FINAL STATUS SURVEY REPORT

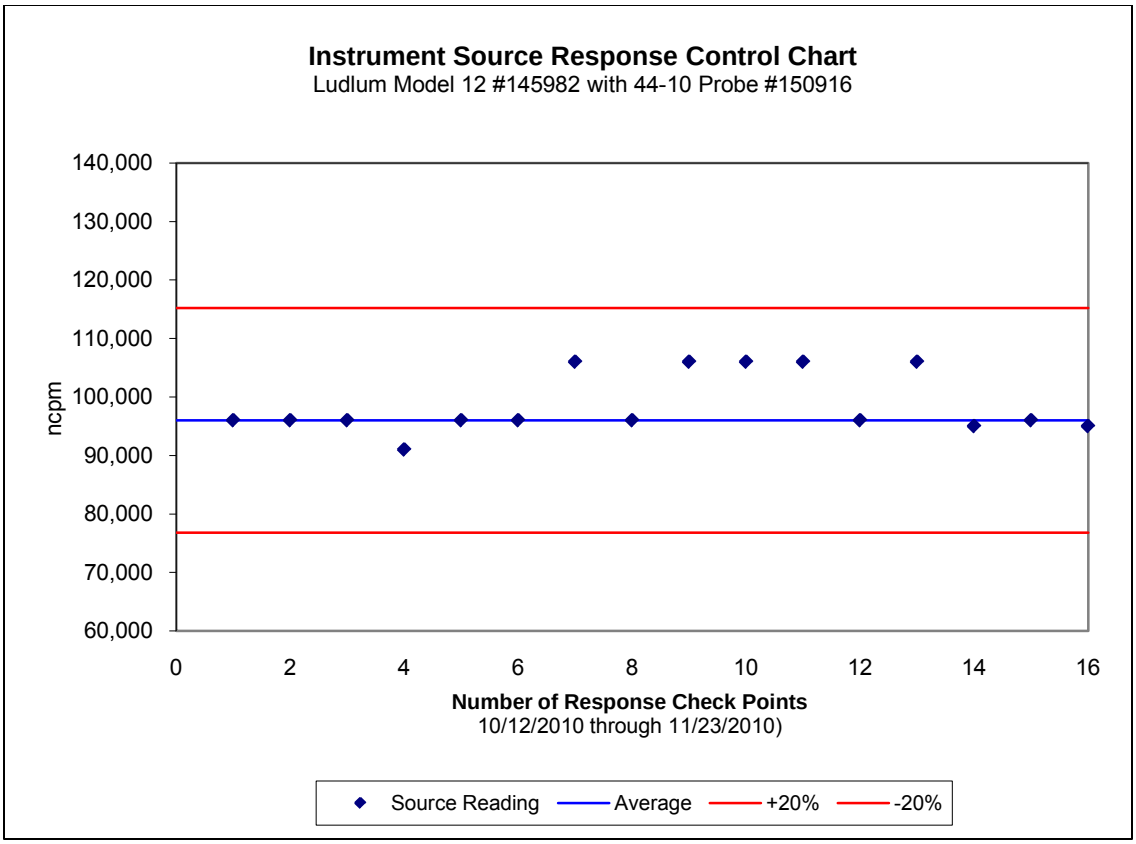
SUBMITTAL NUMBER 1

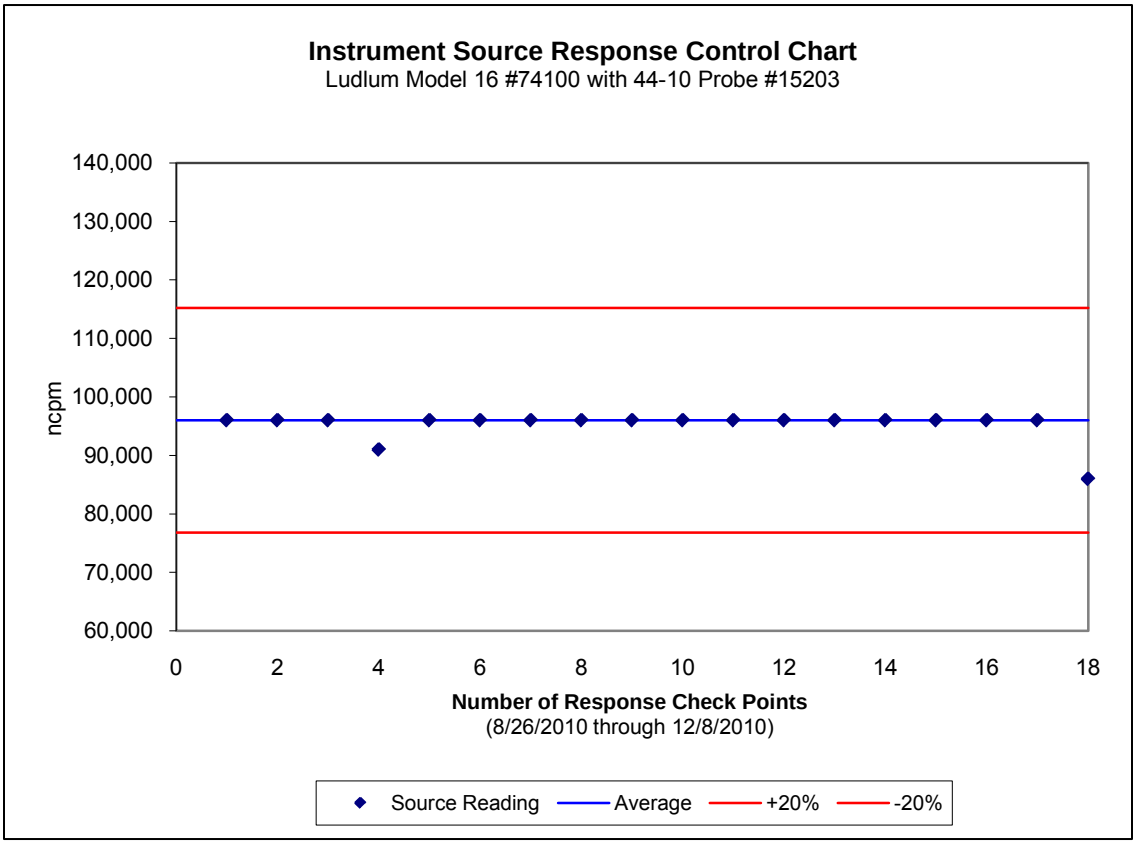
CE WINDSOR SITE

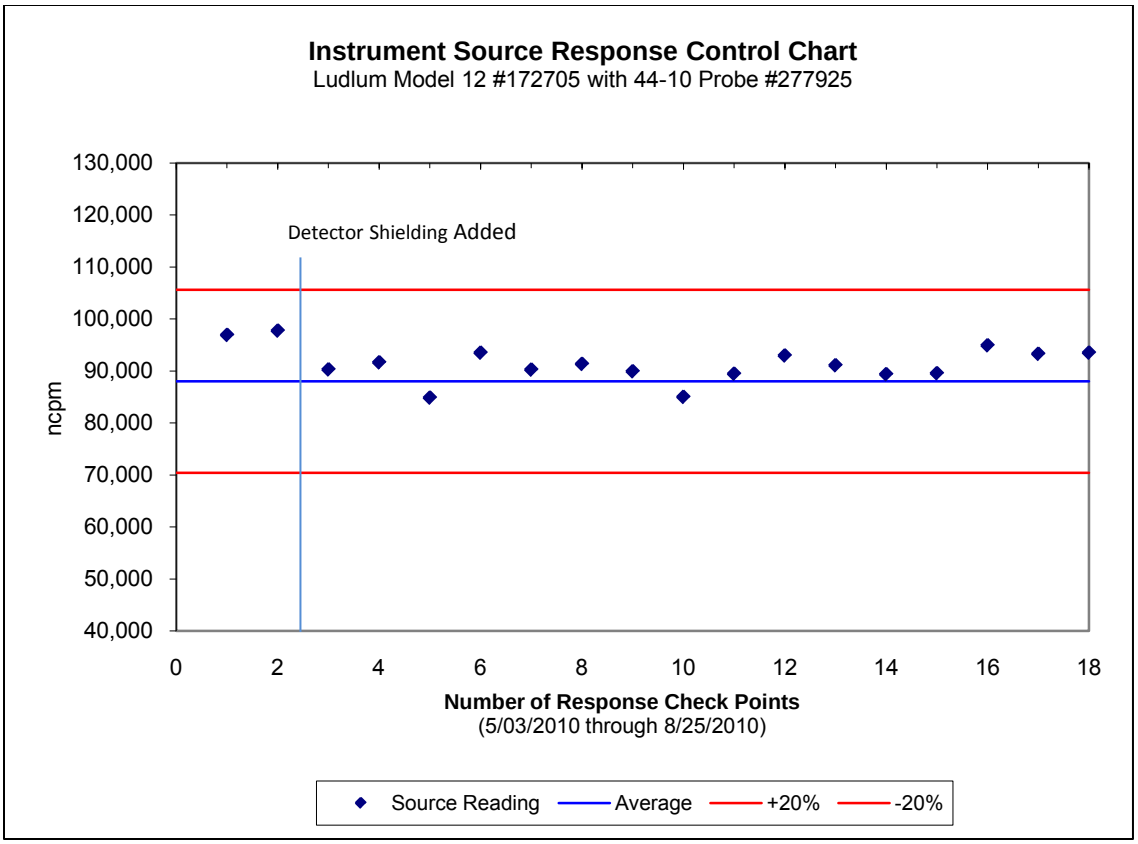
WINDSOR, CONNECTICUT

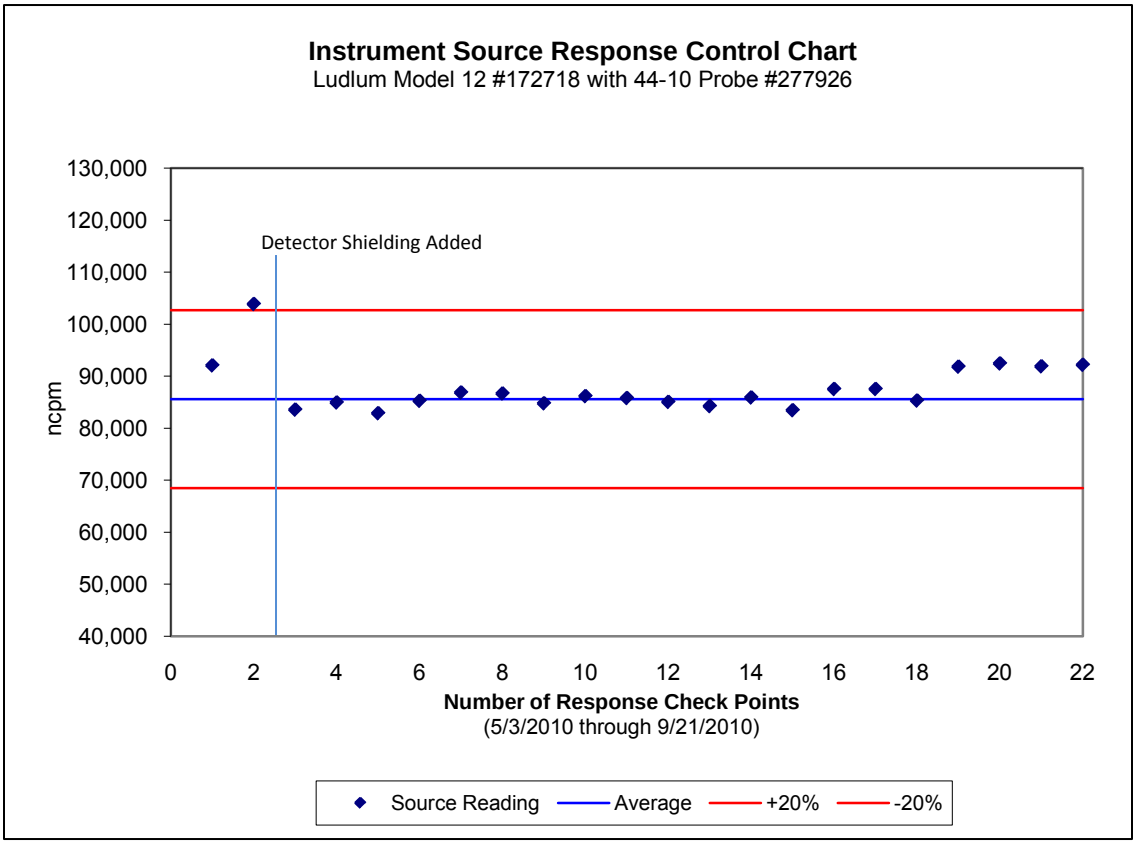
APPENDIX P

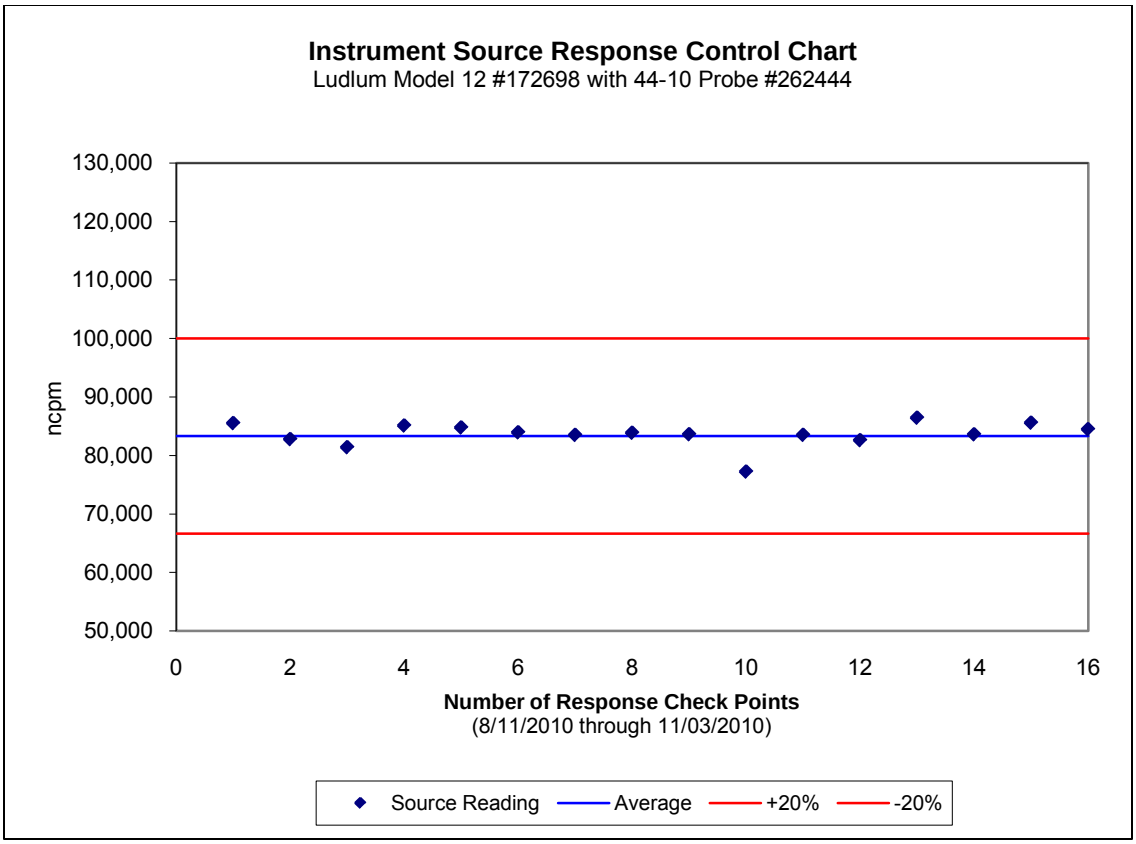
PORTABLE INSTRUMENTATION DOCUMENTATION


Instrument Source Response Control Chart
Ludlum Model 12 #145982 with 44-10 Probe #150916
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
ncpm
0
2
4
6
8
10
12
14
16
Number of Response Check Points
10/12/2010 through 11/23/2010)
Source Reading
Average
+20%
-20%


Instrument Source Response Control Chart
Ludlum Model 16 #74100 with 44-10 Probe #15203
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
ncpm
0
2
4
6
8
10
12
14
16
18
Number of Response Check Points
(8/26/2010 through 12/8/2010)
Source Reading
Average
+20%
-20%


Instrument Source Response Control Chart
Ludlum Model 12 #172705 with 44-10 Probe #277925
Detector Shielding Added
ncpm
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
0
2
4
6
8
10
12
14
16
18
Number of Response Check Points
(5/03/2010 through 8/25/2010)
Source Reading
Average
+20%
-20%


Instrument Source Response Control Chart
Ludlum Model 12 #172718 with 44-10 Probe #277926
Detector Shielding Added
ncpm
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
0
2
4
6
8
10
12
14
16
18
20
22
Number of Response Check Points
(5/3/2010 through 9/21/2010)
Source Reading
Average
+20%
-20%


Instrument Source Response Control Chart
Ludlum Model 12 #172698 with 44-10 Probe #262444
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
ncpm
0
2
4
6
8
10
12
14
16
Number of Response Check Points
(8/11/2010 through 11/03/2010)
Source Reading
Average
+20%
-20%

Ludlum Model 12 #145982 with

44-10 Probe #150916

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION 81

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

CUSTOMER MACTEC INC ORDER NO. 20158040/352828

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 145982

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR 150916

Cal. Date 27-Jul-10 Cal Due Date 27-Jul-11 Cal. Interval 1 Year Meterface 202-356

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 48 % Alt 699.8 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 1000 V Input Sens. 10 mV Det. Oper. 1000 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 2000 / 2004 V

COMMENTS:
Cal'd with 5ft cable.

44-10: 950cpm per nR/Hr

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	400k cpm	400	400
x 1000	100k cpm	100	100
x 100	40k cpm	405	400
x 100	10k cpm	101	100
x 10	4k 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 ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ 73410 ☐ 1131 ☑ 781 ☐ 059 ☐ 280 ☐ 60646 ☐ 70897

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

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 190566 ☐ Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrated By: [signature] Date 27-July-10

Reviewed By: [signature] Date 27 Jul 10

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 03/11/2010 Page 1 of 3

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

81

Bench Test Data For Detector

Detector 44-10 Serial No. PR150916

Customer MACTEC INC Order #. 20158040/352828

Counter 12 Serial No. 145982 Counter Input Sensitivity 10 mV

Count Time 5.F. 6 CPM Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am 241 Size ≈0.79μCi	Isotope Size	Isotope Size	Isotope Size
800	8 K	8 K			
850	8.5	100			
900	9	110			
950	9	120			
1000	9	120			
1050	9	120			
1100	9	120			
1150	10	130			

Signature [signature] Date 27-July-10

• *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer
of
Scientific and Industrial
Instruments

γ1

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

CONVERSION CHART

Customer MACTEC INC Date 27-Jul-10 Order #. 20158040/352828

Model 12 Serial No. 145982 Detector Model 44-10 Serial No. PR150916

Source Cs137, 4mCi High Voltage 1000 V

Input Sensitivity 10 mV

Reference Point	"As Found" Readings: Meter Reading	"As Found" Readings: Range/Scale	After Adjustment Readings: Meter Reading	After Adjustment Readings: Range/Scale
500 mR/hr	440	x1000	440	x1000
400	350		350	
300	260		260	
200	180		180	
100	95		95	

Signature: Jason Fl Date 27-July-10

FORM C17-1D 03/11/2010 Page 3 of 3

INSTRUMENT QC CHECK SHEET

Date: 8-4-10 Time: 1130

Instrument: 12 Serial No: 145982

Probe: 44-10 Serial No: 150916

Cal. Preformed Date: 7-27-10 Cal. Due Date: 7-27-11

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: Count Lab

Jig Used: (Yes) No (circle one) Jig ID# NAI-1

Background count duration N/A (min) Window Setting: ☐in ☐out ☒n/a

Source count duration N/A (min)

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	4000	100000	96000
2			
3			
4			
5			
6			
7			
8			
9			
10			
Average			

Average Source Ref. Reading + 20% = 115200
Average Source Ref. Reading – 20% = 76800
Average Background Reading + 50% = 6000
Average Background Reading – 50% = 2000

Comments:

Performed By: [signature] Date: 8-4-10

RSO Review: [signature] Date: 8/5/10

PROCEDURE NO: RPP-13	REVISION NO: 3	ATTACHMENT 2 PAGE 1 OF 1

Portable Instrument Response Check Sheet

γ1

Probe/Meter Information	γ1	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	150916	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	145982	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	7-27-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	UnSat	Initial	Comments
8.31.10	0610				4000	100000	96000	✓		KS	PRE
8.31.10	1500				4000	100000	96000	✓		JM	POST
9.1.10	0615				4000	100000	96000	✓		KS	PRE NOT USED
9.2.10	0615				4000	100000	96000	✓		KS	PRE/not used
9.7.10	0610				4000	100000	96000	✓		KS	PRE/not used
9.8.10	0600				4000	100000	96000	✓		KS	PRE/not used
9.9.10	0545				4000	100000	96000	✓		KS	PRE/not used
9.13.10	0615				4000	100000	96000	✓		KS	PRE/not used
9.14.10	0600				4000	100000	96000	✓		KS	PRE/not used
9.15.10	0545				4000	100000	96000	✓		KS	PRE/not used
9.16.10	0615				4000	100000	96000	✓		KS	PRE
9.16.10	1555				4000	100000	96000	✓		BL	POST
9.20.10	0545				4000	100000	96000	✓		JM	PRE
9.20.10	1605				4000	100000	96000	✓		BL	POST
9.21.10	0615				4000	100000	96000	✓		JM	PRE/NOT USED
9.22.10	0615				4000	100000	96000	✓		JM	PRE
9.22.10	1725				4000	100000	96000	✓		BL	POST
9.23.10	0615				4000	100000	96000	✓		JM	PRE/not used
9.27.10	0600				4000	100000	96000	✓		KS	PRE/not used
9.28.10	0600				4000	100000	96000	✓		KS	PRE/not used
9.29.10	0610				4000	100000	96000	✓		KS	PRE/not used
9.30.10	0615				4000	100000	96000	✓		KS	PRE
9.30.10	1545				4000	100000	96000	✓		GW	POST
10.4.10	0600				4000	100000	96000	✓		KS	PRE
10.4.10	1605				4000	100000	96000	✓		KS	POST
10.5.10	0605				4000	100000	96000	✓		KS	PRE
10.5.10	1630				4000	110000	106000	✓		GW	POST
10.6.10	0605				4000	110000	106000	✓		KS	PRE
10.6.10	1630				4000	100000	96000	✓		GW	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HD Date: 10/14/10

PROCEDURE RPP-12	REVISION 3	ATTACHMENT 1	PAGE 1 OF 2

Portable Instrument Response Check Sheet

γ1

Probe/Meter Information γ1		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	150916	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	145982	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	7-27-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
10.7.10	0605				4000	110000	106000	✓		KS	PRE
10.7.10	1400				4000	110000	106000	✓		GW	Post
10.8.10	0610				4000	110000	106000	✓		KS	PRE
10.8.10	1615				4000	110000	106000	✓		GW	POST
10.11.10	0615				4000	100000	96000	✓		KS	PRE
10.11.10	1600				4000	100000	96000	✓		GW	Post
10.12.10	0600				4000	100000	96000	✓		KS	PRE
10.12.10	1700				4000	100000	96000	✓		EM	POST
10.13.10	0600				4000	100000	96000	✓		KS	PRE
10.13.10	1620				4000	100000	96000	✓		GW	Post
10.14.10	0620				4000	100000	96000	✓		KS	PRE/not used
10.18.10	0610 10.18.10				4000	100000	96000	✓		KS	PRE/not used
10.19.10	0610				4000	100000	96000	✓		KS	PRE/not used
10.20.10	0605				4000	100000	96000	✓		KS	PRE
10.20.10	1630				4000	100000	96000	✓		DSO/GW	Post
10.21.10	0605				4000	100000	96000	✓		KS	PRE/not used
10.25.10	0610				4000	100000	96000	✓		KS	PRE/not used
10.26.10	0620				4000	100000	96000	✓		KS	PRE/not used
~~10.26.10~~ 10.27.10	0605				4000	110000	106000	✓		KS	PRE/not used
10.28.10	0555				4000	110000	106000	✓		KS	PRE/not used
11.1.10	0615				4000	110000	106000	✓		KS	PRE
11.1.10	1500				4000	100000	96000	✓		RSO/JT	Post
11.2.10	0605				4000	110000	106000	✓		KS	PRE
11.2.10	1745				4000	110000	106000	✓		GW	POST
11.3.10	0605				4000	110000	106000	✓		KS	PRE
11-3-10	17-				4000	110000	106000	✓		JT	Post
11.4.10	0605				4000	110000	106000	✓		KS	PRE/not used
11.8.10	0615				4000	100000	96000	✓		KS	PRE/not used
11.10.10	0600				4000	110000	106000	✓		KS	PRE

* ± 50% or 1 cpm which ever is greater Notify RSO if background is not within range.

RSO Review: HD Date: 12/1/10

Portable Instrument Response Check Sheet

γ1

Probe/Meter Information γ1		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	150916	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	145982	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	7-27-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
11-1-10	0610				4000	110000	106000	✓		ES	PRE
11-11-10	14—				4000	100000	96000	✓		ZT	Post
11-15-10	0615				4000	110000	~~96000~~ 106000	✓		ES	PRE
11-15-10	1545				5000	100000	95000	✓		AN	Post
11-16-10	0615				4000	110000	106000	✓		ES	PRE / not used
11-17-10	0615				4000	100000	96000	✓		ES	PRE / not used
11-18-10	0615				4000	110000	106000	✓		ES	PRE / not used
11-19-10	1615				5000	100000	95000	✓		DSO / GW	~~PRE~~ PRE / 1057
11-22-10	0620				4000	100000	96000	✓		ES	PRE / not used
11-23-10	0610				4000	100000	96000	✓		ES	PRE
11-23-10	1505				5000	100000	95000	✓		DSO / GW	Post
11-24-10	0605				4000	100000	96000	✓		ES	PRE
11-24-10	1500				5000	100000	95000	✓		EM	POST
11-29-10	0610				4000	100000	96000	✓		ES	PRE / not used
11-30-10	~~0615~~ 0630				4000	100000	96000	✓		ES	PRE / not used
12-1-10	0620				4000	100000	96000	✓		ES	PRE / not used
12-2-10	0620				4000	100000	96000	✓		ES	PRE / not used
12-3-10	0620				4000	100000	96000	✓		ES	PRE / not used
12-6-10	0625				4000	100000	96000	✓		ES	PRE / not used
12-7-10	0620				4000	110000	106000	✓		ES	PRE
12-7-10	1515				6000	100000	94000	✓		ICC	Post
12-8-10	0620				4000	100000	96000	✓		ES	PRE
12-8-10	1515				4000	100000	96000	✓		JY / TCP	Post
12-9-10	0610				5000	100000	95000	✓		GW	Pre / not used
12-10-10	0630				4000	100000	96000	✓		ES	PRE / not used
12-13-10	0615				4000	100000	96000	✓		JM	PRE
12-13-10	1530				4000	100000	96000	✓		JY / TCP	Post
12-14-10	0620				4000	100000	96000	✓		ES	PRE / not used
12-15-10	0615				4000	100000	96000	✓		ES	PRE

* ± 50% or 1 cpm which ever is greater Notify RSO if background is not within range.

RSO Review: HTD Date: 1/19/11

Portable Instrument Response Check Sheet

γ1

Probe/Meter Information γ1		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	150916	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	145982	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	7-27-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
12.15.10	1530				5000	100000	95000	✓		JA/KS	Post
12.16.10	0620				5000	100000	95000	✓		JA	PRE/not used
12.17.10	0620				4000	100000	96000	✓		KS	PRE/not used
12.20.10	0620				4000	100000	96000	✓		KS	PRE/not used
12.21.10	0620				4000	110000	~~96000~~ 106000 12-27-10	✓		KS	PRE/not used
12.22.10	0630				4000	110000	106000	✓		KS	PRE/not used
12.23.10	0630				4000	110000	106000	✓		KS	PRE/not used
12.28.10	0620				4000	110000	12-29-10 106000	✓		KS	PRE/not used
12.29.10	0630				4000	110000	106000	✓		KS	PRE/not used GW 12-30-10
12.30.10	0630				4000	110000	106000	✓		GW	~~Post~~ Pre/not used

* ± 50% or 1 cpm which ever is greater Notify RSO if background is not within range.

RSO Review: HLD Date 1/19/11

Ludlum Model 16 #74100 with

44-10 Probe #15203

RSCS
Radiation Safety & Control Services

Calibration Certificate
ID Number: 7410036911-0

Y5

Customer: Joe Darman
Mactec Windsor
2000 Day Hill Road
Windsor, CT 06095

Instrument
Ludlum Model 16-356C

Serial Number
74100

Probe Model
Ludlum 44-10

Serial Number
15203

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
4.00 Kcpm	4.00 Kcpm	4.00 Kcpm	4.00 Kcpm	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
X1000	400 Kcpm	500 Kcpm # *	400 Kcpm #
X1000	100 Kcpm	200 Kcpm # *	100 Kcpm #
X100	40 Kcpm	40 Kcpm #	40 Kcpm #
X100	10 Kcpm	10 Kcpm #	10 Kcpm #
X10	4 Kcpm	4 Kcpm #	4 Kcpm #
X10	1 Kcpm	1 Kcpm #	1 Kcpm #
X1	400 cpm	400 cpm #	400 cpm #
X1	100 cpm	100 cpm #	100 cpm #

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
44-10 15203	Cs-137	0.0913 C/D	Cs-137(Gamma) (SN: 14290)	@1cm

MTE Instrument Type	Model	Cal Due Date
Pulser	Ludlum 500-4 SN: 66151	01/29/2011

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

Electronics Checks	As Found	As Left
High Voltage	1001 Volts	1001 Volts

Calibrated by: QA Review:

Calibration Date: 04/16/2010
Expires: 04/16/2011

Atmospheric Conditions - Temperature: 74°F Humidity: 24% Barometric Pressure: 30.06"hg
This calibration was performed by RSCS Inc. 91 Portsmouth ave, Stratham NH 03885 using a NIST Traceable radiation source, in conformance to the following standards: ANSI N323A (1997). RSCS New Hampshire Radioactive Material License Number: 381R. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedure . This calibration certificate shall not be reproduced except in full without the express written consent of RSCS, Inc

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

INSTRUMENT QC CHECK SHEET

Date: 4/23/2010 Time: 1000

Instrument: 16 Serial No: 74100

Probe: 44-10 Serial No: 15203

Cal. Performed Date: 4/16/2010 Cal. Due Date: 4/16/2011

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration N/A min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration N/A min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	4000	100000	96000
2			
3			
4			
5			
6			
7			
8			
9			
10			
Average	4000.00		96000

Average Source Ref. Reading + 20% = 115200
Average Source Ref. Reading - 20% = 76800
Average Background Reading + 50% = 6000
Average Background Reading - 50% = 2000

Comments:

Performed By: [signature] Date: 4-27-10

RSO Review: [signature] Date: 4-29-10

PROCEDURE RPP-13	REVISION 3	ATTACHMENT 2	PAGE 1 OF 1

Portable Instrument Response Check Sheet

Gamma 5

Probe/Meter Information	X-5	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	RN015203	Serial/ID #	SRS-001	+20%	126,000	+50%	7500
Meter Model	L Model 16	Nuclide	Cs 137	-20 %	84,000	-50%	2500
Meter SN	74100	Serial/ID #	N	+20%	N	+50%	N
Cal Due Date	1-6-10	Nuclide	A	-20 %	A	-50%	A

Date	Time	Alpha Response			Beta Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
11-17-09	0610				4000	100000	96000	✓		HS	PRE / not used
11-18-09	0610				4000	100000	96000	✓		HS	PRE / Not Used
11-19-09	0615				5000	100000	95000	✓		HS	PRE / not used
11-20-09	0600				5000	100000	95000	✓		HS	PRE / not used
11-23-09	0615				4000	100000	96000	✓		HS	PRE / not used
11-24-09	0610				5000	100000	95000	✓		HS	PRE / not used
11-25-09	0615				5000	100000	95000	✓		HS	PRE / not used
11-30-09	0610				5000	100000	95000	✓		HS	PRE / not used
12-1-09	0615				5000	100000	95000	✓		HS	PRE / not used
12-2-09	0615				5000	100000	95000	✓		HS	PRE / not used
12-3-09	0610		N		5000	100000	95000	✓		HS	PRE / not used
12-4-09	0610				4000	100000	96000	✓		HS	PRE
12-4-09	1635				5000	1190000	1185000	✓		HS Cal	POST
12-5-09	0615				4000	100000	96000	✓		HS	PRE / not used
12-7-09	0515				4000	100000	96000	✓		HS	PRE
12-7-09	2100				5000	100000	95000	✓		[illegible]	POST
12-8-09	0610				5000	100000	95000	✓		HS	PRE
12-8-09	2300		A		5000	100000	95000	✓		[illegible]	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTP Date: 1/26/10

Portable Instrument Response Check Sheet

Probe/Meter Information γS		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	Beta Response Bkgd cpm	Beta Response Source cpm	Beta Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
5-12-10	0605				5000	100 000	95000	✓		[illegible]	PRE / not used
5-13-10	0615				5000	100000	95000	✓		[illegible]	PRE
5-14-10	0705				5000	~~105,000~~ 110,000	105,000	✓		[illegible]	POST
5-17-10	0555				4000	100 000	96000	✓		[illegible]	PRE
5-17-10	1700				4000	100000	96000	✓		[illegible]	POST
5-18-10	0600				5000	100000	95000	✓		[illegible]	PRE
5-18-10	1620				5000	110000	~~96000~~ 105000	✓		[illegible]	POST
5-19-10	0600				5000	100000	95000	✓		[illegible]	PRE
5-19-10	1630				5000	105000	100000	✓		[illegible]	Post
5-20-10	0600				5000	100000	95000	✓		[illegible]	PRE
5-20-10	16:30				5000	100000	95,000	✓		[illegible] RC	Post
5-24-10	0610				4000	100000	96000	✓		[illegible]	PRE
5-24-10	1630				5000	100000	95000	✓		GW	Post
5-25-10	0600				5000	100000	95000	✓		[illegible]	PRE
5-25-10	1600				5000	100000	95000	✓		GW / RC	Post
5-26-10	0610				4000	100000	96000	✓		[illegible]	PRE
5-26-10	1555				5000	100000	95000	✓		RB RC	Post
5-27-10	0610				5000	100000	95000	✓		[illegible]	PRE
5-27-10	1410				5000	100000	95000	✓		RC	Post
6-1-10	0610				5000	100000	95000	✓		[illegible]	PRE
6-1-10	1650				5000	100000	95000	✓		~DL	POST
6-2-10	0600				5000	100000	95000	✓		[illegible]	PRE
6-2-10	1635				5000	100,000	95000	✓		RC	Post
6-3-10	0605				5000	100000	95000	✓		[illegible]	PRE / not used
6-7-10	0610				5000	100000	95000	✓		[illegible]	PRE
6-7-10	1700				5000	100000	95000	✓		[illegible]	POST
6-8-10	0615				4000	100000	96000	✓		[illegible]	PRE
6-8-10	15:00				5000	100000	95000	✓		RB	POST
6-9-10	0605				5000	100000	95000	✓		[illegible]	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 6/16/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γS	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response			Beta Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
6/9/10	15:00				5000	100000	95000	✓		RB	Post
6-10-10	0620				5000	100000	95000	✓		[illegible]	PRE
6-10-10	1446				5000	100,000	95,000	✓		[illegible]	Post
6-14-10	0610				4000	100000	96000	✓		[illegible]	PRE
6-14-10	1500				4000	100000	96000	✓		RB	Post
6-15-10	0610				4000	100000	96000	✓		[illegible]	PRE
6-15-10	1815				4000	100000	96000	✓		[illegible]	POST
6-16-10	0610				4000	100000	96000	✓		[illegible]	PRE / not used
6-17-10	0540				4000	100000	96000	✓		[illegible]	PRE / not used
6-21-10	0600				4000	100000	96000	✓		[illegible]	PRE
6-21-10	1510				4000	100000	96000	✓		[illegible]	POST
6-21-10	1700				4000	100000	96000	✓		EM	POST
6-22-10	0610				4000	100000	96000	✓		[illegible]	PRE
6-22-10	1610				5000	100000	95000	✓		[illegible]	Post
6-23-10	0615				4000	100000	96000	✓		[illegible]	PRE
6-23-10	1615				5000	100000	95000	✓		[illegible]	Post
6-24-10	0610				4000	100000	96000	✓		[illegible]	PRE
6-24-10	1530				4000	100000	96000	✓		[illegible]	POST
6-28-10	0600				4000	100000	96000	✓		[illegible]	PRE / not used
6-28-10	1700				4000	100000	96000	✓		[illegible]	Post
6-30-10	0550				4000	100000	96000	✓		[illegible]	PRE / not used
7-1-10	0600				4000	100000	96000	✓		[illegible]	PRE / not used
7-6-10	0530				4000	100000	96000	✓		[illegible]	PRE / not used
7-7-10	0600				5000	100000	95000	✓		[illegible]	PRE / not used
7-8-10	0545				4000	100000	96000	✓		[illegible]	PRE / not used
7-12-10	0550				4000	100000	96000	✓		[illegible]	PRE / not used
7-13-10	0610				4000	110000	106000	✓		[illegible]	PRE
7-13-10	1700				6000	100000	94000	✓		EM	POST
7-14-10	0600				4000	100000	96000	✓		[illegible]	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

SO Review: HTD Date: 7/20/10

PROCEDURE RPP-12	REVISION 3	ATTACHMENT 1	PAGE 1 OF 2

Portable Instrument Response Check Sheet

Probe/Meter Information	γS	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	Beta Response Bkgd cpm	Beta Response Source cpm	Beta Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
7.15.10	0600				4000	90000	86000	✓		KS	PRE / not used
7.19.10	0610				4000	100000	96000	✓		KS	PRE
7-19-10	1630				4000	100,000	96000	✓		WBL	POST
7.20.10	0600				4000	100000	96000	✓		KS	PRE
7.20.10	1615				4000	100,000	96000	✓		RL	POST
7.21.10	0610				4000	100000	96000	✓		KS	PRE
7.21.10	1440				4000	100,000	96000	✓		RL	POST
7.22.10	0610				4000	100000	96000	✓		KS	PRE
7.22.10	1240				4000	100000	96000	✓		GW	POST
7.26.10	0610				4000	100000	96000	✓		KS	PRE
7.26.10	1615				4000	100000	96000	✓		GW	POST
7.27.10	0610				4000	100000	96000	✓		KS	PRE / not used
7.28.10	0610				4000	100000	96000	✓		KS	PRE / not used
7.29.10	0605				4000	100000	96000	✓		KS	PRE / not used
8.2.10	0610				4000	100000	96000	✓		KS	PRE
8.2.10	1615				4000	100000	96000	✓		WBL	POST
8.3.10	~~0805~~ 0600				4000	100000	96000	✓		KS	PRE
8-3-10	1630				4000	100000	96000	✓		WBL	POST
8.4.10	0600				4000	100000	96000	✓		KS	PRE
8-4-10	1600				4000	100000	96000	✓		WBL	POST
8.5.10	0550				4000	100000	96000	✓		KS	PRE
8.5.10	1515				4000	100000	96000	✓		GW	POST
8.9.10	0615				4000	100000	96000	✓		KS	PRE
8-9-10	1545				4000	100000	96000	✓		EM	POST
8.10.10	0605				4000	100000	96000	✓		KS	PRE / not used
8.11.10	0600				4000	100000	96000	✓		KS	PRE / not used
8.12.10	0600				4000	100000	96000	✓		KS	PRE / not used
8.16.10	0610				4000	100000	96000	✓		KS	PRE
8.16.10	1630				4000	100,000	96000	✓		WBL	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTP Date: 9/1/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γS	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	Beta Response Bkgd cpm	Beta Response Source cpm	Beta Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
8.17.10	0610				4000	100000	96000	✓		KS	PRE / not used
8.18.10	0600				4000	100000	96000	✓		KS	PRE / not used
8.19.10	0600				4000	100000	96000	✓		KS	PRE
8.20.10	0600				4000	100000	96000	✓		KS	PRE / not used
8.23.10	0610				4000	100000	96000	✓		KS	PRE / not used
8.24.10	0550				4000	100000	96000	✓		KS	PRE
8.24.10	1605				4000	100000	96000	✓		WBL	POST
8.25.10	0530				4000	110000	106000	✓		KS	PRE
8.25.10	1645				5000	100000	95000	✓		JA/RC	POST
8.26.10	0545				4000	100000	96000	✓		KS	PRE
8.26.10	1645				4000	100000	96000	✓		WBL	POST
9.23.10	0615				4000	100000	96000	✓		[illegible]	PRE / not used
9.27.10	0600				4000	100000	96000	✓		KS	PRE
9.27.10	1630				4000	100000	96000	✓		WBL	POST
9.28.10	0600				4000	100000	96000	✓		KS	PRE
9.28.10	1700				4000	100000	96000	✓		WBL	POST
9.29.10	0610				4000	100000	96000	✓		KS	PRE
9.29.10	1600				4000	95000	91000	✓		JA/RW	POST
9.30.10	0615				4000	100000	96000	✓		KS	PRE / not used
10.4.10	0600				4000	100000	96000	✓		KS	PRE
10.4.10	1645				4000	100000	96000	✓		WBL	POST
10.5.10	0605				4000	100000	96000	✓		KS	PRE / not used
10.6.10	0605				4000	100000	96000	✓		KS	PRE / not used
10.7.10	0605				4000	100000	96000	✓		KS	PRE / not used
10.8.10	0610				4000	100000	96000	✓		KS	PRE
10.8.10	1612				4000	95000	91000	✓		WBL	POST
10.11.10	0615				4000	100000	96000	✓		KS	PRE
10.11.10	1630				4000	100000	96000	✓		WBL	POST
10.12.10	0600				4000	100000	96000	✓		KS	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HD Date: 10/14/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γS	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response			Beta Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
10.12.10	1530				4000	100000	96000	✓		GW	POST
10.13.10	0615				4000	100000	96000	✓		KS	PRE Not Used
10.14.10	0620				4000	100000	96000	✓		KS	PRE / not used
10.18.10	0610				4000	100000	96000	✓		KS	PRE / not used
10.19.10	0610				4000	100000	96000	✓		KS	PRE / not used
10.20.10	0605				4000	100000	96000	✓		KS	PRE
10.20.10	1635				4000	100000	96000	✓		DSD/AN	Post
10.21.10	0605				4000	100000	96000	✓		KS	PRE
10-22-10	1405				4000	100000	96000	✓		WBC	POST
10.25.10	0605				4000	100000	96000	✓		KS	PRE / not used
10.26.10	0620				4000	100000	96000	✓		KS	PRE / not used
10.27.10	0605				4000	100000	96000	✓		KS	PRE / not used
10.28.10	0555				4000	100000	96000	✓		KS	PRE / not used
11.1.10	0615				4000	100000	96000	✓		KS	PRE
11-1-10	1630				4000	100000	96000			RL	POST
11.2.10	0605				4000	100000	96000	✓		KS	PRE
11.2.10	1600				4000	100000	96000	✓		DSD/GW	Post
11.3.10	0605				4000	100000	96000	✓		KS	PRE
11-3-10	1315				4000	100000	96000	✓		WBC	POST
11.4.10	0605				4000	100000	96000	✓		KS	PRE / Not Used
11.8.10	0615				4000	100000	96000	✓		KS	PRE
11.8.10	1630				4000	100000	96000	✓		GW	POST
11.9.10	0600				4000	100000	96000	✓		KS	PRE
11.9.10	1530				4000	100000	96000	✓		ZT	Post
11.10.10	0600				4000	100000	96000	✓		KS	PRE
11.10.10	1710				4000	100000	96000	✓		DSD/AN	Post
11.11.10	0610				4000	100000	96000	✓		KS	PRE
11.11.10	1610				4000	100000	96000	✓		DSD/WBC	Post
11.12.10	0615				4000	100000	96000	✓		KS	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 12/1/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γS	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		-50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	-50%	2000

Date	Time	Alpha Response			Beta Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
11-16-10	0615				4000	100000	96000	✓		[illegible]	Pre
11-16-10	1530				4000	100000	96000	✓		[illegible]	Post
11-17-10	0615				4000	100000	96000	✓		[illegible]	Pre/not used
11-18-10	0615				4000	100000	96000	✓		[illegible]	Pre
11-18-10	1515				4000	100000	96000	✓		[illegible]	Post
11-19-10	0635				4000	100000	96000	✓		[illegible]	Pre
11-19-10	1520				4000	100000	96000	✓		KC	Post
11-22-10	0620				4000	100000	96000	✓		[illegible]	Pre
11-22-10	1520				4000	100000	96000	✓		KC	Post
11-23-10	0610				4000	100000	96000	✓		[illegible]	Pre
11-23-10	1545				4000	100000	96000	✓		[illegible]	Post
11-24-10	0605				11-24-10 4000	100000	96000	✓		[illegible]	Pre
11-24-10	1430				4000	100000	96000	✓		KC	Post
11-29-10	0610				4000	100000	96000	✓		[illegible]	Pre
11-29-10	1520				4000	100000	96000	✓		KC	Post
11-30-10	0630				4000	100000	96000	✓		[illegible]	Pre
11-30-10	1530				4000	100000	96000	✓		[illegible]	Post
12-1-10	0620				4000	100000	96000	✓		[illegible]	Pre/Not used
12-2-10	0620				4000	100000	96000	✓		[illegible]	Pre
12-2-10	1520				4000	100000	96000	✓		KC	Post
12-3-10	0620				4000	100000	96000	✓		[illegible]	Pre
12-3-10	1515				4000	100000	96000	✓		[illegible]	Post
12-6-10	0625				4000	100000	96000	✓		[illegible]	Pre
12-6-10	1515				4000	100000	96000	✓		KC	Post
12-7-10	0620				4000	100000	96000	✓		[illegible]	Pre
12-7-10	1515				4000	100000	96000	✓		KC	Post
12-8-10	0620				4000	100000	96000	✓		[illegible]	Pre
12-8-10	1515				4000	90000	86000	✓		[illegible]	Post
12-9-10	0610				4000	100000	96000	✓		GW	Pre

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: ATD Date: 1/19/11

Portable Instrument Response Check Sheet

Probe/Meter Information 85		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	15203	Serial/ID #		+20%		+50%	
Meter Model	16	Nuclide		-20 %		–50%	
Meter SN	74100	Serial/ID #	SRS-001	+20%	115200	+50%	6000
Cal Due Date	4-16-11	Nuclide	Cs-137	-20 %	76800	–50%	2000

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd Cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
12.9.10	1520				4000	100000	96000	✓		JL	Post
12.10.10	0630				4000	100000	96000	✓		ES	PRE
12-10-10	1430				5000	100000	95000	✓		KC	Post
12.13.10	0615				5000	100000	95000	✓		[illegible]	PRE/ [illegible]
12.14.10	0620				4000	100000	96000	✓		ES	PRE
12.14.10	1515				4000	100000	96000	✓		KC	Post
12.15.10	0615				4000	100000	96000	✓		ES	PRE
12.15.10	1530				4000	100000	96000	✓		JS KS	Post
12.16.10	0615				4000	100000	96000	✓		[illegible]	PRE
12.16.10	1500				4000	100000	96000	✓		JS KC	Post
12.17.10	0620				4000	100000	96000	✓		ES	PRE
12.17.10	1515				4000	100000	96000	✓		A	Post
~~12.20~~ 12.20.10	0620				4000	100000	96000	✓		ES	PRE
12.20.10	1505				4000	100000	96000	✓		JS	Post
12.21.10	0620				4000	100000	96000	✓		ES	PRE
12.21.10	1515				~~4000~~ 5000	90000	85000	✓		JS/22	Post
12.22.10	0630				4000	100000	96000	✓		ES	PRE
12.22.10	1515				4000	100000	96000	✓		JS ES	Post
12.23.10	0630				4000	100000	96000	✓		ES	PRE
12.23.10	1500				4000	100000	96000	✓		JS GW	Post
12.28.10	0620				4000	100000	96000	✓		ES	PRE
12.28.10	1515				5000	100000	95000	✓		JS ES	Post
12.29.10	0630				4000	100000	96000	✓		ES	PRE
12.29.10	1500				4000	100000	96000	✓		GW	Post
12.30.10	0630				4000	100000	96000	✓		GW	Pre
12.30.10	1155				4000	100000	96000	✓		GW	Post

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HED Date: 1/19/11

PROCEDURE NO: RPP-12	REVISION NO: 3	ATTACHMENT 1 PAGE NO: 1 OF 2

Ludlum Model 12 #172705 with

44-10 Probe #277925

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A. 2014002

CUSTOMER MACTEC INC. ORDER NO. 20140197/341915

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 172705

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR277925

Cal. Date 8-Oct-09 Cal Due Date 8-Oct-10 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 51 % Alt 697.8 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 1000 V Input Sens. 10 mV Det. Oper. 1000 V at 10 mV Threshold Dial Ratio = mV

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

COMMENTS:

Instrument calibrated with 5' 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 kcpm	N/A	400
X 1000	100 kcpm		100
X 100	40 kcpm		400
X 100	10 kcpm		100
X 10	4 kcpm		400
X 10	1 kcpm		100
X 1	400 cpm		400
X 1	100 cpm		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	40K cpm	N/A	3980(0)	Log Scale			
	4K cpm		398				
	400 cpm		39				
	40 cpm		4				

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

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 189491 ☐ Oscilloscope S/N ☑ Multimeter S/N 82250292

Calibrated By: Donnie Mieros Date 8-Oct-09

Reviewed By: Rhonda Hein Date 12 Oct 09

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Detector

Detector 44-10 Serial No. PR277925

Order #. 2014002 20140197/341915

Customer MACTEC INC.

Counter 12 Serial No. 172705

Counter Input Sensitivity 10 mV

Count Time 6 seconds

Distance Source to Detector surface

Other

High Voltage	Background	Isotope Am-241 Size ≈0.85μCi	Isotope Size	Isotope Size	Isotope Size
850	684	13549			
900	724	15161			
950	737	15341			
1000	754	15622			
1050	710	15934			
1100	725	15890			

Signature Donnie Miekos

Date 8-Oct-09

FORM C4A 04/09/2003

• *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. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MACTEC INC ORDER NO. 20164515/356696

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 172705

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR277925

Cal. Date 30-Nov-10 Cal Due Date 30-Nov-11 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 20 % Alt 771.0 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 1100 V Input Sens. 10 mV Det. Oper. 1100 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 496 V Ref./Inst. 2000 / 2005 V

COMMENTS:

Calibrated using a 5' cable.
100 μR = 9900 cpm.

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	N/A	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	40kcpm	N/A	4000 (0)	Log Scale			
	4kcpm		400				
	400cpm		40				
	40cpm		4				

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

Reference Instruments and/or Sources: ☐ 73410 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646 ☐ 70897
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 63888 ☐ Oscilloscope S/N ☑ Multimeter S/N 80040300

Calibrated By: David Anderson Date 30-November-2010

Reviewed By: Rhonda Hain Date 30Nov10

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 03/11/2010 Page 1 of 2

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Detector

Detector 44-10 Serial No. PR277925

Customer MACTEC INC

Order #. 20164515/356696

Counter 12 Serial No. 172705

Counter Input Sensitivity 10 mV

Count Time 6 seconds

Distance Source to Detector surface

Other 5' Cable

High Voltage	Background	Isotope Am241 Size ≈ 0.81μCi	Isotope ____ Size ____	Isotope ____ Size ____	Isotope ____ Size ____
850	639	12329			
900	700	13617			
950	676	14399			
1000	656	14560			
1050	664	14375			
* 1100	743	14401			
1150	652	14301			
1200	718	14347			
1250	724	14643			
1300	770	14746			
1350	913	15173			
1400	1030	16233			
1450	1666	18548			

Signature David Anderson

Date 30-November-10

γ10

INSTRUMENT QC CHECK SHEET

Date: 4/29/2010 Time: 0800

Instrument: 12 Serial No: 172705

Probe: 44-10 Serial No: 277925

Cal. Performed Date: 10/8/2009 Cal. Due Date: 10/8/2010

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration 1 min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration 1 min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	1356	89728	88372
2	1445	89278	87833
3	1356	89835	88479
4	1390	89435	88045
5	1458	89136	87678
6	1413	89072	87659
7	1418	89685	88267
8	1411	89913	88502
9	1453	89335	87882
10	1373	89008	87635
Average	1407.30		88035

Average Source Ref. Reading + 20% =	105642
Average Source Ref. Reading - 20% =	70428
Average Background Reading + 50% =	2111
Average Background Reading - 50% =	704

Comments: QC'd with Lead shield in place for FSS.

Performed By: [signature] Date: 4-29-10

RSO Review: HTD Date: 5/3/10

PROCEDURE RPP-13	REVISION draft 3	ATTACHMENT 2	PAGE 1 OF 1

8/10

INSTRUMENT QC CHECK SHEET

Date: 12/15/2010 Time: 1400

Instrument: 12 Serial No: 172705

Probe: 44-10 Serial No: 277925

Cal. Performed Date: 11/30/2010 Cal. Due Date: 11/30/2011

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration 1 min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration 1 min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	1277	93347	**92070**
2	1257	93032	**91775**
3	1261	93197	**91936**
4	1294	93081	**91787**
5	1364	93233	**91869**
6	1338	93792	**92454**
7	1302	92862	**91560**
8	1312	93232	**91920**
9	1353	93047	**91694**
10	1298	93082	**91784**
Average	1305.60		**92070**

Average Source Ref. Reading + 20% =	110484
Average Source Ref. Reading - 20% =	73656
Average Background Reading + 50% =	1958
Average Background Reading - 50% =	653

Comments: QC Check performed with Collimator

Performed By: [signature] Date: 12-15-10

RSO Review: [signature] Date: 12/15/10

PROCEDURE NO: RPP-13	REVISION NO: 3	ATTACHMENT 2 PAGE 1 OF 1

Portable Instrument Response Check Sheet

γ10

use Scaler for QC

Probe/Meter Information γ10		Source Information		Acceptable Response Ranges			
				Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe Model	44-10						
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172705	Serial/ID #	SRS-001	+20%	123426	+50%	7287
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	82284	-50%	2429

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
11-3-9	680				5000	120000	115000	✓		JT	Pre / not used
11-4-09	0615				4522	105089	100567	✓		KS	PRE / not used
11-5-09	0615				4492	110274	105782	✓		KS	PRE / NOT USED
11-6-09	0620				4196	108832	104636	✓		KS	PRE / NOT USED
11-9-09	0610				4652	107596	102944	✓		KS	PRE / NOT USED
11-10-09	0620				4510	105134	100624	✓		KS	PRE / not used
11-11-09	0600				4373	104521	100148	✓		KS	PRE / not used
11-12-09	0600				4689	105688	100999	✓		KS	PRE / not used
11-13-09	0715				4437	104403	99966	✓		KS	PRE / not used
11-16-09	0615				4314	102926	98612	✓		KS	PRE / not used
11-17-09	0610				4290	103331	99041	✓		KS	PRE
11-17-9	16-				4280	106087	101807	✓		JT	Post
11-18-09	0610				4316	103181	98865	✓		KS	PRE
11-18-9	18-				4738	102714	97976	✓		JT	Post
11-19-09	0615				4532	104828	100296	✓		KS	PRE / not used
11-20-09	0600				4638	101258	96620	✓		KS	PRE
11-20-09	2350				4831	107769	102938	✓		JM	POST
11-23-09	0615				4116	106091	101975	✓		KS	PRE / not used
11-24-09	0610				4684	103824	99140	✓		KS	PRE / not used
11-25-09	0615				4249	102523	98274	✓		KS	PRE / not used
11-30-09	0610				4600	103178	98578	✓		KS	PRE / not used
12-1-09	0615				4321	102151	97830	✓		KS	PRE / not used
12-2-09	0615				4470	102924	98454	✓		KS	PRE / not used
12-3-09	0610				4420	103044	98624	✓		KS	PRE / not used
12-4-09	0610				4619	105719	101100	✓		KS	PRE / not used
12-5-09	0615				4620	103821	99201	✓		KS	PRE / not used
12-7-09	0545				4355	102196	97841	✓		KS	PRE / not used
12-8-09	0610				4464	104959	100[illegible]	✓		KS	PRE / not used
12-9-09	0630				6826	105156	98330	✓		KS	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: _____ Date: _____

Portable Instrument Response Check Sheet

810

Use Scaler for QC

Probe/Meter Information	810	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172705	Serial/ID #	SRS-001	+20%	123426	+50%	7287
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	82284	-50%	2429

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
12-10-09	0615				4196	103694	99498	✓		[illegible]	PRE
12-10-09	2330				4525	107586	103061	✓		[illegible]	POST
12-11-09	0615				4258	101440	97182	✓		[illegible]	PRE / not used
12-12-09	0615				4260	102931	98671	✓		[illegible]	PRE / not used
12-14-09	0620				4203	104514	100311	✓		[illegible]	PRE
12-14-09	1520				3745	108604	104859	✓		RC	POST
12-15-09	0615				4288	103031	98743	✓		[illegible]	PRE / not used
12-16-09	0615				4380	102781	98401	✓		[illegible]	PRE
12-16-09	1520				4807	102865	98058	✓		[illegible]	POST
12-17-09	0615				4413	103834	99421	✓		[illegible]	PRE
12-17-09	1530				4292	107232	98940	✓		[illegible]	POST
12-18-09	0615				4607	101660	97053	✓		[illegible]	PRE / not used
12-21-09	0615				4263	101155	96892	✓		[illegible]	PRE / not used
12-22-09	0600				4137	102241	98104	✓		[illegible]	PRE / Not used
12-23-09	0600				4222	102916	98694	✓		[illegible]	PRE / Not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 1/26/10

Portable Instrument Response Check Sheet

810

Use Scaler for QC

Probe/Meter Information	810	Source Information		Acceptable Response Ranges			
				Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe Model	44-10						
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172705	Serial/ID #	SRS-001	+20%	123426	+50%	7287
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	82284	-50%	2429

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
1-4-10	0615				4065	103614	99549	✓		[illegible]	PRE/not used
3-11-10	0700				4433	105423	100990	✓		[illegible]	Pre
3-11-10	1600				4449	105797	101348	✓		RC	Post
3-15-10	0615				4153	104593	100440	✓		[illegible]	PRE
3-15-10	1650				4224	116422	112198	✓		[illegible]	Post
3-16-10	0610				4335	107046	102711	✓		[illegible]	PRE/not used
3-17-10	0615				4181	103800	99619	✓		[illegible]	PRE
3-17-10	1700				4114	105107	100993	✓		[illegible]	Post
3-18-10	0610				4585	102915	98330	✓		[illegible]	PRE
3-18-10	17-				4331	107776	103445	✓		R.C.	Post
3-22-10	0610				4185	103216	99031	✓		[illegible]	PRE
3-22-10	1710				4397	108973	104576	✓		RC	POST
3-23-10	0615				4553	103719	99166	✓		[illegible]	PRE
3-23-10	1630				4483	103540	99057	✓		RC	POST
3-24-10	0615				4233	103905	99572	✓		[illegible]	PRE
3-24-10	1645				4016	106606 ~~102590~~	102390	✓		RC	Post
3-25-10	0610				4432	102619	98187	✓		[illegible]	PRE
3-25-10	1645				4570	103785	99215	✓		RC	POST
3-29-10	0610				4296	102931	98635	✓		[illegible]	PRE
4-5-10	0630				5025	117383	112358	✓		[illegible]	PRE
4-5-10	1615				4442	103383	98941	✓		EM	POST
4-6-10	0630				4807	106756	101949	✓		[illegible]	PRE
4-6-10	1635				4080	106228	102148	✓		RC	POST
4-7-10	0615				4513	108099	103586	✓		[illegible]	PRE
4-7-10	1635				4600	106353	101753	✓		RC	Post
4-8-10	0610				5398	108020	102622	✓		[illegible]	PRE/NOT USED
4-12-10	0610				4576	104062	99486	✓		[illegible]	PRE/not used
4-13-10	0615				4601	110298	105697	✓		[illegible]	PRE NOT USED
4-14-10	0610				4543	104783	100240	✓		[illegible]	PRE/not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 4/27/10

Portable Instrument Response Check Sheet

810

Use Scaler for QC

Probe/Meter Information	810	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		–50%	
Meter SN	172705	Serial/ID #	SRS-001	+20%	123426	+50%	7287
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	82284	–50%	2429

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
4-15-10	0610				4511	102610	98099	✓			PRE NOT Used
4-19-10	0620				4597	106158	101561	✓			PRE Not Used
4-20-10	0540				4416	102598	95488	✓			PRE / Not Used.
4-21-10	0600				4593	101968	97375	✓			PRE / Not Used
4-22-10	0600				4807	103814	99007	✓			PRE Not Used
4-26-10	0545				4555	101217	96662	✓			PRE / Not Used
4-27-10	0600				4445	103700	99255	✓			PRE
4-27-10	1445				4484	107258	102774	✓			POST
4-28-10	0600				4405	102121	97716	✓			PRE
4-28-10	1545				3669	104300	100631	✓			POST
4-29-10	0545				4117	101998	97881	✓			PRE
4-29-10	1500				4544	102348	97804	✓			POST
5-3-10	0550				4688	101631	96943	✓			PRE
5-3-10	1420				4284	102049	97765	✓			POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: [signature] Date: 5/13/10

Portable Instrument Response Check Sheet

8/10

Probe/Meter Information 8/10		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 705	Serial/ID #	SRS-001	+20%	105642	+50%	2111
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	70428	-50%	704

Date	Time	Alpha Response			~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
5-4-10	0605				1508	91810	90302	✓			PRE
5-4-10	1445				1444	93109	91665	✓			POST
5-5-10	0725				1434	91459	90025	✓			PRE/not used
5-6-10	0625				1322	92511	91189	✓			PRE/not used
5-17-10	0555				1298	91770	90472	✓			PRE
5-17-10	1520				1218	91636	90418	✓			POST
5-18-10	0600				1289	86162	84873	✓			PRE
5-18-10	1320				1365	94888	93523	✓			POST
5-19-10	0600				1275	91134	89859	✓			Pre
5-19-10	1650				1463	91772	90309	✓			Post
5-20-10	0600				1433	91744	90311	✓			PRE/not used
5-24-10	0620				1345	91743	90398	✓			PRE/not used
5-25-10	0600				1213	91479	90266	✓			PRE
5-25-10	1625				1402	92766	91364	✓		DD	POST
5-26-10	0610				1238	91579	90341	✓			PRE
5-26-10	1655				1490	93792	92302	✓			POST
5-27-10	0610				1228	91037	89809	✓			PRE/Not Used
6-1-10	0610				1252	90985	89733	✓			PRE
6-1-10	14-				1410	91497	90087	✓			POST
6-2-10	0600				1207	90742	89535	✓			PRE/not used
6-3-10	0605				1224	90800	89576	✓			PRE/not used
6-7-10	0610				1397	91135	89738	✓			PRE/Not Used
6-8-10	0615				1186	90252	89066	✓			PRE/Not Used
6-9-10	0605				1255	91088	89833	✓			PRE/Not Used
6-10-10	0610				1454	93736	92282	✓			PRE/not used
6-14-10	0610				1187	89583	88396	✓			PRE/not used
6-15-10	0610				1093	90113	89020	✓			PRE/not used
6-16-10	0610				1194	89619	88425	✓			PRE/Not Used
6-17-10	0540				1462	89764	88302	✓			PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HID Date: 7/20/10

Portable Instrument Response Check Sheet

8/10

Probe/Meter Information 8/10		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 705	Serial/ID #	SRS-001	+20%	105642	+50%	2111
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	70428	-50%	704

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
6-21-10	0600				1198	90478	89280	✓		[illegible]	PRE
6-21-10	1615				1303	92572	91269	✓		DSD/RC	Post
6-22-10	0610				1184	88399	87215	✓		[illegible]	PRE/Not used
6-23-10	0615				1391	93166	91775	✓		[illegible]	PRE
6-23-10	1630				1445	95770	94325	✓		RC	POST
6-24-10	0610				1419	95705	94286	✓		[illegible]	PRE
6-24-10	1445				2008	92870	90862	✓		DD/RC	Post
6-28-10	0600				1565	90373	88808	✓		[illegible]	PRE
6-28-10	1645				1319	92929	91610	✓		RC	POST
6-29-10	0610				1407	91612	90205	✓		[illegible]	PRE
6-29-10	1600				1157	94690	93533	✓		RC	POST
6-30-10	0550				1397	92342	90945	✓		[illegible]	PRE
6-30-10	1610				1261	95523	94262	✓		RC	POST
7-1-10	0600				1389	92200	90811	✓		[illegible]	PRE/not used
7-6-10	0530				1421	90443	89022	✓		[illegible]	PRE/not used
7-7-10	0600				1383	91922	90539	✓		[illegible]	PRE/not used
7-8-10	0545				1397	94330	92933	✓		[illegible]	PRE/not used
7-12-10	0550				1405	92762	91357	✓		[illegible]	PRE/not used
7-13-10	0610				1331	91717	90386	✓		[illegible]	PRE/not used
7-14-10	0600				1203	93996	92793	✓		[illegible]	PRE/not used
7-15-10	0600				1305	94446	93141	✓		[illegible]	PRE/not used
7-19-10	0610				1269	94072	92803	✓		[illegible]	PRE/not used
7-20-10	0600				1421	94777	93356	✓		[illegible]	PRE/not used
7-21-10	0610				1403	94949	93546	✓		[illegible]	PRE/not used
7-22-10	0620				1218	94690	93472	✓		[illegible]	PRE/not used
7-26-10	0610				1106	92290	91184	✓		[illegible]	PRE not used
7-27-10	0610				1355	92195	90840	✓		[illegible]	PRE not used
7-28-10	0610				1456	91397	89941	✓		[illegible]	PRE
7-28-10	1650				1257	86276	85019	✓		DSD/RC	Post

*± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTP Date: 8/18/10

Portable Instrument Response Check Sheet

8/10

Probe/Meter Information 8/10		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 705	Serial/ID #	SRS-001	+20%	105642	+50%	2111
Cal Due Date	10.8.10	Nuclide	Cs-137	-20 %	70428	-50%	704

Date	Time	Alpha Response			Beta Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
7.29.10	0605				1234	93217	91983	✓		[illegible]	PRE
7.29.10	1515				1543	95439	93896	✓		DSO/RE	Post
8.2.10	0610				1359	92944	91585	✓		[illegible]	PRE/ not used
8.3.10	0600				1382	90453	89071	✓		[illegible]	PRE
8.3.10	1545				1172	89532	88360	✓		RE	POST
8.4.10	0600				1240	92766	91526	✓		[illegible]	PRE/ not used
8.5.10	0550				1323	91684	90361	✓		[illegible]	PRE/ not used
8.9.10	0620				1349	93231	91882	✓		[illegible]	PRE/ not used
8.10.10	0605				1324	90797	89473	✓		[illegible]	PRE
~~8.10.10~~	~~1200~~				~~1590~~	~~96088~~	~~94498~~	✓		~~QW~~	~~POST~~ RE
8.10.10	1610				1150	94131	92,981	✓		DSO/RE	Post
8.11.10	0610				1409	92511	91102	✓		[illegible]	PRE/ not used
8.12.10	0600				1248	90631	89383	✓		[illegible]	PRE/ not used
8.16.10	0610				1265	90831	89566	✓		[illegible]	PRE
8.16.10	1550				1200	96140	94940	✓		RE	POST
8.17.10	0610				1376	96026	94650	✓		[illegible]	PRE/ not used
8.18.10	0600				1295	96059	94764	✓		[illegible]	PRE
8.18.10	1530				1511	98140	96629	✓		JT	Post
8.19.10	0600				1443	94752	93309	✓		[illegible]	PRE/ not used
8.23.10	0610				1209	95477	94268	✓		[illegible]	PRE/ not used
8.24.10	0550				1345	92374	91029	✓		[illegible]	PRE/ not used
8.25.10	0530				1251	~~91556~~ 94556	93305	✓		[illegible]	PRE
8.25.10	1630				1342	94871	93529	✓		JT QW	Post
8.26.10	0545				1348	93230	91882	✓		[illegible]	PRE
8.26.10	1550				1472	97060	95588	✓		JT QW	Post
8.27.10	0545				1398	93047	91649	✓		[illegible]	PRE / Not used/ RE
8.30.10	0615				1433	95346	93913	✓		[illegible]	PRE/ not used
8.31.10	0610				1295	95197	93902	✓		[illegible]	PRE/ not used
9.1.10	0615				1576	94437	92861	✓		[illegible]	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 9/9/10

Portable Instrument Response Check Sheet

γ 10

Probe/Meter Information γ/10		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		–50%	
Meter SN	172 705	Serial/ID #	SRS-001	+20%	105642	+50%	2111
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	70428	–50%	704

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
8.31.10	1538				1630	97,453	96,223	✓		DSD/RC	Post
RC 9-1-10	0745				1338	96,105	94,767	✓		RC	pre
9-1-10	1615				1283	96,148	94,865	✓		RC	POST
9.2.10	0630				1275	94012	92737	✓		[illegible]	PRE / not used
9-2-10	0610				~~1216~~ 1248	94072	92854	✓		[illegible]	PRE
9-2-10	1501				1694	95176	93476	✓		RC	POST
9-8-10	0600				1208	93711	92503	✓		[illegible]	PRE
9-8-10	1615				1491	94852	93361	✓		RC	POST
9.9.10	0845				1319	91355	~~90036~~ 90038	✓		[illegible]	PRE
9-9-10	1625				1518	96080	94562	✓		DSD/RC	Post
9.13.10	0615				1342	95132	93790	✓		[illegible]	PRE
9-13-10	1515				1578	93681	92,103	✓		RC	POST
9-14-10	0600				1290	93869	92579	✓		[illegible]	PRE / not used
9-15-10	0545				1379	93903	92524	✓		[illegible]	PRE
9-15-10	1601				1446	95648	94202	✓		RC	POST
9-16-10	0615				1302	95040	93738	✓		[illegible]	PRE
9-16-10	1535				1492	94799	93307	✓		RC	POST
9-20-10	0600				1292	96299	95007	✓		[illegible]	PRE NOT USED
9-21-10	0600				1624	96483	94859	✓		[illegible]	PRE NOT USED
9-22-10	0600				1674	95009	93335	✓		[illegible]	PRE
9-22-10	1610				1502	94591	93089	✓		RC	POST
9-23-10	0600				1614	95175	93561	✓		[illegible]	PRE
9-23-10	1645				1516	94823	93307	✓		WDC	POST
9.27.10	0600				1312	93899	92587	✓		[illegible]	PRE
9.28.10	0600				1276	93206	91930	✓		[illegible]	PRE / not used
9.29.10	0610				1275	92557	91282	✓		[illegible]	PRE / not used
9.30.10	0615				1301	95540	94239	✓		[illegible]	PRE / not used
10-4-10	0600				~~1219~~ 1249	92360	91141	✓		[illegible]	PRE / not used
10.5.10	0605				1269	92917	91648	✓		[illegible]	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 10/14/10

Portable Instrument Response Check Sheet

γ10

Probe/Meter Information γ10		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		–50%	
Meter SN	172 705	Serial/ID #	SRS-001	+20%	105642	+50%	2111
Cal Due Date	10-8-10	Nuclide	Cs-137	-20 %	70428	–50%	704

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
10-5-10	1630				1157	91183	90026	✓		JT	Post
10-6-10	0605				1348	92593	91245	✓		MS	PRE / Not Used.
10-7-10	0605				1314	92011	90697	✓		MS	PRE
10-7-10	1630				1284	96323	95039	✓		JT	Post

*± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

SO Review: HTD Date: 10/14/10

PROCEDURE RPP-12	REVISION 3	ATTACHMENT 1	PAGE 1 OF 2

Portable Instrument Response Check Sheet

810

Probe/Meter Information 810		Source Information		Acceptable Response Ranges			
Probe Model	Y4-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277925	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172705	Serial/ID #	SRS-001	+20%	110484	+50%	1958
Cal Due Date	11.30.11	Nuclide	Cs-137	-20 %	73656	-50%	653

Date	Time				Gamma Response			Source Check Results			Comments
					Bkgd Cpm	Source cpm	ncpm	Sat	UnSat	Initial	
12.17.10	0800				1269	93186	91917	✓		[illegible]	PRE
12-17-10	1510				1213	92218	91005	✓		[illegible]	Post.
12-20-10	0620				1362	91401	90039	✓		[illegible]	PRE
12-20-10	15-				1264	96018	94755	✓		[illegible]	Post
12-21-10	0620				1380	93187	91807	✓		[illegible]	PRE
12-21-10	1510				1276	96239	94963	✓		[illegible]	Post
12-22-10	0630				1408	94682	93274	✓		[illegible]	PRE / not used
12-22-10	0630				1306	94520	93214	✓		[illegible]	PRE / Not Used
12-28-10	0620				1250	93691	92441	✓		[illegible]	PRE
12-28-10	15-				1069	95092	94023	✓		[illegible]	Post
12-29-10	0630				1190	92485	91295	✓		[illegible]	PRE
12-29-10	12-				1147	93272	92125	✓		[illegible]	Post

N/A

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 1/19/11

PROCEDURE NO: RPP-12	REVISION NO: 3	ATTACHMENT 1 PAGE NO: 1 OF 2

Ludlum Model 12 #172718 with

44-10 Probe #277926

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A. 20140002

CUSTOMER MACTEC INC. ORDER NO. 20140197/341915

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 122718

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR2779260

Cal. Date 9-Oct-09 Cal Due Date 9-Oct-10 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 51 % Alt 697.8 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 1050 V Input Sens. 10 mV Det. Oper. 1050 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 508 V Ref./Inst. 2000 / 2019 V

COMMENTS:

Instrument calibrated with 5' 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 kcpm	N/A	400
X 1000	100 kcpm		100
X 100	40 kcpm		400
X 100	10 kcpm		100
X 10	4 kcpm		400
X 10	1 kcpm		100
X 1	400 cpm		400
X 1	100 cpm		100

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

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	40K cpm	N/A	398660
	4K cpm		398
	400 cpm		40
	40 cpm		4

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

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

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646

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

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 189491 ☐ Oscilloscope S/N ☑ Multimeter S/N 82250292

Calibrated By: Donnie Miekos Date 9.Oct.09

Reviewed By: Rhonda Hein Date 12 Oct 09

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Detector

Detector 44-10 Serial No. PR277926

Order #. 20140002 20140197/341915

Customer MACTEC INC.

Counter 12 Serial No. 172718

Counter Input Sensitivity 10 mV

Count Time 6 seconds

Distance Source to Detector surface

Other

High Voltage	Background	Isotope Am-241 Size ≈0.85 µCi	Isotope Size	Isotope Size	Isotope Size
900	671	14336			
950	706	15659			
1000	688	16634			
1050	701	15577			
1100	674	15268			
1150	676	15698			

Signature Donnie Mickos

Date 9.Oct.09

FORM C4A 04/09/2003

• *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. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MACTEC INC ORDER NO. 20164515/356696

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 172718

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR277926

Cal. Date 30-Nov-10 Cal Due Date 30-Nov-11 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 20 % Alt 771.0 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 1100 V Input Sens. 10 mV Det. Oper. 1100 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 524 V Ref./Inst. 2000 / 2001 V

COMMENTS:

Calibrated using a 5' cable.

100 μR = 9500 cpm.

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	N/A	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*
Digital Readout	40kcpm	N/A	3996 (0)
	4kcpm		399
	400cpm		40
	40cpm		4

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
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: ☐ 73410 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646 ☐ 70897

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

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 63888 ☐ Oscilloscope S/N ☑ Multimeter S/N 80040300

Calibrated By: David Anderson Date 30-November-2010

Reviewed By: Rhonda Hain Date 30 Nov 10

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 03/11/2010 Page 1 of 2

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Detector

Detector 44-10 Serial No. 277926

Customer MACTEC INC Order #. 20164515/356696

Counter 12 Serial No. 172718 Counter Input Sensitivity 10 mV

Count Time 6 seconds Distance Source to Detector surface

Other 5' cable

High Voltage	Background	Isotope Am 241 Size ≈ 0.81 μCi	Isotope ____ Size ____	Isotope ____ Size ____	Isotope ____ Size ____
950	681	11797			
1000	687	13492			
1050	689	13979			
* 1100	687	13967			
1150	689	13953			
1200	718	14129			
1250	737	14075			
1300	765	14153			
1350	759	14060			
1400	800	14155			
1450	898	14286			
1500	976	14975			
1550	1090	15491			

Signature David Anderson Date 30-November-10

γ11

INSTRUMENT QC CHECK SHEET

Date: 4/29/2010 Time: 0800

Instrument: 12 Serial No: 172718

Probe: 44-10 Serial No: 277926

Cal. Performed Date: 10/9/2009 Cal. Due Date: 10/9/2010

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration 1 min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration 1 min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	1485	89762	**88277**
2	1454	86589	**85135**
3	1466	86431	**84965**
4	1453	86585	**85132**
5	1402	86801	**85399**
6	1406	86956	**85550**
7	1455	86717	**85262**
8	1461	86930	**85469**
9	1416	86543	**85127**
10	1420	86874	**85454**
Average	**1441.80**		**85577**

Average Source Ref. Reading + 20% =	102692
Average Source Ref. Reading - 20% =	68462
Average Background Reading + 50% =	2163
Average Background Reading - 50% =	721

Comments: QC'd with lead shield in place for FSS

Performed By: [signature] Date: 4-29-10

RSO Review: HP Date: 5/3/10

PROCEDURE RPP-13	REVISION draft 3	ATTACHMENT 2	PAGE 1 OF 1

INSTRUMENT QC CHECK SHEET

Date: 7/22/2010 Time: 7:00

Instrument: 12 Serial No: 172718

Probe: 44-10 Serial No: 277926

Cal. Performed Date: 11/12/2009 Cal. Due Date: 11/12/2010

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration 1 min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration 1 min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	1267	86124	**84857**
2	1248	86321	**85073**
3	1328	86492	**85164**
4	1242	86441	**85199**
5	1251	86219	**84968**
6	1296	86100	**84804**
7	1212	86294	**85082**
8	1276	87140	**85864**
9	1273	86983	**85710**
10	1236	86490	**85254**
Average	**1262.90**		**85198**

Average Source Ref. Reading + 20% =	**102237**
Average Source Ref. Reading - 20% =	**68158**
Average Background Reading + 50% =	**1894**
Average Background Reading - 50% =	**631**

Comments: QC performed with lead collimator on.

Performed By: [signature] Date: 7-22-10

RSO Review: HD Date: 7/22/10

PROCEDURE NO: RPP-13	REVISION NO: 3	ATTACHMENT 2 PAGE 1 OF 1

γ11

INSTRUMENT QC CHECK SHEET

Date: 12/15/2010 Time: 1400

Instrument: 12 Serial No: 172718

Probe: 44-10 Serial No: 277926

Cal. Performed Date: 11/30/2010 Cal. Due Date: 11/30/2011

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☐ Yes ☐ No Jig ID#: NAI-1

Background count duration _____min Window Setting: ☐ in ☐ out ☐ n/a

Source count duration _____min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	1225	84286	83061
2	1168	83585	82417
3	1208	84751	83543
4	1198	84126	82928
5	1135	84348	83213
6	1134	84408	83274
7	1167	84394	83227
8	1253	84113	82860
9	1150	84160	83010
10	1134	84203	83069
Average	1177.20		83061

Average Source Ref. Reading + 20% = 99673
Average Source Ref. Reading - 20% = 66449
Average Background Reading + 50% = 1766
Average Background Reading - 50% = 589

Comments: QC Check performed with collimator

Performed By: [signature] Date: 12-15-10

RSO Review: [signature] Date: 12/15/10

PROCEDURE NO: RPP-13	REVISION NO: 3	ATTACHMENT 2 PAGE 1 OF 1

Portable Instrument Response Check Sheet

USE SCALER FOR QC

Y11

Probe/Meter Information	Y11	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	120183	+50%	7559
Cal Due Date	10-9-10	Nuclide	Cs-137	-20 %	80122	-50%	2520

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	UnSat	Initial	Comments
11-30-09	0610				4583	102621	98038	✓		[illegible]	PRE
11-30-09	2020				4925	105014	100089	✓		[illegible]	POST
12-1-09	0615				4308	101838	97530	✓		[illegible]	PRE / not used
12-2-09	0615				4707	102074	97367	✓		[illegible]	PRE / not used
12-3-09	0610				4752	102240	97488	✓		[illegible]	PRE
12-3-09	1550				4184	104030	99846	✓		[illegible]	POST
12-4-09	0610				4497	104473	99976	✓		[illegible]	PRE
12-4-09	1650				5858	107314	101456	✓		[illegible]	POST
12-5-09	0615				4729	102713	97984	✓		[illegible]	PRE
12-5-09	1600				4743	105737	100994	✓		w/ DC [illegible]	POST
12-7-09	0545				4397	104453	100056	✓		[illegible]	PRE
12-7-09	2100				4928	104714	101786	✓		[illegible]	POST
12-8-09	0610				4507	103415	98908	✓		[illegible]	PRE / not used
12-9-09	0630				6779	104618	97839	✓		[illegible]	PRE / not used
12-10-09	0615				4284	100849	96565	✓		[illegible]	PRE / not used
12-11-09	0615				4318	99782	95464	✓		[illegible]	PRE
12-11-09	2230				4957	105185	100228	✓		[illegible]	POST
12-12-09	0615				4199	102076	97877	✓		[illegible]	PRE / not used
12-14-09	0620				4009	101660	97651	✓		[illegible]	PRE
12-14-09	1520				4720	108142	103422	✓		[illegible]	POST
12-15-09	0615				4159	102221	98062	✓		[illegible]	PRE / not used
12-16-09	0615				4314	103480	99166	✓		[illegible]	PRE
12-16-09	1455				4639	106872	102,233	✓		[illegible]	POST
12-17-09	0615				4359	101412	97053	✓		[illegible]	PRE / not used
12-18-09	0615				3826	98652	94826	✓		[illegible]	PRE / not used
12-21-09	0615				3914	101602	97688	✓		[illegible]	PRE / not used
12-22-09	0606				4064	99711	95647	✓		[illegible]	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HFTD Date: 1/26/10

Portable Instrument Response Check Sheet

USE SCALER FOR QC

Probe/Meter Information	γ11	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	120183	+50%	7559
Cal Due Date	10-9-10	Nuclide	Cs-137	-20 %	80122	-50%	2520

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
3/1/10	0700				4403	119941	115538	✓		[illegible]	PRE
3-11-10	1600				4369	119734	115365	✓		JE	Post
3.15.10	0615				4001	119693	115692	✓		[illegible]	PRE
3-15-10	16-				4412	112886	108474	✓		JT	Post
3-16-10	0600				4180	100624	96444	✓		[illegible]	PRE/not used
3/17.10	0615				4637	117872	113235	✓		[illegible]	PRE
3-17-10	1700				4041	118178	114137	✓		JR	Post
3-18-10	0610				3959	118021	114,062	✓		EM	Pre
3-18-10	1445				5273	98658	93385	✓		[illegible]	Post
3-22-10	0610				4126	98237	94111	✓		[illegible]	PRE/ not used
3-23-10	0615				4503	98445	93942	✓		[illegible]	PRE/ not used
3-24-10	0615				4183	96711	92588	✓		[illegible]	PRE/ not used
3-25-10	0610				4111	97065	92954	✓		[illegible]	PRE/ not used
3-29-10	0610				4452	98328	93876	✓		[illegible]	PRE/ NOT USED
4-5-10	0630				4753	98317	93564	✓		[illegible]	PRE/ NOT USED
4-6-10	0630				4559	99688	95129	✓		[illegible]	PRE/ NOT USED
4-7-10	0615				4450	100609	96159	✓		[illegible]	PRE/ not used
4-8-10	0610				4585	101455	96900	✓		[illegible]	PRE/ not used
4-12-10	0610				4324	99263	94939	✓		[illegible]	PRE/ not used
4-13-10	0610				4326	98858	94562	✓		[illegible]	PRE/ not used
4-14-10	0610				4559	97879	93320	✓		[illegible]	PRE/ not used
4-15-10	0610				4359	97510	93151	✓		[illegible]	PRE/ NOT USED
4-19-10	0620				4418	99225	94807	✓		[illegible]	PRE
4-19-10	1615				4535	98386	93851	✓		JT	Post
4-20-10	0540				4386	100010	95624	✓		[illegible]	PRE/ not used
4-21-10	0600				4598	97260	92662	✓		[illegible]	PRE/ not used
4-22-10	0600				4509	96929	92420	✓		[illegible]	PRE/ not used
4-26-10	0545				4118	96384	92266	✓		[illegible]	PRE
4-26-10	1530				4435	97236	92801	✓		JT	Post

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 5/3/10

Portable Instrument Response Check Sheet

USE SCALER FOR QC

Probe/Meter Information		Source Information		Acceptable Response Ranges			
	γ11			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe Model	44-10						
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	120183	+50%	7559
Cal Due Date	10-9-10	Nuclide	Cs-137	-20 %	80122	-50%	2520

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
4-27-10	0600				4310	98877	94567	✓		[illegible]	PRE
4-27-10	1445				4456	100669	96213	✓		[illegible]	POST
4-28-10	0600				4223	97154	92931	✓		[illegible]	PRE
4-28-10	1545				3819	98095	94276	✓		[illegible]	POST
4-29-10	0545				4050	97029	92979	✓		[illegible]	PRE
~~4-29-10~~	~~1500~~				~~4294~~	~~108010~~	~~103716~~				Void entry JF
4-29-10	1515				4457	98370	93813	✓		JF	POST
5-3-10	0550				4284	96349	92065	✓		[illegible]	PRE
5-3-10	1420				4196	108062	103866	✓		[illegible]	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: [signature] Date: 5/13/10

Portable Instrument Response Check Sheet

γ11

Probe/Meter Information γ11		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	102692	+50%	2163
Cal Due Date	10.8.10	Nuclide	Cs-137	-20 %	68462	-50%	721

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
5-4-10	0605				1430	84995	83565	✓		[illegible]	PRE
5-4-10	1445				1323	86260	84937	✓		not ZT	POST
5-6-10	0625				1326	84785	83459	✓		[illegible]	PRE / not used
5-17-10	0555				1377	84619	83242	✓		[illegible]	PRE / Not Used
5-18-10	0600				1398	84273	82875	✓		[illegible]	PRE
5-18-10	1320				1272	86529	85257	✓		RL	POST
5-19-10	0600				1204	84349	83145	✓		[illegible]	PRE / not used
5-20-10	0600				1923	84785	82862	✓		[illegible]	PRE / not used
5-24-10	0620				1323	84728	83405	✓		[illegible]	PRE / not used
5-25-10	0600				1177	84389	83212	✓		[illegible]	PRE / not used
5-26-10	0610				1194	84573	83379	✓		[illegible]	PRE
5-26-10	1655				1324	85280	83,956	✓		RL	POST
5-27-10	0610				1176	84562	83386	✓		[illegible]	PRE / Not Used
6-1-10	0610				1197	84752	83555	✓		[illegible]	PRE
6-1-10	14-				1479	84481	83002	✓		ZT	Post
6-2-10	0600				1171	84764	83593	✓		[illegible]	PRE / not used
6-3-10	0605				1222	84110	82888	✓		[illegible]	PRE / not used
6-7-10	0610				1375	84636	83261	✓		[illegible]	PRE / not used
6-8-10	0615				1148	84528	83380	✓		[illegible]	PRE / not used
6-9-10	0605				1177	84470	83293	✓		[illegible]	PRE / NOT USED
~~6-10-10~~	~~0610~~				~~1400~~	~~93736~~	~~92336~~	✓		~~[illegible]~~	~~PRE [illegible]~~
6-10-10	0615				1400	85347	83947	✓		[illegible]	PRE / not used
6-14-10	0610				1182	84254	83072	✓		[illegible]	PRE / not used
6-15-10	0610				1129	83819	82690	✓		[illegible]	PRE / not used
6-16-10	0610				1165	84007	82842	✓		[illegible]	PRE / Not Used
6-17-10	0540				1378	84190	82812	✓		[illegible]	PRE / Not used
6-21-10	0600				1189	83805	82616	✓		[illegible]	PRE
6-21-10	1615				1388	83353	81965	✓		RL	POST
6-22-10	0610				1106	83518	82410	✓		[illegible]	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HP Date: 7/20/10

Portable Instrument Response Check Sheet

γ11

Probe/Meter Information	γ11	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	102692	+50%	2163
Cal Due Date	10.8.10	Nuclide	Cs-137	-20 %	68462	-50%	721

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
6.23.10	0615				1310	87311	86001	✓		[illegible]	PRE
6-23-10	1630				1462	84553	83091	✓		[illegible]	POST
6.24.10	0610				1495	86863	85368	✓		[illegible]	PRE
6.24.10	1445				1776	86083	84307	✓		DD/RC	POST
6.28.10	0600				1403	84141	82738	✓		[illegible]	PRE
6-28-10	1640				1414	85746	84332	✓		RC	POST
6-29-10	0610				1343	87383	86040	✓		[illegible]	PRE
6-29-10	1630				1366	87232	85866	✓		[illegible]	POST
6.30.10	0550				1282	84311	83029	✓		[illegible]	PRE
6-30-10	1609				1111	87616	86505	✓		RC	POST
7.1.10	0600				1329	79567	78238	✓		[illegible]	PRE / not used
7.6.10	0530				1318	86831	85513	✓		[illegible]	PRE / not used
7.7.10	0600				1114	79325	78211	✓		[illegible]	PRE / not used
7.8.10	0545				1206	74626	73420	✓		[illegible]	PRE / not used
7.12.10	0550				1322	77490	~~76668~~ 76168	✓		[illegible]	PRE / not used
7.13.10	0610				1182	76856	75674	✓		[illegible]	PRE / not used
7.22.10	0620				1220	86723	85503	✓		[illegible]	PRE / shield
7-22-10	1530				1134	88562	87428	✓		RC	Post / Shield
7-28-10	0700				1438	88298	86,860	✓		RC	Pre
7.28.10	1630				1287	87955	86668	✓		DSD/RC	Post
7-29-10	0005				1208	87320	86112	✓		[illegible]	PRE
7-29-10	900				1259	88325	87066	✓		[illegible]	Post
8.2.10	0610				1186	87298	86112	✓		[illegible]	PRE
8.2.10	1610				1249	88666	87417	✓		RC	POST
8.3.10	0600				1186	87959	86773	✓		[illegible]	PRE
8-3-10	1545				1127	87130	86003	✓		RC	POST
8.4.10	0600				1163	87030	85847	✓		[illegible]	PRE / not used
8.5.10	0550				1431	86754	85323	✓		[illegible]	PRE
8.9.10	0620				1207	87635	86428	✓		[illegible]	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 9/1/10

Portable Instrument Response Check Sheet

γ11

Probe/Meter Information γ11		Source Information		Acceptable Response Ranges			
				Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe Model	44-10						
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		–50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	102692	+50%	2163
Cal Due Date	10.8.10	Nuclide	Cs-137	-20 %	68462	–50%	721

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
8-10-10	0605				1323	86101	84778	✓		[illegible]	PRE
~~8-10-10~~	~~1200~~				~~1531~~	~~89279~~	~~87748~~	✓		GW	~~Post~~
8-10-10	1610				1359	87517	86158	✓		DSD/RC	Post
8-11-10	0610				1286	87081	85795	✓		[illegible]	PRE
8-11-10	1630				1221	86272	85051	✓		JT	Post
8-12-10	0600				1255	86313	85058	✓		[illegible]	PRE / not used
8-16-10	0610				1216	85455	84239	✓		[illegible]	PRE
8-16-10	1555				1060	86963	85903	✓		RC	POST
8-17-10	0610				1296	88147	86851	✓		[illegible]	PRE / not used
8-18-10	0600				1249	87925	86676	✓		[illegible]	PRE
8-18-10	1540				1321	87348	86027	✓		JT	Post
8-19-10	0600				1303	86861	85558	✓		[illegible]	PRE
8-19-10	1525				1330	86913	85583	✓		DSD/RC	Post
8-23-10	0610				1234	87548	86314	✓		[illegible]	PRE / not used
8-24-10	0550	N		A	1346	84795	83449	✓		[illegible]	PRE / not used
8-25-10	0530				1241	88771	87530	✓		[illegible]	PRE
8-25-10	1620				1250	86558	85308	✓		RC	POST
8-26-10	0545				1161	86929	85768	✓		[illegible]	PRE
8-26-10	1620				1494	87719	86225	✓		RC	POST
8-30-10	0615				1228	87842	~~86714~~ 86614	✓		[illegible]	PRE
8-30-10	1620				1504	87242 GW	85916	✓		GW	Post
8-31-10	0610				1344	85893	84549	✓		[illegible]	PRE
8-31-10	1545				1507	87156	85649	✓		DSD/GW	Post
9-1-10	0615				1544	87543	85999	✓		[illegible]	PRE
9-1-10	1615				1499	86395	84896	✓		RC	POST
9-2-10	0630				1142	87165	86023	✓		[illegible]	PRE / not used
9-7-10	0630				1108	~~1107~~ 87185	86077	✓		[illegible]	PRE
9-7-10	1505				1464	86575	85111	✓		RC	POST
9-8-10	0600				1169	88067	86898	✓		[illegible]	PRE

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HID Date: 9/9/10

Portable Instrument Response Check Sheet

γ11

Probe/Meter Information	γ11	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	102692	+50%	2163
Cal Due Date	10.8.10	Nuclide	Cs-137	-20 %	68462	-50%	721

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
9-8-10	1615				1512	93957	~~92436~~ 92443	✓		RC	POST 92443
9.9.10	0545				1340	90586	89246	✓		KS	PRE
9.9.10	1630				1523	93796	92273	✓		DSD/RC	POST
9.13.10	0615				1321	92495	91174	✓		KS	PRE
9-13-10	1516				1671	92,066	90395	✓		RC	POST
9.14.10	0600				1371	92402	91031	✓		KS	PRE / not used
9.15.10	0545				1473	92272	90799	✓		KS	PRE / NOT USED
9.16.10	0615				1420	93242	91822	✓		KS	PRE
9-16-10	1535				1634	94077	92443	✓		RC	POST
9.20.10	0600				1399	94383	92984	✓		[illegible]	PRE not used
9.21.10	0600				1752	93640	91888	✓		[illegible]	PRE
9-21-10	1540				1658	93840	92182	✓		RC	POST
9.22.10	0600				1657	93627	91970	✓		[illegible]	PRE
9.22.10	1600				1480	93222	91742	✓		RC	POST
9.23.10	0600				1707	93754	92047	✓		[illegible]	PRE
9-23-10	1640				1280	92070	90790	✓		WDL	POST
9.27.10	0600				1293	93232	91939	✓		KS	PRE / not used
9.28.10	0600				1408	91107	89699	✓		KS	PRE / not used
9.29.10	0610				1364	92589	91225	✓		KS	PRE / not used
9.30.10	0615				1394	90431	89037	✓		KS	PRE / not used
10.4.10	0600				1280	89782	88502	✓		KS	PRE / not used
10.5.10	0605				1389	90435	89046	✓		KS	PRE / not used
10.6.10	0605				1430	91747	90317	✓		KS	PRE
10.6.10	16-				1437	94,273	92,835	✓		JT	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HD Date: 10/11/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γ 11	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	277926	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172718	Serial/ID #	SRS-001	+20%	99673	+50%	1766
Cal Due Date	11-30-11	Nuclide	Cs-137	-20 %	66449	-50%	589

Date	Time				Gamma Response			Source Check Results			Comments
					Bkgd Cpm	Source cpm	ncpm	Sat	UnSat	Initial	
12.20.10	0755				1290	86925	85635	✓		VS	PRE / not used
12.21.10	0620				~~1219~~ 1279	85085	83866	✓		VS	PRE
12-21-10	1515				1297	86472	85175	✓		JT	Post
12.22.10	0630				1427	91118	89691	✓		VS	PRE
12.22.10	1515				1555	86734	85179	✓		VS	Post
12.23.10	0630				1326	96437	95111	✓		VS	PRE
12.23.10	1430				1379	96778	95399	✓		JT	Post
12.28.10	0620				980	84875	83895	✓		VS	PRE
12-28-10	15—				1120	91960	90840	✓		JT	Post
12.29.10	0630				1293	90786	89493	✓		VS	PRE
12-29-10	12—				1358	91066	89708	✓		JT	Post

N A

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 1/12/11

PROCEDURE NO: RPP-12	REVISION NO: 3	ATTACHMENT 1 PAGE NO: 1 OF 2

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC. Y12
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MACTEC INC. ORDER NO. 20143935/344137

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 172698

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR262444

Cal. Date 12-Nov-09 Cal Due Date 12-Nov-10 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 42 % Alt 705.8 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 950 V Input Sens. 10 mV Det. Oper. 950 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 498 V Ref./Inst. 2000 / 1998 V

COMMENTS:

Instrument calibrated with 5' 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 kcpm	400	400
X 1000	100 kcpm	100	100
X 100	40 kcpm	400	400
X 100	10 kcpm	100	100
X 10	4 kcpm	400	400
X 10	1 kcpm	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	40K cpm	3987(0)	3987(0)	Log Scale			
	4K cpm	399	399				
	400 cpm	40	40				
	40 cpm	4	4				

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

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 189491 ☐ Oscilloscope S/N ☑ Multimeter S/N 82250292

Calibrated By: Donnie Miekos Date 12-Nov-09

Reviewed By: Rhonda Hunter Date 12 Nov 09

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

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

Ludlum Model 12 #172698 with

44-10 Probe #262444

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC. 1/12
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MACTEC INC. ORDER NO. 20143935/344137

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 172698

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR262444

Cal. Date 12-Nov-09 Cal Due Date 12-Nov-10 Cal. Interval 1 Year Meterface 202-635

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 42 % Alt 705.8 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 950 V Input Sens. 10 mV Det. Oper. 950 V at 10 mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 498 V Ref./Inst. 2000 / 1998 V

COMMENTS:

Instrument calibrated with 5' 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 kcpm	400	400
X 1000	100 kcpm	100	100
X 100	40 kcpm	400	400
X 100	10 kcpm	100	100
X 10	4 kcpm	400	400
X 10	1 kcpm	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	40K cpm	3987(0)	3987(0)	Log Scale			
	4K cpm	399	399				
	400 cpm	40	40				
	40 cpm	4	4				

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

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 189491 ☐ Oscilloscope S/N ☑ Multimeter S/N 82250292

Calibrated By: Donnie Mieros Date 12-Nov-09

Reviewed By: Rhonda Hunn Date 12 Nov 09

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC. 7/12
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR 262444

Customer MACTEC INC. Order #. 20143935/344137

Counter 12 Serial No. 172698 Counter Input Sensitivity 10 mV

Count Time 6 seconds Distance Source to Detector surface

Other

High Voltage	Background	Isotope Am-241 Size ≈0.85 μCi	Isotope Size	Isotope Size	Isotope Size
800	637	9341			
850	680	10137			
900	672	10230			
950	693	10706			
1000	691	10251			
1050	710	10232			

Signature Donnie Miekos Date 12-Nov-09

FORM C4A 04/09/2003

• *Serving The Nuclear Industry Since 1962* •

Instrument Calibration Form

Instrument Information	Calibration Information
Manufacturer: Ludlum	Date of Calibration: 3-7-11
Instrument ID: 8/12	Calibration Due Date: 3-7-12
Meter/Serial #: 12 / 172698	Source/ID: SRS-001 / Cs-137
Probe/Serial #: 44-10 / 262444	Distance From Source: 3¼"
Physical Inspection (SAT/UNSAT): SAT	

HV Test (ref/inst) 500 / 500 (ref/Inst) 1500 / 1500

Instrument Calibration Data

Scale (e.g. x1)	Pulser Count Rate (cpm)	Measured Count Rate (cpm)	Adjusted / Final Count Rate (cpm)	Remarks
x1	100	100	100	
x1	400	400	400	
x10	1000	1000	1000	
x10	4000	4000	4000	
x100	10k	10k	10k	
x100	40k	40k	40k	
x1000	100k	100k	100k	
x1000	400k	400k	400k	

Comments: Calibration performed with lead shield in place.

Performed By: [signature] Date: 3-7-11

RSO Review: [signature] Date: 3/9/11

INSTRUMENTATION CALIBRATION FORM

Manufacturer: Ludlum	Isotope/ID: Cs-137 / SRS-001
Instrument ID: γ12	Activity: ≈ 4 μCi
Meter/Serial #: 12 / 172698	Count Time: 1 min
Probe/Serial #: 44-10 / 262444	Distance from Source: 3¼"

High Voltage	Background Counts Gamma	Gross Counts Gamma
800v	983	81080
850v	1020	81874
900v	986	82547
950v	1062	83010
1000v	1061	83457
* 1050v	1067	83967
1100v	1087	84026
1150v	1123	83692

Final Voltage Setting: 1050v

Performed By: [signature] Date: 3-7-11

RSO Review: [signature] Date: 3/9/11

PROCEDURE NO: RPP-13	REVISION NO: 4	ATTACHMENT 5 PAGE 2 OF 2

Y/Z

INSTRUMENT QC CHECK SHEET

Date: 12/1/2009 Time: 1000

Instrument: 12 Serial No: 172698

Probe: 44-10 Serial No: 262444

Cal. Performed Date: 11/12/2009 Cal. Due Date: 11/12/2010

Source Isotope: Cs-137 Source #: SRS-001

QC Check Location: HP Trailer

Jig Used: ☒ Yes ☐ No Jig ID#: NAI-1

Background count duration 1 min Window Setting: ☐ in ☐ out ☒ n/a

Source count duration 1 min

QC Counting Results			
Count No.	Bkg cpm	Src cpm	ncpm
1	4288	95406	**91118**
2	4390	96670	**92280**
3	4295	95098	**90803**
4	4219	95932	**91713**
5	4305	95977	**91672**
6	4395	95760	**91365**
7	4292	94841	**90549**
8	4230	94587	**90357**
9	4376	95394	**91018**
10	4202	94630	**90428**
Average	4299.20		**91130**

Average Source Ref. Reading + 20% =	109356
Average Source Ref. Reading - 20% =	72904
Average Background Reading + 50% =	6449
Average Background Reading - 50% =	2150

Comments: Initial QC - new instrument

Performed By: [signature] Date: 12-1-09

RSO Review: [signature] Date: 12/3/09

PROCEDURE RPP-13	REVISION 3	ATTACHMENT 2	PAGE 1 OF 1

INSTRUMENT QC CHECK SHEET

Date: 3/7/2011 **Time:** 1500

Instrument: 12 **Serial No:** 172698

Probe: 44-10 **Serial No:** 262444

Cal. Performed Date: 3/7/2011 **Cal. Due Date:** 3/7/2012

Source Isotope: Cs-137 **Source #:** SRS-001

QC Check Location: HP Trailer

Jig Used: ☐ Yes ☐ No **Jig ID#:** NAI-1

Background count duration _____ **min** **Window Setting:** ☐ in ☐ out ☐ n/a

Source count duration _____ **min**

QC Counting Results			
Count No.	**Bkg cpm**	**Src cpm**	**ncpm**
1	1078	83933	**82855**
2	1087	84281	**83194**
3	1077	84407	**83330**
4	1104	84433	**83329**
5	1082	84513	**83431**
6	1059	84858	**83799**
7	1057	84437	**83380**
8	1129	84834	**83705**
9	1082	84116	**83034**
10	1082	84230	**83148**
Average	**1083.70**		**83321**

Average Source Ref. Reading + 20% =	**99985**
Average Source Ref. Reading - 20% =	**66656**
Average Background Reading + 50% =	**1626**
Average Background Reading - 50% =	**542**

Comments: _____

Performed By: [signature] **Date:** 3-7-11

RSO Review: [signature] **Date:** 3/9/11

PROCEDURE NO: RPP-13	REVISION NO: 3	ATTACHMENT 2 PAGE 1 OF 1

Portable Instrument Response Check Sheet

8/12

Probe/Meter Information 8/12		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172698	Serial/ID #	SRS-001	+20%	109356	+50%	6449
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	72904	-50%	2150

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
12.9.09	0630				6237	96774	90537	✓		[illegible]	PRE / not used
12.10.09	0615				4112	94794	90682	✓		[illegible]	PRE / not used
12.11.09	0615				3896	93995	90099	✓		[illegible]	PRE / not used
12.12.09	0615				3964	93995	90031	✓		[illegible]	PRE / not used
12.14.09	0620				3956	93496	89540	✓		[illegible]	PRE / not used
12.15.09	0615				4229	93394	89175	✓		[illegible]	PRE / not used
12.16.09	0615				4063	94075	90012	✓		[illegible]	PRE / not used
12.17.09	0615				4030	94402	90372	✓		[illegible]	PRE / not used
12.18.09	0615				3919	93451	89472	✓		[illegible]	PRE / not used
12.21.09	0615				3948	94977	91029	✓		[illegible]	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HPD Date: 1/26/10

Portable Instrument Response Check Sheet

QC ✓ Without Collimator

Probe/Meter Information	812	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		–50%	
Meter SN	172698	Serial/ID #	SRS-001	+20%	109356	+50%	6449
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	72904	–50%	2150

Date	Time	Alpha Response			γ ~~Beta~~ Response			Source Check Results			Comments
		Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	
4-26-10	7[illegible]				4289	95799	91510	✓		JT	Pre
4-26-10	1530				4139	94473	90334	✓		JT	Post
7-14-10	0600				3628	97477	93849	✓		KS	PRE
7-14-10	1645				4059	94989	90930	✓		JT	Post
7-15-10	0600				3793	94024	90231	✓		KS	PRE
7-15-10	1600				4467	99618	95151	✓		[illegible]	POST
7-19-10	0610				4056	95108	91052	✓		KS	PRE
7-19-10	1145				4041	97017	92976	✓		JT	Post
7-20-10	0600				3891	97481	93590	✓		KS	PRE / Not Used
7-21-10	0610				4328	100056	95728	✓		KS	PRE
7-21-10	1415				4189	95397	91208	✓		[illegible]	POST
7-22-10	0620				3687	96120	92433	✓		KS	PRE
					~~3~~						

± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 9/1/10

Portable Instrument Response Check Sheet

Perform QC with Collimator

Probe/Meter Information	γ/Z	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 698	Serial/ID #	SRS-001	+20%	102237	+50%	1894
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	68158	-50%	631

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	UnSat	Initial	Comments
* 7-22-10	0620				3687	96120	92433	✓		[illegible]	PRE
7-22-10	1525 1600				1151	85724	84573	✓		RC	POST/Shield
7-26-10	0610				1207	84192	82985	✓		[illegible]	PRE
7-26-10	1415				1573	87311	85738	✓		RC	POST shield
7-27-10	0610				1174	83703	82529	✓		[illegible]	PRE
7-27-10	1530				1146	84734	83588	✓		RC	POST
7-28-10	0610				1378	82831	81453	✓		[illegible]	PRE
7-28-10	1625				1166	86159	84993	✓		DSD/M	POST
7-29-10	0605				1388	86155	84767	✓		[illegible]	PRE
7-29-10	9				1453	86313	84860	✓		JT	POST
7-29-10	1040				1422	86227	84805	✓		JT	Pre.
7-29-10	1515				1397	85972	84575	✓		JT	POST
8-2-10	0610				1149	85743	84594	✓		[illegible]	PRE
8-2-10	1610				1251	86950	85699	✓		RC	POST
8-3-10	0600				1255	86361	85106	✓		[illegible]	PRE
8-3-10	1430				1194	85828	84634	✓		JT	POST
8-4-10	0600				1083	84670	83587	✓		[illegible]	PRE/not used
8-5-10	0550				1239	84020	82781	✓		[illegible]	PRE/not used
8-9-10	0620				1090	85195	84105	✓		[illegible]	PRE
8-9-10	1635				1186	85469	84283	✓		JT	POST
8-10-10	0605				1309	83603	82294	✓		[illegible]	PRE
8-10-10	1315				1355	86524	85169	✓		RC	POST
8-11-10	0610				1279	86833	85554	✓		[illegible]	PRE
8-11-10	1630				1287	84099	82812	✓		JT	POST
8-12-10	0600				1266	85965	84699	✓		[illegible]	PRE
8-12-10	1510				1280	86724	85444	✓		RC	POST
8-16-10	0610				1274	86043	84769	✓		[illegible]	PRE/not used
8-17-10	0610				1275	86110	84835	✓		[illegible]	PRE
8-17-10	1625				1137	85877	84740			RC	POST

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 9/1/10

* Note: 7/22/10 PRE QC done without collimator - See previous QC check sheet

PROCEDURE RPP-12	REVISION 3	ATTACHMENT 1	PAGE 1 OF 2

Portable Instrument Response Check Sheet

Probe/Meter Information γ/2		Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 698	Serial/ID #	SRS-001	+20%	102237	+50%	1894
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	68158	-50%	631

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
8-18-10	0600				1339	85848	84509	✓		KS	PRE
8-18-10	1545				1267	85219	83952	✓		JH	Post
8-19-10	0600				1302	84474	83172	✓		KS	PRE
8-19-10	1535				1513	86297	84784	✓		DSD/RC	Post
8-23-10	0610				1275	86338	85063	✓		KS	PRE
8-23-10	1500				1190	87017	85827	✓		GW	POST
8-24-10	0550				1398	82824	81426	✓		KS	PRE
8-24-10	1530				1262	86399	85137	✓		RC	POST
8-25-10	0530				1267	86214	84947	✓		KS	PRE
8-25-10	1620				1108	86609	85501	✓		RC	POST
8-26-10	0545				1177	83446	82269	✓		KS	PRE
8-26-10	1635				1225	86923	85698	✓		DSD/KS	Post
8-30-10	0615				1271	85842	84571	✓		KS	PRE
8-30-10	1625				1496	85952	84456	✓		GW	POST
8-31-10	0610				1265	83187	81922	✓		KS	PRE
8-31-10	1550				1455	85544	84089	✓		DSD/GW	Post
9-1-10	0615				1413	83827	82414	✓		KS	PRE
9-1-10	1615				1262	85939	84677	✓		RC	POST
9-2-10	0630				1250	85604	84354	✓		KS	PRE
9-2-10	1420				1158	85898	84740	✓		RC	POST 9-7-10
9-7-10	0610				1249	84135	82886	✓		KS	PRE
9-7-10	1510				1477	86608	85131	✓		RC	POST
9-8-10	0600				1113	86385	85212	✓		KS	PRE
9-8-10	1615				1343	84159	82816	✓		RC	POST
9-9-10	0545				1282	83759	82477	✓		KS	PRE
9-9-10	1635				1415	85431	84016	✓		DSD/RC	Post
9-13-10	0615				1166	85667	84501	✓		KS	PRE
9-13-10	1513				1284	83719	82435	✓		RC	POST
9-14-10	0600				1240	85348	84100	✓		KS	PRE/ not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 9/29/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γ/12	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 698	Serial/ID #	SRS-001	+20%	102237	+50%	1894
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	68158	-50%	631

Date	Time	Alpha Response Bkgd cpm	Alpha Response Source cpm	Alpha Response ncpm	γ ~~Beta~~ Response Bkgd cpm	γ ~~Beta~~ Response Source cpm	γ ~~Beta~~ Response ncpm	Source Check Results Sat	Source Check Results UnSat	Source Check Results Initial	Comments
9.15.10	0545				1336	84084	82748	✓		[illegible]	PRE
9.15.10	1600				1352	85254	83902	✓		RC	POST
9.16.10	0615				1289	86093	84804	✓		[illegible]	PRE
9.16.10	1537				1402	85379	83977	✓		RC	POST
9.20.10	0600				1417	85905	84488	✓		[illegible]	PRE
9.20.10	1615				1305	85978	84673	✓		RC	POST
9.21.10	0600				1470	85004	83534	✓		[illegible]	PRE
9.21.10	1545				1312	85214	83902	✓		RC	POST
9.22.10	0600				1525	85331	83806	✓		[illegible]	PRE
9.22.10	1602				1181	85475	84294	✓		RC	POST
9.23.10	0600				1578	85581	84063	✓		[illegible]	PRE
9.23.10	1540				1511	84995	83484	✓		RC	POST
9.27.10	0600				1200	84783	83583	✓		[illegible]	PRE
9.27.10	1605				1539	86281	84742	✓		DSD/KW	POST
9.28.10	0600				1237	84883	83646	✓		[illegible]	PRE
9-28-10	1615				1221	85683	84412	✓		RC	POST
9.29.10	0610				1216	85790	84574	✓		[illegible]	PRE
9.29.10	1615				1343	85144	83801	✓		RC	POST
9.30.10	0615				1279	83584	82305	✓		[illegible]	PRE
9-30-10	1530				1200	85934	84734	✓		JT	POST
10.4.10	0600				1200	85293	84093	✓		[illegible]	PRE
10.4.10	1635				1253	85632	84379	✓		JT	POST
10.5.10	0605				1273	83523	82250	✓		[illegible]	PRE
10.5.10	1635				1216	86017	84801	✓		JT	POST
10.6.10	0605				1340	84461	83121	✓		[illegible]	PRE
10.6.10	16-				1197	85700	84503	✓		JT	POST
10.7.10	0605				1238	85194	83956	✓		[illegible]	PRE
10.7.10	1630				1372	84164	82792	✓		JT	POST
10.8.10	0610				1107	86351	85244	✓		[illegible]	PRE/ Not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HTD Date: 10/14/10

Portable Instrument Response Check Sheet

Probe/Meter Information	γ/2	Source Information		Acceptable Response Ranges			
Probe Model	44-10			Source Range	Source (ncpm)	Bkg Range*	Bkg (cpm)
Probe SN	262444	Serial/ID #		+20%		+50%	
Meter Model	12	Nuclide		-20 %		-50%	
Meter SN	172 698	Serial/ID #	SRS-001	+20%	102237	+50%	1894
Cal Due Date	11-12-10	Nuclide	Cs-137	-20 %	68158	-50%	631

		Alpha Response			γ ~~Beta~~ Response			Source Check Results			
Date	Time	Bkgd cpm	Source cpm	ncpm	Bkgd cpm	Source cpm	ncpm	Sat	UnSat	Initial	Comments
10-11-10	0615				1193	84733	83540	✓		BS	PRE
10-11-10	1630				1309	85165	83856	✓		RL	POST
10-12-10	0600				1192	84840	83648	✓		BS	PRE
10-12-10	1515				1187	78441	77254	✓		DSD/RL	Post
10-13-10	0615				1219	79565	78346	✓		BS	PRE / not used
10-14-10	0620				1201	82303	81102	✓		BS	PRE
10-14-10	1420				1328	86720	85392	✓		DSD/W	Post
10-15-10	0610				1299	85929	84630	✓		BS	PRE
10-15-10	1645				1143	84875	83732	✓		JA	Post
10-19-10	0610				1201	85880	84679	✓		BS	PRE
10-19-10	1640				1307	84229	82922	✓		JA	Post
10-20-10	0605				1251	85263	84012	✓		BS	PRE
10-20-10	1640				1443	84814	83371	✓		DSD/AN	Post
10-21-10	0605				1310	85482	84172	✓		BS	PRE
10-21-10	14—				1277	83924	82647	✓		JA	Post
10-25-10	0605				1291	85617	84326	✓		BS	PRE
10-25-10	1630				1310	85672	84362	✓		JA	Post
10-26-10	0620				1224	84590	83366	✓		BS	PRE
10-26-10	1645				1221	83717	82496	✓		JA	Post
10-27-10	0605				1249	84450	83201	✓		BS	PRE / Not Used.
10-28-10	0710				1203	84006	82803	✓		JA	Pre / Not Used.
11-1-10	0615				1166	84710	83544	✓		BS	PRE
11-1-10	1510				1119	83751	82632	✓		JA	Post
11-2-10	0605				1248	87724	86476	✓		BS	PRE
11-2-10	1605				1205	84836	83631	✓		DSD	Post
11-3-10	0605				1232	86855	85623	✓		BS	PRE
11-3-10	1620				1212	85722	84510	✓		JA	Post.
11-4-10	0605				1239	86396	85157	✓		BS	PRE / not used
11-8-10	0615				1254	86086	84834	✓		BS	PRE / not used

* ± 50% or 1 cpm which ever is greater. Notify RSO if background is not within range.

RSO Review: HID Date: 11/9/10

Field Static QC Comparison

Field Static QC Comparison Results

Sample ID# (CE-FSS)	Date	Static Count Results						
		Instrument Model	Serial #	Detector Model	Serial #	Gross (cpm)	Gross Difference %	Comments
41-01-005	05/04/10	Model 12	172705	44-10	277925	2895		
41-01-005QC	05/04/10	Model 12	172718	44-10	277926	2987	-3.2	
41-02-008	05/03/10	Model 12	172705	44-10	277925	3472		
41-02-008 QC	05/03/10	Model 12	172718	44-10	277926	3416	1.6	
41-03-005	05/18/10	Model 12	172705	44-10	277925	2308		
41-03-005QC	05/18/10	Model 12	172718	44-10	277926	3164	-37.1	Note 1
42-01-003	07/28/10	Model 12	172705	44-10	277925	2278		
42-01-003QC	07/28/10	Model 12	172718	44-10	277926	1998	12.3	
42-01-027	07/28/10	Model 12	172705	44-10	277925	2643		
42-01-027QC	07/28/10	Model 12	172718	44-10	277926	2411	8.8	
42-02-024	07/28/10	Model 12	172705	44-10	277925	2792		
42-02-024QC	07/28/10	Model 12	172718	44-10	277926	2841	-1.8	
42-02-028	07/28/10	Model 12	172705	44-10	277925	2488		
42-02-028QC	07/28/10	Model 12	172718	44-10	277926	2575	-3.5	
42-03-013	08/10/10	Model 12	172705	44-10	277925	2342		
42-03-013QC	08/10/10	Model 12	172718	44-10	277926	2176	7.1	
42-03-022	08/10/10	Model 12	172705	44-10	277925	2750		
42-03-022QC	08/10/10	Model 12	172718	44-10	277926	2639	4.0	
42-04-005	08/11/10	Model 12	172705	44-10	277925	2167		
42-04-005QC	08/11/10	Model 12	172718	44-10	277926	2252	-3.9	
42-04-029	08/11/10	Model 12	172705	44-10	277925	2090		
42-04-029QC	08/11/10	Model 12	172718	44-10	277926	1902	9.0	
42-05-010	08/11/10	Model 12	172698	44-10	262444	2029		
42-05-010QC	08/11/10	Model 12	172718	44-10	277926	2119	-4.4	
42-05-019	08/11/10	Model 12	172698	44-10	262444	2020		
42-05-019QC	08/11/10	Model 12	172718	44-10	277926	2087	-3.3	

Sample ID# (CE-FSS)	Date	Static Count Results						
		Instrument Model	Serial #	Detector Model	Serial #	Gross (cpm)	Gross Difference %	Comments
42-06-020	08/16/10	Model 12	172705	44-10	277925	3069		
42-06-020QC	08/16/10	Model 12	172718	44-10	277926	2996	2.4	
42-06-024	08/16/10	Model 12	172705	44-10	277925	2752		
42-06-024QC	08/16/10	Model 12	172718	44-10	277926	2755	-0.1	
42-07-003	08/24/10	Model 12	172698	44-10	262444	2364		
42-07-003QC	08/24/10	Model 12	172718	44-10	277926	2430	-2.8	
42-08-001	08/25/10	Model 12	172705	44-10	277925	2702		
42-08-001QC	08/25/10	Model 12	172718	44-10	277926	2642	2.2	
43-01-009	09/16/10	Model 12	172698	44-10	262444	3559		
43-01-009QC	09/16/10	Model 12	172718	44-10	277926	3543	0.4	
43-01-020	09/16/10	Model 12	172698	44-10	262444	2413		
43-01-020QC	09/16/10	Model 12	172718	44-10	277926	2566	-6.3	
43-02-006	09/21/10	Model 12	172698	44-10	262444	3147		
43-02-006QC	09/21/10	Model 12	172718	44-10	277926	2749	12.6	
43-03-008	11/02/10	Model 12	172698	44-10	262444	3355		
43-03-008QC	11/02/10	Model 16	74100	44-10	RN015203	3300	1.6	
43-03-028	11/02/10	Model 12	172698	44-10	262444	2811		
43-03-028QC	11/02/10	Model 16	74100	44-10	RN015203	2800	0.4	
43-04-009	11/01/10	Model 12	172698	44-10	262444	2679		
43-04-009QC	11/01/10	Model 12	172718	44-10	277926	2600	2.9	

Note 1: The % difference between the two measurements (-37.1%) for survey unit 41-03 appears to be a statistical outlier compared with the rest of the QC comparison data. However, given that the background corrected values were less than the minimum detectable count rates calculated for both instruments, and that the volumetric soil activity form the measurement location indicated uranium 235 and cobalt 60 levels less than each of their corresponding minimum detectable activities indicating that there was no significant presence of plant derived radioactive material in the soil, the difference may be explained by a random background fluctuation.