

ATTACHMENT 8

DAILY OPERATIONAL CHECKS OF PORTABLE SURVEY INSTRUMENTS



**CALIBRATION
CERTIFICATE**
Page 1 of 2

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: 117363
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01610	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	101	101
X 1	250	250	250	1,000 CPM	.2	180 - 220	201	201
X 1	400	400	400	1,000 CPM	.5	450 - 550	503	503
X 10	1,000	1,000	1,000	1,000 CPM	1	900 - 1,100	1,006	1,006
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	2,012	2,012
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	5,031	5,031
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: M. Paul'	Reviewed By: <i>James F. Acutt</i>	Date: 6-4-04
Calibration Date: 04/29/04		Calibration Due: 04/29/05	

Model: 2221Serial Number: 117363

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 21.6 °C	Pressure: 749mmHg	Humidity: 44%		
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			401		401			
1,000	980-1,020			1,009		1,009			
1,500	1,470-1,530			1,515		1,515			
1,900	1,862-1,932			1,919		1,919			
Threshold/Gain Calibration (Desired Ratio <u>10</u> mV/100)									
<u>Input</u>	<u>As Found Value</u>		<u>As Found Ratio (mV/100)</u>		<u>As Left Value</u>		<u>As Left Ratio (mV/100)</u>		
10	103		9.7		103		9.7		
20	212		9.4		212		9.4		
30	315		9.5		315		9.5		
40	427		9.4		427		9.4		
Logmeter Scale Linearity Check									
<u>Input</u>	<u>±20% Tolerance</u>		<u>As Found</u>		<u>As Left</u>				
LOG	400		320-480		400		400		
LOG	4,000		3,200-4,800		4,000		4,000		
LOG	40,000		32,000-48,000		37,500		37,500		
LOG	400,000		320,000-480,000		350,000		350,000		
COMMENTS									
Calibrated in accordance with the OEM Technical Manual									
Instrument									
Calibrated By: <u>Mike Paul</u>					Reviewed By: <u>[Signature]</u>			Date: <u>6-4-04</u>	
Calibration Date: 04/29/04					Calibration Due: 04/29/05				



**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: 43-37A		
Contact Name: Thomas Scott			Serial Number: 190909		
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰	Serial Number: 119701		Activity (dpm): 19,080	Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	3,461	3,461	Count 1 (Heel)		3,461
Count 2	3,303	3,303	Count 2 (Center)		3,545
Count 3	3,545	3,545	Count 3 (Toe)		3,415
Count 4	3,658	3,658	Average		3,473.7
Count 5	3,415	3,415	Tolerance		±10%
Count 6	3,682	3,682	Pass/Fail		Pass
Average	3,510.7	3,510.7			
Background (CPM)	39.6	39.6			
Net Counts	3,471.1	3,471.1			
Efficiency	18.2%	18.2%			
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	117363	04/29/05	39.6	1400V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed			Efficiency performed on contact 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: <i>[Signature]</i>		Reviewed By: <i>[Signature]</i> Date: 9-9-04	
Certification Date: 09/09/04			Certification Due: 09/09/05		

BACKGROUND PLATEAU 43-37 #190909 5FT CABLE 09/09/04

900	2
950	0
1000	0
1050	1
1100	8
1150	19
1200	32
1250	30
1300	30
1350	36
<u>1400</u>	<u>30</u>
1450	33
1500	30
1550	54
1600	106
1650	275
1700	399
1750	677
1800	981
1850	1037
1900	1078
1950	1048

BETA PLATEAU TC-99 #019418 23,465DPM

1400	30
1450	28
1500	118
1550	587
1600	1535
1650	2628
1700	3969
1750	5098
1800	5937
1850	6271
1900	6124
1950	9211

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	166
950	0
1000	0
1050	2
1100	16
1150	1643
1200	2927
1250	3225
1300	3295
1350	3592
<u>1400</u>	<u>3448</u>
1450	3526
1500	3523

James F. Dealt
9-9-04



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CERTIFICATE**

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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: Thomas Scott			Serial Number: 190909		
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Tc ⁹⁹		Serial Number: 119718	Activity (dpm): 20,520	Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	6,152	6,152	Count 1 (Heel)		6,152
Count 2	6,273	6,273	Count 2 (Center)		6,123
Count 3	6,123	6,123	Count 3 (Toe)		6,087
Count 4	6,262	6,262	Average		6,120.7
Count 5	6,087	6,087	Tolerance		±10%
Count 6	6,243	6,243	Pass/Fail		Pass
Average	6,190	6,190			
Background (CPM)	1,412.2	1,412.2			
Net Counts	4,777.8	4,777.8			
Efficiency	23.3%	23.3%			
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	117363	04/29/05	1,412.2	1900V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239			Efficiency performed on contact with 5ft. cable		
10 minute background performed					
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: <i>[Signature]</i>		Reviewed By: <i>[Signature]</i>		Date: 9-9-04	
Certification Date: 09/09/04			Certification Due: 09/09/05		

BACKGROUND PLATEAU 43-37 #190909 5FT CABLE 09/09/04

900	2
950	0
1000	0
1050	1
1100	8
1150	19
1200	32
1250	30
1300	30
1350	36
1400	30
1450	33
1500	30
1550	54
1600	106
1650	275
1700	399
1750	677
1800	981
1850	1037
<u>1900</u>	<u>1078</u>
1950	1048

BETA PLATEAU TC-99 #019418 23,465DPM

1400	30
1450	28
1500	118
1550	587
1600	1535
1650	2628
1700	3969
1750	5098
1800	5937
1850	6271
<u>1900</u>	<u>6124</u>
1950	9211

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	166
950	0
1000	0
1050	2
1100	16
1150	1643
1200	2927
1250	3225
1300	3295
1350	3592
1400	3448
1450	3526
1500	3523

Thomas F. Seal
9-9-09

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37A
Serial Nr: 117363
Serial Nr: 190909

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+50% -50%	+3σ -3σ			X	-	+10% -10%	+3σ -3σ	
9/13/04	0800	GG FW	3	3	5 2	5 2	03031	210Po	1918	1918	2109 1726	2109 1726	PASS
9/14/04	0800	GG FW	4	3	5 2	5 2	38201	210Po	10980	10980	12077 9882	11660 10299	PASS
9/14/04	1530	GG FW	4	4	5 2	5 2	38201	210Po	11840 ²	11840	13024 10656	12372 11307	PASS
9/15/04	0800	GG FW	5	4	5 2	5 2	38201	210Po	11619 ²	11480	13016 10694	12366 11299	PASS
9/15/04	1200	GG FW	4	4	5 2	5 2	38201	210Po	10896	10997	12074 9879	11647 10307	PASS
9/16/04	0800	GG FW	4	4	5 2	5 2	03031	210Po	1904	1917	2109 1725	2105 1729	PASS
9/16/04	1200	GG FW	5	4	5 2	5 2	03031	210Po	1818	1914	2105 1724	2104 1724	PASS

²- Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117363
Serial Nr: 190909

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-20%			-3σ	X	-	+10%	+3σ	
9/16/04	1600	GG	X	X	901	851	601	650	1507	137Cs	8019	8019	8820	8807	PASS
		FW			751	751	900	846					7217	7230	
9/17/04	0800	GG			743	750	600	654	1507	137Cs	7945	8016	8818	8793	PASS
		FW					634	582					7215	8240	
9/20/04	0800	GG			529 ¹	529	423	475	1838	137Cs	102157	102157	112373	104200	PASS
		FW					1060	1032					91942	100114	
9/20/04	1200	GG			883 ¹	883	707	734	0403	137Cs	36989	37055	40761	40307	PASS
		FW					641	604					33350	33803	
9/21/04	0800	GG			590 ¹	534	427	464	2196	137Cs	111630	111630	122793	117126	PASS
		FW					900	841					100467	106134	
9/21/04	1200	GG			752	750	600	659	1838	137Cs	101817	102146	112361	104161	PASS
		FW					644	605					91932	100131	
9/22/04	0800	GG			559 ¹	536	429	467	1160	14C	28082	28082	30890	30603	PASS
		FW					907	857					25273	25560	
9/22/04	1200	GG			821	756	604	655	0403	137Cs	40730	40130	40870	40655	PASS
		FW					646	606					33439	33654	
9/23/04	0800	GG			559	538	430	470	1160	14C	28141	28083	30892	30562	PASS
		FW					909	856					25275	25604	
9/23/04	1200	GG			779	757	606	659	2101	137Cs	98287	98287	108116	105582	PASS
		FW					640	612					88459	90992	
9/24/04	0800	GG			474 ¹	534	427	455	1160	14C	29258	28120	30932	30617	PASS
		FW					910	853					25308	25623	
9/24/04	1200	GG			768	758	606	663	1160	14C	26385	28068	30874	30646	PASS
		FW					641	610					25261	35489	
9/27/04	0800	GG			539 ¹	534	427	458	1160	14C	27049	28038	30841	30616	PASS
		FW					914	862					25234	25459	
9/27/04	1200	GG			819	762	609	662	1160	14C	27345	28018	30820	30576	PASS
		FW					914	862					25216	25460	

¹ - Measurements made in a different location

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117363
Serial Nr: 190909

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3 σ	-3 σ			X	-	+10%	+3 σ	-10%	
9/28/04	0800	GG			748	666		1160	14C	26850	27985	30784	30556		PASS
		FW	624 ¹	624	499	581						25187	25415		
		GG			915	860						30764	30518		PASS
9/28/04	1200	FW	778	763	610	665		1160	14C	27320	27967	25171	25417		PASS
		GG			748	664						30721	30521		PASS
9/29/04	0800	FW	616 ¹	623	498	582		1160	14C	26470	27928	25135	25335		PASS
		GG			915	857						30696	30490		PASS
9/29/04	1200	FW	762	763	610	668		1160	14C	27046	27905	25115	25321		PASS
		GG			749	664						30668	30465		PASS
9/30/04	0800	FW	634 ¹	624	499	584		1160	14C	26790	27880	25092	25294		PASS
		GG			916	855						30638	30443		PASS
9/30/04	1200	FW	769	763	610	671		1160	14C	26874	27853	25068	25263		PASS
		GG			918	856						30609	30424		PASS
10/1/04	0800	FW	798	765	612	673		1160	14C	26722	27826	25043	25228		PASS
		GG			917	854						30588	30394		PASS
10/1/04	1200	FW	755	764	611	675		1160	14C	25481	27807	25026	25220		PASS
		GG			918	852						30588	30364		PASS
10/4/04	0800	FW	772	765	612	677		1160	14C	27824	27807	25027	25251		PASS
		GG			920	854						30558	30351		PASS
10/4/04	1200	FW	801	766	613	679		1160	14C	26584	27780	25002	25209		PASS
		GG			921	855						30573	30346		PASS
10/5/04	0800	FW	798	768	614	680		1160	14C	28383	27793	25014	25241		PASS
		GG			919	854						117400	108339		PASS
10/5/04	1200	FW	724	766	613	677		1837	137Cs	106727	106727	96054	105114		PASS
		GG			917	853						30541	30339		PASS
10/6/04	0800	FW	729	764	612	676		1160	14C	26448	27765	24988	25190		PASS
		GG			918	851						30507	30342		PASS
10/6/04	1200	FW	770	765	612	678		1160	14C	26255	27733	24960	25125		PASS

¹ - Measurements made in a different location

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117363
Serial Nr: 190909

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/7/04	0800	GG			918	851	1160	14C	25456 ²	25456	28001	27522	PASS
		FW	777	765	612	680	1160	14C	25456 ²	25456	22910	23389	
		GG			918	849					28019	27516	PASS
10/7/04	1200	FW	760	765	612	681	1160	14C	25950 ²	25472	22925	23427	PASS
		GG			918	848					28015	27481	PASS
10/8/04	0800	FW	771	765	612	683	1160	14C	25371 ²	25469	22922	23457	PASS
		GG			919	847					28037	27489	PASS
10/8/04	1200	FW	779	766	612	684	1160	14C	26108 ²	25488	22939	23487	PASS
		GG			916	851					28008	27471	PASS
10/12/04	0800	FW	689	763	611	676	1160	14C	24600 ²	25462	22916	23453	PASS
		GG			916	849					29250	29175	PASS
10/12/04	1200	FW	762	763	610	677	1160	14C	25977 ²	26591	23931	24006	PASS
		GG			917	852					28015	27451	PASS
10/13/04	0800	FW	809	764	612	677	1160	14C	25694 ²	25468	22922	23486	PASS
		GG			917	850					28015	27422	PASS
10/13/04	1200	FW	768	765	612	679	1160	14C	25470 ²	25469	22922	23515	PASS
		GG			919	854					30497	30311	PASS
10/14/04	0800	FW	818	766	613	678	1160	14C	27292	27724	24952	25138	PASS
		GG			919	852					30471	30296	PASS
10/14/04	1200	FW	759	766	613	679	1160	14C	26555	27701	24931	25106	PASS
		GG			921	856					30472	30271	PASS
10/15/04	0800	FW	821	767	614	679	1160	14C	27765	27702	24932	25133	PASS
		GG			922	859					30468	30243	PASS
10/15/04	1200	FW	820	769	615	679	1160	14C	27497	27698	24928	25153	PASS
		GG			922	857					30436	30249	PASS
10/18/04	0800	FW	746	768	614	679	1160	14C	26134	27669	24902	25088	PASS
		GG			922	857					30408	30243	PASS
10/18/04	1200	FW	784	768	615	680	1160	14C	26330	27644	24880	25045	PASS

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117363
Serial Nr: 190909

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/19/04	0800	GG	X	X	923	857	1160	14C	X	X	30376	30250	PASS
		FW			615	681	1160	14C			24853	24979	
		GG			923	856					30354	30235	PASS
10/19/04	1200	GG			616	682	1160	14C			24835	24854	
		FW			924	856					30328	30226	PASS
10/20/04	0800	GG			616	684	1160	14C			24814	24916	
		FW			924	855					30307	30211	PASS
10/21/04	0800	GG			616	685	1160	14C			24797	24893	
		FW			924	854					28010	27391	PASS
10/22/04	0800	GG			616	685	1160	14C			22917	23536	
		FW			924	853					29245	29131	PASS
10/22/04	1200	GG			616	687	1160	14C			23928	24041	
		FW			923	852					27995	27364	PASS
10/25/04	0800	GG			615	686	1160	14C			22905	23537	
		FW			923	852					27999	27342	PASS
10/25/04	1200	GG			616	687	1160	14C			22908	23565	
		FW			923	851					28009	27333	PASS
10/26/04	0800	GG			616	688	1160	14C			22916	23592	
		FW			924	851					28005	27307	PASS
10/26/04	1200	GG			616	689	1160	14C			22913	23612	
		FW			922	853					28019	27308	PASS
10/27/04	1300	GG			615	683	1160	14C			22925	23635	
		FW			922	853					28019	27308	PASS

² - Measurements made using a different jig.



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: 94954
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01977	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	98	98
X 1	250	250	250	1,000 CPM	.2	180 - 220	198	198
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	988	988
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	1,975	1,975
X 10	4,000	4,100	4,100	1,000 CPM	5	4.5K-5.5K	4,940	4,940
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	40,500	40,500					
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: <i>M. Paul</i>		Reviewed By: <i>Tom G. Scott</i>		Date: <i>8-5-04</i>	
Calibration Date: 08/05/04			Calibration Due: 08/05/05				

Model: 2221

Serial Number: 94954

M&TE				Environmental Conditions					
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 20.4°C	Pressure: 738mmHg	Humidity: 48%		

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	388	400
1,000	980-1,020	981	1,003
1,500	1,470-1,530	1,468	1,500
1,900	1,862-1,932	1,855	1,898

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	91	10.9	91	10.9
20	183	10.9	183	10.9
30	289	10.4	289	10.4
40	391	10.2	391	10.2

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	45,000	45,000
LOG 400,000	320,000-480,000	450,000	450,000

COMMENTS

Calibrated in accordance with the CP-IN-WI-237 rev 1

Instrument			
Calibrated By: <i>Mike Paul</i>	Reviewed By: <i>Alma F. Acat</i>	Date: <i>8-5-04</i>	
Calibration Date: 08/05/04	Calibration Due: 08/05/05		



**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: 43-37A		
Contact Name: Thomas Scott			Serial Number: 120106		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01982	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰		Serial Number: 119737	Activity (dpm): 18,720	Certification Date: 10/20/97	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	3,482	3,482	Count 1 (Heel)		3,594
Count 2	3,315	3,315	Count 2 (Center)		3,380
Count 3	3,398	3,398	Count 3 (Toe)		3,446
Count 4	3,392	3,392	Average		3,473
Count 5	3,503	3,503	Tolerance		±10%
Count 6	3,520	3,520	Pass/Fail		Pass
Average	3,435	3,435			
Background (CPM)	10.2	10.2			
Net Counts	3,425	3,425			
Efficiency	18.3%	18.3%			
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	94954	08/05/05	10.2	1400V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓
Voltage Plateau YES ✓ NO					
COMMENTS					
10 minute background performed			Efficiency performed on contact 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: <i>M. Pauli</i>		Reviewed By: <i>Thomas Scott</i> Date: 9-7-04	
Certification Date: 08/11/04			Certification Due: 08/11/05		

background plateau 43-37#120106 8/10/2004

900	0
950	0
1000	0
1050	0
1100	0
1150	1
1200	3
1250	3
1300	5
1350	5
1400	3
1450	5
1500	6
1550	11
1600	10
1650	41
1700	108
1750	211
1800	374
1850	708
1900	1020
1950	1090

alpha plateau th-230#119737 18,720dpm

900	0
950	0
1000	0
1050	0
1100	0
1150	4
1200	1013
1250	2372
1300	3059
1350	3212
1400	3229
1450	3328
1500	3304

beta plateau tc-99#019418 23,465dpm

1400	3
1450	7
1500	4
1550	19
1600	135
1650	755
1700	1687
1750	2833
1800	4117
1850	5352
1900	5708
1950	6007

James G. Scott
9-7-04



**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: 43-37B		
Contact Name: Thomas Scott			Serial Number: 120106		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01982	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Tc ⁹⁹		Serial Number: 019418	Activity (dpm): 23,465	Certification Date: 10/01/92	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	6,799	6,799	Count 1 (Heel)		7,019
Count 2	6,684	6,684	Count 2 (Center)		7,561
Count 3	7,443	7,443	Count 3 (Toe)		7,397
Count 4	7,291	7,291	Average		7,326
Count 5	7,448	7,448	Tolerance		±10%
Count 6	7,606	7,606	Pass/Fail		Pass
Average	7,212	7,212			
Background (CPM)	1483.2	1483.2			
Net Counts	5,729	5,729			
Efficiency	24.4%	24.4%			
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	94954	08/05/05	1483.2	1950V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
10 minute background performed			Efficiency performed on contact 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: <i>M. Pauli</i>		Reviewed By: <i>Thomas F. Scott</i> Date: <i>9-7-04</i>	
Certification Date: 08/11/04			Certification Due: 08/11/05		

background plateau 43-37#120106 8/10/2004

900	0
950	0
1000	0
1050	0
1100	0
1150	1
1200	3
1250	3
1300	5
1350	5
1400	3
1450	5
1500	6
1550	11
1600	10
1650	41
1700	108
1750	211
1800	374
1850	708
1900	1020
1950	1090

alpha plateau th-230#119737 18,720dpm

900	0
950	0
1000	0
1050	0
1100	0
1150	4
1200	1013
1250	2372
1300	3059
1350	3212
1400	3229
1450	3328
1500	3304

beta plateau tc-99#019418 23,465dpm

1400	3
1450	7
1500	4
1550	19
1600	135
1650	755
1700	1687
1750	2833
1800	4117
1850	5352
1900	5708
1950	6087

James F. Dault
9-7-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37A
Serial Nr: 94954
Serial Nr: 120106

Calibration Date: 08/05/04
Calibration Date: 08/11/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+50%	+3σ			X	-	+10%	+3σ	
9/13/04	0800	TR	3	4	5	5	38201	210Po	11118	11041	12146	11959	PASS
		FW											
9/14/04	0800	TR	4	3	5	5	03031	210Po	1924	1924	2116	2043	PASS
		FW											
9/14/04	1200	TR	4	3	5	5	38201	210Po	10965	11041	12146	11959	PASS
		FW											
9/15/04	0800	TR	4	3	5	5	03031	210Po	1873	1922	2114	2042	PASS
		FW											
9/15/04	1200	TR	4	4	5	5	38201	210Po	11780	11054	12159	11956	PASS
		FW											
9/16/04	0800	TR	4	4	5	5	38201	210Po	11675	11064	12170	12020	PASS
		FW											
9/16/04	1200	TR	4	4	5	5	38201	210Po	11527	11071	12178	12031	PASS
		FW											
9/17/04	0800	TR	3	4	5	5	03031	210Po	1898	1921	2113	2040	PASS
		FW											
9/17/04	1200	TR	5	4	5	5	03031	210Po	1832	1918	2110	2042	PASS
		FW											

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 94954
Serial Nr: 120106

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
9/20/04	0800	TR FW	X	X	1066	955	822	0403	137Cs	X	X	36429	36062	PASS	
					711	822	822					29806	30173		
9/20/04	1200	TR FW			1065	951	824	2101	137Cs			98255	91825	PASS	
					710	824	824					80390	86820		
9/21/04	0800	TR FW			1063	948	824	1837	137Cs			108385	101665	PASS	
					709	824	824					88679	95399		
9/21/04	1200	TR FW			1051	986	766	1838	137Cs			115497	108683	PASS	
					701	766	766					94498	101313		
9/22/04	0800	TR FW			1047	983	762	1838	137Cs			115513	108641	PASS	
					698	762	762					94511	101383		
9/22/04	1200	TR FW			1040	991	742	1160	14C			29244	29216	PASS	
					693	742	742					23927	23955		
9/23/04	0800	TR FW			1042	991	746	1837	137Cs			108414	101662	PASS	
					695	746	746					88703	95455		
9/23/04	1200	TR FW			1036	995	732	1160	14C			29271	29221	PASS	
					691	732	732					23949	23999		
9/24/04	0800	TR FW			1028	1003	710	1837	137Cs			108474	101766	PASS	
					685	710	710					88751	95459		
9/24/04	1200	TR FW			1024	1000	707	1837	137Cs			108504	101770	PASS	
					683	707	707					88776	95510		
9/27/04	0800	TR FW			1018	1003	693	1837	137Cs			108487	101715	PASS	
					679	693	693					88762	95535		
9/27/04	1200	TR FW			1014	1000	690	1838	137Cs			115562	108683	PASS	
					676	690	690					94550	101429		
9/28/04	0800	TR FW			1014	996	693	1837	137Cs			108559	101894	PASS	
					676	693	693					88821	95487		
9/28/04	1200	TR FW			1014	993	697	1837	137Cs			108591	101908	PASS	
					676	697	697					88847	95530		

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr.: 94954
Serial Nr.: 120106

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20% -20%	+3σ -3σ	X			-	+10% -10%	+3σ -3σ			
9/29/04	0800	TR FW	821	844	1013 675	989 699	1837	137Cs	101102	98794	108662 88905	102086 95481	PASS		
9/29/04	1200	TR FW	812	843	1011 674	986 700	1837	137Cs	98397	98773	108651 88896	102035 95511	PASS		
9/30/04	0800	TR FW	874	844	1013 675	985 703	1837	137Cs	100697	98823	108705 88940	102138 95507	PASS		
9/30/04	1200	TR FW	809	843	1011 674	982 703	1507	137Cs	7632	7632	8395 6869	8199 7065	PASS		
10/1/04	0800	TR FW	734	839	1007 671	986 692	1837	137Cs	99270	98834	108717 88951	102112 95556	PASS		
10/1/04	1200	TR FW	779	837	1004 669	984 690	1838	137Cs	106525	15101	115611 94591	108731 101470	PASS		
10/4/04	0800	TR FW	778	835	1002 668	982 688	1837	137Cs	99841	98858	108744 88973	102120 95597	PASS		
10/4/04	1200	TR FW	791	833	1000 667	979 687	1837	137Cs	98977	98861	108747 88975	102083 95639	PASS		
10/5/04	0800	TR FW	760	831	997 665	979 684	1837	137Cs	99594	98878	108766 88991	102075 95682	PASS		
10/5/04	1200	TR FW	664 ¹	664	797 531	725 603	1837	137Cs	98458	98869	108756 88982	102032 95705	PASS		
10/6/04	0800	TR FW	784	830	996 664	976 683	1837	137Cs	98180	98853	108739 88968	101992 95715	PASS		
10/6/04	1200	TR FW	755	828	993 662	976 679	1838	137Cs	103745	105061	115567 94555	108685 101436	PASS		
10/7/04	0800	TR FW	924	830	996 664	982 678	1837	137Cs	99454	98867	108753 88980	101978 95755	PASS		
10/7/04	1200	TR FW	823	830	996 664	980 680	1837	137Cs	99434	98873	108766 88991	101964 95793	PASS		

¹ - Measurements made in a different location

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 94954
Serial Nr: 120106

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/8/04	0800	TR			999	984	1837	137Cs	100552	98913	108805	102029	PASS
		FW			666	680	1837	137Cs	100552	98913	89022	95798	
		TR			999	982	1837	137Cs	99891	98933	108827	102037	PASS
10/8/04	1200	FW			666	682	1837	137Cs	99891	98933	89040	95830	
		TR			1001	987	1837	137Cs	100102	98957	108852	102058	PASS
10/12/04	0800	FW			667	682	1837	137Cs	100102	98957	89061	95856	
		TR			1001	984	1837	137Cs	100087	98979	108877	102076	PASS
10/12/04	1200	FW			667	684	1837	137Cs	100087	98979	89081	95882	
		TR			1003	986	1837	137Cs	100165	99002	108902	102097	PASS
10/13/04	0800	FW			668	685	1837	137Cs	100165	99002	89102	95906	
		TR			1004	986	1837	137Cs	100367	99028	108930	102131	PASS
10/13/04	1200	FW			669	687	1837	137Cs	100367	99028	89125	95924	
		TR			1005	986	1837	137Cs	100862	99062	108968	102203	PASS
10/14/04	0800	FW			670	689	1837	137Cs	100862	99062	89155	95920	
		TR			1006	985	1837	137Cs	100481	99087	108996	102238	PASS
10/14/04	1200	FW			670	691	1837	137Cs	100481	99087	89179	95937	
		TR			1007	986	1837	137Cs	101083	99123	109035	102320	PASS
10/15/04	0800	FW			671	692	1837	137Cs	101083	99123	89211	95926	
		TR			1008	986	1837	137Cs	100995	99156	109071	102388	PASS
10/15/04	1200	FW			672	694	1837	137Cs	100995	99156	89240	95924	
		TR			1008	985	1837	137Cs	100335	99176	109094	102405	PASS
10/18/04	0800	FW			672	696	1837	137Cs	100335	99176	89259	95948	
		TR			1009	984	1837	137Cs	99929	99189	109108	102399	PASS
10/18/04	1200	FW			673	697	1837	137Cs	99929	99189	89270	95978	
		TR			1010	984	1837	137Cs	100676	99214	109135	102435	PASS
10/19/04	0800	FW			673	699	1837	137Cs	100676	99214	89292	95992	
		TR			1010	982	1837	137Cs	100169	99229	109152	102439	PASS
10/19/04	1200	FW			673	700	1837	137Cs	100169	99229	89306	96019	

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 94954
Serial Nr: 120106

Calibration Date: 04/29/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/20/04	0800	TR			1011	982	1837	137Cs	X		109191	102530	PASS
		FW	887	842	674	702			137Cs	101436	99265	89338	
10/20/04	1200	TR			1011	981	1837	137Cs			109225	102592	PASS
		FW	855	842	674	703			137Cs	101171	99295	89366	
10/21/04	0800	TR			1012	981	1837	137Cs			109250	102622	PASS
		FW	871	843	674	705			137Cs	100744	99318	89386	
10/21/04	1200	TR			1011	980	1837	137Cs			109261	102614	PASS
		FW	826	843	674	706			137Cs	100007	99328	89396	
10/22/04	0800	TR			1012	979	1837	137Cs			109276	102614	PASS
		FW	872	843	675	707			137Cs	100210	99342	89408	
10/22/04	1200	TR			1011	978	1837	137Cs			109279	102592	PASS
		FW	829	843	674	708			137Cs	99498	99344	89410	
10/25/04	0800	TR			1012	977	1837	137Cs			109292	102591	PASS
		FW	856	843	675	709			137Cs	100196	99357	89421	
10/25/04	1200	TR			1012	976	1837	137Cs			109293	102568	PASS
		FW	834	843	674	710			137Cs	99418	99358	89422	
10/26/04	0800	TR			1013	976	1837	137Cs			109306	102566	PASS
		FW	896	844	675	711			137Cs	100158	99369	89432	
10/26/04	1200	TR			1013	977	1837	137Cs			109309	102546	PASS
		FW	884	845	676	712			137Cs	99571	99372	89435	
10/27/04	0800	TR			1014	976	1837	137Cs			109330	102571	PASS
		FW	867	845	676	714			137Cs	100757	99391	89452	
10/27/04	1200	TR			1013	975	1837	137Cs			109330	102549	PASS
		FW	815	844	676	714			137Cs	99385	99391	89452	



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: 108881
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01568	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	
X 1	250	250	250	1,000 CPM	.2	180 – 220	202	
X 1	400	400	400	1,000 CPM	.5	450 – 550	501	
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	1,002	
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	2,004	
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	5,007	
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: <i>[Signature]</i>	Reviewed By: <i>[Signature]</i>	Date: 04-22-04	
Calibration Date: 04/22/04		Calibration Due: 04/22/05	

Model: 2221

Serial Number: 108881

M&TE				Environmental Conditions					
Volt Meter	Due Date:	10/14/04	ID	6565015	Barometer	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	04/13/05	ID	120935	Thermometer	Due Date:	10/22/04	ID:	2525
Timer	Due Date:	10/22/04	ID	22226011	Temp: 22.5 °C	Pressure: 742mmHg	Humidity: 54%		

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	396	396
1,000	980-1,020	997	997
1,500	1,470-1,530	1,002	1,002
1,900	1,862-1,932	1,898	1,898

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


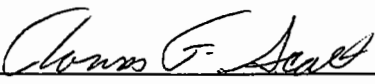
Input	As Found Value	As Found Ratio (mV/100)	As Left Value	As Left Ratio (mV/100)
10	100	10	100	10
20	205	9.8	205	9.8
30	310	9.7	310	9.7
40	420	9.5	420	9.5

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 IN-WI-237

Instrument			
Calibrated By: 	Reviewed By: 	Date: 4-22-04	
Calibration Date: 04/22/04	Calibration Due: 04/22/05		



**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: 43-37B	
Contact Name: Thomas Scott				Serial Number: 190946	
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085		Evaluation Method: Source	
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Tc ⁹⁹		Serial Number: 119718		Activity (dpm): 20,520	
				Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	6,181	6,181	Count 1 (Heel)		5,891
Count 2	5,955	5,955	Count 2 (Center)		5,995
Count 3	5,973	5,973	Count 3 (Toe)		5,958
Count 4	6,063	6,063	Average		5,948
Count 5	6,131	6,131	Tolerance		±10%
Count 6	5,949	5,949	Pass/Fail		Pass
Average	6,042	6,042			
Background (CPM)	1,351	1,351			
Net Counts	4,691	4,691			
Efficiency	22.9%	22.9%			
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	108881	04/22/05	1,351	1850V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed			Efficiency performed on contact 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: <i>M. Paul</i>		Reviewed By: <i>Thomas F. Scott</i>		Date: <i>9-9-04</i>	
Certification Date: 09/09/04			Certification Due: 09/09/05		

BACKGROUND PLATEAU 43-37#190946 5FT CABLE 9/09/04

900	0
950	0
1000	0
1050	1
1100	10
1150	13
1200	14
1250	23
1300	24
1350	20
1400	19
1450	10
1500	35
1550	69
1600	144
1650	250
1700	478
1750	691
1800	907
1850	995
1900	943
1950	993

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	2
1100	103
1150	1800
1200	2953
1250	3260
1300	3402
1350	3422
1400	3568
1450	3563
1500	3528

BETA PLATEAU Tc99 #019418 23,465DPM

1400	23
1450	30
1500	156
1550	778
1600	1681
1650	2788
1700	4196
1750	5376
1800	5996
1850	5962
1900	5982
1950	6150

Thomas F. Deuel

9-9-09



**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: 43-37A	
Contact Name: Thomas Scott		Serial Number: 190946	
Customer Purchase Order Number: N/A	Work Order Number: 2004-02085	Evaluation Method: Source	

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION				
Source Nuclide: Th ²³⁰	Serial Number: 119701	Activity (dpm): 19,080	Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test	CPM
Count 1	3,595	3,595	Count 1 (Heel)	3,707
Count 2	3,416	3,416	Count 2 (Center)	3,413
Count 3	3,387	3,387	Count 3 (Toe)	3,339
Count 4	3,564	3,564	Average	3,486
Count 5	3,281	3,281	Tolerance	±10%
Count 6	3,229	3,229	Pass/Fail	Pass
Average	3,412	3,412		
Background (CPM)	22.4	22.4		
Net Counts	3,390	3,390		
Efficiency	17.8%	17.8%		
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	108881	04/22/05	22.4	1400V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓
			Voltage Plateau YES ✓ NO		

COMMENTS

Calibrated in accordance with CP-IN-WI-239
10 minute background performed

Efficiency performed on contact 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: <i>M. Paul</i>	Reviewed By: <i>Thomas Scott</i> Date: 9-9-04
Certification Date: 09/09/04	Certification Due: 09/09/05

BACKGROUND PLATEAU 43-37#190946 5FT CABLE 9/09/04

900	0
950	0
1000	0
1050	1
1100	10
1150	13
1200	14
1250	23
1300	24
1350	20
1400	19
1450	10
1500	35
1550	69
1600	144
1650	250
1700	478
1750	691
1800	907
1850	995
1900	943
1950	993

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	2
1100	103
1150	1800
1200	2953
1250	3260
1300	3402
1350	3422
1400	3568
1450	3563
1500	3528

BETA PLATEAU Tc99 #019418 23,465DPM

1400	23
1450	30
1500	156
1550	778
1600	1681
1650	2788
1700	4196
1750	5376
1800	5996
1850	5962
1900	5982
1950	6150

Thomas G. Scott
9-9-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-37A
 Serial Nr: 108881
 Serial Nr: 190946

Calibration Date: 04/22/04
 Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+50% -50%	+3σ -3σ			X	-	+10% -10%	+3σ -3σ	
9/13/04	0800	BB FW	4	4	5	5	03031	210Po	1872	1872	2059	2024	PASS
9/14/04	0800	BB FW	3	4	5	5	03031	210Po	1878	1872	2059	2021	PASS
9/14/04	1530	BB FW	4	4	5	5	8041	210Po	10769	10769	11846	11167	PASS
9/15/04	0800	BB FW	4	4	5	5	8041	210Po	10691	10766	11843	11160	PASS
9/15/04	1430	BB FW	3	4	5	5	38201	210Po	11721	11721	12894	12035	PASS
9/16/04	0800	BB FW	4	4	5	5	03031	210Po	1834	1871	2058	2019	PASS
9/16/04	1530	BB FW	3	4	5	5	38201	210Po	10826	11693	12862	12210	PASS
9/17/04	0800	BB FW	4	4	5	5	38201	210Po	11455	11685	12854	12205	PASS
9/17/04	1200	BB FW	4	4	5	5	38201	210Po	11235	11671	12839	12222	PASS
9/20/04	0800	BB FW	4	4	5	5	38201	210Po	11810	11676	12843	12221	PASS
9/20/04	1500	BB FW	4	4	5	5	38201	210Po	11851	11681	12849	12223	PASS
9/21/04	0800	BB FW	4	4	5	5	38201	210Po	11074	11664	12830	12259	PASS
9/21/04	1200	BB FW	4	4	5	5	38201	210Po	10682	11637	12801	12357	PASS
9/22/04	0800	BB FW	4	4	5	5	38201	210Po	11111	11623	12786	12366	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37A
Serial Nr.: 108881
Serial Nr.: 190946

Calibration Date: 04/22/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results		
			X	-	+50% -50%	+3σ -3σ			X	-	+10% -10%	+3σ -3σ			
9/22/04	1200	BB FW	4	4	6	2	5	2	38201	210Po	11212	11613	12774 10451	12366 10860	PASS
10/13/04	1200	BB FW	4	4	6	2	5	2	8204	210Po	10309	10309	11340 9278	10574 10044	PASS
10/14/04	0800	BB FW	4	4	6	2	5	2	8204	210Po	10603	10318	11350 9286	10612 10024	PASS
10/14/04	1200	BB FW	5	4	6	2	5	2	8204	210Po	10770	10540	11594 9486	11194 9887	PASS
10/19/04	1200	BB FW	5	4	6	2	5	2	8041	210Po	9160	9160	10076 8244	9481 8840	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-37B
 Serial Nr.: 108881
 Serial Nr.: 190946

Calibration Date: 04/23/04
 Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background In CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading In CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
9/23/04	0800	BB FW			918 612	802 728	1507	137Cs	7778	7778	8556 7000	7946 7611		PASS	
9/23/04	1200	BB FW			915 610	803 722	2221	137Cs	106600	106600	117259 95940	108230 104969		PASS	
9/24/04	0800	BB FW			915 610	801 723	2221	137Cs	105188	106522	117207 95897	108296 104807		PASS	
9/24/04	1200	BB FW			910 607	809 708	2221	137Cs	105063	106505	117156 95855	108351 104660		PASS	
9/27/04	0800	BB FW			911 607	809 710	2221	137Cs	104575	106447	117091 95802	108459 104434		PASS	
9/27/04	1200	BB FW			910 607	807 710	2101	137Cs	98628	98628	108491 88765	101173 96083		PASS	
9/28/04	0800	BB FW			1001 667	871 797	2221	137Cs	105827	106429	117071 95786	108429 104428		PASS	
9/28/04	1200	BB FW			912 608	808 711	0403	137Cs	40388	40388	44426 36349	41430 39345		PASS	
9/29/04	0800	BB FW			916 611	822 704	2221	137Cs	106323	106425	117068 95783	108397 104454		PASS	
9/29/04	1200	BB FW			917 612	824 705	2221	137Cs	104590	106375	117012 95737	108472 104277		PASS	
9/30/04	0800	BB FW			918 612	822 707	2221	137Cs	106054	106366	117002 95729	108438 104293		PASS	
9/30/04	1200	BB FW			918 612	821 709	2221	137Cs	105650	106347	116982 65712	108413 104281		PASS	
10/1/04	0800	BB FW			917 612	819 709	2221	137Cs	105675	106330	116963 95697	108387 104272		PASS	
10/1/04	1200	BB FW			917 612	818 711	1506	137Cs	6427	6427	7069 5784	6829 6024		PASS	

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 108881
Serial Nr: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
10/4/04	0800	BB			917	817	2221	137Cs	105678	106313	116945	108362	95682	104265	PASS
		FW			611	712					7082	6869			PASS
10/4/04	1200	BB			917	815	1506	137Cs	6794	6438	116932	108334	5795	6007	PASS
		FW			611	713					96671	104269			PASS
10/5/04	0800	BB			919	822	2221	137Cs	105827	106302	106133	102661			PASS
		FW			613	710					86836	90308			PASS
10/5/04	1200	BB			503	575	2101	137Cs	94341	96485	81891	75264			PASS
		FW			629 ¹	629					67002	73629			PASS
10/6/04	0800	BB			919	821	2100	137Cs	74447	74447	122759	117362			PASS
		FW			613	711					100439	105837			PASS
10/6/04	1200	BB			918	821	2103	137Cs	111599	111599	106240	103013			PASS
		FW			612	708					86924	90151			PASS
10/7/04	0800	BB			916	821	2101	137Cs	102426	96582	116889	108373			PASS
		FW			611	706					95636	104153			PASS
10/7/04	1200	BB			914	823	2221	137Cs	104669	106263	106324	103224			PASS
		FW			610	701					86993	90096			PASS
10/8/04	0800	BB			916	827	2101	137Cs	101328	96658	122837	117427			PASS
		FW			611	700					100503	105914			PASS
10/8/04	1200	BB			916	826	2103	137Cs	113796	111670	73440	70243			PASS
		FW			611	701					60087	63284			PASS
10/12/04	0800	BB			506	573	2102	137Cs	66763	66763	116874	108347			PASS
		FW			667 ¹	632					95624	104151			PASS
10/12/04	1200	BB			1005	884	2221	137Cs	105658	106249	116845	108344			PASS
		FW			873 ²	838					95600	104102			PASS
10/13/04	0800	BB			673	788	2221	137Cs	105101	106223	116789	108445			PASS
		FW			875 ²	841					95555	103899			PASS
10/15/04	0800	BB			1012	900	2221	137Cs	103941	106172					PASS
		FW			878 ²	844									PASS

¹ - Measurements made in a different location

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 108881
Serial Nr: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
10/15/04	1200	BB FW	884 ²	846	677	785	2101	137Cs	102964	96759	106434	103585	87083	89932	PASS
10/18/04	0800	BB	754	763	611	702	2101	137Cs	102120	96842	106527	103832	87158	89853	PASS
		FW									825	913		116771	
10/18/04	1200	BB	884 ²	849	679	785	2221	137Cs	105433	106156	95540	103891	116739	108427	PASS
		FW									913	1020		116739	
10/19/04	0800	BB	864 ²	850	680	787	2221	137Cs	104762	106126	95514	103825	106619	104080	PASS
		FW									910	1019		106619	
10/20/04	0800	BB	838 ²	849	679	788	2101	137Cs	102329	96927	87234	89773	116704	108439	PASS
		FW									908	1019		116704	
10/20/04	1200	BB	847 ²	849	679	790	2221	137Cs	104629	106095	98485	103751	116705	108414	PASS
		FW									907	1019		116705	
10/21/04	0800	BB	854 ²	849	679	792	2221	137Cs	106116	106095	95486	103776	116708	108394	PASS
		FW									907	1020		116708	
10/21/04	1200	BB	866 ²	850	680	793	2221	137Cs	106246	106098	95489	103802	116686	108382	PASS
		FW									907	1021		116686	
10/22/04	0800	BB	863 ²	851	681	795	2221	137Cs	105053	106078	95470	103774	106704	104284	PASS
		FW									906	1021		106704	
10/22/04	1200	BB	859 ²	851	681	796	2101	137Cs	102013	97004	87303	89724	106799	104539	PASS
		FW									905	1022		106799	
10/25/04	0800	BB	858 ²	851	681	798	2101	137Cs	102764	97090	87381	89640	116662	108372	PASS
		FW									905	1023		116662	
10/25/04	1200	BB	867 ²	852	682	799	2221	137Cs	104969	106057	95451	103741	116613	108453	PASS
		FW									904	1023		116613	
10/26/04	0800	BB	857 ²	852	682	800	2221	137Cs	103697	106012	95411	103571	116613	108453	PASS
		FW									904	1023		116613	

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr.: 108881
Serial Nr.: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3 σ	-3 σ			X	-	+10%	+3 σ	-3 σ	
10/26/04	1200	BB	X	X	1023	904									
		FW			858 ²	853	682	801	2221	137Cs	103541	105966	95370	103398	PASS
		BB			1023	903									
		FW			845 ²	852	682	802	2221	137Cs	103298	105918	95326	103209	PASS
10/27/04	1300	BB			1023	902									
		FW			852 ²	852	682	803	2221	137Cs	103676	105878	95290	103085	PASS

² - Measurements made using a different jig.



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: 115123
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01610	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	199	199
X 1	400	400	400	1,000 CPM	.5	450 - 550	497	497
X 10	1,000	1,000	1,000	1,000 CPM	1	900 - 1,100	996	996
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	1,991	1,991
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,979	4,979
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: <i>M. Paul</i>		Reviewed By: <i>Rena G. Dept</i>		Date: 7-26-04	
Calibration Date: 04/23/04			Calibration Due: 04/23/05				

Model: 2221Serial Number: 115123

M&TE				Environmental Conditions					
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 21.4 °C	Pressure: 743mmHg	Humidity: 54%		
INSTRUMENT CALIBRATION INFORMATION									
Special Test									
Geotropism	Sat (4) Unsat ()			Hold			Sat (4) Unsat ()		
BAT > 4.5	Sat (4) Unsat ()			Volume Test			Sat (4) Unsat ()		
Mechanical Zero	Sat (4) Unsat ()			Audio Divide			Sat (4) Unsat ()		
Digital Zero	Sat (4) Unsat ()			Window Switch			Sat (4) Unsat ()		
Count	Sat (4) Unsat ()			Lamp			Sat (4) Unsat ()		
High Voltage Calibration									
Voltage	Tolerance ± 2%			As Found			As Left		
400	392-408			401			401		
1,000	980-1,020			1,004			1,004		
1,500	1,470-1,530			1,512			1,512		
1,900	1,862-1,932			1,915			1,915		
Threshold/Gain Calibration (Desired Ratio <u>10</u> mV/100)									
<u>Input</u>	<u>As Found Value</u>		<u>As Found Ratio (mV/100)</u>		<u>As Left Value</u>		<u>As Left Ratio (mV/100)</u>		
10	95		10.5		93		10.5		
20	205		9.8		205		9.8		
30	317		9.5		317		9.5		
40	438		9.1		438		9.1		
Logmeter Scale Linearity Check									
<u>Input</u>	<u>±20% Tolerance</u>		<u>As Found</u>		<u>As Left</u>				
LOG	400		320-480		425				
LOG	4,000		3,200-4,800		4,500				
LOG	40,000		32,000-48,000		45,000				
LOG	400,000		320,000-480,000		425,000				
COMMENTS									
Calibrated in accordance with the OEM Technical Manual									
Instrument									
Calibrated By: <u>M. Paul</u>					Reviewed By: <u>Clara F. Scott</u> Date: <u>2-26-05</u>				
Calibration Date: <u>04/23/04</u>					Calibration Due: <u>04/23/05</u>				



**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: 43-37B	
Contact Name: Thomas Scott				Serial Number: 190910	
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085		Evaluation Method: Source	
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Tc ⁹⁹		Serial Number: 119718		Activity (dpm): 20,520	
Certification Date: 10/14/97					
Parameter	As Found	As Left	Precision Test		CPM
Count 1	6,269	6,269	Count 1 (Heel)		6,381
Count 2	6,426	6,426	Count 2 (Center)		6,320
Count 3	6,291	6,291	Count 3 (Toe)		6,219
Count 4	6,174	6,174	Average		6,307
Count 5	6,144	6,144	Tolerance		±10%
Count 6	6,439	6,439	Pass/Fail		Pass
Average	6,291	6,291			
Background (CPM)	1,417	1,417			
Net Counts	4,874	4,874			
Efficiency	23.8%	23.8%			
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	115123	04/23/05	1,417	1900V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239			Efficiency performed on contact with 5Ft. cable		
10 minute background performed					
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: <i>M. Pauli</i>		Reviewed By: <i>James G. Scott</i>	
				Date: <i>9-9-04</i>	
Certification Date: 09/09/04			Certification Due: 09/09/05		

BACKGROUND PLATEAU 43-37#190910 5FT CABLE 9/09/04

900	1
950	0
1000	0
1050	2
1100	9
1150	18
1200	22
1250	34
1300	19
1350	21
1400	23
1450	28
1500	36
1550	73
1600	153
1650	271
1700	467
1750	699
1800	939
1850	1021

1900 1085

1950 1076

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	10
1100	745
1150	2601
1200	3409
1250	3527
1300	3650
1350	3602
1400	3733
1450	3742
1500	3809

BETA PLATEAU Tc99 #019418 23,465DPM

1400	21
1450	39
1500	219
1550	937
1600	1895
1650	2985
1700	4269
1750	5300
1800	6009
1850	6151
1900	6245
1950	6222

James B. Lee

9-9-04



**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: 43-37A		
Contact Name: Thomas Scott			Serial Number: 190910		
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰		Serial Number: 119701	Activity (dpm): 19,080	Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test	CPM	
Count 1	3,547	3,547	Count 1 (Heel)	3,639	
Count 2	3,591	3,591	Count 2 (Center)	3,561	
Count 3	3,669	3,669	Count 3 (Toe)	3,697	
Count 4	3,524	3,524	Average	3,632	
Count 5	3,729	3,729	Tolerance	±10%	
Count 6	3,612	3,612	Pass/Fail	Pass	
Average	3,612	3,612			
Background (CPM)	31.0	31.0			
Net Counts	3,581	3,581			
Efficiency	18.8%	18.8%			
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	115123	04/23/05	31.0	1400V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
			Voltage Plateau		YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed			Efficiency performed on contact 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: <i>M. Pauli</i>		Reviewed By: <i>Thomas Scott</i>	
Certification Date: 09/09/04		Date: 9-9-04		Certification Due: 09/09/05	

BACKGROUND PLATEAU 43-37#190910 5FT CABLE 9/09/04

900	1
950	0
1000	0
1050	2
1100	9
1150	18
1200	22
1250	34
1300	19
1350	21
1400	23
1450	28
1500	36
1550	73
1600	153
1650	271
1700	467
1750	699
1800	939
1850	1021
1900	1085
1950	1076

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	10
1100	745
1150	2601
1200	3409
1250	3527
1300	3650
1350	3602
1400	3733
1450	3742
1500	3809

BETA PLATEAU Tc99 #019418 23,465DPM

1400	21
1450	39
1500	219
1550	937
1600	1895
1650	2985
1700	4269
1750	5300
1800	6009
1850	6151
1900	6245
1950	6222

Thomas F. Deal

9-9-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37A
Serial Nr: 115123
Serial Nr: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+50%	+3σ			X	-	+10%	+3σ	
9/13/04	0800	TW	4	4	6	6	38201	210Po	10363	10363	11399	11399	PASS
		FW	4	4	2	2					9326	9327	
9/14/04	0800	TW	4	4	6	6	38201	210Po	11690 ²	11690	12860	12123	PASS
		FW	4	4	2	2					10521	11258	
9/14/04	1200	TW	4	4	6	6	38201	210Po	11638 ²	11689	12858	12114	PASS
		FW	4	4	2	2					10520	11263	
9/15/04	0800	TW	4	4	6	6	38201	210Po	11647 ²	11687	12856	12106	PASS
		FW	4	4	2	2					10519	11268	
9/15/04	1430	TW	4	4	6	6	38201	210Po	10570 ²	11654	12819	12303	PASS
		FW	4	4	2	2					10488	11004	
9/16/04	0800	TW	4	4	6	6	38201	210Po	10438 ²	11618	12780	12454	PASS
		FW	4	4	2	2					10456	10782	
9/16/04	1530	TW	4	4	6	6	38201	210Po	11732 ²	11621	12783	12446	PASS
		FW	4	4	2	2					10459	10796	
9/17/04	0800	TW	4	4	6	6	38201	210Po	11531 ²	11619	12780	12433	PASS
		FW	4	4	2	2					10457	10805	

²- Measurement made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 115123
Serial Nr: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background In CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading In CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-3σ			X	-	+10%	+3σ	
9/20/04	0800	TW FW	861	812	974 650	881 743	1838	137Cs	106845	106845	117530 96161	109410 104550	PASS
9/20/04	1200	TW FW	927 ¹	927	1112 741	1006 848	0403	14C	39806	39806	43786 35825	43667 35944	PASS
9/21/04	1200	TW FW	890 ¹	923	1108 739	1004 843	0403	137Cs	41756	39869	43856 35882	43772 35966	PASS
9/22/04	0800	TW FW	673 ¹	673	808 539	696 651	1507	137Cs	7320	7320	8052 6588	8041 6599	PASS
9/22/04	1200	TW FW	810	812	974 649	877 746	1837	137Cs	100841	100841	110925 90757	107665 94018	PASS
9/23/04	0800	TW FW	681 ¹	674	809 539	696 652	1838	137Cs	108210	106889	117578 96200	109233 104546	PASS
9/23/04	1200	TW FW	790	810	972 648	875 746	0403	137Cs	41049	39906	43896 35915	43783 36029	PASS
9/24/04	0800	TW FW	927 ¹	924	1108 739	1000 847	0403	137Cs	41444	39952	43947 35957	43830 36074	PASS
9/24/04	1200	TW FW	787	809	970 647	873 744	1506	137Cs	6890	6890	7579 6201	7446 6333	PASS
9/27/04	0800	TW FW	771	806	967 645	873 739	0403	137Cs	41060	39985	43983 35986	43835 36135	PASS
9/27/04	1200	TW FW	830	808	969 646	874 741	1507	137Cs	7481	7325	8057 6592	8038 6612	PASS
9/28/04	0800	TW FW	771	805	966 644	873 737	0403	137Cs	41982	40042	44046 36038	43934 36150	PASS
9/28/04	1200	TW FW	833	807	968 646	875 739	1507	137Cs	7731	7338	8071 6604	8063 6612	PASS
9/29/04	0800	TW FW	759	804	965 643	876 732	1507	137Cs	7289	7336	8070 6602	8050 6622	PASS

¹ - Measurements made in a different location

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-37B
 Serial Nr: 115123
 Serial Nr: 190910

Calibration Date: 04/23/04
 Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results	
			X	-	+20%	+3σ	-20%			-3σ	X	-	+10%	+3σ		-10%
9/29/04	1200	TW FW	798	804	643	874	734	0403	137Cs	39589	40029	44032	43870	36026	36189	PASS
9/30/04	0800	TW FW	753	802	641	876	727	1508	137Cs	8454	8454	9299	8729	7608	8179	PASS
9/30/04	1200	TW FW	809	802	642	874	729	1837	137Cs	99253	100790	110869	107539	90711	94041	PASS
10/1/04	0800	TW FW	746	800	640	877	723	1507	137Cs	7502	7341	8075	8048	6607	6634	PASS
10/1/04	1200	TW FW	809	800	640	875	724	1837	137Cs	99206	100741	110815	107419	90666	94062	PASS
10/4/04	0800	TW FW	805	800	640	874	726	1507	137Cs	7864	7356	8091	8089	6620	6623	PASS
10/4/04	1200	TW FW	797	800	640	872	728	2100	137Cs	86760	86760	95436	91256	78084	82264	PASS
10/5/04	0800	TW FW	784	799	640	871	728	1507	137Cs	7629	7363	8100	8095	6627	6632	PASS
10/5/04	1200	TW FW	736	797	657	874	720	1160	14C	26530	26530	29183	28739	23877	24321	PASS
10/6/04	0800	TW FW	801	797	638	873	722	2102	137Cs	81858	81858	90044	84319	73672	79396	PASS
10/6/04	1200	TW FW	792	797	638	871	723	2102	137Cs	81576	81849	90034	84272	73664	79425	PASS
10/7/04	0800	TW FW	787	797	637	870	724	2102	137Cs	77731	81720	89892	84755	73548	78685	PASS
10/7/04	1200	TW FW	798	797	637	869	725	2242	137Cs	104559	104559	115015	105962	94103	103156	PASS
10/8/04	0800	TW FW	821	798	638	869	726	2103	137Cs	116013	116013	127615	118057	104412	113970	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-37B
 Serial Nr: 115123
 Serial Nr: 190910

Calibration Date: 04/23/04
 Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background In CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading In CPM		Acceptable Range (CPM)		Results
			X	-	+20%	+3σ			X	-	+10%	+3σ	
10/8/04	1200	TW FW	781	797	638	868	2242	137Cs	104717	104564	115020	105945	PASS
		TW			956	867			123264	114006			PASS
10/12/04	0800	FW TW	787	797	637	865	2196	137Cs	112059	112059	123242	113975	PASS
10/12/04	1200	FW TW	783	796	637	869	2196	137Cs	111434	112038	100835	110102	PASS
10/13/04	0800	FW TW	846	798	638	872	2101	137Cs	95584	95584	105142	98122	PASS
10/13/04	1200	FW TW	843	799	639	872	2242	137Cs	105308	104587	115046	105988	PASS
10/14/04	0800	FW TW	843	800	640	874	2196	137Cs	112516	112053	123259	113970	PASS
10/14/04	1200	FW TW	830	801	641	875	2101	137Cs	94843	95560	105116	98079	PASS
10/15/04	0800	FW TW	877	803	642	882	2102	137Cs	79339	81648	89813	84821	PASS
10/15/04	1200	FW TW	817	803	642	882	2102	137Cs	78196	81546	89701	85024	PASS
10/18/04	0800	FW TW	783	803	642	881	2101	137Cs	94167	95517	105068	98075	PASS
10/18/04	1200	FW TW	803	803	642	880	2102	137Cs	77694	81436	89580	85252	PASS
10/19/04	0800	FW TW	779	802	642	879	2103	137Cs	116396	116026	127628	118043	PASS
10/19/04	1200	FW TW	818	802	642	879	2103	137Cs	114800	115988	127586	118049	PASS
10/20/04	0800	FW TW	802	802	642	878	2101	137Cs	94628	95490	105039	98039	PASS
		FW			642	878			84941	92940			

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 115123
Serial Nr: 190910

Calibration Date: 04/23/04
Calibration Date: 09/09/04

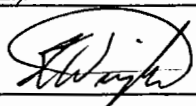
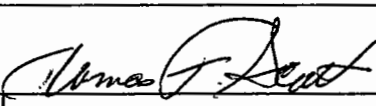
Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/20/04	1200	TW FW	797	802	963	877	2102	137Cs	77595	81330	89462	85437	PASS
10/21/04	0800	TW FW	835	803	964	878	2196	137Cs	111889	112048	123253	113937	PASS
10/21/04	1200	TW FW	805	803	964	877	2101	137Cs	94546	95462	105008	98007	PASS
10/22/04	0800	TW FW	777	802	963	876	2196	137Cs	111506	112032	123236	113907	PASS
10/22/04	1200	TW FW	821	803	963	876	2101	137Cs	94271	95428	104971	98988	PASS
10/25/04	0800	TW FW	816	803	964	876	2101	137Cs	94184	95393	104933	97973	PASS
10/25/04	1200	TW FW	778	803	963	875	2196	137Cs	111094	112006	123206	113898	PASS
10/26/04	0800	TW FW	810	803	963	875	2101	137Cs	94616	95372	104910	97937	PASS
10/26/04	1200	TW FW	815	803	964	875	2196	137Cs	111538	111993	123192	113868	PASS
10/27/04	0800	TW FW	818	803	964	874	2101	137Cs	94859	95359	104895	97898	PASS
10/27/04	1200	TW FW	847	804	965	876	2103	137Cs	115400	115974	127567	118016	PASS
					643	732					104373	113923	

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

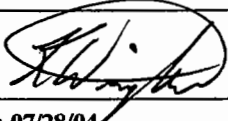
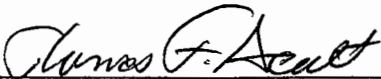
This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 117370
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01945	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	250	250	250	1,000 CPM	.2	180 – 220	201	201
X 1	400	400	400	1,000 CPM	.5	450 – 550	501	501
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	1,002	1,002
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	2,010	2,010
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	5,013	5,013
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: 	Reviewed By: 	Date: 7-29-04	
Calibration Date: 07/28/04	Calibration Due: 01/28/05		

Model: 2221Serial Number: 117370

M&TE				Environmental Conditions					
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	03/08/05	ID	112860	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	03/04/05	ID	02080601	Temp: 23.7 °C	Pressure: 742mmHg	Humidity: 49%		
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			392			400		
1,000	980-1,020			976			1000		
1,500	1,470-1,530			1467			1500		
1,900	1,862-1,932			1856			1900		
Threshold/Gain Calibration (Desired Ratio <u>10</u> mV/100)									
<u>Input</u>	<u>As Found Value</u>		<u>As Found Ratio (mV/100)</u>		<u>As Left Value</u>		<u>As Left Ratio (mV/100)</u>		
10	100		10.0		100		10.0		
20	212		10.6		195		9.75		
30	320		10.7		304		10.13		
40	429		10.73		406		10.15		
Logmeter Scale Linearity Check									
<u>Input</u>	<u>±20% Tolerance</u>		<u>As Found</u>		<u>As Left</u>				
LOG	400		320-480		400				
LOG	4,000		3,200-4,800		4,000				
LOG	40,000		32,000-48,000		40,000				
LOG	400,000		320,000-480,000		400,000				
COMMENTS									
Instrument									
Calibrated By: 					Reviewed By: 				
Calibration Date: 07/28/04					Date: 7-28-04				
					Calibration Due: 01/28/05				



**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: 43-37A		
Contact Name: Thomas Scott			Serial Number: 190672		
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085	Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰		Serial Number: 119701	Activity (dpm): 19,080	Certification Date: 10/14/97	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	3,310	3,310	Count 1 (Heel)		3,310
Count 2	3,451	3,451	Count 2 (Center)		3,443
Count 3	3,443	3,443	Count 3 (Toe)		3,621
Count 4	3,502	3,502	Average		3,458
Count 5	3,621	3,621	Tolerance		±10%
Count 6	3,713	3,713	Pass/Fail		Pass
Average	3,506.7	3,506.7			
Background (CPM)	38.4	38.4			
Net Counts	3,468.3	3,468.3			
Efficiency	18.2%	18.2%			
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	117370	01/28/05	38.4	1400V	40 = 4mV
Detector Setup Report	YES	NO <input checked="" type="checkbox"/>	Barcode Report	YES	NO <input checked="" type="checkbox"/>
			Voltage Plateau		YES <input checked="" type="checkbox"/> NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed			Efficiency performed on contact 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: <i>[Signature]</i>		Reviewed By: <i>[Signature]</i>	
Certification Date: 09/09/04		Date: 9-9-04		Certification Due: 09/09/05	

BACKGROUND PLATEAU 43-37 #190672 5FT CABLE 09/09/04

900	0
950	0
1000	0
1050	1
1100	6
1150	24
1200	19
1250	20
1300	26
1350	24
<u>1400</u>	<u>42</u>
1450	34
1500	41
1550	79
1600	163
1650	249
1700	459
1750	717
1800	893
1850	1029
1900	1086
1950	1104

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	1
1100	70
1150	1953
1200	3113
1250	3400
1300	3505
1350	3628
<u>1400</u>	<u>3654</u>
1450	3654
1500	3623

BETA PLATEAU TC-99 #019418 23,465DPM

1400	37
1450	34
1500	136
1550	720
1600	1629
1650	2836
1700	4183
1750	5336
1800	5937
1850	6290
1900	6217
1950	6409

Alonna G. Scott

9-9-04



**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: 43-37B	
Contact Name: Thomas Scott				Serial Number: 190672	
Customer Purchase Order Number: N/A		Work Order Number: 2004-02085		Evaluation Method: Source	
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Tc ⁹⁹		Serial Number: 119718		Activity (dpm): 20,520	
Certification Date: 10/14/97					
Parameter	As Found	As Left	Precision Test		CPM
Count 1	6,054	6,054	Count 1 (Heel)		6034
Count 2	6,034	6,034	Count 2 (Center)		5865
Count 3	5,865	5,865	Count 3 (Toe)		6175
Count 4	6,147	6,147	Average		6024.7
Count 5	6,175	6,175	Tolerance		±10%
Count 6	6,188	6,188	Pass/Fail		Pass
Average	6,077.2	6,077.2			
Background (CPM)	1,348.8	1,348.8			
Net Counts	4,728.4	4,728.4			
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	117370	01/28/05	1,348.8	1850V	40 = 4mV
Detector Setup Report		YES NO <input checked="" type="checkbox"/>	Barcode Report		YES NO <input checked="" type="checkbox"/>
			Voltage Plateau		YES <input checked="" type="checkbox"/> NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed			Efficiency performed on contact 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: <i>[Signature]</i>		Reviewed By: <i>[Signature]</i> Date: 9-9-04	
Certification Date: 09/09/04			Certification Due: 09/09/05		

BACKGROUND PLATEAU 43-37 #190672 5FT CABLE 09/09/04

900	0
950	0
1000	0
1050	1
1100	6
1150	24
1200	19
1250	20
1300	26
1350	24
1400	42
1450	34
1500	41
1550	79
1600	163
1650	249
1700	459
1750	717
1800	893
<u>1850</u>	<u>1029</u>
1900	1086
1950	1104

ALPHA PLATEAU TH-230 #119739 18,600DPM

900	0
950	0
1000	0
1050	1
1100	70
1150	1953
1200	3113
1250	3400
1300	3505
1350	3628
1400	3654
1450	3654
1500	3623

BETA PLATEAU TC-99 #019418 23,465DPM

1400	37
1450	34
1500	136
1550	720
1600	1629
1650	2836
1700	4183
1750	5336
1800	5937
<u>1850</u>	<u>6290</u>
1900	6217
1950	6409

Thomas F. Seal

9-9-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37A
Serial Nr: 117370
Serial Nr: 190672

Calibration Date: 07/28/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+50%	+3σ			X	-	+10%	+3σ	
9/13/04	0800	KR	5	5	7	6	38201	210Po	11009	11009	12110	11420	PASS
		FW			2	3					9908	10597	
		KR			7	6					12094	11449	PASS
9/14/04	0800	FW	4	4	2	3	38201	210Po	10564	10994	9895	10540	PASS
		KR			7	6					2024	1998	PASS
9/14/04	1200	FW	4	4	2	3	03031	210Po	1840	1840	1656	1682	PASS
		KR			7	6					12081	11461	PASS
9/15/04	0800	FW	4	4	2	3	38201	210Po	10620	10983	9884	10504	PASS
		KR			7	6					2024	1996	PASS
9/15/04	1200	FW	4	4	2	3	03031	210Po	1845	1840	1656	1685	PASS
		KR			7	6					12064	11488	PASS
9/16/04	0800	FW	4	4	2	3	38201	210Po	10487	10968	9871	10447	PASS
		KR			7	6					12064	11480	PASS
9/16/04	1200	FW	5	4	2	3	38201	210Po	10952	10967	9871	10454	PASS
		KR			7	6					12048	11504	PASS
9/17/04	0800	FW	4	4	2	3	38201	210Po	10460	10953	9857	10401	PASS
		KR			7	6					12047	11495	PASS
9/17/04	1200	FW	3	4	2	3	38201	210Po	10913	10952	9856	10408	PASS
		KR			6	6					10045	9281	PASS
10/13/04	1200	FW	5	4	2	3	8041	210Po	9132	9132	8219	8983	PASS
		KR			7	6					10045	9278	PASS
10/14/04	0800	FW	6	4	2	3	8041	210Po	9120	9132	8218	8985	PASS
		KR			7	6					10046	9279	PASS
10/14/04	1200	FW	5	4	2	3	8041	210Po	9182	9133	8220	8987	PASS
		KR			7	6					11074	1207	PASS
10/19/04	1200	FW	6	5	2	3	38201	210Po	10068	10068	9061	9928	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117370
Serial Nr: 190672

Calibration Date: 07/28/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	+3σ			-3σ	-10%	+3σ		
9/20/04	0800	KR FW	X	X	1034	927	1838	137Cs	X	-	115453	108431	PASS
					862'	862					94461	101483	
					689	796					147601	139443	PASS
9/20/04	1200	KR FW			1034	924	2196	137Cs			120764	128922	PASS
					861'	861					7999	7993	PASS
					689	799					7999	7993	PASS
9/21/04	0800	KR FW			916	811	1507	137Cs			6544	6550	PASS
					611	715					7286	7004	PASS
					913	811					5961	6243	PASS
9/21/04	1200	KR FW			609	712	1506	137Cs			7990	7982	PASS
					739	761					6537	6545	PASS
					827	731					108112	100800	PASS
9/22/04	0800	KR FW			551	647	1507	137Cs			88456	95768	PASS
					689'	689					7982	7970	PASS
					917	817					6531	6543	PASS
9/22/04	1200	KR FW			611	711	1837	137Cs			7977	7958	PASS
					794	764					6527	6546	PASS
					826	729					7975	7946	PASS
9/23/04	0800	KR FW			551	648	1507	137Cs			7982	7970	PASS
					683'	688					6531	6543	PASS
					914	816					7977	7958	PASS
9/23/04	1200	KR FW			609	707	1507	137Cs			6527	6546	PASS
					736	762					7975	7946	PASS
					911	818					6525	6554	PASS
9/24/04	0800	KR FW			607	700	1507	137Cs			44268	41865	PASS
					722	759					36219	38622	PASS
					910	816					8643	8096	PASS
9/24/04	1200	KR FW			607	701	0403	137Cs			7072	7619	PASS
					753	758					44249	41840	PASS
					907	816					36204	38613	PASS
9/27/04	0800	KR FW			605	696	1508	137Cs			8651	8125	PASS
					721	756					7078	7606	PASS
					908	816					108179	100966	PASS
9/27/04	1200	KR FW			606	698	0403	137Cs			88510	95723	PASS
					770	757							
					906	815							
9/28/04	0800	KR FW			604	696	1508	137Cs					
					729	755							
					908	818							
9/28/04	1200	KR FW			606	696	1837	137Cs					
					785	757							
					908	818							

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117370
Serial Nr: 190672

Calibration Date: 07/28/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	+3σ			-3σ	X	-	+10%	
9/29/04	0800	KR FW	721	755	604	604	0403	137Cs	40162	40224	44247	41813	PASS
		KR			606	816					7280	6999	PASS
9/29/04	1200	KR FW	755	755	604	694	1506	137Cs	6476	6619	5957	6238	PASS
		KR			905	815					44247	41789	PASS
9/30/04	0800	KR FW	739	754	604	694	0403	137Cs	40238	40225	36202	38660	PASS
		KR			906	815					44238	41762	PASS
9/30/04	1200	KR FW	772	755	604	696	0403	137Cs	39956	40217	36195	38671	PASS
		KR			906	813					44242	41744	PASS
10/1/04	0800	KR FW	742	755	604	696	0403	137Cs	40326	40220	36198	38696	PASS
		KR			906	812					44231	41720	PASS
10/1/04	1200	KR FW	757	755	604	697	0403	137Cs	39876	40210	36189	38701	PASS
		KR			905	811					44254	41754	PASS
10/4/04	0800	KR FW	731	754	603	696	0403	137Cs	40975	40231	36208	38708	PASS
		KR			905	810					44257	41737	PASS
10/4/04	1200	KR FW	759	754	603	698	0403	137Cs	40327	40234	36210	38730	PASS
		KR			904	810					44253	41715	PASS
10/5/04	0800	KR FW	735	753	603	697	0403	137Cs	40110	40230	36207	38745	PASS
		KR			683	622					44255	41698	PASS
10/5/04	1200	KR FW	569 ¹	569	455	516	0403	137Cs	40288	40232	36209	38765	PASS
		KR			903	808					44259	41685	PASS
10/6/04	0800	KR FW	737	753	602	697	0403	137Cs	40378	40235	36212	38786	PASS
		KR			902	808					85553	79411	PASS
10/6/04	1200	KR FW	725	752	601	696	2101	137Cs	77776	77776	69998	76141	PASS
		KR			902	807					44264	41674	PASS
10/7/04	0800	KR FW	740	751	601	696	0403	137Cs	40430	40240	36216	38806	PASS
		KR			901	807					44267	41661	PASS
10/7/04	1200	KR FW	725	751	601	695	0403	137Cs	40366	40243	36219	38825	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117370
Serial Nr: 190672

Calibration Date: 07/28/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results		
			X	-	+20%	-20%	+3σ			-3σ	X	-	+10%	-10%		+3σ	-3σ
10/8/04	0800	KR FW	733	750	900	600	806	694	0403	137Cs	40690	40253	44278	36228	41666	38840	PASS
10/8/04	1200	KR FW	737	750	900	600	805	695	0403	137Cs	40369	40256	44281	36230	41653	38858	PASS
10/12/04	0800	KR FW	740	749	899	600	804	695	0403	137Cs	40549	40261	44287	36235	41646	38876	PASS
10/12/04	1200	KR FW	742	749	899	600	803	695	0403	137Cs	40495	40267	44294	36240	41642	38892	PASS
10/13/04	0800	KR FW	763	750	900	600	803	696	0403	137Cs	40892	40280	44308	36252	41660	38900	PASS
10/15/04	0800	KR FW	784	751	901	600	805	696	0403	137Cs	40998	40295	44324	36265	41685	38904	PASS
10/15/04	1200	KR FW	790	752	902	601	808	695	0403	137Cs	41141	40312	44343	36280	41721	38902	PASS
10/18/04	0800	KR FW	766	752	902	602	808	696	0403	137Cs	40631	40318	44350	36286	41719	38917	PASS
10/18/04	1200	KR FW	777	752	903	602	809	696	0403	137Cs	40393	40319	44351	36287	41707	38932	PASS
10/19/04	0800	KR FW	761	753	903	602	808	697	0403	137Cs	40608	40325	44357	36292	41703	38947	PASS
10/20/04	0800	KR FW	755	753	903	602	808	698	0403	137Cs	40464	40327	44360	36295	41693	38961	PASS
10/20/04	1200	KR FW	744	753	903	602	807	698	0403	137Cs	40523	40331	44364	36294	41686	38976	PASS
10/21/04	0800	KR FW	731	752	902	602	806	698	0403	137Cs	40527	40334	44368	36301	41679	38990	PASS
10/21/04	1200	KR FW	749	752	902	602	806	698	0403	137Cs	40561	40338	44372	36305	41673	39003	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-37B
Serial Nr: 117370
Serial Nr: 190672

Calibration Date: 07/28/04
Calibration Date: 09/09/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
10/22/04	0800	KR FW	X	X	903	860	699	0403	137Cs	X	-	44378	41670	39016	PASS
		KR			903	806						44382	41665		PASS
10/22/04	1200	KR FW			903	805	700	0403	137Cs			36313	39029	39029	PASS
		KR			903	805						44687	41661		PASS
10/25/04	0800	KR FW			903	805	700	0403	137Cs			36316	39042	39042	PASS
		KR			903	805						44394	41664		PASS
10/25/04	1200	KR FW			903	805	701	0403	137Cs			36322	39053	39053	PASS
		KR			903	805						44399	41661		PASS
10/26/04	0800	KR FW			903	804	701	0403	137Cs			36326	39064	39064	PASS
		KR			903	804						44402	41655		PASS
10/26/04	1200	KR FW			903	804	701	0403	137Cs			36329	39076	39076	PASS
		KR			903	804						44406	41651		PASS
10/27/04	0800	KR FW			903	803	701	0403	137Cs			36333	39088	39088	PASS
		KR			903	803						44407	41641		PASS
10/27/04	1300	KR FW			903	803	701	0403	137Cs			36333	39098	39098	PASS
		KR			903	803						44407	41641		PASS



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: 138378
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01588	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	199	199
X 1	400	400	400	1,000 CPM	.5	450 – 550	492	492
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	1,975	1,975
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,953	4,953
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: <i>M. Paul</i>	Reviewed By: <i>Thomas P. Scott</i>	Date: <i>4-27-04</i>	
Calibration Date: 04/27/04	Calibration Due: 04/27/05		

Model: 2221

Serial Number: 138378

M&TE				Environmental Conditions					
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 19.8 °C	Pressure: 741mmHg	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 ()

High Voltage Calibration

Voltage	Tolerance ± 2%	As Found	As Left
400	392-408	393	393
1,000	980-1,020	984	984
1,500	1,470-1,530	1,475	1,475
1,900	1,862-1,932	1,870	1,870

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	100	10.0	100	10.0
20	208	9.6	208	9.6
30	325	9.2	325	9.2
40	426	9.4	426	9.4

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	37,500	37,500
LOG 400,000	320,000-480,000	350,000	350,000

COMMENTS

Calibrated in accordance with the OEM Technical Manual

Instrument			
Calibrated By: <i>Mike Paul</i>	Reviewed By: <i>Allyna F. Scott</i>	Date: <i>4-27-04</i>	
Calibration Date: 04/27/04	Calibration Due: 04/27/05		



**DETECTOR
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: 43-68B		
Contact Name: Thomas Scott				Serial Number: 092511		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01588		Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION						
1) Source Nuclide: Tc ⁹⁹		Serial Number: 069605		Activity (dpm): 25,200		Certification Date: 06/20/96
Parameter	As Found	As Left	Precision Test		CPM (Source #1)	
Count 1	5,637	5,637	Count 1(Heel)		5,338	
Count 2	5,542	5,542	Count 2(Center)		5,561	
Count 3	5,463	5,463	Count 3(Toe)		5,492	
Average	5,547.3	5,547.3	Average		5,463.7	
Background (cpm)	309	309	Tolerance		All counts within ±10% of Average	
Net Counts	5,238.3	5,238.3	Pass/Fail		PASS	
Efficiency	20.8%	20.8%				
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	138378		04/27/05	309	1700V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓	Voltage Plateau YES ✓ NO
COMMENTS						
Calibrated with 5Ft. Cable			Calibrated in accordance with IN-WI-239.			
10 minute background Efficiency determined w/43-68 source jig						
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: <i>Scott King</i>		Reviewed By: <i>Thomas F. Scott</i>		Date: 9-30-04
Certification Date: 04/30/04				Certification Due: 04/30/05		

BACKGROUND PLATEAU 43-68#092511 5FT CABLE 4/29/2004

900	0
950	0
1000	0
1050	4
1100	0
1150	0
1200	0
1250	2
1300	0
1350	1
1400	2
1450	18
1500	39
1550	61
1600	120
1650	205
1700	308
1750	334
1800	344
1850	386
1900	347
1950	430

ALPHA PLATEAU TH-230#119739 18,600DPM

900	0
950	0
1000	1
1050	956
1100	2414
1150	3202
1200	3370
1250	3604
1300	3580
1350	3629
1400	3612
1450	3584
1500	4098

BETA PLATEAU TC-99#069605 25,200DPM

1400	98
1450	664
1500	1705
1550	2758
1600	4046
1650	5432
1700	5614
1750	5519
1800	5818
1850	5952
1900	6383
1950	7870

Thomas B. Seal
4-30-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-68B
 Serial Nr: 138378
 Serial Nr: 092511

Calibration Date: 04/27/04
 Calibration Date: 04/30/04

Date	Time	Technician Reviewer	Background In CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading In CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
9/20/04	1500	TW	206	206	247	165	1837	137Cs	93254	93254	102579	97054	PASS
		FW	206	206	165	180					83928	89454	
9/21/04	0800	TW	222	208	249	166	1160	14C	22558	22558	24814	24577	PASS
		FW	222	208	166	180					20302	20539	
9/21/04	1200	TW	216	208	250	167	0403	137Cs	35913	35913	39505	39211	PASS
		FW	216	208	167	181					32322	32616	
9/24/04	0800	TW	170	205	246	164	1838	137Cs	100032	100032	110035	100860	PASS
		FW	170	205	164	167					90029	99204	
10/4/04	0800	TW	244 ¹	244	292	195	1160	14C	21596	22527	24780	24562	PASS
		FW	244 ¹	244	195	209					20274	20492	
10/4/04	1200	TW	216	206	247	165	1160	14C	24861 ²	24861	27347	25840	PASS
		FW	216	206	165	169					22375	24117	
10/5/04	0800	TW	206	206	247	165	0403	137Cs	34684	35874	39461	39165	PASS
		FW	206	206	165	170					32286	32582	
10/5/04	1200	TW	222	208	249	166	2100	137Cs	74962	74962	82470	71421	PASS
		FW	222	208	166	169					67475	68523	
10/6/04	0800	TW	214	208	250	166	2242	137Cs	93875	93875	103263	99756	PASS
		FW	214	208	166	171					84488	87995	
10/6/04	1200	TW	217	209	250	167	1838	137Cs	96300	98166	107983	105277	PASS
		FW	217	209	167	172					88350	91055	
10/7/04	0800	TW	215	209	251	167	2103	137Cs	103946	103946	114340	111135	PASS
		FW	215	209	167	173					93551	96756	
10/7/04	1200	TW	194	208	250	166	2101	137Cs	83431	83431	91774	89697	PASS
		FW	194	208	166	172					75088	77164	
10/8/04	0800	TW	219	209	250	167	2101	137Cs	84126	83453	91798	89623	PASS
		FW	219	209	167	173					75108	77283	
10/8/04	1200	TW	217	209	251	167	2102	137Cs	70569	70569	77626	73611	PASS
		FW	217	209	167	174					63512	67527	

¹ - Measurements made in a different location

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-68B
 Serial Nr: 138378
 Serial Nr: 092511

Calibration Date: 04/27/04
 Calibration Date: 04/30/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/12/04	0800	TW FW	231	210	252	246	2103	137Cs	103071	103918	114309	110998	PASS
10/12/04	1200	TW FW	222	210	253	246	2102	137Cs	71388	70595	77655	73610	PASS
10/13/04	0800	TW FW	220	211	253	246	2102	137Cs	70458	70591	77650	73558	PASS
10/13/04	1200	TW FW	228	212	254	247	2103	137Cs	107537	104031	114434	111189	PASS
10/14/04	0800	TW FW	230	212	255	248	2102	137Cs	73588	70682	77750	73897	PASS
10/14/04	1200	TW FW	232	213	255	250	2102	137Cs	70420	70674	77742	73842	PASS
10/15/04	0800	TW FW	226	213	256	250	2101	137Cs	88021	83596	91955	90013	PASS
10/15/04	1200	TW FW	233	214	257	251	2101	137Cs	86088	83671	92039	90086	PASS
10/18/04	0800	TW FW	192	213	256	251	2221	137Cs	103054	104001	113360	105637	PASS
10/18/04	1200	TW FW	214	213	256	251	2242	137Cs	95521	93928	103321	99760	PASS
10/19/04	0800	TW FW	200	213	255	250	2101	137Cs	83932	83679	92047	89996	PASS
10/19/04	1200	TW FW	228	213	256	251	2102	137Cs	68203	70604	77664	73906	PASS
10/20/04	0800	TW FW	222	214	256	251	2100	137Cs	77846	75065	82572	81544	PASS
10/20/04	1200	TW FW	208	213	256	250	2103	137Cs	103819	103934	114328	111003	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-68B
 Serial Nr: 138378
 Serial Nr: 092511

Calibration Date: 04/27/04
 Calibration Date: 04/30/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/21/04	0800	TW	218	214	257	250	2103	137Cs	100969	103934	114328	111003	PASS
		FW			171	178					93541	96866	
		TW			256	250					77593	73945	PASS
10/21/04	1200	FW	225	214	171	178	2102	137Cs	68268	70539	63485	67133	PASS
		TW			257	250					77591	73896	PASS
10/22/04	0800	FW	226	214	171	178	2102	137Cs	70491	70538	63484	67179	PASS
		TW			257	250					114260	110901	PASS
10/22/04	1200	FW	226	214	172	179	2103	137Cs	101760	103872	93485	96844	PASS
		TW			257	250					114311	110885	PASS
10/25/04	0800	FW	214	214	172	179	2103	137Cs	105561	103919	93527	96954	PASS
		TW			258	249					82547	81425	PASS
10/25/04	1200	FW	220	215	172	180	2100	137Cs	74363	75043	67539	68661	PASS
		TW			257	249					109545	103402	PASS
10/26/04	0800	FW	211	215	172	180	2196	137Cs	99587	99587	89628	95771	PASS
		TW			258	249					114285	110773	PASS
10/26/04	1200	FW	223	215	172	181	2103	137Cs	103035	103895	93506	97017	PASS
		TW			257	249					109444	103474	PASS
10/27/04	0800	FW	198	214	171	180	2196	137Cs	96721	99494	89545	95515	PASS
		TW			258	249					109457	103425	PASS
10/27/04	1200	FW	232	215	172	180	2196	137Cs	96721	99507	89556	95588	PASS



Duratek Instrument Services
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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: 138379
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01588	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	95	95
X 1	250	250	250	1,000 CPM	.2	180 – 220	194	194
X 1	400	400	400	1,000 CPM	.5	450 – 550	487	487
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	968	968
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	1,950	1,950
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,869	4,869
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: <i>M. Pauli</i>	Reviewed By: <i>James F. Smith</i>	Date: 4-27-04	
Calibration Date: 04/27/04	Calibration Due: 04/27/05		

Model: 2221Serial Number: 138379

M&TE				Environmental Conditions					
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 19.8 °C	Pressure: 741mmHg	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 ()		
High Voltage Calibration									
Voltage	Tolerance ± 2%			As Found			As Left		
400	392-408			391			399		
1,000	980-1,020			979			1,004		
1,500	1,470-1,530			1,468			1,505		
1,900	1,862-1,932			1,863			1,906		
Threshold/Gain Calibration (Desired Ratio <u>10</u> mV/100)									
<u>Input</u>	<u>As Found Value</u>		<u>As Found Ratio (mV/100)</u>		<u>As Left Value</u>		<u>As Left Ratio (mV/100)</u>		
10	94		10.6		94		10.6		
20	198		10.1		198		10.1		
30	306		9.8		306		9.8		
40	418		9.6		418		9.6		
Logmeter Scale Linearity Check									
<u>Input</u>	<u>±20% Tolerance</u>		<u>As Found</u>		<u>As Left</u>				
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: <i>Mike Paul</i>					Reviewed By: <i>Alma F. Acut</i>			Date: 4-27-04	
Calibration Date: 04/27/04					Calibration Due: 04/27/05				



**DETECTOR
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: 43-68B		
Contact Name: Thomas Scott				Serial Number: 122015		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01588		Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION						
1) Source Nuclide: Tc ⁹⁹		Serial Number: 119719		Activity (dpm): 23,100		Certification Date: 10/14/97
Parameter	As Found	As Left	Precision Test		CPM (Source #1)	
Count 1	5,632	5,632	Count 1(Heel)		5,319	
Count 2	5,561	5,561	Count 2(Center)		5,575	
Count 3	5,486	5,486	Count 3(Toe)		5,495	
Average	5,560	5,560	Average		5,463	
Background (cpm)	302.6	302.6	Tolerance		All counts within ±10% of Average	
Net Counts	5,257	5,257	Pass/Fail		PASS	
Efficiency	22.8%	22.8%				
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			
<u>Model</u>	<u>Serial Number</u>		<u>Due Date</u>	<u>Background (cpm)</u>	<u>Operating Voltage</u>	<u>Threshold</u>
2221	138379		04/27/05	302.6	1800V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓	Voltage Plateau YES ✓ NO _
COMMENTS						
Calibrated with 5Ft. Cable			Calibrated in accordance with IN-WI-239.			
10 minute background Efficiency determined w/43-68 source jig						
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: <i>M. Paul</i>		Reviewed By: <i>Thomas F. Scott</i>			Date: <i>4-27-09</i>	
Certification Date: 04/27/04				Certification Due: 04/27/05		

BACKGROUND PLATEAU 43-68#122015 5FT CABLE 4/26/2004

900	0
950	0
1000	0
1050	0
1100	1
1150	0
1200	0
1250	1
1300	2
1350	2
1400	1
1450	8
1500	33
1550	54
1600	80
1650	162
1700	218
1750	325
1800	297
1850	330
1900	357
1950	421

BETA PLATEAU TC-99#119719 23,100DPM

1400	85
1450	582
1500	1638
1550	2697
1600	4095
1650	5000
1700	5355
1750	5341
1800	5668
1850	5564
1900	6221
1950	6991

ALPHA PLATEAU TH-230#119706 21,240DPM

900	316
950	0
1000	1
1050	967
1100	2600
1150	3618
1200	3735
1250	3672
1300	3836
1350	3801
1400	3846
1450	4065
1500	4417

James G. Scott

4-27-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-68B
 Serial Nr: 138379
 Serial Nr: 122015

Calibration Date: 04/27/04
 Calibration Date: 04/27/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			X	-	+10%	+3σ	-3σ	
10/5/04	1200	BB	176 ¹	176	211	193	2102	137Cs	75811	75811	83393	78387	68230	73236	PASS
		FW			141	158					68230	102470	111688	102470	PASS
10/6/04	0800	BB	225 ¹	225	270	245	1838	137Cs	101535	101535	91381	100600	91381	100600	PASS
		FW			180	205					83388	78340	83388	78340	PASS
10/6/04	1200	BB	201 ¹	223	267	249	2102	137Cs	75695	75808	68227	73275	68227	73275	PASS
		FW			178	196					95439	88086	95439	88086	PASS
10/7/04	0800	BB	226 ¹	223	268	248	2101	137Cs	86762	86762	78086	85439	78086	85439	PASS
		FW			178	197					112653	105912	112653	105912	PASS
10/7/04	1200	BB	212 ¹	222	312	292	1838	137Cs	103289	102412	92171	98911	92171	98911	PASS
		FW			208	227					120039	111146	120039	111146	PASS
10/8/04	0800	BB	260	260	309	292	2196	137Cs	109126	109126	98214	107107	98214	107107	PASS
		FW			206	224					119984	111187	119984	111187	PASS
10/8/04	1200	BB	241	258	309	292	2196	137Cs	107588	106077	98169	106967	98169	106967	PASS
		FW			206	224					113010	105700	113010	105700	PASS
10/12/04	0800	BB	254	258	309	290	2242	137Cs	102736	102736	92463	99773	92463	99773	PASS
		FW			307	290					112965	105668	112965	105668	PASS
10/12/04	1200	BB	238	256	309	292	2242	137Cs	101463	102695	92426	99723	92426	99723	PASS
		FW			205	222					154059	143974	154059	143974	PASS
10/13/04	0800	BB	276	258	309	293	2196	137Cs	140053 ²	140053	126048	137075	126048	137075	PASS
		FW			206	222					129783	121522	129783	121522	PASS
10/15/04	0800	BB	246	257	308	292	2103	137Cs	117385	117385	106186	114448	106186	114448	PASS
		FW			205	221					129889	121823	129889	121823	PASS
10/15/04	1200	BB	274	258	309	294	2103	137Cs	120969	118081	106273	114339	106273	114339	PASS
		FW			206	222					83382	78295	83382	78295	PASS
10/18/04	0800	BB	248	257	309	293	2102	137Cs	75619	75802	68222	73309	68222	73309	PASS
		FW			206	222					100963	93922	100963	93922	PASS
10/18/04	1200	BB	249	257	308	291	1837	137Cs	91785	91785	82606	89648	82606	89648	PASS
		FW			205	222									

¹ - Measurements made in a different location

² - Measurements made using a different jig.

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-68B
Serial Nr: 138379
Serial Nr: 122015

Calibration Date: 04/27/04
Calibration Date: 04/27/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-3σ			-10%	+3σ	-3σ			
10/19/04	0800	BB FW	267	257	309	291	223	2242	137Cs	104366	102748	113022	105769	PASS	
10/20/04	0800	BB	270	258	310	292	224	2196	137Cs	109902	109102	120013	111212	PASS	
		FW			206	224						98192	106993		
10/20/04	1200	BB	248	257	309	291	224	2196	137Cs	113316	109230	120153	112039	PASS	
		FW			206	224						98307	106421		
10/21/04	0800	BB	271	258	310	292	224	1837	137Cs	95726	93755	103131	100056	PASS	
		FW			206	224						84380	87455		
10/21/04	1200	BB	252	258	309	291	225	2242	137Cs	105283	102824	113107	106009	PASS	
		FW			206	225						92542	99640		
10/22/04	0800	BB	244	257	309	290	224	2242	137Cs	102713	102821	113103	105958	PASS	
		FW			206	224						92539	99685		
10/22/04	1200	BB	265	258	309	290	225	2196	137Cs	109604	109241	120165	112012	PASS	
		FW			206	225						98317	106470		
10/25/04	0800	BB	263	258	309	290	226	2196	137Cs	110145	109267	120914	112025	PASS	
		FW			206	226						98340	106508		
10/25/04	1200	BB	265	258	310	290	226	2196	137Cs	107892	109229	120152	112011	PASS	
		FW			206	226						98306	106446		
10/26/04	0800	BB	257	258	310	289	227	2242	137Cs	103214	105857	116443	114485	PASS	
		FW			206	227						95271	97229		
10/26/04	1200	BB	250	258	309	289	227	2242	137Cs	104387	105815	116396	114237	PASS	
		FW			206	227						95233	97393		
10/27/04	0800	BB	254	258	309	288	227	2242	137Cs	103063	105738	116312	113938	PASS	
		FW			206	227						95165	97539		
10/27/04	1200	BB	250	258	310	288	228	2242	137Cs	104387	105694	116263	113701	PASS	
		FW			206	228						95125	97687		



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: 84458
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01588	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	96	96
X 1	250	250	250	1,000 CPM	.2	180 - 220	194	194
X 1	400	400	400	1,000 CPM	.5	450 - 550	484	484
X 10	1,000	1,000	1,000	1,000 CPM	1	900 - 1,100	978	978
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	1,945	1,945
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,881	4,881
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: <i>M. Paul</i>	Reviewed By: <i>Ramon G. Acosta</i>	Date: <i>4-27-04</i>
Calibration Date: 04/27/04	Calibration Due: 04/27/05	

Model: 2221Serial Number: 84458

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 19.8 °C	Pressure: 741mmHg	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 ()		
High Voltage Calibration									
Voltage	Tolerance ± 2%			As Found			As Left		
400	392-408			401			401		
1,000	980-1,020			1,002			1,002		
1,500	1,470-1,530			1,499			1,499		
1,900	1,862-1,932			1,893			1,893		
Threshold/Gain Calibration (Desired Ratio <u>10</u> mV/100)									
<u>Input</u>	<u>As Found Value</u>		<u>As Found Ratio (mV/100)</u>		<u>As Left Value</u>		<u>As Left Ratio (mV/100)</u>		
10	103		9.7		91		10.9		
20	217		9.2		193		10.4		
30	334		9.0		296		10.1		
40	447		8.9		401		10.0		
Logmeter Scale Linearity Check									
<u>Input</u>	<u>±20% Tolerance</u>		<u>As Found</u>		<u>As Left</u>				
LOG	400		320-480		450		450		
LOG	4,000		3,200-4,800		4,500		4,500		
LOG	40,000		32,000-48,000		45,000		45,000		
LOG	400,000		320,000-480,000		450,000		450,000		
COMMENTS									
Calibrated in accordance with the OEM Technical Manual									
Instrument									
Calibrated By: <u>Mike Paul</u>					Reviewed By: <u>James F. Asst</u> Date: <u>4-27-04</u>				
Calibration Date: 04/27/04					Calibration Due: 04/27/05				



**DETECTOR
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: 43-68B		
Contact Name: Thomas Scott				Serial Number: 095533		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01588		Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION						
1) Source Nuclide: Tc ⁹⁹		Serial Number: 119719		Activity (dpm): 23,100		
Certification Date: 10/14/97						
Parameter	As Found	As Left	Precision Test		CPM (Source #1)	
Count 1	5,373	5,373	Count 1(Heel)		5,324	
Count 2	5,485	5,485	Count 2(Center)		5,555	
Count 3	5,496	5,496	Count 3(Toe)		5,556	
Average	5,451	5,451	Average		5,478	
Background (cpm)	278.2	278.2	Tolerance		All counts within ±10% of Average	
Net Counts	5,173	5,173	Pass/Fail		PASS	
Efficiency	22.4%	22.4%				
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	84458		04/27/05	278.2	1750V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓	Voltage Plateau YES ✓ NO
COMMENTS						
Calibrated with 5Ft. Cable			Calibrated in accordance with IN-WI-239.			
10 minute background Efficiency determined w/43-68 source jig						
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: <i>Mike Paul</i>		Reviewed By: <i>Thomas G. Scott</i>			Date: 4-27-04	
Certification Date: 04/27/04				Certification Due: 04/27/05		

BACKGROUND PLATEAU 43-68#095533 5FT CABLE 4/26/2004

900	0
950	0
1000	0
1050	1
1100	0
1150	0
1200	0
1250	0
1300	2
1350	0
1400	7
1450	12
1500	29
1550	36
1600	93
1650	161
1700	251
1750	273
1800	873
1850	2541

ALPHA PLATEAU TH-230#119706 21,240DPM

900	0
950	1
1000	62
1050	1533
1100	3226
1150	3824
1200	3796
1250	4066
1300	4027
1350	4055
1400	4038
1450	4308
1500	4560

BETA PLATEAU TC-99#119719 23,100DPM

1400	97
1450	678
1500	1694
1550	2845
1600	4023
1650	5204
1700	5725
1750	5795
1800	6126
1850	7046
1900	614605

Thomas G. Scott

4-27-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-68B
Serial Nr.: 84458
Serial Nr.: 095533

Calibration Date: 04/27/04
Calibration Date: 04/27/04

Date	Time	Technician Reviewer	Background In CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading In CPM		Acceptable Range (CPM)			Results
			X	-	+20%	-20%	+3σ			-3σ	X	-	+10%	-10%	
10/5/04	1200	TW	212	212	254	250	2102	137Cs	78760	78760	78760	86636	82593	PASS	
		FW			169	174						70884	74928		
10/6/04	0800	TW	226	213	256	251	1837	137Cs	92510	92510	92510	101760	96073	PASS	
		FW			170	175						83259	88946		
10/6/04	1200	TW	229	214	257	252	1837	137Cs	95734	92614	92614	101875	96422	PASS	
		FW			171	176						83352	88805		
10/7/04	0800	TW	232	216	259	254	2196	137Cs	101693	101693	101693	111863	108433	PASS	
		FW			173	177						91524	94953		
10/7/04	1200	TW	204	215	258	253	2102	137Cs	76581	78690	78690	86559	82591	PASS	
		FW			172	177						70821	74789		
10/8/04	0800	TW	230	216	259	254	2102	137Cs	75733	78598	78598	86457	82665	PASS	
		FW			173	178						70738	74530		
10/8/04	1200	TW	214	216	259	252	1837	137Cs	90819	92557	92557	101813	96393	PASS	
		FW			173	179						83302	88722		



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: 190192
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01588	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	198	198
X 1	400	400	400	1,000 CPM	.5	450 – 550	496	496
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	991	991
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	1,981	1,981
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,953	4,953
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: <i>M. Paul</i>	Reviewed By: <i>Charles G. Seal</i>	Date: <i>4-26-04</i>	
Calibration Date: 04/26/04		Calibration Due: 04/26/05	

Model: 2221

Serial Number: 190192

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 22.8 °C	Pressure: 741mmHg	Humidity: 51%		

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	391	391
1,000	980-1,020	984	984
1,500	1,470-1,530	1,475	1,475
1,900	1,862-1,932	1,865	1,865

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	207	9.7	207	9.7
30	308	9.7	308	9.7
40	421	9.5	421	9.5

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 the OEM Technical Manual

Instrument			
Calibrated By: <i>Mike Paul</i>	Reviewed By: <i>James F. Salt</i>	Date: <i>4-26-04</i>	
Calibration Date: 04/26/04	Calibration Due: 04/26/05		



**DETECTOR
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: 43-68B		
Contact Name: Thomas Scott				Serial Number: 095535		
Customer Purchase Order Number: N/A		Work Order Number: 2004-01588		Evaluation Method: Source		
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION						
1) Source Nuclide: Tc ⁹⁹		Serial Number: 119718		Activity (dpm): 20,520		
				Certification Date: 10/14/97		
Parameter	As Found	As Left	Precision Test		CPM (Source #1)	
Count 1	4,944	4,944	Count 1(Heel)		4,558	
Count 2	4,924	4,924	Count 2(Center)		5,024	
Count 3	4,922	4,922	Count 3(Toe)		4,669	
Average	4,930	4,930	Average		4,750	
Background (cpm)	276.4	276.4	Tolerance		All counts within ±10% of Average	
Net Counts	4,654	4,654	Pass/Fail		PASS	
Efficiency	22.7%	22.7%				
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	190192		04/26/05	276.4	1750V	40 = 4mV
Detector Setup Report	YES	NO ✓	Barcode Report	YES	NO ✓	Voltage Plateau YES ✓ NO
COMMENTS						
Calibrated with 5Ft. Cable			Calibrated in accordance with IN-WI-239.			
10 minute background Efficiency determined w/43-68 source jig						
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: <i>Mike Paul</i>		Reviewed By: <i>Thomas G. Scott</i>			Date: <i>5-3-04</i>	
Certification Date: 05/03/04				Certification Due: 05/03/05		

BACKGROUND PLATEAU 43-68#095535 5FT CABLE 5/3/2004

900	4
950	0
1000	0
1050	1
1100	0
1150	1
1200	4
1250	1
1300	1
1350	2
1400	6
1450	6
1500	9
1550	28
1600	68
1650	104
1700	231
1750	267
1800	428
1850	857
1900	7080

ALPHA PLATEAU TH-230#119739 18,600DPM

900	0
950	1
1000	0
1050	287
1100	2130
1150	3317
1200	3523
1250	3737
1300	3739
1350	3901
1400	3937
1450	3894
1500	4228

BETA PLATEAU TC-99#069605 25,200DPM

1400	27
1450	341
1500	1216
1550	2428
1600	3671
1650	4945
1700	5883
1750	6123
1800	6293
1850	7305
1900	12180

James F. Dault

5-3-04

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
 Detector: Gas proportional

Model: Ludlum 2221
 Model: Ludlum 43-68B
 Serial Nr: 190192
 Serial Nr: 095535

Calibration Date: 04/26/04
 Calibration Date: 05/03/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)			Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)			Results
			X	-	+20%	+3σ	-20%			-3σ	X	-	+10%	+3σ	
10/5/04	1200	GG	X	X	220	217	2102	137Cs	68361	68361	75197	69198	61524	67523	PASS
10/6/04	0800	GG			147	150	2102	137Cs	68361	68361	61524	67523	111043	106898	PASS
10/6/04	0800	FW	201	185	148	150	1838	137Cs	100948	100948	90853	94998	90853	94998	PASS
10/6/04	1200	GG	196	186	223	220	2196	137Cs	108476	108476	119324	115090	97629	101863	PASS
10/7/04	0800	GG	187	186	223	218	2100	137Cs	78583	78583	86441	82513	70725	74653	PASS
10/7/04	1200	FW	195	187	224	218	2100	137Cs	78583	78583	86456	82466	70737	74727	PASS
10/8/04	0800	GG	202	188	225	220	2100	137Cs	79007	78610	86471	82421	70749	74799	PASS
10/8/04	1200	FW	205	189	226	222	2100	137Cs	80474	78666	86533	82510	70800	74823	PASS
10/12/04	0800	GG	191	189	227	221	2100	137Cs	79054	78678	86545	82466	70810	74889	PASS
10/12/04	1200	GG	208	190	228	223	2100	137Cs	79726	78707	86578	82468	70837	74947	PASS
10/13/04	0800	GG	207	191	229	225	2100	137Cs	79145	78720	86592	82431	70848	75009	PASS
10/13/04	1200	FW	206	192	230	226	2100	137Cs	80468	78767	86644	82500	70890	75033	PASS
10/14/04	0800	GG	207	192	231	227	2100	137Cs	80552	78814	86695	82572	70932	75056	PASS
10/14/04	1200	FW	214	193	232	229	2100	137Cs	80505	78857	86743	82630	70972	75084	PASS
10/15/04	0800	GG	207	194	233	229	2100	137Cs	79140	78864	86751	82591	70978	75138	PASS

Daily Portable Survey Instrument Quality Assurance Checks

Instrument: Scaler/rate meter
Detector: Gas proportional

Model: Ludlum 2221
Model: Ludlum 43-68B
Serial Nr.: 190192
Serial Nr.: 095535

Calibration Date: 04/26/04
Calibration Date: 05/03/04

Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20%	-20%			+3σ	-3σ	X	-	
10/15/04	1200	GG	X	X	233	230	2100	137Cs	X	-	86785	82610	PASS
		FW			156	159	2100	137Cs			71006	75181	
		GG			234	230					86795	82578	PASS
10/18/04	0800	FW	201	195	156	160	2100	137Cs			71014	75232	
		GG			234	230					86820	82576	PASS
		FW	203	195	156	160	2100	137Cs			71035	75279	
10/18/04	1200	GG			234	229					86853	82598	PASS
		FW	193	195	156	161	2100	137Cs			71061	75316	
10/19/04	0800	GG			234	229					86882	82612	PASS
		FW	205	195	156	162	2100	137Cs			71085	75355	
10/20/04	1200	GG			234	229					86903	82605	PASS
		FW	196	195	156	162	2100	137Cs			71102	75399	
10/21/04	0800	GG			234	228					86924	82602	PASS
		FW	192	195	156	163	2100	137Cs			71120	75441	
10/21/04	1200	GG			235	230					111044	106799	PASS
		FW	218	196	157	162	1838	137Cs			90854	95099	
10/22/04	0800	GG			235	229					86954	82625	PASS
		FW	193	196	157	163	2100	137Cs			71144	75473	
10/22/04	1200	GG			235	229					86968	82607	PASS
		FW	201	196	157	163	2100	137Cs			71155	75516	
10/25/04	0800	GG			235	229					86988	82605	PASS
		FW	199	196	157	164	2100	137Cs			71172	75555	
10/25/04	1200	GG			235	228					87020	82638	PASS
		FW	199	196	157	164	2100	137Cs			71198	75579	
10/26/04	0800	GG			235	228					87031	82619	PASS
		FW	193	196	157	165	2100	137Cs			71207	75619	
10/26/04	1200	GG			236	228					87032	82586	PASS
		FW	204	196	157	165	2100	137Cs			71208	75654	

Daily Portable Survey Instrument Quality Assurance Checks

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Model: Ludlum 2221
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Calibration Date: 04/26/04
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Date	Time	Technician Reviewer	Background in CPM		Acceptable Range (CPM)		Source ID Nr.	Isotope	Source Reading in CPM		Acceptable Range (CPM)		Results
			X	-	+20% -20%	+3σ -3σ			X	-	+10% -10%	+3σ -3σ	
10/27/04	1300	GG FW	X	X	235 157	228 164	2100	137Cs	X	-	87055 71227	82596 75685	PASS