LANDAUER®

Calibration Certificate
ID Number: 452192042-0

Customer: Jen Newtown
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
Victoreen Model 451B

Serial Number
452

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
106.00 mR/hr	107.00 mR/hr	107.00 mR/hr	106.67 mR/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
Rate	40 R/hr	37 R/hr	37 R/hr
Rate	10 R/hr	10.5 R/hr	10.5 R/hr
Rate	4 R/hr	4.1 R/hr	4.1 R/hr
Rate	1 R/hr	1.08 R/hr	1.08 R/hr
Rate	400 mR/hr	400 mR/hr	400 mR/hr
Rate	100 mR/hr	107 mR/hr	107 mR/hr
Rate	40 mR/hr	38 mR/hr	38 mR/hr
Rate	10 mR/hr	9.8 mR/hr	9.8 mR/hr
Rate	4 mR/hr	3.8 mR/hr	3.8 mR/hr
Rate	1 mR/hr	1.07 mR/hr	1.07 mR/hr
Integrate	200 mR	200 mR	200 mR
Integrate	50 mR	53 mR	53 mR

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Internal Check: *Pass*
Tap Test: *Pass*
Desiccant Check: *Pass*

Comments: All readings higher than 40 mR/hr were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110). As-Found/As-Left Calibration Factors: F1 = 96/96, F2 = 92/92, F3 = 105/105, F4 = 102/102, F5 = 95/95, INT = 100/100 Dried/replaced desiccant.

Chris Hartman
Calibration Technician

QA Review:

Calibration Date: 09/07/2023
Expires: 09/07/2024

Atmospheric Conditions - Temperature: 73°F Humidity: 48% Barometric Pressure: 29.71"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN 7145), characterized using Exradin Models A6 (S/N 185) / A4 (S/N 220) / A5 (S/N 261), GE RSS-131 (S/N 95I00178), and Standard Imaging Electrometer Electrometer Model Maxx4000 (S/N J171510) in accordance with methods specified in RSCS TSD 20-023, with estimated uncertainty of 6.7%.
RSCS Model 149 Neutron Calibrator, Pu:Be Source Model MRC Model 2726-B (S/N 495), characterized using Far West Technologies Model Rem500 TEPC (S/N 271) in accordance with the methods specified in RSCS TSD 21-049, with an uncertainty of 9.4% at a 95% confidence interval.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.
Unless otherwise stated, calibrations performed in conformance to the following documents: ANSI N323AB-2013; RSCS New Hampshire Radioactive Material License Number 381R.
RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedures.
Calibration Laboratory is operated in accordance with ANSI/NCSL Z540-1-1994
RSCS, Inc. has been assessed by ANAB and meets the requirements of ISO/IEC 17025:2005 while demonstrating technical competence in the field of calibration. Refer to the Scope of Accreditation AC-2079 for information on the types of calibrations to which this accreditation applies.

LANDAUER®

Calibration Certificate
ID Number: 1074190160-0

Customer: Jen Newtown
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
Victoreen Model 451B

Serial Number
1074

Precision Check

Test 1	Test 2	Test 3	Mean	Results
10.10 mR/hr	10.20 mR/hr	10.10 mR/hr	10.13 mR/hr	Satisfactory

Accuracy Check

Range	Target Value	As Found	As Left
Rate	40 R/hr	38 R/hr	37 R/hr
Rate	10 R/hr	11.2 R/hr	10.8 R/hr
Rate	4 R/hr	4.1 R/hr	4.1 R/hr
Rate	1 R/hr	1.08 R/hr	1.08 R/hr
Rate	400 mR/hr	430 mR/hr	390 mR/hr
Rate	100 mR/hr	112 mR/hr	101 mR/hr
Rate	40 mR/hr	39 mR/hr	39 mR/hr
Rate	10 mR/hr	10.1 mR/hr	10.1 mR/hr
Rate	4 mR/hr	4.2 mR/hr	4.2 mR/hr
Rate	1 mR/hr	0.92 mR/hr	0.92 mR/hr
Integrate	200 mR	200 mR	200 mR
Integrate	50 mR	53 mR	53 mR

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Internal Check: *Pass*
Tap Test: *Pass*
Desiccant Check: *Pass*

Comments: All readings 100 mR/hr or higher were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110). As-Found/As-Left Calibration Factors = F1: 96/96, F2: 93/93, F3: 105/97, F4: 99/99, F5: 96/93, Int 100/(100/100).

Mark Nelson
Calibration
Technician

QA
Review:

JUL 19 2023

Calibration Date: 07/18/2023
Expires: 07/18/2024

Atmospheric Conditions - Temperature: 73°F Humidity: 46% Barometric Pressure: 29.89"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN 7145), characterized using Exradin Models A6 (S/N 185) / A4 (S/N 220) / A5 (S/N 261), GE RSS-131 (S/N 95I00178), and Standard Imaging Electrometer Electrometer Model Maxx4000 (S/N J171510) in accordance with methods specified in RSCS TSD 20-023, with estimated uncertainty of 6.7%.
RSCS Model 149 Neutron Calibrator, Pu:Be Source Model MRC Model 2726-B (S/N 495), characterized using Far West Technologies Model Rem500 TEPC (S/N 271) in accordance with the methods specified in RSCS TSD 21-049, with an uncertainty of 9.4% at a 95% confidence interval.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.
Unless otherwise stated, calibrations performed in conformance to the following documents: ANSI N323AB-2013; RSCS New Hampshire Radioactive Material License Number 381R.
RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedures.
Calibration Laboratory is operated in accordance with ANSI/NCSL Z540-1-1994
RSCS, Inc. has been assessed by ANAB and meets the requirements of ISO/IEC 17025:2005 while demonstrating technical competence in the field of calibration. Refer to the Scope of Accreditation AC-2079 for information on the types of calibrations to which this accreditation applies.

RSCS
Radiation Safety & Control Services

Calibration Certificate
ID Number: 3096132196-0

Customer: .
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
Fluke Biomedical Model 451P

Serial Number
3096

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
10.10 mR/hr	10.30 mR/hr	9.80 mR/hr	10.07 mR/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
Rate	4 R/hr	3.4 R/hr	4.1 R/hr
Rate	1 R/hr	0.84 R/hr	0.99 R/hr
Rate	400 mR/hr	340 mR/hr	400 mR/hr
Rate	100 mR/hr	88 mR/hr	104 mR/hr
Rate	40 mR/hr	37 mR/hr	39 mR/hr
Rate	10 mR/hr	9.2 mR/hr	10.1 mR/hr
Rate	4 mR/hr	3.2 mR/hr	3.6 mR/hr
Rate	1 mR/hr	0.9 mR/hr	0.95 mR/hr
Rate	400 µR/hr	370 µR/hr	370 µR/hr
Rate	100 µR/hr	103 µR/hr	103 µR/hr
Integrate	80 mR	69 mR	81 mR
Integrate	20 mR	16.6 mR	19 mR

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Internal Check: *Pass* Tap Test: *Pass*

Comments: All readings 10 mR/hr or higher and the integrate readings were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110).
As-Found/As-Left Calibration Factors: F1 = 107/107, F2 = 115/120, F3 = 110/115, F4 = 100/117, F5 = 92/105, INT = 100/100

Chris Pirie
Calibration
Technician

QA
Review:

Calibration Date: 04/10/2019
Expires: 04/10/2020

Atmospheric Conditions - Temperature: 71°F Humidity: 33% Barometric Pressure: 29.64"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
RSCS Neutron Calibrator, AmBe Source Model NUMEC-AM-31 (S/N Am-478), characterized using Far West Technologies Model FWAD-1 "HAWK" TEPC (S/N 021) in accordance with the methods specified in RSCS TSD 13-002, with estimated uncertainty of 9.4%
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%
Unless otherwise stated, calibrations performed in conformance to the following documents: ANSI N323AB-2013; RSCS New Hampshire Radioactive Material License Number 381R.
RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedures.
Calibration Laboratory is operated in accordance with ANSI/NCSL Z540-1-1994
RSCS, Inc. has been assessed by ANAB and meets the requirements of ISO/IEC 17025:2005 while demonstrating technical competence in the field of calibration. Refer to the Scope of Accreditation AC-2079 for information on the types of calibrations to which this accreditation applies.

Radiation Safety and Control Services, Inc.
93 Ledge Road, Seabrook, NH 03874
1-800-525-8339 (603) 778-2871 www.radsafety.com

ANAB ACCREDITED CALIBRATION LABORATORY

LANDAUER®

Calibration Certificate
ID Number: 3869188696-0

Customer: Jen Newtown
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
Victoreen Model 451P

Serial Number
3869

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
380.00 mR/hr	380.00 mR/hr	380.00 mR/hr	380.00 mR/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
Rate	4 R/hr	3.5 R/hr	4.1 R/hr
Rate	1 R/hr	.87 R/hr	1.00 R/hr
Rate	400 mR/hr	330 mR/hr	380 mR/hr
Rate	100 mR/hr	80 mR/hr	100 mR/hr
Rate	40 mR/hr	40 mR/hr	40 mR/hr
Rate	10 mR/hr	10 mR/hr	10 mR/hr
Rate	4 mR/hr	4 mR/hr	4 mR/hr
Rate	1 mR/hr	1.03 mR/hr	1.03 mR/hr
Rate	400 µR/hr	400 µR/hr	400 µR/hr
Rate	100 µR/hr	102 µR/hr	102 µR/hr
Integrate	80 mR	72 mR	83 mR
Integrate	20 mR	17.6 mR	19.6 mR

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Tap Test: *Pass*

Comments: All readings higher than 40 mR/hr were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110).
As-Found/As-Left Calibration Factors: F1 = 95/95, F2 = 111/111, F3 = 106/106, F4 = 80/90, F5 = 80/90, INT = 100/100

Chris Hartman
Calibration Technician

QA Review:

Calibration Date: 05/18/2023
Expires: 05/18/2024

Atmospheric Conditions - Temperature: 68°F Humidity: 35% Barometric Pressure: 30.16"hg

MAY 18 2023

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN 7145), characterized using Exradin Models A6 (S/N 185) / A4 (S/N 220) / A5 (S/N 261), GE RSS-131 (S/N 95I00178), and Standard Imaging Electrometer Electrometer Model Maxx4000 (S/N J171510) in accordance with methods specified in RSCS TSD 20-023, with estimated uncertainty of 6.7%.
RSCS Model 149 Neutron Calibrator, Pu:Be Source Model MRC Model 2726-B (S/N 495), characterized using Far West Technologies Model Rem500 TEPC (S/N 271) in accordance with the methods specified in RSCS TSD 21-049, with an uncertainty of 9.4% at a 95% confidence interval.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.
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LANDAUER Medical Physics
2 Science Road, Glenwood, IN 60425
1-888-831-4880

ANAB ACCREDITED CALIBRATION LABORATORY

LANDAUER®

Calibration Certificate
ID Number: 799184144-0

Customer: Jen Newtown
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
InoVision Model 451B

Serial Number
799

Precision Check

Test 1	Test 2	Test 3	Mean	Results
107.00 mR/hr	106.00 mR/hr	107.00 mR/hr	106.67 mR/hr	Satisfactory

Accuracy Check

Range	Target Value	As Found	As Left
Rate	40 R/hr	38 R/hr	37 R/hr
Rate	10 R/hr	11.2 R/hr	10.9 R/hr
Rate	4 R/hr	4.2 R/hr	3.9 R/hr
Rate	1 R/hr	1.10 R/hr	1.05 R/hr
Rate	400 mR/hr	410 mR/hr	410 mR/hr
Rate	100 mR/hr	107 mR/hr	107 mR/hr
Rate	40 mR/hr	38 mR/hr	38 mR/hr
Rate	10 mR/hr	9.8 mR/hr	9.8 mR/hr
Rate	4 mR/hr	4.1 mR/hr	4.1 mR/hr
Rate	1 mR/hr	1.02 mR/hr	1.02 mR/hr
Integrate	200 mR	210 mR	200 mR
Integrate	50 mR	54 mR	52 mR

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Internal Check: *Pass* Tap Test: *Pass*

Comments: All readings higher than 40 mR/hr were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110). As-Found/As-Left Calibration Factors: F1 = 100/100, F2 = 90/90, F3 = 102/102, F4 = 100/95, F5 = 97/95, INT = (100/100)/(100/100) Dried/replaced desiccant.

Matt Toleos
Calibration
Technician

QA
Review:

Calibration Date: 02/09/2023
Expires: 02/09/2024

FEB 10 2023

Atmospheric Conditions - Temperature: 69°F Humidity: 24% Barometric Pressure: 30.21"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN 7145), characterized using Exradin Models A6 (S/N 185) / A4 (S/N 220) / A5 (S/N 261), GE RSS-131 (S/N 95I00178), and Standard Imaging Electrometer Electrometer Model Maxx4000 (S/N J171510) in accordance with methods specified in RSCS TSD 20-023, with estimated uncertainty of 6.7%.
RSCS Model 149 Neutron Calibrator, Pu:Be Source Model MRC Model 2726-B (S/N 495), characterized using Far West Technologies Model Rem500 TEPC (S/N 271) in accordance with the methods specified in RSCS TSD 21-049, with an uncertainty of 9.4% at a 95% confidence interval.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.
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LANDAUER Medical Physics
2 Science Road, Glenwood, IN 60425
1-888-831-4880

ANAB ACCREDITED CALIBRATION LABORATORY

LANDAUER®

Calibration Certificate
ID Number: 25006598141710-0

Customer: .
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument
Ludlum Model 9DP-1

Serial Number
25006598

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
38.70 mR/hr	38.50 mR/hr	38.70 mR/hr	38.63 mR/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
X10K	40 R/hr	40.4 R/hr	40.4 R/hr
X10K	10 R/hr	10.9 R/hr	10.9 R/hr
X1K	4 R/hr	4.29 R/hr	4.29 R/hr
X1K	1 R/hr	1.10 R/hr	1.10 R/hr
X100	400 mR/hr	428 mR/hr	428 mR/hr
X100	100 mR/hr	103 mR/hr	103 mR/hr
X10	40 mR/hr	38.7 mR/hr	38.7 mR/hr
X10	10 mR/hr	10.5 mR/hr	10.5 mR/hr
X1	4 mR/hr	3.91 mR/hr	4.32 mR/hr
X1	1 mR/hr	0.86 mR/hr	0.91 mR/hr

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value

Outer Physical Check: *Pass*
Tap Test: *Pass*

Comments: All readings 10 mR/hr or higher were obtained using the J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N: 9141). All other readings were obtained using the Tech Ops Model 773 Cs-137 Beam Calibrator (S/N: S-1110).
As Found/As Left Calibration Factor: X1 = 806/900 X10 = 810/810 X100 = 857/857 X1K = 888/888 X10K = 1367/1367

Mark Nelson
Calibration
Technician

QA
Review:

Calibration Date: 01/31/2020
Expires: 01/31/2021

Atmospheric Conditions - Temperature: 72°F Humidity: 26% Barometric Pressure: 30.22"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
RSCS Neutron Calibrator, AmBe Source Model NUMEC-AM-31 (S/N Am-478), characterized using Far West Technologies Model FWAD-1 "HAWK" TEPC (S/N 021) in accordance with the methods specified in RSCS TSD 13-002, with estimated uncertainty of 9.4%
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%
Unless otherwise stated, calibrations performed in conformance to the following documents: ANSI N323AB-2013; RSCS New Hampshire Radioactive Material License Number 381R.
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LANDAUER Medical Physics
2 Science Road, Glenwood, IN 60425
1-888-831-4880

ANAB ACCREDITED CALIBRATION LABORATORY

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

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

ACCREDITED
CERT # 4084.01

Customer LANDAUER MEDICAL PHYSICS ORDER NO. 20440721/536615

Mfg. Fluke Model 451P-RYR Serial No. 7806

Mfg. _____ Model _____ Serial No. _____

Cal. Date 18-Feb-23 Cal Due Date 18-Feb-24 Cal. Interval 1 Year Meterface Digital

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 15 % Alt 706.6 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.

☐ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

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:

Instrument received with chamber depressurized.

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

Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
Digital			
Digital			
Digital			
Digital			
Digital			
Digital			
Digital			
Digital			
Digital			
Digital			

Range(s) Calibrated Electronically

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	2 R/hr	N/A	2.0 R/hr
	200 mR/hr		200 mR/hr
	20 mR/hr		20
	2 mR/hr		2.0
	200 µR/hr		200 µR/hr

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 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.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013

ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☑ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☑ G112 ☑ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

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

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

Calibrator Donnie Miekos Donnie Miekos Title Calibrator Date 18-Feb-23

QC'd By _____ Title Final QC Date 20 Feb 23

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

LANDAUER®

Calibration Certificate
ID Number: 264306185094-0

Customer: Joe Greco
Upstate Medical Physics
1290 Blossom Drive
Victor, NY 14564

Instrument	Serial Number
Ludlum Model 3-241R	264306

Probe Model	Serial Number
Ludlum 44-38	567
Ludlum 44-9	388694

Precision Check

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

Accuracy Check

Range	Target Value	As Found	As Left
X100	160 mR/Hr	175 mR/Hr	175 mR/Hr
X100	40 mR/Hr	40 mR/Hr	40 mR/Hr
X10	16 mR/Hr	16 mR/Hr	16 mR/Hr
X10	4 mR/Hr	4 mR/Hr	4 mR/Hr
X1	1.6 mR/Hr	1.75 mR/Hr	1.75 mR/Hr
X1	0.4 mR/Hr	0.4 mR/Hr	0.4 mR/Hr
X.1	0.16 mR/Hr	0.165 mR/Hr #	0.165 mR/Hr #
X.1	0.04 mR/Hr	0.04 mR/Hr #	0.04 mR/Hr #

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10.00% of Target value
Readings with # indicate ranges where pulser was used.

Probe Model & SN	Isotope	Efficiency	NIST Source ID	Geometry
44-9 388694	Tc-99m	0.0005 C/D	Co-57 (SN: 1867-29-1)	@1cm

MTE Instrument Type	Model	CalDueDate
Pulser	Ludlum 500-4 SN: 98756	11/16/2023

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

Electronics Checks	As Found	As Left
High Voltage	891 Volts	891 Volts

Comments: Unless indicated with a "#" in the table above to indicate a pulser was used, all readings were obtained using the J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN: 7145).
Ludlum 44-9 (SN: 388694) is NOT calibrated in mR/hr!! Geometry: Detector Perpendicular To Source

Atmospheric Conditions - Temperature: 70°F Humidity: 25% Barometric Pressure: 29.83"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
J.L. Shepherd and Associates Model 89 Cs-137 Box Calibrator (S/N 9141), characterized using Exradin, Model A6 (S/N 185), A3 (S/N 197), A12 (S/N XA091124), and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-001, with estimated uncertainty of 2.7%.
J.L. Shepherd and Associates Model 81-12 Cs-137 Dual Source Gamma Calibrator (SN 7145), characterized using Exradin Models A6 (S/N 185) / A4 (S/N 220) / A5 (S/N 261), GE RSS-131 (S/N 95I00178), and Standard Imaging Electrometer Electrometer Model Maxx4000 (S/N J171510) in accordance with methods specified in RSCS TSD 20-023, with estimated uncertainty of 6.7%.
RSCS Model 149 Neutron Calibrator, Pu:Be Source Model MRC Model 2726-B (S/N 495), characterized using Far West Technologies Model Rem500 TEPC (S/N 271) in accordance with the methods specified in RSCS TSD 21-049, with an uncertainty of 9.4% at a 95% confidence interval.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.
Unless otherwise stated, calibrations performed in conformance to the following documents: ANSI N323AB-2013; RSCS New Hampshire Radioactive Material License Number 381R.
RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedures.
Calibration Laboratory is operated in accordance with ANSI/NCSL Z540-1-1994
RSCS, Inc. has been assessed by ANAB and meets the requirements of ISO/IEC 17025:2005 while demonstrating technical competence in the field of calibration. Refer to the Scope of Accreditation AC-2079 for information on the types of calibrations to which this accreditation applies.

LANDAUER Medical Physics
2 Science Road, Glenwood, IN 60425
1-888-831-4880

ANAB ACCREDITED CALIBRATION LABORATORY

LANDAUER®

Calibration Certificate
ID Number: 264306185094-0

Customer:	Joe Greco **Upstate Medical Physics** 1290 Blossom Drive Victor, NY 14564	**Instrument** Ludlum Model 3-241R	**Serial Number** 264306
		Probe Model Ludlum 44-38 Ludlum 44-9	**Serial Number** 567 388694

Patrick Cashman
Calibration Technician

QA Review:

Calibration Date: 02/24/2023
Expires: 02/24/2024

FEB 24 2023

Atmospheric Conditions - Temperature: 70°F Humidity: 25% Barometric Pressure: 29.63"hg

This calibration was performed by RSCS using one or more of the following NIST Traceable radiation sources:
Tech Ops Model 773 Cs-137 Beam Calibrator (S/N S-1110), characterized using Exradin Model A6 (S/N 185) and Keithley Electrometer Model 617 (S/N 0547677) in accordance with methods specified in RSCS TSD 11-008, with estimated uncertainty of 6.0%.
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