



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

231 Sam Rayburn Parkway
865-270-8962
Lenoir City, TN 37771, U.S.A.

CUSTOMER CABRERA SERVICES

ORDER NO. 20208121/382944

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 79552

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PRO85991

Cal. Date 26-Sep-12 Cal Due Date 26-Sep-13 Cal. Interval 1 Year Meterface 202-002

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 52 % Alt 700.8 mm Hg

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

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity

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

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

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

Instrument Volt Set 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:

2pi Efficiencies:

Source	SourceActivity	SourceCount	Background	Efficiency
Th230 (#5020)	1,609cpm	500cpm	37cpm	29%
Tc99 (#5279)	14,430cpm	6,950cpm	37cpm	48%
Sr90Y90 (#5281)	68,576cpm	35,000cpm	37cpm	51%
Ni63 (#4017)	139,185cpm	1,400cpm	37cpm	0.98%

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	<u>405</u>	<u>400</u>
X 100	100 K cpm	<u>100</u>	<u>100</u>
X 10	40 K cpm	<u>405</u>	<u>400</u>
X 10	10 K cpm	<u>100</u>	<u>100</u>
X 1	4 K cpm	<u>400</u>	<u>400</u>
X 1	1 K cpm	<u>100</u>	<u>100</u>
X 0.1	400 cpm	<u>400</u>	<u>400</u>
X 0.1	100 cpm	<u>100</u>	<u>100</u>

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

ALL Range(s) Calibrated Electronically

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

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

Reference Instruments and/or Sources: 059 280 720 734 781 1131 1616 1696 5105 5717CO 5719CO 60646 70897 73410 E551 E552 G112 M565 S-394 S-1054 T-304 T879 T10081 T10082 Y982

Alpha S/N Th230(#5020) Beta S/N Sr90Y90(#5281), Ni63(#4017) Other Tc99(#5279)

m 500 S/N 247891 Oscilloscope S/N Multimeter S/N 17500076

Calibrated By: [Signature] Date 26 SEP 12

Reviewed By: [Signature] Date 27 Sep 12

AC Inst. Only	<input type="checkbox"/> Passed Dielectric (Hi-Pot) and Continuity Test
	<input type="checkbox"/> Failed: <u> </u>



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CONVERSION CHART

Customer CABRERA SERVICES Date 26-Sep-12 Order # 20208121/382944

Model 3 Serial No. 79552 Detector Model 44-9 Serial No. PRO85991

Source Cs-137 194.6 mCi Cs-137 20 mCi High Voltage 900 V

Input Sensitivity 26 mV

Reference Point	"As Found" Readings (CPM):		After Adjustment Readings (CPM):	
	Meter Reading	Range/Scale	Meter Reading	Range/Scale
150 mR/hr	1.75 k	x 100	1.75 k	x 100
50 mR/hr	1.0 k	x 100	1.0 k	x 100
15 mR/hr	4.1 k	x 10	4.1 k	x 10
5 mR/hr	1.5 k	x 10	1.5 k	x 10
1.5 mR/hr	4.9 k	x 1	4.9 k	x 1
1.0 mR/hr	3.3 k	x 1	3.3 k	x 1

Signature: *Scott D. M.* Date 26 Sep 12