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: 86286
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer PO Number: N/A	Work Order Number: 2008-05280	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value CPM	Scaler Response (±10%)		Ratemeter Response (±10%)	
		As Found	As Left	As Found	As Left
X 1	100	100	100	100	100
X 1	200	200	200	200	200
X 1	400	400	400	400	400
X 10	1,000	1,002	1,002	1,000	1,000
X 10	2,000	2,005	2,005	2,000	2,000
X 10	4,000	4,006	4,006	4,000	4,000
X 100	10,000	10,018	10,018	10,000	10,000
X 100	20,000	20,041	20,041	20,000	20,000
X 100	40,000	40,078	40,078	40,000	40,000
X 1000	100,000	100,188	100,188	100,000	100,000
X 1000	200,000	200,417	200,417	200,000	200,000
X 1000	400,000	400,388	400,388	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:	Date: 8/29/08
Calibration Date: 08/29/2008	Calibration Due: 08/29/2009	

Model: 2221 Serial Number: 86286

M&TE					Environmental Conditions				
Volt Meter	Due Date:	11/01/08	ID	6565015	D-812	Due Date:	05/08/09	ID:	3314
Pulser	Due Date:	11/02/08	ID	112860	Psychron	Due Date:	03/28/09	ID:	992290
Timer	Due Date:	03/07/09	ID	22226011	Temp: 23.4 °C	Pressure: 739mmHg		Humidity: 55%	

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 ( )
Sensitivity	Sat (✓) Unsat ( )	Response Test	Sat (✓) Unsat ( )
Over Range Test	Sat (✓) Unsat ( ) N/A ( )		
Threshold	As Found= 100	As Left= 100	
Window	As Found= Off	As Left= Off	
LCD HV	As Found= 1500	As Left= 1200	
Precision Test	Reading 1= 4000 Reading 2= 4000 Reading 3= 4000 MEAN= 4000		

High Voltage Calibration

Voltage	Tolerance ± 2%	As Found	As Left
350	343-357	353	353
1,500	1,470-1,530	1,518	1,517
2,000	1,960-2,040	2,023	2,023

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 CP-IN-WI-237 Rev 1
Threshold 100=10mv

Instrument Calibrated By:	Reviewed By: Date: 8/29/08
Calibration Date: 08/29/2008	Calibration Due: 08/29/2009

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CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-37A
Contact Name: Tony Riggs		Serial Number: 094515
Customer Purchase Order Number: N/A	Work Order Number: 2008-05469	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

Source Nuclide: Th^{230}	Serial Number: 099603	Activity: 26,220 dpm	Certification Date: 08/14/96

Parameter	As Found	As Left	Precision Test	CPM
Count 1	4,649	4,649	Count 1 (Heel)	4,608
Count 2	4,492	4,492	Count 2 (Center)	4,566
Count 3	4,452	4,452	Count 3 (Toe)	4,349
Count 4	4,617	4,617	Average	4,508
Count 5	4,382	4,382	Tolerance	±10%
Count 6	4,518	4,518	Pass/Fail	Pass
Average	4,518	4,518		
Background (CPM)	9.8	9.8		
Net Counts	4,508	4,508		
Efficiency	17.2%	17.2%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): N/A	Calibration Constant (CC): N/A

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	86286	08/29/09	9.8	1350V	40 = 4 mV

Detector Setup Report YES √ NO	Barcode Report YES √ NO	Voltage Plateau YES √ NO

COMMENTS

5 minute background performed

Efficiency performed on contact with 6Ft. 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: M. Paul

Reviewed By: [signature]

Date: 12/3/08

Certification Date: 12/03/08

Certification Due: 12/03/09

BACKGROUND PLATEAU 43-37#094515 12/2/2008

900	0
950	0
1000	0
1050	0
1100	1
1150	2
1200	7
1250	11
1300	13
1350	16
1400	20
1450	22
1500	21
1550	36
1600	110
1650	189
1700	325
1750	503
1800	830
1850	1052
1900	2734

BETA PLATEAU TC-99#099608 21,311DPM

1400	20
1450	22
1500	67
1550	465
1600	1400
1650	2509
1700	3592
1750	4893
1800	5591
1850	5928
1900	6824
1950	116537

ALPHA PLATEAU TH-230#099603 26,220DPM

900	223
950	0
1000	0
1050	1
1100	161
1150	2851
1200	4076
1250	4356
1300	4455
1350	4517
1400	4683
1450	4599
1500	4638

* Replacing mylar window, screen, & frame lowered the backgrnd to acceptable levels.

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CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-37B
Contact Name: Tony Riggs		Serial Number: 094515
Customer Purchase Order Number: N/A	Work Order Number: 2008-05469	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

Source Nuclide: Tc^{99}	Serial Number: 099608	Activity: 21,312 dpm	Certification Date: 08/08/96

Parameter	As Found	As Left	Precision Test	CPM
Count 1	6,078	6,078	Count 1 (Heel)	5,951
Count 2	6,086	6,086	Count 2 (Center)	5,961
Count 3	5,833	5,833	Count 3 (Toe)	6,143
Count 4	6,158	6,158	Average	6,018
Count 5	6,103	6,103	Tolerance	±10%
Count 6	6,168	6,168	Pass/Fail	Pass
Average	6,071	6,071		
Background (CPM)	1166.2	1166.2		
Net Counts	4,905	4,905		
Efficiency	23.0%	23.0%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): N/A	Calibration Constant (CC): N/A

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	86286	08/29/09	1166.2	1850V	40 = 4 mV

Detector Setup Report YES √ NO	Barcode Report YES √ NO	Voltage Plateau YES √ NO

COMMENTS

5 minute background performed

Efficiency performed on contact with 6Ft. cable

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Detector Certified By: M. Paul	Reviewed By: Jeff Dubinson	Date: 12/3/08
Certification Date: 12/03/08		Certification Due: 12/03/09

BACKGROUND PLATEAU 43-37#094515 12/2/2008

900	0
950	0
1000	0
1050	0
1100	1
1150	2
1200	7
1250	11
1300	13
1350	16
1400	20
1450	22
1500	21
1550	36
1600	110
1650	189
1700	325
1750	503
1800	830
1850	1052
1900	2734

BETA PLATEAU TC-99#099608 21,311DPM

1400	20
1450	22
1500	67
1550	465
1600	1400
1650	2509
1700	3592
1750	4893
1800	5591
1850	5928
1900	6824
1950	116537

ALPHA PLATEAU TH-230#099603 26,220DPM

900	223
950	0
1000	0
1050	1
1100	161
1150	2851
1200	4076
1250	4356
1300	4455
1350	4517
1400	4683
1450	4599
1500	4638