APPENDIX K

PORTABLE INSTRUMENTATION DOCUMENTATION

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 CONSTRUCTORS INC ORDER NO. 223782/285468

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 175852

Cal. Date 7-Oct-04 Cal Due Date 7-Oct-05 Cal. Interval 1 Year Meterface n/a

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 55 % Alt 700.8 mm Hg

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

☑ Mechanical check
☑ F/S Resp. check
☑ Audio check
☑ Ratemeter Linearity check
☑ Data Log check
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89.

☑ Reset check
☑ Alarm Setting check
☑ Integrated Dose check
☑ Overload check

☑ Window Operation
☑ Battery check (Min. Volt) 4.4 VDC
☑ Recycle Mode check
☑ Scaler Readout check
☑ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

☑ Input Sens. Linearity
Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1997 V

COMMENTS: *Firmware: 37122N28*

I/O FIRMWARE#37123N05
CALIBRATED USING 39" CABLE.
RESOLUTION FOR Cs-137 IS 10%.
NO "AS FOUNDS" DUE TO MALFUNCTIONING OF INSTRUMENT.

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

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	RN015203	1000	100	4 / 2	9.173194E-06	5.123821E+10	✓
Detector # 2	LMI44-10	RN015203	1000	100	7 / 1	9.173194E-06	1.000000E+00	
Detector # 3	PK/CS-137	RN015203	711	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 – rad, 1 – Gray, 2 – rem, 3 – Sv, 4 – R, 5 – C/Kg, 6 – Disintegrations, 7 – Counts, 8 – Ci/cm sq., 9 – Bq/cm sq.
Time Base: 0 – Seconds, 1 – Minutes, 2 – Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400 K cpm	N/A	40008 (0)	400 cpm	N/A	40 (0)
	40 K cpm		3994 (0)	40 cpm		4 (0)
	4 K cpm		400 (0)			

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

Reference Instruments and/or Sources: Cs-137 Gamma S/N

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

☐ Alpha S/N ☐ Beta S/N ☑ Other Am-241/≈0.77μCi

☑ m 500 S/N 189509 ☑ Multimeter S/N 80820360

Calibrated By: Moses Campos Date 7-Oct-04

Reviewed By: [illegible] Date 7 Oct 04

FORM C44C 11/26/2003

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

DETECTOR SETUP BAR CODES

Generated: 10/07/2004 08:31:43.

Model 2350 Serial #175852

H711$M
Set High Voltage: 711

T642$.
Set Threshold: 642

W40WONL
Set Window: 40,ON

O400$OOFF$C
Set Overload: 400,OFF

F6$H
Set Scaler Count Time: 6

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL0.000000E+00$8
Set Dead Time: 0.000000E+00

SC1.000000E+00$0
Set Calibration Constant: 1.000000E+00

MPK/CS-137$I
Set Detector Model: PK/CS-137

NRN015203$.
Set Detector Serial #: RN015203

J1.000000E+09$V
Set Ratemeter Alarm: 1.000000E+09

K1000000$H
Set Scaler Alarm: 1000000

P1.000000E+09$.
Set Dose Alarm: 1.000000E+09

SP3$9
SAVE PARAMETERS AS D3

DETECTOR SETUP BAR CODES Generated: 10/07/2004 08:31:18.

Model 2350 Serial #175852

H1000$E
Set High Voltage: 1000

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL9.173194E-06$0
Set Dead Time: 9.173194E-06

SC1.000000E+00$0
Set Calibration Constant: 1.000000E+00

*MLMI44-10$ *
Set Detector Model: LMI44-10

NRN015203$.
Set Detector Serial #: RN015203

J1.000000E+09$V
Set Ratemeter Alarm: 1.000000E+09

K1000000$H
Set Scaler Alarm: 1000000

P1.000000E+09$.
Set Dose Alarm: 1.000000E+09

SP2$8
SAVE PARAMETERS AS D2

DETECTOR SETUP BAR CODES Generated: 10/07/2004 08:30:49.

Model 2350 Serial #175852

H1000$E
Set High Voltage: 1000

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU4$F
Set Readout Units = R

SB2$.
Set Readout Time Base = hr

SM0$3
Set Readout Range Multiplier = auto

SL9.173194E-06$0
Set Dead Time: 9.173194E-06

SC5.123821E+10$M
Set Calibration Constant: 5.123821E+10

*MLMI44-10$ *
Set Detector Model: LMI44-10

NRN015203$.
Set Detector Serial #: RN015203

J1.000000E+09$V
Set Ratemeter Alarm: 1.000000E+09

K1000000$H
Set Scaler Alarm: 1000000

P1.000000E+09$.
Set Dose Alarm: 1.000000E+09

SP1$7
SAVE PARAMETERS AS D1

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D3 in the Model 2350.
Today's date is 10/07/2004.
The current time of day is: 08:30:18.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: M.C.

Comments:

Model 2350 Serial # =	175852.
User I.D. =	
High Voltage =	711 volts.
Threshold =	642.
Window =	40,On.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	6 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	0.000000E+00.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	PK/CS-137.
Detector Serial # =	RN015203.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D2 in the Model 2350.
Today's date is 10/07/2004.
The current time of day is: 08:29:59.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: M.C.

Comments:

Model 2350 Serial # =	175852.
User I.D. =	
High Voltage =	1000 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	9.173194E-06.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	LMI44-10.
Detector Serial # =	RN015203.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 10/07/2004.
The current time of day is: 08:29:37.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: M.C.

Comments:

Model 2350 Serial # =	175852.
User I.D. =	
High Voltage =	1000 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	9.173194E-06.
Detector Calibration Constant =	5.123821E+10.
Detector Model =	LMI44-10.
Detector Serial # =	RN015203.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

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. RN015203

Customer MACTEC CONSTRUCTORS INC Order #. 223782/285468

Counter 2350-1 Serial No. 175852 Counter Input Sensitivity 10.00 mV

Count Time 60 sec Background / 6 second Source Count Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 9.173194E-06

High Voltage	Background	Isotope Am-241 Size ≈0.77μCi	Isotope Size	Isotope Size	Isotope Size
800	6720	10715			
850	6776	12701			
900	6933	12754			
950	7071	12888			
1000	7086	12991			
1050	7330	13149			
1100	8409	13343			
1150	8589	13417			
1200	9729	13576			
1250	10968	13591			

Signature Moses Campa Date 7-Oct-04

FORM C4A 04/09/2003

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.

Model 2350 Bench Test Data

Customer MACTEC CONSTRUCTORS INC Date 7-Oct-04 Order #. 223782/285468

Model 2350-1 Serial No. 175852 Detector 44-10 Serial No. RN015203

Source Cs-137 1.9mCi

High Voltage 1000 V As Found N/A V. Input 10.00 mV As Found / mV.

Cal. Constant 5.123821E+10 as found /

Dead Time 9.173194E-06 as found

Alarm Setting: Ratemeter 1000000000.000000 as found N/A

Scaler 1000000.000000 as found

Integrated dose 1000000000.0000 as found

Overload ☐ On ☑ Off as found ☐ On ☐ Off ☑ N/A Window 1000 off as found

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2000 µR/hr		1.90 mR/hr
1000		1.04 mR/hr
500	N/A	543 µR/hr
200		208 µR/hr
100 µR/hr		105 µR/hr

Other "NOT ABLE TO RECALL DETECTOR SETTINGS"

Signature Moses Campos Date 7-Oct-04

FORM C6-1 04/09/2003

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 CONSTRUCTORS INC ORDER NO. 226689/286947

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 186175

Cal. Date 26-Nov-04 Cal Due Date 26-Nov-05 Cal. Interval 1 Year Meterface n/a

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 33 % Alt 692.8 mm Hg

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

☑ Mechanical check ☑ Input Sens. Linearity

☑ F/S Resp. check ☑ Reset check ☑ Window Operation

☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC

☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check

☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio 100 = 10 mV

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

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1998 V

COMMENTS: *Firmware: 37122N28*

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I/O FIRMWARE# 37123N05
RESOLUTION FOR Cs-137 IS 8.9%.

NO "AS FOUNDS" DUE TO UNACCESSIBLE MEMORY.
```

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

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR199144	950	100	4 / 2	1.123691E-05	5.078137E+10	✓
Detector # 2	LMI44-10	PR199144	950	100	7 / 1	1.123691E-05	1.000000E+00	
Detector # 3	PK/CS-137	662KEV	710	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 – rad, 1 – Gray, 2 – rem, 3 – Sv, 4 – R, 5 – C/Kg, 6 – Disintegrations, 7 – Counts, 8 – Ci/cm sq., 9 – Bq/cm sq.

Time Base: 0 – Seconds, 1 – Minutes, 2 – Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400 K cpm		39971 (0)	400 cpm		40 (0)
	40 K cpm	N/A	3993 (0)	40 cpm	N/A	4 (0)
	4 K cpm		399 (0)			

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

Reference Instruments and/or Sources: Cs-137 Gamma S/N

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

Na S/N ☐ Beta S/N ☑ Other Am-241/Be 0.75μCi

189509 ☑ Multimeter S/N 80820360

Date 26-NOV-04

Date 30 NOV 04

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

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.

Model 2350 Bench Test Data

Customer MACTEC CONSTRUCTORS INC Date 26-Nov-04 Order #. 226689/286947

Model 2350-1 Serial No. 186175 Detector 44-10 Serial No. PR199144

Source 1.9 mCi - Cs-137

High Voltage 950 V As Found N/A V. Input 10.00 mV As Found N/A mV.

Cal. Constant 5.078137E+10 as found

Dead Time 1.123691E-05 as found

Alarm Setting: Ratemeter 1000000000.000000 as found N/A

Scaler 1000000.000000 as found

Integrated dose 1000000000.0000 as found

Overload ☐ On ☑ Off as found ☐ On ☐ Off ☑ N/A Window 1000 off as found

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2000 µR/hr	N/A	1.90 mR/hr
1000		1.02 mR/hr
500		524 µR/hr
200		202 µR/hr
100 µR/hr		98.3 µR/hr

Other "No Detector Setup"

Signature Moses Campos Date 26-Nov-04

FORM C6-1 04/09/2003

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. PR199144

Customer MACTEC CONSTRUCTORS INC Order #. 226689/286947

Counter 2350-1 Serial No. 186175 Counter Input Sensitivity 10.00 mV

Count Time 1 minute Background / 6 seconds Source Count. Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 1.123691E-05

High Voltage	Background	Isotope Am-241 Size ≈ 0.25 μCi	Isotope Size	Isotope Size	Isotope Size
800	5715	9005			
850	5857	9644			
900	5861	10686			
950	5934	10759			
1000	5965	10813			
1050	5974	10997			
1100	6057	11038			
1150	6120	11100			
1200	6206	11110			

Signature Moze Camp Date 26 NOV 04

FORM C4A 04/09/2003

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 11/26/2004.
The current time of day is: 10:50:39.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: M.C.

Comments:

Model 2350 Serial # =	186175.
User I.D. =	
High Voltage =	950 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.123691E-05.
Detector Calibration Constant =	5.078137E+10.
Detector Model =	LMI44-10.
Detector Serial # =	PR199144.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D2 in the Model 2350.
Today's date is 11/26/2004.
The current time of day is: 10:51:01.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: M.C.

Comments:

Model 2350 Serial # =	186175.
User I.D. =	
High Voltage =	950 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.123691E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	LMI44-10.
Detector Serial # =	PR199144.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D3 in the Model 2350.
Today's date is 11/26/2004.
The current time of day is: 10:51:19.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: MC.

Comments:

Model 2350 Serial # =	186175.
User I.D. =	
High Voltage =	710 volts.
Threshold =	642.
Window =	40,On.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	6 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	0.000000E+00.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	PK/CS-137.
Detector Serial # =	662KEV.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	6.5 volts.

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 97833
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-02280	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) ± 10%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 – 110	99	99
X 1	250	250	250	1,000 CPM	.2	180 – 220	197	197
X 1	400	400	400	1,000 CPM	.5	450 – 550	494	494
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	989	989
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	1989	1989
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4943	4943
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	250,000	250,000	250,000					
X 1000	400,000	400,000	400,000					

STATEMENT OF CERTIFICATION

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

Instrument Calibrated By: [signature]	Reviewed By: [signature]	Date: 11-9-04
Calibration Date: 11/9/2004	Calibration Due: 11/9/2005	

Model: 2221 Serial Number: 97833

M&TE					Environmental Conditions				
Volt Meter	Due Date:	10/19/05	ID	6565015	D-812	Due Date:	04/15/05	ID:	2816
Pulser	Due Date:	04/13/05	ID	120935	Psychron	Due Date:	02/11/05	ID:	7480
Timer	Due Date:	03/04/05	ID	02010806	Temp: 19.1 °C	Pressure: 751 mmHg		Humidity: 34%	

INSTRUMENT CALIBRATION INFORMATION

Special Test

Geotropism	Sat (√) Unsat ( )	Hold	Sat (√) Unsat ( )
BAT > 4.5	Sat (√) Unsat ( )	Volume Test	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )	Audio Divide	Sat (√) Unsat ( )
Digital Zero	Sat (√) Unsat ( )	Window Switch	Sat (√) Unsat ( )
Count	Sat (√) Unsat ( )	Lamp	Sat (√) Unsat ( )

High Voltage Calibration

Voltage	Tolerance ± 2%	As Found	As Left
400	392-408	405	405
1,000	980-1,020	1,016	1,016
1,500	1,470-1,530	1,520	1,520
1,900	1,862-1,932	1,922	1,922

Threshold/Gain Calibration (Desired Ratio 10 mV/100)

Input	As Found Value	As Found Ratio (mV/100)	As Left Value	As Left Ratio (mV/100)
10	92	10.9	92	10.9
20	188	10.6	188	10.6
30	290	10.3	290	10.3
40	390	10.3	390	10.3

Logmeter Scale Linearity Check

Input		±20% Tolerance	As Found	As Left
LOG	400	320-480	400	400
LOG	4,000	3,200-4,800	4,000	4,000
LOG	40,000	32,000-48,000	40,000	40,000
LOG	400,000	320,000-480,000	350,000	350,000

COMMENTS

Calibrated in accordance with the OEM Technical Manual

Instrument Calibrated By: [signature]	Reviewed By: [signature] Date: 11-9-04
Calibration Date: 11/9/2004	Calibration Due: 11/9/2005

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Thomas Scott		Serial Number: 0534
Customer Purchase Order Number: N/A	Work Order Number: 2004-01610	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Cs^{137}	Serial Number: 019454			Activity: 5uCi	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711			Activity: Variable	Certification Date: 04/09/04
Desired Exposure (µR/hr)	Detector Response (cpm)	Background (cpm)	(cpm/µR/hr)	Precision Test @250µR/hr	cpm (Source #2)
200	212,955	7,447	1,028	Count 1	256,949
250	259,949	7,447	1,010	Count 2	257,321
400	373,891	7,447	916	Count 3	257,709
Average cpm/uR/hr	985			Average	257,326
				Tolerance ±10%	All counts within ±10% of Average
				Pass/Fail	PASS

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	97833	11/9/2005	7,447	1,100	100 = 10mV
Voltage Plateau:	YES ✓ NO				

COMMENTS

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

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

Detector Certified By:	Reviewed By: Thomas F. Scott Date: 15-9-04
Certification Date: 11/9/2004	Certification Due: 11/9/2005

BACKGROUND PLATEAU 44-10#0534 11/09/04

00	77
750	111
800	235
850	336
900	504
950	578
1000	683
1050	707
1100	692
1150	704
1200	712
1250	731
1300	782
1350	730

SOURCE PLATEAU Cs137 #019454 5uCi BUTTON

700	1061
750	1598
800	2153
850	2633
900	3011
950	3218
1000	3430
1050	3511
1100	3633
1150	3525
1200	3704
1250	3647
1300	3674
1350	3650

Thomas F. Scott 11-9-04

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Thomas Scott		Serial Number: 0534
Customer Purchase Order Number: N/A	Work Order Number: 2004-01610	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Cs^{137}	Serial Number: 019454			Activity: 5uCi	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711			Activity: Variable	Certification Date: 04/09/04
Desired Exposure (µR/hr)	Detector Response (cpm)	Background (cpm)	(cpm/µR/hr)	Precision Test @250µR/hr	cpm (Source #2)
200	212,955	7,447	1,028	Count 1	256,949
250	259,949	7,447	1,010	Count 2	257,321
400	373,891	7,447	916	Count 3	257,709
Average cpm/uR/hr	985			Average	257,326
				Tolerance ±10%	All counts within ±10% of Average
				Pass/Fail	PASS

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	97833	11/9/2005	7,447	1,100	100 = 10mV
Voltage Plateau:	YES ✓ NO				

COMMENTS

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

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

Detector Certified By:	Reviewed By: Thomas F. Scott Date: 11-9-04
Certification Date: 11/9/2004	Certification Due: 11/9/2005

BACKGROUND PLATEAU 44-10#0534 11/09/04

00	77
750	111
800	235
850	336
900	504
950	578
1000	683
1050	707
1100	692
1150	704
1200	712
1250	731
1300	782
1350	730

SOURCE PLATEAU Cs137 #019454 5uCi BUTTON

700	1061
750	1598
800	2153
850	2633
900	3011
950	3218
1000	3430
1050	3511
1100	3633
1150	3525
1200	3704
1250	3647
1300	3674
1350	3650

Thomas F. Scott 11-9-04

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 117651
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01309	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) ± 10%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 – 110	100	100
X 1	200	200	200	1,000 CPM	.2	180 – 220	200	200
X 1	400	400	400	1,000 CPM	.5	450 – 550	500	500
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	1,000	1,000
X 10	2,000	2,000	2,000	1,000 CPM	2	1.8K–2.2K	1,999	1,999
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,998	4,998
X 100	10,000	10,000	10,000					
X 100	20,000	20,000	20,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	200,000	200,000	200,000					
X 1000	400,000	400,000	400,000					

STATEMENT OF CERTIFICATION

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

Instrument Calibrated By:	Reviewed By: Tom F. Scott Date: 1-19-04
Calibration Date: 01/19/04	Calibration Due: 01/19/05

Model: 2221 Serial Number: 117651

M&TE					Environmental Conditions				
Volt Meter	Due Date:	02/12/04	ID	TW12662	Barometer	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	04/02/04	ID	762	Thermometer	Due Date:	10/22/04	ID:	2525
Timer	Due Date:	02/11/04	ID	02010806	Temp: 24.3 °C	Pressure: 740mmHg		Humidity: 31%	

INSTRUMENT CALIBRATION INFORMATION

Special Test

Geotropism	Sat (✓) Unsat ( )	Hold	Sat (✓) Unsat ( )
BAT > 4.5	Sat (✓) Unsat ( )	Volume Test	Sat (✓) Unsat ( )
Mechanical Zero	Sat (✓) Unsat ( )	Audio Divide	Sat (✓) Unsat ( )
Digital Zero	Sat (✓) Unsat ( )	Window Switch	Sat (✓) Unsat ( )
Count	Sat (✓) Unsat ( )	Lamp	Sat (✓) Unsat ( )

High Voltage Calibration

Voltage	Tolerance ± 10%	As Found	As Left
400	392-408	398	398
1,000	980-1,020	995	995
1,500	1,470-1,530	1,503	1,503
1,900	1,862-1,932	1,895	1,895

Timer Calibration

Time (sec.)	Tolerance	As Found	As Left
300	290-310	300	300

Threshold/Gain Calibration (Desired Ratio 10 mV/100)

Input	As Found Value	As Found Ratio (mV/100)	As Left Value	As Left Ratio (mV/100)
10	78	7.8	90	9
20	186	9.3	200	10
30	304	10	316	10.5
40	402	10	440	11

Logmeter Scale Linearity Check

Input		±20% Tolerance	As Found	As Left
LOG	400	320-480	400	400
LOG	4,000	3,200-4,800	4,000	4,000
LOG	40,000	32,000-48,000	40,000	40,000
LOG	400,000	320,000-480,000	400,000	400,000

COMMENTS

Calibrated in accordance with OEM manual.

Instrument Calibrated By:	Reviewed By: Thomas F. Scott Date: 1-19-04
Calibration Date: 01/19/04	Calibration Due: 01/19/05

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Thomas Scott		Serial Number: 192589
Customer Purchase Order Number: N/A	Work Order Number: 2004-01367	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Cs^{137}	Serial Number: 1296115			Activity: 5μCi	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711			Activity: Variable	Certification Date: 04/09/03
Desired Exposure (μR/hr)	Detector Response (cpm)	Background (cpm)	(cpm/uR/hr)	Precision Test @250μR/hr	cpm (Source #2)
200	201,848	4,913	984.7	Count 1	246,403
250	246,567	4,913	966.6	Count 2	246,112
400	386,059	4,913	952.9	Count 3	246,220
Average cpm/uR/hr	968.1			Average	246,912
				Tolerance ±10%	All counts within ±10% of Average
				Pass/Fail	PASS

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	117651	01/19/05	4,913	1100V	100 = 10mV
Voltage Plateau:	YES ✓ NO				

COMMENTS

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

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

Detector Certified By: Mike Pauti	Reviewed By: Thomas F. Scott	Date: 2-10-04
Certification Date: 02/10/04	Certification Due: 02/10/05	

BACKGROUND PLATEAU 44-10#192589 5FT CABLE 2/09/2004

700	148
750	241
800	418
850	555
900	707
950	805
1000	804
1050	783
1100	790
1150	822
1200	785
1250	803
1300	784
1350	879

SOURCE PLATEAU CS-137#1296115

700	3111
750	4401
800	5391
850	6299
900	6527
950	6822
1000	6970
1050	7002
1100	7151
1150	7109
1200	7039
1250	7207
1300	7047
1350	7370

James G. Scott

2-10-04

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 CONSTRUCTORS INC ORDER NO. 206408/276907

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 183077

Mfg. Ludlum Measurements, Inc. Model 43-89 Serial No. PR 191002

Cal. Date 1-Dec-03 Cal Due Date 1-Dec-04 Cal. Interval 1 Year Meterface 202-783

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 69 °F RH 20 % Alt 712.8 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 750 V Input Sens. Comment mV Det. Oper. 750 V at Comment mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 494 V Ref./Inst. 1500 / 1494 V

COMMENTS:

AT: 120mV
BT: 3.5mV
BW: 30mV
O.L. SET TO SIMULATE LIGHT LEAK.
FIRMWARE # 390063.

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

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X1000	400 K cpm	400	400
X1000	100 K cpm	100	100
X100	40 K cpm	400	400
X100	10 K cpm	100	100
X10	4 K cpm	400	400
X10	1 K cpm	100	100
X1	400cpm	400	400
X1	100cpm	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	400 K cpm	398021	398599	Log Scale			
	40 K cpm	39772	39871				
	4 K cpm	3980	3980				
	400 cpm	398	398				
	40 cpm	39	40				

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

Reference Instruments and/or Sources:

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

☑ Alpha S/N Pu-239 / 2928 ☑ Beta S/N Tc-99 / NI-EV ☑ Other Sr-90 / 4016

☑ m 500 S/N 189509 ☐ Oscilloscope S/N ☑ Multimeter S/N 80820360

Calibrated By: Moses Campos Date 1-Dec-03

Reviewed By: W J Robison Date 9 Dec 03

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 11/26/2003

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

Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Detector

Detector 43-89 Serial No. PR 191002

Customer MACTEC CONSTRUCTORS INC

Counter 2224 Serial No. 183077

Count Time 1Minute

Other

Order #. 206408/276907

Alpha Input Sensitivity 120 mV

Beta Input Sensitivity 3.5 mV

Beta Window 30 mV

Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Pu-239 Size 12,600 cpm Alpha	Isotope Pu-239 Size 12,600 cpm Beta	Isotope Tc-99 Size 14,100 cpm Alpha	Isotope Tc-99 Size 14,100 cpm Beta	Isotope Sr-90 Size 44032 cpm Alpha	Isotope Sr-90 Size 44032 cpm Beta
725	1	160	4484	364	1	2576	3	12929
750	1	211	4723	555	3	3448	3	15988
775 Bac	2	268	4848	1134	3	4269	2	17968
800	1	352	5148	2133	2	5098	8	19062

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

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Thomas Campo

Date 1-Dec-03

FORM C4B 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

Work Order: 206408

TAG #: 276907

LUDLUM MEASUREMENTS, INC
POST OFFICE BOX 810 PH: 915-235-5494
501 OAK STREET FAX: 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Date Received: 11/11/2003 Received Via: FEDEX SAVER Condition Received: WORN

SHIP TO:
MACTEC CONSTRUCTORS INC
ATTN: BOB CLARK
2000 DAY HILL ROAD
WINDSOR CT 06095

BILL TO:
MACTEC CONSTRUCTORS INC
ATTN: A/P, CE WINDSOR
2000 DAY HILL ROAD
WINDSOR CT 06095

CUSTOMER #: 16943

Reason for Return: Repair/Calibration Cal Interval \ Special Instructions: 1 / YR

Comments: Replaced Window in Detector.
Cal'd. Instrument.

left message 1-Dec

ITEM	QTY	PART #	DESCRIPTION	PRICE	COST
01*	1.00 EA	2224	M 2224 FOR REPAIR/CAL *183077		
02*	1.00 EA	43-89	M 43-89 FOR REPAIR/CAL *PR191002		
03*	1.00 EA	C	'C' CABLE		

ITEM	QTY	PART #	DESCRIPTION	PRICE	COST
2	1	4393-043	Window	15.00	
1	2	21-9312	D Batteries	—	—

Instrument Calibrated: ____ at ____ Total Parts Cost: 180 Total Calibration, Parts, and Labor: 1250

Secondary Detectors: ____ at ____ Total Calibration Charge: 70.00 Shipping Charges: ____

Extended Calibration: 1 at 70 Total Labor: 27.50 Total Charges: ____

Labor: 1/2 hour(s) at $ 55 per hour

Signed: Mary Campa Date: 1 DEC 03

QC Released: [illegible] 9 DEC 03

DO NOT PAY! INVOICE TO FOLLOW

Date: 4-Dec-03 Contacted: BOB CLARK ok

By: [illegible]

PO Number: M02212-0189 Return Ship: [illegible] Phone 860-285-2544

EFFICIENCY DETERMINATION

Instrument L-2224 Serial # 183077

Probe L-43-93 Serial # 212501

Source Counts

Tc-99 (100 cm2	Cl-36 (100 cm2	Th-230 2" Disk	Background	
Beta CPM	Beta CPM	Alpha CPM	Beta CPM	Alpha CPM
N/A	4093	667	245	2
	4030	630	238	0
	4067	624	188	0
	4071	621	234	0
	4077	658	201	2
Average #DIV/0!	4067.6	640	221.2	0.8

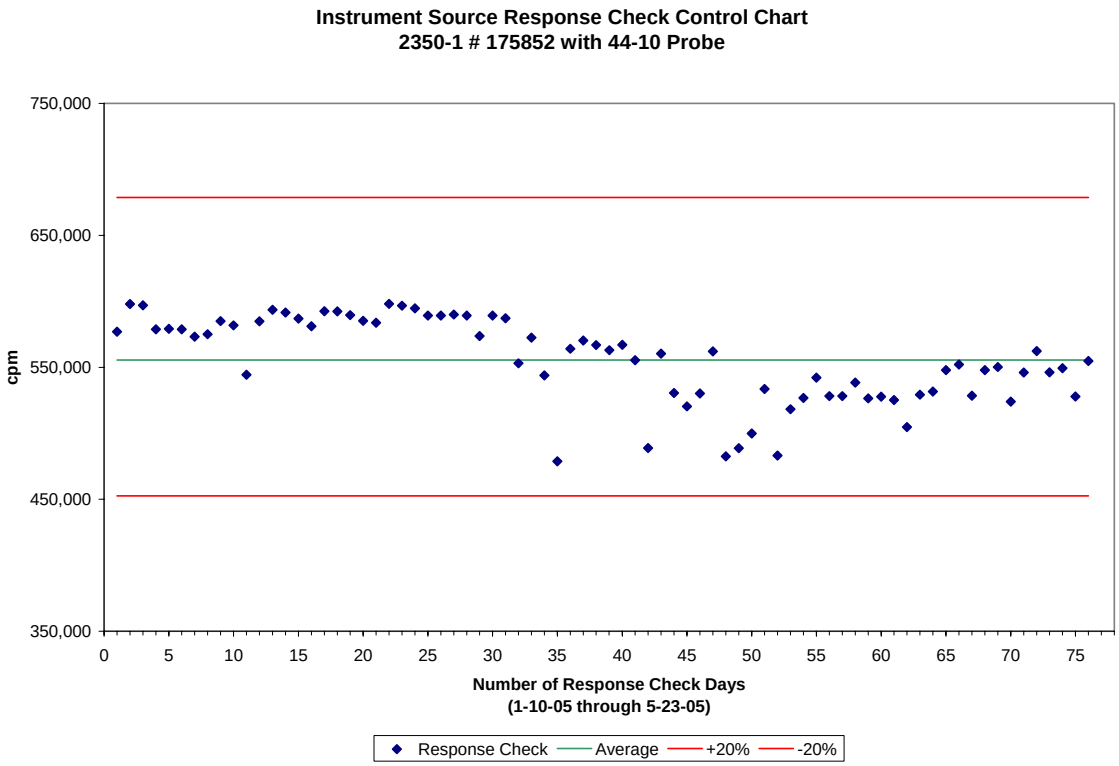
Isotope	Source ID	Activity DPM
Tc-99	KD658	23460
Cl-36	KD659	19980
Th-230	2907-01	4410
Other		

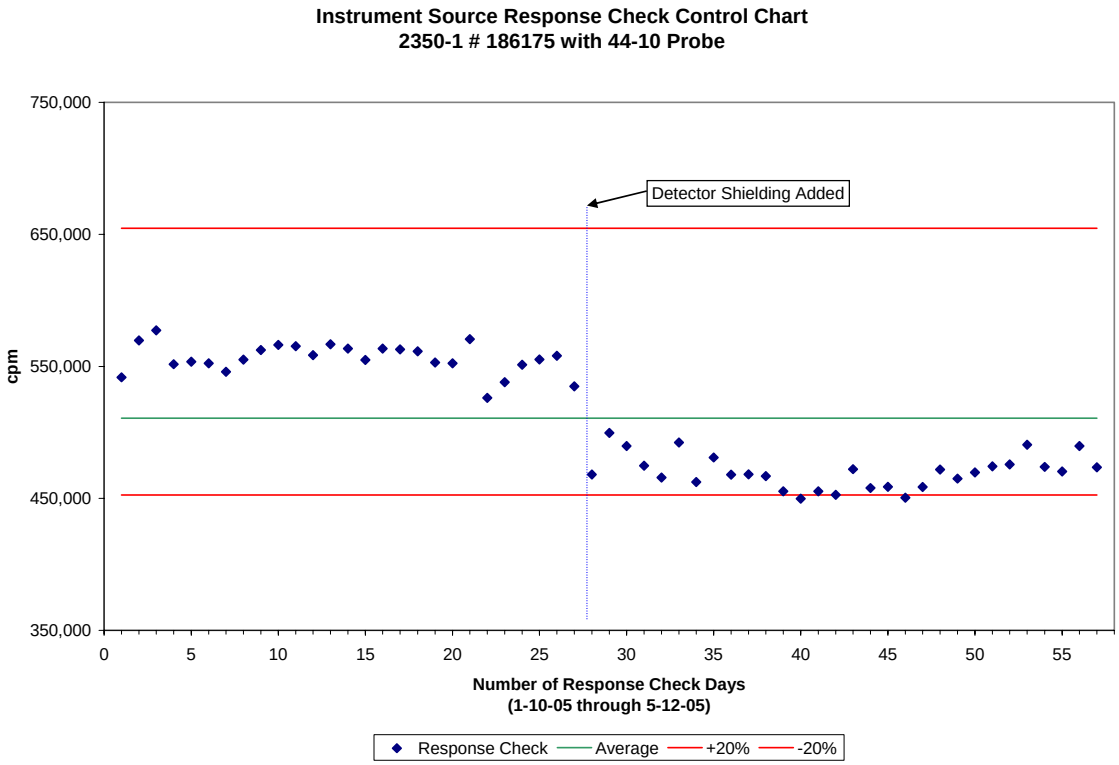
Instrument Efficiency
#DIV/0!
19.3%
14.5%

Performed By: [signature] Date: 3/1/04

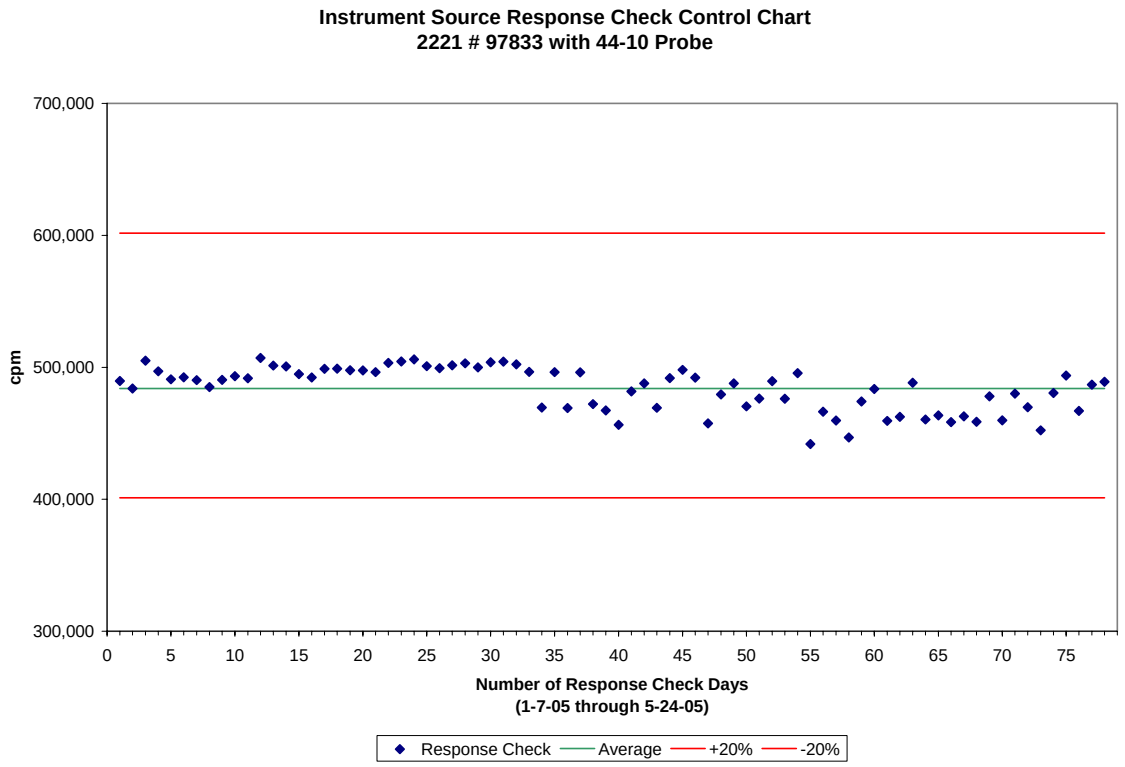
Reviewed By:: [signature] Date: 1/14/04

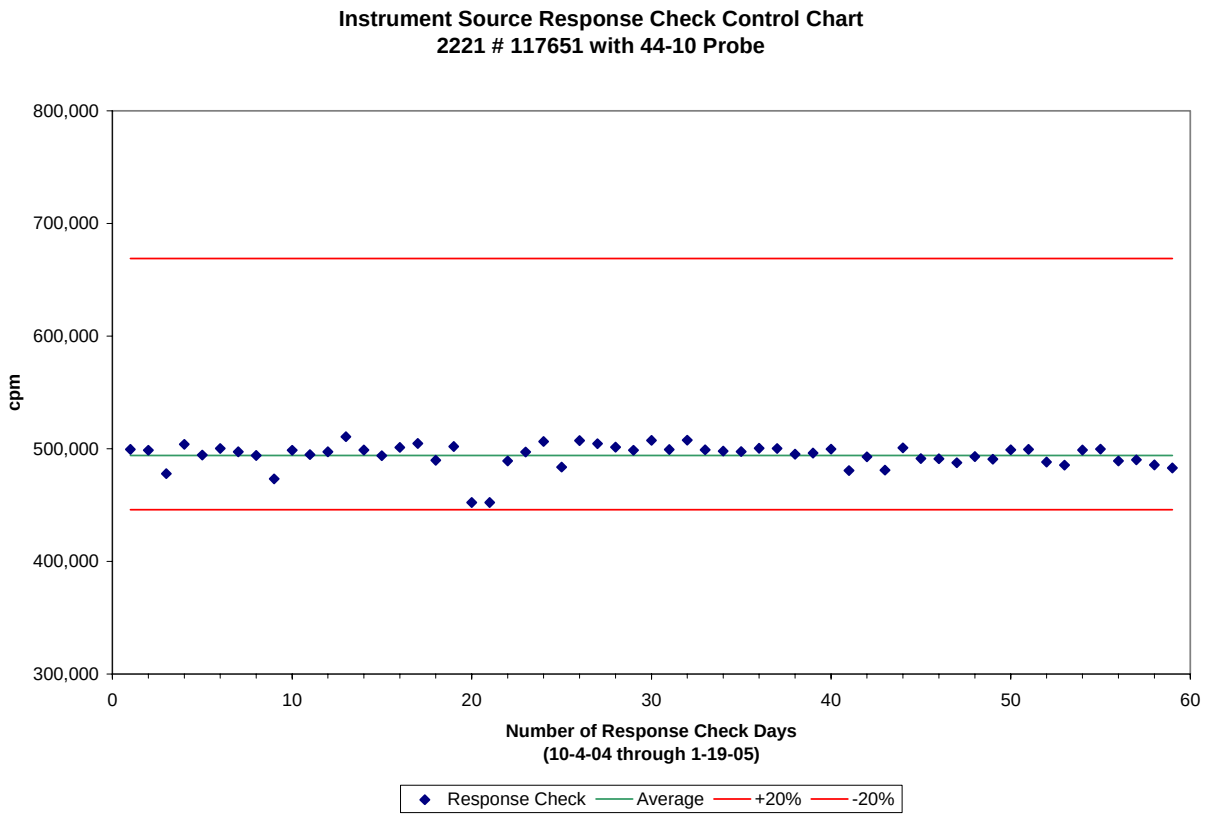
Portable Instrument Control Charts



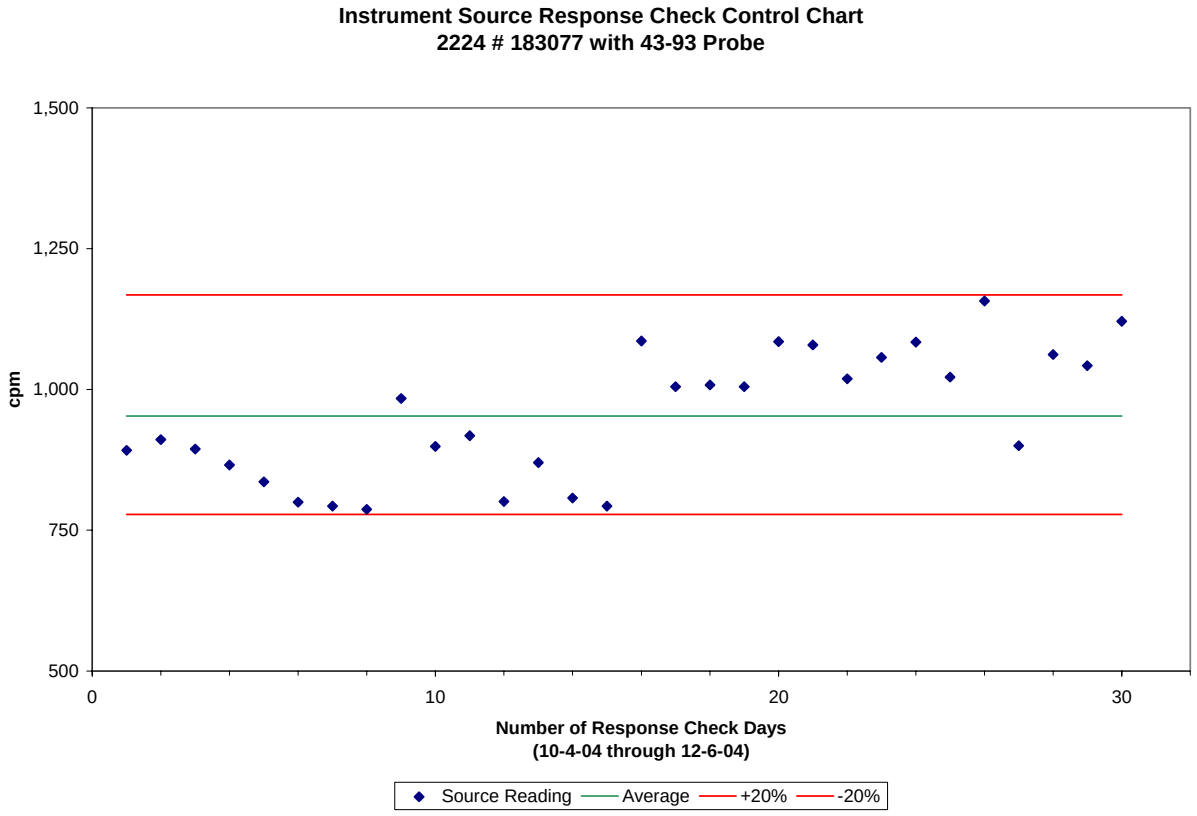


Portable Instrument Control Charts





Portable Instrument Control Charts



INSTRUMENT QC CHECK SHEET

Date 10/27/2004 Time 1015

Instrument Ludlum 2350 Serial # 175852

Probe 44-10 Serial # RN015203

Calibration Due Date 10/7/2005

QC Source

Source ID SRS-020 Isotope Cs-137

QC Check Location Mactec HP

QC Counts		
Count	Gamma CPM	Alpha DPM
1	564524	
2	563901	
3	566493	
4	565862	
5	567367	
Average	565629	0

QC Range		
Gamma CPM X 20%		113126
Alpha DPM X 20%		0
	Max	Min
Gamma	678755	452504
Alpha	0	0

Performed By: Michael Sweet

Reviewed By:

Date 7/7/05

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: 2350 Serial No: 175852 Probe: 44-10 Serial No: 15203

Cal. Preformed Date: OCT-7-04 Cal. Due Date: OCT-7-05

Response Check Location: MACTEC HP AREA

Source ID: SRS-020 Source Jig ID: NAI

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 565679 +20% 678755 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
6/28/05 1315	NA	1640		513404	SAT	MS

Comments:

RSO Review: [signature] Date: 7/7/05

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: 2350-1 Serial No: 175832 Probe: 44-10 Serial No: 15203

Cal. Preformed Date: 7 Oct 2004 Cal. Due Date: 7 Oct 2005

Response Check Location: MACTEC HP AREA

Source ID: SRC-020 Source Jig ID: NAI

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 565629 +20% 678755 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
20 Apr 05	NA	1813	NA	526241	SAT	[illegible]
21 Apr 05	NA	1724	NA	528171	SAT	[illegible]
22 APR 05	N/A	2152	N/A	538418	SAT	[illegible]
4/25/05		1901		526414	SAT	[illegible]
26 Apr 05		1774		~~47183~~ 327696	SAT	[illegible]
27 Apr 05		1796		525189	SAT	[illegible]
28 Apr 05		1722		504675	SAT	[illegible]
29 Apr 05		1713		529255	SAT	[illegible]
2 May 05		1864		531618	SAT	[illegible]
3 MAY 2005		1721		547835	SAT	[illegible]
5-4-05		1760		552167	SAT	JT
5/9/05		1723		528497	SAT	[illegible]
5/10/05		1696		547897	SAT	[illegible]
5/11/05		1781		550190	SAT	[illegible]
12 MAY 05		1646		524006	SAT	[illegible]
~~5/13/05~~				51		
5/16/05		3196		545567	SAT	[illegible]
5/17/05		2736		562254	SAT	[illegible]
5/18/05		1662		546223	SAT	JT
5/19/05		1752		549241		
5/20/05		1803		527852	SAT	[illegible]
5/23/05		1795		554671	SAT	[illegible]

Comments:

RSO Review: [illegible] Date: 7/7/05

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: 2350-1 Serial No: 175852 Probe: 44-10 Serial No: M015205

Cal. Preformed Date: 10-7-04 Cal. Due Date: 10-7-05

Response Check Location: HP Area

Source ID: SRS-020 Source Jig ID: NaI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 565624 +20% 678755 -20% 452524

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
3/16/05 0600	NA	2045	NA	478765	SAT	[illegible]
~~3/17/05~~		~~1554~~				
3/17/05		2056		564100	SAT	[illegible]
3/18/05		1742		570278	SAT	[illegible]
~~3/21/05 0630~~		~~2158~~		~~491112~~		[illegible]
3/21/05 0630		2158		566521	SAT	[illegible]
3/22/05 1400		2030		562917	SAT	[illegible]
3/23/05 0900		2144		567060	SAT	[illegible]
24 Mar 2005		2242		555392	SAT	[illegible]
3/28/05 0600		2136		488836	SAT	[illegible]
3/29/05 0615		2155		560528	SAT	[illegible]
3/30/05 0600		2135		530420	SAT	[illegible]
3/31/05 0630		2165		520381	SAT	[illegible]
4/1/05 0900		2214		530261	SAT	[illegible]
4/4/05 0600		2035		562074	SAT	[illegible]
4/5/05 0600		1892		482539	SAT	[illegible]
6 Apr 05		2086		488648	SAT	[illegible]
7 Apr 05		2015		499932	SAT	[illegible]
4/11/05 0945		2063		533581	SAT	[illegible]
13 Apr 05		2174		483198	SAT	[illegible]
14 Apr 05		1687		518242	SAT	[illegible]
4/18/05		1660		526813	SAT	[illegible]
4/19/05		1789		542163	SAT	[illegible]

Comments:

RSO Review: [signature] Date: 7/7/05

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

Portable Instrument Response Check Sheet

Instrument: Lod 2356 Serial No: 175852 Probe: 44-10 Serial No: RN015203

Cal. Preformed Date: 10-7-04 Cal. Due Date: 10-7-05

Response Check Location: Macfee RP Area

Source ID: SR5-020 Source Jig ID: NaI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 565629 +20% 678755 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
2-2-05 0615	NA	1656	NA	581128	SAT	MS
2-3-05 0612	NA	1574	NA	592434	SAT	MS
2-7-05 0620		1776		592274	SAT	MS
2-8-05 0605		1622		589597	Sat	CMP
2-9-05 0630		1719		585195	Sat	CMP
2-10-05 0630		2033		583781	Sat	CMP
2-15-05 0705		1660		598146	Sat	CMP
2-16-05 0645		1745		596641	Sat	CMP
2-17-05 0645		1695		594640	Sat	CMP
2-21-05 0650		1735		589209	Sat	CMP
2-22-05 0645		1605		589189	Sat	CMP
2-23-05 0625		1776		590042	Sat	CMP
2-24-05 0630		1778		589177	Sat	CMP
2-28-05 0650		2098		573640	Sat	CMP
3-1-05 0710		1895		589187	Sat	CMP
3-2-05 0630		2019		587152	Sat	CMP
3/2/05 1130		~~2428~~ 1679		553061	SAT	MP
3/14/05 1700		2068		572410	SAT	MP
3/15/05 1700		2141		543933	SAT	MP

Comments:

RSO Review: [signature] Date: 7/7/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Ludl 2350 Serial No: 178852 Probe: 44-10 Serial No: RN015208

Cal. Preformed Date: 10-7-04 Cal. Due Date: 10-7-05

Response Check Location: MacTec HP

Source ID: SRS-020 Source Jig ID: NAI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 565629 +20% 678755 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
12-29-04 0630	NA	1784	NA	573913	SqT	MJ
12-30-04 0625		1686		567002	SqT	MS
1-4-05 0627		1915		554972	SqT	MS
1-5-05 0622		1874		591258	SqT	MS
1-10-05 0647		1569		577015	SqT	MJ
1-11-05 0619		1665		597916	SqT	MS
1-12-05 0612		1778		597008	SqT	MS
1-13-05 0609		1628		578773	SqT	MS
1-17-05 0625		1673		579114	SqT	MS
1-18-05 0610		1618		578840	SqT	MJ
1-19-05 0600		1674		573217	SqT	MS
1-20-05 0605		1812		575088	SqT	MS
1-21-05 @ 0935		1708		524995	SqT	[illegible]
1-24-05 0627		1648		581767	SqT	MS
1-25-05 0602		1764		544265	SqT	MS
1-26-05 0620		1634		584819	SqT	MS
1-27-05 0618		1806		593530	SqT	MS
1-31-05 0610		1658		591490	SqT	MS
2-1-05 0600		1674		586596	SqT	MS

Comments:

RSO Review: [signature] Date: 7/1/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Ludlum 2350 Serial No: 175852 Probe: 44-10 Serial No: RN015203

Cal. Preformed Date: 10/7/04 Cal. Due Date: 10/7/05

Response Check Location: Healthwork HP

Source ID: SRS-020 Source Jig ID: NAI-2

Source Reference Reading (α): _____ +20% _____ -20% _____

Source Reference Reading (βγ): 565629 +20% 678755 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
11/16/04 1430	NA	-	NA	560655	SAT	RC
11/17/04 0630				564640	SAT	MS
11/18/04 0622		4157		560208	SAT	MS
11/22/04 0608		4634		575495	SAT	MS
11/23/04 0622		4269		574511	SAT	MS
11/24/04 0625		4383		568612	SAT	MS
11/28/04 0620		4345		567271	SAT	MS
11/30/04 0629		4180		561785	SAT	MS
12-1-04 0805		4863		583513	Sat	LP
12-2-04 0620		4974		568459	SAT	MS
12-6-04 0620		4618		572999	SAT	MS
12-9-04 1015		1825		594528	SAT	RC
12-13-04 0625		1685		586227	SAT	MS
12-14-04 0622		1595		563574	SAT	MS
12-15-04 0618		1656		587524	SAT	MS
12-16-04 0622		1708		560283	SAT	MS
12-20-04 0805		1559		584627	Sat	LP
12-21-04 0630		1523		577170	SAT	MS
12-22-04 0618		2236		566288	SAT	MS
12-27-04 0715		1856		578796	SAT	MS
12-28-04 0622		1773		576290	SAT	MS

Comments:

RSO Review: [signature] Date: 7/7/05

INSTRUMENT QC CHECK SHEET

Date 12/16/2004 Time 1015

Instrument Ludlum 2350 Serial # 186175

Probe 44-10 Serial # PR199144

Calibration Due Date 11/26/2005

QC Source

Source ID SRS-020 Isotope Cs-137

QC Check Location Mactec HP

QC Counts		
Count	Gamma CPM	Alpha DPM
1	540842	
2	542095	
3	544085	
4	547018	
5	553230	
Average	545454	0

QC Range		
Gamma CPM X 20%		109091
Alpha DPM X 20%		0
	Max	Min
Gamma	654545	452504
Alpha	0	0

Performed By:

Reviewed By: Date

MAR 04 2005

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: 2350-1 Serial No: 186475 Probe: 44-10 Serial No: 139494

Cal. Preformed Date: 26 Nov 04 Cal. Due Date: 26 Nov 05

Response Check Location: MACTECH HP

Source ID: SRS -020 Source Jig ID: ___

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 545454 +20% 654545 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
2 May 2005	NA	1454	NA	475597	SAT	[illegible]
3 MAY 2005	N/A	1398	N/A	490632	SAT	[illegible]
5/4/05	N/A	1546	N/A	473741	SAT	[illegible]
5/4/05	N/A	1342		470397	SAT	[illegible]
5/4/05		1451		489670	SAT	[illegible]
12/14/05		1646		478487	SAT	[illegible]

Comments:

RSO Review: [signature] Date: ___

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PORTABLE INSTRUMENT RESPONSE CHECK SHEET

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Instrument: 2350-1 Serial No: 186175 Probe: 44-10 Serial No: 199144

Cal. Preformed Date: 11/26/04 Cal. Due Date: 11/26/05

Response Check Location: MacTech HP

Source ID: SRS-020 Source Jig ID:

Source Reference Reading (α): N/A +20% N/A -20% N/A

Source Reference Reading (βγ): 545-454 +20% 654545 -20% 45-2504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
3/30/05 0900	N/A	1635	N/A	489638	SAT	[illegible]
3/31/05 0630		1403		474778	SAT	[illegible]
4/1/05 0730		1526		465721	SAT	[illegible]
4/4/05		1382		492361	SAT	[illegible]
4/5/05		1312		462297	SAT	[illegible]
6 Apr 05		1.294		480904	SAT	[illegible]
7 Apr 05		1480		467846	SAT	[illegible]
4/11/05 0700		1323		468226	SAT	[illegible]
4/12/05 0400		1468		466352	SAT	[illegible]
13 Apr 05		1436		455319	SAT	[illegible]
14 Apr 05		1378		449694	SAT	[illegible]
4/15/05		1560		455376	SAT	[illegible]
4/18/05		1362		452614	SAT	[illegible]
4/19/05		1406		471165	SAT	[illegible]
20 Apr 05		1516		457776	SAT	[illegible]
21 Apr 05		1404		458706	SAT	[illegible]
22 Apr 05		1565		450506	SAT	[illegible]
4/25/05		1356		458566	SAT	[illegible]
26 Apr 2005		1441		471755	SAT	[illegible]
27 Apr 05		1492		464934	SAT	[illegible]
28 Apr 05		1551		469599	SAT	[illegible]
29 Apr 05		1414		474338	SAT	[illegible]

Comments:

RSO Review: [illegible] Date:

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

Portable Instrument Response Check Sheet

Instrument: 2350-1 Serial No: 186175 Probe: 44-10 Serial No: 199144

Cal. Preformed Date: 11-26-04 Cal. Due Date: 11-26-05

Response Check Location: Mactec HP office

Source ID: SRS-020 Source Jig ID:

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 545454 +20% 654545 -20% 452504

Date/Time	α Bkg	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
1-26-05 0625	NA	3858	NA	565242	SAT	MS
1-27-05 0612		3688		558415	SAT	MS
1-31-05 0622		3742		566740	SAT	MS
2-1-05 0550		3707		563490	SAT	MS
2-2-05 0605		4000		554885	SAT	MS
2-3-05 0615		4683		563418	SAT	MS
2-7-05 0612		4934		562816	SAT	MS
2-8-05 0610		3636		561471	Sat	cmf
2-9-05 0635		4509		552821	sat	cmf
2.10.05 0640		4187		552182	sat	cmf
2.15.05 0705		3973		570545	sat	cmf
2.16.05 0650		4939		526192	sat	cmf
2.17.05 0655		5034		537921	sat	cmf
2.21.05 0650		4905		551092	sat	cmf
2.22.05 0645		4777		555211	sat	cmf
2.23.05 0630		4690		557951	sat	cmf
2.24.05 0630		4816		534878	sat	cmf
3-23-05 1200		1439*		467999*	SAT	[illegible]
24 Mar 05 0620	↓	1406	↓	499606	SAT	[illegible]

Comments:
* QC with Proxop shield installed

RSO Review: [signature] Date:

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: 2350-1 Serial No: 186175 Probe: 44-10 Serial No: 199144

Cal. Preformed Date: 11-26-04 Cal. Due Date: 11-26-05

Response Check Location: MDETEC HP Office

Source ID: SRS-020 Source Jig ID: NaI-2

Source Reference Reading (α): — +20% — -20% —

Source Reference Reading (βγ): 545454 +20% 654545 -20% 452504

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
12-20-04 0807	NA	3900	NA	554222	SaT	LD
12-21-04 0630		3611		545060	SqT	MS
12-22-04 0620		5194		532663	SqT	MS
12-27-04 0710		4486		546637	SqT	MS
12-28-04 0618		4312		544680	SqT	MS
12-29-04 0620		4316		545246	SqT	MS
12-30-04 0620		3848		547367	SqT	MS
1-4-05 0635		4774		549886	SqT	MS
1-5-05 0620		4991		559378	SqT	MS
1-10-05 0650		3783		541713	SqT	MS
1-11-05 0625		3720		569663	SqT	MS
1-12-05 0615		4096		577272	SqT	MS
1-13-05 0608		3968		551604	SqT	MS
1-17-05 0625		3578		553550	SqT	MS
1-18-05 0559		3483		552285	SqT	MS
1-19-05 0612		3612		545911	SqT	MS
1-20-05 0615		3991		555121	SqT	MS
1-24-05 0605		3682		562319	SqT	MS
1-25-05 0610		3695		566285	SqT	MS

Comments:

RSO Review: Date:

INSTRUMENT QC CHECK SHEET

Date 11/29/2004 Time 1050

Instrument Ludlum 2221 Serial # 97833

Probe 44-10 Serial # 534

Calibration Due Date 11/9/2005

QC Source

Source ID SRS-020 Isotope Cs-137

QC Check Location Mactec HP

QC Counts		
Count	Beta DPM	Alpha DPM
1	501098	0
2	502128	0
3	501441	0
4	501467	0
5	500793	0
Average	501385	0

QC Range	
Beta DPM X 20%	100277
Alpha DPM X 20%	0

	Max	Min
Beta	601662	401108
Alpha	0	0

Performed By: [signature]

Reviewed By: [signature] Date

APR 08 2005

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: L2221 Serial No: 97833 Probe: 44-10 Serial No: 0534

Cal. Preformed Date: 11-9-04 Cal. Due Date: 11-9-05

Response Check Location: MACTEC HP AREA

Source ID: SRS 20 Source Jig ID: NA-I

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 501365 +20% 601662 -20% 401108

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
14 Apr 05	NA	1796	NA	459707	SAT	[illegible]
15 Apr 05	NA	1804	NA	446805	SAT	[illegible]
4/18/05	N/A	1822	N/A	474157	Sat	JG
4/19/05	N/A	1496	N/A	483567	Sat	[illegible]
20 Apr 05	NA	1886	NA	459453	SAT	[illegible]
21 Apr 05	NA	1896	NA	462472	SAT	[illegible]
4/25/05		1857		480293	SAT	[illegible]
26 Apr 05		1814		460505	SAT	[illegible]
27 Apr 05		1917		462599	SAT	[illegible]
28 Apr 05		1832		458483	SAT	[illegible]
29 Apr 05		1766		462730	SAT	[illegible]
2 May 05		1790		458700	SAT	[illegible]
3 MAY 2005		1792		477988	Sat	[illegible]
4 May 05		1851		459792	SAT	[illegible]
5/9/05		1812		480041	SAT	[illegible]
5/10/05		1840		469742	SAT	[illegible]
12 MAY 05		1867		452044	SAT	[illegible]
5/17/05		1865		480518	Sat	JG
5/19/05 1250		1605		493687	Sat	JG
5/20/05		1974		466968	SAT	[illegible]
5/23/05		1604		486892	SAT	[illegible]
5/24/05		1836		469111	Sat	[illegible]

Comments:

RSO Review: [illegible] Date: 7/7/05

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PORTABLE INSTRUMENT RESPONSE CHECK SHEET

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Instrument: Ludl 2221 Serial No: 97833 Probe: 44-10 Serial No: 0534

Cal. Preformed Date: 11-9-04 Cal. Due Date: 11-9-05

Response Check Location: MACTEC HP Acca

Source ID: SRS-020 Source Jig ID: NaI-2

Source Reference Reading (α): N/a +20% N/a -20% N/a

Source Reference Reading (βγ): 501385 +20% 601662 -20% 401108

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
3/7/05 1300	N/a	1518	N/a	496342	SAT	JT
9 Mar 2005 0650		1540		469186	SAT	[illegible]
10 Mar 2005 0700		1620		496225	SAT	[illegible]
3/11/05 1015		1476		472114	SAT	[illegible]
3/14/05 0715		1544		467299	SAT	MP
3/15/05		1531		456437	SAT	MP
3/16/05		1720		401785	SAT	MP
3/17/05 0600		1554		487198	SAT	MP
3/18/05 0715		1531		469292	SAT	MP
3/21/05		1529		491772	SAT	MP
3/22/05		1483		498108	SAT	MP
3/23/05		1505		492204	SAT	MP
24 Mar 05 0625		1406		457479	SAT	[illegible]
3/28/05 0600		1602		429387	SAT	MP
3/29/05 0715		1611		481824	SAT	MP
3/30/05 0600		1482		470393	SAT	MP
3/31/05 0600		1547		476341	SAT	MP
4/1/05		1492		489444	SAT	MP
4/4/05 0600		1554		476217	SAT	MP
4/5/05		1644		495525	SAT	MP
12 Apr 05		1624		441806	SAT	[illegible]
13 Apr 05		1588		466433	SAT	[illegible]

Comments:

RSO Review: [signature] Date: 7/7/05

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

Portable Instrument Response Check Sheet

Instrument: Lud 2221 Serial No: 97833 Probe: 44-10 Serial No: 0534

Cal. Preformed Date: 11-9-04 Cal. Due Date: 11-9-05

Response Check Location: Mactec HP Area

Source ID: SRS-020 Source Jig ID: NaI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 501385 +20% 601662 -20% 401108

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
2-2-05 - 0610	NA	1478	NA	492362	SAT	MS
2-3-05 0602		1462		498862	SAT	MS
2-7-05 0605		1563		499056	SAT	MS
2-8-05 0600		1384		497731	Sat	cmf
2-9-05 0630		1477		497561	Sat	cmf
2.10.05 0620		1425		496272	Sat	cmf
2.15.05 0705		1377		503382	Sat	cmf
2.16.05 0645		1474		504486	Sat	cmf
2.17.05 0645		1448		505972	Sat	cmf
2.18.05 0705		1468		500807	Sat	cmf
2.21.05 0647		1538		499343	Sat	cmf
2.22.05 0645		1526		501417	Sat	cmf
2.23.05 0625		1511		503049	Sat	cmf
2.24.05 0630		1533		499901	Sat	cmf
2.28.05 0645		1341		503740	Sat	cmf
3.1.05 0700		1541		504195	Sat	cmf
3.2.05 0635		1417		502178	Sat	cmf
3.3.05 0820		1396		496553	SAT	MP
3/4/05 0730		1519		469504	SAT	MP

Comments:

RSO Review: [signature] Date: 7/7/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Ludlum 2221 Serial No: 97833 Probe: 44-10 Serial No: 0534

Cal. Preformed Date: 11-9-04 Cal. Due Date: 11-9-05

Response Check Location: MACTec HP Area

Source ID: SRS-20 Source Jig ID: NAI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 501385 +20% 601662 -20% 401108

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
12-29-04 0630	NA	1512	NA	489590	SqT	MS
12-30-04 0622		1569		491108	SqT	MS
1-4-05 0620		1925		496887	SqT	MS
1-5-05 0627		1774		500664	SqT	MS
1-6-05 0712		1564		493060	SqT	MS
1-7-05 0820		1453		489715	SqT	MS
1-10-05 0640		1457		483871	SqT	MS
1-11-05 0630		1795		505017	SqT	MS
1-12-05 0605		1493		496999	SqT	MS
1-13-05 0600		1489		490945	SqT	MS
1-17-05 0615		1488		492396	SqT	MS
1-18-05 0550		1543		490368	SqT	MS
1-19-05 0608		1477		485076	SqT	MS
1-20-05 0610		1460		490461	SqT	MS
1-24-05 0615		1324		493260	SqT	MS
1-25-05 0605		1425		491678	SqT	MS
1-26-05 0650		1958		507140	SqT	MS
1-27-05 0620		1817		501379	SqT	MS
1-31-05 0618		1479		500714	SqT	MS
2-1-05 0605		1513		494847	SqT	MS

Comments:

RSO Review: [signature] Date: 7/7/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Ludlum 2221 Serial No: 97833 Probe: 44-10 Serial No: 0534

Cal. Preformed Date: 11-9-04 Cal. Due Date: 11-9-05

Response Check Location: MacTec HP Area

Source ID: SRS-20 Source Jig ID: NAI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 501385 +20% 601662 -20% 401108

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
~~11/29~~ 11/29/04 1100	NA	1682	NA	504394	SaT	MS
11/30/04 0628		1726		489525	SaT	MS
12-1-04 0802		1842		491295	Sat	LP
12-2-04 0628		1982		492300	SaT	MS
12-6-04 0618		1891		490017	SaT	MS
12-7-04 0628		1747		492758	SaT	MS
12-8-04 0622		1617		489675	SaT	MS
12-7-04 1230		1927		462364	SaT	MS
12-9-04 0615		1870		495462	SaT	MS
12-13-04 0610		1395		497090	SaT	MS
12-14-04 0620		1701		478544	SaT	MS
12-15-04 0625		1885		498688	SaT	MS
				492774 MS		MS
12-16-04 0612		1530		474403	SaT	MS
12-20-04 0725		LP ~~1425~~ 1510		494683	Sat	LP
12-21-04 0621		1554		489959	SaT	MS
12-22-04 0628		1770		473059	SaT	MS
12-27-04 0705		1770		491507	SaT	MS
12-28-04 0615		1450		489534	SaT	MS

Comments:

RSO Review: [signature] Date: 7/7/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

INSTRUMENT QC CHECK SHEET

Date: 8/5/04 Time: _____

Instrument: Ludlum 2221 Serial No: 117651

Probe: Ludlum 44-10 Serial No: 192589

Cal. Preformed Date: 2/10/04 Cal. Due Date: 2/10/05

Source Isotope: Cs-137 Source #: SRS-20

QC Check Location: MACTEC HP OFFICES – HEALTH WORKS

Jig Used: Yes No (circle one) Jig ID# NAI - 2

QC Counting Results	
Count No.	Count Result
1	566224
2	574113
3	549386
4	548390
5	548714
	Add results, list in Total
Total	x786828
	Divide the total by 5
Source Reference Rearding (Average)	557366

Range Calculation

Source Ref. Reading: 557366 X 20% = 111473

Avg. + 20% = 668839

Avg. - 20% = 445893

Acceptable Range:

From 445893 (Avg. - 20%) to 668839 (Avg. + 20%)

Comments: _____

Performed By: P Collins Date: _____

RSO Review: _____ Date: _____

OCT 20 2004

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

Portable Instrument Response Check Sheet

Instrument: Lod 2221 Serial No: 117651 Probe: 44-10 Serial No: 192589

Cal. Preformed Date: 2-10-04 / 1/19/04 Cal. Due Date: 2-10-05 / 1-19-05

Response Check Location: MacTec HP area

Source ID: SKS-020 Source Jig ID: NSI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 557366 +20% 668839 -20% 445893

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
1-4-05 0630	NA	2094	NA	499112	SAT	MS
1-5-05 0625		1762		499464	SAT	MS
1-7-05 0625		1511		488182	SAT	MS
1-10-05 0645		1405		485438	SAT	MS
1-11-05 0627		1494		498777	SAT	MS
1-12-05 0620		1884		499523	SAT	MS
1-13-05 0612		1487		489113	SAT	MS
1-17-05 0620		1511		490054	SAT	MS
1-18-05 0605		1542		485584	SAT	MS
1-19-05 0615		1351		482875	SAT	MS

Comments: Rental unit returned to vendor Rec

RSO Review: Date:

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Lud 2221 Serial No: 117651 Probe: 44-10 Serial No: 192589

Cal. Preformed Date: 2-10-04 Cal. Due Date: 2-10-05

Response Check Location: Mactec HP

Source ID: SRS-030 Source Jig ID: NaI-2

Source Reference Reading (α): N/A +20% N/A -20% N/A

Source Reference Reading (βγ): 557366 +20% 668839 -20% 445893

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
11/24/04 0618	NA	1660	NA	499198	SqT	MS
11/29/04 0620		1550		507651	SqT	MS
11/30/04 0618		1546		498949	SqT	MS
12-1-04 0800		1628		497945	SqT	LP
12-2-04 0625		2053		497521	SqT	MS
12-6-04 0605		1751		500343	SqT	MS
12-7-04 0625		1706		500197	SqT	MS
12-8-04 0630		2099		495146	SqT	MS
12-9-04 0618		1840		496135	SqT	MS
12-13-04 0615		1668		499688	SqT	MS
12-14-04 0618		1797		480492	SqT	MS
12-15-04 0625		1933		492774	SqT	MS
12-16-04 0622		1744		480881	SqT	MS
12-20-04 0727		1425		500835	SqT	LP
12-21-04 0625		1754		491174	SqT	MS
12-27-04 0626		1747		491041	SqT	MS
12-28-04 0625		1723		487523	SqT	MS
12-29-04 0627		1645		492978	SqT	MS
12-30-04 0616		1526		490648	SqT	MS

Comments:

RSO Review: Date:

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Lud 2221 Serial No: 117651 Probe: 44-10 Serial No: 192589

Cal. Preformed Date: 2/10/04 Cal. Due Date: 2/10/05

Response Check Location: MacTec HP

Source ID: SRS-020 Source Jig ID: NaI-2

Source Reference Reading (α): NA +20% NA -20% NA

Source Reference Reading (βγ): 557366 +20% 668839 -20% 445893

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
10/19/04 0621	NA	1743	NA	498710	SaT	MS
10/20/04 0625		1938		494705	SaT	MS
10/21/04 0621		1974		497192	SaT	MS
10/25/04 0635		1806		510739	SaT	MS
10/26/04 0620		1784		498898	SaT	MS
10/27/04 0622		1662		493770	SaT	MS
10/28/04 0623		1777		501137	SaT	MS
11/1/04 0620		2566		504669	SaT	MS
11/2/04 0630		1633		489708	SaT	MS
11/3/04 0620		1765		501897	SaT	MS
11/4/04 0630		1528		452213	SaT	MS
11/8/04 0628		1506		452163	SaT	MS
11/9/04 0620		1857		489208	SaT	MS
11/10/04 0620		1706		497011	SaT	MS
11/11/04 0615		1431		506316	Sat	LP MS
11/12/04 0750		1778		483704	SAT	RC
11/15/04 0620		1757		507108	SAT	MS
11/16/04 0620		1872		504525	SaT	MS
11/17/04 0620		1637		501335	SaT	MS
11/18/04 0620		1835		498701	SaT	MS
11/23/04 0618	↓	1669	↓	507369	SaT	MS

Comments:

RSO Review: Date:

PORTABLE INSTRUMENT RESPONSE CHECK SHEET

Page ___ of ___

Instrument: Ludlum 2221 Serial No: 117651 Probe: 44-10 Serial No: 192589

Cal. Preformed Date: 2/10/04 Cal. Due Date: 2/10/05

Response Check Location: Healthworks HP Office

Source ID: SRS-020 Cs137 Source Jig ID: NaI-2

Source Reference Reading (α): _____ +20% _____ -20% _____

Source Reference Reading (βγ): 557366 +20% 668839 -20% 445893

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
8-17-04 0730	N/A	4793	N/A	576389	Sat	RC
8-18-04 0735		4563		562379	Sat	RC
8-31-04 1355		1694 *		509397	Sat	RC
9-1-04 0750		1735		487757	SAT	RC
9-7-04 0730		1705		509558	Sat	RC
9-8-04 1635		1622		486406	SAT	RC
9-13-04 0745		1714		486629	SAT	RC
9-20-04 1315		1600		474656	Sat	RC
9-21-04 0650		2630		492659	SAT	MS
9-22-04 0725		1753		496411	SAT	MS
9-29-04 0815		1870		472600	SAT	RC
9-30-04 0647		1698		494300	SAT	MS
10-4-04 0645		1628		499466	SAT	MS
10-5-04 0730		1841		498703	SAT	MS
10/6/04 0725		1792		477810	SAT	MS
10/7/04 0755		1481		503807	SAT	MS
10/11/04 0645		1799		494285	SAT	MS
10/12/04 0647		1476		500112	SAT	MS
10/13/04 0655		1577		497333	SAT	MS
10/14/04 0645		1691		494007	SAT	MS
10/18/04 0615	↓	1778	↓	473139	SAT	MS

* w/shield

Comments:

RSO Review: _____ Date: _____

PROCEDURE NO: RPP-12	REVISION NO: 0	ATTACHMENT 1 PAGE NO: 1 OF 1

Portable Instrument Response Check Sheet

Instrument: Lud 2224 Serial No: 183077 Probe: 43-93 Serial No: 212501

Cal. Preformed Date: 6-29-04 Cal. Due Date: 6-29-05

Response Check Location: Mactec HP

Source ID: SRS-031 Source Jig ID: N/A

Source Reference Reading (α): 2899 +20% 3478 -20% 2319

Source Reference Reading (βγ): 973 +20% 1168 -20% 778

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
11/29/04 0628	1	261	2391	1157	Sat	MS
11/30/04 0619	1	283	2468	900	Sat	MS
12/1/04 0755	3	393	2454	1062	Sat	MS
12-2-04 0628	1	245	2651	1042	Sat	MS
12-6-04 0625	5	239	2388	1121	Sat	MS

Comments:

RSO Review: [signature] Date: 7/1/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: Lud 2224 Serial No: 183077 Probe: 43-93 Serial No: 212501

Cal. Preformed Date: 6/29/04 Cal. Due Date: 6/29/05

Response Check Location: MacTec HP

Source ID: SRS-031 Source Jig ID: NA

Source Reference Reading (α): 2899 +20% 3478 -20% 2319

Source Reference Reading (βγ): 973 +20% 1168 -20% 778

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
~~10/12/04 0640~~	~~2~~	~~258~~	3104			ms
10/13/04 0650	3	254	2475	800	SqT	MS
10/14/04 0650	0	267	2365	793	SqT	MS
10/18/04 0617	1	212	2489	787	SqT	MS
10/19/04 0630	5	228	2502	984	SqT	MS
10/20/04 0618	2	192	2428	899	SqT	MS
10/21/04 0630	3	214	2537	918	SqT	MS
10/25/04 0631	1	236	2513	801	SqT	MS
10/26/04 0621	2	284	2579	870	SqT	MS
10/27/04 0632	0	269	2358	807	SqT	MS
10/28/04 0635	2	257	2478	793	SqT	MS
~~10~~ 11/1/04 0628	2	260	2511	1086	SqT	MS
11/2/04 0635	0	268	2458	1005	SqT	MS
11/3/04 0635	1	322	2544	1008	SqT	MS
11/4/04 0640	2	279	2678	1005	SqT	MS
11/8/04 0650	1	334	2464	1085	SqT	MS
11/9/04 0630	1	345	2408	1079	SqT	MS
11/10/04 0628	3	256	2529	1019	SqT	MS
11/18/04 0624	0	250	2223	1057	SqT	MS
11/23/04 0910	0	290	2507	1084	SqT	MS
11/24/04 0645	0	245	2410	1022	SqT	MS

Comments:

RSO Review: [signature] Date: 1/7/05

Procedure RPP-12	Revision No: 1	Attachment 1 Page 1 of 1

Portable Instrument Response Check Sheet

Instrument: L-2224 Serial No: 183077 Probe: 43-93 Serial No: 212501

Cal. Preformed Date: 6/29/04 Cal. Due Date: 6/29/05

Response Check Location: MacTec HP

Source ID: SRS-031 Source Jig ID: NA

Source Reference Reading (α): 2899 +20% 3478 -20% 2319

Source Reference Reading (βγ): 973 +20% 1168 -20% 778

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
8/31/04 0650	2	300	2596	988	SqT	MS
9/1/04 0632	0	315	2692	1042	SqT	MS
9/7/04 0650	2	269	2649	950	SqT	MS
9/8/04 0650	3	245	2970	1117	SqT	MS
9/9/04 0650	2	269	2571	953	Sqt	MS
9/13/04 0645	0	314	2693	968	SqT	MS
9/14/04 0647	3	273	2686	1015	SqT	MS
9/15/04 0643	2	250	2656	938	SqT	MS
9/16/04 0657	2	258	2657	912	SqT	MS
9/20/04 0700	1	259	2698	970	SqT	MS
9-21-04 0640	4	266	2829	826	SqT	RC
9-22-04 1530	3	280	2973	838	Sqt	RC
9-23-04	2	250	2843	936	Sqt	MS
9-28-04 0645	2	246	2961	1043	Sqt	MS
9-29-04 0648	0	287	2759	982	SqT	MS
9-30-04 0645	4	260	2594	923	SqT	MS
10-4-04 0645	1	251	2458	892	SqT	MS
10-5-04 0652	2	238	2691	911	SqT	MS
10/6/04 0650	1	252	2647	894	SqT	MS
10/7/04 0730	6	245	2507	866	SqT	RC
10/11/04 0650	2	257	2552	836	SqT	MS

Comments:

RSO Review: [signature] Date: 7/1/05

Portable Instrument Response Check Sheet

Instrument: L-2224 Serial No: 183077 Probe: 43-93 Serial No: 212601

Cal. Preformed Date: 6/29/04 Cal. Due Date: 6/29/05

Response Check Location: Master HP

Source ID: SRS-031 Source Jig ID: NA

Source Reference Reading (α): 2899 +20% 3478 -20% 2319

Source Reference Reading (βγ): 973 +20% 1168 -20% 778

Date/Time	α Bkg.	βγ Bkg.	α Reading	βγ Reading	Remarks	Initials
8/2/04 0600	0	222	2909	959	Sat	MS
8/3/04 0635	6	226	3453	1028	Sat	MS
8/4/04 0715	6	257	2375	897	Sat	MS
8/5/04 0620	0	261	2877	1017	Sat	MS
8/6/04 0635	2	248	2862	1011	Sat	MS
8/7/04 0635	0	249	2740	914	Sat	MS
8/9/04 0645	1	225	2787	943	Sat	MS
8/10/04 0640	2	235	2821	939	Sat	MS
8/11/04 0720	1	209	2839	962	Sat	MS
8/12/04 0630	3	383	2532	1002	Sat	MS
8/13/04 0640	1	356	2919	1065	Sat	MS
8/16/04 0635	1	237	2775	920	Sat	MS
8/17/04 0638	3	232	2765	883	Sat	MS
8/18/04 0645	2	212	2916	890	Sat	MS
8/19/04 0642	3	244	2806	895	Sat	MS
8/23/04 0650	3	229	2813	921	Sat	MS
8/24/04 0640	1	245	2562	936	Sat	MS
8/25/04 0650	1	281	2956	1033	Sat	MS
8/30/04 0638	1	305	2733	1003	Sat	MS

Comments:

RSO Review: [signature] Date: 7/7/05

INSTRUMENT QC CHECK SHEET

Date 7/31/2004 Time 1400

Instrument Ludlum 2224 Serial # 183077

Probe 43-89 Serial # 212501

Calibration Due Date 6/29/2005

QC Source

Source ID SRS-031 Isotope Th-230

QC Check Location Mactec HP

QC Counts		
Count	Beta CPM	Alpha CPM
1	966	2943
2	987	2933
3	961	2859
4	981	2935
5	970	2823
Average	973	2899

QC Range	
Beta CPM X 20%	195
Alpha CPM X 20%	580

	Max	Min
Beta	1168	778
Alpha	3478	2319

Performed By: [signature]

Reviewed By: [signature] Date 9/14/04