APPENDIX E
Calibration Certificates

MJW Technical Services
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
Address: 473 Silver Lane East Hartford, CT 06118	Model: 2360 Serial Number: 193675 Detector Manufacturer: Ludlum Measurements
Contact Name: Chuck Mikaitis	Det. Model: 43-37 Serial Number: PR216984
Customer PO/ CC. Number: 08-1303 / Work Order Number: 2008-604	Meterface: 202-855 Calibration Method: Electronic

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☑ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☑ HV Readout ☑ Battery Check ☑ Reset

☑ Audio ☐ Window Status ☐ FS Response ☐ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 71.3 F Humidity: 41 % 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		
X 1	100 cpm	100 cpm	100 cpm	C-14	C7-804	Th-230	C7-644
X 1	400 cpm	400 cpm	400 cpm	Tc-99	C7-641	SrY-90	C7-638
X 10	1 Kcpm	1 Kcpm	1 Kcpm				
X 10	4 Kcpm	4 Kcpm	4 Kcpm				
X 100	10 Kcpm	10 Kcpm	10 Kcpm				
X 100	40 Kcpm	40 Kcpm	40 Kcpm				
X 1K	100 Kcpm	100 Kcpm	100 Kcpm				
X 1K	400 Kcpm	400 Kcpm	400 Kcpm				
Digital Scaler	40 cpm	40 cpm	40 cpm				
Digital Scaler	400 cpm	400 cpm	400 cpm				
Digital Scaler	4 Kcpm	3991 cpm	3991 cpm				
Digital Scaler	40 Kcpm	39887 cpm	39887 cpm				
Digital Scaler	400 Kcpm	398862 cpm	398862 cpm				

Comments

Inst. Voltage: 1700 V

Alpha threshold: 100 mV
Beta threshold: 4 mV
Beta window: 40 mV

4pi efficiencies on contact with detector surface
C14 = 8.3%
Sr90 = 22.5%
Tc99 = 20.5%
Th230 = 18.6%

Gas proportional count rate decrease:
<10% after 5 hour static check using 60" cable

Statement of Certification

MJW Technical Sevices, 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: Gary A [illegible] Reviewed By: [illegible] Date 5-23-08

Calibration Date: 05/23/2008 Calibration Due: 05/23/2009

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 43-68 Serial No.: PR190296

Counter Mfg.: Ludlum Model: 2360 Serial No.: 184936

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Alpha Threshold: 120 mV Beta Threshold: 4 mV Beta Window: 50 mV

Detector geometry to source: ☑ Face, ☐ Side, ☐ Below, ☐ Other:

Distance to source: ☑ Contact, ☐ 6-Inches, ☐ Other:

Alpha Source : ☑ Th230 @ 13,000 dpm (2/14/08) sn: 4098-03 ☐ Other:

Beta Source: ☑ Tc99 @ 16,800 dpm (2/14/08) sn: 4099-03 ☐ Other:

Count Time: 1 Minute

High Voltage	Alpha Source Counts		Beta Source Counts		Background Counts	
	Alpha	Beta	Alpha	Beta	Alpha	Beta
1500	127	1065	2	1612	3	49
1575	1405	994	3	4081	15	260
1600	1346	1069	3	3904	5	219
1625	1658	1008	33	3693	10	356
1650	1607	960	67	3419	16	382

Comments: Recommended Operating High Voltage: 1600 volts

* SET @ 1650 TO COMPENSATE FOR CHANGE IN ELEVATION. ALBUQUERQUE ~ 5500' & ABERDEEN ~ < 50'.

Calibrated By: [signature] Calibration Date: 7/18/08

Calibration Due: 7/18/09

Reviewed By: [signature] Date: 7/18/08

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washingtion St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2360 Serial No.: 184936

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☑ 97743 ☐ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☐ F/S Response ck. ☐ Audio ck.

☑ THR/WIN ck. High Voltage ck. ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Alpha Threshold.: 120 mV Beta Threshold.: 4 mV Beta Window.: 50 mV

Internal Calibration Date Reset ☑ Instrument found within tolerance (+/- 10%) Yes ☑ No ☐

Reference Setting	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	400 Kcpm	400 Kcpm
100 Kcpm	100 Kcpm	100 Kcpm
40 Kcpm	40 Kcpm	40 Kcpm
10 Kcpm	10 Kcpm	10 Kcpm
4 Kcpm	4 Kcpm	4 Kcpm
1 Kcpm	1 Kcpm	1 Kcpm
400 cpm	400 cpm	400 cpm
100 cpm	100 cpm	100 cpm

Reference Setting	Instrument "As Found Reading"	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	399831
40 Kcpm	+/- 10%	40012
4 Kcpm	+/- 10%	3990
400 cpm	+/- 10%	399

Calibrated By: [signature] Calibration Date: 7/18/08

Calibration Due: ~~7/19/08~~ 7/18/09

Reviewed By: [signature] Date: 7/18/08

ERG Form 1.02C

MJW Technical Services
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: 2224-1 Serial Number: 162425 Detector Manufacturer: Ludlum Measurements, Inc.
Contact Name: Chuck Mikaitis	Det. Model: 43-93 Serial Number: PR182403
Customer PO/ CC. Number: 08-1232 / Work Order Number: 2008-514	Meterface: 202-848 Calibration Method: Electronic

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☑ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☑ HV Readout ☑ Battery Check ☑ Reset

☑ Audio ☐ Window Status ☐ FS Response ☐ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 71.2 F Humidity: 29 % Pressure: 718.8 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	220100		
X 1	400 cpm	401 cpm	401 cpm	Pu-239	C7-639	C-14	C7-804
X 1	800 cpm	800 cpm	800 cpm	SrY-90	C7-661	Th-230	C7-644
X 10	4 Kcpm	4.01 Kcpm	4.01 Kcpm	Tc-99	C7-641		
X 10	8 Kcpm	8 Kcpm	8 Kcpm				
X 100	40 Kcpm	40.1 Kcpm	40.1 Kcpm				
X 100	80 Kcpm	80 Kcpm	80 Kcpm				
X 1K	400 Kcpm	401 Kcpm	401 Kcpm				
X 1K	800 Kcpm	800 Kcpm	800 Kcpm				
Digital Readout	400 cpm	399 cpm	399 cpm				
Digital Readout	4 Kcpm	3.995 Kcpm	3.995 Kcpm				
Digital Readout	40 Kcpm	39.948 Kcpm	39.948 Kcpm				
Digital Readout	400 Kcpm	399.449 Kcpm	399.449 Kcpm				

Comments

Inst. Voltage: 900 V
Beta threshold: 3.3 mV
Beta window: 29.3 mV
Alpha Threshold: 120 mV

4pi efficiencies on contact with detector surface
C14 - 3.36%
Tc99 - 14.3%
Th230 - 22.8%
Sr/Y90 - 34.9%

Alpha crosstalk <10%
Beta crosstalk <1%

Statement of Certification

MJW Technical Sevices, 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: [signature] Reviewed By: Linda M. Lund Date 3/14/08

Calibration Date: 03/14/2008 Calibration Due: 03/14/2009

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. 285783 / 318483

Mfg. Ludlum Measurements, Inc. Model 2224-1 Serial No. 227244

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR-244545

Cal. Date 26-Oct-07 Cal Due Date 26-Oct-08 Cal. Interval 1 Year Meterface 202-848

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. +-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 825 V Input Sens. Comments mV Det. Oper. 825 V at Comments mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 503 V Ref./Inst. 1000 / 999 V

COMMENTS:

Input Sensitivity: Alpha = 120mV
Beta = 3.5mV
Beta WIN = 30mV

Firmware: 390094
HV set w/detector connected.
Calibrated using 5' C-cable.
Overload set by simulating light leak.

4pi Efficiencies:
Th230: Source size = 19,800 dpm, Background = 1 cpm, Source count = 4,244 cpm, Efficiency ≈ 21.43%
Tc99: Source size = 33,200 dpm, Background = 260 cpm, Source count = 6,906 cpm, Efficiency ≈ 20.02%
Ni-63: Source size = 288,018 dpm, Background = 260 cpm, Source count = 1,099 cpm, Efficiency ≈ 0.29%
SrY90: Source size = 110,474 dpm, Background = 260 cpm, Source count = 40,398 cpm, Efficiency ≈ 36.33%

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	800k cpm	800	800
x1000	200k cpm	200	200
x100	80k cpm	800	800
x100	20k cpm	200	200
x10	8k cpm	800	800
x10	2k cpm	200	200
x1	800 cpm	800	800
x1	200 cpm	200	200

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	800k cpm	801712	801712	Log Scale			
	80k cpm	80114	80114				
	8k cpm	8011	8011				
	800 cpm	801	801				
	80 cpm	80	80				

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 ☐ 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 5281 Ni63 s/n 99NI2204017 ☐ Other

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

Calibrated By: Sebastian Caballero Date 26-Oct-07

Reviewed By: Rhonda Hearn Date 28 Oct 07

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 01/24/2007

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

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 43-93 Serial No. PR-244545 Order #. 285783 / 318483

Customer CABRERA SERVICES Alpha Input Sensitivity 120 mV

Counter 2224-1 Serial No. 227244 Beta Input Sensitivity 3.5 mV

Count Time 1Minute Beta Window 30 mV

Other Distance Source to Detector Surface

High Voltage	Background		Isotope Th230 Size 19,800 dpm		Isotope Tc99 Size 33,200 dpm		Isotope Sr-Y90 Size 110,474 dpm		Isotope Ni63 Size 288,018 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
800V	0	197	4,173	543	8	5,467	0	35,977	0	439
* 825	1	260	4,244	807	7	6,906	1	40,398	0	1,099
850	0	294	4,343	1,196	9	8,225	4	41,546	0	2,457

☐ 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 Sebastian Ceballos Date 26-Oct-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. 20106404/324200

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 79498

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR073106

Cal. Date 10-Apr-08 Cal Due Date 10-Apr-09 Cal. Interval 1 Year Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 39 % Alt 690.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-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 900 V Input Sens. 26 mV Det. Oper. 900 V at 26 mV Threshold Dial Ratio _____ = _____ mV

☐ HV Readout (2 points) Ref./Inst. _____ / _____ V Ref./Inst. _____ / _____ V

COMMENTS:

Source Tc 99 ≈ 22,600 dpm
Background ≈ 32 cpm
Source reading ≈ 4797 cpm
Eff. ≈ 21.08%

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*
X 100	400kcpm	N/A	4 K
X 100	100kcpm		1.1
X 10	40kcpm		4
X 10	10kcpm		1.1
X 1	4kcpm		4
X 1	1kcpm		1.09
X 0.1	400cpm		4
X 0.1	100cpm		

*Uncertainty within ± 10% C.F. within ± 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			

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 ☐ 1131 ☐ 781 ☐ 059 ☐ 280
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 _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 63893 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 80040300

Calibrated By: Jerany Thompson Date 10-Apr-08

Reviewed By: Rhonda Hain Date 11 Apr 08

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 01/29/2008

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

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.

CONVERSION CHART

Customer CABRERA SERVICES Date 10-Apr-08 Order #. 20106404/324200

Model 3 Serial No. 79497 Detector Model 44-9 Serial No. PR073106

Source Cs137≈ High Voltage 900 V

Input Sensitivity 26 mV

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	NA		2K	X100
50 mR/hr			1.1K	X100
15 mR/hr			3.9K	X10
5 mR/hr			1.4K	X10
1.5 mR/hr			4K	X1
1.0 mR/hr			2.7K	X1

Signature: Jesany Thompson Date 10. Apr. 08

MJW Technical Services
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: 3 Serial Number: 166511 Detector Manufacturer: Ludlum Measurements, Inc.
Contact Name: Chuck Mikaitis	Det. Model: 44-9 Serial Number: PR073107
Customer PO/ CC. Number: 08-1090 Work Order Number: 2007-347	Meterface: 202-002 Calibration Method: Electronic

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☑ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☐ HV Readout ☑ Battery Check ☑ Reset

☑ Audio ☐ Window Status ☑ FS Response ☐ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 71.2 F Humidity: 61 % Pressure: 726.4 mm Hg Altitude: 1455 ft

Instrument Calibration

Multiplier\Range	Calibration Point	Instrument Response	
		Before Calibration	After Calibration
X 0.1	100 cpm	95 cpm	100 cpm
X 0.1	400 cpm	395 cpm	400 cpm
X 1	1 Kcpm	1 Kcpm	1 Kcpm
X 1	4 Kcpm	4 Kcpm	4 Kcpm
X 10	10 Kcpm	10 Kcpm	10 Kcpm
X 10	40 Kcpm	40 Kcpm	40 Kcpm
X 100	100 Kcpm	100 Kcpm	100 Kcpm
X 100	400 Kcpm	400 Kcpm	400 Kcpm

Reference Instruments and / or Sources

Pulser: LUD500-2	220099		
Th-230	C7-643	C-14	C7-804
SrY-90	C7-661	Tc-99	C7-641

Comments

Inst. Voltage: 900 V Input Sensitivity: 36 mV

4 Pi Efficiency @ 1/4 inch

Th-230 4.0%

C-14 2.4%

Tc-99 11.0%

SrY-90 27.3%

Statement of Certification

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Instrument Calibrated By: [signature] Reviewed By: Linda M. Lund Date 10/3/07

Calibration Date: 10/02/2007 Calibration Due: 10/02/2008

MJW Technical Services
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: 2221 Serial Number: 216473 Detector Manufacturer: Ludlum Measurements, Inc.
Contact Name: Chuck Mikaitis	Det. Model: 44-20 Serial Number: PR262403
Customer PO/ CC. Number: 08-1277 / Work Order Number: 2008-568	Meterface: 202-159 Calibration Method: Electronic

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☑ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☑ HV Readout ☑ Battery Check ☑ Reset

☑ Audio ☐ Window Status ☑ FS Response ☐ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 71.3 F Humidity: 33 % Pressure: 729.0 mm Hg Altitude: 1455 ft

Instrument Calibration

Multiplier\Range	Calibration Point	Instrument Response	
		Before Calibration	After Calibration
X 1	100 cpm	100 cpm	100 cpm
X 1	400 cpm	400 cpm	400 cpm
X 10	1 Kcpm	1 Kcpm	1 Kcpm
X 10	4 Kcpm	4 Kcpm	4 Kcpm
X 100	10 Kcpm	10 Kcpm	10 Kcpm
X 100	40 Kcpm	40 Kcpm	40 Kcpm
X 1K	100 Kcpm	100 Kcpm	100 Kcpm
X 1K	400 Kcpm	400 Kcpm	400 Kcpm
Digital Ratemeter	40 cpm	39 cpm	39 cpm
Digital Ratemeter	400 cpm	401 cpm	401 cpm
Digital Ratemeter	4 Kcpm	3.992 Kcpm	3.992 Kcpm
Digital Ratemeter	40 Kcpm	39.91 Kcpm	39.91 Kcpm
Digital Ratemeter	400 Kcpm	398.9 Kcpm	398.9 Kcpm
Digital Scaler	40 cpm	40 cpm	40 cpm
Digital Scaler	400 cpm	398 cpm	398 cpm
Digital Scaler	4 Kcpm	3.985 Kcpm	3.985 Kcpm
Digital Scaler	40 Kcpm	39.87 Kcpm	39.87 Kcpm
Digital Scaler	400 Kcpm	398.7 Kcpm	398.7 Kcpm
Log Scale	50 cpm	50 cpm	50 cpm
Log Scale	500 cpm	500 cpm	500 cpm
Log Scale	5 Kcpm	5 Kcpm	5 Kcpm
Log Scale	50 Kcpm	50 Kcpm	50 Kcpm
Log Scale	500 Kcpm	450 Kcpm	450 Kcpm

Reference instruments and / or Sources

Scaler: 2200	34451	Pulser: LUD500-2	220099
Am-241	C7-660		

Comments

Model 2221 currently set for gross counts

High Voltage: 850V detector connected with 5 foot cord

Threshold: 100 (10mV)

Window: OUT

4pi Am241 efficiency on contact with Model 44-20 detector = 15.5%

Model 44-20 energy resolution = 8.8%, acceptable detector energy resolution is <13%

Statement of Certification

MJW Technical Sevices, 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: [signature] Reviewed By: Linda M. Lund Date 4-17-08

Calibration Date: 04/17/2008 Calibration Due: 04/17/2009

MJW Technical Services
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: 200051 Detector Manufacturer: Ludlum Measurements, Inc.
Contact Name: Chuck Mikaitis	Det. Model: 43-10-1 Serial Number: PR215948
Customer PO/ CC. Number: 08-1266 / Work Order Number: 2008-553	Meterface: Analog / Digital Calibration Method: Electronic

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☐ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☑ HV Readout ☐ Battery Check ☐ Reset

☑ Audio ☐ Window Status ☐ FS Response ☐ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 71.6 F Humidity: 34 % Pressure: 729.0 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	220100	Oscilloscope: TDS1002	C062886
Alpha	40 cpm	40 cpm	40 cpm	Pu-239	C7-636	C-14	C7-804
Alpha	400 cpm	399 cpm	399 cpm	SrY-90	C7-661	Th-230	C7-644
Alpha	4000 cpm	3990 cpm	3990 cpm	Tc-99	C7-641		
Alpha	40000 cpm	39909 cpm	39909 cpm				
Alpha	400000 cpm	399075 cpm	399075 cpm				
Beta-Gamma	40 cpm	39 cpm	39 cpm				
Beta-Gamma	400 cpm	399 cpm	399 cpm				
Beta-Gamma	4000 cpm	3990 cpm	3990 cpm				
Beta-Gamma	40000 cpm	39901 cpm	39901 cpm				
Beta-Gamma	400000 cpm	399029 cpm	399029 cpm				

Comments

Amplifier gain: 22

Window status: Beta threshold - 4 mV
Beta window - 50 mV
Alpha threshold - 176 mV

Instrument Voltage set @ 675V = 2.72 on High Voltage dial

Alpha background is 1 cpm, Beta background is 59 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 = 40.5%
C14 = 10.4%
SrY90 = 35.0%
Th230 = 39.7%
Tc99 = 26.2%

Statement of Certification

MJW Technical Sevices, 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: [signature] Reviewed By: [signature] Date 4/8/2008

Calibration Date: 04/07/2008 Calibration Due: 04/07/2009

Calibration Certificate
ID Number: C854F11890-0

Calibration Technology
A Division of RSCS, Inc.

Customer: Hank Siegrist
Cabrera Services, Inc.
473 Silver Lane
East Hartford, CT 06118-

Instrument
Bicron Model MicroRem

Serial Number
C854F

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

Accuracy Check			
Range	Target Value	As Found	As Left
X1000	160 mrem/hr	160 mrem/hr	160 mrem/hr
X1000	40 mrem/hr	40 mrem/hr	40 mrem/hr
X100	16 mrem/hr	16 mrem/hr	16 mrem/hr
X100	4 mrem/hr	4 mrem/hr	4 mrem/hr
X10	1.6 mrem/hr	1.7 mrem/hr	1.7 mrem/hr
X10	0.4 mrem/hr	0.4 mrem/hr	0.40 mrem/hr
X1	160 µrem/hr	160 µrem/hr	160 µrem/hr
X1	40 µrem/hr	40 µrem/hr #	40 µrem/hr #
X0.1	16 µrem/hr	11.5 µrem/hr # *	15 µrem/hr #
X0.1	4 µrem/hr	3.5 µrem/hr #	4 µrem/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
Readings with # indicate ranges where pulser was used.

MTE Instrument Type	Model	CalDueDate
Pulser	Ludlum 500-4 SN: 66151	01/15/2008

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

Calibrated by: QA Review:

Calibration Date: 05/17/2007
Expires: 05/17/2008

Atmospheric Conditions - Temperature: 76°F Humidity: 32% Barometric Pressure: 29.78"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

MJW Technical Services
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

Customer Name: Cabrera Services Inc

Address: 473 Silver Lane
East Hartford, CT 06118

Contact Name: Chuck Mikaitis

Customer PO/ CC. Number: 08-1159

Work Order Number: 2007-434

Instrument

Manufacturer: Ludlum Measurements, Inc.

Model: 19 Serial Number: 87139

Detector Manufacturer: Ludlum Measurements, Inc.

Det. Model: Internal Scintillator Serial Number: n/a

Meterface: 202-016 Calibration Method: Electronic and Source

Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other (See Comments)

☑ Geotropism ☑ Meter Zero ☑ Mech. Ck. ☑ HV Readout ☑ Battery Check ☑ Reset

☑ Audio ☐ Window Status ☑ FS Response ☑ Linearity ☐ Background Subtract ☐ Alarm Set

Temperature: 70.9 F Humidity: 29 % Pressure: 729.0 mm Hg Altitude: 1455 ft

Instrument Calibration

Multiplier\Range	Calibration Point	Instrument Response	
		Before Calibration	After Calibration
25 uR/hr	5 uR/hr	893 cpm	870 cpm
25 uR/hr	20 uR/hr	3.57 Kcpm	3.48 Kcpm
50 uR/hr	20 uR/hr	3.48 Kcpm	3.48 Kcpm
50 uR/hr	40 uR/hr	7.09 Kcpm	7.09 Kcpm
250 uR/hr	50 uR/hr	8.93 Kcpm	8.7 Kcpm
250 uR/hr	200 uR/hr	35.7 Kcpm	34.8 Kcpm
250 uR/hr	200 uR/hr	195 uR/hr	195 uR/hr
500 uR/hr	200 uR/hr	34.8 Kcpm	34.8 Kcpm
500 uR/hr	200 uR/hr	200 uR/hr	200 uR/hr
500 uR/hr	400 uR/hr	70.9 Kcpm	70.9 Kcpm
500 uR/hr	400 uR/hr	390 uR/hr	390 uR/hr
5000 uR/hr	1000 uR/hr	1000 uR/hr	1000 uR/hr
5000 uR/hr	4000 uR/hr	3900 uR/hr	3900 uR/hr

Reference Instruments and / or Sources

Pulser: LUD500-2	220100		
Cs-137	7753CM	Cs-137	7020CM

Comments

Inst. Voltage: 650 V Input Sensitivity: 36 mV

Statement of Certification

MJW Technical Sevices, 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: [signature]

Reviewed By: [signature] Date 12/18/07

Calibration Date: 12/18/2007

Calibration Due: 12/18/2008

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 **2590**
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			
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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# **11640**.

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** Air Sampler Serial No. **2590**
Calibrator Model **F&J Venturi D-812** 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	Corrected Flow (LPM)
1	70.9	29.78	1	20	0.980	19.60	20	0.997	19.94
2	70.9	29.78	1	40	0.980	39.20	39	0.997	38.88
3	70.9	29.78	1	50	0.980	50.00	48	0.997	47.85
4	70.9	29.78	1	60	0.980	58.80	57	0.997	56.82
5	70.9	29.78	1	80	0.980	78.39	75	0.997	74.76
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$$\text{Air Sampler Temp/Press Corr Factor} = \sqrt{\frac{530°\text{R}}{\text{Inlet temp (°F)} + 460°\text{R}} \times \frac{(\text{Inlet Press} - \text{Gauge Press})}{29.92 \text{ in. Hg}}}$$

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

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

Corrected Flow = (Indicated Flow) x (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) 289-1885**
Customer Address: **809 Main Street, East Hartford, CT 06108**

Inst. Mfr. **F&J Specialty Products** Inst. Model **LV-1** Inst. s/n **2773**
Reference Inst. **F&J Venturi D-812** Inst. s/n **2541**

Cal. Date **21 April 2008** Due Date **21 April 2009** Cal. Interval **1 year**

Barometric Press: Actual **29.93** in. Hg Corrected to: 29.73 in. Hg
Temperature: Actual **77**°F Corrected to: 73.4°F
Filters Used: ☒Particulate ☐Charcoal/silver zeolite ☐Other:

Measurement	Air Sampler Flow Rate (LPM)	Ref. Inst. Flow Rate (LPM)	Percent Deviation
1	**19.54**	**19.87**	**1.70**
2	**39.07**	**38.75**	**-0.82**
3	**48.84**	**47.69**	**-2.40**
4	**58.61**	**56.64**	**-3.48**
5	**78.14**	**73.53**	**-6.27**
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12			

****Average percent deviation across the range = -2.25**

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# **11836**.

Calibrated by: **Kurt D. Newton** _____ Date: **21 April 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. **2773**
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	Corrected Flow (LPM)
1	73.4	29.73	1	20	0.977	19.54	20	0.994	19.87
2	73.4	29.73	1	40	0.977	39.07	39	0.994	38.75
3	73.4	29.73	1	50	0.977	48.84	48	0.994	47.69
4	73.4	29.73	1	60	0.977	58.61	57	0.994	56.64
5	73.4	29.73	1	80	0.977	78.14	74	0.994	73.53
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12									

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

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

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

Corrected Flow = (Indicated Flow) x (Temp/Press Corr Factor)

Calibrated by: **Kurt D. Newton** _____ Date: **21 April 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 **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
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****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**

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	Corrected Flow (LPM)
1	70.9	29.78	1	20	0.980	19.60	20	0.997	19.94
2	70.9	29.78	1	40	0.980	39.20	39	0.997	38.88
3	70.9	29.78	1	50	0.980	50.00	48	0.997	47.85
4	70.9	29.78	1	60	0.980	58.80	57	0.997	56.82
5	70.9	29.78	1	80	0.980	78.39	75	0.997	74.76
6									
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12									

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

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

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

Corrected Flow = (Indicated Flow) x (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) 289-1885**
Customer Address: **809 Main Street, East Hartford, CT 06108**

Inst. Mfr. **F&J Specialty Products** Inst. Model **LV-1** Inst. s/n **3390**
Reference Inst. **F&J Venturi D-812** Inst. s/n **2541**

Cal. Date **21 April 2008** Due Date **21 April 2009** Cal. Interval **1 year**

Barometric Press: Actual **29.93** in. Hg Corrected to: 29.73 in. Hg
Temperature: Actual 77°F Corrected to: 73.4°F
Filters Used: ☒Particulate ☐Charcoal/silver zeolite ☐Other:

Measurement	Air Sampler Flow Rate (LPM)	Ref. Inst. Flow Rate (LPM)	Percent Deviation
1	**19.54**	**19.87**	**1.70**
2	**39.07**	**39.74**	**1.70**
3	**48.84**	**48.69**	**-0.31**
4	**58.61**	**57.63**	**-1.69**
5	**78.14**	**74.52**	**-4.86**
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****Average percent deviation across the range = -0.69**

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# **11838**.

Calibrated by: **Kurt D. Newton** _____ Date: **21 April 2008**

CERTIFICATE OF CALIBRATION
(AIR SAMPLER)

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

Air Sampler Model **F&J LV-1** Air Sampler Serial No. **3390**
Calibrator Model **F&J Venturi D-812** 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	Corrected Flow (LPM)
1	73.4	29.73	1	20	0.977	19.54	20	0.994	19.87
2	73.4	29.73	1	40	0.977	39.07	40	0.994	39.74
3	73.4	29.73	1	50	0.977	48.84	49	0.994	48.69
4	73.4	29.73	1	60	0.977	58.61	58	0.994	57.63
5	73.4	29.73	1	80	0.977	78.14	75	0.994	74.52
6									
7									
8									
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11									
12									

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

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

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

Corrected Flow = (Indicated Flow) x (Temp/Press Corr Factor)

Calibrated by: **Kurt D. Newton** _____ Date: **21 April 2008**

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 3863
P.O.# 02-055

Description of Standard:

Model No. DNS-12 Serial No. 3975-02 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 2148/90.

Measurement Result:

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

11,000 ± 441

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

17,700 ± 706 (0.00796 μCi)

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:

Calibration Technician: Q.A. Representati

Calibration Date: 4-25-2002 Reviewed Date: 4-29-02

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 3863
P.O.# 02-055

Description of Standard:

Model No. DNS-11 Serial No. 3973-02 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 2393/91.

Measurement Result:

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

8,860 ± 265

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

17,500 ± 523 (0.00786 μCi)

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:

Calibration Technician: Q.A. Representative:

Calibration Date: 4-29-2002 Reviewed Date: 4-29-02

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