pass

Inst.#14C SN#172825 Tc-99	
Initial Source Readings	
Date	Result (cpm)
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	3,000
3/5/2007	2,500
3/5/2007	2,500
	Average
	2900

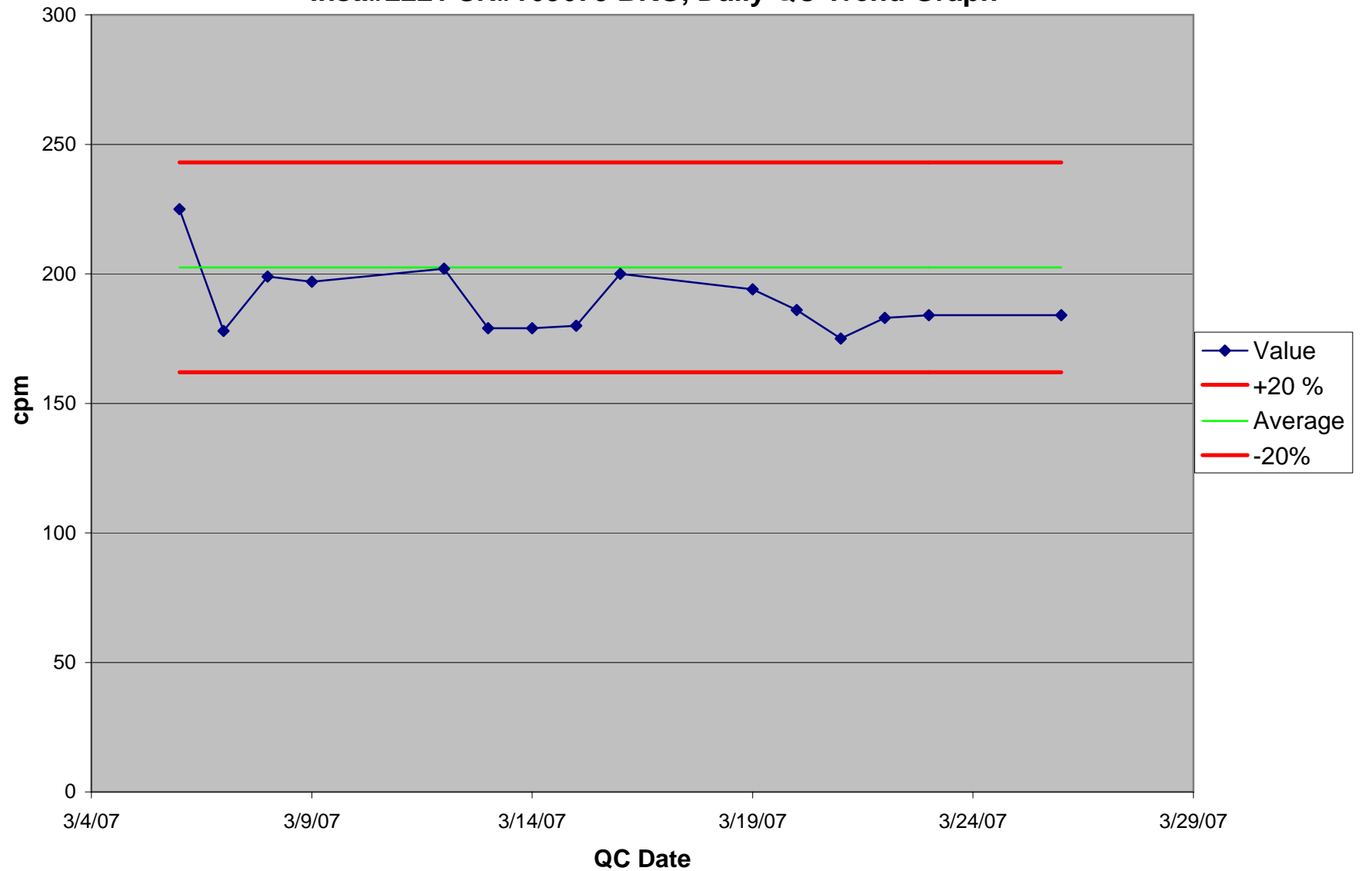
**Inst.#14C SN#172825 Tc-99, Daily QC Trend Graph**



Inst.#2221 SN#163673 BKG		
QC Daily Source		
Date	Result (cpm)	P/F
3/6/2007	225	Pass
3/7/2007	178	Pass
3/8/2007	199	Pass
3/9/2007	197	Pass
3/12/2007	202	Pass
3/13/2007	179	Pass
3/14/2007	179	Pass
3/15/2007	180	Pass
3/16/2007	200	Pass
3/19/2007	194	Pass
3/20/2007	186	Pass
3/21/2007	175	Pass
3/22/2007	183	Pass
3/23/2007	184	Pass
3/26/2007	184	Pass

Inst.#2221 SN#163673 BKG	
Initial Source Readings	
Date	Result (cpm)
3/5/2007	203
3/5/2007	202
3/5/2007	200
3/5/2007	203
3/5/2007	207
3/5/2007	208
3/5/2007	225
3/5/2007	187
3/5/2007	173
3/5/2007	217
	Average
	203

**Inst.#2221 SN#163673 BKG, Daily QC Trend Graph**

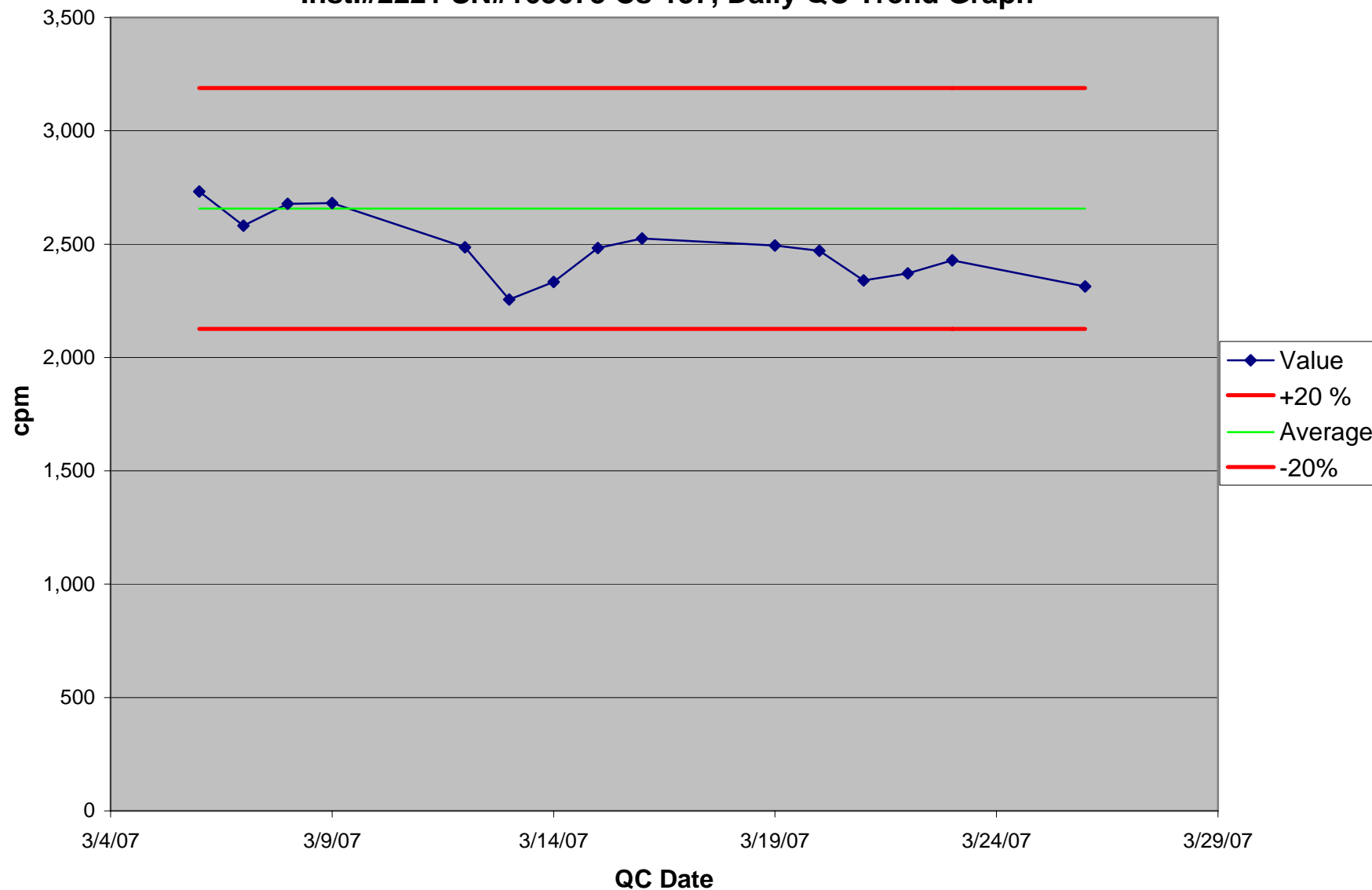


Inst.#2221 SN#163673 Cs-137		
QC Daily Source		
Date	Result (cpm)	P/F
3/6/2007	2,732	Pass
3/7/2007	2,581	Pass
3/8/2007	2,678	Pass
3/9/2007	2,681	Pass
3/12/2007	2,486	Pass
3/13/2007	2,256	Pass
3/14/2007	2,333	Pass
3/15/2007	2,483	Pass
3/16/2007	2,525	Pass
3/19/2007	2,494	Pass
3/20/2007	2,471	Pass
3/21/2007	2,340	Pass
3/22/2007	2,371	Pass
3/23/2007	2,429	Pass
3/26/2007	2,313	Pass

Inst.#2221 SN#163673 Cs-137	
Initial Source Readings	
Date	Result (cpm)
3/5/2007	2,499
3/5/2007	2,545
3/5/2007	2,619
3/5/2007	2,727
3/5/2007	2,793
3/5/2007	2,838
3/5/2007	2,759
3/5/2007	2,690
3/5/2007	2,521
3/5/2007	2,582
	Average
	2657



**Inst.#2221 SN#163673 Cs-137, Daily QC Trend Graph**



CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2224		Detector:		43-68		Calibration Date:		1/18/2007							
Serial #:			183048		Serial #:		PR161781		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							126											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average $\alpha/\beta$ cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average $\alpha/\beta$ cpm	Control Chart source 1 sigma, cpm				
Alpha	0.1985	Th-230	3973-02	17,500	4/29/2002	7.54E+04	17,499	500	1	1	0.60	0.70	3473.3	67.53				
Beta	0.2891	Tc-99	3975-02	17,700	4/29/2002	2.11E+05	17,700	1000	1	1	132.40	10.57	5117.1	92.62				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA $\alpha$ (dpm)	MDA $\beta$ (dpm)	$\alpha$ MDA OK?	$\beta$ MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
3/7/2007	1	145	3,482	5,300	1.0	145.0	3481.0	5155.0	PASS	PASS	PASS	PASS	30.60	162	Yes	Yes	GTB	GTB
3/8/2007	0	125	3,604	5,279	0.0	125.0	3604.0	5154.0	PASS	PASS	PASS	PASS	12.00	151	Yes	Yes	GTB	GTB
3/9/2007	0	117	3,520	5,151	0.0	117.0	3520.0	5034.0	PASS	PASS	PASS	PASS	12.00	146	Yes	Yes	GTB	GTB
3/12/2007	1	124	3,353	5,194	1.0	124.0	3352.0	5070.0	PASS	PASS	PASS	PASS	30.60	150	Yes	Yes	GTB	GTB
3/14/2007	0	131	3,537	5,368	0.0	131.0	3537.0	5237.0	PASS	PASS	PASS	PASS	12.00	154	Yes	Yes	GTB	GTB
3/15/2007	0	137	3,383	5,293	0.0	137.0	3383.0	5156.0	PASS	PASS	PASS	PASS	12.00	158	Yes	Yes	GTB	GTB
3/16/2007	1	125	3,357	5,266	1.0	125.0	3356.0	5141.0	PASS	PASS	PASS	PASS	30.60	151	Yes	Yes	GTB	GTB
3/19/2007	0	127	3,389	5,311	0.0	127.0	3389.0	5184.0	PASS	PASS	PASS	PASS	12.00	152	Yes	Yes	GTB	GTB
3/20/2007	0	133	3,343	5,310	0.0	133.0	3343.0	5177.0	PASS	PASS	PASS	PASS	12.00	156	Yes	Yes	PCR	PCR
3/21/2007	1	136	3,416	5,239	1.0	136.0	3415.0	5103.0	PASS	PASS	PASS	PASS	30.60	157	Yes	Yes	PCR	PCR
3/22/2007	1	131	3,429	5,325	1.0	131.0	3428.0	5194.0	PASS	PASS	PASS	PASS	30.60	154	Yes	Yes	PCR	PCR
3/23/2007	1	132	3,375	5,214	1.0	132.0	3374.0	5082.0	PASS	PASS	PASS	PASS	30.60	155	Yes	Yes	PCR	PCR
3/26/2007	0	134	3,371	5,189	0.0	134.0	3371.0	5055.0	PASS	PASS	PASS	PASS	12.00	156	Yes	Yes	PCR	PCR
3/27/2007	1	128	3,493	5,348	1.0	128.0	3492.0	5220.0	PASS	PASS	PASS	PASS	30.60	153	Yes	Yes	PCR	PCR

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2360		Detector:		43-37		Calibration Date:		2/14/2007							
Serial #:			184938		Serial #:		PR178371		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							582											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average $\alpha/\beta$ cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average $\alpha/\beta$ cpm	Control Chart source 1 sigma, cpm				
Alpha	0.1265	Th-230	3973-02	17,500	4/29/2002	7.54E+04	17,499	300	1	1	15.70	3.71	2213.6	47.98				
Beta	0.1920	Tc-99	3975-02	17,700	4/29/2002	2.11E+05	17,700	1000	1	1	454.30	14.74	3398.7	73.49				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA $\alpha$ (dpm)	MDA $\beta$ (dpm)	$\alpha$ MDA OK?	$\beta$ MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
3/7/2007	13	445	2,255	3,856	13.0	445.0	2242.0	3411.0	PASS	PASS	PASS	PASS	26.86	91	Yes	Yes	GTB	GTB
3/8/2007	15	455	2,240	3,927	15.0	455.0	2225.0	3472.0	PASS	PASS	PASS	PASS	28.55	91	Yes	Yes	GTB	GTB
3/9/2007	18	426	2,181	3,718	18.0	426.0	2163.0	3292.0	PASS	PASS	PASS	PASS	30.89	89	Yes	Yes	GTB	GTB
3/12/2007	18	474	2,315	3,725	18.0	474.0	2297.0	3251.0	PASS	PASS	PASS	QUESTION	30.89	93	Yes	Yes	GTB	GTB
3/13/2007	15	468	2,221	3,982	15.0	468.0	2206.0	3514.0	PASS	PASS	PASS	PASS	28.55	93	Yes	Yes	GTB	GTB
3/14/2007	11	455	2,212	3,914	11.0	455.0	2201.0	3459.0	PASS	PASS	PASS	PASS	25.04	91	Yes	Yes	GTB	GTB
3/15/2007	18	473	2,181	3,729	18.0	473.0	2163.0	3256.0	PASS	PASS	PASS	PASS	30.89	93	Yes	Yes	GTB	GTB
3/16/2007	19	455	2,220	3,995	19.0	455.0	2201.0	3540.0	PASS	PASS	PASS	PASS	31.62	91	Yes	Yes	GTB	GTB
3/19/2007	15	456	2,254	3,879	15.0	456.0	2239.0	3423.0	PASS	PASS	PASS	PASS	28.55	92	Yes	Yes	GTB	GTB
3/20/2007	18	480	2,144	3,925	18.0	480.0	2126.0	3445.0	PASS	PASS	PASS	PASS	30.89	94	Yes	Yes	GTB	GTB
3/21/2007	15	439	2,165	3,868	15.0	439.0	2150.0	3429.0	PASS	PASS	PASS	PASS	28.55	90	Yes	Yes	PCR	PCR
3/22/2007	11	462	2,290	3,805	11.0	462.0	2279.0	3343.0	PASS	PASS	PASS	PASS	25.04	92	Yes	Yes	PCR	PCR
3/23/2007	12	465	2,255	3,894	12.0	465.0	2243.0	3429.0	PASS	PASS	PASS	PASS	25.97	92	Yes	Yes	PCR	PCR
3/26/2007	11	476	2,264	3,781	11.0	476.0	2253.0	3305.0	PASS	PASS	PASS	PASS	25.04	94	Yes	Yes	PCR	PCR
3/27/2007	14	465	2,209	3,963	14.0	465.0	2195.0	3498.0	PASS	PASS	PASS	PASS	27.72	92	Yes	Yes	PCR	PCR

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2360		Detector:		43-37		Calibration Date:		2/14/2007							
Serial #:			193675		Serial #:		PR216984		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							582											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.1476	Th-230	3973-02	17,500	4/29/2002	7.54E+04	17,499	300	1	1	3.40	1.51	2582.3	69.69				
Beta	0.2029	Tc-99	3975-02	17,700	4/29/2002	2.11E+05	17,700	1000	1	1	381.80	43.46	3590.7	156.93				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
3/7/2007	4	386	2,694	3,915	4.0	386.0	2690.0	3529.0	PASS	PASS	PASS	PASS	14.33	80	Yes	Yes	GTB	GTB
3/8/2007	3	393	2,489	3,935	3.0	393.0	2486.0	3542.0	PASS	PASS	PASS	PASS	12.88	81	Yes	Yes	GTB	GTB
3/12/2007	6	396	2,657	4,106	6.0	396.0	2651.0	3710.0	PASS	PASS	PASS	PASS	16.76	81	Yes	Yes	GTB	GTB
3/13/2007	3	391	2,545	4,152	3.0	391.0	2542.0	3761.0	PASS	PASS	PASS	PASS	12.88	80	Yes	Yes	GTB	GTB
3/14/2007	4	405	2,653	3,823	4.0	405.0	2649.0	3418.0	PASS	PASS	PASS	PASS	14.33	82	Yes	Yes	GTB	GTB
3/15/2007	2	408	2,637	3,996	2.0	408.0	2635.0	3588.0	PASS	PASS	PASS	PASS	11.15	82	Yes	Yes	GTB	GTB
3/16/2007	4	425	2,647	4,051	4.0	425.0	2643.0	3626.0	PASS	PASS	PASS	PASS	14.33	84	Yes	Yes	GTB	GTB
3/19/2007	2	386	2,631	3,918	2.0	386.0	2629.0	3532.0	PASS	PASS	PASS	PASS	11.15	80	Yes	Yes	GTB	GTB
3/21/2007	4	386	2,540	3,831	4.0	386.0	2536.0	3445.0	PASS	PASS	PASS	PASS	14.33	80	Yes	Yes	PCR	PCR
3/22/2007	3	368	2,675	4,054	3.0	368.0	2672.0	3686.0	PASS	PASS	PASS	PASS	12.88	78	Yes	Yes	PCR	PCR
3/23/2007	3	366	2,615	4,214	3.0	366.0	2612.0	3848.0	PASS	PASS	PASS	PASS	12.88	78	Yes	Yes	PCR	PCR
3/26/2007	3	384	2,553	4,165	3.0	384.0	2550.0	3781.0	PASS	PASS	PASS	PASS	12.88	80	Yes	Yes	PCR	PCR
3/27/2007	3	391	2,584	4,041	3.0	391.0	2581.0	3650.0	PASS	PASS	PASS	PASS	12.88	80	Yes	Yes	PCR	PCR

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

										Trial MDA Calculator	$\alpha$	$\beta$
										Sample Count Time (min)	1	
										Bkg Count Rate (cpm)	0.1	
										Bkg Count Time (min)	1	
										Counter Efficiency	0.147567	0.202868
										MDCR (cpm)	4.471333	#DIV/0!
										MDA (dpm)	30.30044	#DIV/0!
<b>Initial Background and Source Counts for Control Chart</b>												
#	Initial bkg counts				Initial source plus bkg counts							
	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm				
1	5	5	372	372	2601	2601	4150	4150				
2	4	4	424	424	2602	2602	4171	4171				
3	6	6	410	410	2622	2622	4069	4069				
4	1	1	288	288	2581	2581	4001	4001				
5	2	2	428	428	2636	2636	3822	3822				
6	4	4	392	392	2630	2630	3918	3918				
7	3	3	414	414	2658	2658	3745	3745				
8	2	2	381	381	2445	2445	3821	3821				
9	3	3	374	374	2607	2607	4030	4030				
10	4	4	335	335	2475	2475	3998	3998				
Mean		3.40		381.8		2585.7		3972.5				
S <sub>(n-1)</sub>		1.51		43.46		69.97		143.50				
-3 sigma		-1.12		251.43		2375.79		3542.01				
+3 sigma		7.92		512.17		2795.61		4402.99				
-2 sigma		0.39		294.88		2445.76		3685.51				
+2 sigma		6.41		468.72		2725.64		4259.49				
					Mean-bkg	2582.3		3590.7				
					S <sub>(n-1)</sub>	69.69		156.93				
				Mean-bkg	-3 sigma	2373.24		3119.90				
				Mean-bkg	+3 sigma	2791.36		4061.50				
				Mean-bkg	-2 sigma	2442.93		3276.83				
				Mean-bkg	+2 sigma	2721.67		3904.57				
						2596		3778				
						2598		3747				
						2616		3659				
						2580		3713				
						2634		3394				
						2626		3526				
						2655		3331				
						2443		3440				
						2604		3656				
						2471		3663				



# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:		43-10-1		Calibration Date:		5/3/2006								
Serial #:			200051		Serial #:		PR215948		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average $\alpha/\beta$ cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average $\alpha/\beta$ cpm	Control Chart source 1 sigma, cpm					
Alpha	0.3559	Th-230	3973-02	17,500	4/29/2002	7.54E+04	17,499	20	20	1	0.12	0.07	6227.8	93.82					
Beta	0.2437	Tc-99	3975-02	17,700	4/29/2002	2.11E+05	17,700	200	20	1	38.50	1.87	4314.3	68.91					
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA $\alpha$ (dpm)	MDA $\beta$ (dpm)	$\alpha$ MDA OK?	$\beta$ MDA OK?	H.P. Technician	Technician Initials	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta							
3/6/2007	3	747	6,180	4,384	0.2	37.4	6179.9	4346.7	PASS	PASS	PASS	PASS	12.10	97	Yes	Yes	GTB	GTB	
3/7/2007	5	709	6,096	4,252	0.3	35.5	6095.8	4216.6	QUESTION	PASS	PASS	PASS	13.17	95	Yes	Yes	GTB	GTB	
3/8/2007	2	709	6,199	4,232	0.1	35.5	6198.9	4196.6	PASS	PASS	PASS	PASS	11.43	95	Yes	Yes	GTB	GTB	
3/9/2007	2	749	6,161	4,304	0.1	37.5	6160.9	4266.6	PASS	PASS	PASS	PASS	11.43	97	Yes	Yes	GTB	GTB	
3/12/2007	4	771	6,129	4,427	0.2	38.6	6128.8	4388.5	PASS	PASS	PASS	PASS	12.67	98	Yes	Yes	GTB	GTB	
3/13/2007	3	770	6,078	4,239	0.2	38.5	6077.9	4200.5	PASS	PASS	PASS	PASS	12.10	98	Yes	Yes	GTB	GTB	
3/14/2007	2	723	6,134	4,274	0.1	36.2	6133.9	4237.9	PASS	PASS	PASS	PASS	11.43	95	Yes	Yes	GTB	GTB	
3/15/2007	2	784	6,113	4,318	0.1	39.2	6112.9	4278.8	PASS	PASS	PASS	PASS	11.43	99	Yes	Yes	GTB	GTB	
3/16/2007	4	760	6,182	4,405	0.2	38.0	6181.8	4367.0	PASS	PASS	PASS	PASS	12.67	98	Yes	Yes	GTB	GTB	
3/19/2007	3	773	6,094	4,407	0.2	38.7	6093.9	4368.4	PASS	PASS	PASS	PASS	12.10	98	Yes	Yes	GTB	GTB	
3/20/2007	1	778	6,081	4,315	0.1	38.9	6081.0	4276.1	PASS	PASS	PASS	PASS	10.55	99	Yes	Yes	GTB	GTB	
3/21/2007	1	740	6,088	4,414	0.1	37.0	6088.0	4377.0	PASS	PASS	PASS	PASS	10.55	96	Yes	Yes	PCR	PCR	
3/22/2007	5	763	6,123	4,404	0.3	38.2	6122.8	4365.9	QUESTION	PASS	PASS	PASS	13.17	98	Yes	Yes	PCR	PCR	
3/23/2007	1	787	6,258	4,447	0.1	39.4	6258.0	4407.7	PASS	PASS	PASS	PASS	10.55	99	Yes	Yes	PCR	PCR	
3/26/2007	2	748	6,200	4,272	0.1	37.4	6199.9	4234.6	PASS	PASS	PASS	PASS	11.43	97	Yes	Yes	PCR	PCR	
3/27/2007	0	730	6,048	4,349	0.0	36.5	6048.0	4312.5	PASS	PASS	PASS	PASS	8.43	96	Yes	Yes	PCR	PCR	



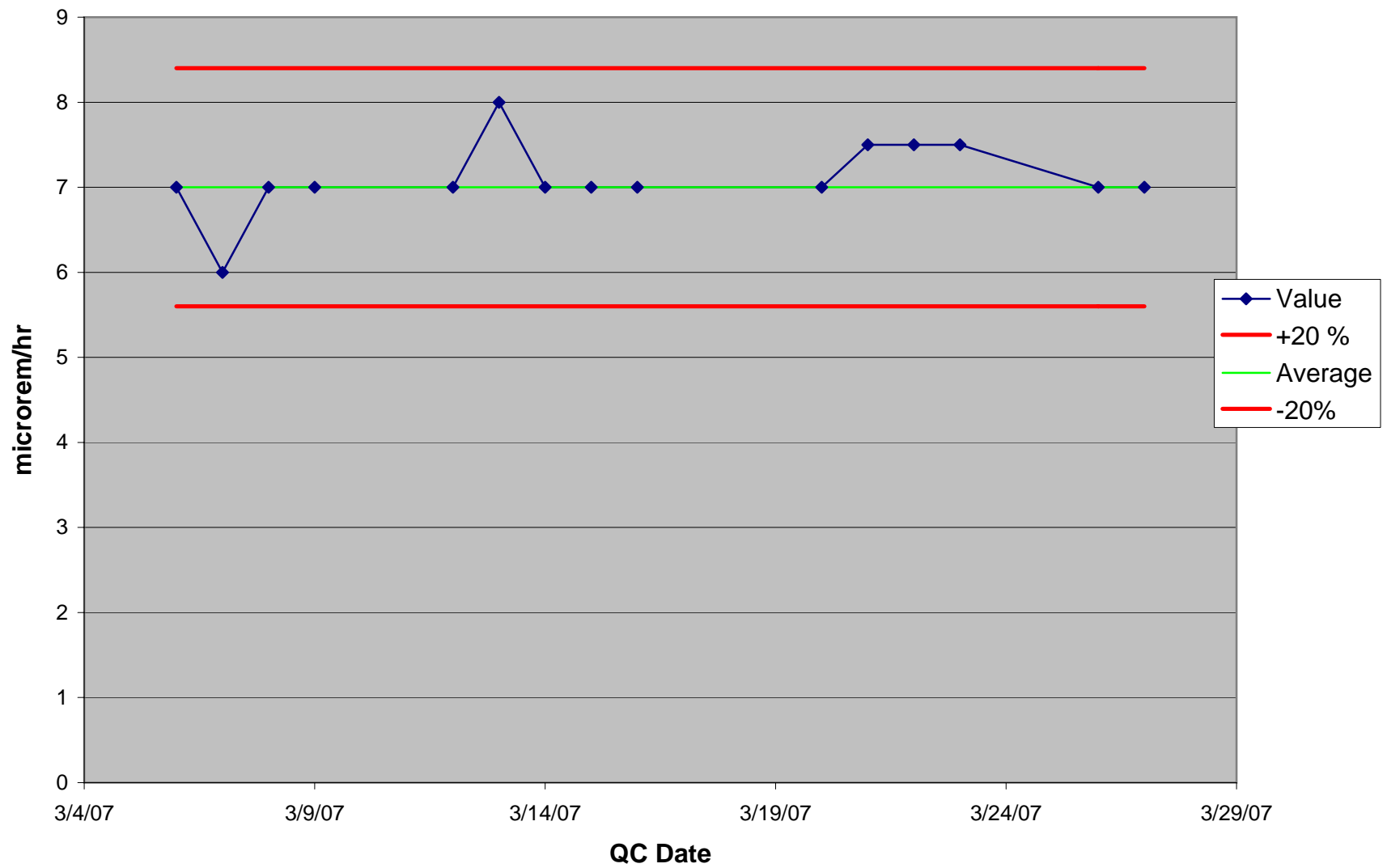
# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

Inst.#19 SN#87139 BKGD		
QC Daily Source		
Date	Result (µrem/hr)	P/F
3/6/2007	7	Pass
3/7/2007	6	Pass
3/8/2007	7	Pass
3/9/2007	7	Pass
3/12/2007	7	Pass
3/13/2007	8	Pass
3/14/2007	7	Pass
3/15/2007	7	Pass
3/16/2007	7	Pass
3/20/2007	7	Pass
3/21/2007	7.5	Pass
3/22/2007	7.5	Pass
3/23/2007	7.5	Pass
3/26/2007	7	Pass
3/27/2007	7	Pass

Inst.#19 SN#87139 BKGD	
Initial Source Readings	
Date	Result (µrem/hr)
3/5/2007	7
3/5/2007	8
3/5/2007	7
3/5/2007	8
3/5/2007	7
3/5/2007	6
3/5/2007	7
3/5/2007	7
3/5/2007	6
3/5/2007	7
	Average
	7

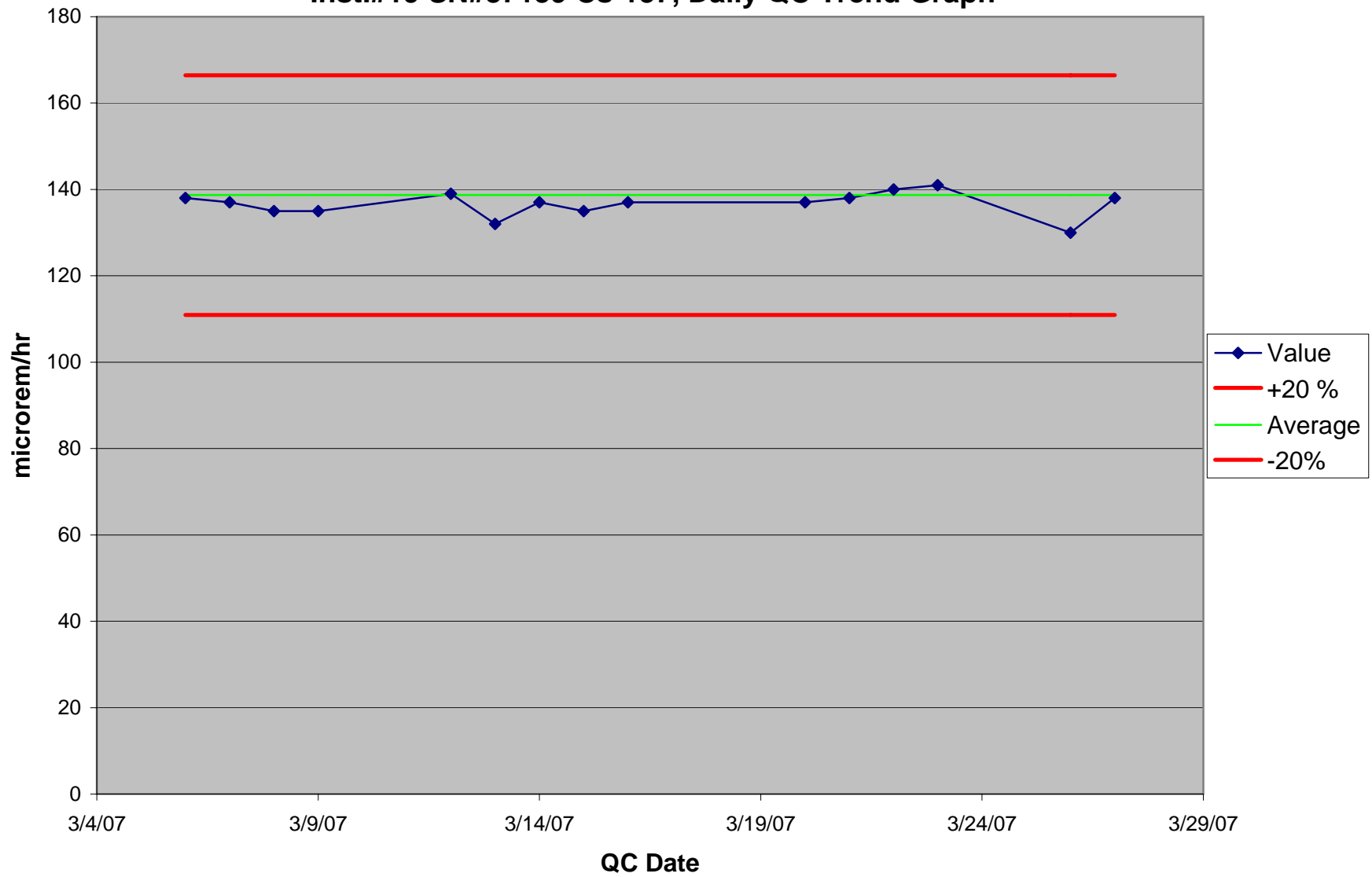
Inst.#19 SN#87139 BKGD, Daily QC Trend Graph



Inst.#19 SN#87139 Cs-137		
QC Daily Source		
Date	Result (µrem/hr)	P/F
3/6/2007	138	Pass
3/7/2007	137	Pass
3/8/2007	135	Pass
3/9/2007	135	Pass
3/12/2007	139	Pass
3/13/2007	132	Pass
3/14/2007	137	Pass
3/15/2007	135	Pass
3/16/2007	137	Pass
3/20/2007	137	Pass
3/21/2007	138	Pass
3/22/2007	140	Pass
3/23/2007	141	Pass
3/26/2007	130	Pass
3/27/2007	138	Pass

Inst.#19 SN#87139 Cs-137	
Initial Source Readings	
Date	Result (µrem/hr)
3/5/2007	140
3/5/2007	137
3/5/2007	137
3/5/2007	139
3/5/2007	140
3/5/2007	138
3/5/2007	141
3/5/2007	140
3/5/2007	136
3/5/2007	139
	Average
	139

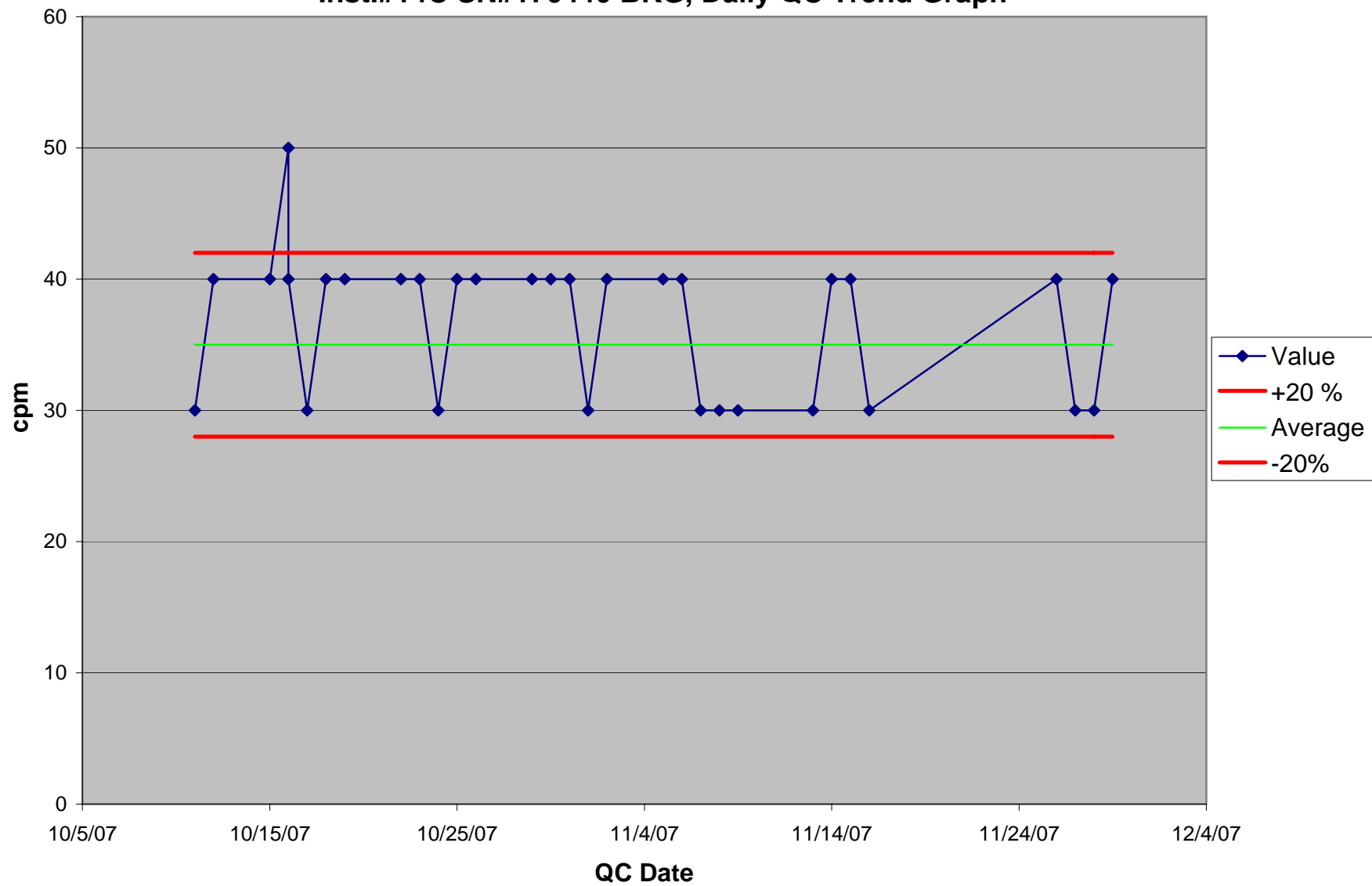
**Inst.#19 SN#87139 Cs-137, Daily QC Trend Graph**



Inst.#14C SN#170440 BKG		
QC Daily Source		
Date	Result (cpm)	P/F
10/11/2007	30	Pass
10/12/2007	40	Pass
10/15/2007	40	Pass
10/16/2007	50	Fail
10/16/07 R	40	Pass
10/17/2007	30	Pass
10/18/2007	40	Pass
10/19/2007	40	Pass
10/22/2007	40	Pass
10/23/2007	40	Pass
10/24/2007	30	Pass
10/25/2007	40	Pass
10/26/2007	40	Pass
10/29/2007	40	Pass
10/30/2007	40	Pass
10/31/2007	40	Pass
11/1/2007	30	Pass
11/2/2007	40	Pass
11/5/2007	40	Pass
11/6/2007	40	Pass
11/7/2007	30	Pass
11/8/2007	30	Pass
11/9/2007	30	Pass
11/13/2007	30	Pass
11/14/2007	40	Pass
11/15/2007	40	Pass
11/16/2007	30	Pass
11/26/2007	40	Pass
11/27/2007	30	Pass
11/28/2007	30	Pass
11/29/2007	40	Pass

Inst.#14C SN#170440 BKG	
Initial Source Readings	
Date	Result (cpm)
10/10/2007	30
10/10/2007	50
10/10/2007	20
10/10/2007	40
10/10/2007	40
10/10/2007	50
10/10/2007	40
10/10/2007	20
10/10/2007	30
10/10/2007	30
	Average
	35

Inst.#14C SN#170440 BKG, Daily QC Trend Graph

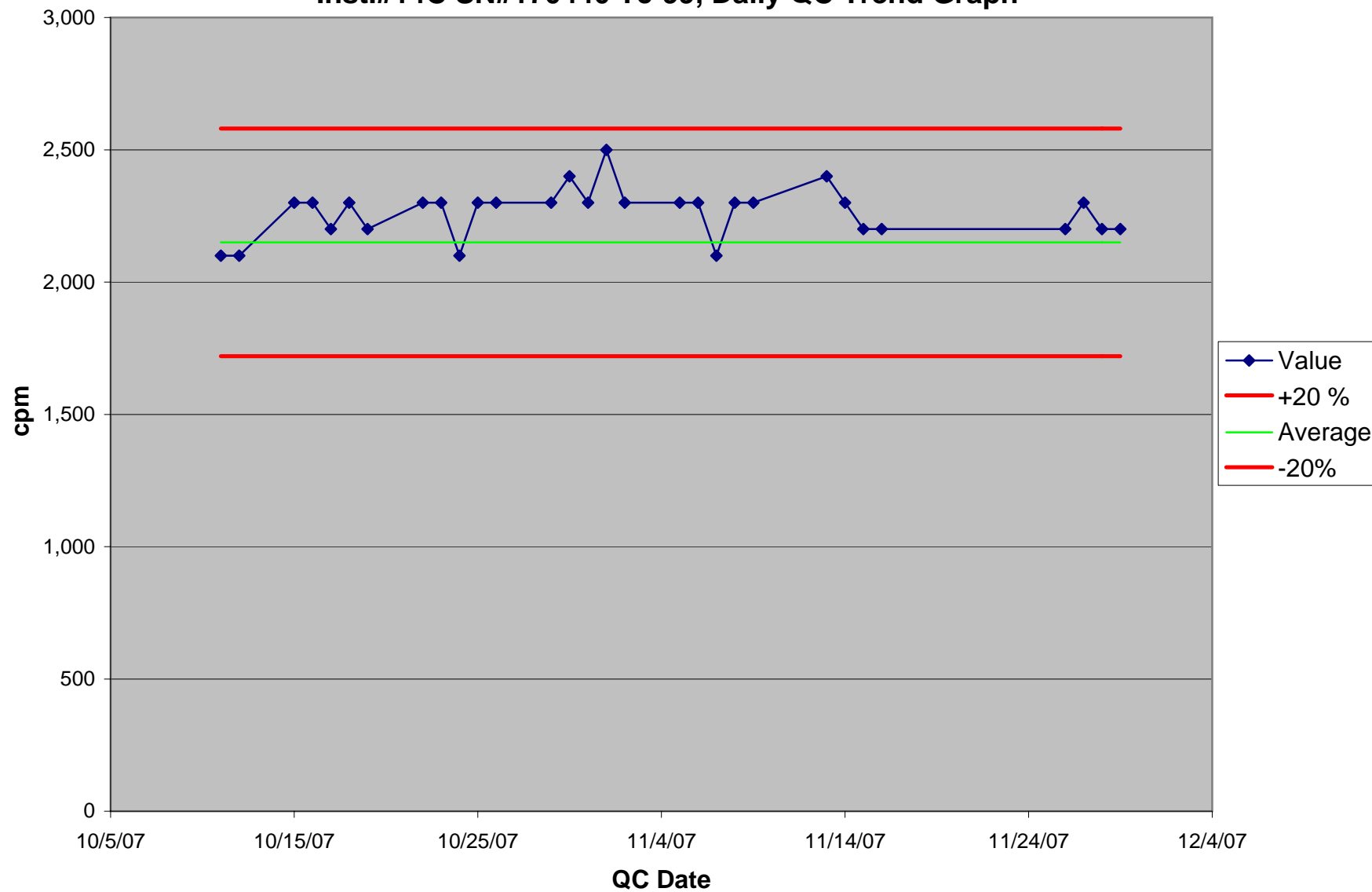


Inst.#14C SN#170440 Tc-99		
QC Daily Source		
Date	Result (cpm)	P/F
10/11/2007	2,100	Pass
10/12/2007	2,100	Pass
10/15/2007	2,300	Pass
10/16/2007	2,300	Pass
10/17/2007	2,200	Pass
10/18/2007	2,300	Pass
10/19/2007	2,200	Pass
10/22/2007	2,300	Pass
10/23/2007	2,300	Pass
10/24/2007	2,100	Pass
10/25/2007	2,300	Pass
10/26/2007	2,300	Pass
10/29/2007	2,300	Pass
10/30/2007	2,400	Pass
10/31/2007	2,300	Pass
11/1/2007	2,500	Pass
11/2/2007	2,300	Pass
11/5/2007	2,300	Pass
11/6/2007	2,300	Pass
11/7/2007	2,100	Pass
11/8/2007	2,300	Pass
11/9/2007	2,300	Pass
11/13/2007	2,400	Pass
11/14/2007	2,300	Pass
11/15/2007	2,200	Pass
11/16/2007	2,200	Pass
11/26/2007	2,200	Pass
11/27/2007	2,300	Pass
11/28/2007	2,200	Pass
11/29/2007	2,200	Pass

Inst.#14C SN#170440 Tc-99	
Initial Source Readings	
Date	Result (cpm)
10/10/2007	2,000
10/10/2007	2,200
10/10/2007	2,100
10/10/2007	2,200
10/10/2007	2,200
10/10/2007	2,300
10/10/2007	2,200
10/10/2007	2,100
10/10/2007	2,000
10/10/2007	2,200
	Average
	2150



**Inst.#14C SN#170440 Tc-99, Daily QC Trend Graph**



# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2360		Detector:		43-37		Calibration Date:		7/19/2007							
Serial #:			193675		Serial #:		PR178371		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							582											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average $\alpha/\beta$ cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average $\alpha/\beta$ cpm	Control Chart source 1 sigma, cpm				
Alpha	0.1372	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	300	1	1	4.60	2.22	695.5	20.57				
Beta	0.1862	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	1000	1	1	422.70	19.94	2588.6	51.20				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA $\alpha$ (dpm)	MDA $\beta$ (dpm)	$\alpha$ MDA OK?	$\beta$ MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
10/12/2007	3	423	729	2,956	3.0	423.0	726.0	2533.0	PASS	PASS	PASS	PASS	13.85	91	Yes	Yes	Shoemaker	RLS
10/15/2007	3	411	732	2,993	3.0	411.0	729.0	2582.0	PASS	PASS	PASS	PASS	13.85	90	Yes	Yes	Shoemaker	RLS
10/16/2007	0	415	660	2,936	0.0	415.0	660.0	2521.0	QUESTION	PASS	PASS	PASS	3.76	90	Yes	Yes	Shoemaker	RLS
10/17/2007	6	393	671	2,917	6.0	393.0	665.0	2524.0	PASS	PASS	PASS	PASS	18.03	88	Yes	Yes	Shoemaker	RLS
10/18/2007	5	405	680	2,870	5.0	405.0	675.0	2465.0	PASS	PASS	PASS	QUESTION	16.79	89	Yes	Yes	Shoemaker	RLS
10/19/2007	2	416	703	2,866	2.0	416.0	701.0	2450.0	PASS	PASS	PASS	QUESTION	12.00	90	Yes	Yes	Shoemaker	RLS
10/22/2007	2	395	706	2,881	2.0	395.0	704.0	2486.0	PASS	PASS	PASS	QUESTION	12.00	88	Yes	Yes	Shoemaker	RLS
10/23/2007	5	411	720	2,928	5.0	411.0	715.0	2517.0	PASS	PASS	PASS	PASS	16.79	90	Yes	Yes	Shoemaker	RLS
10/24/2007	1	409	712	2,918	1.0	409.0	711.0	2509.0	PASS	PASS	PASS	PASS	9.59	90	Yes	Yes	Shoemaker	RLS
10/25/2007	6	391	718	2,927	6.0	391.0	712.0	2536.0	PASS	PASS	PASS	PASS	18.03	88	Yes	Yes	Shoemaker	RLS
10/26/2007	4	406	675	2,924	4.0	406.0	671.0	2518.0	PASS	PASS	PASS	PASS	15.41	89	Yes	Yes	Shoemaker	RLS
10/29/2007	5	408	739	2,886	5.0	408.0	734.0	2478.0	PASS	PASS	PASS	QUESTION	16.79	89	Yes	Yes	Shoemaker	RLS
10/30/2007	4	401	682	2,858	4.0	401.0	678.0	2457.0	PASS	PASS	PASS	QUESTION	15.41	89	Yes	Yes	Shoemaker	RLS
10/31/2007	4	397	747	2,928	4.0	397.0	743.0	2531.0	PASS	PASS	QUESTION	PASS	15.41	88	Yes	Yes	Shoemaker	RLS
11/1/2007	7	372	664	2,825	7.0	372.0	657.0	2453.0	PASS	QUESTION	PASS	QUESTION	19.18	86	Yes	Yes	Shoemaker	RLS
11/2/2007	4	410	705	2,908	4.0	410.0	701.0	2498.0	PASS	PASS	PASS	PASS	15.41	90	Yes	Yes	Shoemaker	RLS
11/5/2007	2	418	721	2,979	2.0	418.0	719.0	2561.0	PASS	PASS	PASS	PASS	12.00	91	Yes	Yes	Shoemaker	RLS
11/6/2007	6	400	666	2,924	6.0	400.0	660.0	2524.0	PASS	PASS	PASS	PASS	18.03	89	Yes	Yes	Shoemaker	RLS
11/7/2007	4	403	699	2,955	4.0	403.0	695.0	2552.0	PASS	PASS	PASS	PASS	15.41	89	Yes	Yes	Larry Pawlus	LP
11/8/2007	1	406	671	3,072	1.0	406.0	670.0	2666.0	PASS	PASS	PASS	PASS	9.59	89	Yes	Yes	Shoemaker	RLS
11/9/2007	3	436	739	3,001	3.0	436.0	736.0	2565.0	PASS	PASS	PASS	PASS	13.85	92	Yes	Yes	Shoemaker	RLS
11/13/2007	3	405	720	3,049	3.0	405.0	717.0	2644.0	PASS	PASS	PASS	PASS	13.85	89	Yes	Yes	Shoemaker	RLS
11/14/2007	2	399	704	2,875	2.0	399.0	702.0	2476.0	PASS	PASS	PASS	QUESTION	12.00	89	Yes	Yes	Shoemaker	RLS
11/15/2007	6	396	660	3,027	6.0	396.0	654.0	2631.0	PASS	PASS	QUESTION	PASS	18.03	88	Yes	Yes	Shoemaker	RLS
11/16/2007	6	385	701	2,983	6.0	385.0	695.0	2598.0	PASS	PASS	PASS	PASS	18.03	87	Yes	Yes	Larry Pawlus	LP
11/26/2007	6	408	692	2,871	6.0	408.0	686.0	2463.0	PASS	PASS	PASS	QUESTION	18.03	89	Yes	Yes	Larry Pawlus	LP
11/27/2007	6	436	694	2,945	6.0	436.0	688.0	2509.0	PASS	PASS	PASS	PASS	18.03	92	Yes	Yes	Larry Pawlus	LP
11/28/2007	7	390	737	2,895	7.0	390.0	730.0	2505.0	PASS	PASS	PASS	PASS	19.18	88	Yes	Yes	Larry Pawlus	LP
11/29/2007	4	399	711	2,930	4.0	399.0	707.0	2531.0	PASS	PASS	PASS	PASS	15.41	89	Yes	Yes	Larry Pawlus	LP

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2360		Detector:		43-37		Calibration Date:		2/14/2007								
Serial #:			184938		Serial #:		PR216984		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							582												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm					
Alpha	0.0663	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	300	1	1	1.00	0.82	336.3	20.24					
Beta	0.1753	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	1000	1	1	420.20	30.91	2437.2	44.92					
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta							
10/11/2007	2	408	304	2,904	2.0	408.0	302.0	2496.0	PASS	PASS	PASS	PASS	24.82	95	Yes	Yes	Berliner	NMB	
10/12/2007	3	468	338	2856	3.0	468.0	335.0	2388.0	QUESTION	PASS	PASS	PASS	28.65	102	Yes	Yes	Shoemaker	RLS	
10/15/2007	2	399	330	2863	2.0	399.0	328.0	2464.0	PASS	PASS	PASS	PASS	24.82	94	Yes	Yes	Shoemaker	RLS	
10/16/2007	1	402	342	2763	1.0	402.0	341.0	2361.0	PASS	PASS	PASS	PASS	19.82	94	Yes	Yes	Shoemaker	RLS	
10/17/2007	1	390	330	2776	1.0	390.0	329.0	2386.0	PASS	PASS	PASS	PASS	19.82	93	Yes	Yes	Shoemaker	RLS	
10/18/2007	1	425	345	2885	1.0	425.0	344.0	2460.0	PASS	PASS	PASS	PASS	19.82	97	Yes	Yes	Shoemaker	RLS	
10/19/2007	1	447	343	2901	1.0	447.0	342.0	2454.0	PASS	PASS	PASS	PASS	19.82	99	Yes	Yes	Shoemaker	RLS	
10/22/2007	1	395	310	2829	1.0	395.0	309.0	2434.0	PASS	PASS	PASS	PASS	19.82	94	Yes	Yes	Shoemaker	RLS	
10/23/2007	2	404	373	2826	2.0	404.0	371.0	2422.0	PASS	PASS	PASS	PASS	24.82	95	Yes	Yes	Shoemaker	RLS	
10/24/2007	1	392	361	2871	1.0	392.0	360.0	2479.0	PASS	PASS	PASS	PASS	19.82	93	Yes	Yes	Shoemaker	RLS	
10/25/2007	1	393	300	2791	1.0	393.0	299.0	2398.0	PASS	PASS	PASS	PASS	19.82	93	Yes	Yes	Shoemaker	RLS	
10/26/2007	3	386	326	2811	3.0	386.0	323.0	2425.0	QUESTION	PASS	PASS	PASS	28.65	93	Yes	Yes	Shoemaker	RLS	
10/29/2007	2	387	345	2816	2.0	387.0	343.0	2429.0	PASS	PASS	PASS	PASS	24.82	93	Yes	Yes	Shoemaker	RLS	
10/30/2007	1	401	364	2884	1.0	401.0	363.0	2483.0	PASS	PASS	PASS	PASS	19.82	94	Yes	Yes	Shoemaker	RLS	
10/31/2007	1	410	368	2759	1.0	410.0	367.0	2349.0	PASS	PASS	PASS	PASS	19.82	95	Yes	Yes	Shoemaker	RLS	
11/1/2007	3	408	284	2933	3.0	408.0	281.0	2525.0	QUESTION	PASS	QUESTION	PASS	28.65	95	Yes	Yes	Shoemaker	RLS	
11/2/2007	2	384	331	2769	2.0	384.0	329.0	2385.0	PASS	PASS	PASS	PASS	24.82	92	Yes	Yes	Shoemaker	RLS	
11/5/2007	2	433	289	2848	2.0	433.0	287.0	2415.0	PASS	PASS	QUESTION	PASS	24.82	98	Yes	Yes	Shoemaker	RLS	
11/6/2007	2	452	345	2989	2.0	452.0	343.0	2537.0	PASS	PASS	PASS	QUESTION	24.82	100	Yes	Yes	Shoemaker	RLS	
11/7/2007	2	446	344	2874	2.0	446.0	342.0	2428.0	PASS	PASS	PASS	PASS	24.82	99	Yes	Yes	Shoemaker	RLS	
11/8/2007	3	391	380	2852	3.0	391.0	377.0	2461.0	QUESTION	PASS	QUESTION	PASS	28.65	93	Yes	Yes	Shoemaker	RLS	
11/9/2007	3	397	348	2801	3.0	397.0	345.0	2404.0	QUESTION	PASS	PASS	PASS	28.65	94	Yes	Yes	Shoemaker	RLS	
11/13/2007	3	390	315	2840	3.0	390.0	312.0	2450.0	QUESTION	PASS	PASS	PASS	28.65	93	Yes	Yes	Shoemaker	RLS	
11/14/2007	2	410	299	2788	2.0	410.0	297.0	2378.0	PASS	PASS	PASS	PASS	24.82	95	Yes	Yes	Larry Pawlus	LP	
11/15/2007	2	450	355	2945	2.0	450.0	353.0	2495.0	PASS	PASS	PASS	PASS	24.82	100	Yes	Yes	Larry Pawlus	LP	
11/16/2007	3	454	327	2945	3.0	454.0	324.0	2491.0	QUESTION	PASS	PASS	PASS	28.65	100	Yes	Yes	Shoemaker	RLS	
11/26/2007	1	459	329	2788	1.0	459.0	328.0	2329.0	PASS	PASS	PASS	QUESTION	19.82	101	Yes	Yes	Larry Pawlus	LP	
11/27/2007	3	397	351	2893	3.0	397.0	348.0	2496.0	QUESTION	PASS	PASS	PASS	28.65	94	Yes	Yes	Larry Pawlus	LP	
11/28/2007	3	407	329	2844	3.0	407.0	326.0	2437.0	QUESTION	PASS	PASS	PASS	28.65	95	Yes	Yes	Larry Pawlus	LP	
11/29/2007	3	450	314	2838	3.0	450.0	311.0	2388.0	QUESTION	PASS	PASS	PASS	28.65	100	Yes	Yes	Larry Pawlus	LP	

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]



# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2224		Detector:		43-68		Calibration Date:		1/18/2007								
Serial #:			183048		Serial #:		PR161781		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							126												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm					
Alpha	0.1783	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	500	1	1	0.90	0.99	904.1	38.38					
Beta	0.2413	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	1000	1	1	141.10	12.34	3354.2	48.50					
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta							
10/12/2007	1	140	950	3,579	1.0	140.0	949.0	3439.0	PASS	PASS	PASS	PASS	34.06	191	Yes	Yes	Shoemaker	RLS	
10/15/2007	1	130	875	3,512	1.0	130.0	874.0	3382.0	PASS	PASS	PASS	PASS	34.06	184	Yes	Yes	Shoemaker	RLS	
10/16/2007	0	131	847	3,577	0.0	131.0	847.0	3446.0	PASS	PASS	PASS	PASS	13.35	185	Yes	Yes	Shoemaker	RLS	
10/17/2007	1	151	859	3,561	1.0	151.0	858.0	3410.0	PASS	PASS	PASS	PASS	34.06	198	Yes	Yes	Shoemaker	RLS	
10/18/2007	1	140	886	3,466	1.0	140.0	885.0	3326.0	PASS	PASS	PASS	PASS	34.06	191	Yes	Yes	Shoemaker	RLS	
10/19/2007	2	120	835	3,524	2.0	120.0	833.0	3404.0	PASS	PASS	PASS	PASS	42.64	177	Yes	Yes	Shoemaker	RLS	
10/22/2007	1	163	846	3,431	1.0	163.0	845.0	3268.0	PASS	PASS	PASS	PASS	34.06	205	Yes	Yes	Shoemaker	RLS	
10/23/2007	0	128	815	3,370	0.0	128.0	815.0	3242.0	PASS	PASS	QUESTION	QUESTION	13.35	183	Yes	Yes	Shoemaker	RLS	
10/24/2007	1	160	931	3,456	1.0	160.0	930.0	3296.0	PASS	PASS	PASS	PASS	34.06	203	Yes	Yes	Shoemaker	RLS	
10/25/2007	3	153	887	3,604	3.0	153.0	884.0	3451.0	QUESTION	PASS	PASS	PASS	49.22	199	Yes	Yes	Shoemaker	RLS	
10/26/2007	2	150	887	3,567	2.0	150.0	885.0	3417.0	PASS	PASS	PASS	PASS	42.64	197	Yes	Yes	Shoemaker	RLS	
10/29/2007	1	142	869	3,531	1.0	142.0	868.0	3389.0	PASS	PASS	PASS	PASS	34.06	192	Yes	Yes	Shoemaker	RLS	
10/30/2007	2	149	949	3,631	2.0	149.0	947.0	3482.0	PASS	PASS	PASS	QUESTION	42.64	197	Yes	Yes	Shoemaker	RLS	
10/31/2007	0	121	957	3,470	0.0	121.0	957.0	3349.0	PASS	PASS	PASS	PASS	13.35	178	Yes	Yes	Shoemaker	RLS	
11/1/2007	3	153	969	3,571	3.0	153.0	966.0	3418.0	QUESTION	PASS	PASS	PASS	49.22	199	Yes	Yes	Shoemaker	RLS	
11/2/2007	0	144	944	3,598	0.0	144.0	944.0	3454.0	PASS	PASS	PASS	QUESTION	13.35	193	Yes	Yes	Shoemaker	RLS	
11/5/2007	0	147	988	3,616	0.0	147.0	988.0	3469.0	PASS	PASS	QUESTION	QUESTION	13.35	195	Yes	Yes	Shoemaker	RLS	
11/6/2007	2	149	1008	3,594	2.0	149.0	1006.0	3445.0	PASS	PASS	QUESTION	PASS	42.64	197	Yes	Yes	Shoemaker	RLS	
11/7/2007	1	150	965	3,604	1.0	150.0	964.0	3454.0	PASS	PASS	PASS	QUESTION	34.06	197	Yes	Yes	Larry Pawlus	LP	
11/8/2007	2	146	951	3,594	2.0	146.0	949.0	3448.0	PASS	PASS	PASS	PASS	42.64	195	Yes	Yes	Shoemaker	RLS	
11/9/2007	1	129	1006	3,570	1.0	129.0	1005.0	3441.0	PASS	PASS	QUESTION	PASS	34.06	184	Yes	Yes	Shoemaker	RLS	
11/13/2007	1	165	895	3,517	1.0	165.0	894.0	3352.0	PASS	PASS	PASS	PASS	34.06	206	Yes	Yes	Shoemaker	RLS	
11/14/2007	2	155	975	3,490	2.0	155.0	973.0	3335.0	PASS	PASS	PASS	PASS	42.64	200	Yes	Yes	Larry Pawlus	LP	
11/15/2007	2	164	933	3,534	2.0	164.0	931.0	3370.0	PASS	PASS	PASS	PASS	42.64	206	Yes	Yes	Larry Pawlus	LP	
11/16/2007	2	171	995	3,501	2.0	171.0	993.0	3330.0	PASS	QUESTION	QUESTION	PASS	42.64	210	Yes	Yes	Shoemaker	RLS	
11/26/2007	3	147	941	3,546	3.0	147.0	938.0	3399.0	QUESTION	PASS	PASS	PASS	49.22	195	Yes	Yes	Larry Pawlus	LP	
11/27/2007	3	165	942	3,520	3.0	165.0	939.0	3355.0	QUESTION	PASS	PASS	PASS	49.22	206	Yes	Yes	Larry Pawlus	LP	
11/28/2007	3	156	987	3,565	3.0	156.0	984.0	3409.0	QUESTION	PASS	QUESTION	PASS	49.22	201	Yes	Yes	Larry Pawlus	LP	
11/29/2007	3	147	974	3,564	3.0	147.0	971.0	3417.0	QUESTION	PASS	PASS	PASS	49.22	195	Yes	Yes	Larry Pawlus	LP	

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

										Trial MDA Calculator	$\alpha$	$\beta$
										Sample Count Time (min)	1	
Initial Background and Source Counts for Control Chart										Bkg Count Rate (cpm)	0.1	
#	Initial bkg counts				Initial source plus bkg counts					Bkg Count Time (min)	1	
	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm		Counter Efficiency	0.178325	0.24131
1	2	2	119	119	942	942	3504	3504		MDCR (cpm)	4.471333	#DIV/0!
2	0	0	145	145	888	888	3448	3448		MDA (dpm)	25.074	#DIV/0!
3	2	2	133	133	900	900	3437	3437				
4	1	1	137	137	912	912	3448	3448				
5	0	0	154	154	973	973	3473	3473				
6	2	2	148	148	901	901	3548	3548				
7	0	0	154	154	857	857	3524	3524				
8	2	2	125	125	873	873	3557	3557				
9	0	0	143	143	860	860	3544	3544				
10	0	0	153	153	944	944	3470	3470				
Mean		0.90		141.1		905.0		3495.3				
S <sub>(n-1)</sub>		0.99		12.34		38.36		45.78				
-3 sigma		-2.08		104.07		789.91		3357.95				
+3 sigma		3.88		178.13		1020.09		3632.65				
-2 sigma		-1.09		116.42		828.27		3403.73				
+2 sigma		2.89		165.78		981.73		3586.87				
					Mean-bkg	904.1		3354.2				
					S <sub>(n-1)</sub>	38.38		48.50				
				Mean-bkg	-3 sigma	788.96		3208.70				
				Mean-bkg	+3 sigma	1019.24		3499.70				
				Mean-bkg	-2 sigma	827.34		3257.20				
				Mean-bkg	+2 sigma	980.86		3451.20				
						940		3385				
						888		3303				
						898		3304				
						911		3311				
						973		3319				
						899		3400				
						857		3370				
						871		3432				
						860		3401				
						944		3317				

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2224		Detector:		43-89		Calibration Date:		7/30/2007							
Serial #:			110002		Serial #:		PR164832		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							100											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.1598	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	100	1	1	1.00	0.94	790.2	38.96				
Beta	0.0720	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	1500	1	1	243.80	27.08	1161.3	40.12				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
10/11/2007	0	236	798	1345	0.0	236.0	798.0	1109.0	PASS	PASS	PASS	PASS	18.77	1034	Yes	Yes	Shoemaker	RLS
10/12/2007	1	210	761	1399	1.0	210.0	760.0	1189.0	PASS	PASS	PASS	PASS	47.89	978	Yes	Yes	Shoemaker	RLS
10/15/2007	2	203	777	1332	2.0	203.0	775.0	1129.0	PASS	PASS	PASS	PASS	59.95	962	Yes	Yes	Shoemaker	RLS
10/16/2007	0	202	735	1353	0.0	202.0	735.0	1151.0	PASS	PASS	PASS	PASS	18.77	960	Yes	Yes	Shoemaker	RLS
10/17/2007	0	213	802	1339	0.0	213.0	802.0	1126.0	PASS	PASS	PASS	PASS	18.77	985	Yes	Yes	Shoemaker	RLS
10/18/07 R	0	203	830	1386	0.0	203.0	830.0	1183.0	PASS	PASS	PASS	PASS	18.77	962	Yes	Yes	Shoemaker	RLS
10/19/2007	1	210	765	1387	1.0	210.0	764.0	1177.0	PASS	PASS	PASS	PASS	47.89	978	Yes	Yes	Shoemaker	RLS
10/22/2007	3	238	792	1430	3.0	238.0	789.0	1192.0	QUESTION	PASS	PASS	PASS	69.20	1039	Yes	Yes	Shoemaker	RLS
10/23/2007	2	244	795	1445	2.0	244.0	793.0	1201.0	PASS	PASS	PASS	PASS	59.95	1051	Yes	Yes	Shoemaker	RLS
10/24/2007	0	226	791	1409	0.0	226.0	791.0	1183.0	PASS	PASS	PASS	PASS	18.77	1013	Yes	Yes	Shoemaker	RLS
10/25/2007	0	212	815	1367	0.0	212.0	815.0	1155.0	PASS	PASS	PASS	PASS	18.77	983	Yes	Yes	Shoemaker	RLS
10/26/2007	2	237	801	1367	2.0	237.0	799.0	1130.0	PASS	PASS	PASS	PASS	59.95	1037	Yes	Yes	Shoemaker	RLS
10/29/2007	0	210	780	1402	0.0	210.0	780.0	1192.0	PASS	PASS	PASS	PASS	18.77	978	Yes	Yes	Shoemaker	RLS
10/30/2007	0	215	820	1400	0.0	215.0	820.0	1185.0	PASS	PASS	PASS	PASS	18.77	989	Yes	Yes	Shoemaker	RLS
10/31/2007	0	286	796	1434	0.0	286.0	796.0	1148.0	PASS	PASS	PASS	PASS	18.77	1135	Yes	Yes	Shoemaker	RLS
11/1/2007	3	233	791	1308	3.0	233.0	788.0	1075.0	QUESTION	PASS	PASS	QUESTION	69.20	1028	Yes	Yes	Shoemaker	RLS
11/2/2007	2	220	862	1266	2.0	220.0	860.0	1046.0	PASS	PASS	PASS	QUESTION	59.95	1000	Yes	Yes	Shoemaker	RLS
11/5/2007	0	223	764	1298	0.0	223.0	764.0	1075.0	PASS	PASS	PASS	QUESTION	18.77	1007	Yes	Yes	Shoemaker	RLS
11/6/2007	1	224	815	1320	1.0	224.0	814.0	1096.0	PASS	PASS	PASS	PASS	47.89	1009	Yes	Yes	Shoemaker	RLS
11/7/2007	0	206	753	1330	0.0	206.0	753.0	1124.0	PASS	PASS	PASS	PASS	18.77	969	Yes	Yes	Shoemaker	RLS
11/8/2007	2	212	775	1296	2.0	212.0	773.0	1084.0	PASS	PASS	PASS	PASS	59.95	983	Yes	Yes	Shoemaker	RLS
11/9/2007	3	222	774	1286	3.0	222.0	771.0	1064.0	QUESTION	PASS	PASS	QUESTION	69.20	1005	Yes	Yes	Shoemaker	RLS
11/13/2007	2	225	800	1282	2.0	225.0	798.0	1057.0	PASS	PASS	PASS	QUESTION	59.95	1011	Yes	Yes	Larry Pawlus	LP
11/14/2007	2	216	768	1330	2.0	216.0	766.0	1114.0	PASS	PASS	PASS	PASS	59.95	991	Yes	Yes	Larry Pawlus	LP
11/15/2007	2	215	803	1387	2.0	215.0	801.0	1172.0	PASS	PASS	PASS	PASS	59.95	989	Yes	Yes	Shoemaker	RLS
11/16/2007	3	237	764	1335	3.0	237.0	761.0	1098.0	QUESTION	PASS	PASS	PASS	69.20	1037	Yes	Yes	Larry Pawlus	LP
11/26/2007	3	213	767	1395	3.0	213.0	764.0	1182.0	QUESTION	PASS	PASS	PASS	69.20	985	Yes	Yes	Larry Pawlus	LP
11/27/2007	2	230	827	1333	2.0	230.0	825.0	1103.0	PASS	PASS	PASS	PASS	59.95	1022	Yes	Yes	Larry Pawlus	LP
11/28/2007	3	219	738	1308	3.0	219.0	735.0	1089.0	QUESTION	PASS	PASS	PASS	69.20	998	Yes	Yes	Larry Pawlus	LP
11/29/2007	3	233	764	1318	3.0	233.0	761.0	1085.0	QUESTION	PASS	PASS	PASS	69.20	1028	Yes	Yes	Larry Pawlus	LP



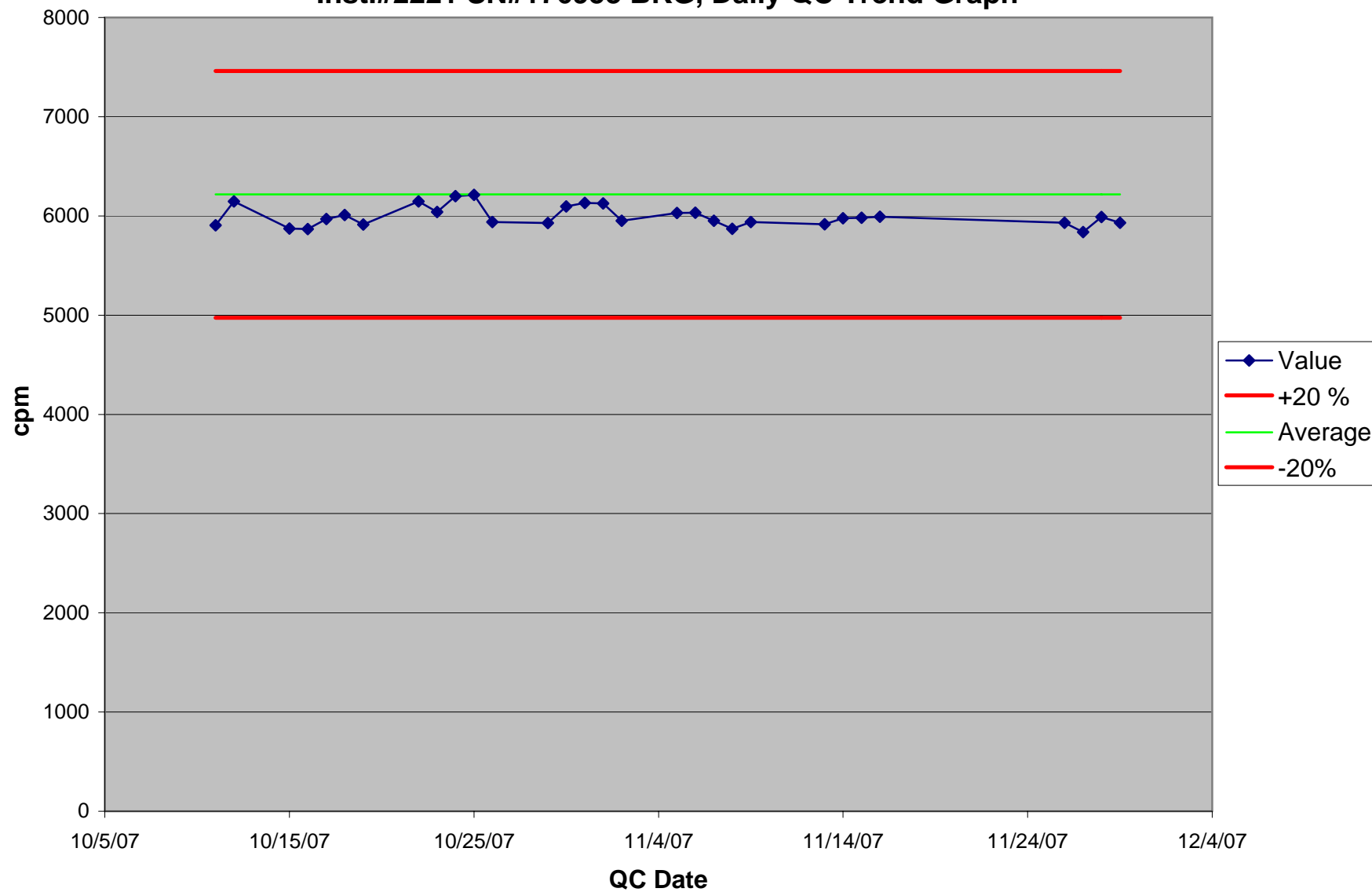
# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

Inst.#2221 SN#176953 BKG		
QC Daily Source		
Date	Result (cpm)	P/F
10/11/2007	5906	Pass
10/12/2007	6145	Pass
10/15/2007	5874	Pass
10/16/2007	5868	Pass
10/17/2007	5970	Pass
10/18/2007	6010	Pass
10/19/2007	5914	Pass
10/22/2007	6145	Pass
10/23/2007	6041	Pass
10/24/2007	6199	Pass
10/25/2007	6213	Pass
10/26/2007	5939	Pass
10/29/2007	5928	Pass
10/30/2007	6096	Pass
10/31/2007	6131	Pass
11/1/2007	6127	Pass
11/2/2007	5950	Pass
11/5/2007	6030	Pass
11/6/2007	6032	Pass
11/7/2007	5950	Pass
11/8/2007	5870	Pass
11/9/2007	5939	Pass
11/13/2007	5917	Pass
11/14/2007	5977	Pass
11/15/2007	5981	Pass
11/16/2007	5992	Pass
11/26/2007	5930	Pass
11/27/2007	5837	Pass
11/28/2007	5988	Pass
11/29/2007	5931	Pass

Inst.#2221 SN#176953 BKG	
Initial Source Readings	
Date	Result (cpm)
10/10/2007	6208
10/10/2007	6268
10/10/2007	6320
10/10/2007	6380
10/10/2007	6158
10/10/2007	6105
10/10/2007	6401
10/10/2007	6057
10/10/2007	6261
10/10/2007	6017
	Average
	6218

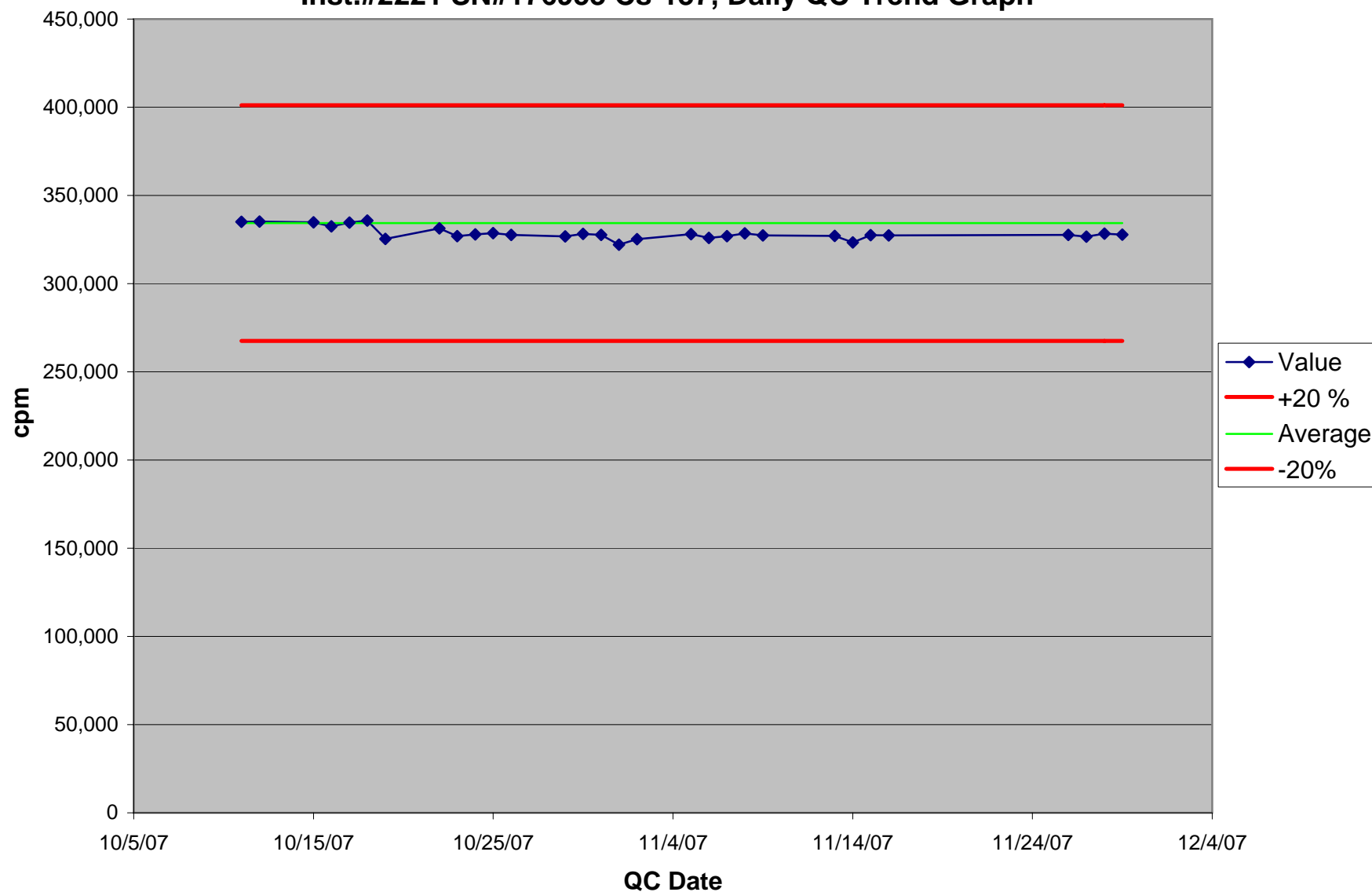
**Inst.#2221 SN#176953 BKG, Daily QC Trend Graph**



Inst.#2221 SN#176953 Cs-137		
QC Daily Source		
Date	Result (cpm)	P/F
10/11/2007	335,049	Pass
10/12/2007	335,169	Pass
10/15/2007	334,788	Pass
10/16/2007	332,517	Pass
10/17/2007	334,627	Pass
10/18/2007	335,688	Pass
10/19/2007	325,345	Pass
10/22/2007	331,352	Pass
10/23/2007	326,864	Pass
10/24/2007	327,942	Pass
10/25/2007	328,688	Pass
10/26/2007	327,694	Pass
10/29/2007	326,816	Pass
10/30/2007	328,182	Pass
10/31/2007	327,687	Pass
11/1/2007	322,032	Pass
11/2/2007	325,278	Pass
11/5/2007	328,026	Pass
11/6/2007	325,859	Pass
11/7/2007	326,868	Pass
11/8/2007	328,494	Pass
11/9/2007	327,337	Pass
11/13/2007	327,026	Pass
11/14/2007	323,293	Pass
11/15/2007	327,553	Pass
11/16/2007	327,281	Pass
11/26/2007	327,567	Pass
11/27/2007	326,690	Pass
11/28/2007	328,408	Pass
11/29/2007	327,752	Pass

Inst.#2221 SN#176953 Cs-137	
Initial Source Readings	
Date	Result (cpm)
10/10/2007	335,267
10/10/2007	334,504
10/10/2007	333,511
10/10/2007	334,247
10/10/2007	333,382
10/10/2007	335,704
10/10/2007	333,868
10/10/2007	335,406
10/10/2007	334,443
10/10/2007	333,044
	Average
	334338

**Inst.#2221 SN#176953 Cs-137, Daily QC Trend Graph**



# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:		43-10-1		Calibration Date:		9/21/2007							
Serial #:			142645		Serial #:		PR156519		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							100											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average $\alpha/\beta$ cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average $\alpha/\beta$ cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3487	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	20	20	1	0.22	0.23	1767.7	50.44				
Beta	0.1815	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	200	20	1	37.21	8.43	2522.2	48.59				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA $\alpha$ (dpm)	MDA $\beta$ (dpm)	$\alpha$ MDA OK?	$\beta$ MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
10/11/2007	0	642	1,787	2,604	0.0	32.1	1787.0	2571.9	PASS	PASS	PASS	PASS	8.60	122	Yes	Yes	Shoemaker	RLS
10/12/2007	9	666	1,709	2,482	0.5	33.3	1708.6	2448.7	PASS	PASS	PASS	PASS	15.09	124	Yes	Yes	Shoemaker	RLS
10/15/2007	4	656	1,735	2,636	0.2	32.8	1734.8	2603.2	PASS	PASS	PASS	PASS	12.93	123	Yes	Yes	Berliner	NMB
10/16/2007	6	612	1,742	2,610	0.3	30.6	1741.7	2579.4	PASS	PASS	PASS	PASS	13.90	119	Yes	Yes	Shoemaker	RLS
10/17/2007	0	625	1,818	2,596	0.0	31.3	1818.0	2564.8	PASS	PASS	PASS	PASS	8.60	120	Yes	Yes	Shoemaker	RLS
10/18/2007	3	651	1,714	2,581	0.2	32.6	1713.9	2548.5	PASS	PASS	PASS	PASS	12.35	123	Yes	Yes	Shoemaker	RLS
10/19/2007	5	646	1,830	2,600	0.3	32.3	1829.8	2567.7	PASS	PASS	PASS	PASS	13.44	122	Yes	Yes	Shoemaker	RLS
10/22/2007	2	628	1,734	2,590	0.1	31.4	1733.9	2558.6	PASS	PASS	PASS	PASS	11.66	121	Yes	Yes	Shoemaker	RLS
10/23/2007	3	626	1,739	2,634	0.2	31.3	1738.9	2602.7	PASS	PASS	PASS	PASS	12.35	120	Yes	Yes	Shoemaker	RLS
10/24/2007	7	637	1,768	2,467	0.4	31.9	1767.7	2435.2	PASS	PASS	PASS	PASS	14.32	121	Yes	Yes	Shoemaker	RLS
10/25/2007	3	594	1,759	2,636	0.2	29.7	1758.9	2606.3	PASS	PASS	PASS	PASS	12.35	118	Yes	Yes	Shoemaker	RLS
10/26/2007	2	619	1,748	2,584	0.1	31.0	1747.9	2553.1	PASS	PASS	PASS	PASS	11.66	120	Yes	Yes	Shoemaker	RLS
10/29/2007	1	617	1,759	2,595	0.1	30.9	1759.0	2564.2	PASS	PASS	PASS	PASS	10.77	120	Yes	Yes	Shoemaker	RLS
10/30/2007	3	629	1,780	2,575	0.2	31.5	1779.9	2543.6	PASS	PASS	PASS	PASS	12.35	121	Yes	Yes	Shoemaker	RLS
10/31/2007	0	626	1,767	2,500	0.0	31.3	1767.0	2468.7	PASS	PASS	PASS	PASS	8.60	120	Yes	Yes	Shoemaker	RLS
11/1/2007	1	650	1,723	2,688	0.1	32.5	1723.0	2655.5	PASS	PASS	PASS	QUESTION	10.77	122	Yes	Yes	Shoemaker	RLS
11/2/2007	4	630	1,812	2,449	0.2	31.5	1811.8	2417.5	PASS	PASS	PASS	QUESTION	12.93	121	Yes	Yes	Shoemaker	RLS
11/5/2007	8	713	1,771	2,559	0.4	35.7	1770.6	2523.4	PASS	PASS	PASS	PASS	14.72	127	Yes	Yes	Shoemaker	RLS
11/6/2007	3	619	1,738	2,540	0.2	31.0	1737.9	2509.1	PASS	PASS	PASS	PASS	12.35	120	Yes	Yes	Shoemaker	RLS
11/7/2007	5	654	1,717	2,504	0.3	32.7	1716.8	2471.3	PASS	PASS	PASS	PASS	13.44	123	Yes	Yes	Larry Pawlus	LP
11/8/2007	9	582	1,764	2,550	0.5	29.1	1763.6	2520.9	PASS	PASS	PASS	PASS	15.09	117	Yes	Yes	Shoemaker	RLS
11/9/2007	8	644	1,725	2,571	0.4	32.2	1724.6	2538.8	PASS	PASS	PASS	PASS	14.72	122	Yes	Yes	Shoemaker	RLS
11/13/2007	3	657	1,769	2,579	0.2	32.9	1768.9	2546.2	PASS	PASS	PASS	PASS	12.35	123	Yes	Yes	Shoemaker	RLS
11/14/2007	4	670	1,820	2,559	0.2	33.5	1819.8	2525.5	PASS	PASS	PASS	PASS	12.93	124	Yes	Yes	Larry Pawlus	LP
11/15/2007	10	618	1,735	2,559	0.5	30.9	1734.5	2528.1	PASS	PASS	PASS	PASS	15.44	120	Yes	Yes	Larry Pawlus	LP
11/16/2007	7	634	1,766	2,566	0.4	31.7	1765.7	2534.3	PASS	PASS	PASS	PASS	14.32	121	Yes	Yes	Berliner	NMB

# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

										Trial MDA Calculator	$\alpha$	$\beta$
										Sample Count Time (min)	1	
										Bkg Count Rate (cpm)	0.1	
										Bkg Count Time (min)	1	
										Counter Efficiency	0.348659	0.181453
										MDCR (cpm)	4.471333	#DIV/0!
										MDA (dpm)	12.82438	#DIV/0!
<b>Initial Background and Source Counts for Control Chart</b>												
	<b>Initial bkg counts</b>				<b>Initial source plus bkg counts</b>							
<b>#</b>	<b>Alpha</b>	<b>cpm</b>	<b>Beta</b>	<b>cpm</b>	<b>Alpha</b>	<b>cpm</b>	<b>Beta</b>	<b>cpm</b>				
1	10	0.5	638	31.9	1,845	1845	2,572	2572				
2	14	0.7	670	33.5	1,750	1750	2,622	2622				
3	5	0.25	615	30.75	1,778	1778	2,550	2550				
4	3	0.15	612	30.6	1,773	1773	2,554	2554				
5	0	0	631	31.55	1,775	1775	2,535	2535				
6	2	0.1	981	49.05	1,781	1781	2,563	2563				
7	6	0.3	1,082	54.1	1,686	1686	2,587	2587				
8	2	0.1	850	42.5	1,686	1686	2,565	2565				
9	2	0.1	721	36.05	1,818	1818	2,442	2442				
10	0	0	642	32.1	1,787	1787	2,604	2604				
Mean		0.22		37.2		1767.9		2559.4				
S <sub>(n-1)</sub>		0.23		8.43		50.45		48.73				
-3 sigma		-0.46		11.91		1616.56		2413.22				
+3 sigma		0.90		62.51		1919.24		2705.58				
-2 sigma		-0.23		20.34		1667.00		2461.95				
+2 sigma		0.67		54.08		1868.80		2656.85				
					Mean-bkg	1767.7		2522.2				
					S <sub>(n-1)</sub>	50.44		48.59				
				Mean-bkg	-3 sigma	1616.35		2376.43				
				Mean-bkg	+3 sigma	1919.01		2667.95				
				Mean-bkg	-2 sigma	1666.80		2425.02				
				Mean-bkg	+2 sigma	1868.56		2619.36				
						1844.5		2540.1				
						1749.3		2588.5				
						1777.75		2519.25				
						1772.85		2523.4				
						1775		2503.45				
						1780.9		2513.95				
						1685.7		2532.9				
						1685.9		2522.5				
						1817.9		2405.95				
						1787		2571.9				

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:		43-10-1		Calibration Date:		9/21/2007							
Serial #:			142645		Serial #:		PR156519		12 month calibration:		OK							
Detector Active Area or Area Covered by Smear (cm <sup>2</sup> ):							100											
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	T <sub>1/2</sub> (yr)	Source Decayed Activity	Required MDA (DPM/100cm <sup>2</sup> )	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source- Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3487	Th-230	1136	5,070	7/18/2006	7.54E+04	5,070	20	20	1	0.22	0.23	1767.7	50.44				
Beta	0.1979	Tc-99	1195	13,900	7/26/2007	2.11E+05	13,900	200	20	1	37.21	8.43	2750.5	52.07				
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
11/26/2007	7	744	1,750	2,878	0.4	37.2	1749.7	2840.8	PASS	PASS	PASS	PASS	14.32	119	Yes	Yes	Shoemaker	RLS
11/27/2007	7	667	1,789	2,638	0.4	33.4	1788.7	2604.7	PASS	PASS	PASS	QUESTION	14.32	114	Yes	Yes	Larry Pawlus	LP
11/28/2007	7	676	1,759	2,795	0.4	33.8	1758.7	2761.2	PASS	PASS	PASS	PASS	14.32	114	Yes	Yes	Larry Pawlus	LP
11/29/2007	7	733	1,749	2,811	0.4	36.7	1748.7	2774.4	PASS	PASS	PASS	PASS	14.32	118	Yes	Yes	Larry Pawlus	LP



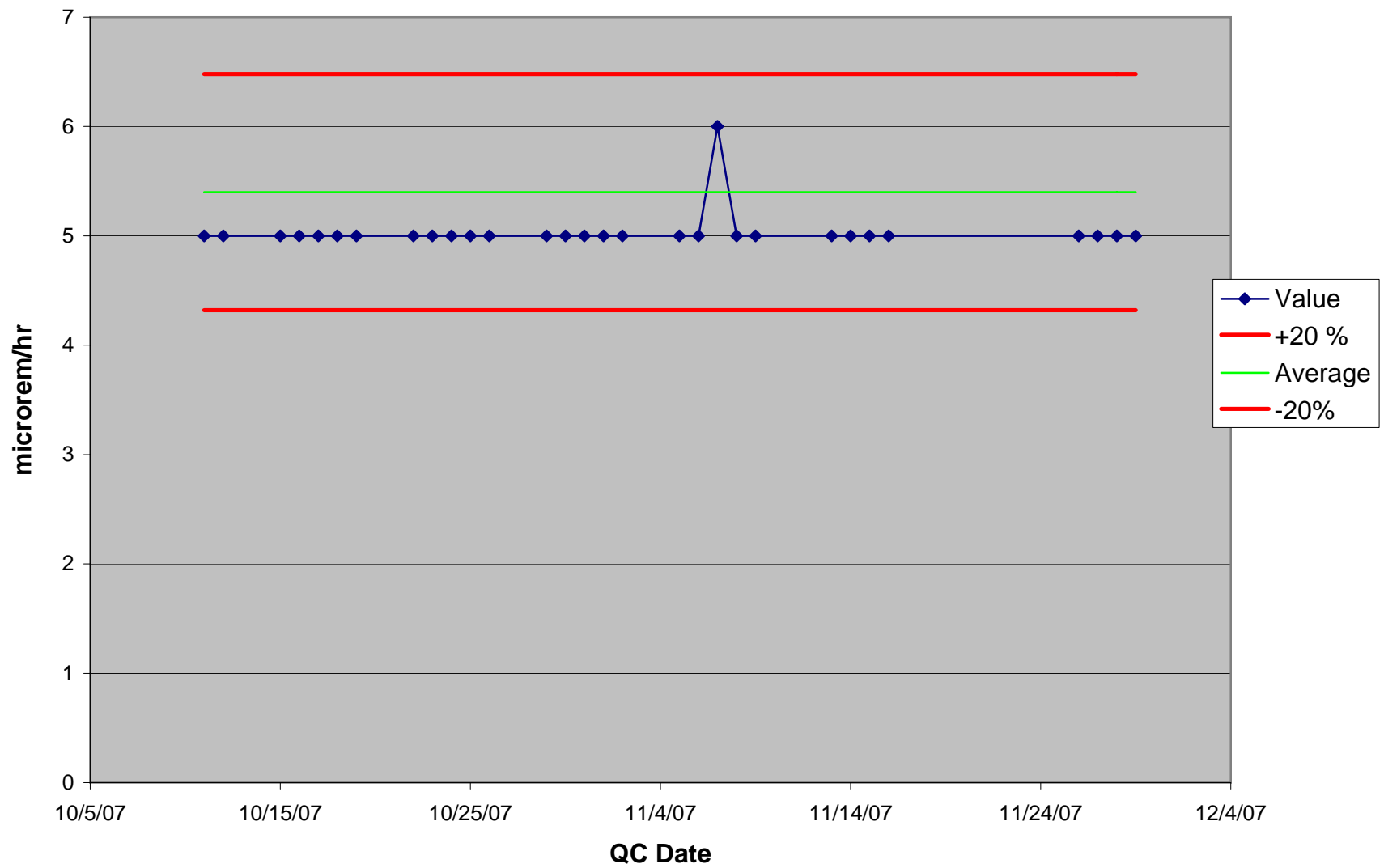
# CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

[illegible]

Micro Rem SN#1490 BKGD		
QC Daily Source		
Date	Result (µrem/hr)	P/F
10/11/2007	5	Pass
10/12/2007	5	Pass
10/15/2007	5	Pass
10/16/2007	5	Pass
10/17/2007	5	Pass
10/18/2007	5	Pass
10/19/2007	5	Pass
10/22/2007	5	Pass
10/23/2007	5	Pass
10/24/2007	5	Pass
10/25/2007	5	Pass
10/26/2007	5	Pass
10/29/2007	5	Pass
10/30/2007	5	Pass
10/31/2007	5	Pass
11/1/2007	5	Pass
11/2/2007	5	Pass
11/5/2007	5	Pass
11/6/2007	5	Pass
11/7/2007	6	Pass
11/8/2007	5	Pass
11/9/2007	5	Pass
11/13/2007	5	Pass
11/14/2007	5	Pass
11/15/2007	5	Pass
11/16/2007	5	Pass
11/26/2007	5	Pass
11/27/2007	5	Pass
11/28/2007	5	Pass
11/29/2007	5	Pass

Micro Rem SN#1490 BKGD	
Initial Source Readings	
Date	Result (µrem/hr)
10/11/2007	6
10/11/2007	6
10/11/2007	7
10/11/2007	5
10/11/2007	4
10/11/2007	5
10/11/2007	5
10/11/2007	5
10/11/2007	5
10/11/2007	6
	Average
	5

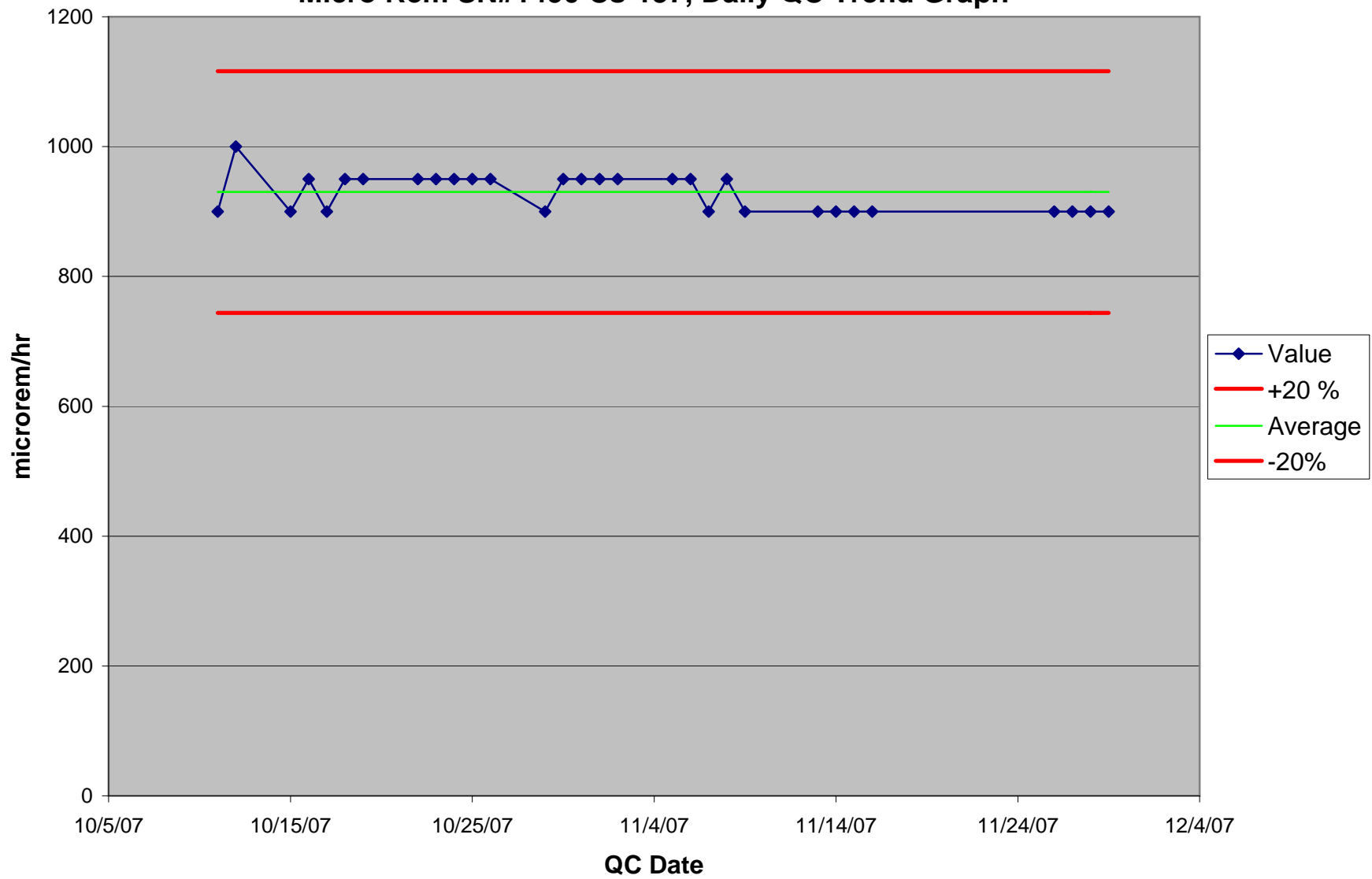
Micro Rem SN#1490 BKGD, Daily QC Trend Graph

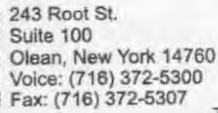


Micro Rem SN#1490 Cs-137		
QC Daily Source		
Date	Result (µrem/hr)	P/F
10/11/2007	900	Pass
10/12/2007	1000	Pass
10/15/2007	900	Pass
10/16/2007	950	Pass
10/17/2007	900	Pass
10/18/2007	950	Pass
10/19/2007	950	Pass
10/22/2007	950	Pass
10/23/2007	950	Pass
10/24/2007	950	Pass
10/25/2007	950	Pass
10/26/2007	950	Pass
10/29/2007	900	Pass
10/30/2007	950	Pass
10/31/2007	950	Pass
11/1/2007	950	Pass
11/2/2007	950	Pass
11/5/2007	950	Pass
11/6/2007	950	Pass
11/7/2007	900	Pass
11/8/2007	950	Pass
11/9/2007	900	Pass
11/13/2007	900	Pass
11/14/2007	900	Pass
11/15/2007	900	Pass
11/16/2007	900	Pass
11/26/2007	900	Pass
11/27/2007	900	Pass
11/28/2007	900	Pass
11/29/2007	900	Pass

Micro Rem SN#1490 Cs-137	
Initial Source Readings	
Date	Result (µrem/hr)
10/11/2007	900
10/11/2007	900
10/11/2007	1000
10/11/2007	900
10/11/2007	900
10/11/2007	1000
10/11/2007	1000
10/11/2007	900
10/11/2007	900
10/11/2007	900
	Average
	930

Micro Rem SN#1490 Cs-137, Daily QC Trend Graph





This Certificate will be accompanied by Calibration Charts or Readings where Applicable

## Statement of Certification

MJW Technical Services, Inc certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NC SL Z540-1-1994 and ANSI N323. The Instrument listed above was inspected prior to shipment and it met all the manufacturer's published operating specifications. (MJW technical Services is not responsible for damage incurred during shipment or use of this instrument).

Instrument		Reviewed By: <i>Linda M. Lund</i>	Date: <i>2/14/07</i>
Calibrated By: <i>[Signature]</i>			
Calibration Date: <i>02/14/2007</i>		Calibration Due: <i>02/14/2008</i>	





Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES

ORDER NO. 279885/315168

Mfg. Ludlum Measurements, Inc. Model 2360

Serial No. 184938

Mfg. Ludlum Measurements, Inc. Model 43-37

Serial No. PR-178371

Cal. Date 19-Jul-07 Cal Due Date 19-Jul-08 Cal. Interval 1 Year Meterface 202-855

Check mark ☒ Applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 51 % Alt 700.8 mm Hg

- ☐ New Instrument ☐ Instrument Received ☐ Within Toler.  $\pm 10\%$  ☐ 10-20% ☐ Out of Tol. ☒ Requiring Repair ☐ Other-See comments
- ☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
- ☐ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☒ Geotropism
- ☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC
- ☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1675 V

☒ HV Readout (2 points) Ref./Inst. 500 / 510 V Ref./Inst. 1500 / 1500 V

Firmware Version: 39010a25

(EEPROM Settings)

Alpha Threshold: 100mV

User Time: 1.0

Beta Threshold: 4mV

Alpha Alarm: 50000

Beta Window: 40mV

Beta Alarm: 50000

Overload Checked but not set

A/B Alarm: 50000

Instrument calibrated with a 5' cable.

Model 2360 Date: 7/19/07

High voltage set with detector disconnected

Calibration Date Due: 7/19/08

## COMMENTS:

Eff. for Tc99sn:5280-04A, Eff.  $\approx 32\% \pi$ , Source count  $\approx 30499$ cpm - 685cpm background, Source size = 93200dpm  
Eff. for Th230sn:1495, Eff.  $\approx 18\% \pi$ , Source count  $\approx 3556$ cpm - 3cpm background, Source size = 19800dpm  
Eff. for Sr90Y90sn:5281-04, Eff.  $\approx 30\% \pi$ , Source count  $\approx 34718$ cpm - 685cpm background, Source size = 111222dpm  
Eff. for Ni63sn:, Eff.  $\approx 4.5\% \pi$ , Source count  $\approx 13853$ cpm - 685cpm background, Source size = 288558dpm

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	N/A	400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400kcpm		400
x1	100kcpm		100

\*Uncertainty within  $\pm 10\%$  C.F. within  $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		
400kcpm	N/A	39841 (0)			
40kcpm		3968			
4kcpm		399			
400cpm		40			
40cpm		4			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

## Reference Instruments and/or Sources:

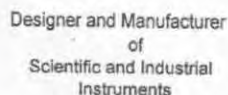
☐ S-394/1122 ☐ 1131 ☐ 781  
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☒ Alpha S/N Th230sn:1495 ☒ Beta S/N Sr90Y90sn:5281-04, Ni63sn:4017 ☐ Other Tc99sn:5280-04A

☒ m 500 S/N 50800 ☐ Oscilloscope S/N  ☒ Multimeter S/N 83990502

Calibrated By: Charles Disk Date 19 July 07

Reviewed By: Rhonda Hami Date 19 Jul 07



**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556 U.S.A.

Detector	<u>43-37</u>	Serial No.	<u>PR-178371</u>	Order #.	<u>279885/315168</u>
Customer	<u>CABRERA SERVICES</u>			Alpha Input Sensitivity	<u>100</u> mV
Counter	<u>2360</u>	Serial No.	<u>184938</u>	Beta Input Sensitivity	<u>4</u> mV
Count Time	<u>1Minute</u>			Beta Window	<u>40</u> mV
Other	<u>Calibrated w/5' cable</u>			Distance Source to Detector	<u>Surface</u>

[illegible]

- |  |  |
|--|--|
| <input type="checkbox"/> Gas Proportional detector count rate decreased            | ≤ 10% after 15 hour static test using 39" cable.                       |
| <input checked="" type="checkbox"/> Gas proportional detector count rate decreased | ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter. |

Signature

Date \_\_\_\_\_





Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

LUDLUM MEASUREMENTS, INC.  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

### Bench Test Data For Detector

Detector 43-37 Serial No. PR-178371 Order # 279885/315168  
Customer CABRERA SERVICES  
Counter 2360 Serial No. 184938 Alpha Input Sensitivity 100 mV  
Count Time 1Minute Beta Input Sensitivity 4 mV  
Other Calibrated w/5' cable Beta Window 40 mV  
Distance Source to Detector Surface

High Voltage	Background		Isotope <u>NI 63</u> Size <u>288558 dpm</u>		Isotope _____ Size _____		Isotope _____ Size _____	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
<u>1650</u>	<u>2</u>	<u>470</u>	<u>0</u>	<u>12863</u>				
<u>1675</u>	<u>3</u>	<u>685</u>	<u>1</u>	<u>13853</u>				
<u>1700</u>	<u>6</u>	<u>812</u>	<u>1</u>	<u>14095</u>				
<u>1725</u>	<u>2</u>	<u>1026</u>	<u>2</u>	<u>14653</u>				

- ☐ Gas Proportional detector count rate decreased  $\leq 10\%$  after 15 hour static test using 39" cable.  
☒ Gas proportional detector count rate decreased  $\leq 10\%$  after 5 hour static test using 39" cable and alpha/beta counter.

Signature

Charles disk

Date

19 July 07



Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES

ORDER NO. 269548 / 309434

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 183048

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR-161781

Cal. Date 18-Jan-07 Cal Due Date 18-Jan-08 Cal. Interval 1 Year Meterface 202-783

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 20 % Alt 705.8 mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler.  $\pm 10\%$  ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☐ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☒ Geotropism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC

☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1625 V Input Sens. Comments mV Det. Oper. 1625 V at Comments mV Threshold Dial Ratio = mV

☒ HV Readout (2 points) Ref./Inst. 500 / 505 V Ref./Inst. 2000 / 1995 V

## COMMENTS:

Input Sensitivity: Alpha = 120mV  
Beta = 3.5mV  
Beta WIN = 50mV

Firmware: 390063  
Overload checked but not set.  
Calibrated using 5' C-cable.

## 4pi Efficiencies:

Th230: Source size = 19,800 dpm, Background = 0 cpm, Source count = 3,963 cpm, Efficiency  $\approx 20.02\%$   
Tc99: Source size = 33,200 dpm, Background = 256 cpm, Source count = 11,502 cpm, Efficiency  $\approx 33.87\%$   
Ni-63: Source size = 289,557 dpm, Background = 256 cpm, Source count = 21,442 cpm, Efficiency  $\approx 7.32\%$   
SrY90: Source size = 112,569 dpm, Background = 256 cpm, Source count = 41,465 cpm, Efficiency  $\approx 36.61\%$

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400k cpm	400	400
x1000	100k cpm	100	100
x100	40k cpm	400	400
x100	10k cpm	100	100
x10	4k cpm	400	400
x10	1k cpm	100	100
x1	400 cpm	400	400
x1	100 cpm	100	100

\*Uncertainty within  $\pm 10\%$  C.F. within  $\pm 20\%$

ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400k cpm	39930(0)	39930(0)	Log Scale			
	40k cpm	3994	3994				
	4k cpm	399	399				
	400 cpm	40	40				
	40 cpm	4	4				

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394 ☐ 1122 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☒ Alpha S/N Th230 s/n 121495 ☒ Beta S/N Ni-63 s/n 99Ni220+617 ☐ Other Tc99 s/n 5296 SrY90 s/n 5211

☒ m 500 S/N 81084 ☐ Oscilloscope S/N  ☒ Multimeter S/N 78401030

Calibrated By: Sebastien Ceballos Date 18-Jan-07

Reviewed By: Rhonda Harris Date 19 Jan 07



### Bench Test Data For Detector

Detector 43-68 Serial No. PR-161781

Order #. 269548 / 309434

Customer CABRERA SERVICES

Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 183048

Beta Input Sensitivity 3.5 mV

Count Time 1Minute

Beta Window 50 mV

Other \_\_\_\_\_

Distance Source to Detector Surface[illegible]

- |                                     |  |  |
|-------------------------------------|--|--|
| <input type="checkbox"/>            | Gas Proportional detector count rate decreased | ≤ 10% after 15 hour static test using 39" cable.                       |
| <input checked="" type="checkbox"/> | Gas proportional detector count rate decreased | ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter. |

Signature Sebastian Gebach

Date 18-Jan-07



A Division of RSCS, Inc.

**Customer:** Chuck Mikaitis  
Cabrera Services, Inc.  
473 Silver Lane  
East Hartford, CT 06118-

**Instrument**  
Ludlum Model 2-001R

**Serial Number**  
95952

**Probe Model**  
Ludlum 44-6

**Serial Number**  
051218

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
4.00 mR/hr	4.00 mR/hr	4.00 mR/hr	4.00 mR/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
X10	40 mR/Hr	40 mR/Hr	40 mR/Hr
X10	10 mR/Hr	10 mR/Hr	10 mR/Hr
X1	4 mR/Hr	4 mR/Hr	4 mR/Hr
X1	1 mR/Hr	1 mR/Hr	1 mR/Hr
X0.1	0.4 mR/Hr	0.5 mR/Hr *	0.40 mR/Hr
X0.1	0.1 mR/Hr	0.5 mR/Hr *	0.10 mR/Hr

Readings with \* indicate ranges where As-Found readings are >20% of Target value. Readings with \*\* indicate As-left readings are >10% of Target value

Outer Physical Check: *Pass*      Mechanical Zero: *Pass*  
Internal Check: *Pass*  
Geotropism Check: *Pass*

Calibrated by:

QA  
Review:

Calibration Date: 06/25/2007  
Expires: 06/25/2008

Atmospheric Conditions - Temperature: 76°F Humidity: 30% Barometric Pressure: 29.56"hg

This calibration was performed by RSCS Inc. 91 Portsmouth ave, Stratham NH 03885 using a NIST Traceable radiation source, in conformance to the following standards: ANSI N323A (1997), RSCS New Hampshire Radioactive Material License Number: 381R. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedure 2.4. This calibration certificate shall not be reproduced except in full without the express written consent of RSCS, Inc

Radiation Safety and Control Services, Inc.  
91 Portsmouth Ave. Stratham, NH 03885  
1-800-525-8339 (603) 778-2871 Fax (603) 778-6879 [www.radsafety.com](http://www.radsafety.com)





243 Root St.  
Suite 100  
Olean, New York 14760  
Voice: (716) 372-5300  
Fax: (716) 372-5307

## Certificate Of Calibration

This Certificate will be accompanied by Calibration Charts or Readings where Applicable

Customer		Instrument			
Customer Name: Cabrera Services Inc		Manufacturer: Ludlum Measurements, Inc.			
Address: 473 Silver Lane East Hartford, CT 06118		Model: 14C	Serial Number: 170440		
		Detector Manufacturer: Ludlum Measurements, Inc.			
Contact Name: Chuck Mikaitis		Det. Model: 44-38	Serial Number: PR174016		
Customer PO/ CC. Number: 07-867	Work Order Number: 2007-287	Meterface: 202-241	Calibration Method: Electronic and Source		
Instrument Received: <input type="checkbox"/> Within Toler. +/-10% <input checked="" type="checkbox"/> 10-20% <input type="checkbox"/> Out of Tol. <input type="checkbox"/> Requiring Repair <input type="checkbox"/> Other (See Comments)					
<input checked="" type="checkbox"/> Geotropism <input checked="" type="checkbox"/> Meter Zero <input checked="" type="checkbox"/> Mech. Ck. <input type="checkbox"/> HV Readout <input checked="" type="checkbox"/> Battery Check <input checked="" type="checkbox"/> Reset					
<input checked="" type="checkbox"/> Audio <input type="checkbox"/> Window Status <input checked="" type="checkbox"/> FS Response <input checked="" type="checkbox"/> Linearity <input type="checkbox"/> Background Subtract <input type="checkbox"/> Alarm Set					
Temperature: 71.1 F		Humidity: 60 %	Pressure: 721.4 mm Hg		
		Altitude: 1455 ft			
Instrument Calibration					
Multiplier/Range	Calibration Point	Instrument Response		Reference instruments and / or Sources	
		Before Calibration	After Calibration		
X 0.1	0.05 mR/hr	55 cpm	53.5 cpm	Pulser: LUD500-2	220099
X 0.1	0.15 mR/hr	169 cpm	163 cpm	Cs-137	7753CM
X 1	0.5 mR/hr	550 cpm	535 cpm	Cs-137	7020CM
X 1	0.5 mR/hr	0.4 mR/hr	0.5 mR/hr	C-14	C7-804
X 1	1.5 mR/hr	1690 cpm	1630 cpm	SrY-90	C7-661
X 1	1.5 mR/hr	1.4 mR/hr	1.5 mR/hr	Th-230	C7-644
X 10	5 mR/hr	5 mR/hr	5 mR/hr	Tc-99	C7-641
X 10	15 mR/hr	15 mR/hr	15 mR/hr	Comments	
X 100	50 mR/hr	50 mR/hr	50 mR/hr	Inst. Voltage: 896 V	
X 100	150 mR/hr	155 mR/hr	155 mR/hr	Input Sensitivity: 31 mV	
X 1K	500 mR/hr	520 mR/hr	500 mR/hr	4pi efficiencies on contact with detector surface.	
X 1K	1500 mR/hr	1550 mR/hr	1500 mR/hr	Model 44-38, Sn PR174016	
				C14 - <0.1%	
				Tc99 - <0.1%	
				Th230 - <0.1%	
				SrY90 - 1.0%	
				Page 1 of 2, see page 2 for secondary detector	

### Statement of Certification

MJW Technical Services, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323. The instrument listed above was inspected prior to shipment and it met all the manufacturer's published operating specifications. (MJW technical Services is not responsible for damage incurred during shipment or use of this instrument).

Instrument	Calibrated By:	Reviewed By:	Date: 7/5/07
Calibration Date: 07/05/2007		Calibration Due: 07/05/2008	





243 Root St.  
Suite 100  
Olean, New York 14760  
Voice: (716) 372-5300  
Fax: (716) 372-5307

## Certificate Of Calibration

This Certificate will be accompanied by Calibration Charts or Readings where Applicable

Customer		Instrument			
Customer Name: Cabrera Services Inc		Manufacturer: Ludlum Measurements, Inc.			
Address: 473 Silver Lane East Hartford, CT 06118		Model: 14C	Serial Number: 170440		
		Detector Manufacturer: Ludlum Measurements, Inc.			
Contact Name: Chuck Mikaitis		Det. Model: 44-9	Serial Number: PR180868		
Customer PO/ CC. Number: 07-867	Work Order Number: 2007-287	Meterface: 202-241	Calibration Method: N/A		
Instrument Received: <input type="checkbox"/> Within Toler. $\pm 10\%$ <input checked="" type="checkbox"/> 10-20% <input type="checkbox"/> Out of Tol. <input type="checkbox"/> Requiring Repair <input type="checkbox"/> Other (See Comments)					
<input checked="" type="checkbox"/> Geotropism <input checked="" type="checkbox"/> Meter Zero <input checked="" type="checkbox"/> Mech. Ck. <input type="checkbox"/> HV Readout <input checked="" type="checkbox"/> Battery Check <input checked="" type="checkbox"/> Reset					
<input checked="" type="checkbox"/> Audio <input type="checkbox"/> Window Status <input checked="" type="checkbox"/> FS Response <input type="checkbox"/> Linearity <input type="checkbox"/> Background Subtract <input type="checkbox"/> Alarm Set					
Temperature: 71.1 F		Humidity: 60 %	Pressure: 721.4 mm Hg		
		Altitude: 1455 ft			
Instrument Calibration					
Multiplier/Range	Calibration Point	Instrument Response		Reference instruments and / or Sources	
		Before Calibration	After Calibration		
				Pulser: LUD500-2	220099
				C-14	C7-804
				Th-230	C7-644
					SrY-90
					C7-661
					Tc-99
					C7-641
				Comments	
				Inst. Voltage: 896 V	
				Input Sensitivity: 31 mV	
				4pi efficiencies @ 0.25" from detector surface	
				C14 - 3.0%	
				Tc99 - 10.0%	
				Th230 - 6.2%	
				Sr/Y90 - 22.6%	
				Page 2 of 2, see page 1 for primary detector	

### Statement of Certification

MJW Technical Services, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANS/NCSL Z540-1-1994 and ANSI N323. The instrument listed above was inspected prior to shipment and it met all the manufacturer's published operating specifications. (MJW technical Services is not responsible for damage incurred during shipment or use of this instrument).

Instrument

Calibrated By: 

Reviewed By: 

Date 7/5/07

Calibration Date: 07/05/2007

Calibration Due: 07/05/2008



**EBERLINE**  
SERVICES

## CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 6500  
P.O.# 07-006

**Description of Standard:**

Model No. DNS-11 Serial No. 99TH470 0992 Isotope Th-230

Electroplated on polished Ni disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

**Measurement Method:**

The 2pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 4001-02.

**Measurement Result:**

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was:

2,570 ± 128

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was:

5,070 ± 253 (0.00228  $\mu\text{Ci}$ )

The uncertainty of the measurement is 5%, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST

Reviewed by: [Signature]

Calibration Technician: [Signature]

Q.A. Representative: Anthony W. Toth

Calibration Date: 7-18-2006

Reviewed Date: 7-27-06





**EBERLINE**  
SERVICES

## CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 6652

P.O.# 07-870

**Description of Standard:**

Model No. DNS-12 Serial No. 5803-07 Isotope Tc-99

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

**Measurement Method:**

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 4002-02.

**Measurement Result:**

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

8,710 ± 261

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

13,900 ± 417 ( 0.00627  $\mu$ Ci)

The uncertainty of the measurement is 3 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST

Reviewed by: *Ken Smith*

Calibration Technician: *Art Reust*

Q.A. Manager: *Anthony W. Toth*

Calibration Date: 7-26-2007

Reviewed Date: 7-26-07

Source Manufacturing Lab  
7021 Pan American Freeway NE  
Albuquerque, New Mexico 87109-4238  
(505) 761-5413 Fax (505) 761-5416  
areust@eberlineservices.com



# CERTIFICATE OF CALIBRATION (AIR SAMPLER)



**RSA Laboratories, Inc.**

19 Pendleton Drive, P.O. Box 61

Hebron, Connecticut 06248

(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Cabrera Services, Inc., Attn: Larry Pawlus (860) 569-0095

Customer Address: 809 Main Street, East Hartford, CT 06108

Inst. Mfr. F&J Specialty Products

Inst. Model LV-1

Inst. s/n 2802

Reference Inst. F&J Venturi D-812

Inst. s/n 2541

Cal. Date 04 February 2008

Due Date 04 February 2009

Cal. Interval 1 year

Barometric Press: Actual 30.00 in. Hg

Corrected to: 29.78 in. Hg

Temperature: Actual 72°F

Corrected to: 70.9°F

Filters Used: ☒Particulate ☐Charcoal/silver zeolite ☐Other:

Measurement	Air Sampler Flow Rate (LPM)	Ref. Inst. Flow Rate (LPM)	Percent Deviation
1	19.60	19.94	1.69
2	39.20	38.88	-0.83
3	50.00	47.85	-2.40
4	58.80	56.82	-3.48
5	78.39	74.76	-4.86
6			
7			
8			
9			
10			
11			
12			

**\*\*Average percent deviation across the range = -1.98**

This is to certify that RSA Laboratories, Inc. of Hebron, Connecticut, has on this date certified this air sampler to be within the accuracy specified above. The Reference Flow Device bears Letters of Certification traceable to the National Institute of Science and Technology. RSA Laboratories, Inc. ID# 11643.

Calibrated by: Kurt D. Newton

Date: 04 February 2008

# CERTIFICATE OF CALIBRATION

## (AIR SAMPLER)

Facility: **RSA Laboratories, Inc.** Customer: **Cabrera Services, Inc.**

Air Sampler Model **F&J LV-1**  
 Calibrator Model **F&J Venturi D-812**

Air Sampler Serial No. **2802**  
 Calibrator Serial No. **2541**

Measurement	AIR SAMPLER					CALIBRATOR		
	Inlet Temp. (°F)	Inlet Press (In-Hg)	Gauge Press (In-Hg)	Indicated Flow (LPM)	Temp/Press Correction Factor	Corrected Flow (LPM)	Indicated Flow (LPM)	Temp/Press Correction Factor
1	70.9	29.78	1	20	0.980	19.60	20	0.997
2	70.9	29.78	1	40	0.980	39.20	39	0.997
3	70.9	29.78	1	50	0.980	50.00	48	0.997
4	70.9	29.78	1	60	0.980	58.80	57	0.997
5	70.9	29.78	1	80	0.980	78.39	75	0.997
6								
7								
8								
9								
10								
11								
12								

$$\text{Air Sampler Temp/Press Corr Factor} = \sqrt{\frac{530^{\circ}\text{R}}{\text{Inlet temp } (^{\circ}\text{F}) + 460^{\circ}\text{R}}} \times \frac{(\text{Inlet Press} - \text{Gauge Press})}{29.92 \text{ in. Hg}}$$

$$\text{Calibrator Temp/Press Corr Factor} = \sqrt{\frac{530^{\circ}\text{R}}{\text{Inlet temp } (^{\circ}\text{F}) + 460^{\circ}\text{R}}} \times \frac{\text{Inlet Press}}{29.92 \text{ in. Hg}}$$

$$\% \text{ Deviation} = \frac{\text{Corrected Flow} - \text{Sampler Flow}}{\text{Corrected Flow}} \times 100$$

$$\text{Corrected Flow} = (\text{Indicated Flow}) \times (\text{Temp/Press Corr Factor})$$

Calibrated by: **Kurt D. Newton**

Date: **04 February 2008**

# CERTIFICATE OF CALIBRATION

(AIR SAMPLER)



**RSA Laboratories, Inc.**

19 Pendleton Drive, P.O. Box 61

Hebron, Connecticut 06248

(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Cabrera Services, Inc., Attn: Larry Pawlus (860) 569-0095

Customer Address: 809 Main Street, East Hartford, CT 06108

Inst. Mfr. F&J Specialty Products

Inst. Model LV-1

Inst. s/n 2772

Reference Inst. F&J Venturi D-812

Inst. s/n 2541

Cal. Date 04 February 2008

Due Date 04 February 2009

Cal. Interval 1 year

Barometric Press: Actual 30.00 in. Hg

Corrected to: 29.78 in. Hg

Temperature: Actual 72°F

Corrected to: 70.9°F

Filters Used: ☒Particulate ☐Charcoal/silver zeolite ☐Other:

Measurement	Air Sampler Flow Rate (LPM)	Ref. Inst. Flow Rate (LPM)	Percent Deviation
1	19.60	19.94	1.69
2	39.20	38.88	-0.83
3	50.00	47.85	-2.40
4	58.80	56.82	-3.48
5	78.39	74.76	-4.86
6			
7			
8			
9			
10			
11			
12			

**\*\*Average percent deviation across the range = -1.98**

This is to certify that RSA Laboratories, Inc. of Hebron, Connecticut, has on this date certified this air sampler to be within the accuracy specified above. The Reference Flow Device bears Letters of Certification traceable to the National Institute of Science and Technology. RSA Laboratories, Inc. ID# 11642.

Calibrated by: Kurt D. Newton

Date: 04 February 2008



# CERTIFICATE OF CALIBRATION

## (AIR SAMPLER)

Facility: RSA Laboratories, Inc. Customer: Cabrera Services, Inc.

Air Sampler Model F&J LV-1

Calibrator Model F&J Venturi D-812

Air Sampler Serial No. 2772

Calibrator Serial No. 2541

AIR SAMPLER						CALIBRATOR		
Measurement	Inlet Temp. (°F)	Inlet Press (In-Hg)	Gauge Press (In-Hg)	Indicated Flow (LPM)	Temp/Press Correction Factor	Corrected Flow (LPM)	Indicated Flow (LPM)	Temp/Press Correction Factor
1	70.9	29.78	1	20	0.980	19.60	20	0.997
2	70.9	29.78	1	40	0.980	39.20	39	0.997
3	70.9	29.78	1	50	0.980	50.00	48	0.997
4	70.9	29.78	1	60	0.980	58.80	57	0.997
5	70.9	29.78	1	80	0.980	78.39	75	0.997
6								
7								
8								
9								
10								
11								
12								

$$\text{Air Sampler Temp/Press Corr Factor} = \sqrt{\frac{530^{\circ}\text{R}}{\text{Inlet temp } (^{\circ}\text{F}) + 460^{\circ}\text{R}}} \times \frac{(\text{Inlet Press} - \text{Gauge Press})}{29.92 \text{ in. Hg}}$$

$$\text{Calibrator Temp/Press Corr Factor} = \sqrt{\frac{530^{\circ}\text{R}}{\text{Inlet temp } (^{\circ}\text{F}) + 460^{\circ}\text{R}}} \times \frac{\text{Inlet Press}}{29.92 \text{ in. Hg}}$$

$$\% \text{ Deviation} = \frac{\text{Corrected Flow} - \text{Sampler Flow}}{\text{Corrected Flow}} \times 100$$

$$\text{Corrected Flow} = (\text{Indicated Flow}) \times (\text{Temp/Press Corr Factor})$$

Calibrated by: Kurt D. Newton

Date: 04 February 2008



Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

## CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER **CABRERA SEVICES**

ORDER NO. 277310/313701

Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 193675  
Mfg. Ludlum Measurements, Inc. Model 43-37 Serial No. PR-216984  
Cal. Date 30-May-07 Cal Due Date 30-May-08 Cal. Interval 1 Year Meterface 202-855

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 50 % Alt 698.8 mm Hg

- ☐ New Instrument    ☐ Instrument Received    ☒ Within Toler.  $\pm 10\%$     ☐ 10-20%    ☐ Out of Tol.    ☐ Requiring Repair    ☐ Other-See comments
- ☒ Mechanical ck.    ☒ Meter Zeroed    ☐ Background Subtract    ☐ Input Sens. Linearity  
☐ F/S Resp. ck.    ☒ Reset ck.    ☒ Window Operation    ☒ Geotropism  
☒ Audio ck.    ☐ Alarm Setting ck.    ☒ Batt. ck. (Min. Volt) 2.2 VDC  
☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89.    ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1675 V

☒ HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 1500 / 1500 V

Firmware Version: 39010a27

(EEPROM Settings)

Alpha Threshold: 100 mV

User Time: 1.0

Beta Threshold: 4 mV

Alpha Alarm: 50000

Beta Window: 40 mV

Beta Alarm: 50000

Overload Checked but not set

A/B Alarm: 50000

Instrument calibrated with a 5' cable.

Model 2360 Date: 05/30/07

High voltage set with detector disconnected

Calibration Date Due: 05/30/08

### COMMENTS:

Eff. for Th230sn: 1495, Eff.  $\approx 17.6\%$  4pi

Eff. for Tc99sn: 5279-04, Eff.  $\approx 31.7\%$  4pi

Eff. for Sr90y90sn: 5281-04, Eff.  $\approx 28.5\%$  4pi

Eff. for Ni63sn: 4017, Eff.  $\approx 4.7\%$  4pi

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	<u>400</u>	<u>400</u>
x1000	100kcpm	<u>100</u>	<u>100</u>
x100	40kcpm	<u>400</u>	<u>400</u>
x100	10kcpm	<u>100</u>	<u>100</u>
x10	4kcpm	<u>400</u>	<u>400</u>
x10	1kcpm	<u>100</u>	<u>100</u>
x1	400kcpm	<u>400</u>	<u>400</u>
x1	100kcpm	<u>100</u>	<u>100</u>

\*Uncertainty within  $\pm 10\%$  C.F. within  $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		
400kcpm	<u>39796</u> (07)	<u>39796</u> (07)			
40kcpm	<u>3979</u>	<u>3979</u>			
4kcpm	<u>398</u>	<u>398</u>			
400cpm	<u>40</u>	<u>40</u>			
40cpm	<u>4</u>	<u>4</u>			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

### Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ S105 ☐ T1008 ☐ T679 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☒ m 500 S/N 50800 ☐ Oscilloscope S/N ☒ Multimeter S/N 83990502

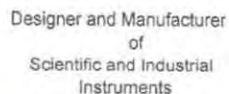
Calibrated By: Charles Date: 30 May 07

Reviewed By: Rhonda Harris Date: 30 May 07

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.  
FORM C22S 01/24/2007

AC Inst. ☐ Passed Dielectric (Hi-Pot) and Continuity Test  
Only ☐ Failed:





**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556 U.S.A.

Detector	43-37	Serial No.	PR-216984	Order #.	277310/313701
Customer	CABRERA SEVICES			Alpha Input Sensitivity	100 mV
Counter	2360	Serial No.	193675	Beta Input Sensitivity	4 mV
Count Time	1Minute			Beta Window	40 mV
Other	w/5' cable			Distance Source to Detector	Surface

[illegible]

- |  |  |
|--|--|
| <input type="checkbox"/> Gas Proportional detector count rate decreased            | ≤ 10% after 15 hour static test using 39" cable.                       |
| <input checked="" type="checkbox"/> Gas proportional detector count rate decreased | ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter. |

Signature

Date \_\_\_\_\_

### Bench Test Data For Detector

Detector 43-37 Serial No. PR-216984

Order # 277310/313701

Customer CABRERA SEVICES

Alpha Input Sensitivity 100 mV

Counter 2360 Serial No. 193675

Beta Input Sensitivity 4 mV

Count Time 1Minute

Beta Window 40 mV

Other w/5' cable

Distance Source to Detector Surface[illegible]

☐ Gas Proportional detector count rate decreased

≤ 10% after 15 hour static test using 39" cable.

☒ Gas proportional detector count rate decreased

≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature

Date \_\_\_\_\_





Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES

ORDER NO. 279885/315168

Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 184938  
Mfg. Ludlum Measurements, Inc. Model 43-37 Serial No. PR-178371  
Cal. Date 19-Jul-07 Cal Due Date 19-Jul-08 Cal. Interval 1 Year Meterface 202-855

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 51 % Alt 700.8 mm Hg

- ☐ New Instrument ☐ Instrument Received ☐ Within Toler.  $\pm 10\%$  ☐ 10-20% ☐ Out of Tol. ☒ Requiring Repair ☐ Other-See comments
- ☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity  
☐ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☒ Geotropism  
☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC  
☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1675 V

☒ HV Readout (2 points) Ref./Inst. 500 / 510 V Ref./Inst. 1500 / 1500 V

Firmware Version: 39010n25

Alpha Threshold: 100mv

Beta Threshold: 4mv

Beta Window: 40mv

Overload Checked but not set

Instrument calibrated with a 5' cable.

High voltage set with detector disconnected

(EEPROM Settings)

User Time: 1.0

Alpha Alarm: 50000

Beta Alarm: 50000

A/B Alarm: 50000

Model 2360 Date: 7/19/07

Calibration Date Due: 7/19/08

## COMMENTS:

Eff. for Tc99sn:5280-04A, Eff.  $\approx 32\%pi$ , Source count  $\approx 30499cpm$  - 685cpm background, Source size = 93200dpm  
Eff. for Th230sn:1495, Eff.  $\approx 18\%pi$ , Source count  $\approx 3556cpm$  - 3cpm background, Source size = 19800dpm  
Eff. for Sr90Y90sn:5281-04, Eff.  $\approx 30\%pi$ , Source count  $\approx 34718cpm$  - 685cpm background, Source size = 111222dpm  
Eff. for Ni63sn:, Eff.  $\approx 4.5\%pi$ , Source count  $\approx 13853cpm$  - 685cpm background, Source size = 288558dpm

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	N/A	400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400kcpm		400
x1	100kcpm		100

\*Uncertainty within  $\pm 10\%$  C.F. within  $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout					
400kcpm	N/A	39841 (2)			
40kcpm		3968			
4kcpm		399			
400cpm		40			
40cpm		4			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

## Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☒ Alpha S/N Th230sn:1495 ☒ Beta S/N Sr90Y90sn:5281-04, Ni63sn:4017 ☐ Other Tc99sn:5280-04A

☒ m 500 S/N 50800 ☐ Oscilloscope S/N ☒ Multimeter S/N 83990502

Calibrated By: Charles disk Date 19 July 07

Reviewed By: Rhonda Harin Date 19 Jul 07





Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

LUDLUM MEASUREMENTS, INC.  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

### Bench Test Data For Detector

Detector 43-37 Serial No. PR-178371 Order # 279885/315168  
Customer CABRERA SERVICES Alpha Input Sensitivity 100 mV  
Counter 2360 Serial No. 184938 Beta Input Sensitivity 4 mV  
Count Time 1 Minute Beta Window 40 mV  
Other Calibrated w/5' cable Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Th 230</u> Size <u>19800 dpm</u>		Isotope <u>Tc 99</u> Size <u>93200 dpm</u>		Isotope <u>Sr 90 Y 90</u> Size <u>111222 dpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
<u>1650</u>	<u>2</u>	<u>470</u>	<u>3308</u>	<u>1672</u>	<u>19</u>	<u>28551</u>	<u>5</u>	<u>29999</u>
<u>1675</u>	<u>3</u>	<u>685</u>	<u>3556</u>	<u>1823</u>	<u>29</u>	<u>30534</u>	<u>1</u>	<u>34718</u>
<u>1700</u>	<u>6</u>	<u>812</u>	<u>3708</u>	<u>2034</u>	<u>48</u>	<u>30499</u>	<u>18</u>	<u>38648</u>
<u>1725</u>	<u>2</u>	<u>1026</u>	<u>3854</u>	<u>2161</u>	<u>128</u>	<u>28658</u>	<u>84</u>	<u>40086</u>

- ☐ Gas Proportional detector count rate decreased  $\leq$  10% after 15 hour static test using 39" cable.  
☒ Gas proportional detector count rate decreased  $\leq$  10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature

Charles Lisk

Date

19 July 07







Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES

ORDER NO. 288887 / 320260

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 183048  
Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR-161781  
Cal. Date 19-Dec-07 Cal Due Date 19-Dec-08 Cal. Interval 1 Year Meterface 202-783

Check mark ☒ Applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 20 % Alt 700.8 mm Hg  
☐ New Instrument ☐ Instrument Received ☒ Within Toler.  $\pm 10\%$  ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments  
☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity  
☐ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☒ Geotropism  
☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC  
☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1625 V Input Sens. Comments mV Det. Oper. 1625 V at Comments mV Threshold Dial Ratio = mV

☒ HV Readout (2 points) Ref./Inst. 500 / 506 V Ref./Inst. 1500 / 1995 V

## COMMENTS:

Input Sensitivity: Alpha = 120mV

Beta = 4mV

Beta WIN = 50mV

Firmware: 390063

Overload checked but not set.

Calibrated using 5' C-cable.

## 4pi Efficiencies:

Th230: Source size = 19,800 dpm, Background = 4 cpm, Source count = 3,965 cpm, Efficiency  $\approx 20.01\%$

Tc99: Source size = 33,200 dpm, Background = 222 cpm, Source count = 10,741 cpm, Efficiency  $\approx 31.68\%$

Ni-63: Source size = 287,723 dpm, Background = 222 cpm, Source count = 19,356 cpm, Efficiency  $\approx 6.65\%$

SrY90: Source size = 110,076 dpm, Background = 222 cpm, Source count = 41,131 cpm, Efficiency  $\approx 37.16\%$

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400k cpm	400	400
x1000	100k cpm	100	100
x100	40k cpm	400	400
x100	10k cpm	100	100
x10	4k cpm	400	400
x10	1k cpm	100	100
x1	400 cpm	400	400
x1	100 cpm	100	100

\*Uncertainty within  $\pm 10\%$  C.F. within  $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400k cpm	400274	400274			
40k cpm	40028	40028			
4k cpm	4001	4001			
400 cpm	401	401			
40 cpm	40	40			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☒ Alpha S/N Th230 s/n 121495 ☒ Beta S/N Tc99 s/n 5296, SrY90 s/n 5231 ☐ Other

☒ m 500 S/N 114520 ☐ Oscilloscope S/N ☒ Multimeter S/N 78401030

Calibrated By: Sebastian Caballero Date 19-Dec-07

Reviewed By: Rhonda Harris Date 20 Dec 07



Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

**LUDLUM MEASUREMENTS, INC.**  
POST OFFICE BOX 810 PH. 325-235-5494  
501 OAK STREET FAX NO. 325-235-4672  
SWEETWATER, TEXAS 79556, U.S.A.

### Bench Test Data For Detector

Detector 43-68 Serial No. PR-161781

Order # 288887 / 320260

Customer CABRERA SERVICES

Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 183048

Beta Input Sensitivity 4 mV

Count Time 1 Minute

Beta Window 50 mV

Other \_\_\_\_\_

Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Th230</u> Size <u>19,800 dpm</u>		Isotope <u>Tc99</u> Size <u>33,200 dpm</u>		Isotope <u>Ni-63</u> Size <u>287,723 dpm</u>		Isotope <u>Sr90</u> Size <u>110,076 dpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1575V	1	163	3,503	1,423	12	10,804	6	18,585	2	33,813
1600	2	200	3,702	1,542	12	11,001	10	19,422	5	38,669
* 1625	4	222	3,965	1,512	28	10,741	7	19,356	53	41,131
1650	2	303	4,289	1,358	146	9,468	5	18,188	344	41,107

- ☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.
- ☒ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Sebasti Caballero

Date 19-Dec-07





This Certificate will be accompanied by Calibration Charts or Readings where Applicable

## Statement of Certification

MJW Technical Services, Inc certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323. The instrument listed above was inspected prior to shipment and it met all the manufacturer's published operating specifications. (MJW technical Services is not responsible for damage incurred during shipment or use of this instrument).

Instrument

Calibrated By:

Reviewed By:

Leino M. Lund

Date \_\_\_\_\_

10/3/07

Calibration Date: 10/02/2007

Calibration Due: 10/02/2008



This Certificate will be accompanied by Calibration Charts or Readings where Applicable

## Statement of Certification

MJW Technical Services, Inc certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323. The instrument listed above was inspected prior to shipment and it met all the manufacturer's published operating specifications. (MJW technical Services is not responsible for damage incurred during shipment or use of this instrument).

Instrument		Reviewed By: <i>Linda M. Lund</i>	Date: <i>12/5/07</i>
Calibrated By: <i>[Signature]</i>		Calibration Due: 12/05/2008	
Calibration Date: 12/05/2007			





243 Root St.  
Suite 100  
Olean, New York 14760  
Voice: (716) 372-5300  
Fax: (716) 372-5307

## Certificate Of Calibration

This Certificate will be accompanied by Calibration Charts or Readings where Applicable

Customer		Instrument			
Customer Name: Cabrera Services Inc		Manufacturer: Ludlum Measurements, Inc.			
Address: 473 Silver Lane East Hartford, CT 06118		Model: 2929	Serial Number: 129566		
		Detector Manufacturer: Ludlum Measurements, Inc.			
Contact Name: Chuck Mikaltis		Det. Model: 43-10-1	Serial Number: PR132720		
Customer PO/ CC. Number: 08-1170	Work Order Number: 2007-440	Meterface: Analog / Digital	Calibration Method: Electronic		
Instrument Received: <input checked="" type="checkbox"/> Within Toler. $\pm 10\%$ <input type="checkbox"/> 10-20% <input type="checkbox"/> Out of Tol. <input type="checkbox"/> Requiring Repair <input type="checkbox"/> Other (See Comments)					
<input type="checkbox"/> Geotropism <input checked="" type="checkbox"/> Meter Zero <input checked="" type="checkbox"/> Mech. Ck. <input checked="" type="checkbox"/> HV Readout <input type="checkbox"/> Battery Check <input type="checkbox"/> Reset					
<input checked="" type="checkbox"/> Audio <input type="checkbox"/> Window Status <input type="checkbox"/> FS Response <input type="checkbox"/> Linearity <input type="checkbox"/> Background Subtract <input type="checkbox"/> Alarm Set					
Temperature: 70.9 F		Humidity: 28 %	Pressure: 723.9 mm Hg Altitude: 1455 ft		
Instrument Calibration					
Multiplier/Range	Calibration Point	Instrument Response		Reference instruments and / or Sources	
		Before Calibration	After Calibration		
Alpha	40 cpm	41 cpm	39 cpm	Pulser: LUD500-2	220110
Alpha	400 cpm	401 cpm	399 cpm	Th-230	C7-644 Tc-99 C7-641
Alpha	4000 cpm	4019 cpm	3990 cpm	C-14	C7-804 Pu-239 C7-639
Alpha	40000 cpm	40070 cpm	39900 cpm	SrY-90	C7-630
Alpha	400000 cpm	400430 cpm	398720 cpm	<b>Comments</b> Inst. Voltage: 800 V Amplifier gain: As found = 20, As Left = 25 Window status: Beta threshold - 4 mV Beta window - 50 mV Alpha threshold - 175 mV Instrument Voltage set @ 800 = 3.27 on High Voltage dial Alpha background is 1 cpm, Beta background is 76 cpm Alpha crosstalk in the Beta channel is <10% with insert in place Beta crosstalk in the Alpha channel is <1% with insert in place 4 pi Efficiency Pu239 = 34.8% C14 = 7.5% SrY90 = 26.4% Th230 = 33.3% Tc99 = 20.4%	
Beta-Gamma	40 cpm	40 cpm	40 cpm		
Beta-Gamma	400 cpm	401 cpm	398 cpm		
Beta-Gamma	4000 cpm	4010 cpm	3990 cpm		
Beta-Gamma	40000 cpm	40060 cpm	39780 cpm		
Beta-Gamma	400000 cpm	400450 cpm	398395 cpm		

### Statement of Certification

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Instrument

Calibrated By: 

Reviewed By: 

Date

1/4/08

Calibration Date: 01/03/2008

Calibration Due: 01/03/2009



**EBERLINE**  
SERVICES

## CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 6481  
P.O.# 06-735

**Description of Standard:**

Model No. DNS-11 Serial No. 2888-01 Isotope Th-230

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

**Measurement Method:**

The 2pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 4001-02.

**Measurement Result:**

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was:

9,720  $\pm$  388

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was:

19,200  $\pm$  766 (0.00863  $\mu$ Ci)

The uncertainty of the measurement is 4%, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by: Anthony W. Toth

Calibration Technician: Art Reust Q.A. Representative: Anthony W. Toth

Calibration Date: 6-14-2006 Reviewed Date: 6-15-06