FORT McCLELLAN

Anniston, Alabama

APPENDIX I

INSTRUMENT and SOURCE CALIBRATIONS

DECEMBER 1996

ALLIED TECHNOLOGY GROUP

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 215801

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 65528

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR058761

Cal. Date 10/30/95 Cal Due Date 10/30/96 Cal. Interval 1 Year Meterface 202-330

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 42 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

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: CALIBRATED USING 39" CABLE

BACK

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	150mR/hr	1.5	1.5
X 100	50mR/hr	0.5	0.5
X 10	15mR/hr	1.5	1.5
X 10	5mR/hr	0.55	0.55
X 1	1.5mR/hr = 4340 cpm	1.5	1.5
X 1	1.0mR/hr	1.0	1.0
X 0.1	434 cpm	1.5	1.5
X 0.1	145 cpm	0.5	0.5

*Uncertainty within ± 10% C.F. within ± 20%

X 0.1 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 10/30/95

Reviewed By: Jimmie Fleming Date 10-30-95

FORM C22A 03/25/95

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2623
Work Order # I-95-11-216

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 3 Serial Number 92557 (011)
External Probe(s) HP260 Serial # (190)

Calibration Method Pulser s/n 318
^{137}Cs s/n 10263 200mCi
^{99}Tc s/n S1256

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	X0.1	100 CPM		100 CPM	All Calibrations Btn. + & - 10%
2		200		200	
3		400		400	Battery: OK
4					
5	X1	1K		1K	Mechanical Zero: OK
6		2K		2K	
7		4K		4K	Response: OK
8					
9	X10	10K		10K	Reset: OK
10		20K		20K	
11		40K		40K	Audio: OK
12					
13	X100	100K		100K	High Voltage = 900 Volts
14		200K		200K	
15		400K		400K	1 mR/hr = 3K CPM in ^{137}Cs field
16					
17					^{99}Tc Efficiency = 10.5%
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: Robert R McCan (Signed)
Calibration Date: 11-06-95
Next Calibration Due: 05-06-96

I certify that the above information is correct:
Administrative Coordinator 11-06-95 Date

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 211729

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 97134

Mfg. Ludlum Measurements, Inc. Model 43-65 Serial No. PR096929

Cal. Date 03/30/95 Cal Due Date 09/30/95 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 28 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 650 V Input Sens. 36 mV Det. Oper. 650 V at 36 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 K cpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☐ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 3/30/95

Reviewed By: Jimmie Fleming Date 3-30-95

FORM C22A 03/25/95

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2623
Work Order # I-95-11-216

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 3 Serial Number 97348 (195)
External Probe(s) HP260 Serial # (193)

Calibration Method Pulser s/n 318
^{137}Cs s/n 10263 200mCi
^{99}Tc s/n S1256

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	X0.1	100 CPM		100 CPM	All Calibrations Btn. + & - 10%
2		200		200	
3		400		400	Battery Check: OK
4					
5	X1	1K		1K	Mechanical Zero: OK
6		2K		2K	
7		4K		4K	Response: OK
8					
9	X10	10K		10K	Reset: OK
10		20K		20K	
11		40K		40K	Audio: OK
12					
13	X100	100K		100K	High Voltage = 900 Volts
14		200K		200K	
15		400K		400K	1 mR/hr = 3K CPM in ^{137}Cs field
16					^{99}Tc Efficiency = 10.9%
17					
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: Robert R McCar (Signed)
Calibration Date: 11-06-95
Next Calibration Due: 05-06-96

I certify that the above information is correct:
Theresa M DeBo 11-06-95
Administrative Coordinator Date

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 211729

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 97427

Mfg. Ludlum Measurements, Inc. Model 43-65 Serial No. PR096930

Cal. Date 03/30/95 Cal Due Date 09/30/95 Cal. Interval 6 Months Meterface 202-663

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 20 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 750 V Input Sens. 32 mV Det. Oper. 750 V at 32 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 K cpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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	40 K cpm	39930 cpm	39930 cpm	Log Scale			
	4 k cpm	3993 cpm	3993 cpm				
	400 cpm	399 "	399 "				
	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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 3/30/95

Reviewed By: Jimmie Fleming Date 3-30-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-65 Serial No. PR096930

Customer ATG, INC. Order #. 211729

Counter 3 Serial No. 97427 Counter Input Sensitivity 32 mV

Count Time CPM Distance Source to Detector SURFACE

Isotope Th 230 3442 cpm Other

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
650	0	1500
700	0	1500
750	0	1500
800	0	1500
850	3	1600

Operating Voltage Set at 750 V

Air Proportional	43-5	43-65	Background	~~Meter~~ DIGITAL Reading	Range/Scale
	Toe	L/S*	0	1446	x 1
	Center	Center	0	1500	x 1
	Heel	Other**	0	1467	x1

☑ Uniformity (± 10%) Average Efficiency 42.7 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Bob Weems Date 3/30/95

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 211729

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 97901

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR089847

Cal. Date 03/30/95 Cal Due Date 09/30/95 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 20 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. ____ V at ____ mV Threshold Dial Ratio ____ = ____ mV

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

COMMENTS:

Archive

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	500 K cpm	5K	5K
X 100	100 K cpm	1K	1K
X 10	50 K cpm	5K	5K
X 10	10 K cpm	1K	1K
X 1	5 K cpm	5K	5K
X 1	1 K cpm	1K	1K
X 0.1	500 cpm	5K	5K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ____ ☐ Beta S/N ____ ☐ Other ____

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ____ ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 3/30/95

Reviewed By: Jimmie Fleming Date 3-30-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR089847

Customer ATG, INC. Order #. 211729

Counter 3 Serial No. 97991 Counter Input Sensitivity 34 mV

Count Time CPM Distance Source to Detector Surface

Other 13.6 % Resolution for Cs-137

High Voltage	Background	Isotope Am 241 Size 1.6 μC	Isotope Size	Isotope Size	Isotope Size
800	8K	110K			
850	8K	130K			
900	8K	130K			
950	8K	130K			
1000	9K	130K			

Signature Bob Weems Date 3/30/95

FORM C4A 02/23/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ATG, INC. Date 09/28/95 Order #. 215159

Model 3 Serial No. 97901 Detector Model 44-10 Serial No. RN010890

Source RA 226 S/N Y982 High Voltage 900 V
CALIBRATED USING 50 FT CABLE

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
	N	A		
2000 μR/hR			6.5 K	x 100
1000 "			3.7 K	"
200 "			700	"
100 "			3.6 K	x 10

Signature: Bob Weems Date 9/28/95

FORM C17-18 07/13/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 215159

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 97901

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. RN010890

Cal. Date 09/28/95 Cal Due Date 03/28/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 50 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:
Calibrated using 50 foot cable.

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	500 K cpm	N/A	5 K
X 100	100 K cpm		1 K
X 10	50 K cpm		5 K
X 10	10 K cpm		1 K
X 1	5 K cpm		5 K
X 1	1 K cpm		1 K
X 0.1	500 cpm		5 K
X 0.1	100 cpm		1 K

*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			

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Reference Instruments and/or Sources:

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

☐ Alpha S/N ☐ Beta S/N ☑ Other Ra 226

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 9/28/95

Reviewed By: Conrad Salando Date 9/28/95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

TOMER ALLIED TECHNOLOGY GROUP,INCORPORATED ORDER NO. 218351

. Ludlum Measurements, Inc. Model 3 Serial No. 97901

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR058761

Cal. Date 03/25/96 Cal Due Date 09/25/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☑ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 33 mV Det. Oper. 900 V at 33 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	150 mR/hr	0.95	1.37
X 100	50 mR/hr	0.4	0.55
X 10	15 mR/hr	1.4	1.5
X 10	5 mR/hr	0.5	0.55
X 1	1.5 mR/hr = 4810cpm	1.5	1.5
X 1	1.0 mR/hr	1.05	1.05
X 0.1	481 cpm	1.45	1.5
X 0.1	160 cpm	0.49	0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Jr. Date 3-25-96

Reviewed By: Rhonda Harris Date 3-26-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 97992

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR096946

Cal. Date 06/07/96 Cal Due Date 12/07/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	150 mR/hr	1.5	1.5
X100	50 mR/hr	0.5	0.5
X 10	15 mR/hr	1.5	1.5
X 10	5 mR/hr	0.5	0.5
X 1.0	1.5 mR/hr = 4810 cpm	1.5	1.5
X 1.0	1.0 mR/hr	1.0	1.0
X 0.1	481 cpm	1.5	1.5
X 0.1	160 cpm	0.5	0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30-

☐ Alpha S/N ☐ Beta S/N ☐ Other

m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 6-7-96

Reviewed By: Randall Hess Date 6-11-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 100356

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR100925

Cal. Date 06/07/96 Cal Due Date 12/07/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % AP 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 32 mV Det. Oper. 900 V at 32 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	150 mR/hr	1.5	1.5
X100	50 mR/hr	0.5	0.5
X 10	15 mR/hr	1.5	1.5
X 10	5 mR/hr	0.5	0.5
X 1.0	1.5 mR/hr = 4970 cpm	1.5	1.5
X 1.0	1.0 mR/hr	1.0	1.0
X 0.1	497 cpm	1.5	1.5
X 0.1	166 cpm	0.5	0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Williams Date 6-7-96

Reviewed By: Randall Hess Date 6-11-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 220500

I. Ludlum Measurements, Inc. Model 3 Serial No. 100356

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR 100925

Cal. Date 07/24/96 Cal Due Date 01/24/97 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 46 % Alt 702.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 32 mV Det. Oper. 900 V at 32 mV Threshold Dial Ratio ____ = ____ mV

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

COMMENTS:

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	150 mR/hr	N/A	1.5
X 100	50 mR/hr		0.5
X 10	15 mR/hr		1.5
X 10	5 mR/hr		0.5
X 1	1.5 mR/hr = 4800 cpm		1.5
X 1	1.0 mR/hr		1.0
X 0.1	480 cpm		1.5
X 0.1	160 cpm		0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ____ ☐ Beta S/N ____ ☐ Other ____

m 500 S/N 57881 ☐ Oscilloscope S/N ____ ☑ Multimeter S/N 52400059

Calibrated By: Jimmie Fleming Date 7-24-96

Reviewed By: Debbie Dibrell Date 7-25-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

Work Order #: 220500

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Received: 07/02/96 **Received Via:** Federal Express **Condition Received:** Fair

Customer Name: ALLIED TECHNOLOGY GROUP
Address: %FT. MCCLELLAN--BLDG.3192--CHEMICAL
City/State/Zip: ANNISTON, AL 36205-5000

Customer Account #: 005333
# of Packing Slips: 1
Calibration Interval: 6 Months

Reason for Return: Repair/Calibrat **Special Instructions:** NONE

Item(s): 1. Model: 3 S/N: 100356
2. Model: 44-9 S/N: PR100925

Accessories: 39"C CABLE

COMMENTS: Resoldered bad connection in probe.

ITEM	PART #	DESCRIPTION	AMT	PRICE/EA.	COST
			2	—	—
1	21-9313	D Batteries	1	2.00	
		Shipping Tube			

Instrument Calibrated 1 at $ 40
Secondary Detectors ____ at $ ____
Extended Calibration ____ at $ ____
Labor 1/2 hour(s) at $ 40 per hour

Total Parts Cost $ ____
Total Calibration Charge $ 40
Total Labor $ 20
Sub-total Calibration, Parts, and Labor $ 60
Shipping Charges $ ____
Total Charges $ ____

Signed Jimmie Fleming Date 7-24-96
Q/C Released Debby Dilmore Date 7-25-96

DO NOT PAY! INVOICE TO FOLLOW

Date 7/25/96 **Contacted** NEAL WHATLEY **By** ____
PO Number 3364 **Return Ship** UPS Ground **Phone #** 205-848-5976

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 216044

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 100357

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR098037

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 650 V Input Sens. 32 mV Det. Oper. 650 V at 32 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
x 100	100 Kcpm	1K	1K
x 10	40 K cpm	4K	4K
x 10	10 K cpm	1K	1K
x 1	4 K cpm	4K	4K
x 1	1 K cpm	1K	1K
x 0.1	400 cpm	4K	4K
x 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N Pu-239 12800cpm ☐ Beta S/N ☐ Other

☑ m 500 S/N 121025 ☐ Oscilloscope S/N ☑ Multimeter S/N A5099

Calibrated By: Ronald Hodges Date 11-14-95

Reviewed By: Bob Wiens Date 11-14-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR098037

Customer ALLIED TECHNOLOGY GROUP,INC. Order #. 216044

Counter 3 Serial No. 100357 Counter Input Sensitivity 32 mV

Count Time Cpm Distance Source to Detector Surface

Isotope Pu-239 12800cpm Other

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
550	0	2.8K
600	0	3.2K
650	0	3.5K
700	3	3.5K
750	9	3.6K

Operating Voltage Set at 650 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3.25K	X1
	Center	Center	0	3.5K	
	Heel	Other**	0	3.5K	

☑ Uniformity (± 10%) Average Efficiency 27 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Ronald Hood Date 11-14-95

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

Ludlum Measurements, Inc. Model 3 Serial No. 100357

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR098037

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 650 V Input Sens. 34 mV Det. Oper. 650 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	400 K cpm	4K	4K
X100	100 Kcpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1.0	4 K cpm	4K	4K
X 1.0	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N 8743 ☐ Beta S/N ☐ Other

☑ m 500 S/N 57885 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Hanni Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR098037

Customer ALLIED TECHNOLOGY GROUP Order #. 219269

Counter 3 Serial No. 100357 Counter Input Sensitivity 34 mV

Count Time CPM Distance Source to Detector Surface

Isotope 8743 Other Pu-239 12,800 cpm

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
575	0	3K
600	0	3.4K
625	0	3.4K
650	0	3.4K
675	1	3.4K
700	2	3.4K
725	10	3.4K
750	14	3.4K
775	35	3.4K

Operating Voltage Set at 650 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3.2K	X1
	Center	Center	0	3.4K	X1
	Heel	Other**	0	3.4K	X1

☑ Uniformity (± 10%) Average Efficiency 26 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Bill Henson Date 5-8-96

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

J. Ludlum Measurements, Inc. Model 3 Serial No. 100466

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR098598

Cal. Date 06/07/96 Cal Due Date 12/07/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☑ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	150 mR/hr	1.3	1.5
X100	50 mR/hr	0.5	0.55
X 10	15 mR/hr	1.5	1.5
X 10	5 mR/hr	0.5	0.5
X 1.0	1.5 mR/hr = 5300 cpm	1.5	1.5
X 1.0	1.0 mR/hr	1.0	1.0
X 0.1	530 cpm	1.5	1.5
X 0.1	177 cpm	0.5	0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Williams Date 6-7-96

Reviewed By: Randall Hess Date 6-11-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 216787

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 100487

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR098036

Cal. Date 01/03/96 Cal Due Date 07/03/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 25 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 700 V Input Sens. 34 mV Det. Oper. 700 V at 34 mV Threshold Dial Ratio = m

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 Kcpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 #8743 ☐ Beta S/N ☐ Other

m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 1-3-96

Reviewed By: Rhonda Hanson Date 1-3-96

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-467
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR098036

Customer ALLIED TECHNOLOGY GROUP Order #. 216787

Counter 3 Serial No. 100487 Counter Input Sensitivity 34 mV

Count Time cpm Distance Source to Detector Surface

Isotope Pu-239 #8743 Other

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
600	0	1.8k
650	0	3.2k
700	0	3.4k
750	1	3.4k
800	3	3.4k

Operating Voltage Set at 700 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3.2K	x1
	Center	Center	0	3.4K	"
	Heel	Other**	0	3.4K	"

☑ Uniformity (± 10%) Average Efficiency 26 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Michael Moore Date 1-3-96

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 214544

g. Ludlum Measurements, Inc. Model 3 Serial No. 100502

g. Ludlum Measurements, Inc. Model 44-9 Serial No. PR098547

Cal. Date 08/23/95 Cal Due Date 02/23/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 77 °F RH 50 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	150 mR/hr	N/A	1.5
X 100	50 mR/hr		0.5
X 10	15 mR/hr		1.5
X 10	5 mR/hr		0.5
X 1	1.5 mR/hr = 4750cpm		1.5
X 1	1.0 mR/hr		1.0
X 0.1	475 cpm		1.5
X 0.1	158 cpm		0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 54668 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: Randy [illegible] Date 8/23/95

Reviewed By: Debby Dilmore Date 8-23-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 100502

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR098547

Cal. Date 06/07/96 Cal Due Date 12/07/96 Cal. Interval 6 Months Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	150 mR/hr	1.5	1.5
X100	50 mR/hr	0.5	0.5
X 10	15 mR/hr	1.5	1.5
X 10	5 mR/hr	0.5	0.5
X 1.0	1.5 mR/hr = 4880 cpm	1.5	1.5
X 1.0	1.0 mR/hr	1.0	1.0
X 0.1	488 cpm	1.5	1.5
X 0.1	163 cpm	0.5	0.5

*Uncertainty within ± 10% C.F. within ± 20% X 0.1 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 6-7-96

Reviewed By: Randall Hess Date 6-11-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 216044

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 100538

Mfg. Ludlum Measurements, inc. Model 43-5 Serial No. PR098034

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 650 V Input Sens. 32 mV Det. Oper. 650 V at 32 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
x 100	100 Kcpm	1K	1K
x 10	40 K cpm	4K	4K
x 10	10 K cpm	1K	1K
x 1	4 K cpm	4K	4K
x 1	1 K cpm	1K	1K
x 0.1	400 cpm	4K	4K
x 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 12800cpm ☐ Beta S/N ☐ Other

☑ m 500 S/N 121025 ☐ Oscilloscope S/N ☑ Multimeter S/N A5099

Calibrated By: Ronald Nash Date 11-14-95

Reviewed By: Bob Wiens Date 11-14-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR098034

Customer ALLIED TECHNOLOGY GROUP,INC. Order #. 216044

Counter 3 Serial No. 100538 Counter Input Sensitivity 32 mV

Count Time cpm Distance Source to Detector Surface

Isotope Pu-239 12800cpm Other

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
550	0	2.8K
600	0	3.4K
650	0	3.7K
700	1	3.7K
750	9	3.8K

Operating Voltage Set at 650 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3.25K	X1
	Center	Center	0	3.7K	X1
	Heel	Other**	0	3.5K	X

☑ Uniformity (± 10%) Average Efficiency 27 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature [signature] Date 11-14-95

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

J. Ludlum Measurements, Inc. Model 3 Serial No. 120072

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR124118

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 1150 V Input Sens. 35 mV Det. Oper. 1150 V at 35 mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
X100	400 K cpm	4.1 K	4K
X100	100 Kcpm	1.05K	1K
X 10	40 K cpm	4.05K	4K
X 10	10 K cpm	1K	1K
X 1.0	4 K cpm	4.05K	4K
X 1.0	1 K cpm	1K	1K
X 0.1	400 cpm	4.05K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Am-241 5.5μCi

☑ m 500 S/N 54668 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR124118

Customer ALLIED TECHNOLOGY GROUP Order #. 219269

Counter 3 Serial No. 120072 Counter Input Sensitivity 35 mV

Count Time CPM Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am-241 Size 5.5μCi	Isotope Size	Isotope Size	Isotope Size
900	9.5K	110K			
950	10.5K	215K			
1000	10.5K	230K			
1050	10.5K	250K			
1100	11K	255K			
1150	11K	255K			
1200	11K	255K			
1250	11K	255K			
1300	11K	260K			

Signature Bill Henson Date 5-8-96

FORM C4A 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 102192

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR100604

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 600 V Input Sens. 34 mV Det. Oper. 600 V at 34 mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
X100	400 K cpm	4K	4K
X100	100 Kcpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1.0	4 K cpm	4K	4K
X 1.0	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 8743 ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 57885 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR100604

Customer ALLIED TECHNOLOGY GROUP Order #. 219269

Counter 3 Serial No. 102192 Counter Input Sensitivity 34 mV

Count Time CPM Distance Source to Detector Surface

Isotope 8743 Other Pu-239 12,800 cpm

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
500	0	2.3K
525	0	2.9K
550	0	3.3K
575	0	3.3K
600	0	3.3K
625	1	3.3K
650	3	3.3K
675	8	3.3K
700	24	3.3K

Operating Voltage Set at 600 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3.3K	x1
	Center	Center	0	3.3K	x1
	Heel	Other**	0	3.3K	x1

☑ Uniformity (± 10%) Average Efficiency 25.8 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Bill Henson Date 5-8-96

FORM C21 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 208746

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 102498

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR100924

Cal. Date 10/05/94 Cal Due Date 04/05/95 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 45 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☐ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 K cpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 10-5-94

Reviewed By: Jimmie Fleming Date 10-7-94

FORM C22A 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ALLIED TECHNOLOGY GROUP, INC. Date 10/05/94 Order #. 208746

Model 3 Serial No. 102498 Detector Model 44-9 Serial No. PR100924

Source Cs-137 194.6 mCi High Voltage 900 V

	"As Found" Readings:		After Adjustment Readings:	
Reference Point	Meter Reading	Range/Scale	Meter Reading	Range/Scale
150 mR/hr	3.3K	x100		
50 mR/hr	1.4K	"		
15 mR/hr	4.7K	x 10		
5 mR/hr	1.7K	"		
1.5 mR/hr	4.5K	x 1		
1.0 mR/hr	2.9K	"		

Signature: Bob Weems Date 10-5-94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 211729

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 102498

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR100924

Cal. Date 03/30/95 Cal Due Date 09/30/95 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 20 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 36 mV Det. Oper. 900 V at 36 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 K cpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

γ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 3/30/95

Reviewed By: Jimmie Fleming Date 3-30-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ATG, INC. Date 03/30/95 Order #. 211729

Model 3 Serial No. 102498 Detector Model 44-9 Serial No. PR100924

Source Cs 137 S/N G112, 199.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings: Meter Reading	"As Found" Readings: Range/Scale	After Adjustment Readings: Meter Reading	After Adjustment Readings: Range/Scale
150 mR/hr	3.5 K	x100	3.5 K	x100
50 mR/hr	1.5 K	"	1.5 K	"
15 mR/hr	5 K	x 10	5 K	x 10
5 mR/hr	1.7 K	"	1.7 K	"
1.5 mR/hr	4.5 K	x 1	4.5 K	x 1
1.0 mR/hr	3.3 K	"	3.3 K	"

Signature: Bob Weems Date 3/30/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 215067

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 102498

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR100924

Cal. Date 09/25/95 Cal Due Date 03/25/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 50 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio ___ = ___

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

COMMENTS:

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	400 K cpm	4K	4K
X 100	100 Kcpm	1K	1K
X 10	40 K cpm	4K	4K
X 10	10 K cpm	1K	1K
X 1	4 K cpm	4K	4K
X 1	1 K cpm	1K	1K
X 0.1	400 cpm	4K	4K
X 0.1	100 cpm	1K	1K

*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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-196

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☑ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N ___ ☐ Beta S/N ___ ☐ Other ___

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ___ ☑ Multimeter S/N 57770263

Calibrated By: Bob Williams Date 9/25/95

Reviewed By: Jimmie Fleming Date 9-29-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ALLIED TECHNOLOGY GROUP Date 09/25/95 Order #. 215067

Model 3 Serial No. 102498 Detector Model 44-9 Serial No. PR100924

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	3.5 K	x 100	3.5 K	x 100
50 mR/hr	1.5 K	"	1.5 K	"
15 mR/hr	4.9 K	x 10	4.9 K	x 10
5 mR/hr	1.7 K	"	1.7 K	"
1.5 mR/hr	.51 K	"	.51 K	"
1.0 mR/hr	3.1 K	x 1	3.1 K	x 1

Signature: Bob Weems Date 9/25/95

FORM C17-1A 07/13/95

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Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INCORPORATED ORDER NO. 218351

Ludlum Measurements, Inc. Model 3 Serial No. 102498

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR100924

Cal. Date 03/25/96 Cal Due Date 09/25/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

"AS FOUNDS" reflect non-zeroed instrument upon receipt.

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	4.21K	4K
X 100	100kcpm	1.15K	1K
X 10	40kcpm	4.21K	4K
X 10	10kcpm	1.15K	1K
X 1	4kcpm	4.21K	4K
X 1	1kcpm	1.15K	1K
X 0.1	400cpm	4.25K	4K
X 0.1	100cpm	1.15K	1K

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 81084 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Date 3-25-96

Reviewed By: Rhonda Harris Date 3-26-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG,INC. ORDER NO. 216022

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 102554

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. BB 098546

Cal. Date 11/15/95 Cal Due Date 05/15/96 Cal. Interval 6 Months Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

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

COMMENTS:

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	400 K cpm	3.9 K	4k
x 100	100 Kcpm	1k	1k
x 10	40 K cpm	3.9 K	4k
x 10	10 K cpm	1k	1k
x 1	4 K cpm	3.9k	4k
x 1	1 K cpm	1k	1k
x 0.1	400 cpm	3.9k	4k
x 0.1	100 cpm	1k	1k

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 54668 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: Conrad Galindo Date 11/15/95

Reviewed By: Debby Gibson Date 11-15-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ATG,INC. Date 11/15/95 Order #. 216022

Model 3 Serial No. 102554 Detector Model 44-9 Serial No. PR 098546

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	3.7K	X100	3.8K	X100
50 mR/hr	1.6K	X100	1.7K	X100
15 mR/hr	4.9K	X10	0.6K	X100
5 mR/hr	1.8K	X10	1.8K	X10
1.5 mR/hr	4.5K	X1	4.7K	X1
1.0 mR/hr	3.2K	X1	3.2K	X1

Signature: Conrad Melinda Date 11/15/95

FORM C17-1A 07/13/95

• Serving The Nuclear Industry Since 1962 •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

USTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 210335

..fg. Ludlum Measurements, Inc. Model 9 Serial No. 95293

Mfg. Model Serial No.

Cal. Date 01/06/95 Cal Due Date 07/06/95 Cal. Interval 6 Months Meterface 200

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 696.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

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

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

COMMENTS:

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 1000	4 R/hr	4	4
X 1000	1 R/hr	1	1
X 100	400 mR/hr	4	4
X 100	100 mR/hr	1	1
X 10	40 mR/hr	4	4
X 10	10 mR/hr	1	1
X 1	4 mR/hr	4	4
X 1	1 mR/hr	1	1

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-196

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☑ G112 ☐ M565 ☐ 5105 ☑ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N ☐ Beta S/N ☐ Other

☐ m 500 S/N ☐ Oscilloscope S/N ☐ Multimeter S/N

Calibrated By: Bob Weems Date 1/6/95

Reviewed By: Jimmie Fleming Date 1-9-95

FORM C22A 09/28/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG,INC. ORDER NO. 216022

Mfg. Ludlum Measurements, Inc. Model 9 Serial No. 45293

Mfg. Model Serial No.

Cal. Date 11/15/95 Cal Due Date 05/15/96 Cal. Interval 6 Months Meterface 200

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 708.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

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

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

COMMENTS:

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 1000	4 R/hr	4	4
X 1000	1 R/hr	1	1
X 100	400 mR/hr	4	4
X 100	100 mR/hr	1	1
X 10	40 mR/hr	3.9	4
X 10	10 mR/hr	1	1
X 1	4 mR/hr	3.7	4
X 1	1 mR/hr	0.9	1

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1962

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☑ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-30-

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☐ m 500 S/N _____ ☐ Oscilloscope S/N _____ ☐ Multimeter S/N _____

Calibrated By: Conrad Salinas Date 11/15/95

Reviewed By: Debby Dilmore Date 11-15-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

ORDER NO. 218822

'STOMER ALLIED TECHNOLOGY GROUP

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 121291

Mfg. Ludlum Measurements, Inc. Model 44-10-5 Serial No. PR 123 837

Cal. Date 04/16/96 Cal Due Date 10/16/96 Cal. Interval 6 Months Meterface 202 356

Check mark ☑ applies to applicable Instr. and/or detector IAW mfg. spec. T. 75 °F RH 32 % Alt. 711.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 1400 V Input Sens. 10 mV Det. Oper. 1400 V at 10 mV Threshold Dial Ratio =

☑ HV Readout (2 points) Ref./Inst 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

Calibrated using 50' cable.
HV set with detector connected

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 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronic

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

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 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 technique. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N

☐ Alpha S/N ☐ Beta S/N ☑ Other Am 241 ~ 1.6 mC

☑ m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 4-16-96

Reviewed By: Rhonda Hamm Date 4-16-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10-5 Serial No. PR125857

Order #. 218822

Customer ALLIED TECHNOLOGY GROUP

Counter 12 Serial No. 121291

Counter Input Sensitivity 10 mV

Count Time CPM

Distance Source to Detector surface

Other

High Voltage	Background	Isotope Am241 Size ~1.6mCi	Isotope Size	Isotope Size	Isotope Size
1200	6K	18K			
1250	6.5K	19K			
1300	6.5K	22K			
1350	6K	25K			
1400	6K	26K			
1450	6K	26K			
1500	6K	26K			

Signature Michael Moore

Date 4-16-96

FORM C4A 02/23/94

• Serving The Nuclear Industry Since 1962 •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 219688

fg. Ludlum Measurements, Inc. Model 12 Serial No. 125254

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR128057

Cal. Date 06/01/96 Cal Due Date ~~06/01/97~~ 12-1-96 Cal. Interval 1/2 Year Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 505 / 500 V Ref./Inst. 1993 / 2000 V

COMMENTS:

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 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

m 500 S/N 121025 ☐ Oscilloscope S/N ☑ Multimeter S/N 64100257

Calibrated By: Randall Hester Date 6-1-96

Reviewed By: Rhonda Harris Date 6-3-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ALLIED TECHNOLOGY GROUP,INC. Date 06/01/96 Order #. 219688

Model 12 Serial No. 125254 Detector Model 44-9 Serial No. PR128057

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	330	X1000	330	X1000
50 mR/hr	145	"	145	"
15 mR/hr	480	X100	480	X100
5 mR/hr	180	"	180	"
1.5 mR/hr	460	X10	460	X10
1.0 mR/hr	340	"	340	"

Signature: Randall Hess Date 6-1-96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG ORDER NO. 220838

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 125254

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR128057

Cal. Date 07/24/96 Cal Due Date 01/24/97 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 41 % Alt 702.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

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 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 7-24-96

Reviewed By: Rhonda Harris Date 7-24-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ATG Date 07/24/96 Order #. 220838

Model 12 Serial No. 125254 Detector Model 44-9 Serial No. PR128057

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
	N/A			
150 mR/hr			320	X1000
50 mR/hr			140	"
15 mR/hr			460	X100
5 mR/hr			250	"
1.5 mR/hr			440	X10
1.0 mR/hr			290	"

Signature: Bob Weems Date 7-24-96

FORM C17-1A 07/13/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

J. Ludlum Measurements, Inc. Model 12 Serial No. 125261

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR128041

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. BH ☑ 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 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 510 / 500 V Ref./Inst. 2015 / 2000 V

COMMENTS:

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 1000	400 K cpm	410	400
X 1000	100 K cpm	105	100
X 100	40 K cpm	405	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	405	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 57885 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer ALLIED TECHNOLOGY GROUP Date 05/08/96 Order #. 219269

Model 12 Serial No. 125261 Detector Model 44-9 Serial No. PR128041

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	375	x1000	345	x1000
50 mR/hr	160	"	160	"
15 mR/hr	55	"	55	"
5 mR/hr	190	x100	190	x100
1.5 mR/hr	60	"	60	"
1.0 mR/hr	320	x10	310	x10

Signature: Bill Henson Date 5-8-96

FORM C17-1A 07/13/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 218726

Ludlum Measurements, Inc. Model 12 Serial No. 125304

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR 129327

Cal. Date 04/04/96 Cal Due Date 10/04/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 28 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 505 / 500 V Ref./Inst. 2009 / 2000 V

COMMENTS:

HV Alpha = 1250v.
HV Beta = 1700v.
Model 12 currently set for Alpha.

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 1000	400kcpm	410	400
X 1000	100kcpm	103	100
X 100	40kcpm	410	400
X 100	10kcpm	103	100
X 10	4kcpm	415	400
X 10	1kcpm	103	100
X 1	400cpm	410	400
X 1	100cpm	105	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337,Pu239,15.7kcpm ☑ Beta S/N 636/83,Tc99,140kcpm ☐ Other

m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elvis Chavez Date 4-4-96

Reviewed By: Rhonda Harris Date 4-4-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR129327

Customer ALLIED TECHNOLOGY GROUP Order #. 218726

Counter 12 Serial No. 125304 Counter Input Sensitivity 4 mV

Count Time cpm Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu239 Size 15,100cpm	Isotope Tc99 Size 140Kcpm	Isotope Size	Isotope Size
1100	1	6500			
1150	1	6500			
1200	0	6500			
1250	4	6500			
1300	2	7000			
1350	6	7000			
1400	11	7000			
1550	100		70,000		
1600	220		80,000		
1650	300		80,000		
1700	300		80,000		
1750	300		80,000		
1800	320		150,000		

Probe counts variance = <10%
after 15hr. static check

Signature Elias Chavez Jr. Date 4-4-96

FORM C4A 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 220727/220682

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 125304

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR 129751

Cal. Date 07/17/96 Cal Due Date 01/17/97 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 46 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

Alpha H.V.- 1250 v.
Beta H.V.- 1725 v.

Instrument calibrated using 39" cable.

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 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239, 12.8 K cpm ☑ Beta S/N Tc-99, 140 K cpm ☐ Other

☑ m 500 S/N 57881 ☐ Oscilloscope S/N ☑ Multimeter S/N 52400059

Calibrated By: Jimmie Fleming Date 7-17-96

Reviewed By: Bob Weems Date 7-18-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 B Serial No. PR 129751 Order #. 220727/220682

Customer ALLIED TECHNOLOGY GROUP, INC. T. 72 °F RH 46 % BP 703.8 mm Hg

Counter 12 Serial No. 125304 Counter Input Sensitivity 4 mV

Count Time 1 minute Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Tc-99 Size 140 Kcpm	Isotope Size	Isotope Size	Isotope Size
1500	42	38056			
1525	51	46996			
1550	89	56131			
1575	91	65267			
1600	138	73471			
1625	192	78438			
1650	249	81340			
1675	244	81271			
1700	265	82327			
1725	281	82153			
1750	323	82732			
1775	467	86956			
1800	597	90223			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

Signature Jimmie Fleming Date 7-17-96

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 MIL-STD-45662A and ANSI N323-1976. State of Texas Calibration License No. LO-1963

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 A Serial No. PR 129751 Order #. 220727/220682

Customer ALLIED TECHNOLOGY GROUP, INC. T. 72 °F RH 46 % BP 703.8 mm Hg

Counter 12 Serial No. 125304 Counter Input Sensitivity 4 mV

Count Time 1 minute Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12.8 Kcpm	Isotope Size	Isotope Size	Isotope Size
1100	0	5821			
1125	1	6031			
1150	0	6028			
1175	2	6240			
1200	1	6213			
1225	0	6373			
1250	1	6349			
1275	2	6359			
1300	3	6349			
1325	2	6352			
1350	3	6313			
1375	4	6316			
1400	9	6417			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 30" cable.

Signature Jimmie Fleming Date 7-17-96

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 MIL-STD-45662A and ANSI N323-1978.
State of Texas Calibration License No. LO-196

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 218726

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 125308

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR129751

Cal. Date 04/04/96 Cal Due Date 10/04/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 28 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 503 / 500 V Ref./Inst. 2008 / 2000 V

COMMENTS:

HV Alpha = 1250v.
HV Beta = 1700v.
Model 12 currently set for Alpha.

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 1000	400kcpm	415	400
X 1000	100kcpm	105	100
X 100	40kcpm	410	400
X 100	10kcpm	103	100
X 10	4kcpm	410	400
X 10	1kcpm	103	100
X 1	400cpm	410	400
X 1	100cpm	103	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337,Pu239,15.7kcpm ☑ Beta S/N 636/83,Tc99,140kcpm ☐ Other

☑ m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Date 4-4-96

Reviewed By: Rhonda Harris Date 4-4-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR129751

Customer ALLIED TECHNOLOGY GROUP Order #. 219269

Counter 2200 Serial No. 102775 Counter Input Sensitivity 4 mV

Count Time 1 min. background, 0.1 min. source Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12,800 cpm	Isotope Tc-99 Size ≈136,100 dpm	Isotope Size	Isotope Size
1100	0	634			
1150	1	637			
1200	1	660			
→ 1250	1	658			
1300	2	651			
1350	5	649			
1400	16	660			
1500	47		2069		
1550	113		2760		
1600	206		3486		
1650	321		3721		
1700	362		3842		
→ 1750	363		3881		
1800	352		3916		
1850	420		4259		

Signature Bill Henson Date 5-8-96

FORM C4A 02/23/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR 129751

Customer ALLIED TECHNOLOGY GROUP Order #. 218726

Counter 12 Serial No. 125308 Counter Input Sensitivity 4 mV

Count Time CPM Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu239 Size 15,700cpm	Isotope Tc99 Size 140Kcpm	Isotope Size	Isotope Size
1100	1	7000			
1150	1	7500			
1200	0	7500			
1250	2	7500			
1300	2	7500			
1350	3	7500			
1400	10	7500			
1550	108		20,000		
1600	260		80,000		
1650	300		80,000		
1700	300		80,000		
1750	300		80,000		
1800	300		165,000		
1850	300		200,000		

Probe counts variance =< 10%
after 15hr. static check

Signature Elias Chavez Date 4-4-96

FORM C4A 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG ORDER NO. 220838

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 125308

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR 129327

Cal. Date 07/24/96 Cal Due Date 01/24/97 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 46 % Alt 702.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2008 / 2000 V

COMMENTS:

Alpha H.V.-1250 v.
Beta H.V.-1725 v.

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 1000	400 K cpm	390	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	395	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N Pu-239, 12.8 K cpm ☑ Beta S/N Tc-99, 140 K cpm ☐ Other

☑ m 500 S/N 57881 ☐ Oscilloscope S/N ☑ Multimeter S/N 52400059

Calibrated By: Jimmie Fleming Date 7-24-96

Reviewed By: Rhonda Harris Date 7-24-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 B Serial No. PR 129327 Order #. 220838

Customer ATG T. 74 °F RH 46 % BP 702.8 mm Hg

Counter 12 Serial No. 125308 Counter Input Sensitivity 4 mV

Count Time 1 minute Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Tc-99 Size 140 Kcpm	Isotope Size	Isotope Size	Isotope Size
1550	69	59788			
1575	106	68780			
1600	150	75736			
1625	211	79103			
1650	229	80493			
1675	245	81172			
1700	265	80459			
1725	244	81539			
1750	274	81788			
1775	285	82679			
1800	315	84085			
1825	297	85989			
1850	320	88225			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

Signature Jimmie Fleming Date 7-24-96

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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Designer and Manufacturer
of
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LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 a Serial No. PR 129327 Order #. 220838

Customer ATG T. 74 °F RH 46 % BP 702.8 mm Hg

Counter 12 Serial No. 125308 Counter Input Sensitivity 4 mV

Count Time 1 minute Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12.8 Kcpm	Isotope Size	Isotope Size	Isotope Size
1100	0	6195			
1125	0	6267			
1150	1	6187			
1175	0	6160			
1200	0	6178			
1225	1	6222			
1250	1	6336			
1275	2	6216			
1300	1	6196			
1325	0	6276			
1350	2	6287			
1375	6	6441			
1400	8	6316			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

Signature Jennie Flemmy Date 7-24-96

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 MIL-STD-45662A and ANSI N323-1978.
State of Texas Calibration License No. LO-196

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

Mfg. Ludlum Measurements, Inc. Model 12S Serial No. 114316

Mfg. Model Serial No.

Cal. Date 05/09/96 Cal Due Date 11/09/96 Cal. Interval 6 Months Meterface 202-004

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 880 V Input Sens. 43 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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 1000	2000 uR/hr	1.9	2
X 1000	1000 uR/hr	1	1
X 100	200 uR/hr = 35.3K cpm	1.9	2
X 100	100 uR/hr	1	1
X 10	3.53K cpm	1.9	2
X 10	1.76K cpm	1	1
X1	353 cpm	1.9	2
X1	176 cpm	1	1

*Uncertainty within ± 10% C.F. within ± 20% X10 ,X1 **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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-196

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ Gi12 ☑ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 57885 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-9-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ,INCORPORATED ORDER NO. 216150

Ludlum Measurements, Inc. Model 18 Serial No. 118294

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR061082

Cal. Date 11/27/95 Cal Due Date 05/27/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 78 °F RH 33 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 510 / 500 V Ref./Inst. 2007 / 2000 V

COMMENTS:

HV (1) 1250v. Alpha
HV (2) 1700v. Beta
HV (3) 900v.

Window set at 1.5 X input sensitivity.
Input sensitivity must be re-set for proper operation with G-M detector.

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 1000	400kcpm	398	400
X 1000	100kcpm	98	100
X 100	40kcpm	398	400
X 100	10kcpm	98	100
X 10	4kcpm	398	400
X 10	1kcpm	98	100
X 1	400cpm	398	400
X 1	100cpm	95	100

*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 MIL-STD-45662A 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 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337,Pu239 ☑ Beta S/N 200A101884,C14*635/83,Tc99 ☐ Other

☑ m 500 S/N 79956 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Date 11-27-95

Reviewed By: Debby Gibson Date 11-29-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR061082

Customer ALLIED TECHNOLOGY GROUP Order #. 216150

Counter 18 Serial No. 118294 Counter Input Sensitivity 4 mV

Count Time CPM Distance Source to Detector Surface

Other Static checked for 18 hrs.

High Voltage	Background	Isotope Pu239 Size 15,700cpm	Isotope C14 Size 0.165μCi	Isotope Tc99 Size 14,300cpm	Isotope ____ Size ____
1100	2	7000			
1150	1	7500			
1200	2	7500			
1250	3	7500			
1300	1	7500			
1350	2	7500			
1400	7	7500			
1550	130		50,000	7000	
1600	250		50,000	8000	
1650	250		55,000	9000	
1700	250		55,000	9000	
1750	300		55,000	9000	
1800	350		60,000	9000	
1850	350		60,000	10,000	

Signature Elias Chavez Date 11-27-95

FORM C4A 02/23/94

• Serving The Nuclear Industry Since 1962 •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

J. Ludlum Measurements, Inc. Model 18 Serial No. 118294

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR061082

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 505 / 500 V Ref./Inst. 2010 / 2000 V

COMMENTS:

H.V. 1 set @ 1250 Volts for Alpha.
H.V. 2 set @ 1750 Volts for Beta.
H.V. 3 set @ 900 Volts for G-M detector.

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	400 K cpm	400	400
X1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X1	400 cpm	400	400
X1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N 8743 ☑ Beta S/N 0733 ☐ Other

☑ m 500 S/N 57885 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR061082

Customer ALLIED TECHNOLOGY GROUP Order #. 219269

Counter 18 Serial No. 118294 Counter Input Sensitivity 4 mV

Count Time CPM Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12,800cpm	Isotope Tc-99 Size ≈136,100dpm	Isotope Size	Isotope Size
1100	0	6K			
1150	0	6K			
1200	0	6K			
1250	0	6K			
1300	0	6K			
1350	1	6K			
1400	5	6K			
1500	50		15K		
1550	100		23K		
1600	150		29K		
1650	260		35K		
1700	360		36K		
1750	360		36K		
1800	450		36K		
1850	1320		42K		

Signature Bill Henson Date 5-8-96

FORM C4A 02/23/94

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CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ,INCORPORATED ORDER NO. 216150

Ludlum Measurements, Inc. Model 18 Serial No. 118295

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR061083

Cal. Date 11/27/95 Cal Due Date 05/27/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 78 °F RH 33 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 508 / 500 V Ref./Inst. 2009 / 2000 V

COMMENTS:

HV (1) 1250v. Alpha
HV (2) 1700v. Beta
HV (3) 900v.

Window set at 1.5 X input sensitivity.
Input sensitivity must be re-set for proper operation with G-M detector.

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 1000	400kcpm	402	400
X 1000	100kcpm	102	100
X 100	40kcpm	405	400
X 100	10kcpm	102	100
X 10	4kcpm	403	400
X 10	1kcpm	102	100
X 1	400cpm	403	400
X 1	100cpm	105	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337,Pu239 ☑ Beta S/N 200A101884,C14*635/83,Tc99 ☐ Other

m 500 S/N 79956 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Jr. Date 11-27-95

Reviewed By: Debby Gibson Date 11-29-95

FORM C22A 03/25/95

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR061083

Order #. 216150

Customer ALLIED TECHNOLOGY GROUP

Counter 18 Serial No. 118295

Counter Input Sensitivity 4 mV

Count Time CPM

Distance Source to Detector Surface

Other Static checked for 16 hrs.

High Voltage	Background	Isotope Pu239 Size 15,700 cpm	Isotope C14 Size 0.165 µCi	Isotope Tc99 Size 14,300 cpm	Isotope ___ Size ___
1100	0	7000			
1150	0	7500			
1200	1	7500			
1250	2	7500			
1300	2	7500			
1350	2	7500			
1400	3	7500			
1550	100		50,000	7500	
1600	250		50,000	8000	
1650	250		55,000	8500	
1700	250		55,000	8500	
1750	300		55,000	8500	
1800	300		70,000	10,000	

Signature Elias Chavez Date 11-22-95

FORM C4A 02/23/94

• Serving The Nuclear Industry Since 1962 •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 219269

J. Ludlum Measurements, Inc. Model 18 Serial No. 118295

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR061093

Cal. Date 05/08/96 Cal Due Date 11/08/96 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 505 / 500 V Ref./Inst. 2010 / 2000 V

COMMENTS:

H.V. 1 set @ 1250 Volts for Alpha.
H.V. 2 set @ 1700 Volts for Beta.
H.V. 3 set @ 900 Volts for G-M detector.

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	400 K cpm	400	400
X1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X1	400 cpm	400	400
X1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30-

☑ Alpha S/N 8743 ☑ Beta S/N 0733 ☐ Other

☑ m 500 S/N 57885 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 5-8-96

Reviewed By: Rhonda Harris Date 5-13-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR061083

Customer ALLIED TECHNOLOGY GROUP

Order #. 219269

Counter 18 Serial No. 118295

Counter Input Sensitivity 4 mV

Count Time CPM

Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12,800 cpm	Isotope Tc-99 Size ≈136,100 dpm	Isotope Size	Isotope Size
1100	0	6K			
1150	0	6K			
1200	0	6K			
1250	0	6K			
1300	1	6K			
1350	3	6K			
1400	11	6K			
1500	50		17K		
1550	100		25K		
1600	160		31K		
1650	280		35K		
1700	380		35K		
1750	360		35K		
1800	440		37K		
1850	570		41K		

Signature Bill Henson Date 5-8-96

FORM C4A 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC
POST OFFICE BOX 810 PH 915-235-5494
501 OAK STREET FAX NO. 915-235-4572
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER NAVAL AIR STATION ORDER NO 954537

Mfg. Ludlum Measurements, Inc. Model 18 Serial No 120052

Mfg Ludlum Measurements, Inc. Model 43-68 Serial No. PR127608

Cal. Date 09/29/95 Cal Due Date 09/29/96 Cal. Interval 1 Year Metertace 202-356

Check mark ☑ applies to applicable instr. and/or detector AW mfg spec. T. 73 °F RH 53 % All 703.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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) 22 VDC

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = [illegible]

☑ HV Readout (2 points) Ref./Inst 504 / 500 V Ref./Inst 2013 / 2000 V

COMMENTS:

H.V. #1 1250v (alpha)
H.V. #2 1750v (beta)
H.V. #3 900v

window set at 1.5x input sensitivity

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 1000	400kcpm		400
X 1000	100kcpm		100
X 100	40kcpm		400
X 100	10kcpm		100
X 10	4kcpm		400
X 10	1kcpm		100
X 1	400cpm		400
X 1	100cpm		100

*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 MIL-STD-45662A 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 ☐ T1006 ☐ T879 ☐ Neutron Am 241 Be S/N T-506

☑ Alpha S/N Pu239 8743 ☑ Beta S/N Tc 99 636/83 ☐ Other

☑ m 500 S/N 50800 ☐ Oscilloscope S/N ☑ Multimeter S/N 61341135

Calibrated By: Connie Tomlinson Date 9-29-95

Reviewed By Rhonda Hanna Date 9-29-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 220370

Mfg. Ludlum Measurements, Inc. Model 18 Serial No. 120052

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR 127608

Cal. Date 07/16/96 Cal Due Date 01/16/97 Cal. Interval 6 Months Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 52 % Alt 704.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set Comments V Input Sens. 4 mV Det. Oper. Comments V at 4 mV Threshold Dial Ratio = mV

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

COMMENTS:

High Voltage #1 = 1250 v.
High Voltage #2 = 1725 v.
High Voltage #3 = 900 v.

Instrument calibrated using 39" cable.

Window set at 1.5 x input sensitivity.

High Voltage set with detector connected.

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	400 K cpm	400	400
X 100	100 K cpm	100	100
X 10	40 K cpm	400	400
X 10	10 K cpm	100	100
X 1	4 K cpm	400	400
X 1	1 K cpm	100	100
X 0.1	400 cpm	400	400
X 0.1	100 cpm	100	100

*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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N Pu-239, 12.8 K cpm ☑ Beta S/N Tc-99, 140 K cpm ☐ Other

☑ m 500 S/N 57881 ☐ Oscilloscope S/N ☑ Multimeter S/N 52400059

Calibrated By: Jimmie Fleming Date 7-16-96

Reviewed By: Rhonda Harris Date 7-17-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 B Serial No. PR 127608 Order #. 220370

Customer ALLIED TECHNOLOGY GROUP T. 73 °F RH 52 % BP 704.8 mm Hg

Counter 18 Serial No. 120052 Counter Input Sensitivity 4 mV

Count Time CPM Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Tc-99 Size 140 K cpm	Isotope Size	Isotope Size	Isotope Size
1500	38	20 K			
1525	50	35 K			
1550	55	45 K			
1575	72	60 K			
1600	150	60 K			
1625	180	75 K			
1650	200	80 K			
1675	200	80 K			
1700	250	85 K			
1725	250	85 K			
1750	250	85 K			
1775	300	85 K			
1800	300	85 K			
1825	300	90 K			
1850	350	90 K			
1875	500	110 K			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

Signature Jimmie Fleming Date 7-16-96

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 MIL-STD-45662A and ANSI N323-1978.
State of Texas Calibration License No. LO-1963

FORM C4E_SEG 05/15/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Gas Proportional Detector

Detector 43-68 A Serial No. PR 127608 Order #. 220370

Customer ALLIED TECHNOLOGY GROUP T. 73 °F RH 52 % BP 704.8 mm Hg

Counter 18 Serial No. 120052 Counter Input Sensitivity 4 mV

Count Time cpm Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Pu-239 Size 12.8 K cpm	Isotope Size	Isotope Size	Isotope Size
1100	0	6 K			
1125	1	6 K			
1150	2	6 K			
1175	0	6 K			
1200	0	6 K			
1225	0	6 K			
1250	1	6 K			
1275	1	6 K			
1300	1	6 K			
1325	0	6 K			
1350	0	6.5 K			
1375	2	6.5 K			
1400	7	6.5 K			

☑ Gas Proportional Detector count rate decreased ≤ 10% after 15 hour static test using 33" cable.

Signature Jimmie Fleming Date 7-16-96

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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-196

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 218672

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 36542

Mfg. _____ Model _____ Serial No. _____

Cal. Date 04/02/96 Cal Due Date 10/02/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 650 V Input Sens. 44 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ m

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

COMMENTS:

COPY

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*
5000	4000 uR/hr	4000	4000
5000	1000 uR/hr	1100	1100
500	400 uR/hr = 74.2K CPm	400	400
500	100 uR/hr	110	110
250	200 uR/hr = 37.1K "	200	200
250	100 uR/hr	100	100
50	7420 cpm	40	40
50	1860 cpm	10	10
25	3710 cpm	20	20
25	930 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-196

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☑ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Weema Date 4/2/96

Reviewed By: Rhonda Harris Date 4-2-96

FORM C22A 02/27/96

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 3414
Work Order # I-96-07-215

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 19 Serial Number 91491
External Probe(s) _____ Serial # (180)
Calibration Method 137Cs s/n 10263 200mC
Pulser s/n 101500

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	25 uR/hr	2.15K CPM		10 uR/hr	All Calibrations Btn. + & - 10%
2		4.30K		20	
3					Battery: OK
4	50	2.15K		10	
5		8.60K		41	Mechanical Zero: OK
6					
7	250	0.05 mR/hr		52	Reset: OK
8		0.1		98	
9		0.2		180	Response: OK
10					
11	500	0.1		100	Audio: OK
12		0.2		195	
13		0.4		365	Light: OK
14					
15	5000	1		1,000	High Voltage = 710 Volts
16		2		1,900	
17		4		3,800	1000 uR/hr = 215K CPM
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by James Christopher (Signed)
Calibration Date: 06-21-96
Next Calibration Due: 12-21-96

I certify that the above information is correct:
Theresa M. Lebas
Administrative Coordinator
06-21-96
Date

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 215572

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98046

Mfg. Model Serial No.

Cal. Date 10/27/95 Cal Due Date 04/27/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 25 % Alt 696.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 780 V Input Sens. 35 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
5000	4000 uR/hr	NA	4000
5000	1000 uR/hr		1050
500	400 uR/hr = 79800 cpm		400
500	100 uR/hr		100
250	200 uR/hr = 38800 cpm		200
250	100 uR/hr		105
50	7980 cpm		40
50	2000 cpm		10
25	3880 cpm		20
25	970 cpm		5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

m 500 S/N 54668 ☑ Oscilloscope S/N 7090252 ☑ Multimeter S/N 57390613

Calibrated By: Conrad Galindo Date 10/27/95

Reviewed By: Denny Gilmore Date 10-28-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INCORPORATED ORDER NO. 218351

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98046

Mfg. Model Serial No.

Cal. Date 03/25/96 Cal Due Date 09/25/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 780 V Input Sens. 32 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
5000	4000uR/hr	4200	4000
5000	1000uR/hr	1100	1000
500	400uR/hr = 77500 cpm	390	400
500	100uR/hr	100	100
250	200uR/hr = 38500 cpm	190	200
250	100uR/hr	100	100
50	7750 cpm	39	40
50	1930 cpm	10	10.1
25	3850 cpm	19.5	20
25	960 cpm	5	5.1

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Jr. Date 3-25-96

Reviewed By: Rhonda Harris Date 3-26-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 216044

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98059

Mfg. Model Serial No.

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 28 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 900 V Input Sens. 32 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
5000	4000 uR/hr	3600	4000
5000	1000 uR/hr	1000	1050
500	400 uR/hr = 78200 cpm	370	400
500	100 uR/hr	100	110
250	200 uR/hr = 38200 cpm	180	200
250	100 uR/hr	100	105
50	7820 cpm	39	40
50	1960 cpm	10	10
25	3820 cpm	19	20
25	955 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 121025 ☑ Oscilloscope S/N 1101224 ☑ Multimeter S/N A5099

Calibrated By: Ronald Hess Date 11-14-95

Reviewed By: Bob Weems Date 11-14-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 214544

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98096

Mfg. _____ Model _____ Serial No. _____

Cal. Date 08/23/95 Cal Due Date 02/23/96 Cal. Interval 6 Months Meterface 202-0

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 77 °F RH 50 % Alt 708.5 mm

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 635 V Input Sens. 38 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ =

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

COMMENTS:

Gamma Calibration GM detectors positioned perpendicular to source except for M 44-8 in which the front of probe faces source

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
5000	4000 uR/hr	4000	4000
5000	1000 uR/hr	1000	1000
500	400 uR/hr = 71.7 K cpm	400	400
500	100 uR/hr	100	100
250	200 uR/hr = 35.8K "	200	200
250	100 uR/hr	100	100
50	7170 cpm	40	40
50	1790 cpm	10	10
25	3580 cpm	20	20
25	896 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 Range(s) Calibrated Electronic

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READIN
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 facilit 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 techn The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LC

Reference Instruments and/or Sources:

Cs 137 Gamma S/N ☐ 1162 ☐ G112 ☑ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 8/23/95

Reviewed By: Debby Gilmore Date 8-23-95

ORM C224 03/25/93

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 215572

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98100

Mfg. Model Serial No.

Cal. Date 10/27/95 Cal Due Date 04/27/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 25 % Alt 696.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 725 V Input Sens. 34 mV Det. Oper. V at mV Threshold Dial Ratio = m

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

COMMENTS:

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*
5000	4000 uR/hr	N/A	4000
5000	1000 uR/hr		1050
500	400 uR/hr = 81700 cpm		400
500	100 uR/hr		105
250	200 uR/hr = 39800 cpm		200
250	100 uR/hr		105
50	8170 cpm		40
50	2040 cpm		10
25	3980 cpm		20
25	995 cpm		5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 54668 ☑ Oscilloscope S/N 7090252 ☑ Multimeter S/N 57390613

Calibrated By: Conrad [illegible] Date 10/27/95

Reviewed By: Debby [illegible] Date 10-28-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 208746

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98102

Mfg. _____ Model _____ Serial No. _____

Cal. Date 10/05/94 Cal Due Date 04/05/95 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 28 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☐ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC

Instrument Volt Set 690 V Input Sens. 34 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000 uR/hr	4000	4000
5000	1000 uR/hr	1000	1000
500	400 uR/hr = 69K cpm	400	400
500	100 uR/hr	100	100
250	200 uR/hr = 34.5 K "	200	200
250	100 uR/hr	100	100
50	6900 cpm	40	40
50	1725 cpm	10	10
25	3450 cpm	20	20
25	862 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 10-5-94

Reviewed By: Jimmie Fleming Date 10-7-94

FORM C22A 02/04/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

TOMER ALLIED TECHNOLOGY GROUP,INCORPORATED ORDER NO. 218351

Ludlum Measurements, Inc. Model 19 Serial No. 98102

Mfg. Model Serial No.

Cal. Date 03/25/96 Cal Due Date 09/25/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 779 V Input Sens. 33 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
5000	4000uR/hr	3900	4000
5000	1000uR/hr	1000	1000
500	400uR/hr = 68100cpm	370	400
500	100uR/hr	95	100
250	200uR/hr = 34000cpm	195	200
250	100uR/hr	95	105
50	6810 cpm	38	40
50	1700 cpm	9.5	10
25	3400 cpm	19.5	20
25	850 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Ti008 ☑ T879 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Jr. Date 3-25-96

Reviewed By: Rhonda Hann Date 3-26-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 214214

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98102

Mfg. _____ Model _____ Serial No. _____

Cal. Date 08/07/95 Cal Due Date 02/07/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 50 % Alt 704.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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

Instrument Volt Set 725 V Input Sens. 34 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000 uR/hr	3800	4000
5000	1000 uR/hr	1000	1100
500	400 uR/hr = 72200 cpm	410	406
500	100 uR/hr	110	105
250	200 uR/hr = 34800 cpm	195	200
250	100 uR/hr	105	105
50	7220 cpm	41	40
50	1810 cpm	11	10
25	3480 cpm	20	20
25	870 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☒ m 500 S/N 54668 ☑ Oscilloscope S/N 7090252 ☑ Multimeter S/N 57390613

Calibrated By: Conrad Solinda Date 8/7/95

Reviewed By: Debby Dilmore Date 8-7-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 208746

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98112

Mfg. _____ Model _____ Serial No. _____

Cal. Date 10/05/94 Cal Due Date 04/05/95 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 28 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☐ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC

Instrument Volt Set 650 V Input Sens. 34 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000 uR/hr	4000	4000
5000	1000 uR/hr	1000	1000
500	400 uR/hr = 70.7 K CPM	400	400
500	100 uR/hr	100	100
250	200 uR/hr = 35.3 K "	200	200
250	100 uR/hr	100	100
50	7070 cpm	40	40
50	1767 cpm	10	10
25	3530 cpm	20	20
25	883 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30-

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 10-5-94

Reviewed By: Jimmie Fleming Date 10-7-94

FORM C22A 02/04/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG,INC. ORDER NO. 216063

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 98112

Mfg. Model Serial No.

Cal. Date 11/10/95 Cal Due Date 05/10/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 38 % Alt 704.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 685 V Input Sens. 34 mV Det. Oper. V at mV Threshold Dial Ratio =

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

COMMENTS:

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*
5000	4000 uR/hr	N/A	4000
5000	1000 uR/hr		1000
500	400 uR/hr = 75.9 K cpm		400
500	100 uR/hr		100
250	200 uR/hr = 37.9 K "		200
250	100 uR/hr		100
50	7590 cpm		40
50	1900 cpm		10
25	3790 cpm		20
25	950 cpm		5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 technique. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-19

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☑ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Williams Date 11/10/95

Reviewed By: Dillon Gilmore Date 11-10-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

g. Ludlum Measurements, Inc. Model 19 Serial No. 98112

Mfg. Model Serial No.

Cal. Date 6-7-96 Cal Due Date 12-7-96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 800 V Input Sens. 33 mV Det. Oper. V at mV Threshold Dial Ratio = mV

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

COMMENTS:

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*
5000	4000 uR/hr	3800	4000
5000	1000 uR/hr	1000	1100
500	400 uR/hr = 64.4K cpm	400	400
500	100 uR/hr	100	100
250	200 uR/hr = 32.2K "	200	200
250	100 uR/hr	100	100
50	6440 cpm	40	40
50	1610 cpm	10	10
25	3220 cpm	20	20
25	805 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 104542 ☑ Oscilloscope S/N 7090270 ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 6-7-96

Reviewed By: Ronald Hatch Date 6-11-96

FORM C22A 02/27/96

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 3414
Work Order # I-96-07-215

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 19 Serial Number 109938
External Probe(s) _____ Serial # (149)
Calibration Method 137 Cs s/n 10263 200:
Pulser s/n 120935

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	25 uR/hr	2.12K CPM		10 uR/hr	All Calibrations Btn. + & - 10%
2		4.24K		19.5	
3					Battery: OK
4	50	2.12K		10	
5		8.48K		39.5	Mechanical Zero: OK
6					
7	250	0.05 mR/hr		52	Response: OK
8		0.1		100	
9		0.2		195	Reset: OK
10					
11	500	0.1		100	Audio: OK
12		0.2		200	
13		0.4		380	Light: OK
14					
15	500	1		1,000	1000 uR/hr = 212K CPM
16		2		2,000	
17		4		3,950	High Voltage = 790 Volts
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: William Owens (Signed)
Calibration Date: 07-02-96
Next Calibration Due: 01-02-97

I certify that the above information is correct:
Theresa M. Cobas
Administrative Coordinator
07-02-96
Date

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG, INC. ORDER NO. 215160

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 111280

Mfg. _____ Model _____ Serial No. _____

Cal. Date 10/02/95 Cal Due Date 04/02/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 70 °F RH 48 % Alt 702.8 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair

☑ 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

Instrument Volt Set 600 V Input Sens. 34 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____

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

COMMENTS:

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*
5000	4000 uR/hr	N/A	4,000
5000	1000 uR/hr		1,100
500	400 uR/hr = 74K cpm		400
500	100 uR/hr		100
250	200 uR/hr = 36K cpm		200
250	100 uR/hr		105
50	7.4K cpm		40
50	1.85K cpm		10
25	3.6K cpm		20
25	900 cpm		5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-19

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☑ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☑ m 500 S/N 57885 ☑ Oscilloscope S/N 0060519 ☑ Multimeter S/N 56110559

Calibrated By: Bill Henson Date 10-2-95

Reviewed By: Debbie Dilmore Date 10-2-95

FORM C22A 03/25/95

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP,INCORPORATED ORDER NO. 218351

Ludlum Measurements, Inc. Model 19 Serial No. 111280

Mfg. _____ Model _____ Serial No. _____

Cal. Date 03/25/96 Cal Due Date 09/25/96 Cal. Interval 6 Months Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 600 V Input Sens. 33 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

"AS FOUNDS" reflect non-zeroed instrument upon receipt.

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*
5000	4000uR/hr	4250	4000
5000	1000uR/hr	1100	1000
500	400uR/hr = 69600cpm	390	400
500	100uR/hr	100	100
250	200uR/hr = 34400cpm	195	200
250	100uR/hr	100	105
50	6960 cpm	39	40
50	1740 cpm	9.5	10
25	3440cpm	19.2	20
25	860 cpm	4.9	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

m 500 S/N 81084 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Date 3-25-96

Reviewed By: Rhonda Harris Date 3-26-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 962485

Ludlum Measurements, Inc. Model 19 Serial No. 131251

Mfg. _____ Model _____ Serial No. _____

Cal. Date 06/27/96 Cal Due Date 06/27/97 Cal. Interval 1 Year Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 55 % Alt 703.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 547 V Input Sens. 36 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000uR/hr		4000
5000	1000uR/hr		1000
500	400uR/hr = 73000 cpm		400
500	100uR/hr		100
250	200uR/hr = 36000 cpm		200
250	100uR/hr		100
50	7300 cpm		40
50	1820 cpm		10
25	3600 cpm		20
25	900 cpm		5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

m 500 S/N 94940 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 62840682

Calibrated By: R. Sutton Date 6-27-96

Reviewed By: Rhonda Harris Date 6-27-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG INC ORDER NO. 962080

Ludlum Measurements, Inc. Model 19 Serial No. 131291

Mfg. _____ Model _____ Serial No. _____

Cal. Date 06/19/96 Cal Due Date 06/19/97 Cal. Interval 1 Year Meterface 202-016

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. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 673 V Input Sens. 37 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000uR/hr		4000
5000	1000uR/hr		1000
500	400uR/hr = 72700 cpm		400
500	100uR/hr		100
250	200uR/hr = 35600 cpm		200
250	100uR/hr		100
50	7270 cpm		40
50	1810 cpm		10
25	3560 cpm		20
25	890 cpm		5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

m 500 S/N 94940 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 62840682

Calibrated By: R. Johnson Date 6-19-96

Reviewed By: Rhonda Harris Date 6-19-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 962485

Ludlum Measurements, Inc. Model 19 Serial No. 131294

Mfg. _____ Model _____ Serial No. _____

Cal. Date 06/27/96 Cal Due Date 06/27/97 Cal. Interval 1 Year Meterface 202-016

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 55 % Alt 703.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 534 V Input Sens. 37 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

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

COMMENTS:

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*
5000	4000uR/hr		4000
5000	1000uR/hr		1000
500	400uR/hr = 72000 cpm		400
500	100uR/hr		100
250	200uR/hr = 35300 cpm		200
250	100uR/hr		100
50	7200 cpm		40
50	1800 cpm		10
25	3530 cpm		20
25	880 cpm		5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 **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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LQ-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☑ T879 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

m 500 S/N 94940 ☐ Oscilloscope S/N _____ ☑ Multimeter S/N 62840682

Calibrated By: R. Solano Date 6-27-96

Reviewed By: Rhonda Harris Date 6-27-96

FORM C22A 02/27/96

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 215096

Mfg. Ludlum Measurements, Inc. Model 177 Serial No. 93292

Mfg. Ludlum Measurements, Inc. Model 44-95 Serial No. RN010885

Cal. Date 09/26/95 Cal Due Date 03/26/96 Cal. Interval 6 Months Meterface 202-577

Check mark ☑ applies to applicable instr. and/or detector LAW mfg. spec. T. 73 °F RH 50 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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) 5.97 VDC

Instrument Volt Set 500 V Input Sens. 37 mV Det. Oper. 500 V at 37 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 998 / 1000 V

COMMENTS:

TUBE #1 GETS 75% EFFICIENCY FOR Cs-137.
TUBE #2 GETS 86% EFFICIENCY FOR Cs-137
TUBE #3 GETS 82% EFFICIENCY FOR Cs-137
TUBE #4 GETS 77% EFFICIENCY FOR Cs-137

AVERAGE EFFICIENCY=80% FOR Cs-137 @ SURFACE LEVEL

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 1000	400 k cpm	400	400
X 1000	100 k cpm	100	100
X 100	40 k cpm	400	400
X 100	10 k cpm	100	100
X 10	4 k cpm	400	400
X 10	1k cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*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 MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1960

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1006 ☐ 1879 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Cs-137 0.00406uCi

☑ m 500 S/N 121025 ☐ Oscilloscope S/N ☑ Multimeter S/N A5099

Calibrated By: [signature] Date 9/26/95

Reviewed By: [signature] Date 9/27/95

FORM C22A 03/25/95

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

RENTAL EQUIPMENT

CUSTOMER INFORMATION

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2714
Work Order # I-95-10-214

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 2221 Serial Number 97830 (13
External Probe(s) 44-10 Serial # 127700 (21

Calibration Method ^{137}Puler s/n 101500
^{137}Cs s/n 10263 200mCi

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	RATEMETER				All Calibrations Btn. + & - 10%
2	X1	100 CPM		100 CPM	Battery: OK
3		200		200	
4		400		400	Mechanical Zero: OK
5					Response: OK
6	X10	1K		1K	Zero: OK
7		2K		2K	Threshold = 100 ≈ 10mV
8		4K		4K	Window: OUT
9					Audio: OK
10	X100	10K		10K	Lamp: OK
11		20K		20K	
12		40K		40K	High Voltage = 1050 Volts
13					
14	X1K	100K		100K	.1 mR/hr ≈ 110K CPM in ^{137}Cs fi
15		200K		200K	
16		400K		400K	
17					
18	LOG	400		400	
19		4K		4K	
20		40K		40K	
21		400K		400K	
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: (Signed)
Calibration Date: 10-09-95
Next Calibration Due: 04-09-96

I certify that the above information is correct:
Administrative Coordinator
10-09-95
Date

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATIO
CERTIFICAT

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT
Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2714
Work Order # I-95-10-214

INSTRUMENT INFORMATION

Instrument Manufacturer Ludlum
Model 2221 Serial Number 108881 (
External Probe(s) 44-10 Serial # 118371 (

Calibration Method ^{137}Pulser s/n 101500
^{137}Cs s/n 10263 200m

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
RATEMETER	X1	100 CPM		100 CPM	All Calibrations Btn. + & - 10
2		200		200	Battery: OK
3		400		400	
4					Mechanical Zero: OK
5	X10	1K		1K	Response: OK
6		2K		2K	Zero: OK
7		4K		4K	Threshold = 100 ≅ 10mV
8					Window = OUT
9	X100	10K		10K	Audio: OK
10		20K		20K	Lamp: OK
11		40K		40K	
12					High Voltage = 1100 Volts
13	X1K	100K		100K	
14		200K		200K	0.1 mR/hr ≅ 111K CPM in ^{137}Cs
15		400K		400K	
16					
17	LOG	400		400	
18		4K		4K	
19		40K		40K	
20		400K		400K	
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: (Signed)
Calibration Date: 10-09-95
Next Calibration Due: 04-09-96

I certify that the above information is correct:
Administrative Coordinator
10-09-95
Date

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP ORDER NO. 992766

Ludlum Measurements, Inc. Model 2224 Serial No. 113176

Mfg. Ludlum Measurements, Inc. Model 43-89 Serial No. PR103674

Cal. Date 07/11/96 Cal Due Date 10/11/96 Cal. Interval 3 Months Meterface 202-694

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 58 % Alt 703.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

Instrument Volt Set 700 V Input Sens. Comments mV Det. Oper. 700 V at Comments mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1508 / 1500 V

COMMENTS:

```
Firmware version: 390063
Threshold Alpha: 120
          Beta: 3.5
   Beta window: 30
Overload checked but not set
Hv set with detector not connected.
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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		400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*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	400kcpm		39916 (0)	Log Scale			
	40kcpm		3992 (0)				
	4kcpm		399 (0)				
	400cpm		40 (0)				
	40cpm		4 (0)				

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N Pu239 4337 ☑ Beta S/N Ic99 443-68-3A/Sr90y90 (443-68-3) ☐ Other

m 500 S/N 104535 ☐ Oscilloscope S/N ☑ Multimeter S/N 44460225

Calibrated By: Rhonda Hann Date 7-11-96

Reviewed By: Elias Chavez Date 7-11-96

FORM C22A 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-89 Serial No. PR103674 Order #. 992766

Customer ALLIED TECHNOLOGY GROUP Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 113176 Beta Input Sensitivity 3.5 mV

Count Time 1 Minute Beta Window 30 mV

Other Distance Source to Detector Surface

High Voltage	Background		Isotope Pu239 Size 15.7Kcpm		Isotope Sr90Y90 Size 0.01112μCi		Isotope Tc99 Size 0.00997μCi	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
650	0	84	4825	361	0	6452	0	831
675	2	121	5532	372	1	8728	0	1439
700	2	213	5876	470	1	11415	2	2212
725	2	265	6072	636	0	13064	0	2550
750	0	348	6169	936	0	13497	1	3008

Uniformity +/- 10% for Tc99
Efficiency ≈ 21%

Toe	2	2192
Center	2	2212
Heel	2	2217

Signature Rhonda Harris Date 7-11-96

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG,INC. ORDER NO. 216045

Ludlum Measurements, Inc. Model 2929 Serial No. 99041

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR096923

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 22 % Alt 707.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 850 V = 3.41 on High Voltage dial. High Voltage set with detector connected.

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

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400423	400423
	40K cpm	40045	40045
	4K cpm	4004	4004
	400 cpm	400	400
	40 cpm	40	40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400249	400249
	40K cpm	40041	40041
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 #9843 ☑ Beta S/N C-14 .159uCi. Tc-99 634/83 ☐ Other

m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 11-14-95

Reviewed By: Debby Gilmore Date 11-14-95

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR096923 Order #. 216045

Customer ATG,INC. Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 99041 Beta Input Sensitivity 4 mV

Count Time 1Minute Beta Window 50 mV

Other Distance Source to Detector tray

High Voltage	Background Alpha	Background Beta	Isotope Pu239 Size 12800cpm Alpha	Beta	Isotope C14 Size .159uCi Alpha	Beta	Isotope Tc99 Size 1670cpm Alpha	Beta
800	1	77	10312	242	0	23389	1	804
825	0	66	10377	288	1	31123	4	890
850	1	86	10407	393	2	36461	1	1034
875	0	75	10567	617	2	43410	3	1010

Signature Michael Moore Date 11-14-95

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

TOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 216044

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 99045

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR098327

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 22 % Alt 707.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 800 V = 3.21 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 485 / 500 V Ref./Inst. 2005 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400370	400370
	40K cpm	40032	40032
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400183	400183
	40K cpm	40025	40025
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 #8743 ☑ Beta S/N C-14 .159uCi, Tc-99 634/83 ☐ Other

m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 11-14-95

Reviewed By: Bob Weems Date 11-14-95

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR098327 Order #. 216044

Customer ALLIED TECHNOLOGY GROUP,INC. Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 99 043 Beta Input Sensitivity 4 mV

Count Time 1Minute Beta Window 50 mV

Other Distance Source to Detector Tray

High Voltage	Background Alpha	Background Beta	Isotope Pu239 Size 12800dpm Alpha	Isotope Pu239 Size 12800dpm Beta	Isotope C14 Size .159uCi Alpha	Isotope C14 Size .159uCi Beta	Isotope Tc99 Size 16704dpm Alpha	Isotope Tc99 Size 16704dpm Beta
700	1	49	9901	213	0	3992	0	522
725	0	48	9825	196	0	10613	2	604
750	0	62	10084	201	0	17890	1	764
775	0	61	10025	194	1	29370	1	873
800	0	77	10169	307	0	34982	1	953
825	1	70	10408	576	1	44388	1	969
850	2	73	10231	1515	3	49921	3	992

Signature Michael Moore Date 11-14-95

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

TOMER ALLIED TECHNOLOGY GROUP,INC. ORDER NO. 216044

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 99045

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR098325

Cal. Date 11/14/95 Cal Due Date 05/14/96 Cal. Interval 6 Months Meterface

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 22 % Alt 707.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 950 V = 3.92 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400454	400454
	40K cpm	40032	40032
	4K cpm	4004	4004
	400 cpm	400	400
	40 cpm	40	40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400291	400291
	40K cpm	40036	40036
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239 #8743 ☑ Beta S/N C-14 .159uCi, Tc-99 634/83 ☐ Other

m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 11-14-95

Reviewed By: Bob Wiems Date 11-14-95

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR098325 Order #. 216044

Customer ALLIED TECHNOLOGY GROUP,INC. Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 99045 Beta Input Sensitivity 4 mV

Count Time 1Minute Beta Window 50 mV

Other Distance Source to Detector tray

High Voltage	Background Alpha	Background Beta	Isotope Pu239 Size 128000pm Alpha	Isotope Pu239 Size 128000pm Beta	Isotope C14 Size 0.159mCi Alpha	Isotope C14 Size 0.159mCi Beta	Isotope Tc99 Size 16700pm Alpha	Isotope Tc99 Size 16700pm Beta
900	0	70	10032	215	2	14888	2	671
925	0	62	10113	202	1	21653	4	746
950	0	70	10161	266	0	27915	1	896
975	1	86	10269	332	0	34753	2	982
1000	2	231	10117	797	1	40721	6	1162

Signature Michael Moore Date 11-14-95

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

TOMER ALLIED TECHNOLOGY GROUP, INC. ORDER NO. 219806

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 99045

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR098325

Cal. Date 6-7-96 Cal Due Date 12-7-96 Cal. Interval 6 Months Meterface

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 43 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 975 V = 3.86 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	399816	399816
	40K cpm	39989	39989
	4K cpm	3998	3998
	400 cpm	400	400
	40 cpm	40	40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	399802	399802
	40K cpm	39989	39989
	4K cpm	3999	3999
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-30

☑ Alpha S/N Pu 239 S/N 8743 ☑ Beta S/N C14 S/N 112387 ☐ Other

m 500 S/N 104542 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770263

Calibrated By: Bob Weems Date 6-7-96

Reviewed By: Randall Hess Date 6-11-96

FORM C25 02/27/96

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR098325 Order #. 219806

Customer ALLIED TECHNOLOGY GROUP, INC. Alpha Input Sensitivity 17.5 mV

Counter 2929 Serial No. 99045 Beta Input Sensitivity 4 mV

Count Time 1 Minute Beta Window 50 mV

Other Distance Source to Detector TRAY

High Voltage	Background Alpha	Background Beta	Isotope C14 Size 176490 cpm Alpha	Isotope C14 Size 176490 cpm Beta	Isotope Pu 239 Size 12,800 cpm Alpha	Isotope Pu 239 Size 12,800 cpm Beta	Isotope ____ Size ____ Alpha	Isotope ____ Size ____ Beta
900	1	64	1	9850	10037	191		
925	0	77	1	18609	10239	207		
950	0	71	0	25998	10055	248		
975	1	94	0	28527	10104	342		
1000	0	175	1	31054	10021	669		

Signature Bob Weems Date 6-7-96

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY ORDER NO. 946212

Ludlum Measurements, Inc. Model 2929 Serial No. 115523

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR118525

Cal. Date 11/25/94 Cal Due Date 11/25/95 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 57 % Alt 706.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 850 V = 3.46 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 491 / 500 V Ref./Inst. 2008 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm		399974
	40K cpm		40000
	4K cpm		4000
	400 cpm		400
	40 cpm		40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm		400080
	40K cpm		40006
	4K cpm		4000
	400 cpm		400
	40 cpm		40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337*Pu239*15.7kcpm ☑ Beta S/N 200A101884*C14*634/83*Tc99* ☐ Other

☑ m 500 S/N 38120 ☐ Oscilloscope S/N ☑ Multimeter S/N A33097

Calibrated By: Elias Chavez Date 11-25-94

Reviewed By: Rhonda Harris Date 11-25-94

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR118525

Order #. 946212

Customer ALLIED TECHNOLOGY

Alpha Input Sensitivity 125 mV

Counter 2929 Serial No. 115573

Beta Input Sensitivity 4 mV

Count Time 1 Minute

Beta Window 50 mV

Other

Distance Source to Detector TRAY

High Voltage	Background		Isotope C14 Size 0.165 μCi		Isotope Tc99 Size 1670 cpm		Isotope Pu239 Size 15.7 Kcpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
775	0	54	0	20198	0	825	11616	301
800	0	60	1	29193	0	907	11936	340
825	0	61	0	37415	0	997	11883	487
850	0	64	0	45408	1	1058	11885	596
875	0	61	1	52754	2	1015	12027	730
900	0	61	0	57883	3	1066	12162	1073
925	3	72	1	65347	4	1099	12094	1722

Signature Elias Chaney Jr. Date 11-25-94

FORM C4B 02/23/94

• Serving The Nuclear Industry Since 1962 •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-255-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG ORDER NO. 216317

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 115573

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR 118525

Cal. Date 12/06/95 Cal Due Date 06/06/96 Cal. Interval 6 Months Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 20 % Alt 706.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 850 V = 3.48 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 490 / 500 V Ref./Inst. 2015 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400210	400210
	40K cpm	40021	40021
	4K cpm	4001	4001
	400 cpm	400	400
	40 cpm	40	40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	400235	400235
	40K cpm	40025	40025
	4K cpm	4002	4002
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

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 MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239, 12.8 K cpm ☑ Beta S/N C-14, 0.159 uCi ☐ Other

m 500 S/N 57881 ☐ Oscilloscope S/N ☑ Multimeter S/N 59120574

Calibrated By: Jimmie Flemmy Date 12-6-95

Reviewed By: Debby Gilmore Date 12-6-95

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-467
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 118525 Order #. 216317

Customer ATG Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 115573 Beta Input Sensitivity 4 mV

Count Time 1Minute Beta Window 50 mV

Other Distance Source to Detector Source tray

High Voltage	Background Alpha	Background Beta	Isotope C-14 Size 0.159 µCi Alpha	Isotope C-14 Beta	Isotope Pu-239 Size 12.8 Kcpm Alpha	Isotope Pu-239 Beta	Isotope Size Alpha	Isotope Beta
800	0	61	0	18844	9948	247		
825	0	63	1	28563	10075	303		
850	1	78	0	34165	10002	346		
875	1	76	1	40551	10049	422		
900	0	81	0	47668	9916	652		

Signature Jimmie Fleming Date 12-6-95

FORM C4B 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG INC ORDER NO. 962079

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 126128

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR133007

Cal. Date 06/14/96 Cal Due Date 06/14/97 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 49 % Alt 703.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 800 V = 3.13 on High Voliage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 501 / 500 V Ref./Inst. 1996 / 2000 V

COMMENTS:

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm		401393
	40K cpm		40135
	4K cpm		4020
	400 cpm		402
	40 cpm		40

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm		401989
	40K cpm		40218
	4K cpm		4022
	400 cpm		402
	40 cpm		40

*Uncertainty within ± 10% C.F. within ± 20%

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 requrements of MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N PU239 8743 ☑ Beta S/N C14 200A101884*TC99 634/83 ☐ Other

m 500 S/N 79956 ☐ Oscilloscope S/N ☑ Multimeter S/N 53801574

Calibrated By: Elias Chavez Date 6-14-96

Reviewed By: Rhonda Harris Date 6-15-96

FORM C25 02/27/96

COPY

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 133007 Order #. 962079

Customer ATG INC Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 126128 Beta Input Sensitivity 4 mV

Count Time 1 Minute Beta Window 50 mV

Other Distance Source to Detector Tray

High Voltage	Background Alpha	Background Beta	Isotope C14 Size 0.165 µCi Alpha	Isotope C14 Beta	Isotope Tc99 Size 1670 cpm Alpha	Isotope Tc99 Beta	Isotope Pu239 Size 12,800 cpm Alpha	Isotope Pu239 Beta
725	1	40	1	24298	0	927	9876	700
750	0	50	0	31121	0	1021	9988	621
775	0	62	2	38379	1	1137	10041	359
800	0	49	0	44891	2	1254	10058	345
825	1	74	0	51309	1	1297	10073	479
850	0	86	0	56315	0	1266	10106	904
875	0	98	1	60809	1	1309	10382	2091

Signature Elias Stanley Date 6-14-96

FORM C4B 02/23/94

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

RENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2623
Work Order # I-95-11-216

INSTRUMENT INFORMATION

Instrument Manufacturer Bicron
Model Micro Rem Serial Number B687G
External Probe(s) Serial # (189)
Calibration Method ^{137}Cs s/n 10263 200mC

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	X0.1	0.015 mR/hr		16 uR/hr	All Calibrations Btn. + & - 10%
2					
3	X1	0.05		50	Battery: OK
4		0.1		95	
		0.15		145	Mechanical Zero: OK
7	X10	0.5		500	High Voltage: OK
8		1		1,000	
9		1.5		1,500	
10					
11	X100	5		5,000	
12		10		10,500	
13		15		16,000	
14					
15	X1000	50		50,000	
16		100		103,000	
17		150		158,000	
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: James Christopher (Signed)
Calibration Date: 09-19-95
Next Calibration Due: 03-19-96

I certify that the above information is correct:
Theresa Meeks
Administrative Coordinator
09-19-95
Date

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

CALIBRATION CERTIFICATE

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

CUSTOMER INFORMATION

.ENTAL EQUIPMENT

Customer Name: GTS INSTRUMENT SERVICES
Customer Address: 2045 Rt. 286
Pittsburgh, PA 15239

Customer P.O.# 2623
Work Order # I-95-11-216

INSTRUMENT INFORMATION

Instrument Manufacturer Bicron
Model Micro Rem Serial Number B690G
External Probe(s) _____ Serial # (191)

Calibration Method ^{137}Cs s/n 10263 200m

INSTRUMENT CALIBRATION INFORMATION

	Instrument Range	Calibration Standard Value	Instrument Response Before Calib.	Instrument Response After Calib.	Comment
1	X0.1	0.015 mR/hr		15 uR/hr	All Calibrations Btn. + & - 10%
2					
3	X1	0.05		50	Battery: OK
4		0.1		100	
		0.15		150	Mechanical Zero: OK
7	X10	0.5		500	High Voltage: OK
8		1		1,000	
9		1.5		1,500	
10					
11	X100	5		5,000	
12		10		10,000	
13		15		15,000	
14					
15	X1000	50		50,000	
16		100		100,000	
17		150		150,000	
18					
19					
20					
21					
22					
23					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated by: Robert P. McCann (Signed)
Calibration Date: 11-06-95
Next Calibration Due: 05-06-96

I certify that the above information is correct:
Administrative Coordinator
11-06-95
Date

SPECIALTY PRODUCTS, INC.
Post Office Box 660065
Miami Springs, Florida 33266-0065
(305) 888-0383
Telex: 4996578 F & J, GA-MA U.I.
Fax: (305) 665-3909

Specialty products for the nuclear industry

CALIBRATION PROCEDURE DATA SHEET

HVCAL2

P.O. NUMBER : 2209

CUSTOMER : ALLIED TECHNOLOGY GROUP

I. NBS Traceable Flow Instrument
Laminar Flow Element Serial # : 715840-Y1
Pressure Meter Serial # : 1031378

II. DATE : 01/18/95
GAUGE MODEL :
GAUGE SERIAL # :
PUMP MODEL : H9400
PUMP SERIAL # : 001452

AIR LEAKAGE CHECK : ✓
ON-OFF SWITCH CHECK : ✓
VARIABLE SPEED CONTROL CHECK : ✓

III. 1. Gauge Scale : 0-70 CFM
2. Maximum Flow Rate : 25 CFM
3. Instrument Warmup : 5 Minutes
4. Customer Calibration Filters : (a.) Charcoal : NONE
(b.) Particulate : WHATMAN 41

IV. Day of Test : 1. Barometric Pressure : 30.12 in. Hg
2. Temperature : 78 Degrees F

CALIBRATION POINTS SELECTED AND COMPARISONS :

(1) Delta P in. H20	(2) LFE Flow Rate ACFM	(3) P inlet in. Hg	(4) T and V Factor	(5) P Corr. Factor	(6) LFE Flow SCFM	(7) Gauge Flow CFM	(8) Percent Deviation
5.74	70.81	30.12	0.9754	1.0067	69.53	70.00	0.31
4.60	56.73	30.12	0.9754	1.0067	55.70	60.00	7.32
3.96	48.92	30.12	0.9754	1.0067	48.04	50.00	3.70
3.06	37.95	30.12	0.9754	1.0067	37.26	40.00	6.96

AVERAGE DEVIATION ACROSS THE RANGE IS : 4.57 PERCENT

1 LFE SCFM = (LFE ACFM) x (Temp. and Viscosity Factor) x (P Corr. Factor)

V. CALIBRATION PERFORMED BY : [signature]

Q.A. APPROVAL BY : Josh Edwards

FINAL INSPECTION CERTIFICATE

This is to certify that LV-1

Serial Number 001192 has been checked out

in accordance with Quality Control Procedure MAS1 and that

Date: 1/18/95 Q.C. Inspector: Josh Edwards

COPY

F&J SPECIALTY PRODUCTS,INC. P.O. Box 660065, Miami Springs, Florida 33266-0065 (305)

SPECIALTY PRODUCTS, INC.
Post Office Box 660065
Miami Springs, Florida 33266-0065
(305) 888-0383
Telex: 4996578 F & J, GA-MA U.I.
Fax: (305) 665-3909

Specialty products for the nuclear industry

QUALITY CONTROL PROCEDURE
ACTUAL FLOW RATE (SCFM) vs. INDICATED FLOW RATE

FM52

GENERAL INFORMATION

SERIAL # : 001192

P.O. NUMBER : 2209

CUSTOMER : ALLIED TECHNOLOGY GROUP

1. A. TEST FACILITY : M.A.S. WAREHOUSE
   B. ELEVATION : SEA LEVEL
   C. DATE OF TEST : 1/17/95
   D. ATMOSPHERIC PRESSURE : 30.05 in. Hg
   E. INLET TEMPERATURE TO SYSTEM : 76 Degrees F
   F. DIGITAL VENTURI CALIBRATOR
      (A) MANUFACTURER : F&J SPECIALTY PRODUCTS, INC.
      (B) MODEL # : D-812
      (C) SERIAL # : 2538
   G. AIR SAMPLER SYSTEM MODEL # : LV-1

(1) AIR SAMPLER OBSERVED FLOW RATE (LPM)	(2) TEMP. & PRESSURE CORRECTION FACTOR	(3) AIR SAMPLER STP FLOW RATE (1) x (2) (SLPM)	(4) DIGITAL CALIBRATOR STP FLOW RATE (SLPM)
100	0.9696	96.921	98.26
80	0.9759	78.202	77.59
60	0.9811	58.895	60.03
40	0.9860	39.368	41.34

*** THE AVERAGE PERCENT DEVIATION ACROSS THE RANGE IS : 2.21

QCPRMAS1

ACTUAL FLOW RATE (SCFM) v INDICATED FLOW RATE

QUALITY CONTROL PROCEDURE MAS 1

SERIAL # : 001192

II. TEST DATA

FILTERS UTILIZED :

(A) PARTICULATE : FP47M
(B) CHARCOAL / SILVER ZEOLITE : NONE

(1) FLOW INDICATED ON ROTOMETER (LPM)	(2) ATMOSPHERIC PRESSURE (in. Hg)	(3) INLET TEMPERATURE (Degrees F)	(4) GAUGE PRESSURE (in. Hg)	(5) TEMPERATURE AND PRESSURE CORRECTION	(6) CALCULATED FLOW (1) x (5) (SLPM)	(7) DIGITAL CALIBRATOR STP FLOW (SLPM)	(8) PERCENT DEVIATION (7) - (6) / (7) (%)
100	30.05	76	1.6	0.9696	96.921	98.26	1.36
80	30.05	76	1.2	0.9759	78.202	77.59	0.79
60	30.05	76	0.9	0.9811	58.895	60.03	1.89
40	30.05	76	0.6	0.9860	39.368	41.34	4.78

$$\text{(5) TEMPERATURE AND PRESSURE CORRECTION} = \sqrt{\left[\frac{(2) - (4)}{29.92} \times \frac{530}{460 + (3)}\right]}$$

AVERAGE DEVIATION : 2.21 PERCENT

PERFORMED BY : Anthony Mitchell

DATE : 1/17/95

REV. 3/16/93

QCPRMAS1 LV-1 Q.C. REV. 06/08/87

I. GENERAL APPEARANCE AND VISUAL INSPECTION

A. The unit is visually inspected to confirm the proper appearance and assembly of all exterior features. The following items are reviewed:

✓ 1. Appropriate quality of filter holder

2. Proper alignment of components
- ✓ a) Pipe fittings
- ✓ b) Flowmeter
- ✓ c) Pump
- ✓ d) Handle
- ✓ e) Base plate
- ✓ f) Cover guard
- ✓ g) Protection of the fuse
- ✓ h) Switch components

✓ 3. Proper attachment of all decals and labels

II. OPEARATION FUNCTIONALITY

A. Pump Operation

✓ 1. The pump is energized
✓ 2. Check calibration of flowmeter with the regulator
✓ 3. Check wiring with a wiring diagram

III. PUMP PACKAGING

A. Documentation

1. Serial Number
- ✓ a) On pump
- ✓ b) In log

✓ 2. The pump is boxed with the proper material

IV. FINAL INSPECTION

✓ A. A random group of pumps is checked for minimum quality standards.

SERIAL # : 001192 DATE : 1/18/95

INSPECTOR : Gerb Edwards

THE SOURCE INC.

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

COPY

Certificate of Calibration
(Alpha Source)

The Thorium 230 alpha source was measured in a gas proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at it's plateau voltage to determine it's 2π cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. Alpha standard 93TH1004194 is our NIST referenced source used in establishing NIST traceability.

REF.PO# 2223
Model S-Th-100

Active Diameter(or area) 10X10cm Mounting Material SS
Total Diameter(or area) 11X11cm Thickness 0.79mm

12,500	cpm ±	625	cpm 2π
24,600	dpm ±	1230	dpm 4π
0.0111	microcurie		
02-15-95	date of measurement		
95TH1000487	source serial number		
5.0	overall uncertainty(percent)		
1.5	backscatter (percent)		

Michael A. Ortiz
Calibration Manager

Charles L. Gonzales
Quality Assurance Manager

less than 20 leak test results(dpm /source100cm^2)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactive measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

AC006-95

THE SOURCE INC.

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

COPY

Certificate of Calibration
(Beta Source)

The Tecnetium 99 beta source was measured in a gas proportional counter using P-10 as counting gas. The beta emissions from the surface of the source were measured at it's plateau voltage to determine it's 2π cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. Beta standard 93TC4704196 is our NIST referenced source used in establishing NIST traceability.

REF.PO# 2223
Model S-Tc-100

Active Diameter(or area) 10x10cm Mounting Material SS
Total Diameter(or area) 11x11cm Thickness 0.79 mm

18,000	cpm ±	900	cpm 2π
28,800	dpm ±	1,440	dpm 4π
0.0130	microcurie		
02-15-95	date of measurement		
95TC1000488	source serial number		
5.0	overall uncertainty(percent)		
25	backscatter (percent)		

Michael A. Ortiz
Calibration Manager

Charles L. Gonzales
Quality Assurance Manager

less than 2200 leak test results(dpm /100cm^2)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactive measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

BC007-95

THE SOURCE INC.
Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

Certificate of Calibration
(Beta Source)

The Technetium 99 beta source was measured in a gas proportional counter using P-10 as counting gas. The beta emissions from the surface of the source were measured at its plateau voltage to determine its 2π cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. Beta standard 91TC4704553 is our NIST referenced source used in establishing NIST traceability.

REF.PO# 1616

Active Diameter(or area) 44mm Mounting Material SS
Total Diameter(or area) 47mm Thickness 0.79mm

28,200	cpm±	1,410	cpm 2π
45,200	dpm ±	2,260	dpm 4π
0.0204	micro-curie		
06-15-93	date of measurement		
93TC4701591	source serial number		
5.0%	overall uncertainty(percent)		

Michael A. Ortiz
Calibration Manager

Charles L. Gonzales
Quality Assurance Manager

less than 2200 leak test results
(dpm /100cm^2)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactivity measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

BC006-93

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide: Th-230
Half Life: (7.54 ± 0.03) x 10^4 years
Catalog No.: AFSS-230
Source No.: Z-824

Customer: ATG (ALLIED TECHNOLOGY)
P.O.No.: 2106
Reference Date: March 15 1994 12:00 PST.
Contained Radioactivity: 2,500 dpm
Contained Radioactivity: 41.7 Bq

Description of Source

a. Capsule type: Stainless steel disc (1.875" OD x 0.03" Thick)
b. Nature of active deposit: Electrodeposited thorium oxide
c. Active diameter/volume: 1.75"
d. Backing: Stainless steel
e. Cover: None

Radioimpurities

Th-228 less than 1% as of March 5, 1993.

Method of Calibration

The source was assayed using a windowless internal gas flow proportional counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ± 1.8%
b. Random uncertainty in assay: ± 1.8%
c. Random uncertainty in weighing(s): ± 0.0%
d. Total uncertainty at the 99% confidence level: ± 2.5%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Anna U. Kua
QUALITY CONTROL

Mar 18, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

IPL Ref. No.: 453-88

ATG INC.
RICHLAND OPERATION
ALLIED TECHNOLOGY GROUP

September 25, 1995

Mr. Frank Whitaker
Fax: (904) 452-2348

Dear Mr. Whitaker:

Enclosed please find calibration certificate for Th-230 source number Z824. After contacting isotope products, it was discovered that parts for sources are made prior to injection of activity, therefore, actual dpm is 2500.

If you have any further questions, please feel free to contact me at the Richland facility.

Sincerely,

Mark Smith
Health Physics Technician

MS/sw

P.O. Box 3002, 2025 Battelle Blvd., Richland, WA 99352
(509) 375-5160 FAX: (509) 375-0613

RECEIPT OF RADIOACTIVE MATERIAL INVESTIGATION

Upon notification for HP to receive radioactive material (sources, waste, black box, shielded containers, etc.) ask the following questions: If additional space is needed for comments, use the reverse side.

QUESTION	COMMENT
What is it?	Tc^{99} & Th^{230}
What is the total quantity?	$1.2E^{-2}$ µCi (Tc^{99}) + $1.1E^{-2}$ µCi (Th^{230})
Where is it?	Count room.
Is it secure?	Yes
Is there any radiological survey data available? If yes, what is the data? (Indicate survey date and number))	No

Upon initial examination of the material, complete the following:

QUESTION	COMMENT
Specific isotope listed on the container label: Tc^{99} & Th^{230}	Contact Exposure Rate: 28,800 + 24,600 ~~mR/hr~~ dpm 30 cm Exposure Rate: N/D mR/hr N/A
What information is on the material container label (serial number, name, or initials, date, etc.)?	NAME, SERIAL#, DATE 95TC100#0488, 2-15-95 95TH100#0487, 2-15-95
What is the origin of the material?	ATG OFFICE IN OR, TN
Who informed HP of the material?	FRANK WHITAKER
Time/Date HP was informed of the material:	0700 on 12/11/95
Time/date material was physically received by HP:	0700 on 12/11/95
Technician who received material:	R. Nugent
Physical Description of the container:	Good
Physical description of the material:	Good
Weight of the material:	N/A

GTS Instrument Services
2045 Route 286
Pittsburgh, PA 15239-2839
412/733-1900 Fax: 412/327-8189

WORK ORDER

WO Number I-96-04-224
Customer P.O. Number 3208

WO Date 04-11-96
Requested Service Date ASAP

CUSTOMER INFORMATION

Billing Allied Technology Group
Address 99A Midway Lane
Oak Ridge, TN 37830

Contact
Telephone

Shipping
Address

Contact
Telephone

INSTRUMENT INFORMATION

Maintenance & Repair Performed: See Below

Instrument Manufacturer F&J
Model H9400 Serial # 001452
External Probe(s) Serial #

OTHER TESTS & CHECKS

Description (Leak Test, Etc.) n/a

ACCOUNTING & BILLING INFORMATION

WO Accounting		Item	Quantity	Description	Rate/Unit Price	Extension
Name	Date					
Received	04-11-96	Labor		Troubleshoot & Repair		N/C
Repaired	05-01-96	Travel				
		Time				
Calibrated	05-01-96	Parts	1 ea	Pressure Gauge & Barrel Assembly		125.00
Next Calibration Due	11-01-96					
Shipped	05-01-96					
Billed						
Certificate				Calibration		50.00
Shipping Method	FEDERAL					
Work Performed By:	William Owens (Signature)	Taxes				

THE SOURCE INC.
Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

Certificate of Calibration
(Alpha Source)

The Thorium 230 alpha source was measured in a gas proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at it's plateau voltage to determine it's 2π cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. Alpha standard 93TH1004194 is our NIST referenced source used in establishing NIST traceability.

REF.PO# 2223
Model S-Th-100

Active Diameter(or area) 10X10cm Mounting Material SS
Total Diameter(or area) 11X11cm Thickness 0.79mm

12,500	cpm ±	625	cpm 2π
24,600	dpm ±	1230	dpm 4π
0.0111	microcurie		
02-15-95	date of measurement		
95TH1000487	source serial number		
5.0	overall uncertainty(percent)		
1.5	backscatter (percent)		

Michael A. Ortiz
Calibration Manager
Charles L. Gonzales
Quality Assurance Manager

less than 20 leak test results(dpm /source100cm^2)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactive measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

AC006-95

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide:	Th-230	Customer:	ATG (ALLIED TECHNOLOGY)
Half Life:	(7.54 ± 0.03) x 10^4 years	P.O.No.:	2106
Catalog No.:	AFSS-230	Reference Date:	March 15 1994 12:00 PST.
Source No.:	Z-824	Contained Radioactivity:	2,500 dpm
		Contained Radioactivity:	41.7 Bq

Description of Source

a. Capsule type:	Stainless steel disc (1.875" OD x 0.03" Thick)
b. Nature of active deposit:	Electrodeposited thorium oxide
c. Active diameter/volume:	1.75"
d. Backing:	Stainless steel
e. Cover:	None

Radioimpurities

Th-228 less than 1% as of March 5, 1993.

Method of Calibration

The source was assayed using a windowless internal gas flow proportional counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	± 1.8%
b. Random uncertainty in assay:	± 1.8%
c. Random uncertainty in weighing(s):	± 0.0%
d. Total uncertainty at the 99% confidence level:	± 2.5%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Anna U. Hua
QUALITY CONTROL

Mar 18, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

IPL Ref. No.: 453-88

CERTIFICATE OF CALIBRATION

MODEL CAL2800 WIDE AREA STANDARD

Radionuclide:	C-14	**Activity:**	149.0 Bq (4.027 nCi)
Serial Number:	C516	**Reference Date:**	1200 PST May 1, 1995
Half Life[1]:	5730 ± 40 years		

PRINCIPAL EMISSIONS[1]

Type	Energy (keV)	Intensity (%)
beta	E_{max} = 156 E_{avg} = 49.5	100

SOURCE DESCRIPTION

Gravimetric aliquots of a calibrated solution were deposited in a uniform array in a 10 cm x 10 cm area on a 12 cm x 12 cm x 3 mm plastic backing. The active region is sealed beneath 0.9 mg/cm^2 aluminized mylar stretched on an aluminum frame.

METHOD OF CALIBRATION

The source was calibrated by dispensing a gravimetric aliquot of a solution calibrated by liquid scintillation using an efficiency established through ongoing intercomparisons with the National Institute of Standards and Technology. This standard is indirectly (implicitly) traceable to the National Institute of Standards and Technology.

North American Scientific, Inc. participates in the Radioactivity Measurements Assurance Program conducted by the National Institute of Standards and Technology in cooperation with the Nuclear Energy Institute.

TOTAL UNCERTAINTY (99% Confidence Level)

Systematic uncertainty	4.00%
Random uncertainty	2.06%
Total uncertainty (quadratic sum)	± 4.50%

Daniel Kalas
Calibration Laboratory Manager

May 5, 1995
Date

REFERENCES

(1) Table of Radioactive Isotopes, 7th edition, 1986.

• LEAK TEST CERTIFICATION ON REVERSE •

North American Scientific, Inc. 7435 Greenbush Ave., North Hollywood, CA 91605 (818) 503-9201 Fax (818) 503-0764

THE SOURCE INC.

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

Certificate of Calibration
(Beta Source)

The Technetium 99 beta source was measured in a gas proportional counter using P-10 as counting gas. The beta emissions from the surface of the source were measured at its plateau voltage to determine its 2π cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. Beta standard 91TC4704553 is our NIST referenced source used in establishing NIST traceability.

REF.PO# 1616

Active Diameter(or area) 44mm Mounting Material SS
Total Diameter(or area) 47mm Thickness 0.79mm

28,200	cpm±	1,410	cpm 2π
45,200	dpm ±	2,260	dpm 4π
0.0204	micro-curie		
06-15-93	date of measurement		
93TC4701591	source serial number		
5.0%	overall uncertainty(percent)		

Michael A. Ortiz
Calibration Manager

Charles L. Gonzales
Quality Assurance Manager

less than 2200 leak test results
(dpm /100cm^2)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactivity measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

BC006-93

CERTIFICATE OF CALIBRATION

MODEL ENV4051 GAMMA STANDARD

Radionuclide Co-60 Activity 969.1 nCi Serial Number A1324

Reference Date June 1, 1993 Half-Life[1] 5.271 ± 0.001 years

PRINCIPAL EMISSIONS[1]

Type	Energy (keV)	Intensity (%)
gamma	1173.237	99.90
	1332.501	99.9824

SOURCE DESCRIPTION

A gravimetric aliquot of a calibrated Co-60 solution is evenly distributed in approximately 500 milliliters of a 1.5 g/cc epoxy matrix and cast in a customer supplied Marinelli beaker.

METHOD OF CALIBRATION

The Co-60 solution was calibrated on a high purity Germanium detector using Co-60 efficiency at 1173.237 keV. This efficiency was established through ongoing intercomparisons with NIST.

North American Scientific, Inc. participates in the Radioactivity Measurements Assurance Program conducted by the National Institute of Standards and Technology in cooperation with the U.S. Council for Energy Awareness.

TOTAL UNCERTAINTY (99% Confidence Level)

Systematic uncertainty	± 1.37%
Weighing uncertainty	± 0.04%
Total uncertainty	± 1.41%

Calibration Laboratory

7-20-93
Date

REFERENCES

(1) Table of Radioactive Isotopes, 7th edition, 1986.

•LEAK TEST CERTIFICATION ON REVERSE•

North American Scientific, Inc. 7435 Greenbush Ave., North Hollywood, CA 91605 (818) 503-9201 Fax (818) 503-0764

LEAK TEST METHODS

1. **Soak (Immersion) Test** (ISO/TR 4826-1979 (E) section 2.1.3)

   The source is immersed in water or other suitable liquid at 50°C for at least 4 hours and the activity in the liquid measured. Acceptance limit: 0.0001 μCi alpha, 0.001 μCi beta-gamma.

2. **Immersion Test** (ANSI N542-1977, Appendix A2.1.3)

   The source is immersed in water at 100°C for 10 minutes. The water is removed and the source cooled and rinsed using fresh water. These operations are repeated twice, boiling in the water from the previous rinsing operation. Acceptance limit: 0.0001 μCi alpha, 0.005 μCi beta-gamma for all the water collected.

3. **Wipe (Smear) Test** (ANSI N542-1977, Appendix A2.1.1)

   All external surfaces of the source are wiped with a piece of filter paper or other absorbent material which has been moistened with an appropriate solvent and the activity removed is measured. Acceptance limit: 0.0001 μCi alpha, 0.001 μCi beta-gamma.

4. **Leak Test Not Applicable**

   For sources with no covering or a delicate covering over the radioactive portion or gas standards and sources, the inactive portions or containment vessel are wipe tested as in Method 3 above. Acceptance limit: 0.0001 μCi alpha, 0.001 μCi beta-gamma.

5. **Other**

LEAK TEST CERTIFICATION

The standard was leak tested in accordance with Leak Test Method 3 as described above. The removable activity was determined to be less than 0.001 μCi beta-gamma. This leak test should be performed every six months or as required by a specific NRC or Agreement State License.

Daniel [illegible]
Health Physics

7-20-93
Date