ENERGYSOLUTIONS

Survey Package Worksheet for Hematite Building 231

Package Identification No.: HDP-B0231	**Prepared by:** Paul C. Ely
Location: Building 231	**Date Prepared:** 11/28/2007
Area Classification: Class 2	**Reviewed by:**

Area Description

Building 231 is a Class 2 area. Survey areas include floor, walls, ceiling and overhead horizontal surfaces excluding partitions, equipment and furniture.

Historical Information

Building 231 is a warehouse that was erected in 1996 and is used to store shipping containers and other equipment and materials. Refurbishment of radioactive material shipping containers was performed previously in this building. U-235 and U-238 are the primary isotopes in this building.

General Survey Instructions

1. Perform surface scans at a scan speed not to exceed 2-inches per second. Any locations that exceed twice background must be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
   a. 10% scan of floor, wall, and ceiling surfaces for alpha contamination and for alpha plus beta contamination.
   b. Perform independent gamma and alpha plus beta scans of floor joints, cracks, pits and drains for activity above twice background.
   c. 10% scan of overhead horizontal surfaces for alpha contamination and for alpha plus beta contamination.
2. Perform exposure rate measurement at 1-cm and 100-cm from the surface at each floor measurement location provided on survey maps. If a reading exceeds twice background, survey surrounding area. Notify the ES Project Manager of any exposure rate measurements that exceed twice background.
3. Perform direct alpha and alpha plus beta surface activity measurements, independently, at each measurement location provided on survey maps and at the highest activity location in marked elevated areas.
4. Collect removable surface activity sample over an area of 100 cm^2 in size at each floor measurement location provided on survey maps (attached). Notify the ES Project Manager if results exceed 800 dpm/100 cm^2.

Special Instructions

- Source check instrumentation to Th-230 for alpha, Tc-99 for beta, and Cs-137 for gamma measurements.
- Use gas proportional detector model numbers 43-68, 43-106 or equivalent detector as approved by the RSO for total surface activity surveys.
- The MDC for total alpha and beta activity measurements shall be less than 1,000 dpm/100 cm^2.
- Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface prior to survey.
- Record maximum and average scan measurement results, in cpm, for each scan area.
- Measurement and sampling locations are based on a random-start triangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.
- Notify the ES Project Manager of locations that exceed 5,000 dpm/100 cm^2 total alpha or beta surface activity.
- Notify the Project Manager of any exposure rate measurements that exceed twice background at 1-cm.
- Attach photographic records if available and provide descriptive comments for each image under Survey Comments.

Survey Performance

Software – Headers (if needed)			General Description	1-cm Exposure Rate	100-cm Exposure Rate	Alpha Scan	Beta Scan	Gamma Scan	Direct Alpha	Direct Beta	α & β Smears/ Samples
4	5	6									
Hematite Building 231 Class 2 Areas											
Hematite Bldg 231	FLOOR	B0231	Floor 10%	✓	✓	✓	✓	✓	✓	✓	✓
Hematite Bldg 231	L. WALL	B0231	Lower Wall 10%	N/A	N/A	✓	✓	N/A	✓	✓	✓
Hematite Bldg 231	CLNG + U. WALL	B0231	Ceiling & Upper Wall 10%	N/A	N/A	✓	✓	N/A	✓	✓	✓
Hematite Bldg 231	OVHD	B0231	Overhead Horizontal Surfaces 10%	N/A	N/A	✓	✓	N/A	20 ✓	20 ✓	20 ✓

Survey Comments

Package Review

Surveyor(s): V. Baldwin, D. Schumaker, M. Chase, D. Shiffleff

Date Package Completed: 12/4/2007

Package Reviewed by and Date: Paul C Ely 12/26/2007

Survey Package B-0231
Building 231 Class 2 Interior

X (Max):	**48.8**	meters	
Y (Max):	**42.7**	meters	
A (Area):	2084	m^2	
Actual Survey Area:	**1710**	m^2	
Required Survey Points:	**40**	18%	percent void area
N (Points):	**52**	49	Estimated Minimum Points

$$L = \left[\frac{A}{0.866 * N}\right]^{1/2}$$

L= 6.8 meters (distance between measurement points)

$$D = 0.866 * L$$

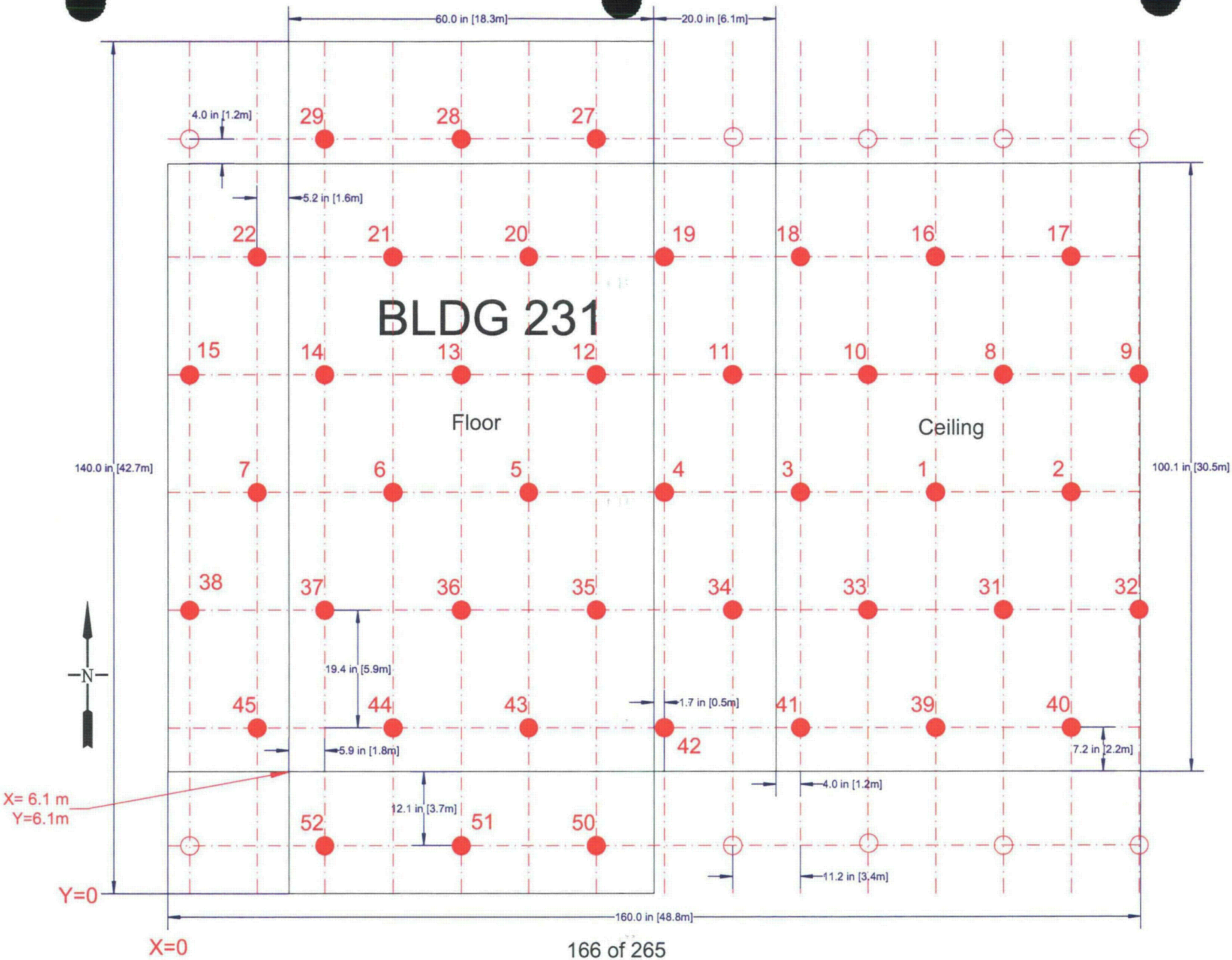
D= 5.9 meters (distance between rows)

L/2= 3.4 meters (row offset value)

X (Random):	1.4	random generated number
Y (Random):	38	random generated number
X (Origin):	38.5	initially generated random number
Y (Origin):	20.1	initially generated random number

Number of rows:	7
Number of columns:	7

Survey Point	**Survey Location X**	**Y**	**Row**
Starting Point (1)	38.5	20.1	4
2	45.3	20.1	
3	31.7	20.1	
4	24.9	20.1	
5	18.1	20.1	
6	11.3	20.1	
7	4.5	20.1	
8	41.9	26.0	5
9	48.7	26.0	
10	35.1	26.0	
11	28.3	26.0	
12	21.5	26.0	
13	14.7	26.0	
14	7.9	26.0	
15	1.1	26.0	
16	38.5	31.9	6
17	45.3	31.9	
18	31.7	31.9	
19	24.9	31.9	
20	18.1	31.9	
21	11.3	31.9	
22	4.5	31.9	
23	41.9	37.8	7
24	48.7	37.8	
25	35.1	37.8	
26	28.3	37.8	
27	21.5	37.8	
28	14.7	37.8	
29	7.9	37.8	
30	1.1	37.8	
31	41.9	14.2	3
32	48.7	14.2	
33	35.1	14.2	
34	28.3	14.2	
35	21.5	14.2	
36	14.7	14.2	
37	7.9	14.2	
38	1.1	14.2	
39	38.5	8.3	2
40	45.3	8.3	
41	31.7	8.3	
42	24.9	8.3	
43	18.1	8.3	
44	11.3	8.3	
45	4.5	8.3	
46	41.9	2.4	1
47	48.7	2.4	
48	35.1	2.4	
49	28.3	2.4	
50	21.5	2.4	
51	14.7	2.4	
52	7.9	2.4	
53	1.1	2.4	


60.0 in [18.3m]
20.0 in [6.1m]
4.0 in [1.2m]
5.2 in [1.6m]
BLDG 231
Floor
Ceiling
140.0 in [42.7m]
100.1 in [30.5m]
19.4 in [5.9m]
1.7 in [0.5m]
5.9 in [1.8m]
7.2 in [2.2m]
4.0 in [1.2m]
12.1 in [3.7m]
11.2 in [3.4m]
160.0 in [48.8m]
N
X= 6.1 m
Y=6.1m
Y=0
X=0
29
28
27
22
21
20
19
18
16
17
15
14
13
12
11
10
8
9
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51
50

Survey Progress Tracking Sheet
Survey Package B-0231
Building 231 Class 2

Complete: Paul C Ely **Date:** 12/6/07
Name

Scans								Fixed Readings				Smear	
gamma µR		alpha cpm		beta cpm		Survey		gamma µR		alpha	beta	alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.	1-cm	1-m	cpm	cpm	cpm	cpm
						BKG	Floor			6	473		
						BKG	Floor			6	436		
						BKG	Floor			5	416		
		<6	<6	<473	<473	Floor	Entire Floor Area						
		<6	<6	<473	<473	Floor	Floor Cracks						
						BKG	E. Wall			0	133		
						BKG	E. Wall			2	130		
						BKG	E. Wall			0	105		
3.4	3.4	0	1	140	180	1	C	3.7	3.4	1	131	1	40
3.5	4.1	0	1	140	200	2	C	4.1	3.8	4	132	0	46
na	na	0	1	140	200	3	C	3.6	3.5	2	119	1	47
na	na	0	1	110	150	4	W	3.5	3.4	0	117	1	51
na	na	na	na	na	na	5	W	3.6	3.3	2	157	3	45
na	na	na	na	na	na	6	F	3.0	4.0	4	170	1	44
3.5	4.5	0	0	110	180	7	W	3.7	3.6	2	132	0	49
3.1	3.5	0	1	120	180	8	C	3.4	3.4	3	129	0	44
3.5	3.8	0	1	120	200	9	C	3.8	3.8	0	121	0	34
3.5	4.0	0	1	110	180	10	C	3.4	3.5	2	160	0	55
3.5	3.9	0	1	120	200	11	W	3.4	3.1	0	129	1	39
na	na	na	na	na	na	12	F	4.0	3.7	2	128	0	49
na	na	na	na	na	na	13	F	3.4	3.6	9	147	0	42
na	na	na	na	na	na	14	F	3.2	3.7	1	138	1	48
3.9	4.4	0	1	150	210	15	W	4.1	3.7	2	115	0	45
na	na	0	1	120	200	16	C	3.9	3.5	3	140	1	46
na	na	0	1	140	200	17	C	3.8	3.7	3	137	1	50
na	na	0	1	110	180	18	C	3.8	3.5	5	129	0	46
3.2	3.4	0	0	120	180	19	W	3.1	3.2	2	123	1	42
na	na	na	na	na	na	20	F	3.4	3.3	1	164	1	34
na	na	na	na	na	na	21	F	3.7	3.0	2	157	1	53
3.8	4.1	0	1	120	200	22	W	4.3	4.3	0	139	1	59
3.2	3.8	0	1	120	220	27	W	3.4	3.8	2	146	1	37
4.0	4.2	0	1	110	200	28	W	4.1	3.6	1	127	1	37

Survey Progress Tracking Sheet
Survey Package B-0231
Building 231 Class 2

Complete: Paul C Ely
Name

Date: 12/6/07

Scans									Fixed Readings				Smear	
gamma µR		alpha cpm		beta cpm		Survey			gamma µR		alpha	beta	alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.		1-cm	1-m	cpm	cpm	cpm	cpm
4.5	4.7	0	1	110	210	29	W		4.3	4.0	2	108	2	40
na	na	0	1	140	210	31	C		3.9	3.4	1	114	0	48
na	na	0	1	140	200	32	C		4.1	3.8	2	146	1	35
na	na	0	0	110	150	33	C		3.5	3.5	1	145	1	57
na	na	0	0	120	180	34	W		3.5	3.4	1	122	1	39
na	na	na	na	na	na	35	F		3.5	3.8	1	184	0	35
na	na	na	na	na	na	36	F		4.0	3.6	1	184	0	41
na	na	na	na	na	na	37	F		3.8	3.6	0	149	0	37
na	na	0	0	120	200	38	W				3	128	0	48
na	na	0	1	140	220	39	C				1	136	0	38
na	na	0	1	140	200	40	C				1	179	0	43
na	na	0	1	150	220	41	C				2	155	1	53
na	na	0	0	110	180	42	W		3.4	3.6	3	109	1	54
3.5	3.8	na	na	na	na	43	F		3.8	3.8	1	157	2	48
na	na	na	na	na	na	44	F		3.7	3.5	2	161	1	48
3.5	4.5	0	0	150	200	45	W		4.6	4.2	1	135	1	47
na	na	0	1	150	240	50	W				2	136	1	52
na	na	0	1	140	240	51	W				1	137	3	57
na	na	0	1	150	210	52	W				0	134	0	54
						BKG					0	150		
						BKG					2	133		
						BKG					1	135		
		0	1	140	220	1	OVHD	Horizontal			2	140	1	39
		0	1	130	160	2	OVHD	Horizontal			0	142	0	38
		0	1	140	220	3	OVHD	Horizontal			7	162	2	45
		0	1	140	240	4	OVHD	Horizontal			2	190	0	51
		0	1	120	220	5	OVHD	Horizontal			2	190	2	38
		0	1	160	200	6	OVHD	Horizontal			0	158	5	36
		0	1	100	160	7	OVHD	Horizontal			5	140	5	41
		0	1	120	200	8	OVHD	Horizontal			5	180	2	40
		0	1	100	160	9	OVHD	Horizontal			5	160	0	39
		0	1	120	240	10	OVHD	Horizontal			5	170	3	51

Survey Progress Tracking Sheet
Survey Package B-0231
Building 231 Class 2

Complete: Paul C Ely **Date:** 12/6/07
Name

Scans									Fixed Readings				Smear	
gamma µR		alpha cpm		beta cpm		Survey			gamma µR		alpha	beta	alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.		1-cm	1-m	cpm	cpm	cpm	cpm
		0	1	110	200	11	OVHD	Horizontal			5	166	2	46
		0	1	100	160	12	OVHD	Horizontal			0	156	2	35
		0	1	120	240	13	OVHD	Horizontal			4	174	0	40
		0	1	120	240	14	OVHD	Horizontal			2	197	3	48
		0	1	140	200	15	OVHD	Horizontal			3	174	1	39
		0	1	140	200	16	OVHD	Horizontal			2	150	1	43
		0	1	170	180	17	OVHD	Horizontal			2	160	1	37
		0	1	140	180	18	OVHD	Horizontal			2	145	2	39
		0	1	140	200	19	OVHD	Horizontal			4	160	1	50
		0	1	140	200	20	OVHD	Horizontal			3	155	2	43

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal

Survey Report

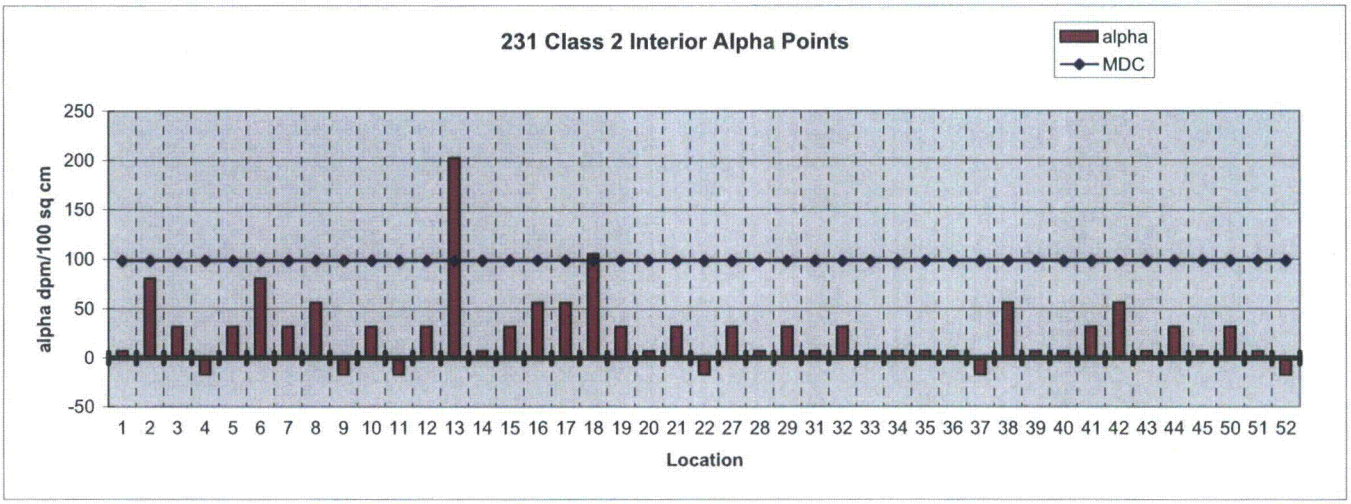
Description: HEMATITE Building 231 Class 2 Interior
Survey Date: 11/29/2007 **Survey Package: B-0231**
Technician Name: M. Chase / V. Baldwin
Comments: Class 2 Interior Areas
Instrument Manufacturer: Ludlum

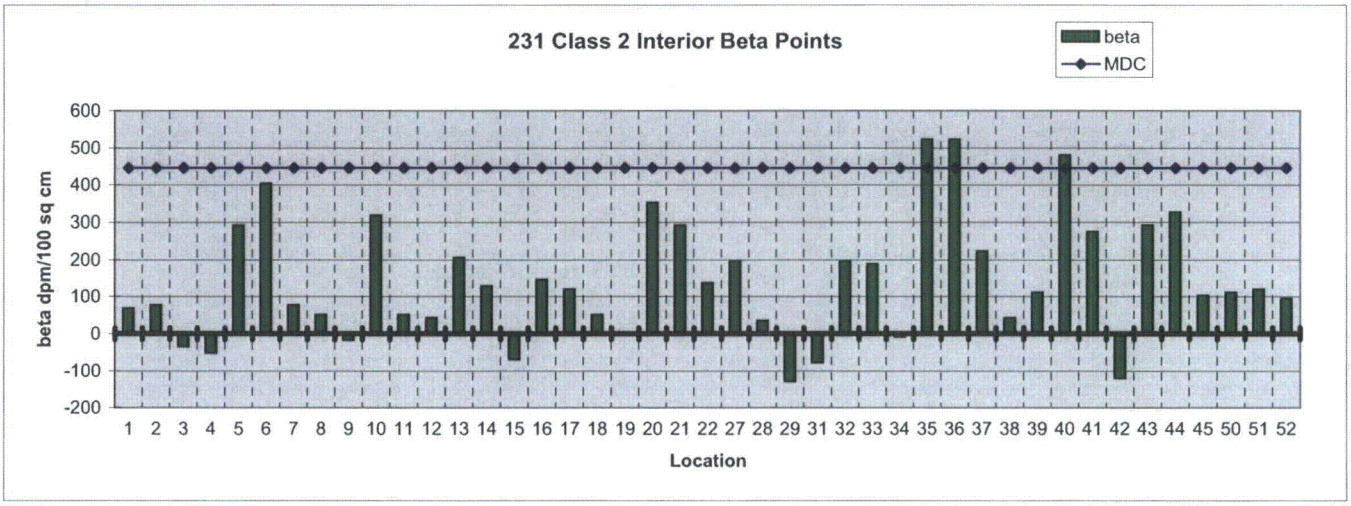
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		0				133		
		BKG	60		2				130		
		BKG	60		0				105		
		AVG BKG			**0.7**				**123**		
1	C	FLDCT	60	1	0.7	98	7	131	123	446	69
2	C	FLDCT	60	4	0.7	98	81	132	123	446	77
3	C	FLDCT	60	2	0.7	98	32	119	123	446	-34
4	W	FLDCT	60	0	0.7	98	-17	117	123	446	-51
5	W	FLDCT	60	2	0.7	98	32	157	123	446	292
6	F	FLDCT	60	4	0.7	98	81	170	123	446	403
7	W	FLDCT	60	2	0.7	98	32	132	123	446	77
8	C	FLDCT	60	3	0.7	98	56	129	123	446	51
9	C	FLDCT	60	0	0.7	98	-17	121	123	446	-17
10	C	FLDCT	60	2	0.7	98	32	160	123	446	317
11	W	FLDCT	60	0	0.7	98	-17	129	123	446	51
12	F	FLDCT	60	2	0.7	98	32	128	123	446	43
13	F	FLDCT	60	9	0.7	98	203	147	123	446	206
14	F	FLDCT	60	1	0.7	98	7	138	123	446	129
15	W	FLDCT	60	2	0.7	98	32	115	123	446	-69
16	C	FLDCT	60	3	0.7	98	56	140	123	446	146
17	C	FLDCT	60	3	0.7	98	56	137	123	446	120
18	C	FLDCT	60	5	0.7	98	105	129	123	446	51
19	W	FLDCT	60	2	0.7	98	32	123	123	446	0
20	F	FLDCT	60	1	0.7	98	7	164	123	446	352
21	F	FLDCT	60	2	0.7	98	32	157	123	446	292
22	W	FLDCT	60	0	0.7	98	-17	139	123	446	137
27	W	FLDCT	60	2	0.7	98	32	146	123	446	197
28	W	FLDCT	60	1	0.7	98	7	127	123	446	34
29	W	FLDCT	60	2	0.7	98	32	108	123	446	-129
31	C	FLDCT	60	1	0.7	98	7	114	123	446	-77
32	C	FLDCT	60	2	0.7	98	32	146	123	446	197
33	C	FLDCT	60	1	0.7	98	7	145	123	446	189
34	W	FLDCT	60	1	0.7	98	7	122	123	446	-9
35	F	FLDCT	60	1	0.7	98	7	184	123	446	523
36	F	FLDCT	60	1	0.7	98	7	184	123	446	523
37	F	FLDCT	60	0	0.7	98	-17	149	123	446	223
38	W	FLDCT	60	3	0.7	98	56	128	123	446	43
39	C	FLDCT	60	1	0.7	98	7	136	123	446	112
40	C	FLDCT	60	1	0.7	98	7	179	123	446	480
41	C	FLDCT	60	2	0.7	98	32	155	123	446	275
42	W	FLDCT	60	3	0.7	98	56	109	123	446	-120
43	F	FLDCT	60	1	0.7	98	7	157	123	446	292
44	F	FLDCT	60	2	0.7	98	32	161	123	446	326
45	W	FLDCT	60	1	0.7	98	7	135	123	446	103
50	W	FLDCT	60	2	0.7	98	32	136	123	446	112
51	W	FLDCT	60	1	0.7	98	7	137	123	446	120
52	W	FLDCT	60	0	0.7	98	-17	134	123	446	94

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Interior Alpha Points
alpha
MDC
alpha dpm/100 sq cm
250
200
150
100
50
0
-50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 50 51 52
Location


231 Class 2 Interior Beta Points
beta
MDC
beta dpm/100 sq cm
600
500
400
300
200
100
0
-100
-200
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 50 51 52
Location

Survey Report

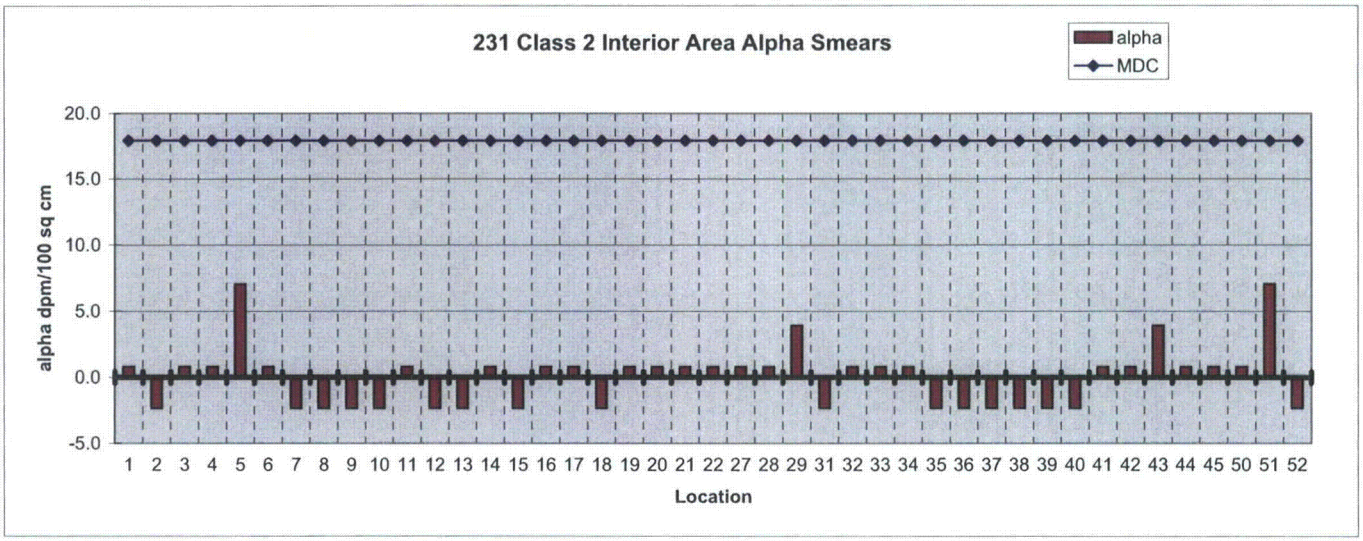
Description: HEMATITE Building 231 Class 2 Interior Area Smears
Survey Date: 11/29/2007 **Survey Package: B-0231**
Technician Name: M. Chase / V. Baldwin
Comments: Smears from Class 2 Interior Areas
Instrument Manufacturer: Ludlum **Count Date:** 11/29/2007

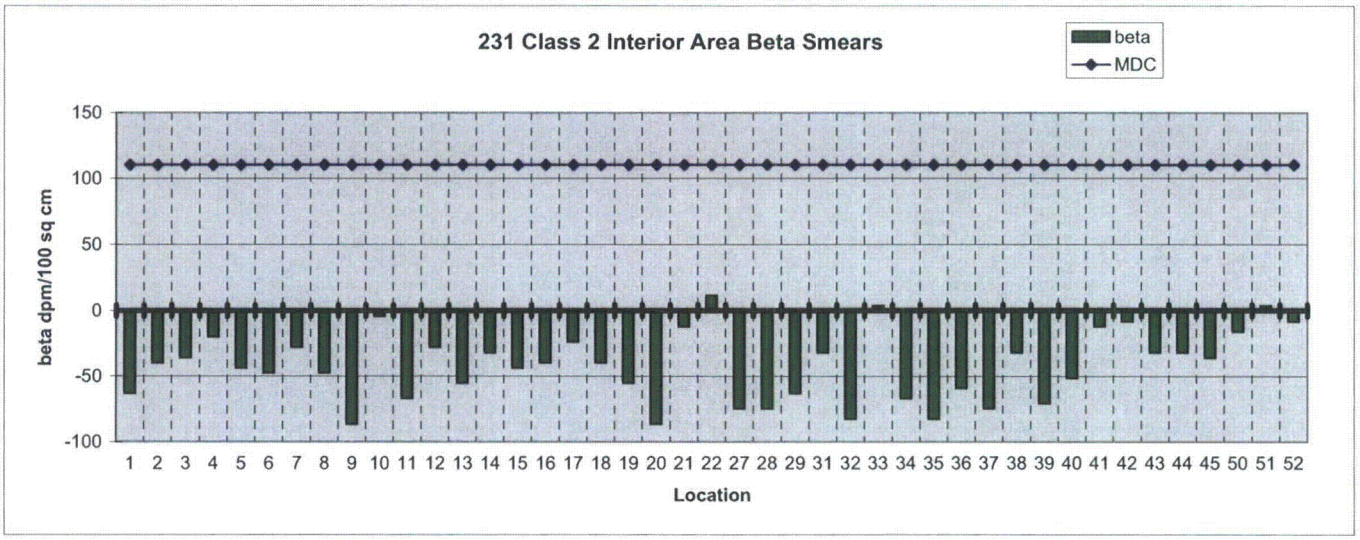
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.75**				**56.1**		
1	C	SMEAR	60	1	0.75	17.9	0.8	40	56.1	110	-63
2	C	SMEAR	60	0	0.75	17.9	-2.4	46	56.1	110	-40
3	C	SMEAR	60	1	0.75	17.9	0.8	47	56.1	110	-36
4	W	SMEAR	60	1	0.75	17.9	0.8	51	56.1	110	-20
5	W	SMEAR	60	3	0.75	17.9	7.1	45	56.1	110	-44
6	F	SMEAR	60	1	0.75	17.9	0.8	44	56.1	110	-47
7	W	SMEAR	60	0	0.75	17.9	-2.4	49	56.1	110	-28
8	C	SMEAR	60	0	0.75	17.9	-2.4	44	56.1	110	-47
9	C	SMEAR	60	0	0.75	17.9	-2.4	34	56.1	110	-87
10	C	SMEAR	60	0	0.75	17.9	-2.4	55	56.1	110	-4
11	W	SMEAR	60	1	0.75	17.9	0.8	39	56.1	110	-67
12	F	SMEAR	60	0	0.75	17.9	-2.4	49	56.1	110	-28
13	F	SMEAR	60	0	0.75	17.9	-2.4	42	56.1	110	-55
14	F	SMEAR	60	1	0.75	17.9	0.8	48	56.1	110	-32
15	W	SMEAR	60	0	0.75	17.9	-2.4	45	56.1	110	-44
16	C	SMEAR	60	1	0.75	17.9	0.8	46	56.1	110	-40
17	C	SMEAR	60	1	0.75	17.9	0.8	50	56.1	110	-24
18	C	SMEAR	60	0	0.75	17.9	-2.4	46	56.1	110	-40
19	W	SMEAR	60	1	0.75	17.9	0.8	42	56.1	110	-55
20	F	SMEAR	60	1	0.75	17.9	0.8	34	56.1	110	-87
21	F	SMEAR	60	1	0.75	17.9	0.8	53	56.1	110	-12
22	W	SMEAR	60	1	0.75	17.9	0.8	59	56.1	110	11
27	W	SMEAR	60	1	0.75	17.9	0.8	37	56.1	110	-75
28	W	SMEAR	60	1	0.75	17.9	0.8	37	56.1	110	-75
29	W	SMEAR	60	2	0.75	17.9	3.9	40	56.1	110	-63
31	C	SMEAR	60	0	0.75	17.9	-2.4	48	56.1	110	-32
32	C	SMEAR	60	1	0.75	17.9	0.8	35	56.1	110	-83
33	C	SMEAR	60	1	0.75	17.9	0.8	57	56.1	110	4
34	W	SMEAR	60	1	0.75	17.9	0.8	39	56.1	110	-67
35	F	SMEAR	60	0	0.75	17.9	-2.4	35	56.1	110	-83
36	F	SMEAR	60	0	0.75	17.9	-2.4	41	56.1	110	-59
37	F	SMEAR	60	0	0.75	17.9	-2.4	37	56.1	110	-75
38	W	SMEAR	60	0	0.75	17.9	-2.4	48	56.1	110	-32
39	C	SMEAR	60	0	0.75	17.9	-2.4	38	56.1	110	-71
40	C	SMEAR	60	0	0.75	17.9	-2.4	43	56.1	110	-51
41	C	SMEAR	60	1	0.75	17.9	0.8	53	56.1	110	-12
42	W	SMEAR	60	1	0.75	17.9	0.8	54	56.1	110	-8
43	F	SMEAR	60	2	0.75	17.9	3.9	48	56.1	110	-32
44	F	SMEAR	60	1	0.75	17.9	0.8	48	56.1	110	-32
45	W	SMEAR	60	1	0.75	17.9	0.8	47	56.1	110	-36
50	W	SMEAR	60	1	0.75	17.9	0.8	52	56.1	110	-16
51	W	SMEAR	60	3	0.75	17.9	7.1	57	56.1	110	4
52	W	SMEAR	60	0	0.75	17.9	-2.4	54	56.1	110	-8

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Interior Area Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 50 51 52
Location


231 Class 2 Interior Area Beta Smears
beta
MDC
beta dpm/100 sq cm
150
100
50
0
-50
-100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 50 51 52
Location

Survey Report

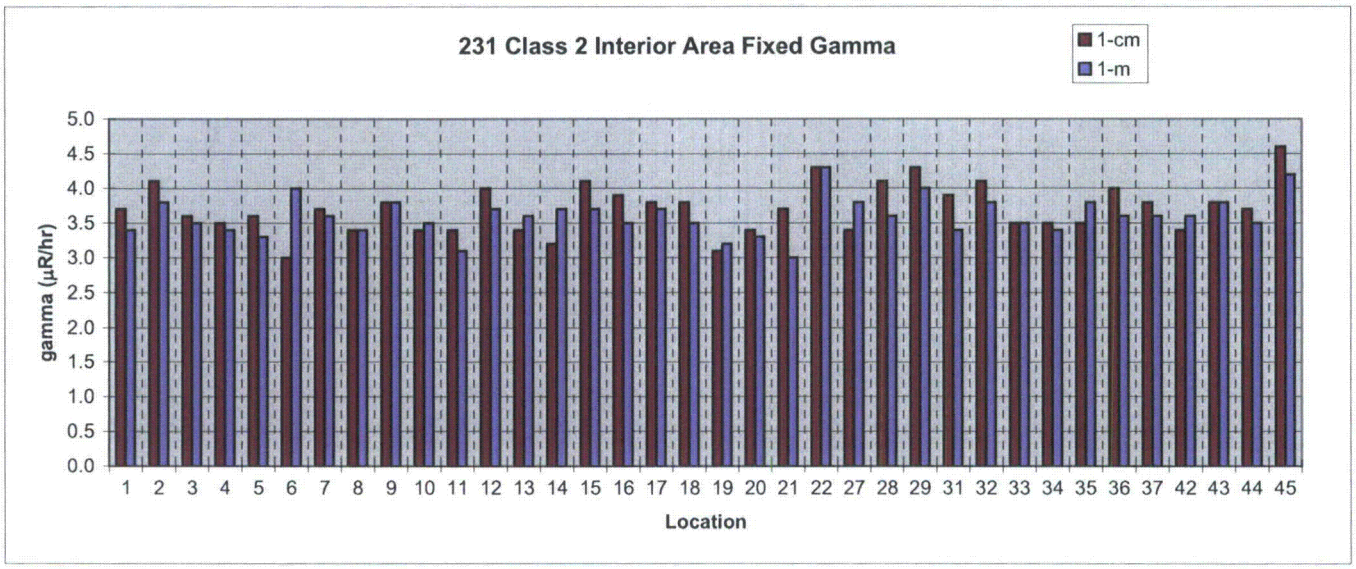
Description: HEMATITE Building 231 Class 2 Interior Area Gamma Surveys
Survey Date: 11/28/2007 **Survey Package: B-0231**
Technician Name: V. Baldwin
Comments: Interior Area Gamma Results
Instrument Manufacturer: Ludlum

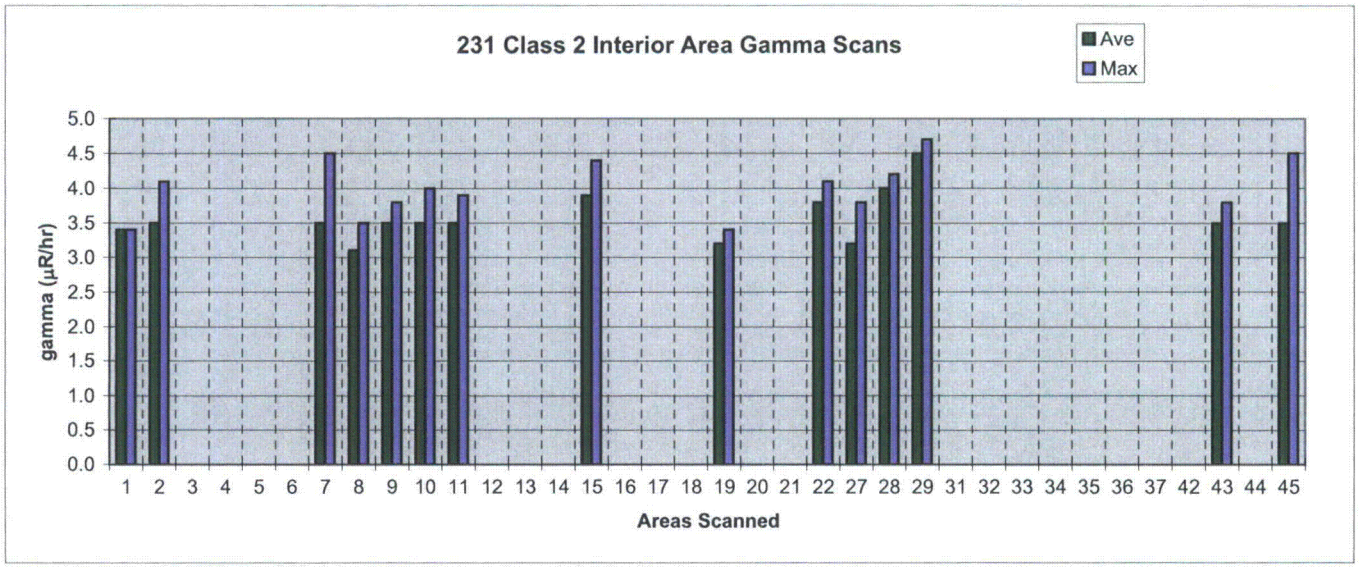
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
44-10	12269	9/6/08	2350	98638	9/27/08

Survey Results

		gamma µR		gamma scan µR	
Location #	Surface*	1-cm	1-m	Ave	Max
1	C	3.7	3.4	3.4	3.4
2	C	4.1	3.8	3.5	4.1
3	C	3.6	3.5		
4	W	3.5	3.4		
5	W	3.6	3.3		
6	F	3.0	4.0		
7	W	3.7	3.6	3.5	4.5
8	C	3.4	3.4	3.1	3.5
9	C	3.8	3.8	3.5	3.8
10	C	3.4	3.5	3.5	4.0
11	W	3.4	3.1	3.5	3.9
12	F	4.0	3.7		
13	F	3.4	3.6		
14	F	3.2	3.7		
15	W	4.1	3.7	3.9	4.4
16	C	3.9	3.5		
17	C	3.8	3.7		
18	C	3.8	3.5		
19	W	3.1	3.2	3.2	3.4
20	F	3.4	3.3		
21	F	3.7	3.0		
22	W	4.3	4.3	3.8	4.1
27	W	3.4	3.8	3.2	3.8
28	W	4.1	3.6	4.0	4.2
29	W	4.3	4.0	4.5	4.7
31	C	3.9	3.4		
32	C	4.1	3.8		
33	C	3.5	3.5		
34	W	3.5	3.4		
35	F	3.5	3.8		
36	F	4.0	3.6		
37	F	3.8	3.6		
42	W	3.4	3.6		
43	F	3.8	3.8	3.5	3.8
44	F	3.7	3.5		
45	W	4.6	4.2	3.5	4.5

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Interior Area Fixed Gamma
1-cm
1-m
gamma (µR/hr)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 42 43 44 45
Location


231 Class 2 Interior Area Gamma Scans
Ave
Max
gamma (µR/hr)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 28 29 31 32 33 34 35 36 37 42 43 44 45
Areas Scanned

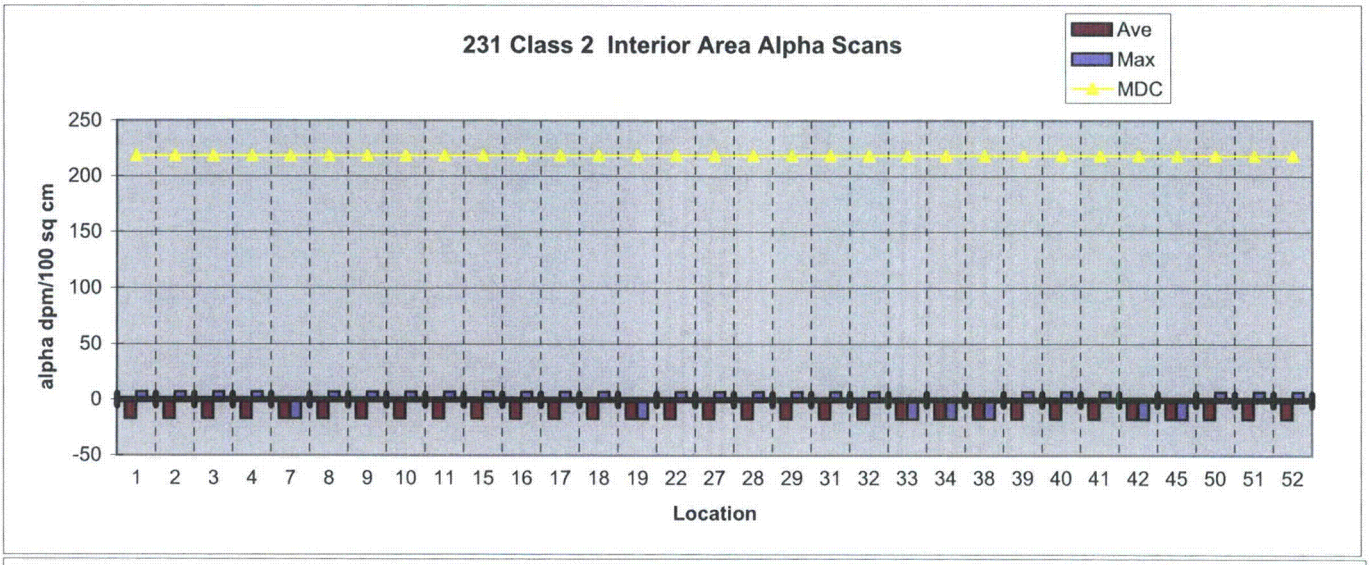
Survey Report

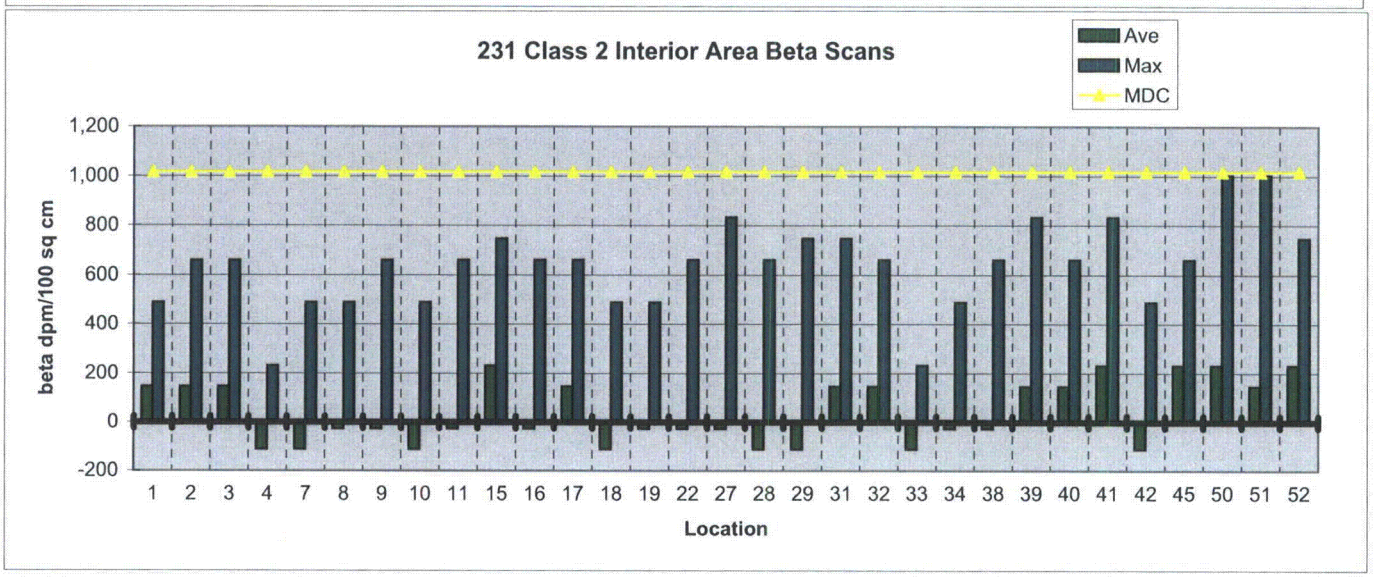
Description: HEMATITE Building 231 Class 2 Alpha & Beta Scans
Survey Date: 11/29/2007 **Survey Package: B-0231**
Technician Name: M. Chase / V. Baldwin
Comments: Interior Area alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	0				133					
		BKG	2				130					
		BKG	0				105					
		AVG BKG	**0.7**				**123**				**218**	**1,017**
1	C	SCAN	0	1	-17	7	140	180	146	489	218	1,017
2	C	SCAN	0	1	-17	7	140	200	146	661	218	1,017
3	C	SCAN	0	1	-17	7	140	200	146	661	218	1,017
4	W	SCAN	0	1	-17	7	110	150	-112	232	218	1,017
7	W	SCAN	0	0	-17	-17	110	180	-112	489	218	1,017
8	C	SCAN	0	1	-17	7	120	180	-26	489	218	1,017
9	C	SCAN	0	1	-17	7	120	200	-26	661	218	1,017
10	C	SCAN	0	1	-17	7	110	180	-112	489	218	1,017
11	W	SCAN	0	1	-17	7	120	200	-26	661	218	1,017
15	W	SCAN	0	1	-17	7	150	210	232	746	218	1,017
16	C	SCAN	0	1	-17	7	120	200	-26	661	218	1,017
17	C	SCAN	0	1	-17	7	140	200	146	661	218	1,017
18	C	SCAN	0	1	-17	7	110	180	-112	489	218	1,017
19	W	SCAN	0	0	-17	-17	120	180	-26	489	218	1,017
22	W	SCAN	0	1	-17	7	120	200	-26	661	218	1,017
27	W	SCAN	0	1	-17	7	120	220	-26	832	218	1,017
28	W	SCAN	0	1	-17	7	110	200	-112	661	218	1,017
29	W	SCAN	0	1	-17	7	110	210	-112	746	218	1,017
31	C	SCAN	0	1	-17	7	140	210	146	746	218	1,017
32	C	SCAN	0	1	-17	7	140	200	146	661	218	1,017
33	C	SCAN	0	0	-17	-17	110	150	-112	232	218	1,017
34	W	SCAN	0	0	-17	-17	120	180	-26	489	218	1,017
38	W	SCAN	0	0	-17	-17	120	200	-26	661	218	1,017
39	C	SCAN	0	1	-17	7	140	220	146	832	218	1,017
40	C	SCAN	0	1	-17	7	140	200	146	661	218	1,017
41	C	SCAN	0	1	-17	7	150	220	232	832	218	1,017
42	W	SCAN	0	0	-17	-17	110	180	-112	489	218	1,017
45	W	SCAN	0	0	-17	-17	150	200	232	661	218	1,017
50	W	SCAN	0	1	-17	7	150	240	232	1,004	218	1,017
51	W	SCAN	0	1	-17	7	140	240	146	1,004	218	1,017
52	W	SCAN	0	1	-17	7	150	210	232	746	218	1,017

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Interior Area Alpha Scans
Ave
Max
MDC
alpha dpm/100 sq cm
250
200
150
100
50
0
-50
1 2 3 4 7 8 9 10 11 15 16 17 18 19 22 27 28 29 31 32 33 34 38 39 40 41 42 45 50 51 52
Location


231 Class 2 Interior Area Beta Scans
Ave
Max
MDC
beta dpm/100 sq cm
1,200
1,000
800
600
400
200
0
-200
1 2 3 4 7 8 9 10 11 15 16 17 18 19 22 27 28 29 31 32 33 34 38 39 40 41 42 45 50 51 52
Location

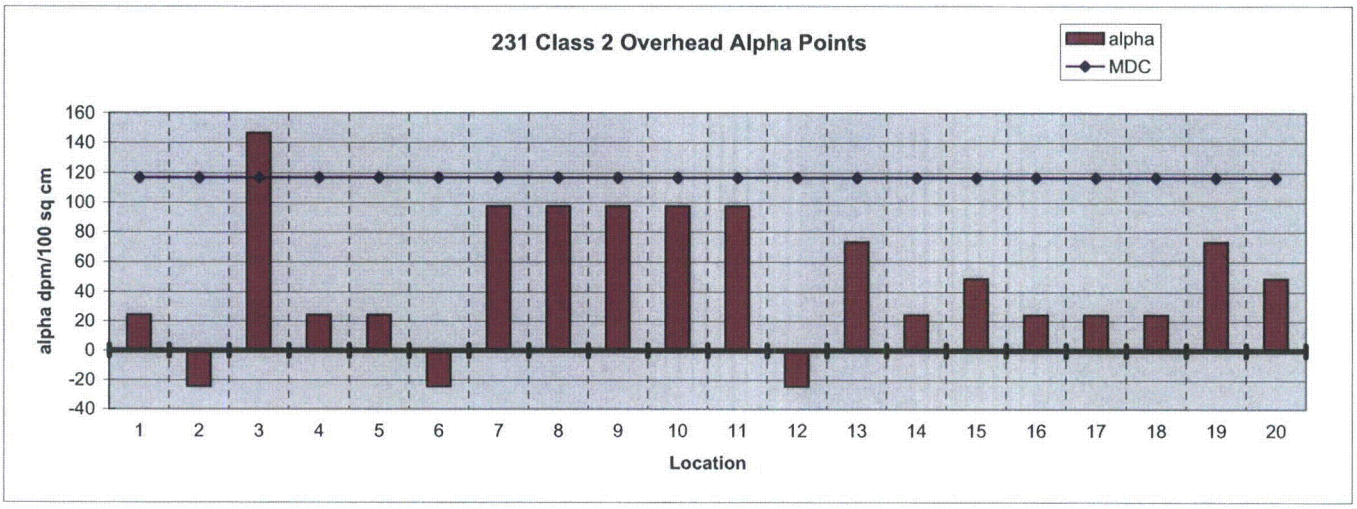
Survey Report

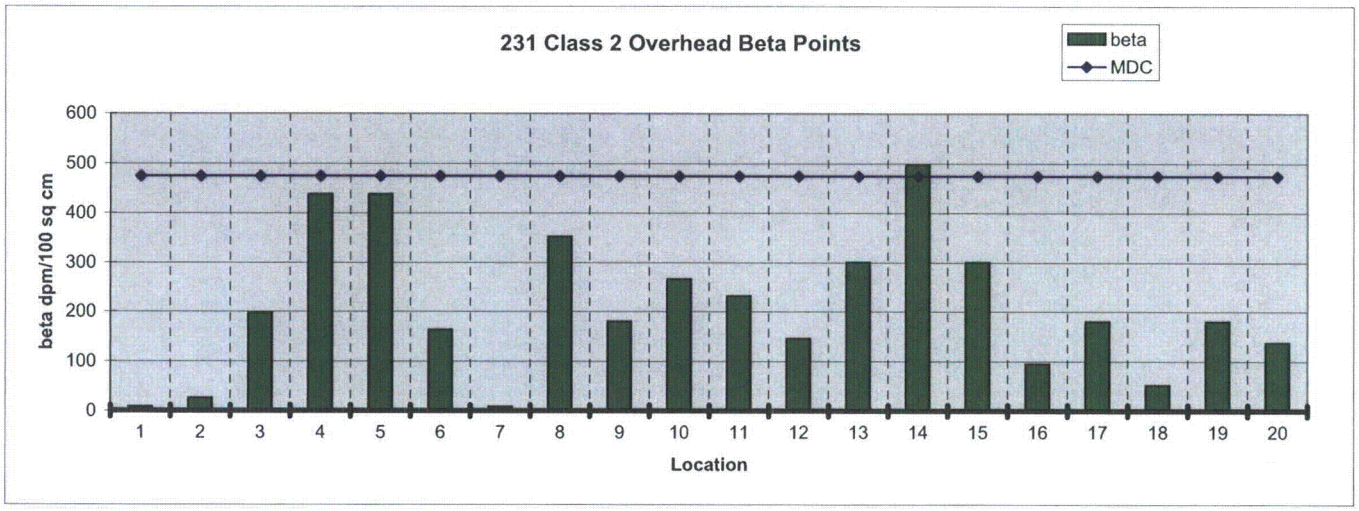
Description: HEMATITE Building 231 Class 2 Overhead
Survey Date: 12/3/2007 **Survey Package: B-0231**
Technician Name: D. Schumaker
Comments: Class 2 Overhead Areas
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results			Direct Readings								
Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α (dpm/100cm^2)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β (dpm/100cm^2)
		BKG	60		0				150		
		BKG	60		2				133		
		BKG	60		1				135		
		AVG BKG			**1**				**139**		
1	OVHD	FLDCT	60	2	1	117	24	140	139	474	9
2	OVHD	FLDCT	60	0	1	117	-24	142	139	474	26
3	OVHD	FLDCT	60	7	1	117	147	162	139	474	197
4	OVHD	FLDCT	60	2	1	117	24	190	139	474	438
5	OVHD	FLDCT	60	2	1	117	24	190	139	474	438
6	OVHD	FLDCT	60	0	1	117	-24	158	139	474	163
7	OVHD	FLDCT	60	5	1	117	98	140	139	474	9
8	OVHD	FLDCT	60	5	1	117	98	180	139	474	352
9	OVHD	FLDCT	60	5	1	117	98	160	139	474	180
10	OVHD	FLDCT	60	5	1	117	98	170	139	474	266
11	OVHD	FLDCT	60	5	1	117	98	166	139	474	232
12	OVHD	FLDCT	60	0	1	117	-24	156	139	474	146
13	OVHD	FLDCT	60	4	1	117	73	174	139	474	300
14	OVHD	FLDCT	60	2	1	117	24	197	139	474	498
15	OVHD	FLDCT	60	3	1	117	49	174	139	474	300
16	OVHD	FLDCT	60	2	1	117	24	150	139	474	94
17	OVHD	FLDCT	60	2	1	117	24	160	139	474	180
18	OVHD	FLDCT	60	2	1	117	24	145	139	474	51
19	OVHD	FLDCT	60	4	1	117	73	160	139	474	180
20	OVHD	FLDCT	60	3	1	117	49	155	139	474	137

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Overhead Alpha Points
alpha
MDC
alpha dpm/100 sq cm
160
140
120
100
80
60
40
20
0
-20
-40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


231 Class 2 Overhead Beta Points
beta
MDC
beta dpm/100 sq cm
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

Survey Report

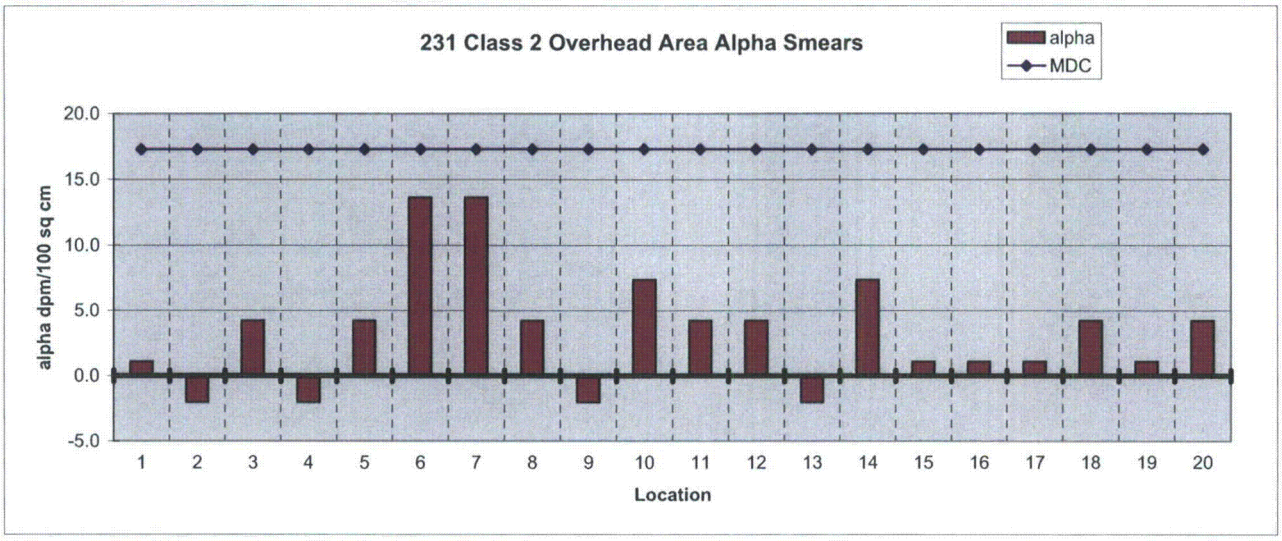
Description: HEMATITE Building 231 Class 2 Overhead Area Smears
Survey Date: 12/3/2007 **Survey Package: B-0231**
Technician Name: D. Schumaker
Comments: Smears from Class 2 Overhead Areas
Instrument Manufacturer: Ludlum **Count Date:** 12/3/2007

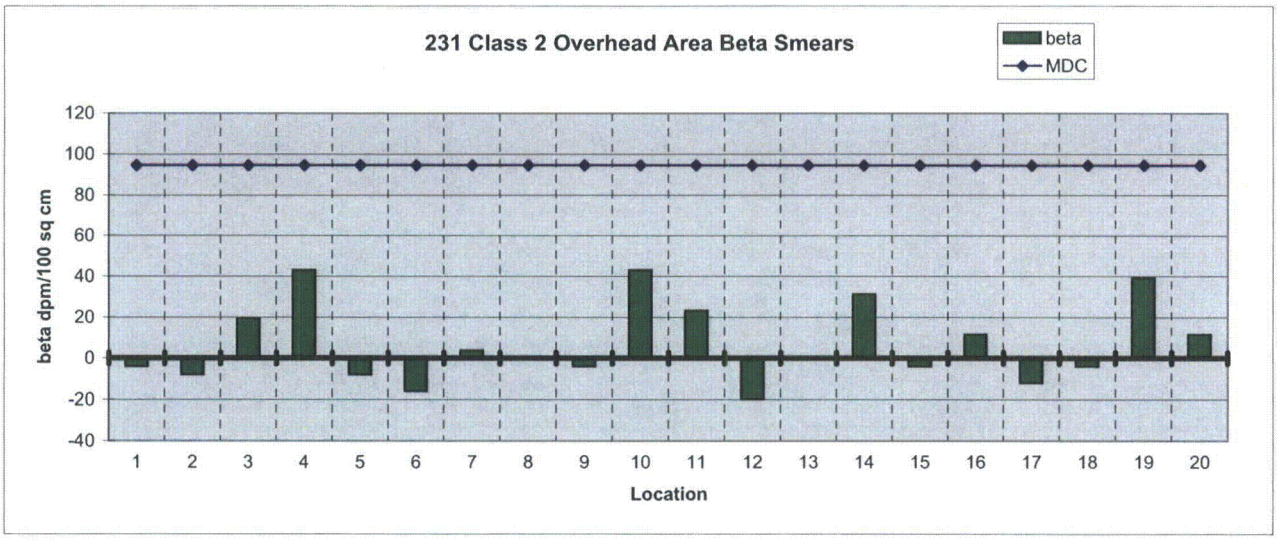
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.65**				**40.1**		
1	OVHD	SMEAR	60	1	0.65	17.3	1.1	39	40.05	95	-4
2	OVHD	SMEAR	60	0	0.65	17.3	-2.0	38	40.05	95	-8
3	OVHD	SMEAR	60	2	0.65	17.3	4.2	45	40.05	95	19
4	OVHD	SMEAR	60	0	0.65	17.3	-2.0	51	40.05	95	43
5	OVHD	SMEAR	60	2	0.65	17.3	4.2	38	40.05	95	-8
6	OVHD	SMEAR	60	5	0.65	17.3	13.6	36	40.05	95	-16
7	OVHD	SMEAR	60	5	0.65	17.3	13.6	41	40.05	95	4
8	OVHD	SMEAR	60	2	0.65	17.3	4.2	40	40.05	95	0
9	OVHD	SMEAR	60	0	0.65	17.3	-2.0	39	40.05	95	-4
10	OVHD	SMEAR	60	3	0.65	17.3	7.4	51	40.05	95	43
11	OVHD	SMEAR	60	2	0.65	17.3	4.2	46	40.05	95	23
12	OVHD	SMEAR	60	2	0.65	17.3	4.2	35	40.05	95	-20
13	OVHD	SMEAR	60	0	0.65	17.3	-2.0	40	40.05	95	0
14	OVHD	SMEAR	60	3	0.65	17.3	7.4	48	40.05	95	31
15	OVHD	SMEAR	60	1	0.65	17.3	1.1	39	40.05	95	-4
16	OVHD	SMEAR	60	1	0.65	17.3	1.1	43	40.05	95	12
17	OVHD	SMEAR	60	1	0.65	17.3	1.1	37	40.05	95	-12
18	OVHD	SMEAR	60	2	0.65	17.3	4.2	39	40.05	95	-4
19	OVHD	SMEAR	60	1	0.65	17.3	1.1	50	40.05	95	39
20	OVHD	SMEAR	60	2	0.65	17.3	4.2	43	40.05	95	12

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Overhead Area Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


231 Class 2 Overhead Area Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

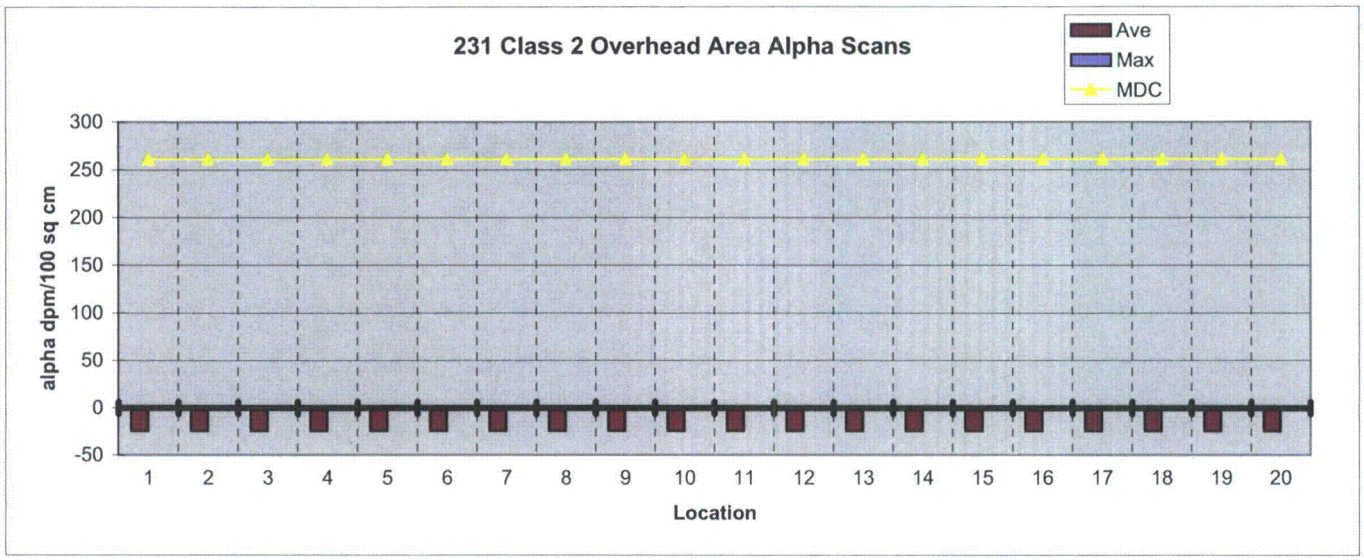
Survey Report

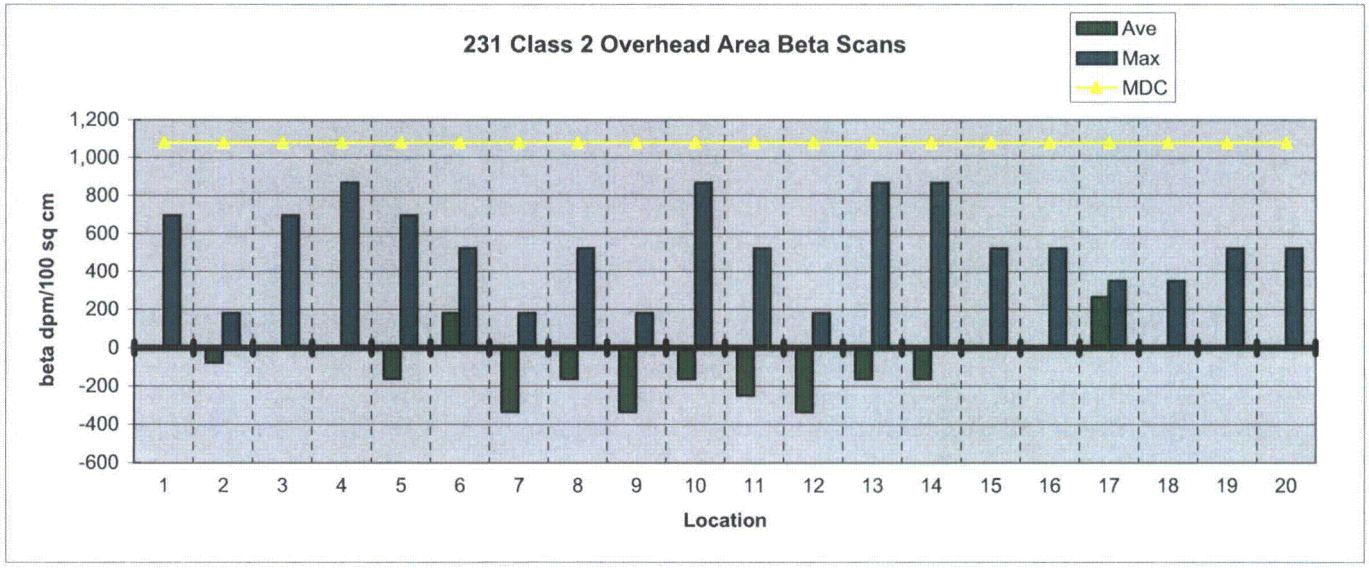
Description: HEMATITE Building 231 Class 2 Overhead Alpha & Beta Scans
Survey Date: 12/3/2007 **Survey Package: B-0231**
Technician Name: D. Schumaker
Comments: Overhead Area alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	0				150					
		BKG	2				133					
		BKG	1				135					
		AVG BKG	**1**				**139**				**261**	**1,081**
1	OVHD	SCAN	0	1	-24	0	140	220	9	695	261	1,081
2	OVHD	SCAN	0	1	-24	0	130	160	-77	180	261	1,081
3	OVHD	SCAN	0	1	-24	0	140	220	9	695	261	1,081
4	OVHD	SCAN	0	1	-24	0	140	240	9	867	261	1,081
5	OVHD	SCAN	0	1	-24	0	120	220	-163	695	261	1,081
6	OVHD	SCAN	0	1	-24	0	160	200	180	523	261	1,081
7	OVHD	SCAN	0	1	-24	0	100	160	-335	180	261	1,081
8	OVHD	SCAN	0	1	-24	0	120	200	-163	523	261	1,081
9	OVHD	SCAN	0	1	-24	0	100	160	-335	180	261	1,081
10	OVHD	SCAN	0	1	-24	0	120	240	-163	867	261	1,081
11	OVHD	SCAN	0	1	-24	0	110	200	-249	523	261	1,081
12	OVHD	SCAN	0	1	-24	0	100	160	-335	180	261	1,081
13	OVHD	SCAN	0	1	-24	0	120	240	-163	867	261	1,081
14	OVHD	SCAN	0	1	-24	0	120	240	-163	867	261	1,081
15	OVHD	SCAN	0	1	-24	0	140	200	9	523	261	1,081
16	OVHD	SCAN	0	1	-24	0	140	200	9	523	261	1,081
17	OVHD	SCAN	0	1	-24	0	170	180	266	352	261	1,081
18	OVHD	SCAN	0	1	-24	0	140	180	9	352	261	1,081
19	OVHD	SCAN	0	1	-24	0	140	200	9	523	261	1,081
20	OVHD	SCAN	0	1	-24	0	140	200	9	523	261	1,081

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 2 Overhead Area Alpha Scans
Ave
Max
MDC
alpha dpm/100 sq cm
300
250
200
150
100
50
0
-50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


231 Class 2 Overhead Area Beta Scans
Ave
Max
MDC
beta dpm/100 sq cm
1,200
1,000
800
600
400
200
0
-200
-400
-600
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

ENERGYSOLUTIONS

Survey Package Worksheet for Hematite Building 231

Package Identification No.: HDP-C0231	**Prepared by:** Paul C. Ely
Location: Building 231	**Date Prepared:** 11/28/2007
Area Classification: Class 3	**Reviewed by:**

Area Description

Building 231 exterior is a Class 3 area. Survey areas include walls and roof.

Historical Information

Building 231 is a warehouse that was erected in 1996 and is used to store shipping containers and other equipment and materials. Refurbishment of radioactive material shipping containers was performed previously in this building. U-235 and U-238 are the primary isotopes in this building.

General Survey Instructions

1. Perform surface scans at a scan speed not to exceed 2-inches per second. Any locations that exceed twice background must be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
   a. 10% scan of exterior walls and roof for alpha contamination and for alpha plus beta contamination.
2. Perform exposure rate measurement at approximately 1-cm and 100-cm from the surface at each roof measurement location indicated on attached survey location table. If a reading exceeds twice background, survey surrounding area. Notify the ES Project Manager of any exposure rate measurements that exceed twice background.
3. Perform direct alpha and alpha plus beta surface activity measurements, independently, at each measurement location provided on attached survey location table and at the highest activity location in marked elevated areas.
4. Collect removable surface activity sample over an area of 100 cm^2 in size at each measurement location provided on attached survey location table. Notify the ES Project Manager if alpha or beta results exceed 800 dpm/100 cm^2.

Special Instructions

- Source check instrumentation to Th-230 for alpha, Tc-99 for beta, and Cs-137 for gamma measurements.
- Use gas proportional detector model numbers 43-68, 43-106 or equivalent detector as approved by the RSO for total surface activity surveys.
- The MDC for total alpha and beta activity measurements shall be less than 1,000 dpm/100 cm^2.
- Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface prior to survey.
- Record maximum and average scan measurement results, in cpm, for each scan area.
- Measurement and sampling locations are based on random-location selection. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.
- Notify the ES Project Manager of locations that exceed 5,000 dpm/100 cm^2 total alpha or beta surface activity.
- Notify the ES Project Manager of any exposure rate measurements that exceed twice background at 1-cm.
- Attach photographic records if available and provide descriptive comments for each image under Survey Comments.

Survey Performance

Software – Headers (if needed)			General Description	1-cm Exposure Rate	100-cm Exposure Rate	Alpha Scan	Beta Scan	Gamma Scan	Direct Alpha	Direct Beta	α & β Smears/ Samples
4	5	6									
Hematite Building 231 Class 2 Areas											
Hematite Bldg 231	ROOF	B0231	Roof 10%	✓	✓	✓	✓	✓	✓	✓	✓
Hematite Bldg 231	EXTRIOR	B0231	Exterior Wall 10%	N/A	N/A	✓	✓	N/A	✓	✓	✓

Survey Comments

① Survey points on roof (#3, 9 & 14) were inaccessible (measurements were beyond roof surface). Points relocated to nearest roof area as #3A, 9A & 14A.

② Survey point on exterior wall, #2, was inaccessible due to electrical lines accross area of survey point. Survey point relocated to avoid lines and designated as #2A.

Package Review

Surveyor(s): D. Schumaker, D. Shifflett

Date Package Completed: 12/4/2007

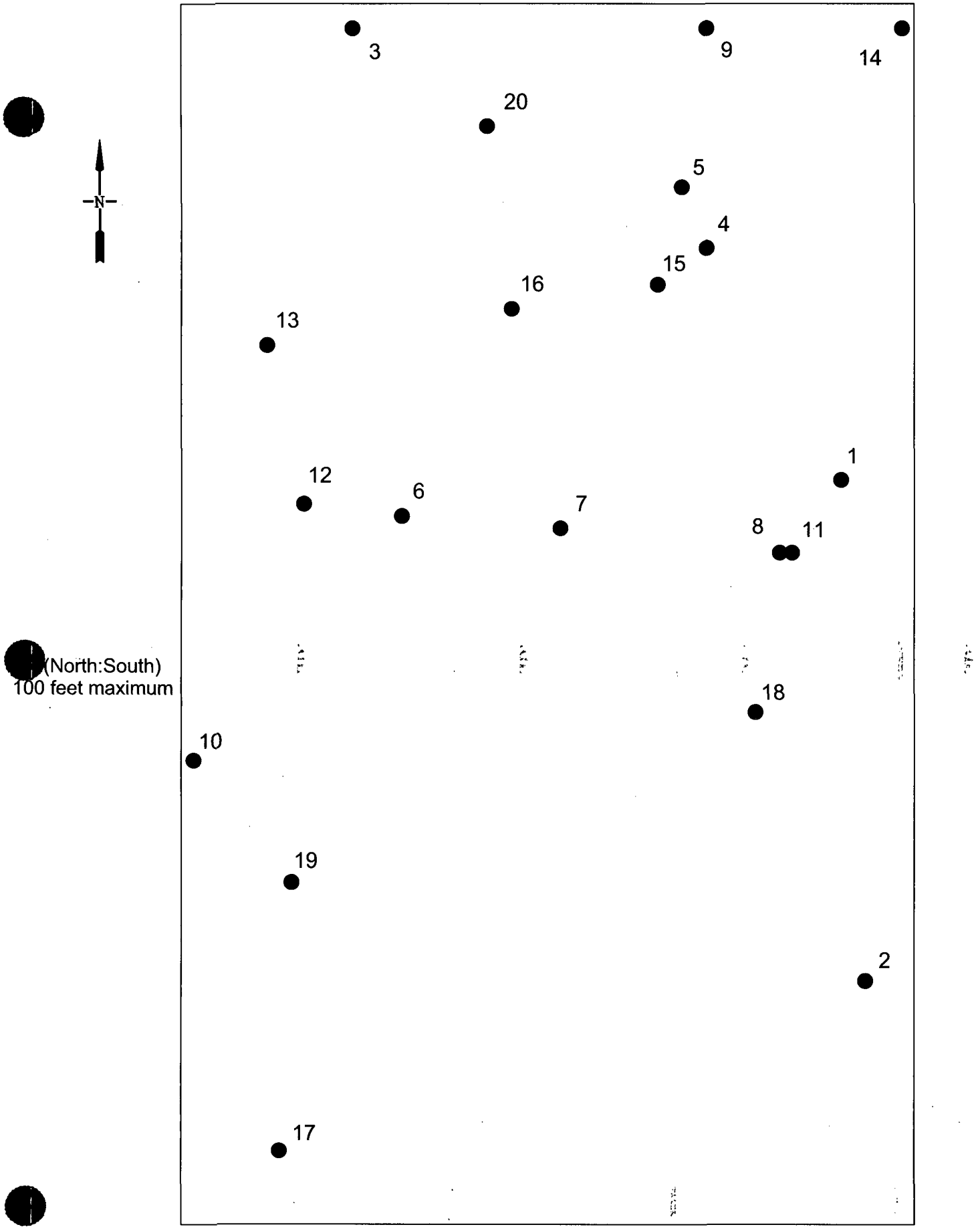
Package Reviewed by and Date: Paul C Ely 12/27/2007

Survey Package C-0231
Building 231 Class 3 Roof

X (Max):	**60**	feet
Y (Max):	**140**	feet

RANDOM LOCATIONS SORTED

Survey Point	**Survey Location X (ft)**	**Y (ft)**
10	1	38
13	7	72
17	8	6
19	9	28
12	10	59
3	14	124
6	18	58
20	25	90
16	27	75
7	31	57
15	39	77
5	41	85
4	43	80
9	43	115
18	47	42
8	49	55
11	50	55
1	54	61
2	56	20
14	59	104



Building 231, Class 3, Roof

Survey Package C-0231
Building 231 Class 3 Exterior Walls

X (East:West)	**400**	feet
Y (North:South)	**24**	feet

RANDOM LOCATIONS SORTED

Survey Point	**Survey Location X (ft)**	**Y (ft)**
19	46	7
4	54	6
11	66	3
20	73	23
15	74	5
8	83	4
2	151	22
17	163	15
12	173	8
14	216	19
5	225	21
7	244	17
6	250	13
10	250	13
1	251	21
18	260	2
9	303	7
3	345	23
13	365	17
16	381	0

Wall locations start a SW Corner at ground level. X indicates the distance around the building clockwise and Y indicates the elevation above ground.

Survey Progress Tracking Sheet
Survey Package C-0231
Building 231 Class 3

Complete: Paul C Ely
Name

Date: 12/6/07

Scans									Fixed Readings				Smear	
gamma µR		alpha cpm		beta cpm		Survey			gamma µR		alpha	beta	alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point		Loc.	1-cm	1-m	cpm	cpm	cpm	cpm
						BKG	OW				1	112		
						BKG	OW				0	124		
						BKG	OW				3	109		
		0	1	110	160	1	OW				6	127	0	31
		na	na	na	na	2	OW	I			na	na	na	na
		0	1	130	170	3	OW				3	136	0	29
		0	3	120	160	4	OW				1	123	0	42
		0	1	120	180	5	OW				3	132	0	39
		0	2	120	160	6	OW				2	114	1	47
		0	1	120	180	7	OW				1	146	0	32
		0	2	120	180	8	OW				4	140	na	na
		0	1	120	140	9	OW				3	150	0	51
		0	2	120	160	10	OW				2	114	2	39
		0	1	120	160	11	OW				2	128	0	45
		0	3	129	150	12	OW				3	126	0	30
		0	3	120	180	13	OW				7	152	1	37
		0	3	130	160	14	OW				4	133	1	43
		0	3	130	150	15	OW				3	134	1	44
		0	3	120	180	16	OW				6	142	1	41
		0	3	109	119	17	OW				2	124	1	41
		0	1	120	160	18	OW				0	121	0	34
		0	1	120	160	19	OW				2	124	0	32
		0	2	110	140	20	OW				5	130	0	43
		0	1	100	160	2A	OW	offset 16' west			2	136	1	39
						BKG	R				2	130		
						BKG	R				1	139		
						BKG	R				1	144		
4.0	5.6	0	1	240	280	1	R		3.5	4.0	16	197	2	33
na	na	0	1	240	300	2	R		4.6	4.6	4	225	1	52
na	na					3	R	I	na	na	na	na		
3.2	4.0	0	1	180	280	4	R		4.0	4.0	5	228	2	43
na	na	0	1	160	245	5	R		4.3	4.3	7	242	3	43

Survey Progress Tracking Sheet
Survey Package C-0231
Building 231 Class 3

Complete: Paul C Ely **Date:** 12/6/07
Name

Scans									Fixed Readings				Smear	
gamma µR		alpha cpm		beta cpm		Survey			gamma µR		alpha	beta	alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.		1-cm	1-m	cpm	cpm	cpm	cpm
na	na	0	1	200	280	6	R		4.5	4.0	8	178	0	44
na	na	0	1	220	280	7	R		4.0	4.0	3	208	5	56
3.2	4.0	0	1	240	280	8	R		4.0	4.6	7	163	2	39
na	na					9	R	I	na	na	na	na		
na	na	0	1	220	280	10	R		4.8	4.8	5	209	1	41
na	na	0	1	240	280	11	R		4.0	4.6	8	207	4	41
na	na	0	1	220	280	12	R		4.0	4.0	11	198	4	43
na	na	0	1	200	215	13	R		4.5	4.1	6	202	4	42
na	na					14	R	I	na	na	na	na		
na	na	0	1	160	280	15	R		3.8	4.5	9	210	4	40
na	na	0	1	240	280	16	R		4.0	4.2	9	202	4	49
na	na	0	1	220	300	17	R		5.0	5.4	7	195	2	46
na	na	0	1	220	280	18	R		4.5	4.7	12	206	1	45
na	na	0	1	200	260	19	R		4.2	4.7	10	195	1	38
na	na	0	1	200	280	20	R		4.0	4.4	5	210	3	54
						BKG					0	150		
						BKG					2	133		
						BKG					1	135		
		0	1	180	220	3A	R	Offset			17	185	1	46
		0	1	180	240	9A	R	Offset			5	221	3	48
		0	1	180	240	14A	R	Offset			8	190	5	42

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal

Survey Report

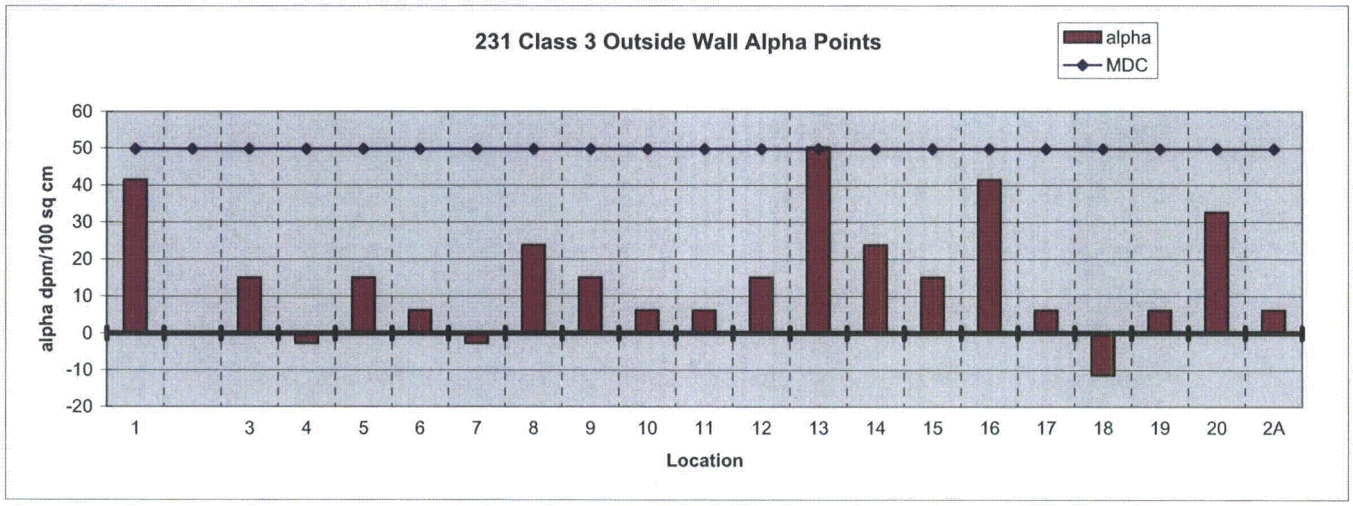
Description: HEMATITE Building 231 Class 3 Outside Walls
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: D. Schumaker / D. Shifflett
Comments: Class 3 Outside Wall Areas
Instrument Manufacturer: Ludlum

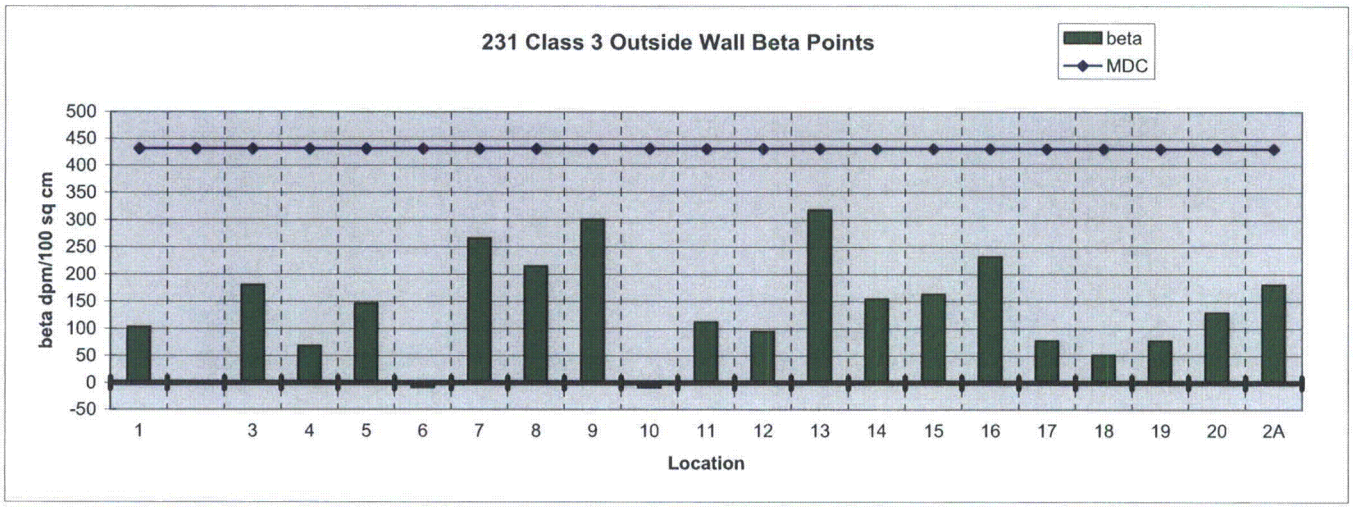
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	095522	126	9/11/08	2350	126172	9/27/08	α	9.0%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		1				112		
		BKG	60		0				124		
		BKG	60		3				109		
		AVG BKG			**1.3**				**115**		
1	OW	FLDCT	60	6	1.3	50	41	127	115	431	103
	OW	FLDCT	60	na	1.3	50	--	na	115	431	--
3	OW	FLDCT	60	3	1.3	50	15	136	115	431	180
4	OW	FLDCT	60	1	1.3	50	-3	123	115	431	69
5	OW	FLDCT	60	3	1.3	50	15	132	115	431	146
6	OW	FLDCT	60	2	1.3	50	6	114	115	431	-9
7	OW	FLDCT	60	1	1.3	50	-3	146	115	431	266
8	OW	FLDCT	60	4	1.3	50	24	140	115	431	215
9	OW	FLDCT	60	3	1.3	50	15	150	115	431	300
10	OW	FLDCT	60	2	1.3	50	6	114	115	431	-9
11	OW	FLDCT	60	2	1.3	50	6	128	115	431	112
12	OW	FLDCT	60	3	1.3	50	15	126	115	431	94
13	OW	FLDCT	60	7	1.3	50	50	152	115	431	317
14	OW	FLDCT	60	4	1.3	50	24	133	115	431	154
15	OW	FLDCT	60	3	1.3	50	15	134	115	431	163
16	OW	FLDCT	60	6	1.3	50	41	142	115	431	232
17	OW	FLDCT	60	2	1.3	50	6	124	115	431	77
18	OW	FLDCT	60	0	1.3	50	-11	121	115	431	51
19	OW	FLDCT	60	2	1.3	50	6	124	115	431	77
20	OW	FLDCT	60	5	1.3	50	33	130	115	431	129
2A	OW	FLDCT	60	2	1.3	50	6	136	115	431	180

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Outside Wall Alpha Points
alpha
MDC
alpha dpm/100 sq cm
60
50
40
30
20
10
0
-10
-20
1
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
2A
Location


231 Class 3 Outside Wall Beta Points
beta
MDC
beta dpm/100 sq cm
500
450
400
350
300
250
200
150
100
50
0
-50
1
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
2A
Location

Survey Report

Description: HEMATITE Building 231 Class 3 Outside Wall Smears
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: M. Chase / V. Baldwin
Comments: Smears from Class 3 Outside Walls
Instrument Manufacturer: Ludlum

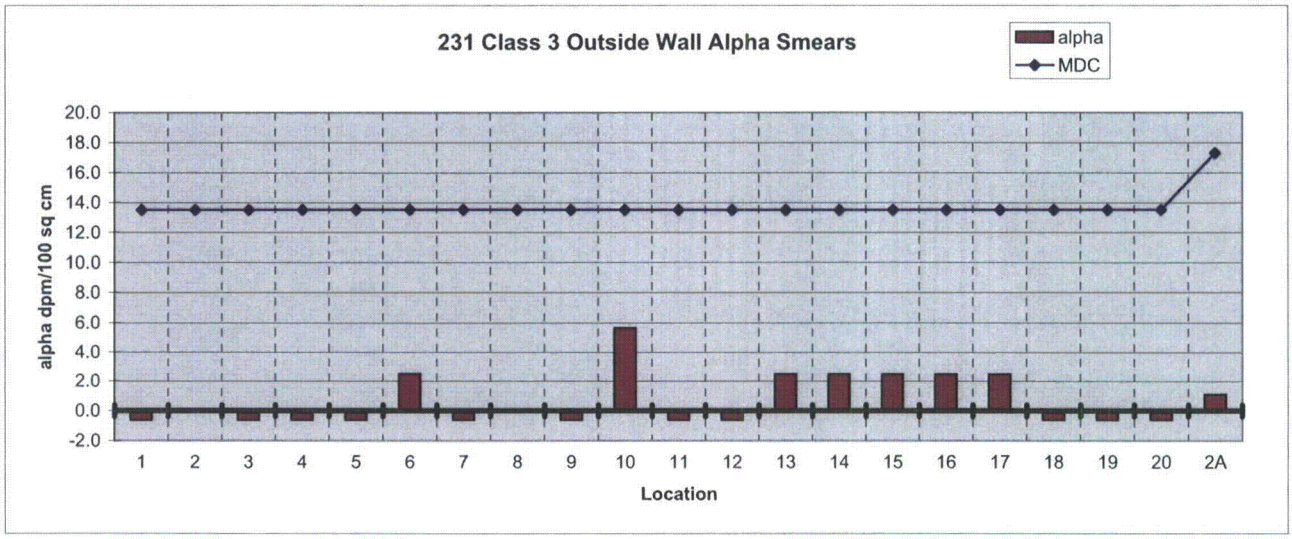
Count Date: 12/1/2007 12/3/2007

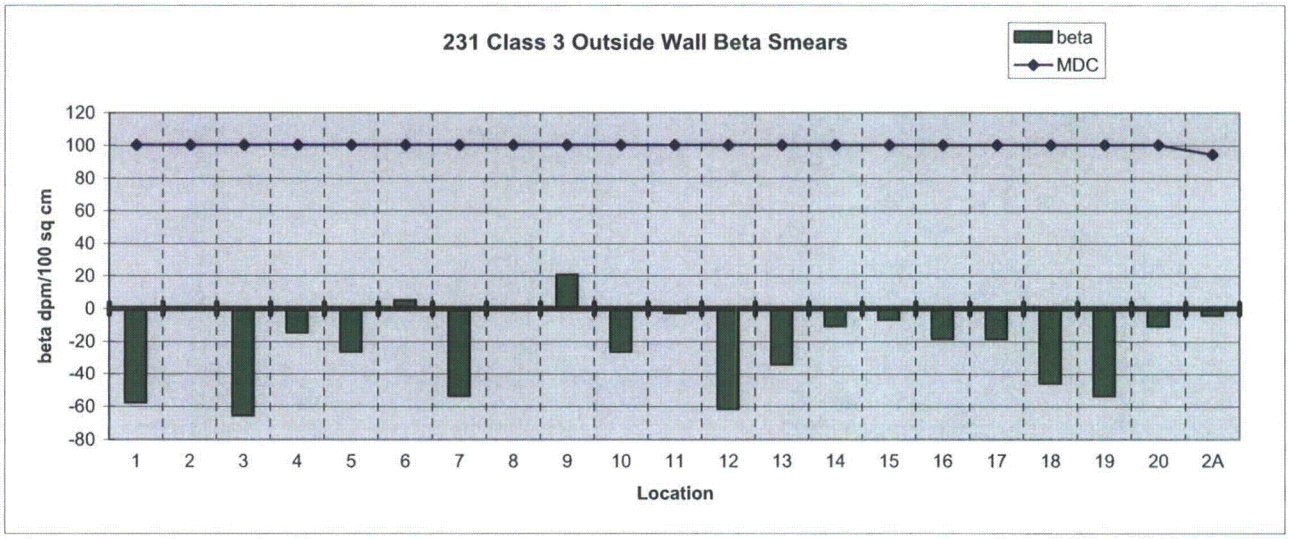
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.20**				**45.7**		
1	OW	SMEAR	60	0	0.2	13.5	-0.6	31	45.7	100	-58
2	OW	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
3	OW	SMEAR	60	0	0.2	13.5	-0.6	29	45.7	100	-65
4	OW	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
5	OW	SMEAR	60	0	0.2	13.5	-0.6	39	45.7	100	-26
6	OW	SMEAR	60	1	0.2	13.5	2.5	47	45.7	100	5
7	OW	SMEAR	60	0	0.2	13.5	-0.6	32	45.7	100	-54
8	OW	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
9	OW	SMEAR	60	0	0.2	13.5	-0.6	51	45.7	100	21
10	OW	SMEAR	60	2	0.2	13.5	5.6	39	45.7	100	-26
11	OW	SMEAR	60	0	0.2	13.5	-0.6	45	45.7	100	-3
12	OW	SMEAR	60	0	0.2	13.5	-0.6	30	45.7	100	-62
13	OW	SMEAR	60	1	0.2	13.5	2.5	37	45.7	100	-34
14	OW	SMEAR	60	1	0.2	13.5	2.5	43	45.7	100	-11
15	OW	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
16	OW	SMEAR	60	1	0.2	13.5	2.5	41	45.7	100	-18
17	OW	SMEAR	60	1	0.2	13.5	2.5	41	45.7	100	-18
18	OW	SMEAR	60	0	0.2	13.5	-0.6	34	45.7	100	-46
19	OW	SMEAR	60	0	0.2	13.5	-0.6	32	45.7	100	-54
20	OW	SMEAR	60	0	0.2	13.5	-0.6	43	45.7	100	-11
2A	OW	SMEAR	60	1	0.65	17.3	1.1	39	40.05	95	-4

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Outside Wall Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2A
Location


231 Class 3 Outside Wall Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
-80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2A
Location

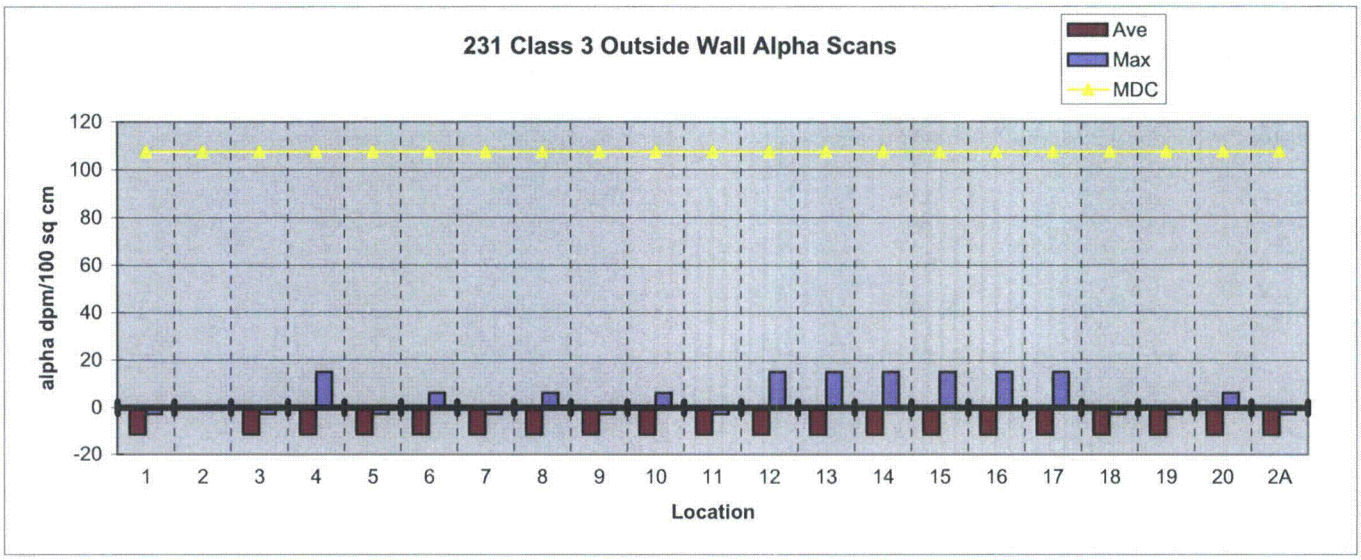
Survey Report

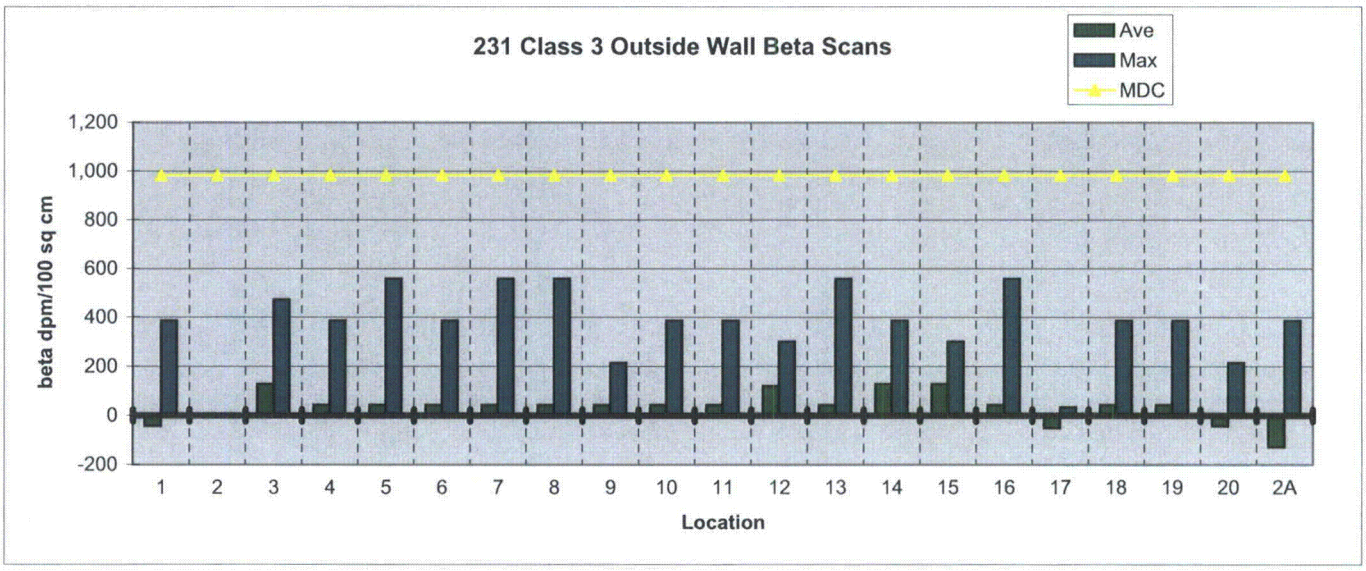
Description: HEMATITE Building 231 Class 3 Outside Wall Alpha & Beta Scans
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: D. Schumaker / D. Shifflett
Comments: Outside Wall alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	095522	126	9/11/08	2350	126172	9/27/08	α	9.0%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	1				112					
		BKG	0				124					
		BKG	3				109					
		AVG BKG	**1.3**				**115**				**107**	**984**
1	OW	SCAN	0	1	-11	-3	110	160	-43	386	107	984
2	OW	SCAN	na	na			na	na			107	984
3	OW	SCAN	0	1	-11	-3	130	170	129	472	107	984
4	OW	SCAN	0	3	-11	15	120	160	43	386	107	984
5	OW	SCAN	0	1	-11	-3	120	180	43	558	107	984
6	OW	SCAN	0	2	-11	6	120	160	43	386	107	984
7	OW	SCAN	0	1	-11	-3	120	180	43	558	107	984
8	OW	SCAN	0	2	-11	6	120	180	43	558	107	984
9	OW	SCAN	0	1	-11	-3	120	140	43	215	107	984
10	OW	SCAN	0	2	-11	6	120	160	43	386	107	984
11	OW	SCAN	0	1	-11	-3	120	160	43	386	107	984
12	OW	SCAN	0	3	-11	15	129	150	120	300	107	984
13	OW	SCAN	0	3	-11	15	120	180	43	558	107	984
14	OW	SCAN	0	3	-11	15	130	160	129	386	107	984
15	OW	SCAN	0	3	-11	15	130	150	129	300	107	984
16	OW	SCAN	0	3	-11	15	120	180	43	558	107	984
17	OW	SCAN	0	3	-11	15	109	119	-51	34	107	984
18	OW	SCAN	0	1	-11	-3	120	160	43	386	107	984
19	OW	SCAN	0	1	-11	-3	120	160	43	386	107	984
20	OW	SCAN	0	2	-11	6	110	140	-43	215	107	984
2A	OW	SCAN	0	1	-11	-3	100	160	-129	386	107	984

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Outside Wall Alpha Scans
Ave
Max
MDC
alpha dpm/100 sq cm
120
100
80
60
40
20
0
-20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2A
Location


231 Class 3 Outside Wall Beta Scans
Ave
Max
MDC
beta dpm/100 sq cm
1,200
1,000
800
600
400
200
0
-200
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2A
Location

Survey Report

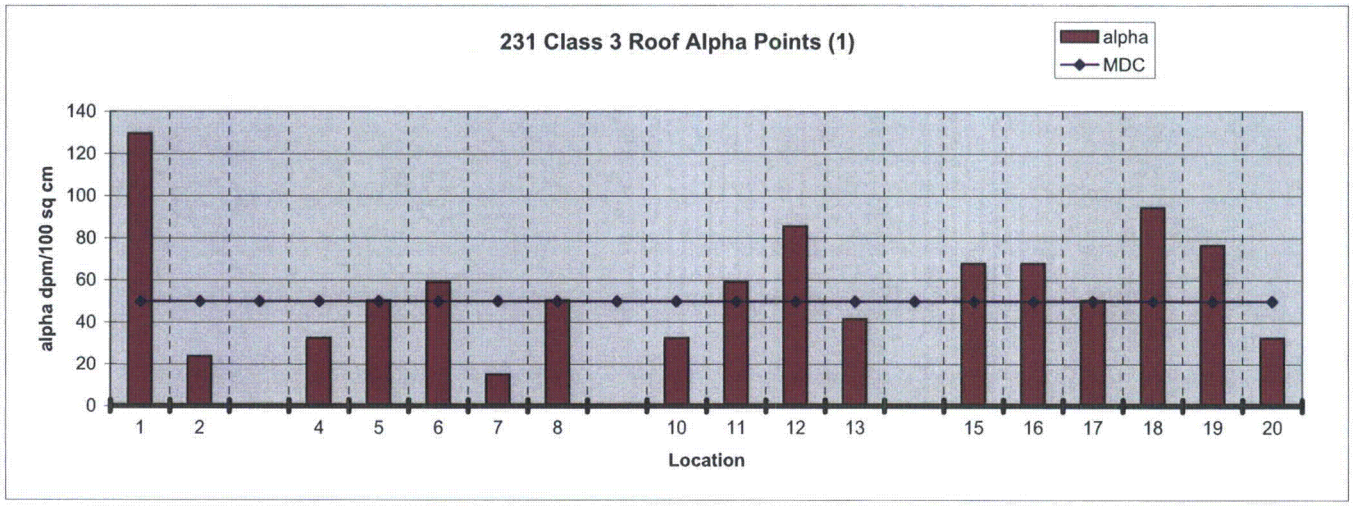
Description: HEMATITE Building 231 Class 3 Roof (1)
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: D. Schumaker / V. Baldwin / D. Shifflett
Comments: Class 3 Roof
Instrument Manufacturer: Ludlum

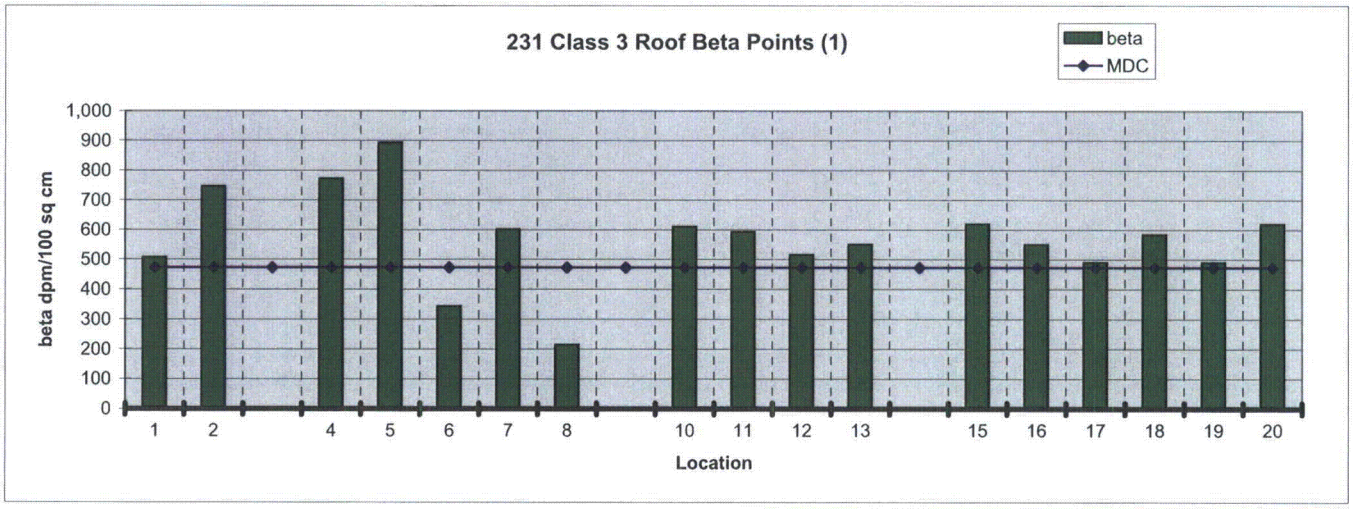
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	095522	126	9/11/08	2350	126172	9/27/08	α	9.0%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		2				130		
		BKG	60		1				139		
		BKG	60		1				144		
		AVG BKG			**1.3**				**138**		
1	R	FLDCT	60	16	1.3	50	130	197	138	472	506
2	R	FLDCT	60	4	1.3	50	24	225	138	472	746
	R	FLDCT	60	na	1.3	50	--	na	138	472	--
4	R	FLDCT	60	5	1.3	50	33	228	138	472	772
5	R	FLDCT	60	7	1.3	50	50	242	138	472	892
6	R	FLDCT	60	8	1.3	50	59	178	138	472	343
7	R	FLDCT	60	3	1.3	50	15	208	138	472	601
8	R	FLDCT	60	7	1.3	50	50	163	138	472	215
	R	FLDCT	60	na	1.3	50	--	na	138	472	--
10	R	FLDCT	60	5	1.3	50	33	209	138	472	609
11	R	FLDCT	60	8	1.3	50	59	207	138	472	592
12	R	FLDCT	60	11	1.3	50	86	198	138	472	515
13	R	FLDCT	60	6	1.3	50	41	202	138	472	549
	R	FLDCT	60	na	1.3	50	--	na	138	472	--
15	R	FLDCT	60	9	1.3	50	68	210	138	472	618
16	R	FLDCT	60	9	1.3	50	68	202	138	472	549
17	R	FLDCT	60	7	1.3	50	50	195	138	472	489
18	R	FLDCT	60	12	1.3	50	94	206	138	472	583
19	R	FLDCT	60	10	1.3	50	77	195	138	472	489
20	R	FLDCT	60	5	1.3	50	33	210	138	472	618

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Roof Alpha Points (1)
alpha
MDC
alpha dpm/100 sq cm
140
120
100
80
60
40
20
0
1
2
4
5
6
7
8
10
11
12
13
15
16
17
18
19
20
Location


231 Class 3 Roof Beta Points (1)
beta
MDC
beta dpm/100 sq cm
1,000
900
800
700
600
500
400
300
200
100
0
1
2
4
5
6
7
8
10
11
12
13
15
16
17
18
19
20
Location

Survey Report

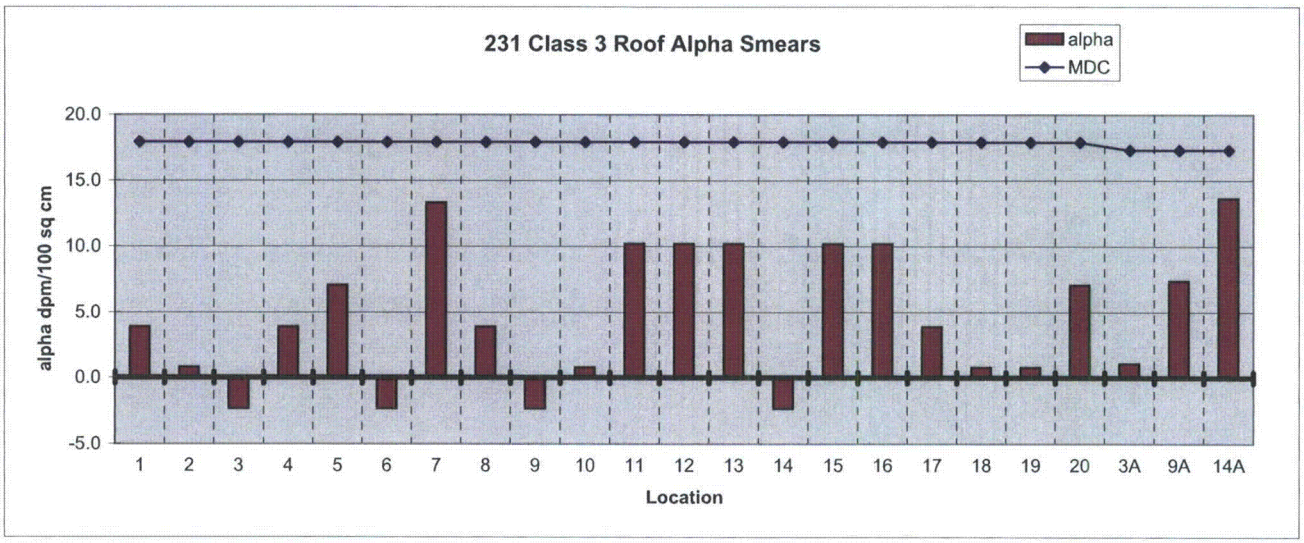
Description: HEMATITE Building 231 Class 3 Roof Smears **Survey Package: C-0231**
Survey Date: 11/29/2007 12/3/2007
Technician Name: M. Chase / V. Baldwin
Comments: Smears from Class 3 Roof
Instrument Manufacturer: Ludlum **Count Date:** 11/29/2007 12/3/2007

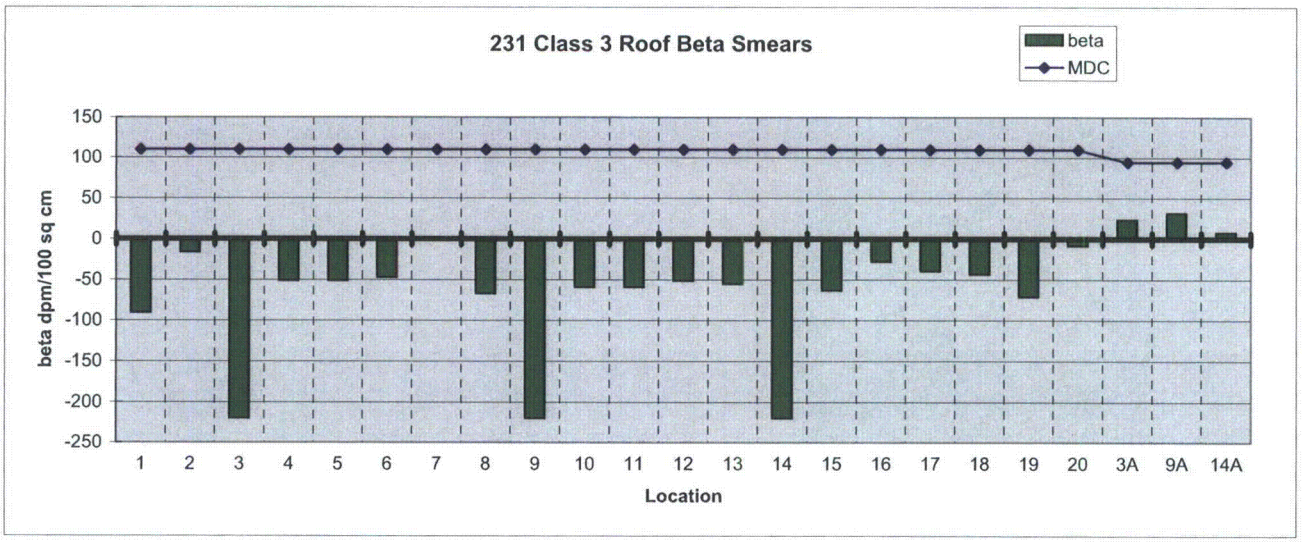
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.75**				**56.1**		
1	R	SMEAR	60	2	0.75	17.9	3.9	33	56.1	110	-91
2	R	SMEAR	60	1	0.75	17.9	0.8	52	56.1	110	-16
3	R	SMEAR	60	0	0.75	17.9	-2.4	0	56.1	110	-220
4	R	SMEAR	60	2	0.75	17.9	3.9	43	56.1	110	-51
5	R	SMEAR	60	3	0.75	17.9	7.1	43	56.1	110	-51
6	R	SMEAR	60	0	0.75	17.9	-2.4	44	56.1	110	-47
7	R	SMEAR	60	5	0.75	17.9	13.3	56	56.1	110	0
8	R	SMEAR	60	2	0.75	17.9	3.9	39	56.1	110	-67
9	R	SMEAR	60	0	0.75	17.9	-2.4	0	56.1	110	-220
10	R	SMEAR	60	1	0.75	17.9	0.8	41	56.1	110	-59
11	R	SMEAR	60	4	0.75	17.9	10.2	41	56.1	110	-59
12	R	SMEAR	60	4	0.75	17.9	10.2	43	56.1	110	-51
13	R	SMEAR	60	4	0.75	17.9	10.2	42	56.1	110	-55
14	R	SMEAR	60	0	0.75	17.9	-2.4	0	56.1	110	-220
15	R	SMEAR	60	4	0.75	17.9	10.2	40	56.1	110	-63
16	R	SMEAR	60	4	0.75	17.9	10.2	49	56.1	110	-28
17	R	SMEAR	60	2	0.75	17.9	3.9	46	56.1	110	-40
18	R	SMEAR	60	1	0.75	17.9	0.8	45	56.1	110	-44
19	R	SMEAR	60	1	0.75	17.9	0.8	38	56.1	110	-71
20	R	SMEAR	60	3	0.75	17.9	7.1	54	56.1	110	-8
3A	R	SMEAR	60	1	0.65	17.3	1.1	46	40.05	95	23
9A	R	SMEAR	60	3	0.65	17.3	7.4	48	40.05	95	31
14A	R	SMEAR	60	5	0.65	17.3	13.6	42	40.05	95	8

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Roof Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 3A 9A 14A
Location


231 Class 3 Roof Beta Smears
beta
MDC
beta dpm/100 sq cm
150
100
50
0
-50
-100
-150
-200
-250
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 3A 9A 14A
Location

Survey Report

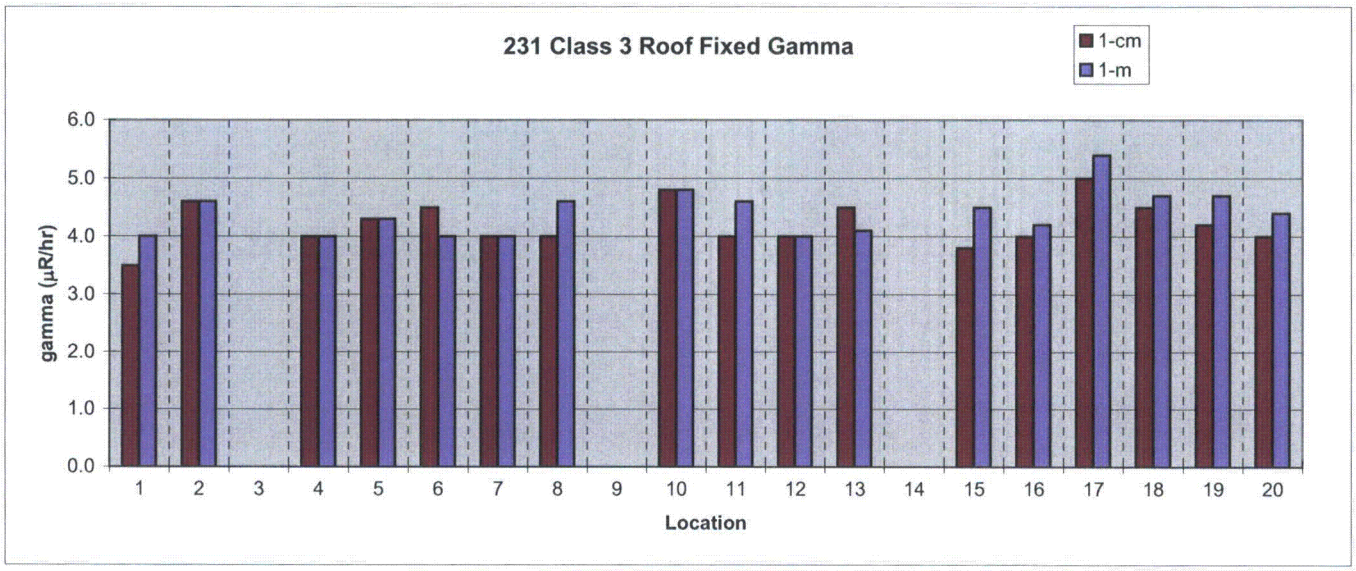
Description: HEMATITE Building 231 Class 3 Roof Gamma Surveys
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: D. Shifflett
Comments: Roof Area Gamma Results
Instrument Manufacturer: Ludlum

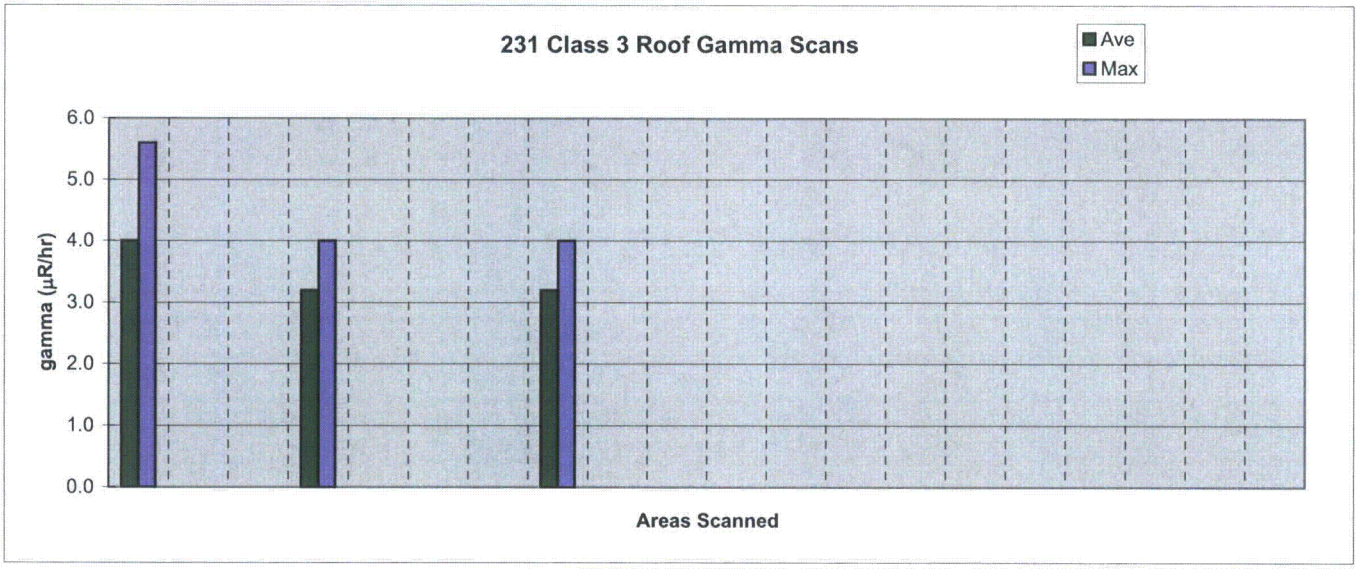
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
44-10	12269	9/6/08	2350	98638	9/27/08

Survey Results

		gamma μR**		gamma scan μR**	
Location #	**Location***	**1-cm**	**1-m**	**Ave**	**Max**
1	R	3.5	4	4	5.6
2	R	4.6	4.6	na	na
3	R	na	na	na	na
4	R	4	4	3.2	4
5	R	4.3	4.3	na	na
6	R	4.5	4	na	na
7	R	4	4	na	na
8	R	4	4.6	3.2	4
9	R	na	na	na	na
10	R	4.8	4.8	na	na
11	R	4	4.6	na	na
12	R	4	4	na	na
13	R	4.5	4.1	na	na
14	R	na	na	na	na
15	R	3.8	4.5	na	na
16	R	4	4.2	na	na
17	R	5	5.4	na	na
18	R	4.5	4.7	na	na
19	R	4.2	4.7	na	na
20	R	4	4.4	na	na

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal
** na indicates measurements not taken for this location


231 Class 3 Roof Fixed Gamma
1-cm
1-m
gamma (µR/hr)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


231 Class 3 Roof Gamma Scans
Ave
Max
gamma (µR/hr)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Areas Scanned

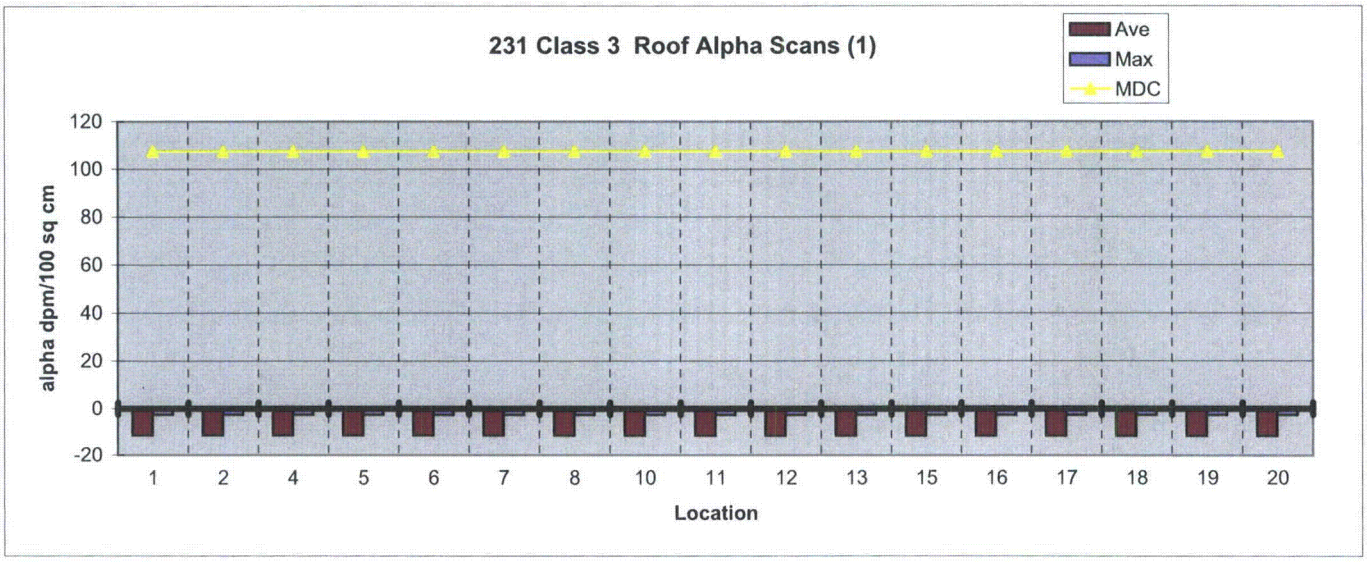
Survey Report

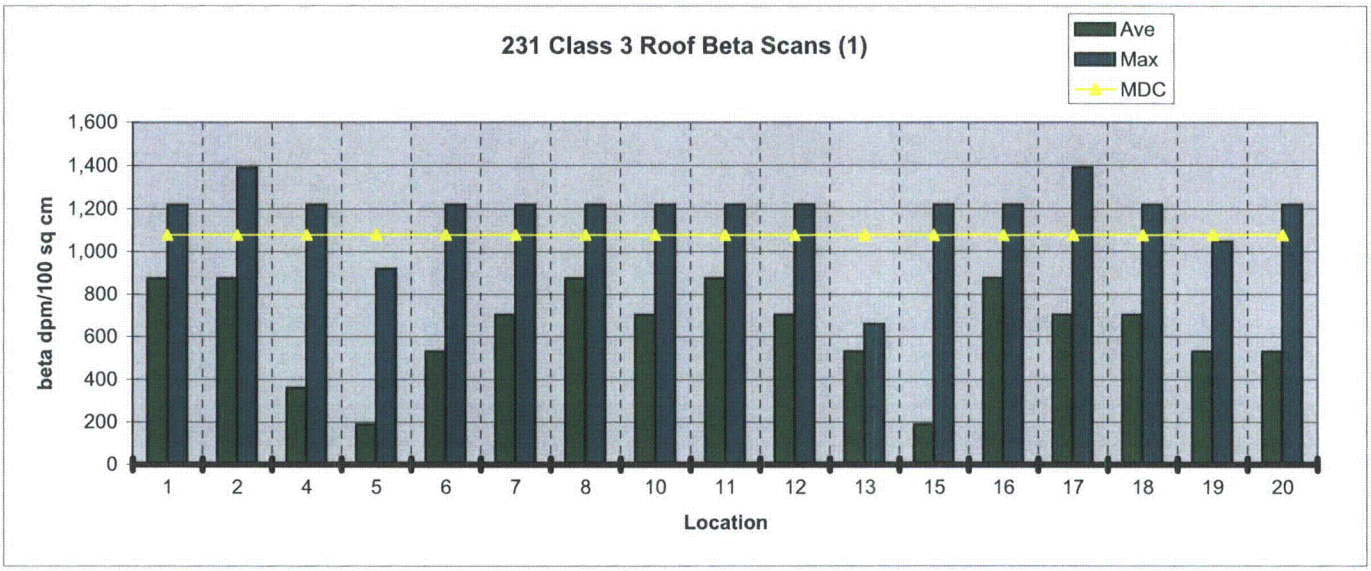
Description: HEMATITE Building 231 Class 3 Roof Alpha & Beta Scans (1)
Survey Date: 11/29/2007 **Survey Package: C-0231**
Technician Name: V. Baldwin / D. Schumaker
Comments: Roof alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	095522	126	9/11/08	2350	126172	9/27/08	α	9.0%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	2				130					
		BKG	1				139					
		BKG	1				144					
		AVG BKG	**1.3**				**138**				**107**	**1,077**
1	R	SCAN	0	1	-11	-3	240	280	875	1,218	107	1,077
2	R	SCAN	0	1	-11	-3	240	300	875	1,390	107	1,077
4	R	SCAN	0	1	-11	-3	180	280	360	1,218	107	1,077
5	R	SCAN	0	1	-11	-3	160	245	189	918	107	1,077
6	R	SCAN	0	1	-11	-3	200	280	532	1,218	107	1,077
7	R	SCAN	0	1	-11	-3	220	280	704	1,218	107	1,077
8	R	SCAN	0	1	-11	-3	240	280	875	1,218	107	1,077
10	R	SCAN	0	1	-11	-3	220	280	704	1,218	107	1,077
11	R	SCAN	0	1	-11	-3	240	280	875	1,218	107	1,077
12	R	SCAN	0	1	-11	-3	220	280	704	1,218	107	1,077
13	R	SCAN	0	1	-11	-3	200	215	532	661	107	1,077
15	R	SCAN	0	1	-11	-3	160	280	189	1,218	107	1,077
16	R	SCAN	0	1	-11	-3	240	280	875	1,218	107	1,077
17	R	SCAN	0	1	-11	-3	220	300	704	1,390	107	1,077
18	R	SCAN	0	1	-11	-3	220	280	704	1,218	107	1,077
19	R	SCAN	0	1	-11	-3	200	260	532	1,047	107	1,077
20	R	SCAN	0	1	-11	-3	200	280	532	1,218	107	1,077

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


231 Class 3 Roof Alpha Scans (1)
Ave
Max
MDC
alpha dpm/100 sq cm
120
100
80
60
40
20
0
-20
1
2
4
5
6
7
8
10
11
12
13
15
16
17
18
19
20
Location


231 Class 3 Roof Beta Scans (1)
Ave
Max
MDC
beta dpm/100 sq cm
1,600
1,400
1,200
1,000
800
600
400
200
0
1
2
4
5
6
7
8
10
11
12
13
15
16
17
18
19
20
Location

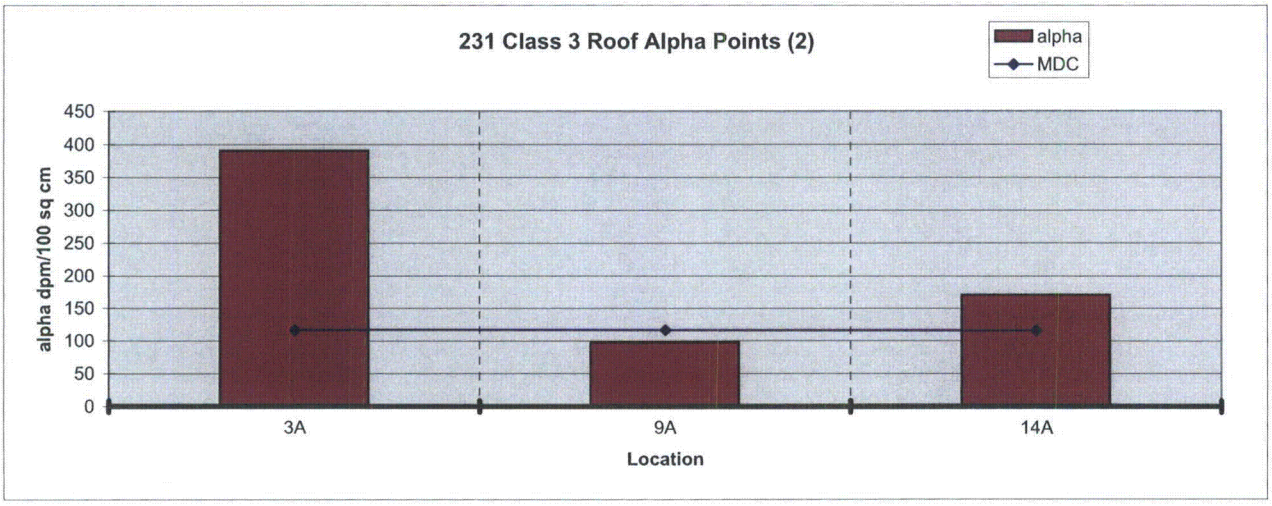
Survey Report

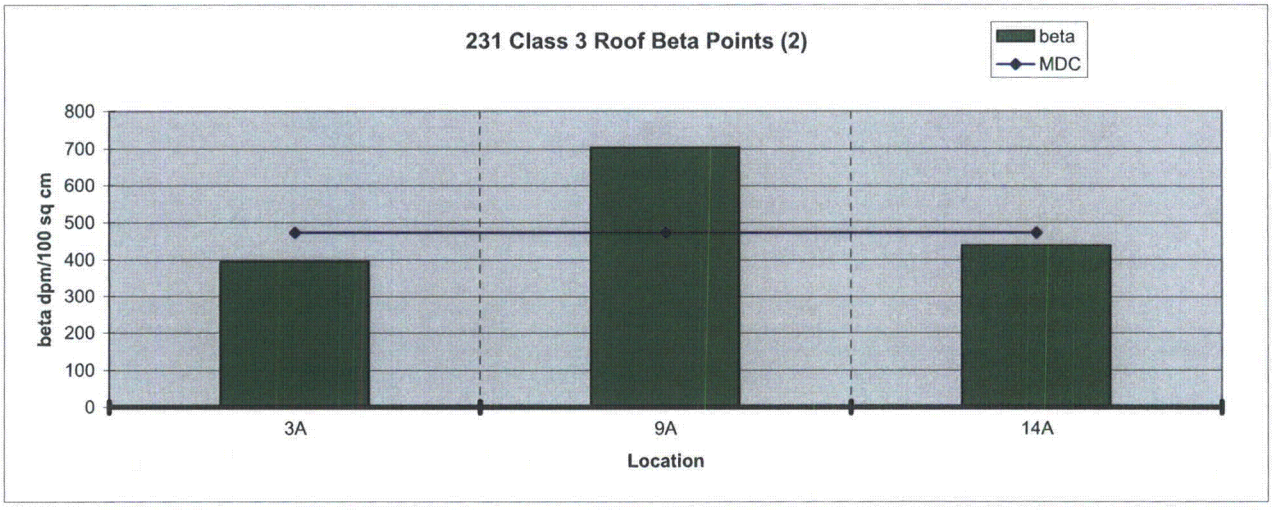
Description: HEMATITE Building 231 Class 3 Roof (2)
Survey Date: 12/3/2007 **Survey Package: C-0231**
Technician Name: D. Schumaker
Comments: Class 3 Roof
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results			Direct Readings								
Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		0				150		
		BKG	60		2				133		
		BKG	60		1				135		
		AVG BKG			**1**				**139**		
3A	R	FLDCT	60	17	1	117	391	185	139	474	395
9A	R	FLDCT	60	5	1	117	98	221	139	474	704
14A	R	FLDCT	60	8	1	117	171	190	139	474	438

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal





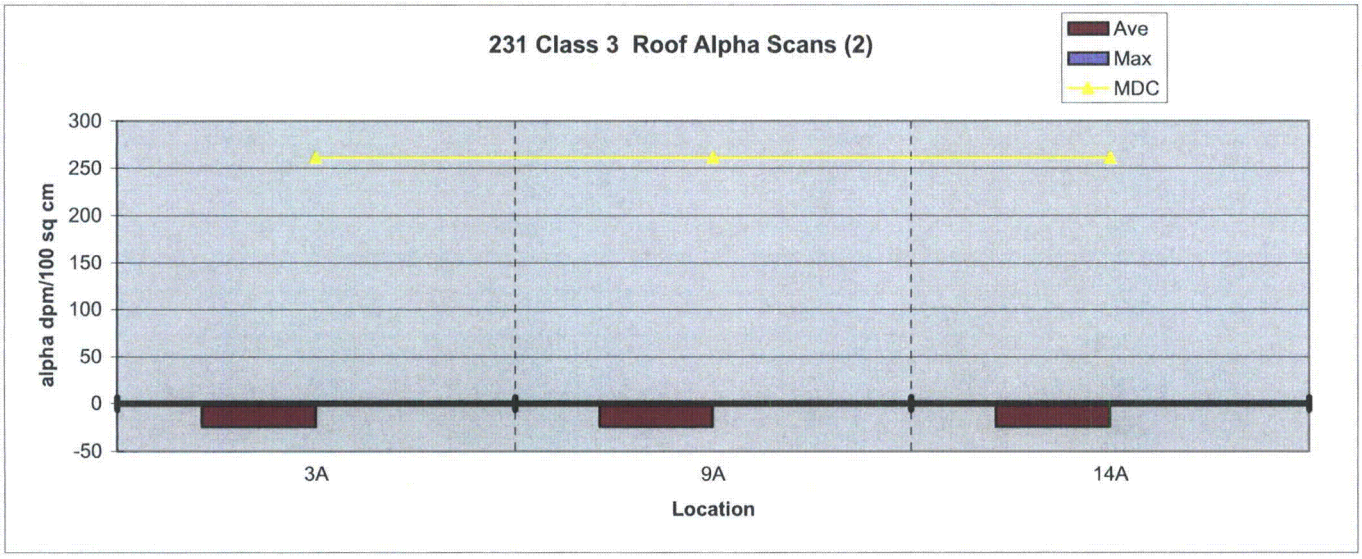
Survey Report

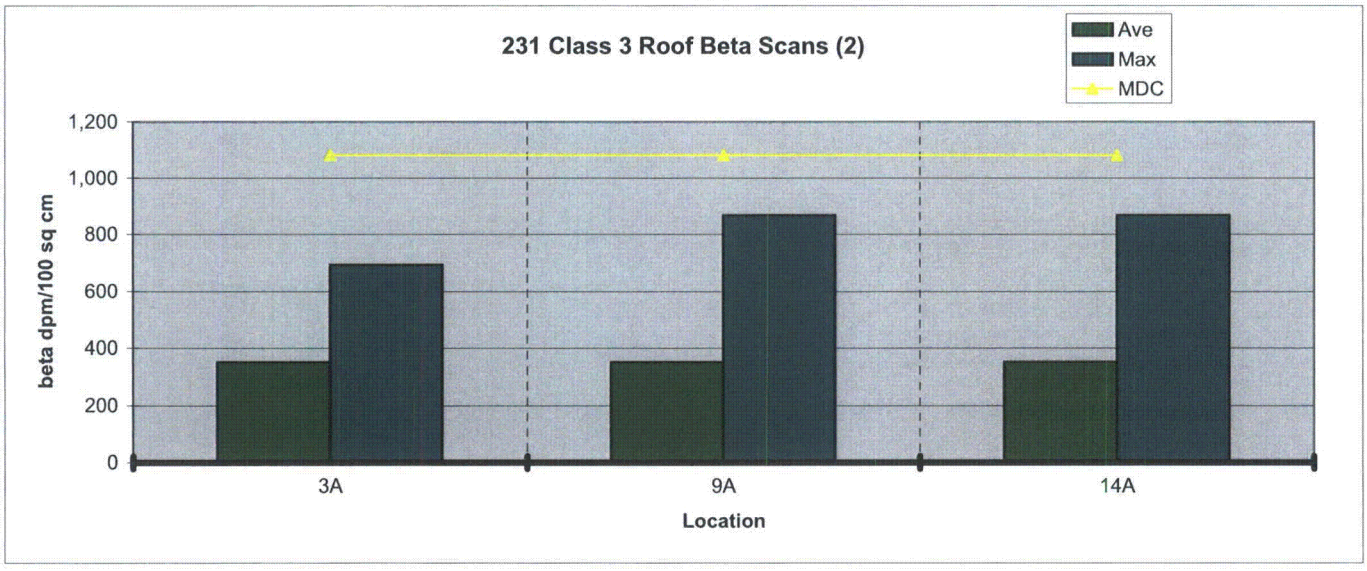
Description: HEMATITE Building 231 Class 3 Roof Alpha & Beta Scans (2)
Survey Date: 12/3/2007 **Survey Package: C-0231**
Technician Name: D. Schumaker
Comments: Roof alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	0				150					
		BKG	2				133					
		BKG	1				135					
		AVG BKG	**1**				**139**				**261**	**1,081**
3A	R	SCAN	0	1	-24	0	180	220	352	695	261	1,081
9A	R	SCAN	0	1	-24	0	180	240	352	867	261	1,081
14A	R	SCAN	0	1	-24	0	180	240	352	867	261	1,081

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal





ENERGYSOLUTIONS

Survey Package Worksheet for Hematite Building 110

Package Identification No.: HDP-C0110	**Prepared by:** Paul C. Ely
Location: Building 110	**Date Prepared:** 11/28/2007
Area Classification: Class 3	**Reviewed by:**

Area Description

Building 110 is a non-impacted area, but it is being characterized as a Class 3 area. Survey areas include floor, walls, ceiling, drains, sumps, roof and overhead horizontal surfaces and vent ducts excluding partitions, equipment and furniture.

Historical Information

Building 110 is the Pedestrian Entrance/Office Building. The building was built in 1970 and serves as the pedestrian entrance to the plant. The building currently has a security station at the entrance, several offices, a conference room, and a kitchen. As per historical documents, no work with radioactive or chemical compounds occurred in this building.

General Survey Instructions

1. Perform surface scans at a scan speed not to exceed 2-inches per second. Any locations that exceed twice background must be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
   a. 10% scan of floor and lower wall for alpha contamination and for alpha plus beta contamination.
   b. 10% scan of upper wall, and ceiling surfaces for alpha contamination and for alpha plus beta contamination.
   c. Perform independent gamma and alpha plus beta scans of pits and drains for activity above twice background.
   d. 10% scan of overhead horizontal surfaces for alpha contamination and for alpha plus beta contamination.
   e. Scan of vent duct for alpha contamination and for alpha plus beta contamination at accessible locations marked with a felt tip pen or equivalent during a walkdown performed prior to the survey.
   f. 10% scan of exterior walls and roof for alpha contamination and for alpha plus beta contamination.
2. Perform exposure rate measurement at 1-cm and 100-cm from the surface at each floor measurement location provided on survey maps. If a reading exceeds twice background, survey surrounding area. Notify the ES Project Manager of any exposure rate measurements that exceed twice background.
3. Perform direct alpha and alpha plus beta surface activity measurements, independently, at each measurement location provided on survey maps and at the highest activity location in marked elevated areas.
4. Collect removable surface activity sample over an area of 100 cm^2 in size at each measurement location provided on survey maps (attached). Notify the ES Project Manager if alpha or beta results exceed 500 dpm/100 cm^2.
5. Collect one sediment samples if material is available from a pre-selected floor drain based on activity level.

Special Instructions

- Source check instrumentation to Th-230 for alpha, Tc-99 for beta, and Cs-137 for gamma measurements.
- Use gas proportional detector model numbers 43-68, 43-106 or equivalent detector as approved by the RSO for total surface activity surveys.
- The MDC for total alpha and beta activity measurements shall be less than 1,000 dpm/100 cm^2.
- Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface prior to survey.
- Record maximum and average scan measurement results, in cpm, for each scan area.
- If any measurement and sampling location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.
- Notify the ES Project Manager of locations that exceed 5,000 dpm/100 cm^2 total alpha or beta surface activity.
- Notify the ES Project Manager of any exposure rate measurements that exceed twice background at 1-cm.
- Attach photographic records if available and provide descriptive comments for each image under Survey Comments.

Survey Performance

Software – Headers (if needed)			General Description	1-cm Exposure Rate	100-cm Exposure Rate	Alpha Scan	Beta Scan	Gamma Scan	Direct Alpha	Direct Beta	α & β Smears/ Samples
4	5	6									
Hematite Building 110 Class 3 Areas											
Hematite Bldg 110	FLOOR	C0110	Floor 10%	✓	✓	✓	✓	✓	✓	✓	✓
Hematite Bldg 110	L. WALL	C0110	Lower Wall 10%	N/A	N/A	✓	✓	N/A	✓	✓	✓
Hematite Bldg 110	CLNG + U. WALL	C0110	Ceiling & Upper Wall 10%	N/A	N/A	✓	✓	N/A	✓	✓	✓
Hematite Bldg 110	OVHD	C0110	Overhead Horizontal Surfaces 10%	N/A	N/A	✓	✓	N/A	20 ✓	20 ✓	20 ✓
Hematite Bldg 110	DUCT	C0110	Vent Duct	N/A	N/A	✓	✓	N/A	15 ✓	15 ✓	15 ✓
Hematite Bldg 110	ROOF	C0110	Roof 10%	✓	✓	✓	✓	✓	✓	✓	✓
Hematite Bldg 110	EXTRIOR	C0110	Exterior Wall 10%	✓	✓	✓	✓	N/A	✓	✓	✓
Hematite Bldg 110	DRAINS	A0110	Drains, Open Grating & Piping	✓	N/A	✓	✓	N/A	✓	✓	✓

Survey Comments

210 of 265

Package Review

Surveyor(s): D. Schumaker, V. Baldwin, M. Chase, S. Holiday, D. Shiffleff

Date Package Completed: 12/4/2007

Package Reviewed by and Date: Paul C Ely 12/27/2007

Survey Package C-0110
Building 110 Class 3 Exterior Walls

X (East:West)	**317**	feet
Y (North:South)	**10**	feet

Survey Point	**Survey Location X (ft)**	**Y (ft)**
1	272	2
2	304	7
3	163	4
4	190	4
5	170	7
6	98	3
7	93	10
8	135	10
9	250	6
10	308	8
11	126	2
12	193	2
13	216	8
14	148	9
15	288	3
16	158	5
17	19	6
18	298	8
19	263	2
20	23	8

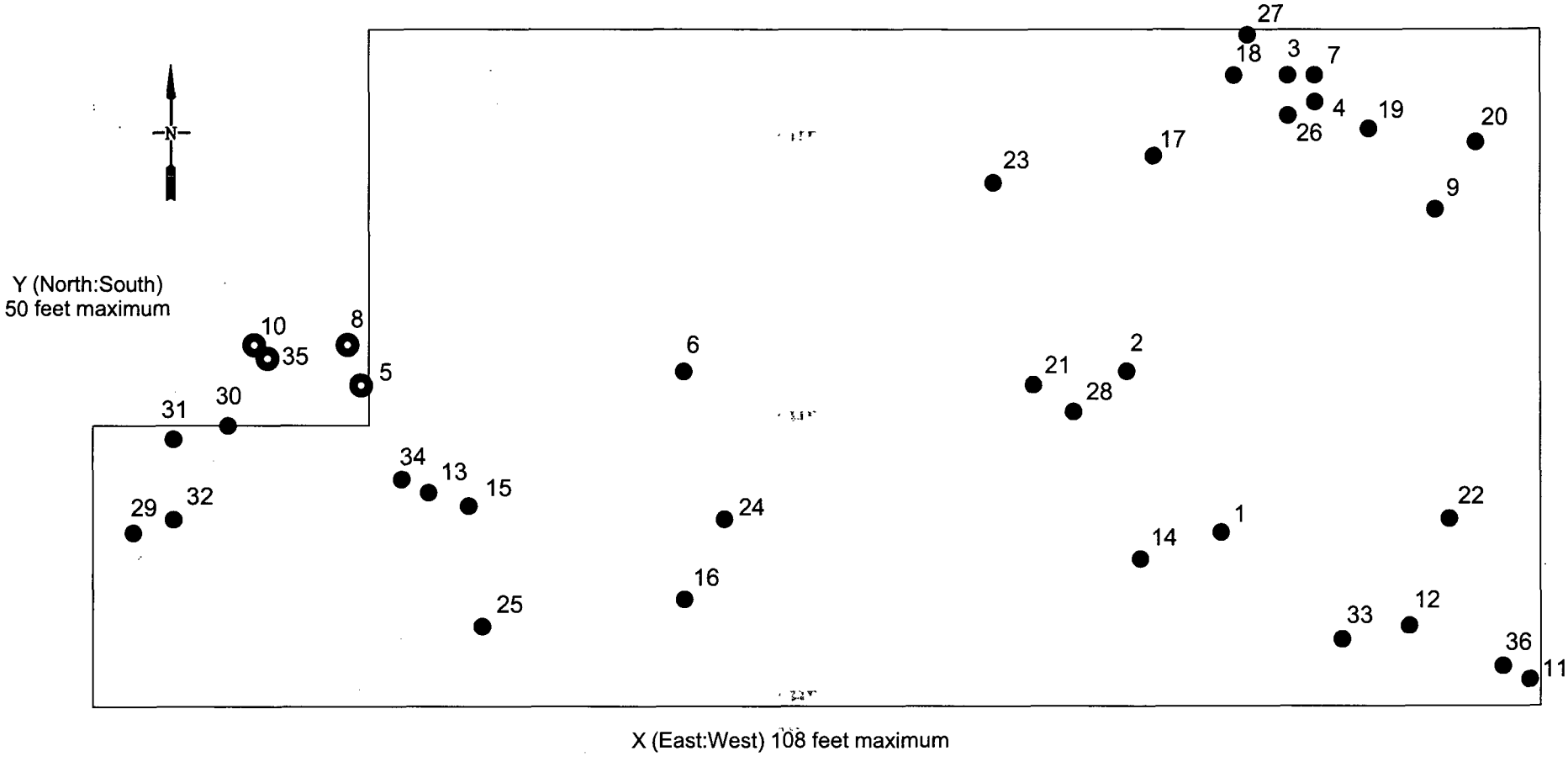
Wall locations start a SW Corner at ground level. X indicates the distance around the building clockwise and Y indicates the elevation above ground.

Building 110 Class 3 Roof

X (East:West)	**108**	feet
Y (North:South)	**50**	feet

RANDOM LOCATIONS SORTED

Survey Point	**Survey Location X (ft)**	**Y (ft)**
29	3	13
32	6	14
31	6	20
30	7	22
10	12	27
35	13	26
8	19	27
5	20	24
34	23	17
13	25	16
15	28	15
24	29	6
16	44	8
6	44	25
25	47	14
23	67	39
21	70	24
28	73	22
2	77	25
14	78	11
17	79	41
1	84	13
18	85	47
27	86	50
26	89	44
3	89	47
4	91	45
7	91	47
33	93	5
19	95	43
12	98	6
9	100	37
22	101	14
20	103	42
36	105	3
11	107	2

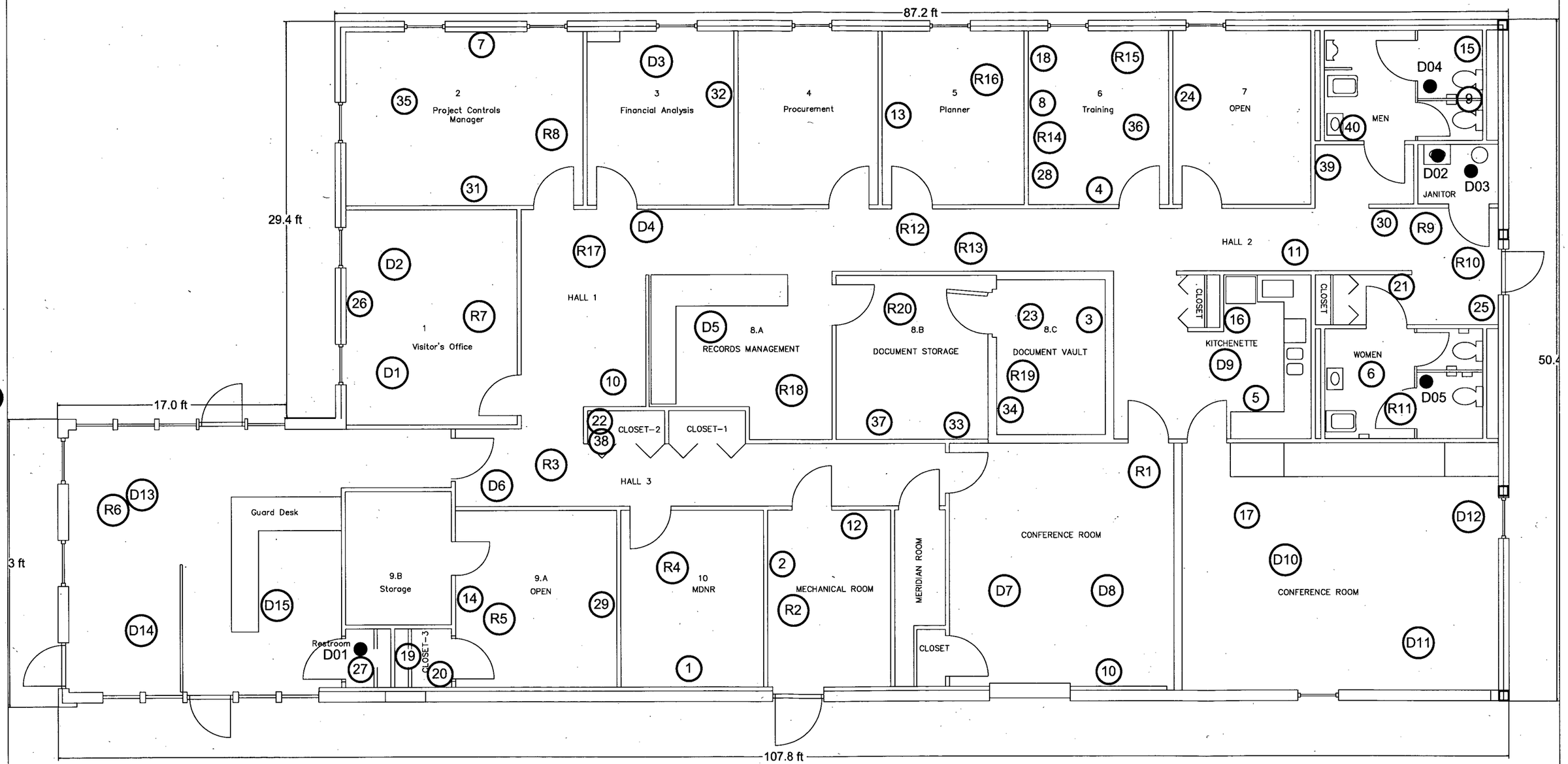


Building 110, Class 3, Roof

Survey Package C-0110
Building 110 Class 3

Location No	**29**	
Location # 2	**5**	**Floor = 0**
		N. Wall = 1
		E. Wall = 2
		S. Wall = 3
		W. Wall = 4
		Ceiling = 5

		Survey Location		
Location No	**Description**	**Loc #**	**Loc # 2**	**Point**
1	Office 1	24	3	1
2	Hall 1	23	4	2
3	Office 2	16	2	3
4	Office 3	7	3	4
5	Office 4	15	3	5
6	Office 5	13	0	6
7	Office 6	3	1	7
8	Hall 2	7	4	8
9	Office 7	10	2	9
10	Men's	21	3	10
11	Men's Entry	8	4	11
12	Janitor	23	1	12
13	Women's	6	4	13
14	Women's Entry	26	4	14
15	Kitchenette	10	2	15
16	Office 8C	15	4	16
17	Office 8B	21	0	17
18	Office 8A	7	4	18
19	Closet-1	27	4	19
20	Closet-2	27	2	20
21	Conference Rm	14	1	21
22	Meridan Rm	20	4	22
23	Mechanical Rm	16	5	23
24	MDNR	9	4	24
25	Office 9B	14	2	25
26	Office 9A	1	4	26
27	Closet-3	28	2	27
28	Restroom	7	4	28
29	Entry Rm	26	2	29
		8	1	30
		3	3	31
		4	2	32
		17	3	33
		16	4	34
		3	0	35
		7	0	36
		17	3	37
		20	4	38
		11	4	39
		10	3	40



"Rn" Designations are for overhead survey locations
"Dn" Designations are for overhead duct survey locations

BLDG 110
FLOOR PLAN

SCALE: 1/4"=1'-0"

Survey Progress Tracking Sheet
Survey Package C-0110 Complete: Paul C Ely Date: 12/6/07
Building 110 Class 3 Name

Scans									Fixed Readings				Smear	
gamma		alpha		beta		Survey			gamma				alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.*		1-cm	1-m	alpha	beta	cpm	cpm
						BKG	R				3	137		
						BKG	R				2	163		
						BKG	R				3	167		
3.8	5.2	10	48	220	247	1	R		4.3	4.2	8	261	0	49
						2	R		4.5	4.6	10	309	2	32
						3	R		5.3	5.4	6	262	1	39
						4	R		5.9	5.2	2	240	2	46
						5	R	I	na	na	na	na	na	na
						6	R		4.2	4.5	9	218	0	39
						7	R		5.0	5.3	4	236	3	45
						8	R	I	na	na	na	na	na	na
						9	R		5.5	5.5	13	273	2	29
						10	R	I	na	na	na	na	na	na
						11	R		4.7	4.5	7	246	0	47
						12	R		4.7	4.9	9	224	1	48
						13	R		4.5	4.1	6	230	2	43
						14	R		4.9	4.4	9	210	1	39
						15	R		4.0	4.5	15	276	3	64
						16	R		4.3	4.9	4	205	0	42
						17	R		5.1	5.2	8	267	0	47
						18	R		5.0	5.6	12	254	1	44
						19	R		5.9	5.6	12	239	1	50
						20	R		5.3	5.9	7	281	0	50
						21	R		4.1	4.9	37	210	1	34
						22	R		5.0	2.3	11	296	0	37
						23	R		4.7	5	8	251	0	30
						24	R		3.9	4.4	8	213	1	54
						25	R		4.3	4.5	10	265	0	45
						26	R		5.3	5	3	244	2	33
						27	R		5.3	4.9	4	242	1	44
						28	R		4.4	4.8	6	300	2	31
						29	R		4.2	4.7	7	203	1	55
						30	R		4.8	4.5	9	253	0	48

Survey Progress Tracking Sheet
Survey Package C-0110
Building 110 Class 3

Complete: Paul C Ely
Name

Date: 12/6/07

Scans									Fixed Readings				Smear	
gamma		alpha		beta		Survey			gamma				alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.*		1-cm	1-m	alpha	beta	cpm	cpm
						31	R		4.1	4.4	12	261	1	48
						32	R		4.1	4.5	5	204	1	49
						33	R		4.5	4.9	7	218	0	47
						34	R		4.2	4.3	3	254	2	35
						35	R	I	na	na	na	na	na	na
						36	R		5.2	4.7	11	262	3	51
						BKG					3	137		
						BKG					2	163		
						BKG					3	167		
		0	10	12	250	1	VD				10	256	0	44
						2	VD				12	250	0	35
						3	VD				23	260	0	33
						4	VD				17	270	0	42
						5	VD				4	148	0	36
						6	VD				16	187	0	41
						7	VD				18	198	0	38
						8	VD				15	211	1	38
						9	VD				11	201	0	36
						10	VD				6	147	2	43
						11	VD				10	212	0	40
						12	VD				9	210	0	50
						13	VD				15	209	0	42
						14	VD				14	211	2	42
						15	VD				10	240	0	36
		10		288		BKG								
		6		268		BKG	PRE				0.3	148		
		3		245		BKG	POST				2	140		
		1	4	190	222	1	OW				12	120	0	44
		0	4	190	222	2	OW				7	131	2	44
		0	8	450	510	3	OW				4	308	0	42
		0	10	350	400	4	OW				10	294	0	38

Survey Progress Tracking Sheet
Survey Package C-0110 **Complete:** Paul C Ely **Date:** 12/6/07
Building 110 Class 3 **Name**

Scans									Fixed Readings				Smear	
gamma		alpha		beta		Survey			gamma				alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.*		1-cm	1-m	alpha	beta	cpm	cpm
		0	7	400	450	**5**	OW				8	278	1	52
		0	13	440	465	**6**	OW				15	276	2	46
		0	10	350	550	**7**	OW				10	260	0	48
		0	20	440	480	**8**	OW				11	203	1	44
		0	12	180	210	**9**	OW				8	124	0	42
		0	3	170	190	**10**	OW				14	90	0	48
		0	10	420	460	**11**	OW				12	238	0	53
		0	10	360	410	**12**	OW				11	315	0	36
		0	7	175	230	**13**	OW				12	125	0	42
		0	10	450	500	**14**	OW				7	221	1	44
		0	9	190	225	**15**	OW				2	131	0	45
		0	16	430	490	**16**	OW				8	216	1	44
		0	10	315	490	**17**	OW				3	322	0	33
		0	4	180	220	**18**	OW				12	109	0	43
		2	6	320	350	**19**	OW				15	134	1	35
		0	10	325	470	**20**	OW				5	178	1	29
		3		220		BKG								
		6		204		BKG	PRE				0.3	148		
		2		282		BKG	POST				2	140		
		1	3	250	300	**1**	INT	W			3	156	1	38
		1	10	228	275	**2**	INT	W			4	115	0	46
		3	20	330	375	**3**	INT	W			7	147	0	28
		2	6	275	315	**4**	INT	W			2	145	1	46
		0	2	300	405	**5**	INT	W			3	143	1	43
		0	2	350	480	**6**	INT	F	4.8	5.2	5	322	0	47
		1	8	275	350	**7**	INT	W			10	181	1	39
		2	6	285	350	**8**	INT	W			6	143	1	34
		0	3	320	405	**9**	INT	W			6	167	1	36
		0	2	270	310	**10**	INT	W			4	147	1	36
		0	6	250	300	**11**	INT	W			2	138	1	41
		1	10	200	230	**12**	INT	W			5	114	0	44
		1	10	255	300	**13**	INT				9	280	0	38

Survey Progress Tracking Sheet
Survey Package C-0110 **Complete:** Paul C Ely **Date:** 12/6/07
Building 110 Class 3 **Name**

Scans									Fixed Readings				Smear	
gamma		alpha		beta		Survey			gamma				alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.*		1-cm	1-m	alpha	beta	cpm	cpm
		1	4	200	230	**14**	INT	W			2	129	0	45
		0	3	320	385	**15**	INT	W			6	146	3	49
		0	2	230	250	**16**	INT	W			2	143	1	48
		0	0	280	315	**17**	INT	F	4	3.8	1	109	2	47
		2	8	265	289	**18**	INT	W			5	151	3	38
		0	2	250	315	**19**	INT	W			4	133	2	46
		0	3	200	300	**20**	INT	W			3	110	0	29
		0	5	350	375	**21**	INT	W			4	119	0	45
		0	2	225	275	**22**	INT	W			na	140	0	36
		2	22	400	450	**23**	INT	C			3	210	0	46
		0	2	250	325	**24**	INT	W			6	130	0	51
		0	5	350	375	**25**	INT	W			4	137	1	34
		1	5	270	350	**26**	INT	W			5	148	1	33
		1	4	260	280	**27**	INT	W			5	123	1	46
		2	6	265	290	**28**	INT	W			4	153	1	47
		0	3	200	235	**29**	INT	W			4	140	2	39
		0	8	230	275	**30**	INT	W			9	135	2	33
		1	7	250	285	**31**	INT	W			11	160	1	45
		0	6	255	285	**32**	INT	W			1	163	0	31
		1	20	220	275	**33**	INT	W			5	139	0	42
		1	4	400	433	**34**	INT	W			5	159	0	43
		2	10	325	380	**35**	INT	F	4.7	6	3	157	0	47
		0	6	340	375	**36**	INT	F	4.9	5.4	na	196	0	38
		1	20	220	275	**37**	INT	W			5	132	1	30
		1	2	230	280	**38**	INT	W			7	120	1	44
		0	3	228	300	**39**	INT	W			8	121	0	42
		1	3	350	375	**40**	INT	W			11	156	0	39
						BKG					3	220		
						BKG					6	204		
						BKG					2	282		
		0	2	230	350	1	OVHD				6	260	5	47
		2	15	275	350	2	OVHD				14	314	4	40

Survey Progress Tracking Sheet
Survey Package C-0110 **Complete:** Paul C Ely **Date:** 12/6/07
Building 110 Class 3 **Name**

Scans									Fixed Readings				Smear	
gamma		alpha		beta		Survey			gamma				alpha	beta
Ave	Max	Ave	Max	Ave	Max	Point	Loc.*		1-cm	1-m	alpha	beta	cpm	cpm
		0	10	250	325	3	OVHD				7	298	6	44
		0	15	250	320	4	OVHD				12	326	1	40
		2	10	235	300	5	OVHD				8	275	2	43
		1	15	280	330	6	OVHD				15	344	4	51
		1	10	290	350	7	OVHD				10	308	6	50
		2	15	250	287	8	OVHD				11	298	4	29
		1	10	240	275	9	OVHD				16	301	1	46
		1	10	275	305	10	OVHD				11	322	5	46
		0	15	275	315	11	OVHD				15	302	2	45
		0	6	280	315	12	OVHD				8	308	1	47
		0	6	235	255	13	OVHD				9	250	0	40
		0	20	300	350	14	OVHD				17	322	6	35
		0	20	300	375	15	OVHD				13	340	1	53
		0	5	325	350	16	OVHD				3	318	3	43
		2	6	290	300	17	OVHD				5	287	2	47
		2	20	280	315	18	OVHD				16	307	2	44
		2	15	285	325	19	OVHD				11	284	0	34
		0	5	220	260	20	OVHD				5	259	4	41
						BKG	PRE				0.3	148		
						BKG	POST				2	140		
						D1	Drain		10	3.75	10	315	0	31
						D2	Drain		5	5	5	202	0	51
						D3	Drain		8	5	29	516	0	46
						D4	Drain		5	6	3	220	1	44
						D5	Drain		5	5	6	266	1	33

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhe

Survey Report

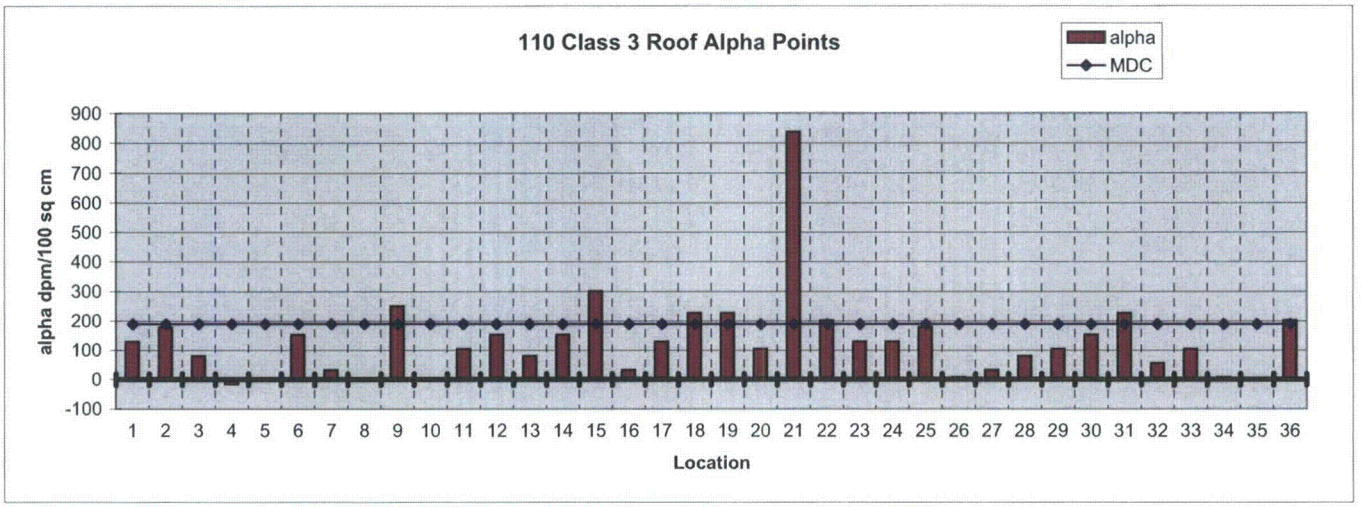
Description: HEMATITE Building 110 Class 3 Roof
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Roof
Instrument Manufacturer: Ludlum

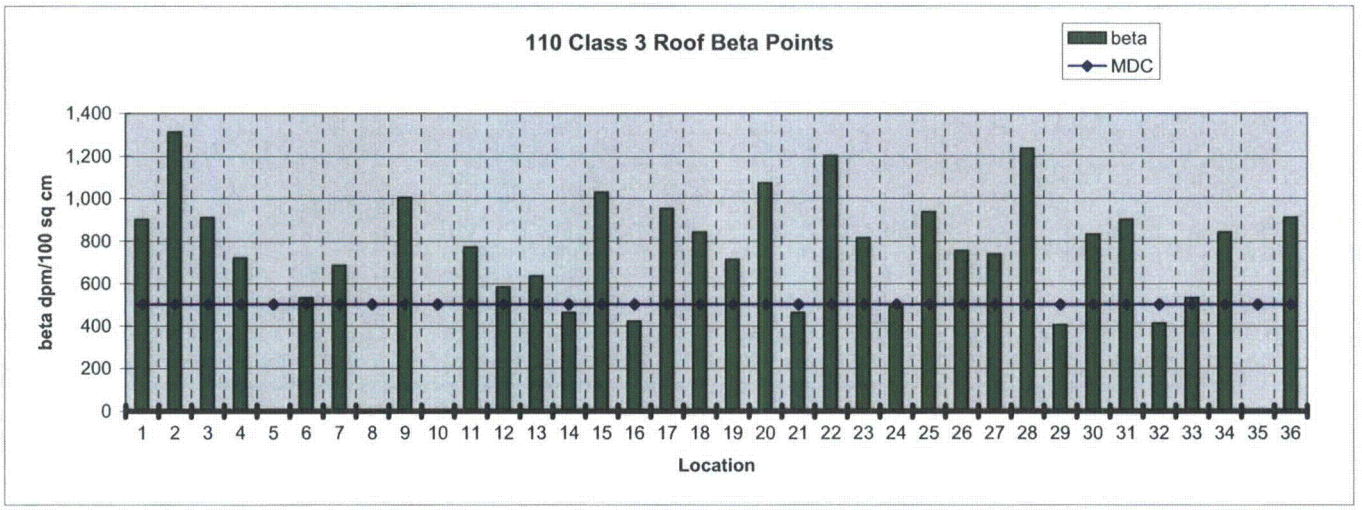
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		3				137		
		BKG	60		2				163		
		BKG	60		3				167		
		AVG BKG			**2.7**				**156**		
1	R	FLDCT	60	8	2.7	190	129	261	156	502	901
2	R	FLDCT	60	10	2.7	190	178	309	156	502	1,313
3	R	FLDCT	60	6	2.7	190	81	262	156	502	909
4	R	FLDCT	60	2	2.7	190	-17	240	156	502	721
5	R	FLDCT	60	na	2.7	190	--	na	156	502	--
6	R	FLDCT	60	9	2.7	190	154	218	156	502	532
7	R	FLDCT	60	4	2.7	190	32	236	156	502	686
8	R	FLDCT	60	na	2.7	190	--	na	156	502	--
9	R	FLDCT	60	13	2.7	190	252	273	156	502	1,004
10	R	FLDCT	60	na	2.7	190	--	na	156	502	--
11	R	FLDCT	60	7	2.7	190	105	246	156	502	772
12	R	FLDCT	60	9	2.7	190	154	224	156	502	583
13	R	FLDCT	60	6	2.7	190	81	230	156	502	635
14	R	FLDCT	60	9	2.7	190	154	210	156	502	463
15	R	FLDCT	60	15	2.7	190	300	276	156	502	1,030
16	R	FLDCT	60	4	2.7	190	32	205	156	502	420
17	R	FLDCT	60	8	2.7	190	129	267	156	502	952
18	R	FLDCT	60	12	2.7	190	227	254	156	502	841
19	R	FLDCT	60	12	2.7	190	227	239	156	502	712
20	R	FLDCT	60	7	2.7	190	105	281	156	502	1,073
21	R	FLDCT	60	37	2.7	190	838	210	156	502	463
22	R	FLDCT	60	11	2.7	190	203	296	156	502	1,201
23	R	FLDCT	60	8	2.7	190	129	251	156	502	815
24	R	FLDCT	60	8	2.7	190	129	213	156	502	489
25	R	FLDCT	60	10	2.7	190	178	265	156	502	935
26	R	FLDCT	60	3	2.7	190	7	244	156	502	755
27	R	FLDCT	60	4	2.7	190	32	242	156	502	738
28	R	FLDCT	60	6	2.7	190	81	300	156	502	1,236
29	R	FLDCT	60	7	2.7	190	105	203	156	502	403
30	R	FLDCT	60	9	2.7	190	154	253	156	502	832
31	R	FLDCT	60	12	2.7	190	227	261	156	502	901
32	R	FLDCT	60	5	2.7	190	56	204	156	502	412
33	R	FLDCT	60	7	2.7	190	105	218	156	502	532
34	R	FLDCT	60	3	2.7	190	7	254	156	502	841
35	R	FLDCT	60	na	2.7	190	--	na	156	502	--
36	R	FLDCT	60	11	2.7	190	203	262	156	502	909

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Roof Alpha Points
alpha
MDC
alpha dpm/100 sq cm
900
800
700
600
500
400
300
200
100
0
-100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Location


110 Class 3 Roof Beta Points
beta
MDC
beta dpm/100 sq cm
1,400
1,200
1,000
800
600
400
200
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Location

Survey Report

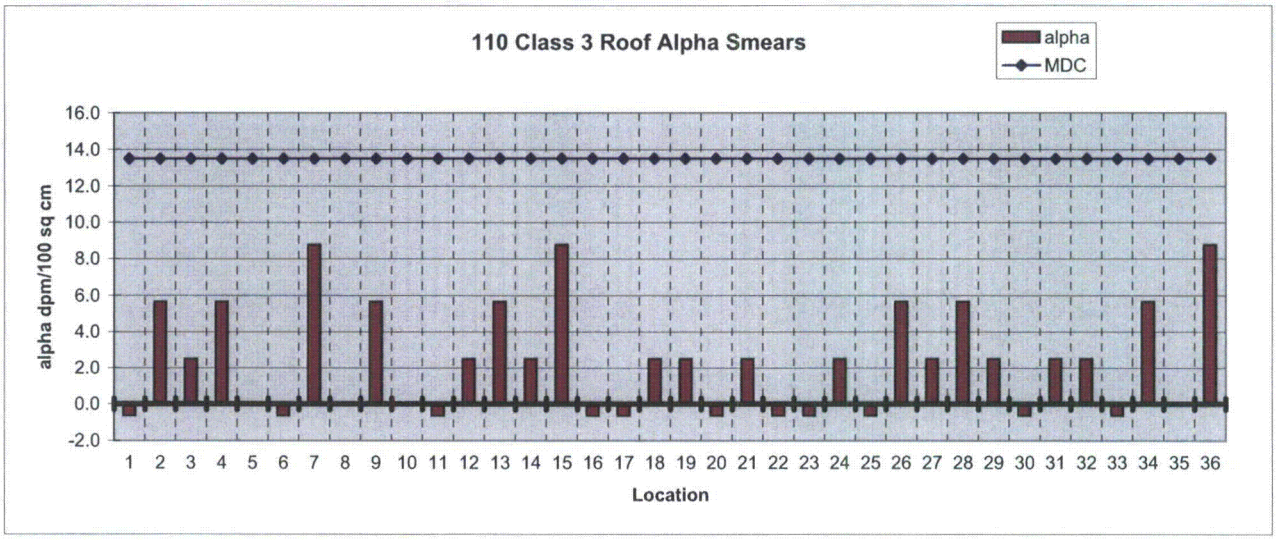
Description: HEMATITE Building 110 Class 3 Roof Smears
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Roof Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/1/2007

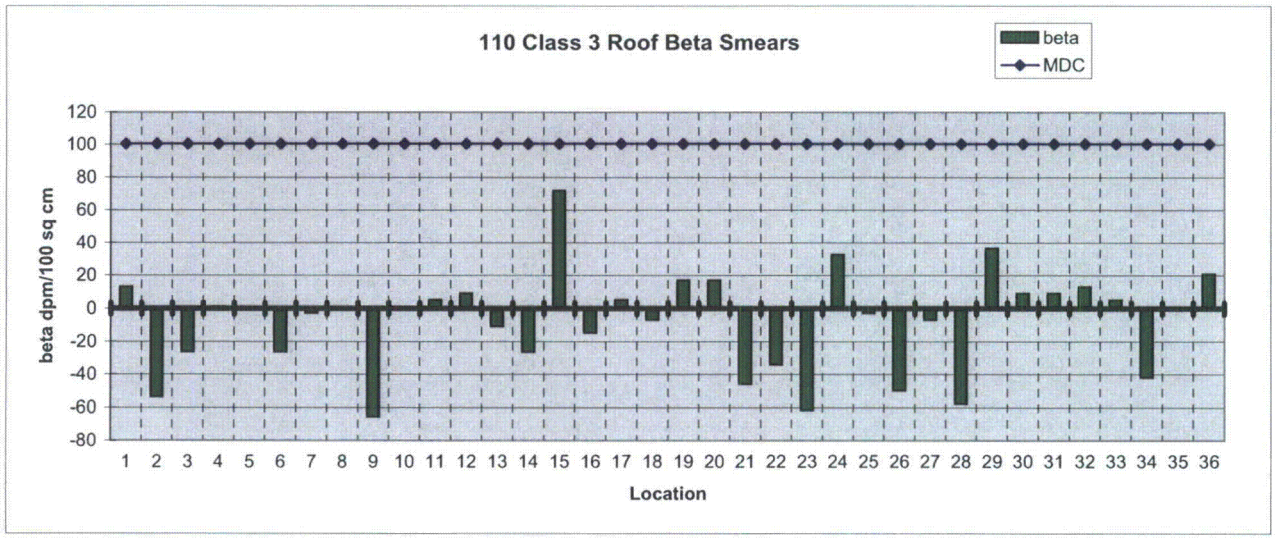
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.20**				**45.7**		
1	R	SMEAR	60	0	0.2	13.5	-0.6	49	45.7	100	13
2	R	SMEAR	60	2	0.2	13.5	5.6	32	45.7	100	-54
3	R	SMEAR	60	1	0.2	13.5	2.5	39	45.7	100	-26
4	R	SMEAR	60	2	0.2	13.5	5.6	46	45.7	100	1
5	R	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
6	R	SMEAR	60	0	0.2	13.5	-0.6	39	45.7	100	-26
7	R	SMEAR	60	3	0.2	13.5	8.8	45	45.7	100	-3
8	R	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
9	R	SMEAR	60	2	0.2	13.5	5.6	29	45.7	100	-65
10	R	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
11	R	SMEAR	60	0	0.2	13.5	-0.6	47	45.7	100	5
12	R	SMEAR	60	1	0.2	13.5	2.5	48	45.7	100	9
13	R	SMEAR	60	2	0.2	13.5	5.6	43	45.7	100	-11
14	R	SMEAR	60	1	0.2	13.5	2.5	39	45.7	100	-26
15	R	SMEAR	60	3	0.2	13.5	8.8	64	45.7	100	72
16	R	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
17	R	SMEAR	60	0	0.2	13.5	-0.6	47	45.7	100	5
18	R	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
19	R	SMEAR	60	1	0.2	13.5	2.5	50	45.7	100	17
20	R	SMEAR	60	0	0.2	13.5	-0.6	50	45.7	100	17
21	R	SMEAR	60	1	0.2	13.5	2.5	34	45.7	100	-46
22	R	SMEAR	60	0	0.2	13.5	-0.6	37	45.7	100	-34
23	R	SMEAR	60	0	0.2	13.5	-0.6	30	45.7	100	-62
24	R	SMEAR	60	1	0.2	13.5	2.5	54	45.7	100	33
25	R	SMEAR	60	0	0.2	13.5	-0.6	45	45.7	100	-3
26	R	SMEAR	60	2	0.2	13.5	5.6	33	45.7	100	-50
27	R	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
28	R	SMEAR	60	2	0.2	13.5	5.6	31	45.7	100	-58
29	R	SMEAR	60	1	0.2	13.5	2.5	55	45.7	100	36
30	R	SMEAR	60	0	0.2	13.5	-0.6	48	45.7	100	9
31	R	SMEAR	60	1	0.2	13.5	2.5	48	45.7	100	9
32	R	SMEAR	60	1	0.2	13.5	2.5	49	45.7	100	13
33	R	SMEAR	60	0	0.2	13.5	-0.6	47	45.7	100	5
34	R	SMEAR	60	2	0.2	13.5	5.6	35	45.7	100	-42
35	R	SMEAR	60	na	0.2	13.5	--	na	45.7	100	--
36	R	SMEAR	60	3	0.2	13.5	8.8	51	45.7	100	21

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Roof Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Location


110 Class 3 Roof Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
-80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Location

Survey Report

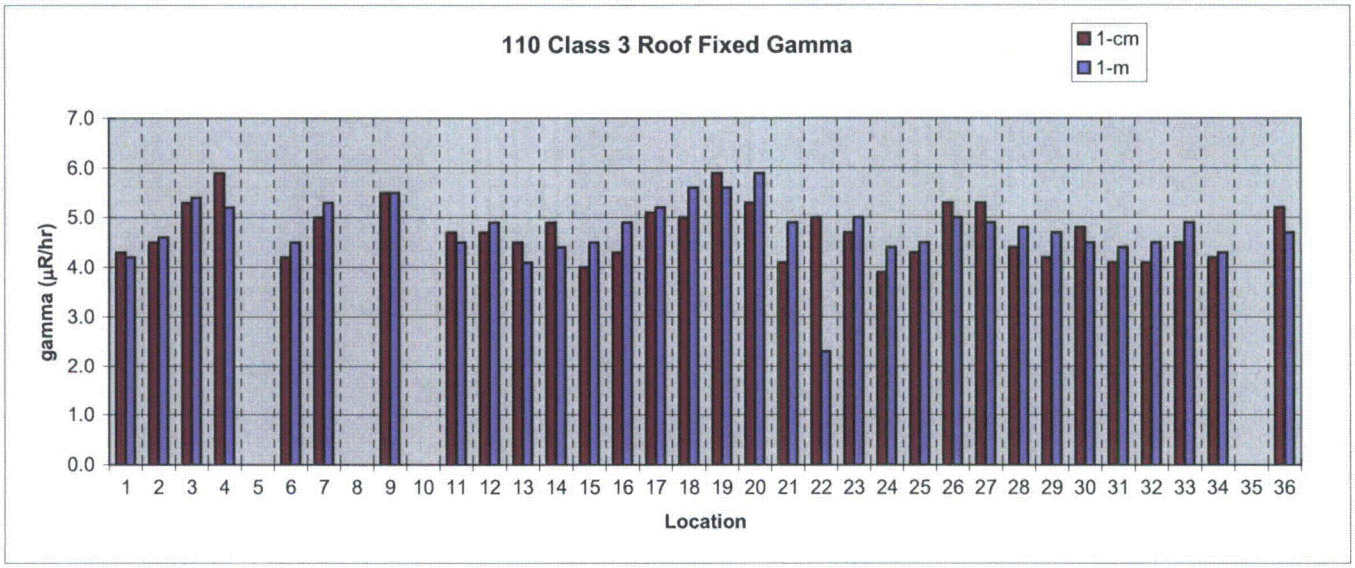
Description: HEMATITE Building 110 Class 3 Roof Gamma Surveys
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: D. Shifflett
Comments: Roof Area Gamma Results
Instrument Manufacturer: Ludlum

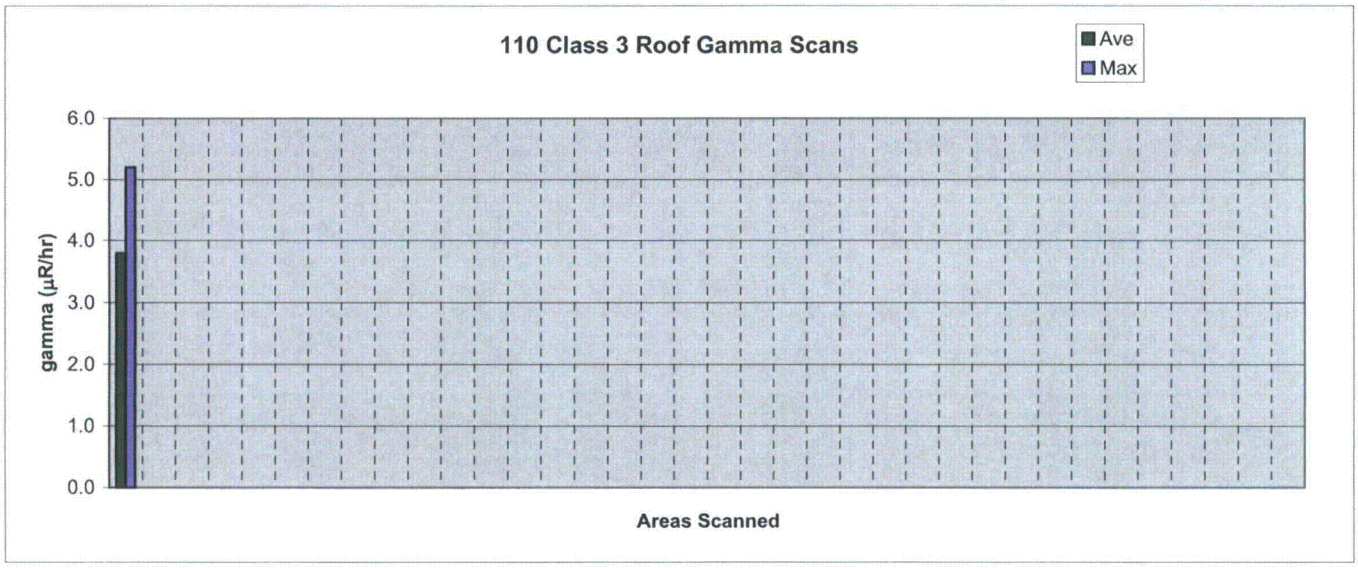
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
44-10	12269	9/6/08	2350	98638	9/27/08

Survey Results

			gamma µR		gamma scan µR	
Location #	Location*	Location*	1-cm**	1-m**	Ave	Max
1	R	0	4.3	4.2	3.8	5.2
2	R	0	4.5	4.6		
3	R	0	5.3	5.4		
4	R	0	5.9	5.2		
5	R	I	na	na		
6	R	0	4.2	4.5		
7	R	0	5	5.3		
8	R	I	na	na		
9	R	0	5.5	5.5		
10	R	I	na	na		
11	R	0	4.7	4.5		
12	R	0	4.7	4.9		
13	R	0	4.5	4.1		
14	R	0	4.9	4.4		
15	R	0	4	4.5		
16	R	0	4.3	4.9		
17	R	0	5.1	5.2		
18	R	0	5	5.6		
19	R	0	5.9	5.6		
20	R	0	5.3	5.9		
21	R	0	4.1	4.9		
22	R	0	5	2.3		
23	R	0	4.7	5		
24	R	0	3.9	4.4		
25	R	0	4.3	4.5		
26	R	0	5.3	5		
27	R	0	5.3	4.9		
28	R	0	4.4	4.8		
29	R	0	4.2	4.7		
30	R	0	4.8	4.5		
31	R	0	4.1	4.4		
32	R	0	4.1	4.5		
33	R	0	4.5	4.9		
34	R	0	4.2	4.3		
35	R	I	na	na		
36	R	0	5.2	4.7		

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal
** If na is indicated, no data was obtained for this location


110 Class 3 Roof Fixed Gamma
1-cm
1-m
gamma (µR/hr)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Location


110 Class 3 Roof Gamma Scans
Ave
Max
gamma (µR/hr)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Areas Scanned

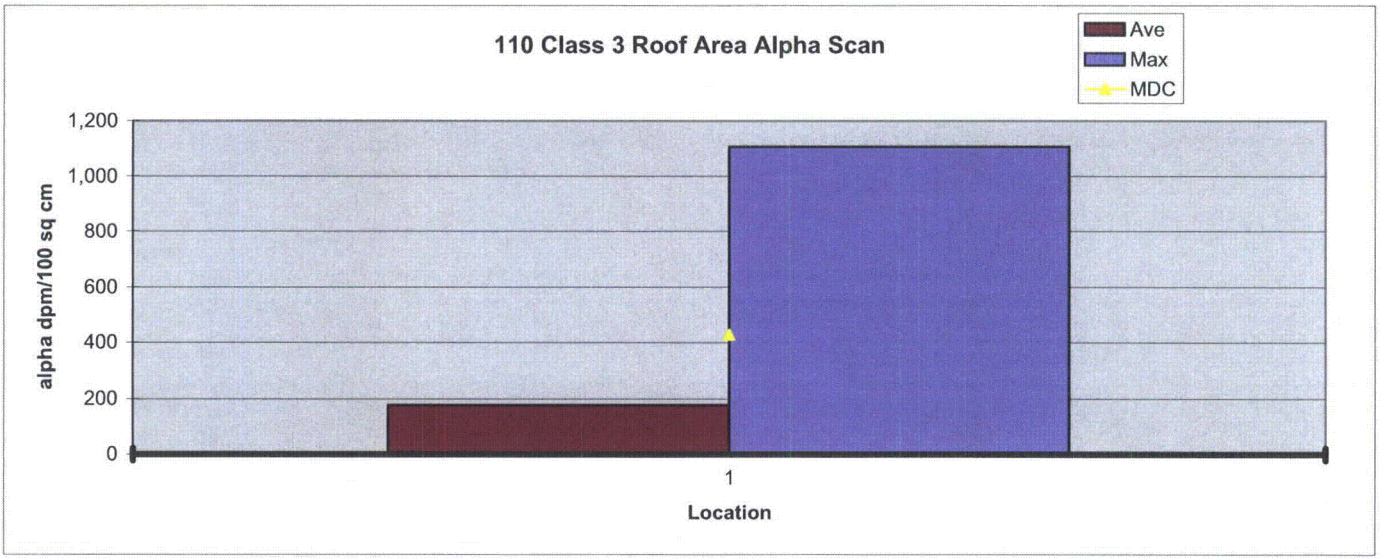
Survey Report

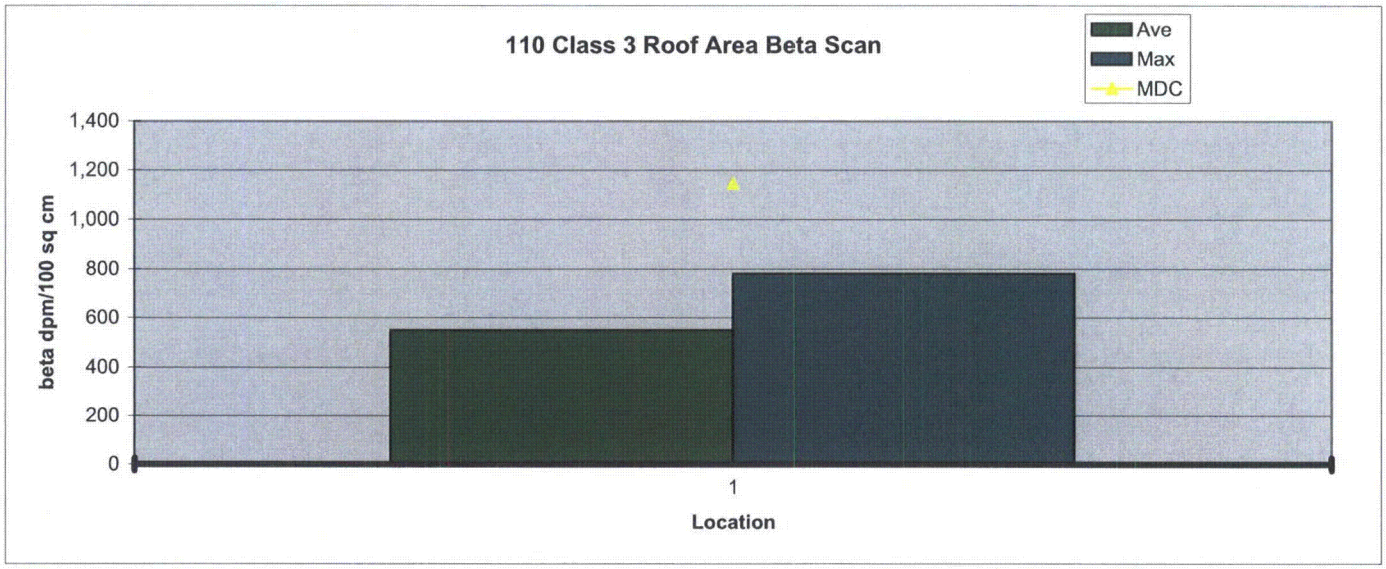
Description: HEMATITE Building 110 Class 3 Roof Alpha & Beta Scans
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Roof alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	3				137					
		BKG	2				163					
		BKG	3				167					
		AVG BKG	**2.7**				**156**				**429**	**1,146**
1	R	SCAN	10	48	178	1106	220	247	549	781	429	1,146

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal





Survey Report

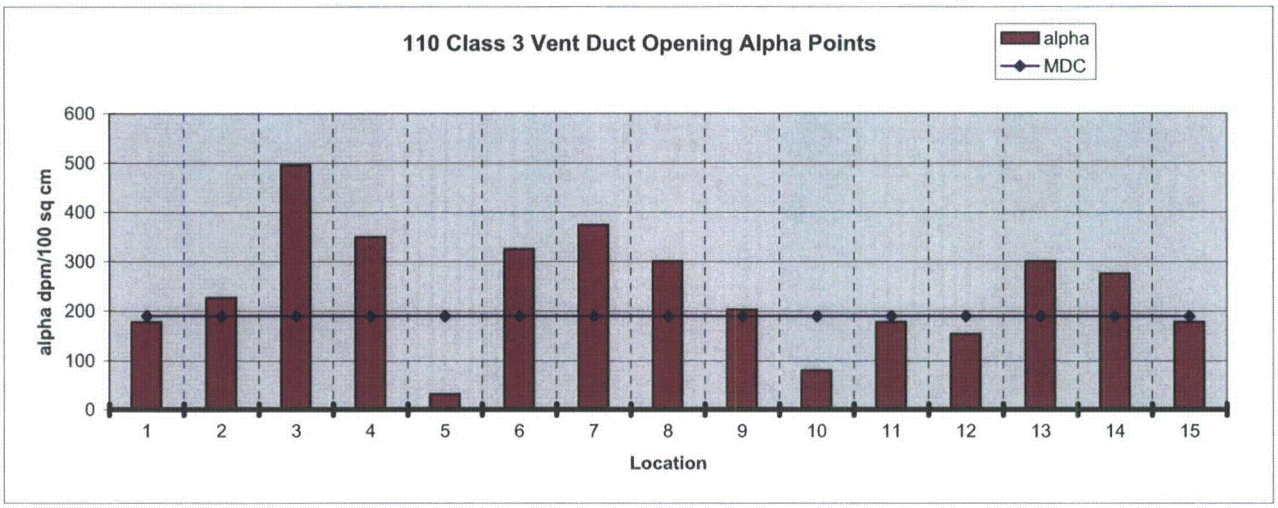
Description: HEMATITE Building 110 Class 3 Vent Duct
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Vent Duct Openings
Instrument Manufacturer: Ludlum

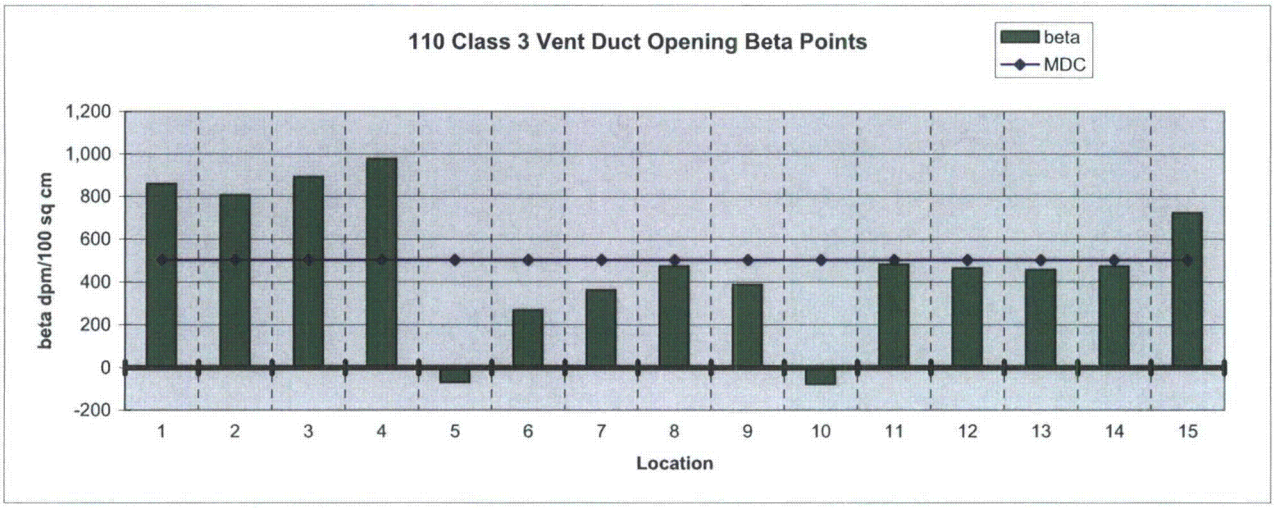
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α (dpm/100cm²)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β (dpm/100cm²)
		BKG	60		3				137		
		BKG	60		2				163		
		BKG	60		3				167		
		AVG BKG			**2.7**				**156**		
1	VD	FLDCT	60	10	2.7	190	178	256	156	502	858
2	VD	FLDCT	60	12	2.7	190	227	250	156	502	807
3	VD	FLDCT	60	23	2.7	190	496	260	156	502	892
4	VD	FLDCT	60	17	2.7	190	349	270	156	502	978
5	VD	FLDCT	60	4	2.7	190	32	148	156	502	-69
6	VD	FLDCT	60	16	2.7	190	325	187	156	502	266
7	VD	FLDCT	60	18	2.7	190	374	198	156	502	360
8	VD	FLDCT	60	15	2.7	190	300	211	156	502	472
9	VD	FLDCT	60	11	2.7	190	203	201	156	502	386
10	VD	FLDCT	60	6	2.7	190	81	147	156	502	-77
11	VD	FLDCT	60	10	2.7	190	178	212	156	502	480
12	VD	FLDCT	60	9	2.7	190	154	210	156	502	463
13	VD	FLDCT	60	15	2.7	190	300	209	156	502	455
14	VD	FLDCT	60	14	2.7	190	276	211	156	502	472
15	VD	FLDCT	60	10	2.7	190	178	240	156	502	721

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Vent Duct Opening Alpha Points
alpha
MDC
alpha dpm/100 sq cm
600
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Location


110 Class 3 Vent Duct Opening Beta Points
beta
MDC
beta dpm/100 sq cm
1,200
1,000
800
600
400
200
0
-200
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Location

Survey Report

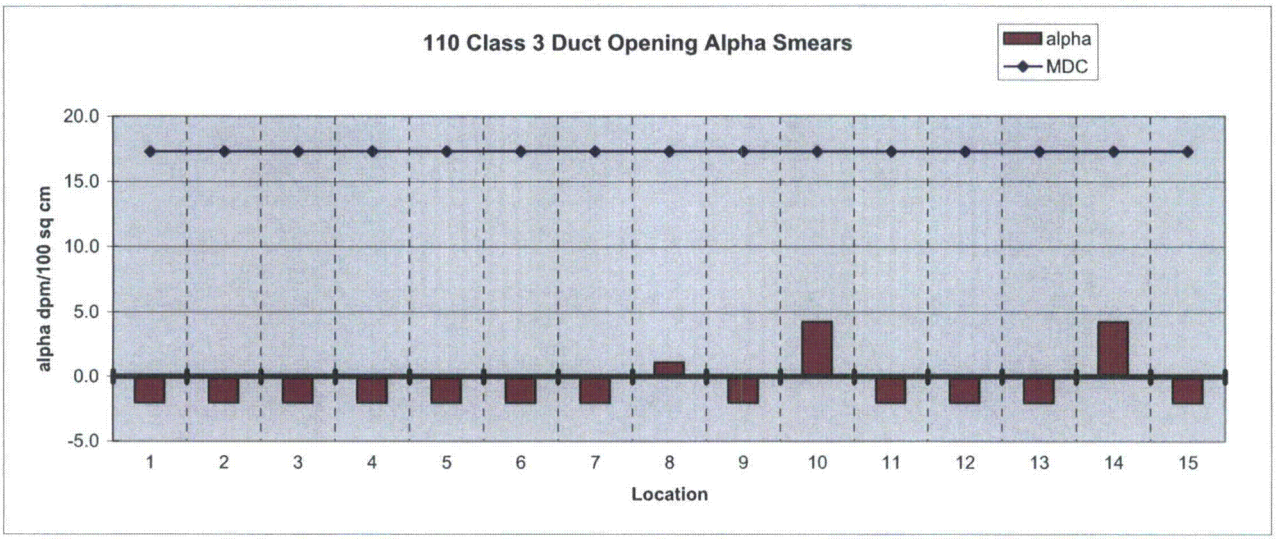
Description: HEMATITE Building 110 Class 3 Duct Opening Smears
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Duct Opening Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/3/2007

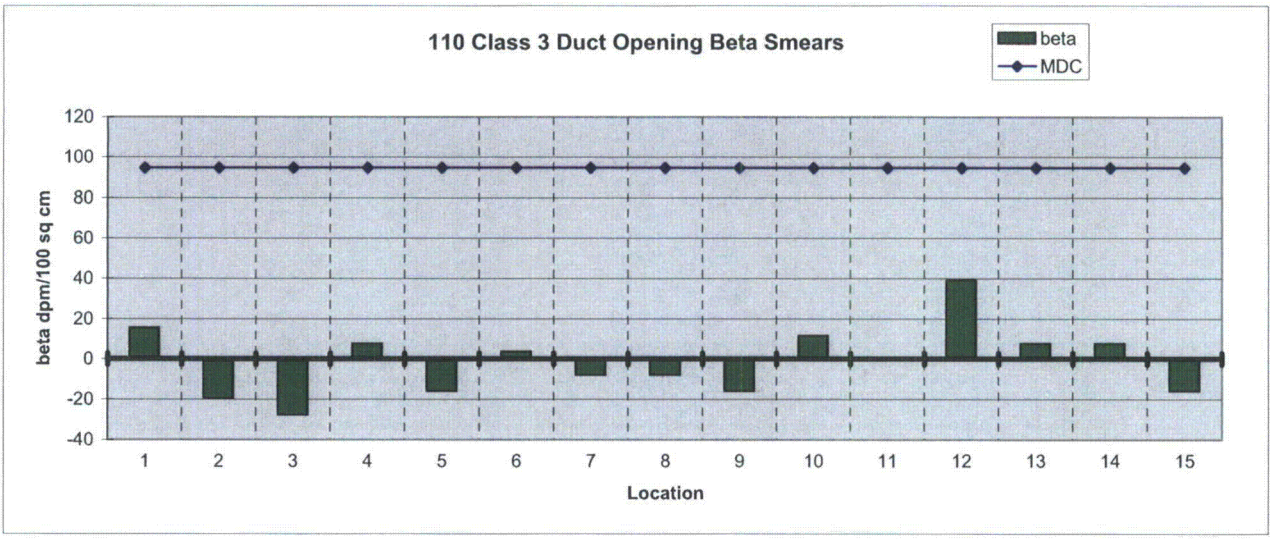
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.65**				**40.1**		
1	VD	SMEAR	60	0	0.65	17.3	-2.0	44	40.05	95	15
2	VD	SMEAR	60	0	0.65	17.3	-2.0	35	40.05	95	-20
3	VD	SMEAR	60	0	0.65	17.3	-2.0	33	40.05	95	-28
4	VD	SMEAR	60	0	0.65	17.3	-2.0	42	40.05	95	8
5	VD	SMEAR	60	0	0.65	17.3	-2.0	36	40.05	95	-16
6	VD	SMEAR	60	0	0.65	17.3	-2.0	41	40.05	95	4
7	VD	SMEAR	60	0	0.65	17.3	-2.0	38	40.05	95	-8
8	VD	SMEAR	60	1	0.65	17.3	1.1	38	40.05	95	-8
9	VD	SMEAR	60	0	0.65	17.3	-2.0	36	40.05	95	-16
10	VD	SMEAR	60	2	0.65	17.3	4.2	43	40.05	95	12
11	VD	SMEAR	60	0	0.65	17.3	-2.0	40	40.05	95	0
12	VD	SMEAR	60	0	0.65	17.3	-2.0	50	40.05	95	39
13	VD	SMEAR	60	0	0.65	17.3	-2.0	42	40.05	95	8
14	VD	SMEAR	60	2	0.65	17.3	4.2	42	40.05	95	8
15	VD	SMEAR	60	0	0.65	17.3	-2.0	36	40.05	95	-16

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Duct Opening Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Location


110 Class 3 Duct Opening Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Location

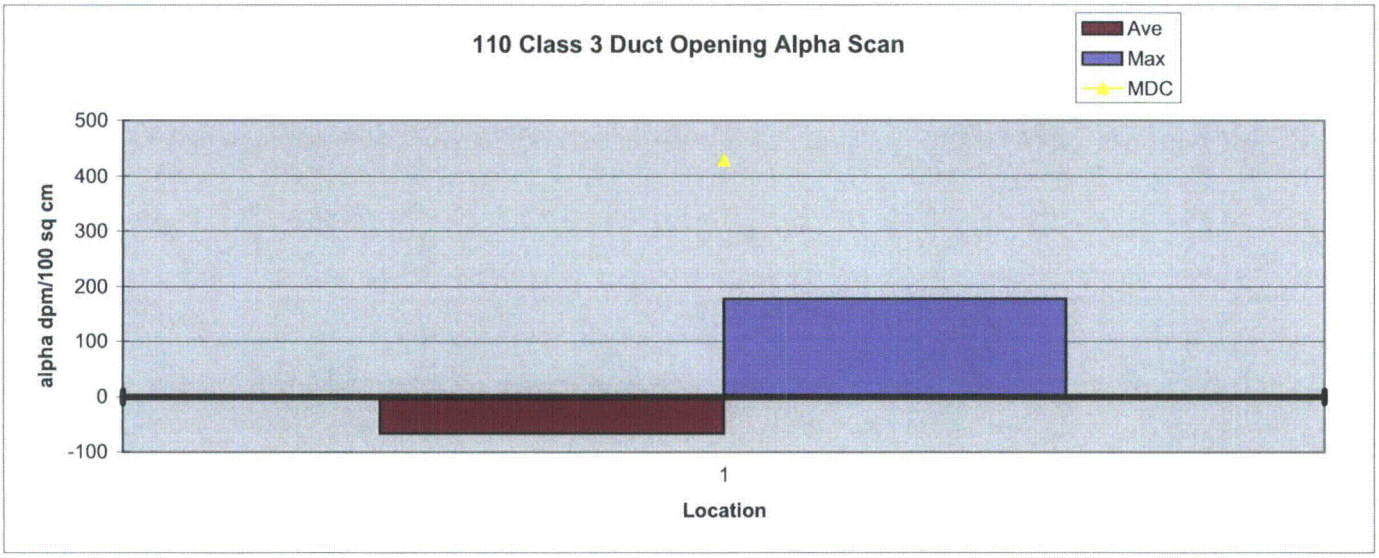
Survey Report

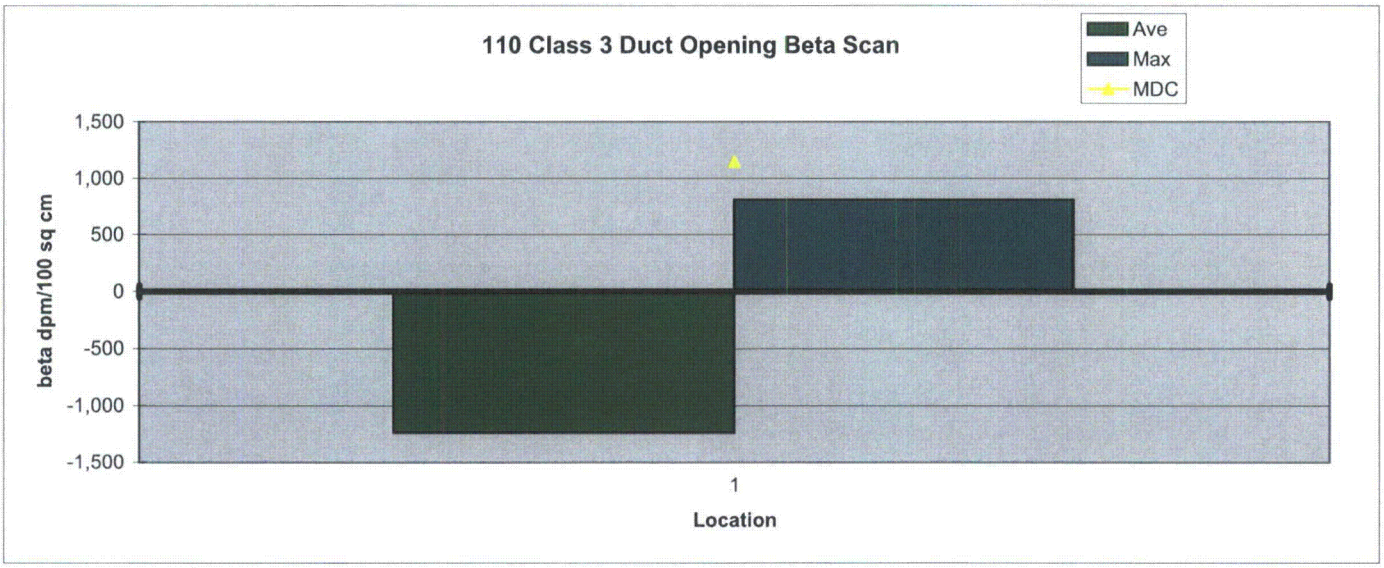
Description: HEMATITE Building 110 Class 3 Duct Opening Alpha & Beta Scans
Survey Date: 11/30/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Duct Opening alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	3				137					
		BKG	2				163					
		BKG	3				167					
		AVG BKG	**2.7**				**156**				**429**	**1,146**
1	VD	SCAN	0	10	-66	178	12	250	####	807	429	1,146

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal





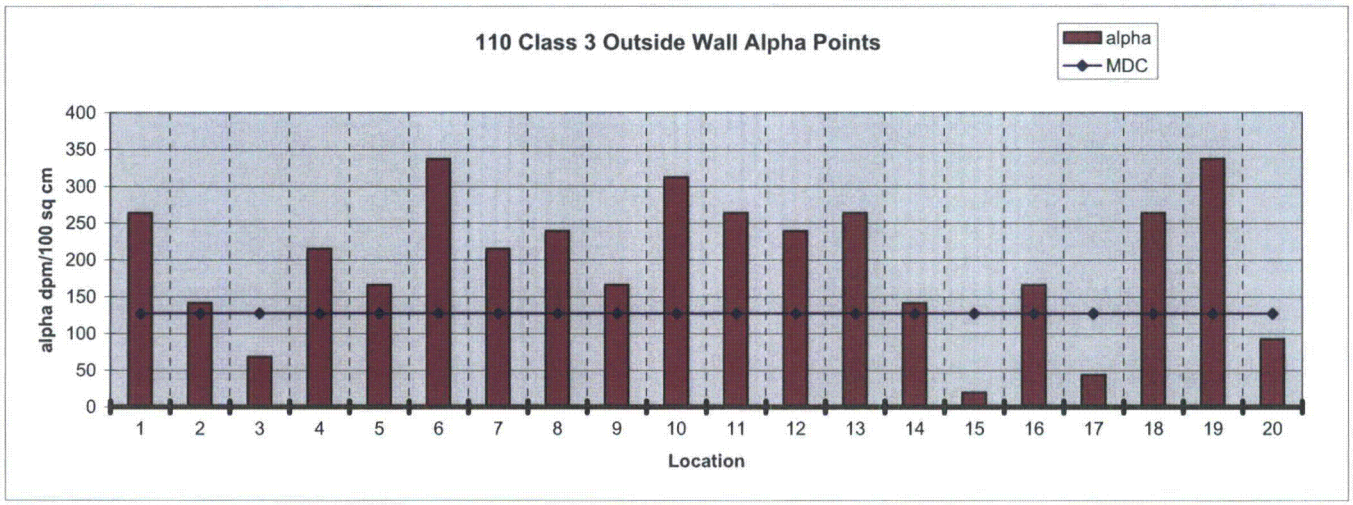
Survey Report

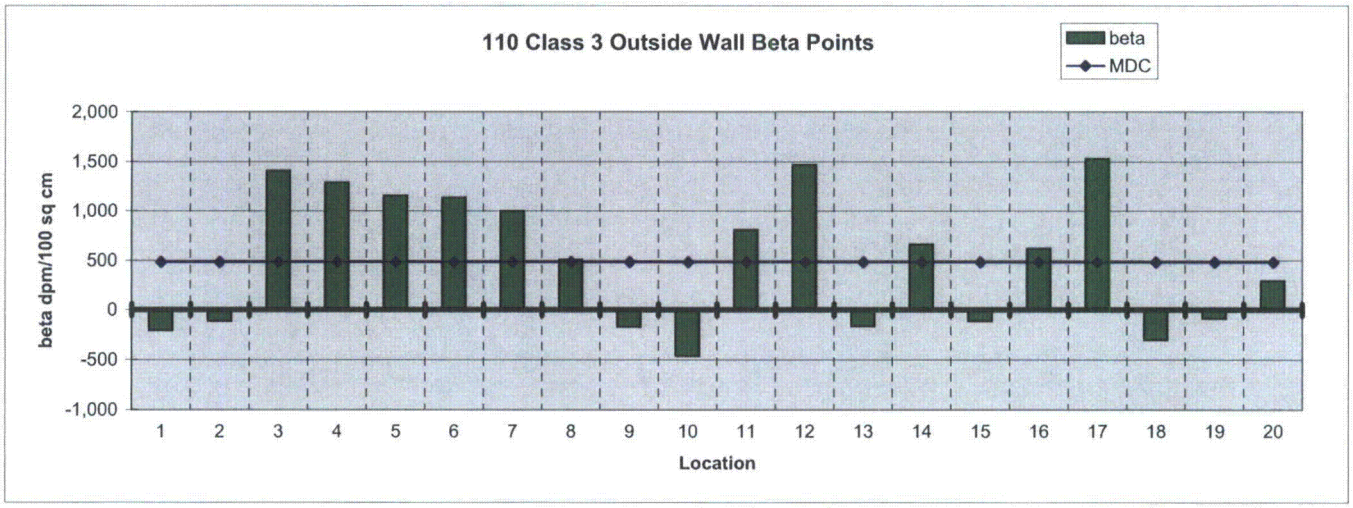
Description: HEMATITE Building 110 Class 3 Outside Walls
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Outside Walls
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results			Direct Readings								
Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α (dpm/100cm²)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β (dpm/100cm²)
		BKG[1]	60		0.3				148		
		BKG[1]	60		2				140		
		AVG BKG			**1.2**				**144**		
1	OW	FLDCT	60	12	1.2	127	264	120	144	482	-206
2	OW	FLDCT	60	7	1.2	127	142	131	144	482	-112
3	OW	FLDCT	60	4	1.2	127	68	308	144	482	1,407
4	OW	FLDCT	60	10	1.2	127	215	294	144	482	1,287
5	OW	FLDCT	60	8	1.2	127	166	278	144	482	1,150
6	OW	FLDCT	60	15	1.2	127	337	276	144	482	1,133
7	OW	FLDCT	60	10	1.2	127	215	260	144	482	995
8	OW	FLDCT	60	11	1.2	127	239	203	144	482	506
9	OW	FLDCT	60	8	1.2	127	166	124	144	482	-172
10	OW	FLDCT	60	14	1.2	127	313	90	144	482	-463
11	OW	FLDCT	60	12	1.2	127	264	238	144	482	807
12	OW	FLDCT	60	11	1.2	127	239	315	144	482	1,467
13	OW	FLDCT	60	12	1.2	127	264	125	144	482	-163
14	OW	FLDCT	60	7	1.2	127	142	221	144	482	661
15	OW	FLDCT	60	2	1.2	127	20	131	144	482	-112
16	OW	FLDCT	60	8	1.2	127	166	216	144	482	618
17	OW	FLDCT	60	3	1.2	127	44	322	144	482	1,527
18	OW	FLDCT	60	12	1.2	127	264	109	144	482	-300
19	OW	FLDCT	60	15	1.2	127	337	134	144	482	-86
20	OW	FLDCT	60	5	1.2	127	93	178	144	482	292

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal
[1] Daily instrument background check data used.


110 Class 3 Outside Wall Alpha Points
alpha
MDC
alpha dpm/100 sq cm
400
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Outside Wall Beta Points
beta
MDC
beta dpm/100 sq cm
2,000
1,500
1,000
500
0
-500
-1,000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

Survey Report

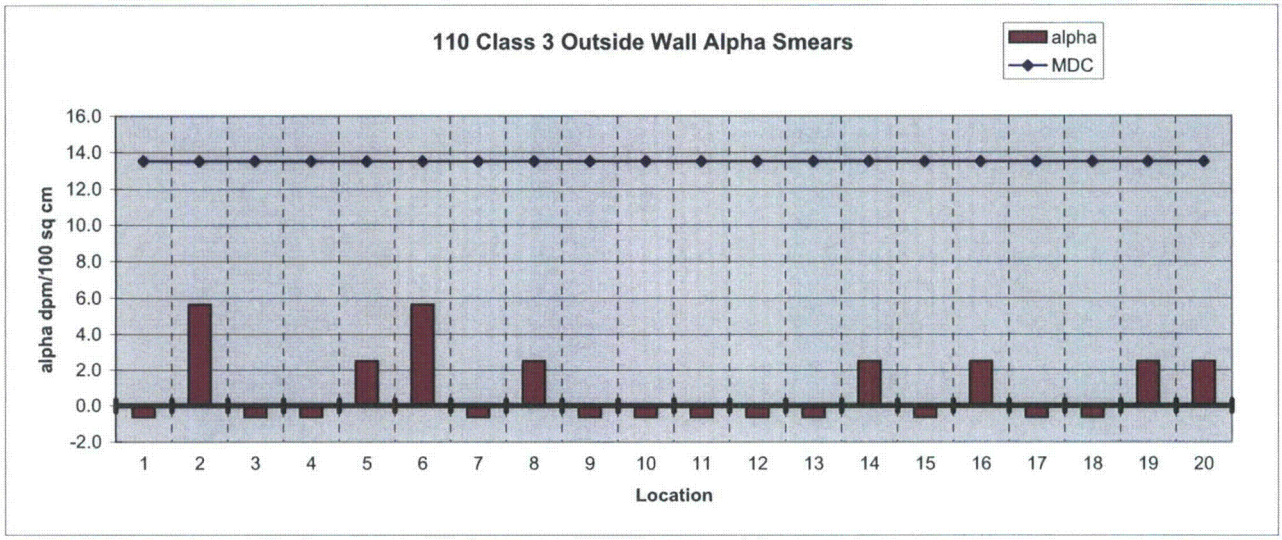
Description: HEMATITE Building 110 Class 3 Outside Wall Smears
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Outside Wall Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/1/2007

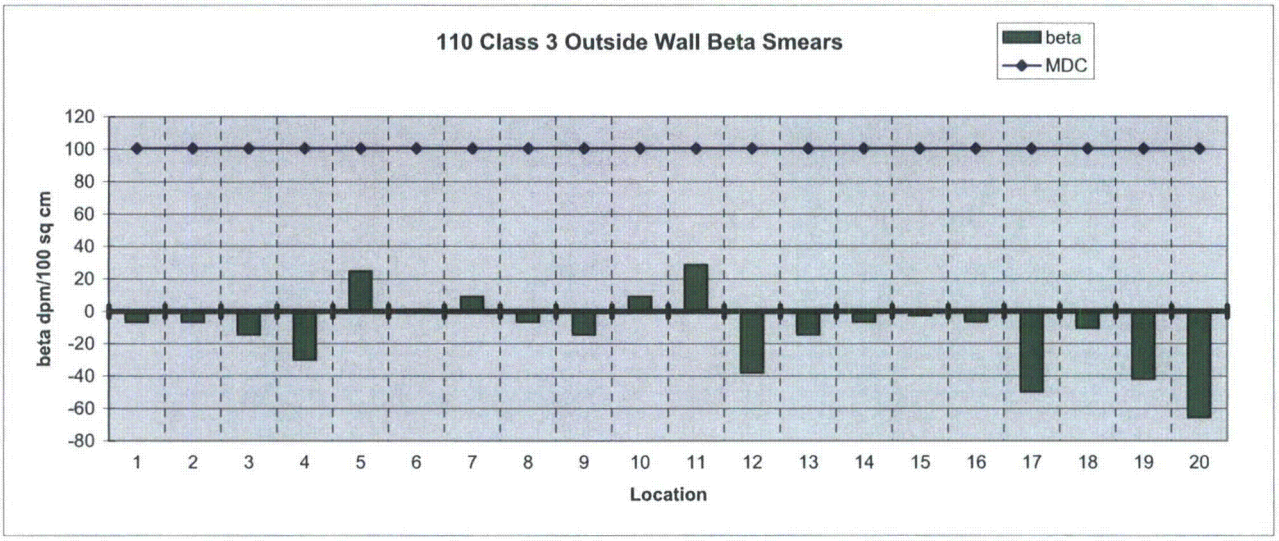
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.20**				**45.7**		
1	OW	SMEAR	60	0	0.2	13.5	-0.6	44	45.7	100	-7
2	OW	SMEAR	60	2	0.2	13.5	5.6	44	45.7	100	-7
3	OW	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
4	OW	SMEAR	60	0	0.2	13.5	-0.6	38	45.7	100	-30
5	OW	SMEAR	60	1	0.2	13.5	2.5	52	45.7	100	25
6	OW	SMEAR	60	2	0.2	13.5	5.6	46	45.7	100	1
7	OW	SMEAR	60	0	0.2	13.5	-0.6	48	45.7	100	9
8	OW	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
9	OW	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
10	OW	SMEAR	60	0	0.2	13.5	-0.6	48	45.7	100	9
11	OW	SMEAR	60	0	0.2	13.5	-0.6	53	45.7	100	29
12	OW	SMEAR	60	0	0.2	13.5	-0.6	36	45.7	100	-38
13	OW	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
14	OW	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
15	OW	SMEAR	60	0	0.2	13.5	-0.6	45	45.7	100	-3
16	OW	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
17	OW	SMEAR	60	0	0.2	13.5	-0.6	33	45.7	100	-50
18	OW	SMEAR	60	0	0.2	13.5	-0.6	43	45.7	100	-11
19	OW	SMEAR	60	1	0.2	13.5	2.5	35	45.7	100	-42
20	OW	SMEAR	60	1	0.2	13.5	2.5	29	45.7	100	-65

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Outside Wall Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Outside Wall Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
-80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

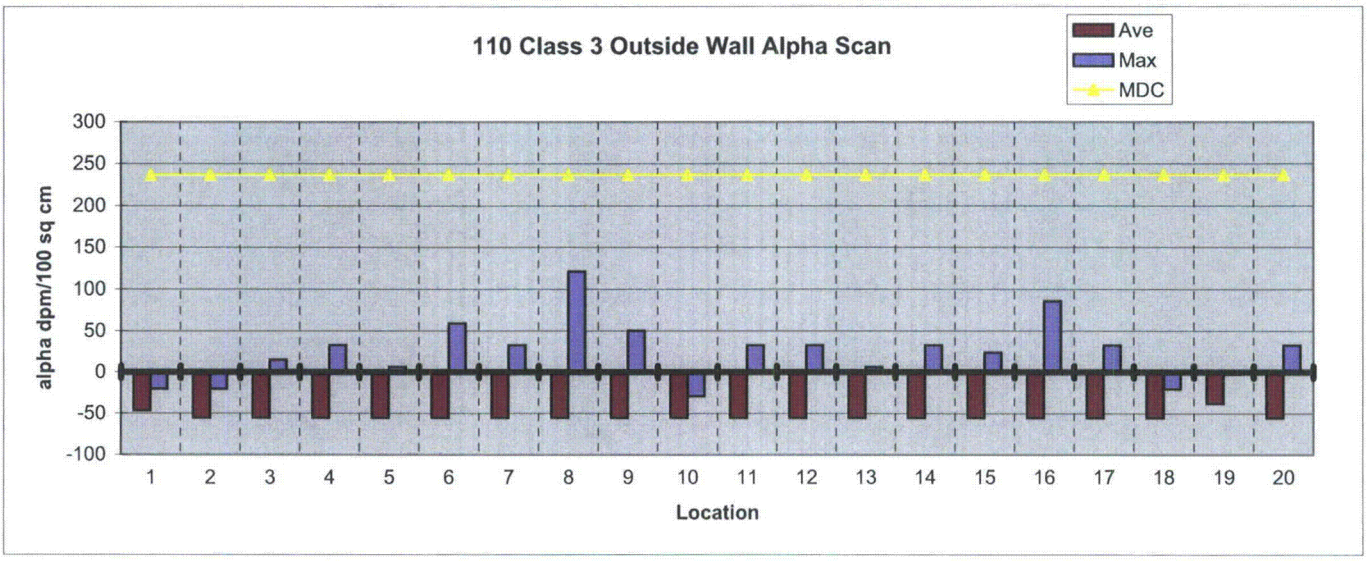
Survey Report

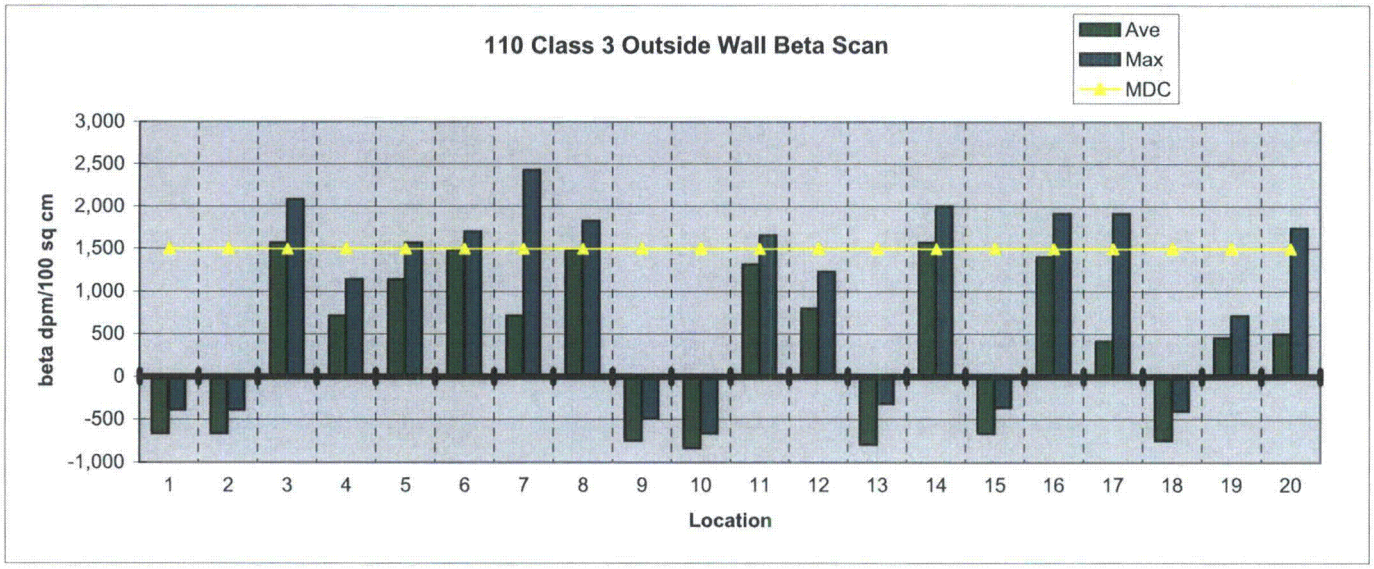
Description: HEMATITE Building 110 Class 3 Outside Wall Alpha & Beta Scans
Survey Date: 12/3/2007 **Survey Package: C-0110**
Technician Name: P. Ely / V. Baldwin
Comments: Outside Wall alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	095522	126	11/15/08	2350	126172	9/27/08	α	9.0%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	10				288					
		BKG	6				268					
		BKG	3				245					
		AVG BKG	**6.3**				**267**				**237**	**1,499**
1	OW	SCAN	1	4	-47	-20	190	222	-661	-386	237	1,499
2	OW	SCAN	0	4	-56	-20	190	222	-661	-386	237	1,499
3	OW	SCAN	0	8	-56	15	450	510	1,570	2,085	237	1,499
4	OW	SCAN	0	10	-56	33	350	400	712	1,141	237	1,499
5	OW	SCAN	0	7	-56	6	400	450	1,141	1,570	237	1,499
6	OW	SCAN	0	13	-56	59	440	465	1,484	1,699	237	1,499
7	OW	SCAN	0	10	-56	33	350	550	712	2,428	237	1,499
8	OW	SCAN	0	20	-56	121	440	480	1,484	1,828	237	1,499
9	OW	SCAN	0	12	-56	50	180	210	-746	-489	237	1,499
10	OW	SCAN	0	3	-56	-29	170	190	-832	-661	237	1,499
11	OW	SCAN	0	10	-56	33	420	460	1,313	1,656	237	1,499
12	OW	SCAN	0	10	-56	33	360	410	798	1,227	237	1,499
13	OW	SCAN	0	7	-56	6	175	230	-789	-317	237	1,499
14	OW	SCAN	0	10	-56	33	450	500	1,570	1,999	237	1,499
15	OW	SCAN	0	9	-56	24	190	225	-661	-360	237	1,499
16	OW	SCAN	0	16	-56	86	430	490	1,399	1,913	237	1,499
17	OW	SCAN	0	10	-56	33	315	490	412	1,913	237	1,499
18	OW	SCAN	0	4	-56	-20	180	220	-746	-403	237	1,499
19	OW	SCAN	2	6	-38	-3	320	350	455	712	237	1,499
20	OW	SCAN	0	10	-56	33	325	470	498	1,742	237	1,499

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Outside Wall Alpha Scan
Ave
Max
MDC
alpha dpm/100 sq cm
300
250
200
150
100
50
0
-50
-100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Outside Wall Beta Scan
Ave
Max
MDC
beta dpm/100 sq cm
3,000
2,500
2,000
1,500
1,000
500
0
-500
-1,000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

Survey Report

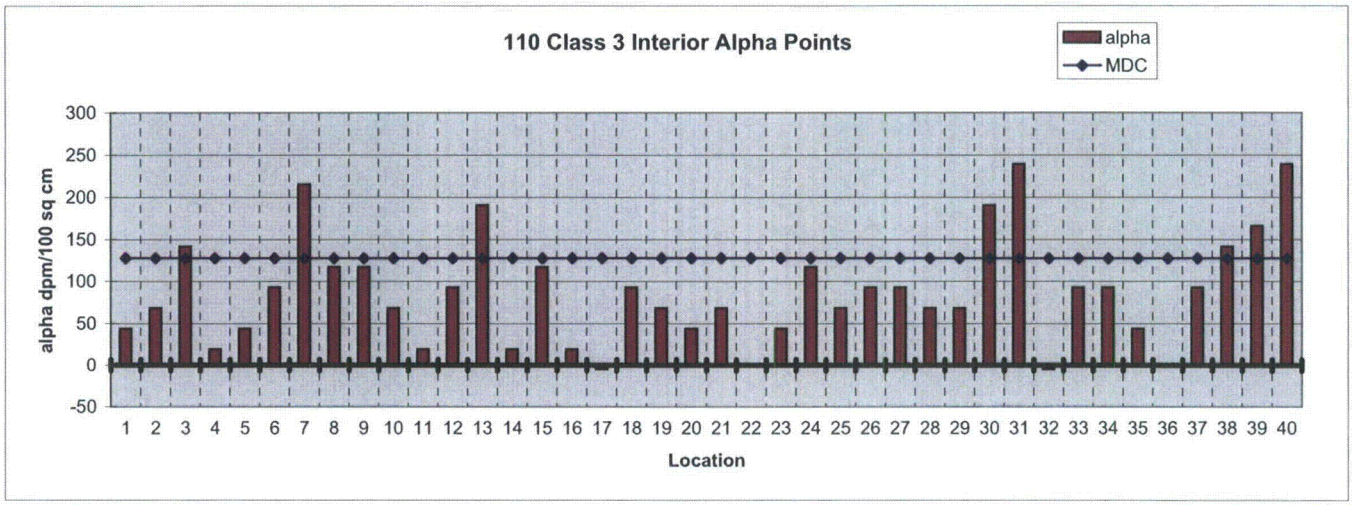
Description: HEMATITE Building 110 Class 3 Interior
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Interior
Instrument Manufacturer: Ludlum

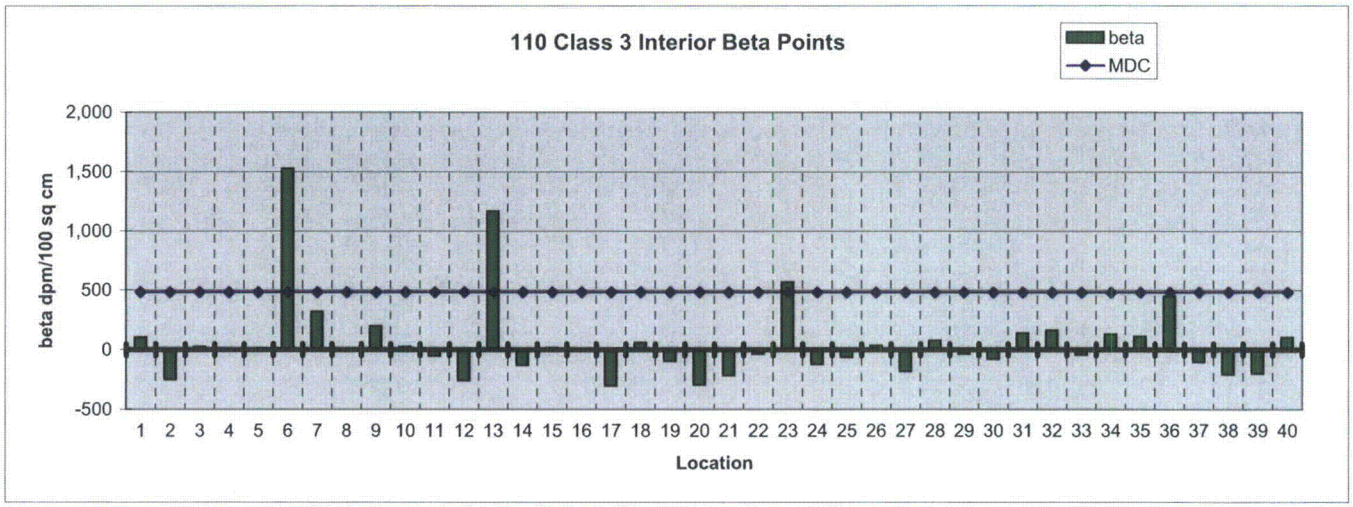
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α** (counts)	α BKG (cpm)	α MDC (dpm)	Net α (dpm/100cm²)	Gross β** (counts)	β BKG (cpm)	β MDC (dpm)	Net β (dpm/100cm²)
		BKG[1]	60		0.3				148		
		BKG[1]	60		2				140		
		AVG BKG			**1.2**				**144**		
1	INT	FLDCT	60	3	1.2	127	44	156	144	482	103
2	INT	FLDCT	60	4	1.2	127	68	115	144	482	-249
3	INT	FLDCT	60	7	1.2	127	142	147	144	482	26
4	INT	FLDCT	60	2	1.2	127	20	145	144	482	9
5	INT	FLDCT	60	3	1.2	127	44	143	144	482	-9
6	INT	FLDCT	60	5	1.2	127	93	322	144	482	1,527
7	INT	FLDCT	60	10	1.2	127	215	181	144	482	317
8	INT	FLDCT	60	6	1.2	127	117	143	144	482	-9
9	INT	FLDCT	60	6	1.2	127	117	167	144	482	197
10	INT	FLDCT	60	4	1.2	127	68	147	144	482	26
11	INT	FLDCT	60	2	1.2	127	20	138	144	482	-51
12	INT	FLDCT	60	5	1.2	127	93	114	144	482	-257
13	INT	FLDCT	60	9	1.2	127	190	280	144	482	1,167
14	INT	FLDCT	60	2	1.2	127	20	129	144	482	-129
15	INT	FLDCT	60	6	1.2	127	117	146	144	482	17
16	INT	FLDCT	60	2	1.2	127	20	143	144	482	-9
17	INT	FLDCT	60	1	1.2	127	-5	109	144	482	-300
18	INT	FLDCT	60	5	1.2	127	93	151	144	482	60
19	INT	FLDCT	60	4	1.2	127	68	133	144	482	-94
20	INT	FLDCT	60	3	1.2	127	44	110	144	482	-292
21	INT	FLDCT	60	4	1.2	127	68	119	144	482	-215
22	INT	FLDCT	60	na	1.2	127	--	140	144	482	-34
23	INT	FLDCT	60	3	1.2	127	44	210	144	482	566
24	INT	FLDCT	60	6	1.2	127	117	130	144	482	-120
25	INT	FLDCT	60	4	1.2	127	68	137	144	482	-60
26	INT	FLDCT	60	5	1.2	127	93	148	144	482	34
27	INT	FLDCT	60	5	1.2	127	93	123	144	482	-180
28	INT	FLDCT	60	4	1.2	127	68	153	144	482	77
29	INT	FLDCT	60	4	1.2	127	68	140	144	482	-34
30	INT	FLDCT	60	9	1.2	127	190	135	144	482	-77
31	INT	FLDCT	60	11	1.2	127	239	160	144	482	137
32	INT	FLDCT	60	1	1.2	127	-5	163	144	482	163
33	INT	FLDCT	60	5	1.2	127	93	139	144	482	-43
34	INT	FLDCT	60	5	1.2	127	93	159	144	482	129
35	INT	FLDCT	60	3	1.2	127	44	157	144	482	112
36	INT	FLDCT	60	na	1.2	127	--	196	144	482	446
37	INT	FLDCT	60	5	1.2	127	93	132	144	482	-103
38	INT	FLDCT	60	7	1.2	127	142	120	144	482	-206
39	INT	FLDCT	60	8	1.2	127	166	121	144	482	-197
40	INT	FLDCT	60	11	1.2	127	239	156	144	482	103

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal
** If na is indicated, no data was obtained for this location
[1] Daily instrument background check data used.


110 Class 3 Interior Alpha Points
alpha
MDC
alpha dpm/100 sq cm
300
250
200
150
100
50
0
-50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location


110 Class 3 Interior Beta Points
beta
MDC
beta dpm/100 sq cm
2,000
1,500
1,000
500
0
-500
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location

Survey Report

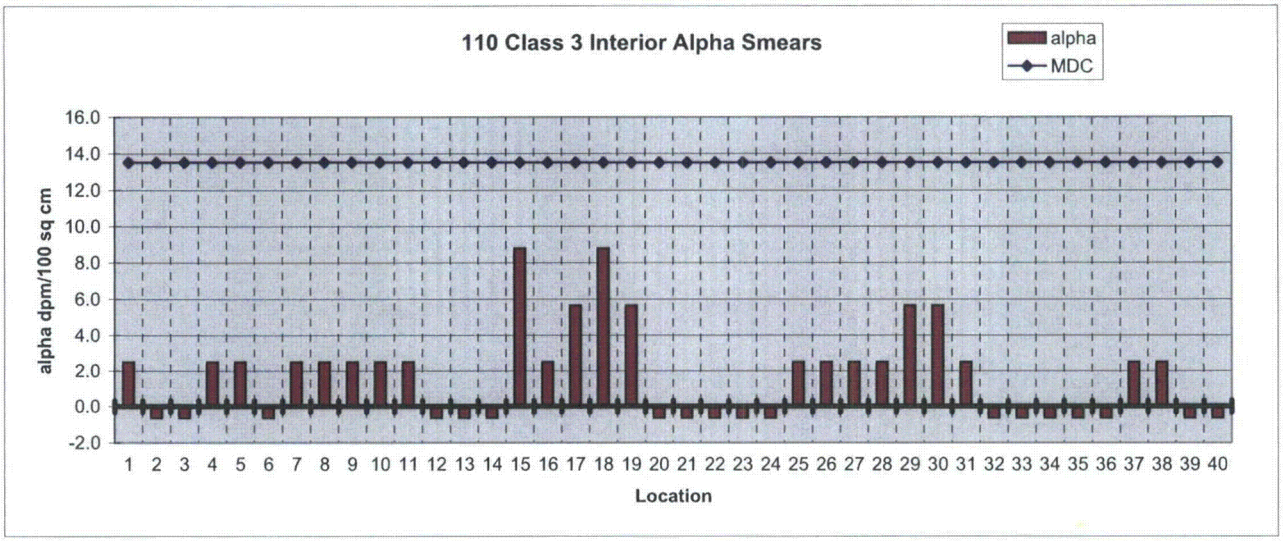
Description: HEMATITE Building 110 Class 3 Interior Smears
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Interior Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/1/2007

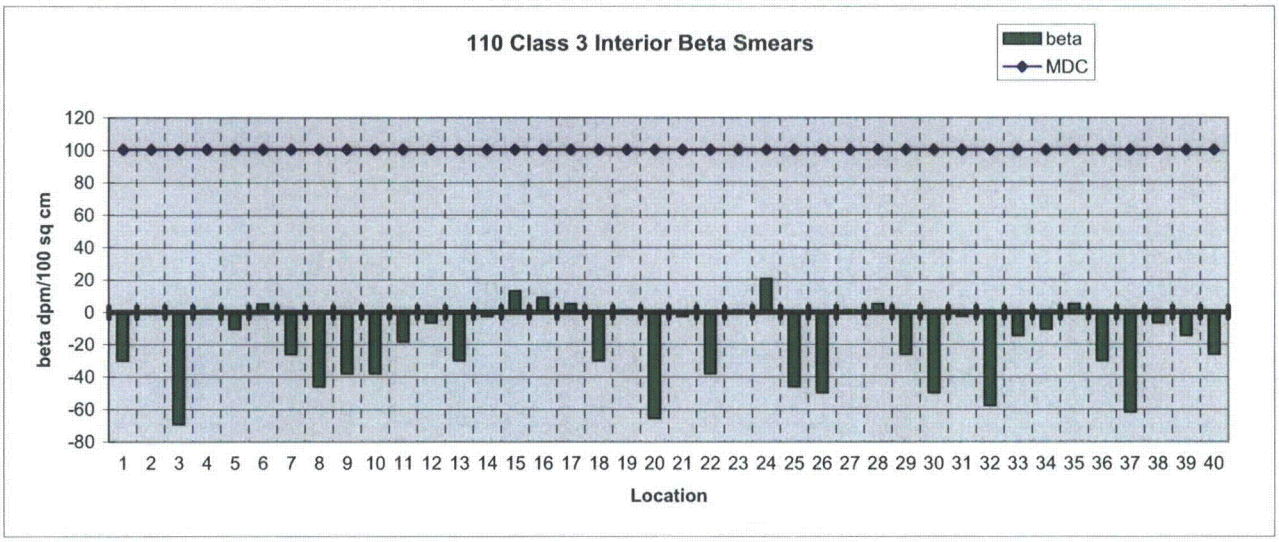
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.20**				**45.7**		
1	INT	SMEAR	60	1	0.2	13.5	2.5	38	45.7	100	-30
2	INT	SMEAR	60	0	0.2	13.5	-0.6	46	45.7	100	1
3	INT	SMEAR	60	0	0.2	13.5	-0.6	28	45.7	100	-69
4	INT	SMEAR	60	1	0.2	13.5	2.5	46	45.7	100	1
5	INT	SMEAR	60	1	0.2	13.5	2.5	43	45.7	100	-11
6	INT	SMEAR	60	0	0.2	13.5	-0.6	47	45.7	100	5
7	INT	SMEAR	60	1	0.2	13.5	2.5	39	45.7	100	-26
8	INT	SMEAR	60	1	0.2	13.5	2.5	34	45.7	100	-46
9	INT	SMEAR	60	1	0.2	13.5	2.5	36	45.7	100	-38
10	INT	SMEAR	60	1	0.2	13.5	2.5	36	45.7	100	-38
11	INT	SMEAR	60	1	0.2	13.5	2.5	41	45.7	100	-18
12	INT	SMEAR	60	0	0.2	13.5	-0.6	44	45.7	100	-7
13	INT	SMEAR	60	0	0.2	13.5	-0.6	38	45.7	100	-30
14	INT	SMEAR	60	0	0.2	13.5	-0.6	45	45.7	100	-3
15	INT	SMEAR	60	3	0.2	13.5	8.8	49	45.7	100	13
16	INT	SMEAR	60	1	0.2	13.5	2.5	48	45.7	100	9
17	INT	SMEAR	60	2	0.2	13.5	5.6	47	45.7	100	5
18	INT	SMEAR	60	3	0.2	13.5	8.8	38	45.7	100	-30
19	INT	SMEAR	60	2	0.2	13.5	5.6	46	45.7	100	1
20	INT	SMEAR	60	0	0.2	13.5	-0.6	29	45.7	100	-65
21	INT	SMEAR	60	0	0.2	13.5	-0.6	45	45.7	100	-3
22	INT	SMEAR	60	0	0.2	13.5	-0.6	36	45.7	100	-38
23	INT	SMEAR	60	0	0.2	13.5	-0.6	46	45.7	100	1
24	INT	SMEAR	60	0	0.2	13.5	-0.6	51	45.7	100	21
25	INT	SMEAR	60	1	0.2	13.5	2.5	34	45.7	100	-46
26	INT	SMEAR	60	1	0.2	13.5	2.5	33	45.7	100	-50
27	INT	SMEAR	60	1	0.2	13.5	2.5	46	45.7	100	1
28	INT	SMEAR	60	1	0.2	13.5	2.5	47	45.7	100	5
29	INT	SMEAR	60	2	0.2	13.5	5.6	39	45.7	100	-26
30	INT	SMEAR	60	2	0.2	13.5	5.6	33	45.7	100	-50
31	INT	SMEAR	60	1	0.2	13.5	2.5	45	45.7	100	-3
32	INT	SMEAR	60	0	0.2	13.5	-0.6	31	45.7	100	-58
33	INT	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
34	INT	SMEAR	60	0	0.2	13.5	-0.6	43	45.7	100	-11
35	INT	SMEAR	60	0	0.2	13.5	-0.6	47	45.7	100	5
36	INT	SMEAR	60	0	0.2	13.5	-0.6	38	45.7	100	-30
37	INT	SMEAR	60	1	0.2	13.5	2.5	30	45.7	100	-62
38	INT	SMEAR	60	1	0.2	13.5	2.5	44	45.7	100	-7
39	INT	SMEAR	60	0	0.2	13.5	-0.6	42	45.7	100	-15
40	INT	SMEAR	60	0	0.2	13.5	-0.6	39	45.7	100	-26

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Interior Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location


110 Class 3 Interior Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
-80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location

Survey Report

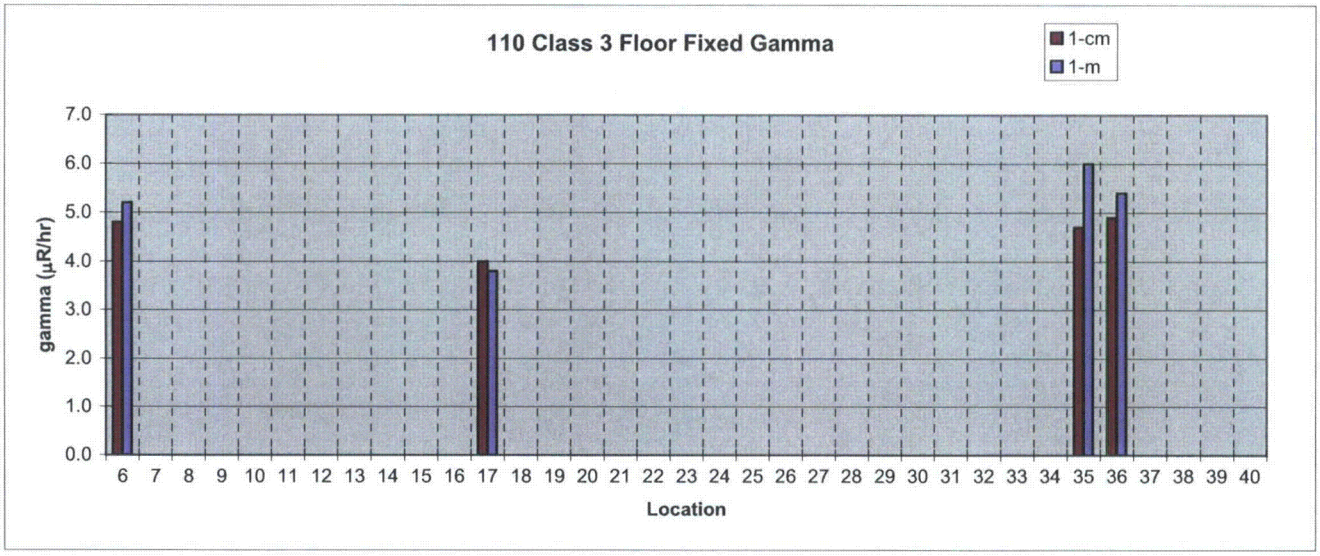
Description: HEMATITE Building 110 Class 3 Interior Floor Gamma Surveys
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase
Comments: Interior Floor Gamma Results
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
44-10	12269	9/6/08	2350	98638	9/27/08

Survey Results

			gamma µR	
Location #	**Location***	**Location***	**1-cm**	**1-m**
6	INT	F	4.8	5.2
7	INT	W		
8	INT	W		
9	INT	W		
10	INT	W		
11	INT	W		
12	INT	W		
13	INT	0		
14	INT	W		
15	INT	W		
16	INT	W		
17	INT	F	4	3.8
18	INT	W		
19	INT	W		
20	INT	W		
21	INT	W		
22	INT	W		
23	INT	C		
24	INT	W		
25	INT	W		
26	INT	W		
27	INT	W		
28	INT	W		
29	INT	W		
30	INT	W		
31	INT	W		
32	INT	W		
33	INT	W		
34	INT	W		
35	INT	F	4.7	6
36	INT	F	4.9	5.4
37	INT	W		
38	INT	W		
39	INT	W		
40	INT	W		

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal



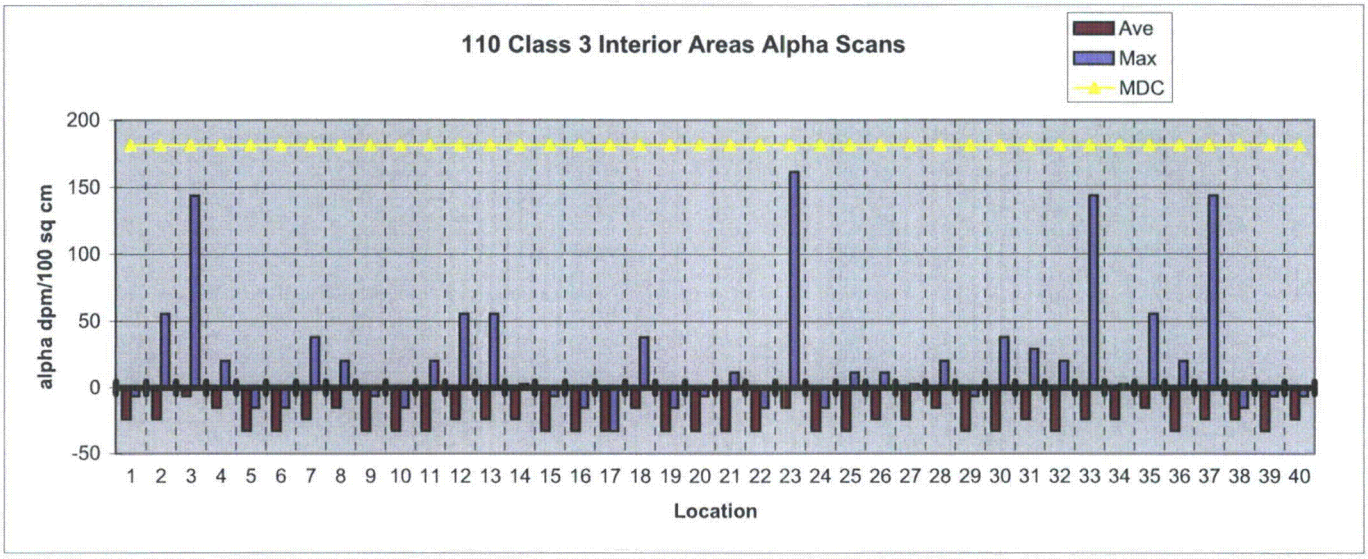
Survey Report

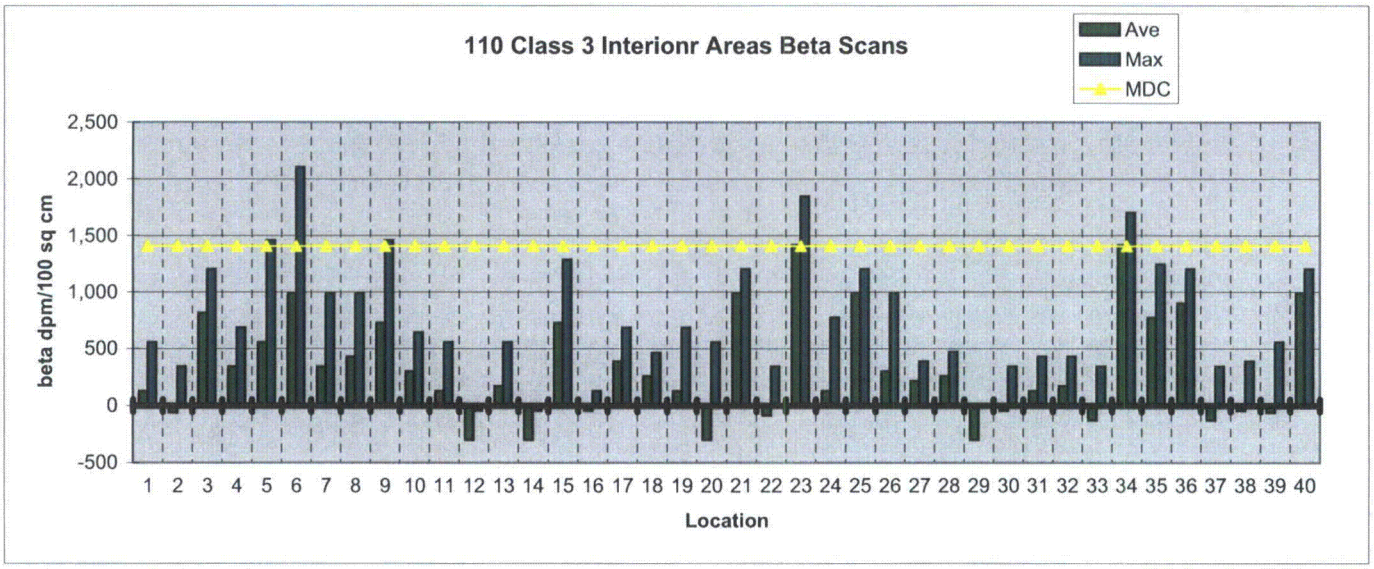
Description: HEMATITE Building 110 Class 3 Interior Alpha & Beta Scans
Survey Date: 12/4/2007 **Survey Package: C-0110**
Technician Name: D. Schumaker / V. Baldwin
Comments: Interior alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	095522	126	9/11/08	2350	126172	9/27/08	α	9.0%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	3				220					
		BKG	6				204					
		BKG	2				282					
		AVG BKG	**3.7**				**235**				**181**	**1,406**
1	INT	SCAN	1	3	-24	-6	250	300	129	558	181	1,406
2	INT	SCAN	1	10	-24	56	228	275	-60	343	181	1,406
3	INT	SCAN	3	20	-6	144	330	375	815	1,201	181	1,406
4	INT	SCAN	2	6	-15	20	275	315	343	686	181	1,406
5	INT	SCAN	0	2	-33	-15	300	405	558	1,459	181	1,406
6	INT	SCAN	0	2	-33	-15	350	480	987	2,102	181	1,406
7	INT	SCAN	1	8	-24	38	275	350	343	987	181	1,406
8	INT	SCAN	2	6	-15	20	285	350	429	987	181	1,406
9	INT	SCAN	0	3	-33	-6	320	405	729	1,459	181	1,406
10	INT	SCAN	0	2	-33	-15	270	310	300	644	181	1,406
11	INT	SCAN	0	6	-33	20	250	300	129	558	181	1,406
12	INT	SCAN	1	10	-24	56	200	230	-300	-43	181	1,406
13	INT	SCAN	1	10	-24	56	255	300	172	558	181	1,406
14	INT	SCAN	1	4	-24	3	200	230	-300	-43	181	1,406
15	INT	SCAN	0	3	-33	-6	320	385	729	1,287	181	1,406
16	INT	SCAN	0	2	-33	-15	230	250	-43	129	181	1,406
17	INT	SCAN	0	0	-33	-33	280	315	386	686	181	1,406
18	INT	SCAN	2	8	-15	38	265	289	257	463	181	1,406
19	INT	SCAN	0	2	-33	-15	250	315	129	686	181	1,406
20	INT	SCAN	0	3	-33	-6	200	300	-300	558	181	1,406
21	INT	SCAN	0	5	-33	11	350	375	987	1,201	181	1,406
22	INT	SCAN	0	2	-33	-15	225	275	-86	343	181	1,406
23	INT	SCAN	2	22	-15	161	400	450	1,416	1,845	181	1,406
24	INT	SCAN	0	2	-33	-15	250	325	129	772	181	1,406
25	INT	SCAN	0	5	-33	11	350	375	987	1,201	181	1,406
26	INT	SCAN	1	5	-24	11	270	350	300	987	181	1,406
27	INT	SCAN	1	4	-24	3	260	280	215	386	181	1,406
28	INT	SCAN	2	6	-15	20	265	290	257	472	181	1,406
29	INT	SCAN	0	3	-33	-6	200	235	-300	0	181	1,406
30	INT	SCAN	0	8	-33	38	230	275	-43	343	181	1,406
31	INT	SCAN	1	7	-24	29	250	285	129	429	181	1,406
32	INT	SCAN	0	6	-33	20	255	285	172	429	181	1,406
33	INT	SCAN	1	20	-24	144	220	275	-129	343	181	1,406
34	INT	SCAN	1	4	-24	3	400	433	1,416	1,699	181	1,406
35	INT	SCAN	2	10	-15	56	325	380	772	1,244	181	1,406
36	INT	SCAN	0	6	-33	20	340	375	901	1,201	181	1,406
37	INT	SCAN	1	20	-24	144	220	275	-129	343	181	1,406
38	INT	SCAN	1	2	-24	-15	230	280	-43	386	181	1,406
39	INT	SCAN	0	3	-33	-6	228	300	-60	558	181	1,406
40	INT	SCAN	1	3	-24	-6	350	375	987	1,201	181	1,406

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Interior Areas Alpha Scans
Ave
Max
MDC
alpha dpm/100 sq cm
200
150
100
50
0
-50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location


110 Class 3 Interionr Areas Beta Scans
Ave
Max
MDC
beta dpm/100 sq cm
2,500
2,000
1,500
1,000
500
0
-500
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Location

Survey Report

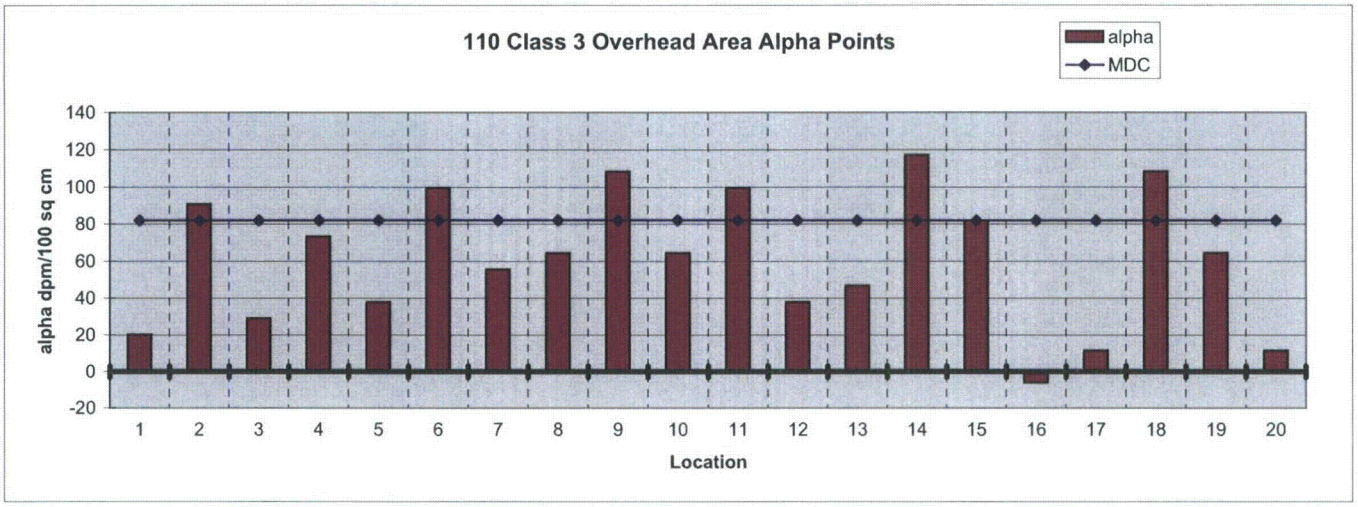
Description: HEMATITE Building 110 Class 3 Overhead Areas
Survey Date: 12/4/2007 **Survey Package: C-0110**
Technician Name: D. Schumaker / V. Baldwin
Comments: Class 3 Overhead Areas
Instrument Manufacturer: Ludlum

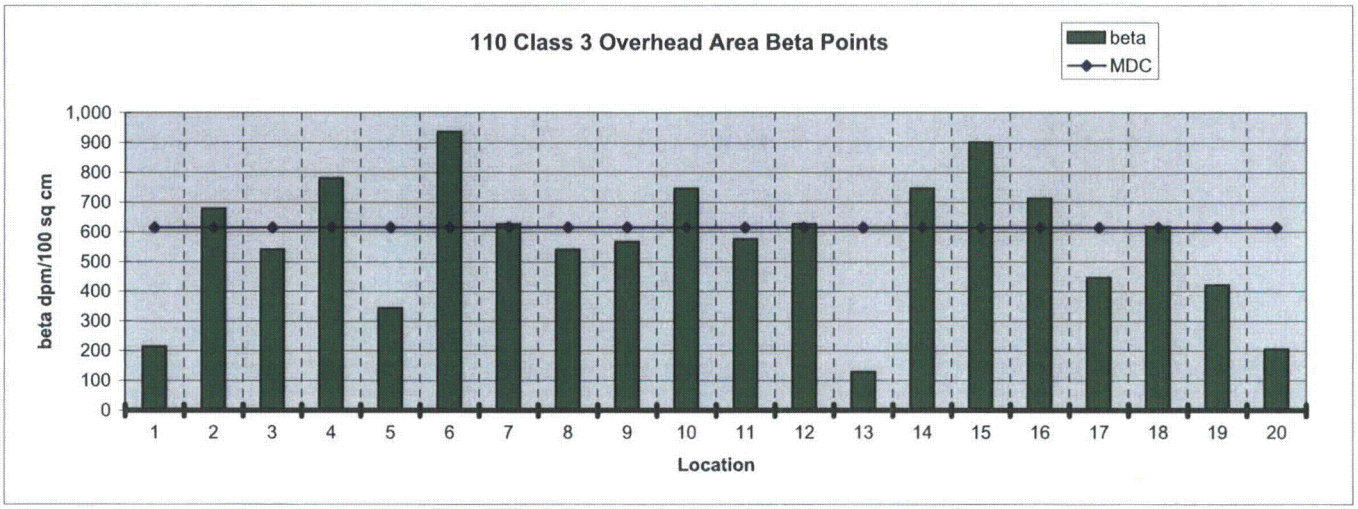
Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	095522	126	11/15/08	2350	126172	9/27/08	α	9.0%
							β/γ	9.3%

Survey Results Direct Readings

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
		BKG	60		3				220		
		BKG	60		6				204		
		BKG	60		2				282		
		AVG BKG			**3.7**				**235**		
1	OVHD	FLDCT	60	6	3.7	82	20	260	235	615	215
2	OVHD	FLDCT	60	14	3.7	82	91	314	235	615	678
3	OVHD	FLDCT	60	7	3.7	82	29	298	235	615	541
4	OVHD	FLDCT	60	12	3.7	82	73	326	235	615	781
5	OVHD	FLDCT	60	8	3.7	82	38	275	235	615	343
6	OVHD	FLDCT	60	15	3.7	82	100	344	235	615	935
7	OVHD	FLDCT	60	10	3.7	82	56	308	235	615	626
8	OVHD	FLDCT	60	11	3.7	82	64	298	235	615	541
9	OVHD	FLDCT	60	16	3.7	82	108	301	235	615	566
10	OVHD	FLDCT	60	11	3.7	82	64	322	235	615	746
11	OVHD	FLDCT	60	15	3.7	82	100	302	235	615	575
12	OVHD	FLDCT	60	8	3.7	82	38	308	235	615	626
13	OVHD	FLDCT	60	9	3.7	82	47	250	235	615	129
14	OVHD	FLDCT	60	17	3.7	82	117	322	235	615	746
15	OVHD	FLDCT	60	13	3.7	82	82	340	235	615	901
16	OVHD	FLDCT	60	3	3.7	82	-6	318	235	615	712
17	OVHD	FLDCT	60	5	3.7	82	11	287	235	615	446
18	OVHD	FLDCT	60	16	3.7	82	108	307	235	615	618
19	OVHD	FLDCT	60	11	3.7	82	64	284	235	615	420
20	OVHD	FLDCT	60	5	3.7	82	11	259	235	615	206

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Overhead Area Alpha Points
alpha
MDC
alpha dpm/100 sq cm
140
120
100
80
60
40
20
0
-20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Overhead Area Beta Points
beta
MDC
beta dpm/100 sq cm
1,000
900
800
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

Survey Report

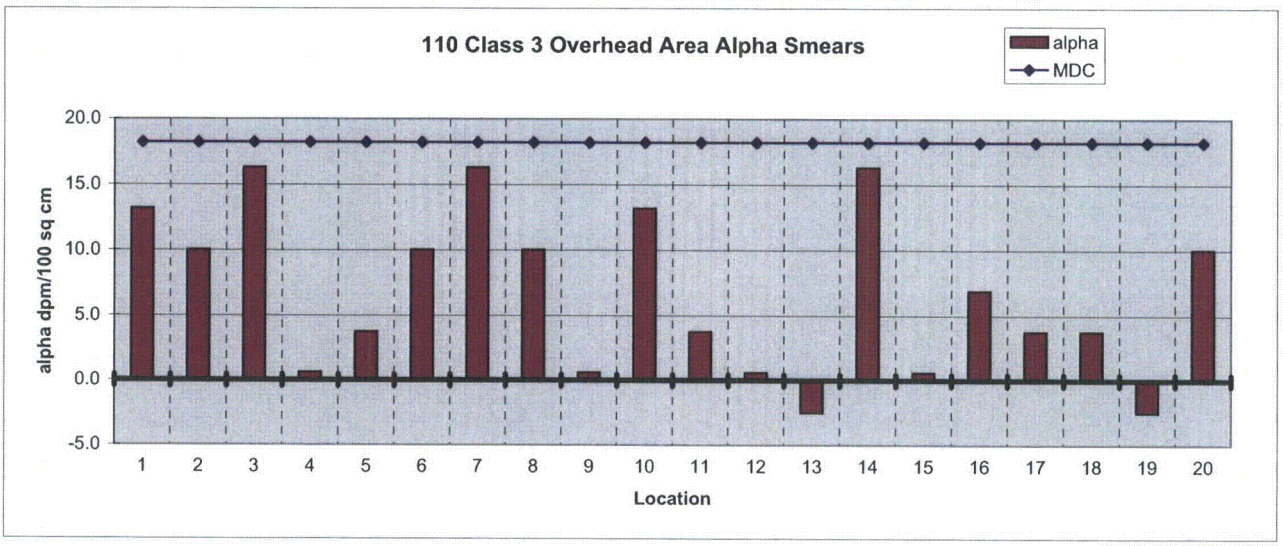
Description: HEMATITE Building 110 Class 3 Overhead Area Smears
Survey Date: 12/4/2007 **Survey Package: C-0110**
Technician Name: D. Schumaker / V. Baldwin
Comments: Class 3 Overhead Area Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/4/2007

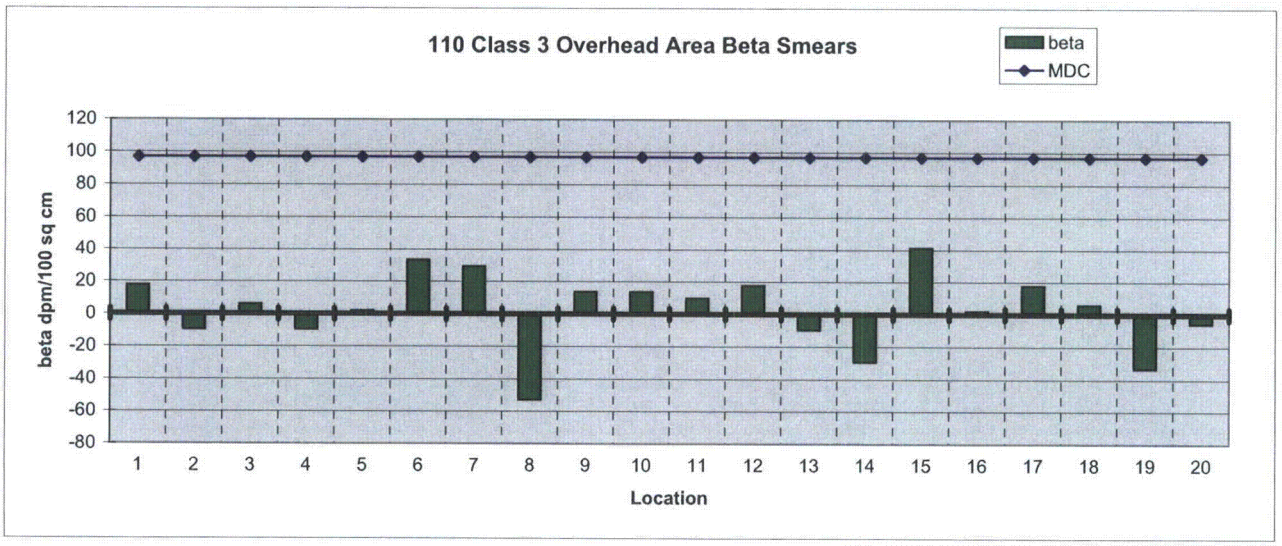
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			**0.80**				**42.5**		
1	OVHD	SMEAR	60	5	0.8	18.2	13.2	47	42.5	97	18
2	OVHD	SMEAR	60	4	0.8	18.2	10.0	40	42.5	97	-10
3	OVHD	SMEAR	60	6	0.8	18.2	16.3	44	42.5	97	6
4	OVHD	SMEAR	60	1	0.8	18.2	0.6	40	42.5	97	-10
5	OVHD	SMEAR	60	2	0.8	18.2	3.8	43	42.5	97	2
6	OVHD	SMEAR	60	4	0.8	18.2	10.0	51	42.5	97	33
7	OVHD	SMEAR	60	6	0.8	18.2	16.3	50	42.5	97	29
8	OVHD	SMEAR	60	4	0.8	18.2	10.0	29	42.5	97	-53
9	OVHD	SMEAR	60	1	0.8	18.2	0.6	46	42.5	97	14
10	OVHD	SMEAR	60	5	0.8	18.2	13.2	46	42.5	97	14
11	OVHD	SMEAR	60	2	0.8	18.2	3.8	45	42.5	97	10
12	OVHD	SMEAR	60	1	0.8	18.2	0.6	47	42.5	97	18
13	OVHD	SMEAR	60	0	0.8	18.2	-2.5	40	42.5	97	-10
14	OVHD	SMEAR	60	6	0.8	18.2	16.3	35	42.5	97	-29
15	OVHD	SMEAR	60	1	0.8	18.2	0.6	53	42.5	97	41
16	OVHD	SMEAR	60	3	0.8	18.2	6.9	43	42.5	97	2
17	OVHD	SMEAR	60	2	0.8	18.2	3.8	47	42.5	97	18
18	OVHD	SMEAR	60	2	0.8	18.2	3.8	44	42.5	97	6
19	OVHD	SMEAR	60	0	0.8	18.2	-2.5	34	42.5	97	-33
20	OVHD	SMEAR	60	4	0.8	18.2	10.0	41	42.5	97	-6

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Overhead Area Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Overhead Area Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
-80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

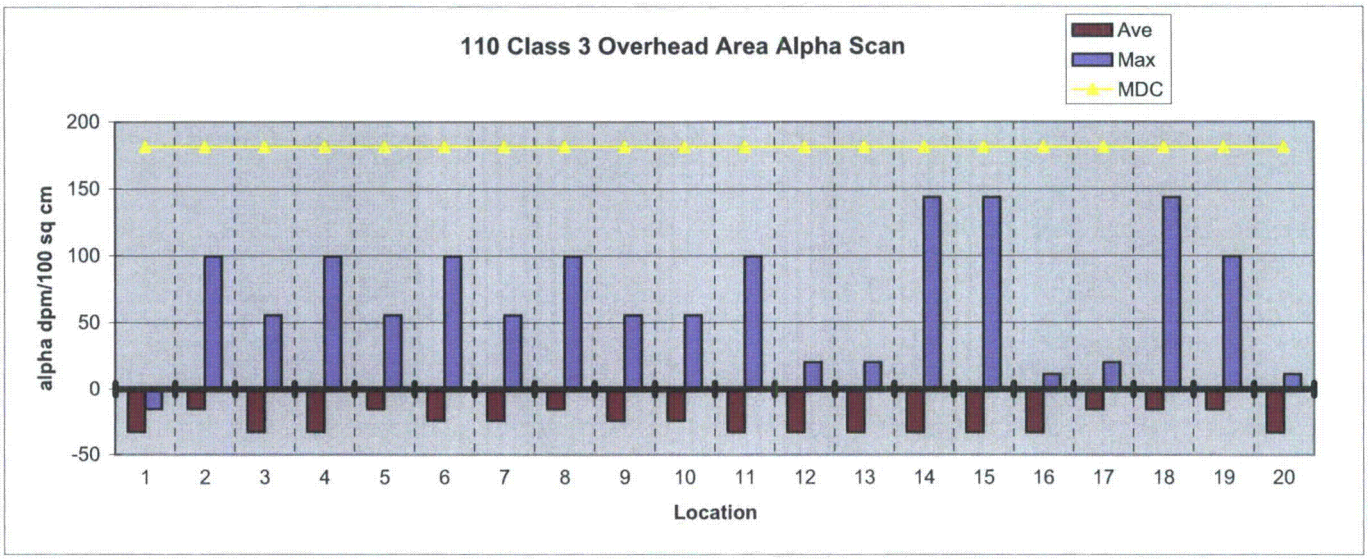
Survey Report

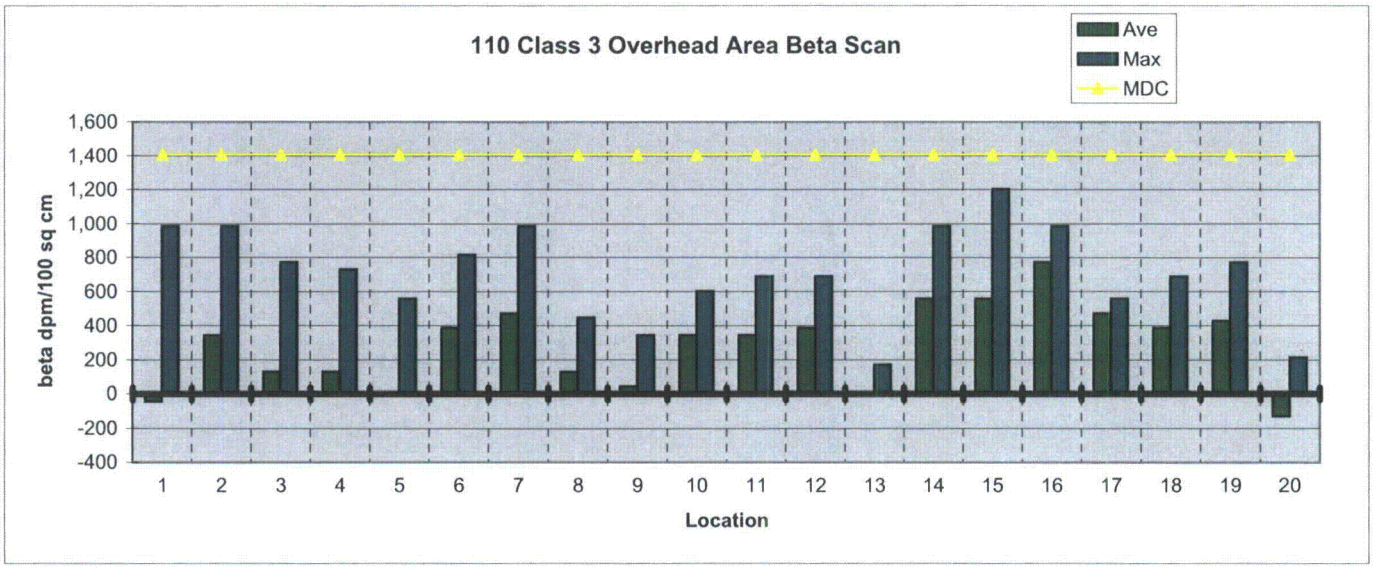
Description: HEMATITE Building 110 Class 3 Overhead Area Alpha & Beta Scans
Survey Date: 12/3/2007 **Survey Package: C-0110**
Technician Name: D. Schumaker / V. Baldwin
Comments: Overhead Area alpha/beta scan data
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:	i	Detector Width (cm)	Scan Speed (cm/s)
43-68	095522	126	11/15/08	2350	126172	9/27/08	α	9.0%	2	10	5
							β/γ	9.3%			

Survey Results			alpha scan (cpm)		alpha scan ($dpm/100cm^2$)		beta scan (cpm)		beta scan ($dpm/100cm^2$)		scan MDC ($dpm/100cm^2$)	
Location #	Surface*	Count Type	Ave	Max	Ave	Max	Ave	Max	Ave	Max	alpha	beta
		BKG	3				220					
		BKG	6				204					
		BKG	2				282					
		AVG BKG	**3.7**				**235**				**181**	**1,406**
1	OVHD	SCAN	0	2	-33	-15	230	350	-43	987	181	1,406
2	OVHD	SCAN	2	15	-15	100	275	350	343	987	181	1,406
3	OVHD	SCAN	0	10	-33	56	250	325	129	772	181	1,406
4	OVHD	SCAN	0	15	-33	100	250	320	129	729	181	1,406
5	OVHD	SCAN	2	10	-15	56	235	300	0	558	181	1,406
6	OVHD	SCAN	1	15	-24	100	280	330	386	815	181	1,406
7	OVHD	SCAN	1	10	-24	56	290	350	472	987	181	1,406
8	OVHD	SCAN	2	15	-15	100	250	287	129	446	181	1,406
9	OVHD	SCAN	1	10	-24	56	240	275	43	343	181	1,406
10	OVHD	SCAN	1	10	-24	56	275	305	343	601	181	1,406
11	OVHD	SCAN	0	15	-33	100	275	315	343	686	181	1,406
12	OVHD	SCAN	0	6	-33	20	280	315	386	686	181	1,406
13	OVHD	SCAN	0	6	-33	20	235	255	0	172	181	1,406
14	OVHD	SCAN	0	20	-33	144	300	350	558	987	181	1,406
15	OVHD	SCAN	0	20	-33	144	300	375	558	1,201	181	1,406
16	OVHD	SCAN	0	5	-33	11	325	350	772	987	181	1,406
17	OVHD	SCAN	2	6	-15	20	290	300	472	558	181	1,406
18	OVHD	SCAN	2	20	-15	144	280	315	386	686	181	1,406
19	OVHD	SCAN	2	15	-15	100	285	325	429	772	181	1,406
20	OVHD	SCAN	0	5	-33	11	220	260	-129	215	181	1,406

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Overhead Area Alpha Scan
Ave
Max
MDC
alpha dpm/100 sq cm
200
150
100
50
0
-50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location


110 Class 3 Overhead Area Beta Scan
Ave
Max
MDC
beta dpm/100 sq cm
1,600
1,400
1,200
1,000
800
600
400
200
0
-200
-400
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Location

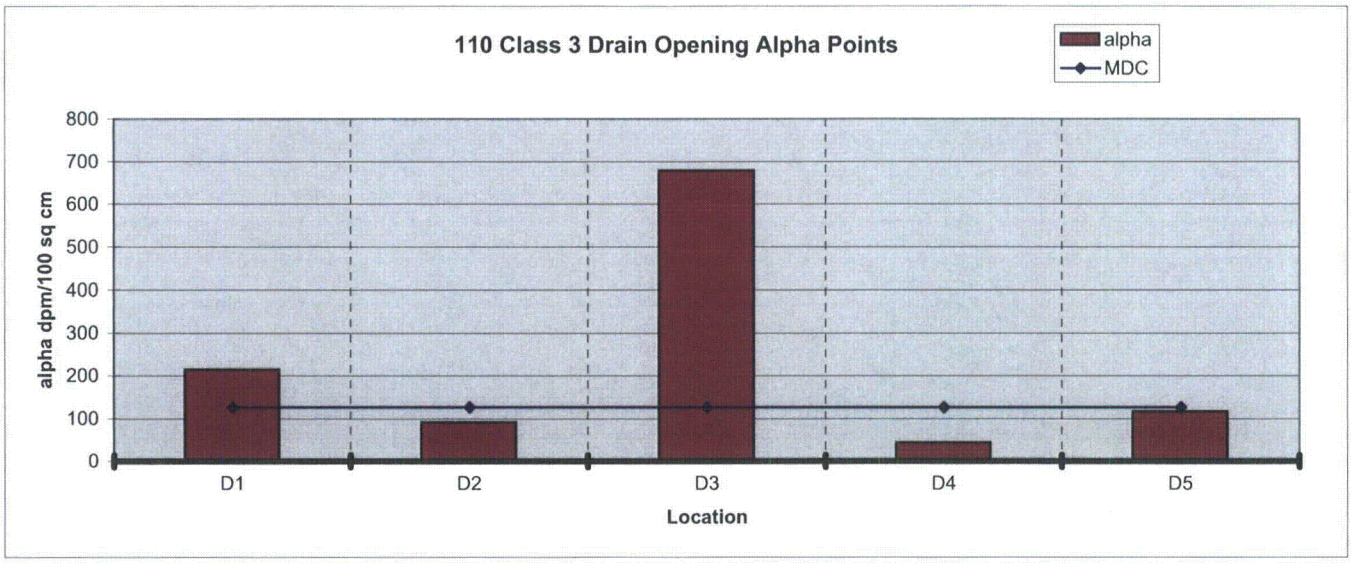
Survey Report

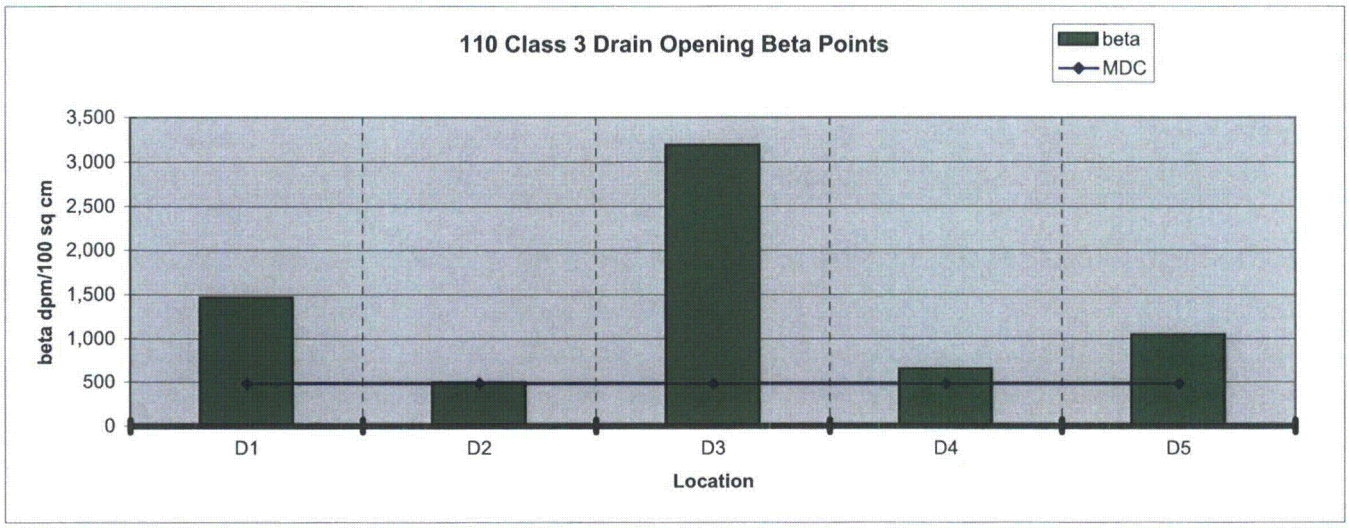
Description: HEMATITE Building 110 Class 3 Drains
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Drain Openings
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Area (cm^2)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-68	119337	126	11/15/08	2360	193667	8/15/08	α	3.3%
							β/γ	9.3%

Survey Results			Direct Readings								
Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDC (dpm)	Net α ($dpm/100cm^2$)	Gross β (counts)	β BKG (cpm)	β MDC (dpm)	Net β ($dpm/100cm^2$)
PRE		BKG[1]	60		0.3				148		
POST		BKG[1]	60		2				140		
		AVG BKG			**1.2**				**144**		
D1	Drain	FLDCT	60	10	1.2	127	215	315	144	482	1,467
D2	Drain	FLDCT	60	5	1.2	127	93	202	144	482	498
D3	Drain	FLDCT	60	29	1.2	127	679	516	144	482	3,192
D4	Drain	FLDCT	60	3	1.2	127	44	220	144	482	652
D5	Drain	FLDCT	60	6	1.2	127	117	266	144	482	1,047

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal
[1] Daily instrument background check data used.





Survey Report

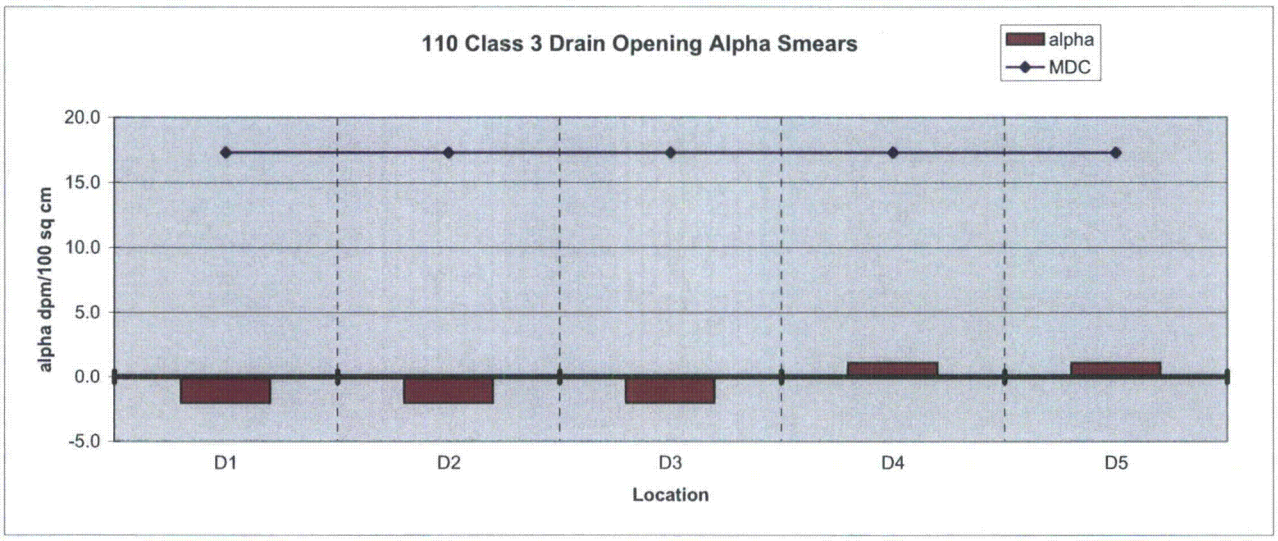
Description: HEMATITE Building 110 Class 3 Drain Opening Smears
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: M. Chase / S. Holiday
Comments: Class 3 Drain Opening Smears
Instrument Manufacturer: Ludlum **Count Date:** 12/3/2007

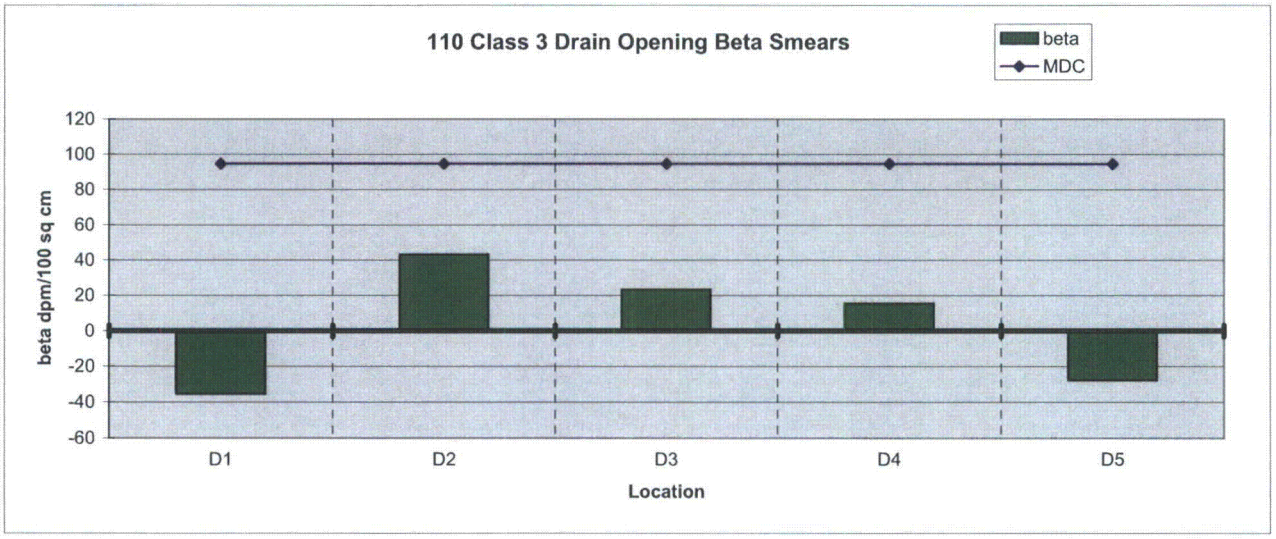
Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due	Sensitivities	Eff.:
43-10-1	103276	9/21/08	2929	102001	9/21/08	α	31.9%
						β/γ	25.5%

Survey Results

Location #	Surface*	Count Type	Time (sec)	Gross α (counts)	α BKG (cpm)	α MDA (dpm)	Net α (dpm/100cm^2)	Gross β (cpm)	β BKG (cpm)	β MDA (dpm)	Net β (dpm/100cm^2)
		AVG BKG			0.65				40.1		
D1	Drain	SMEAR	60	0	0.65	17.3	-2.0	31	40.05	95	-35
D2	Drain	SMEAR	60	0	0.65	17.3	-2.0	51	40.05	95	43
D3	Drain	SMEAR	60	0	0.65	17.3	-2.0	46	40.05	95	23
D4	Drain	SMEAR	60	1	0.65	17.3	1.1	44	40.05	95	15
D5	Drain	SMEAR	60	1	0.65	17.3	1.1	33	40.05	95	-28

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal


110 Class 3 Drain Opening Alpha Smears
alpha
MDC
alpha dpm/100 sq cm
20.0
15.0
10.0
5.0
0.0
-5.0
D1
D2
D3
D4
D5
Location


110 Class 3 Drain Opening Beta Smears
beta
MDC
beta dpm/100 sq cm
120
100
80
60
40
20
0
-20
-40
-60
D1
D2
D3
D4
D5
Location

Survey Report

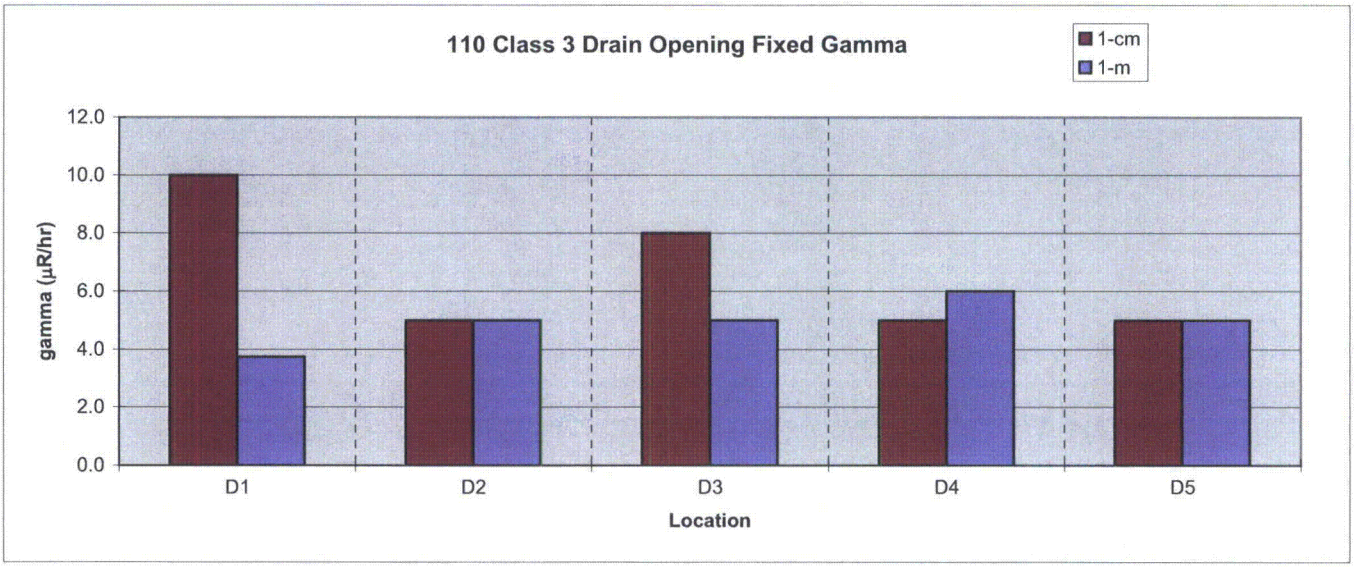
Description: HEMATITE Building 110 Class 3 Drain Opening Gamma Surveys
Survey Date: 11/29/2007 **Survey Package: C-0110**
Technician Name: D. Schumaker / D. Shifflett
Comments: Drain Opening Gamma Results
Instrument Manufacturer: Ludlum

Detector Type	Detector SN	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
44-10	12269	9/6/08	2350	98638	9/27/08

Survey Results

		gamma µR	
Location #	**Location***	**1-cm**	**1-m**
D1	Drain	10	3.75
D2	Drain	5	5
D3	Drain	8	5
D4	Drain	5	6
D5	Drain	5	5

* R = Roof, INT = Interior, OW = Outside Wall, VD = Vent Duct, F = Floor, W = Wall, C = Ceiling, I = Inaccessible, OVHD = Overhead Horizontal



HEMATITE PHOTOGRAPHS
ELEVATED AREAS

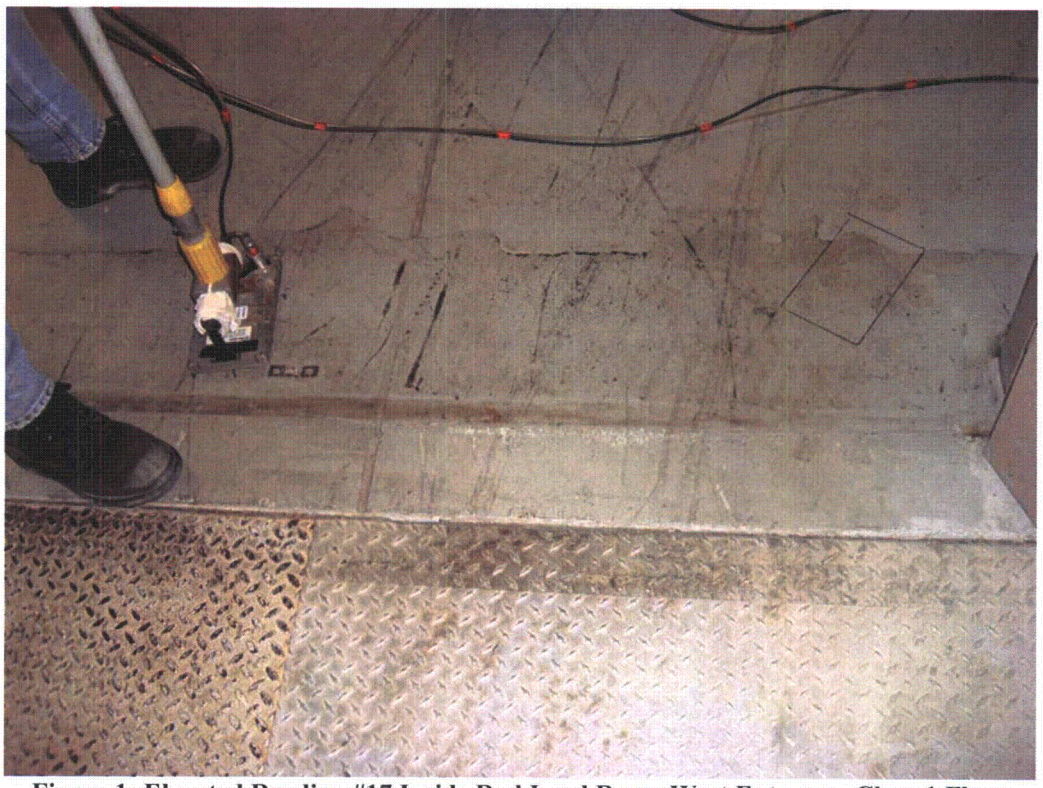


Figure 1: Elevated Reading #17 Inside Rod Load Room West Entrance, Class-1 Floor

Figure 2: Elevated Reading #15 on Floor Plug Inside Rod Load Room West Entrance, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

Figure 3: Elevated Reading #14 on Floor Plug Inside Rod Load Room South Wall, SW End, Class-1

Figure 4: Elevated Reading #6 on Floor Anchor Hole (Covered with Tape) Inside Rod Load Room Near South Wall & KARDEX Room, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

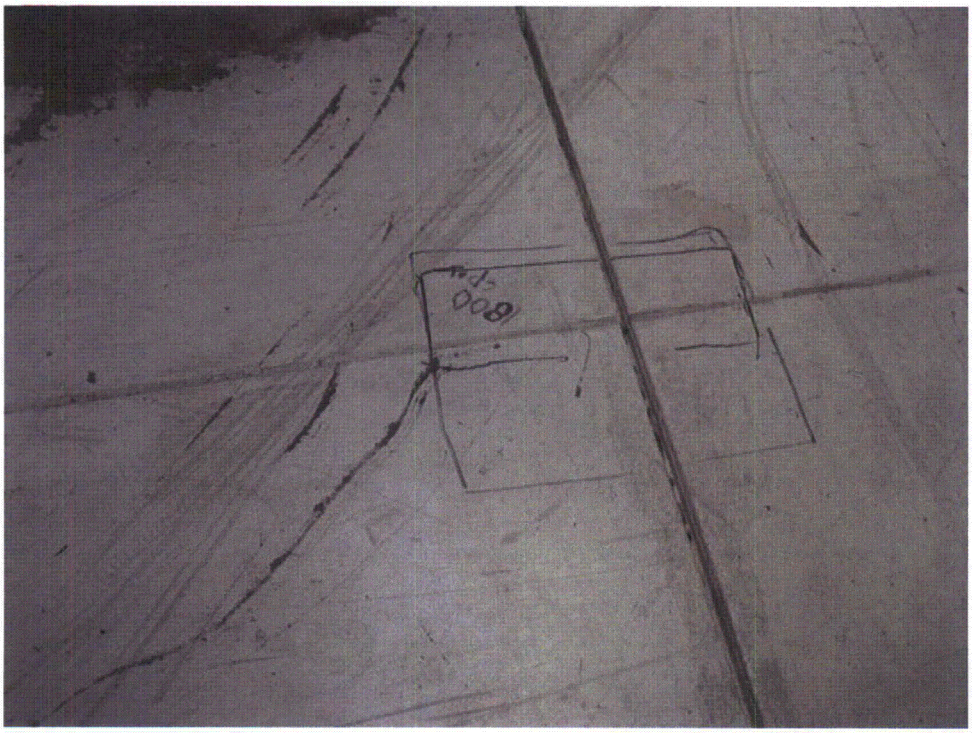


Figure 5: Elevated Reading #10 on Floor Inside Rod Load Room West Center Area, Class-1

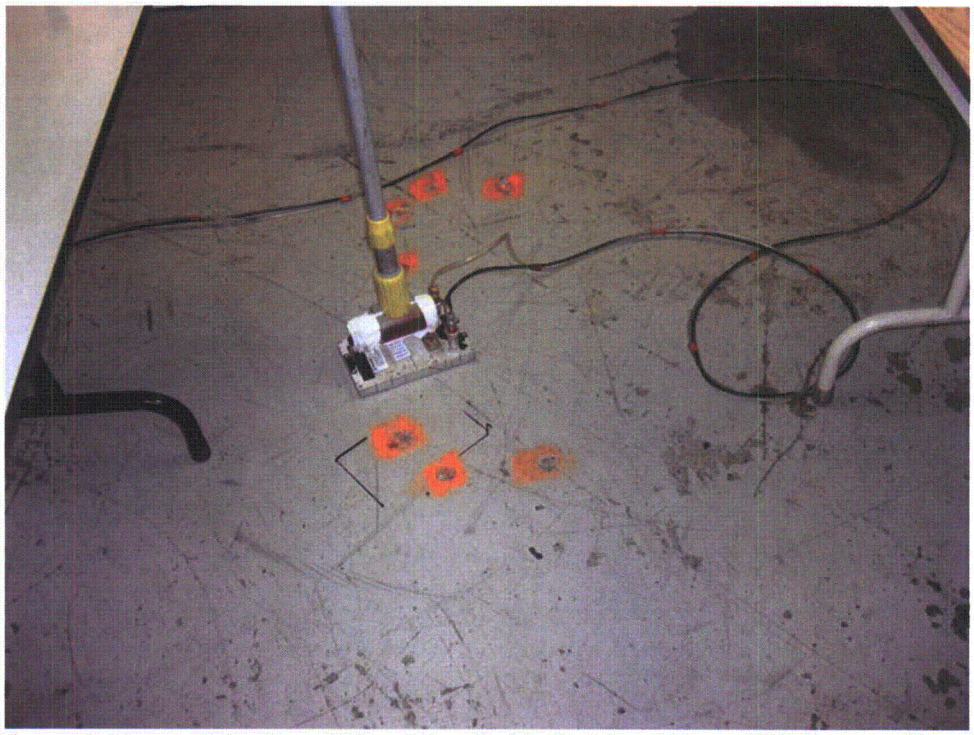


Figure 6: Elevated Readings #18 on Floor Inside Rod Load Room NW Corner, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

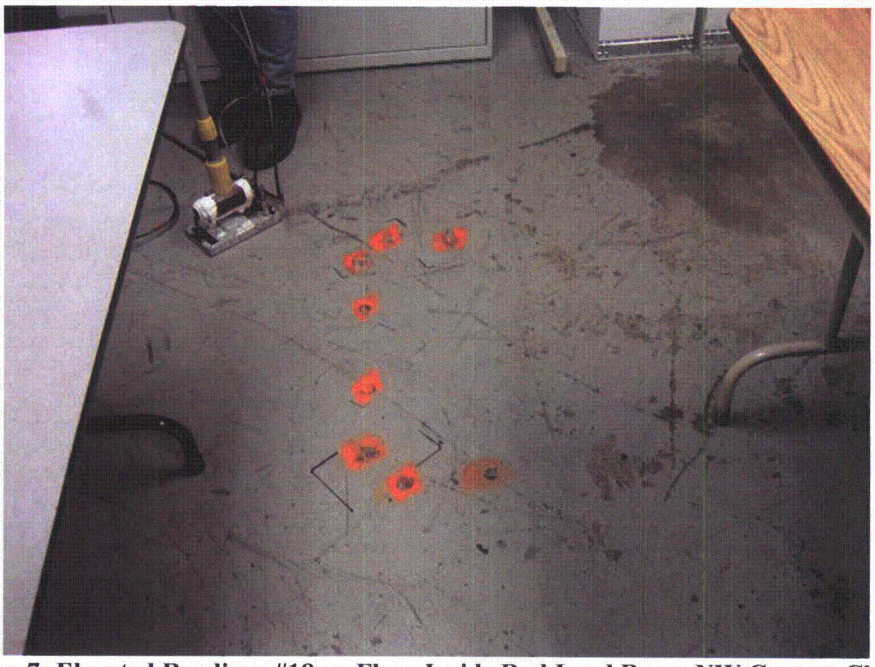


Figure 7: Elevated Readings #18 on Floor Inside Rod Load Room NW Corner, Class-1

Figure 8: Elevated Readings Under Floor Tile Women's Room Entrance, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

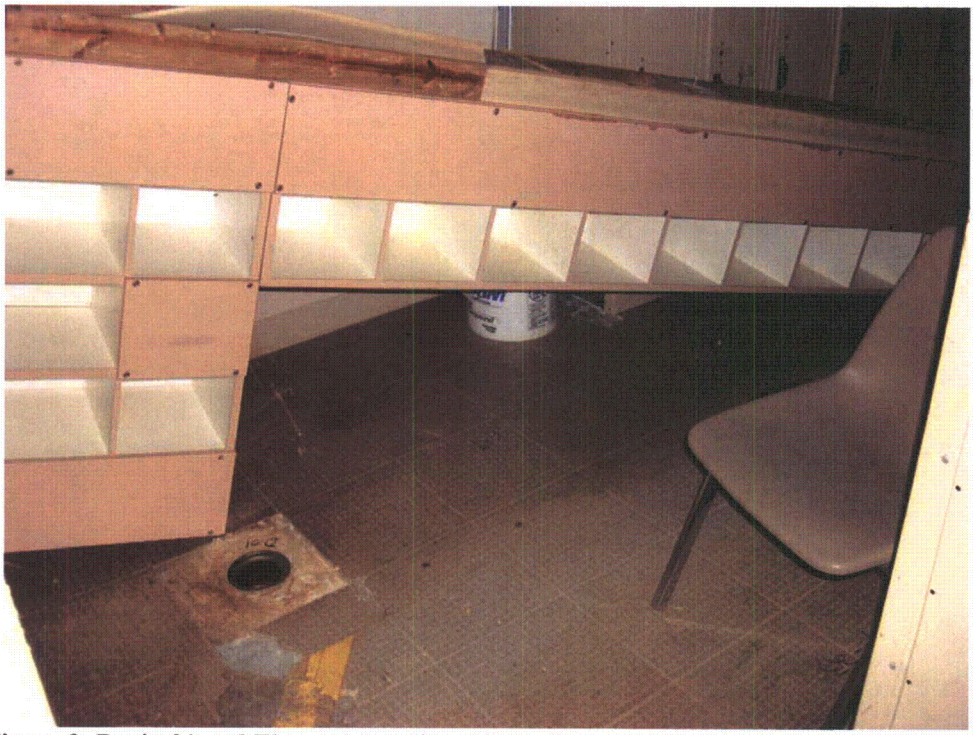


Figure 9: Drain 01 and Elevated Readings Under Removed Bench Men's Room, Class-1

Figure 10: Drain 01, 04 and 05 in Men's Room, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

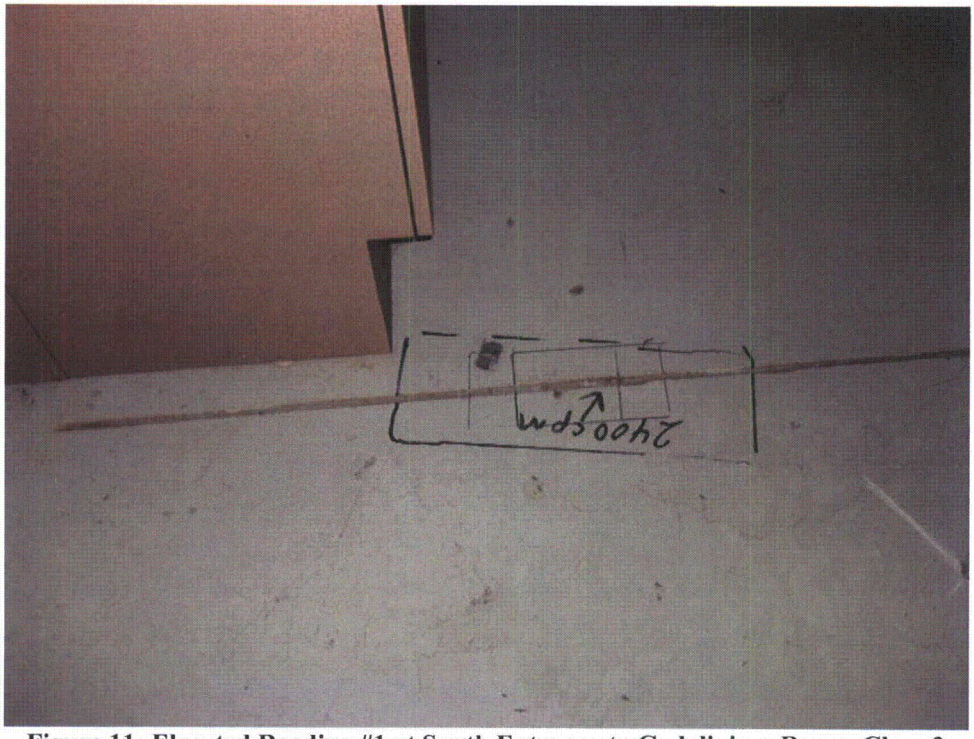


Figure 11: Elevated Reading #1 at South Entrance to Gadolinium Room, Class-2

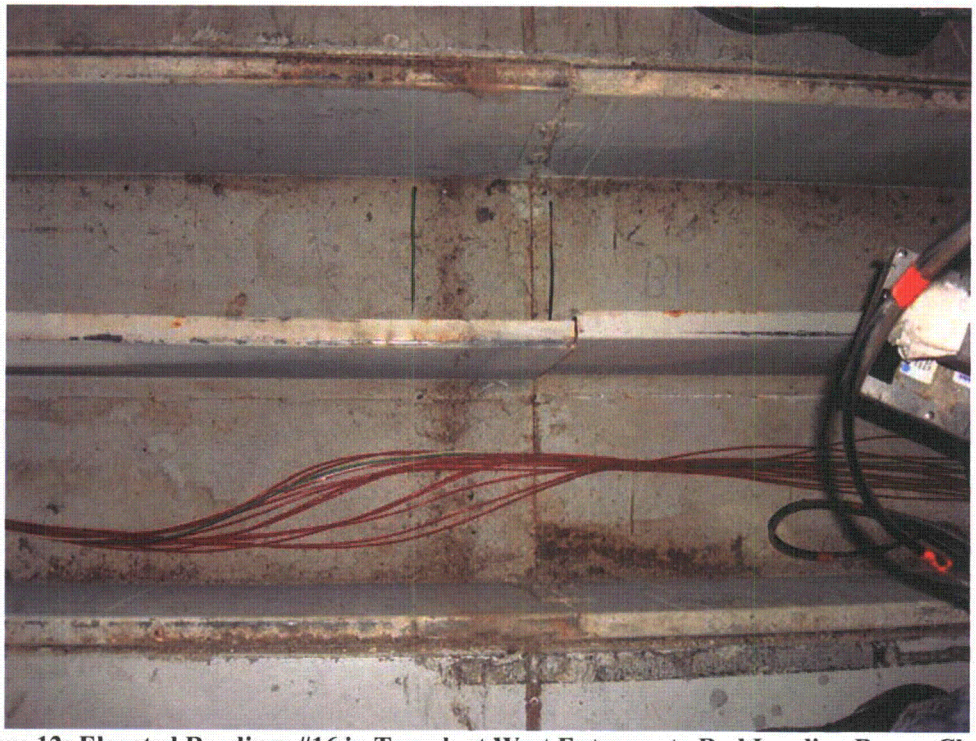


Figure 12: Elevated Readings #16 in Trench at West Entrance to Rod Loading Room, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

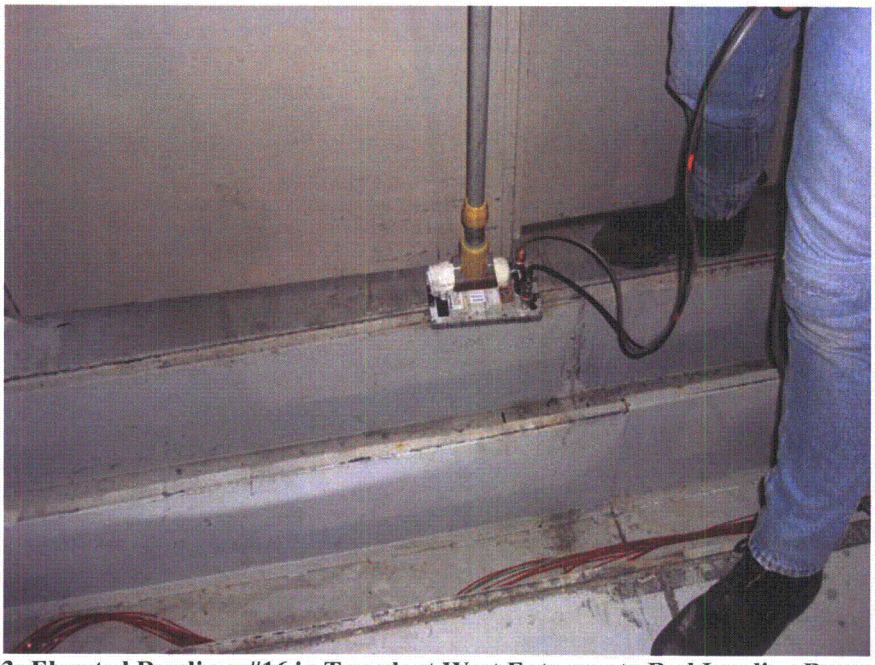


Figure 13: Elevated Readings #16 in Trench at West Entrance to Rod Loading Room, Class-1

Figure 14: Elevated Reading #3 in Crack at West Wall of "U" Shaped Area, Class-2

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

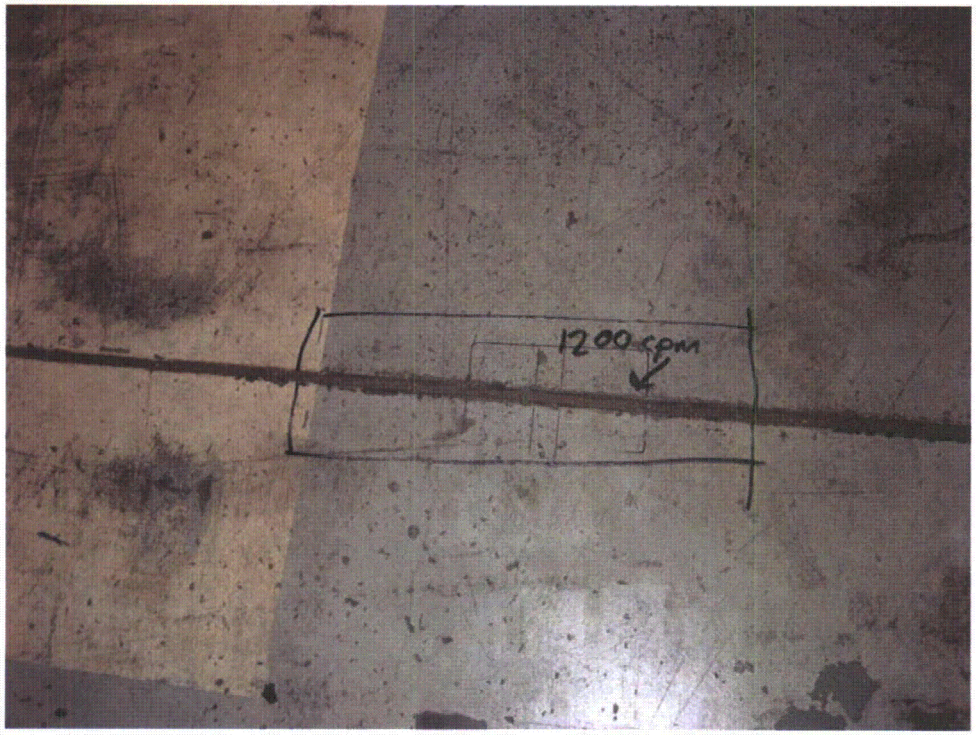


Figure 15: Elevated Reading #2 in Crack Southwest Portion of "U" Shaped Area, Class-2

Figure 16: Drain 13 in Women's Room, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

Figure 17: Drain 12 in Women's Room, Class-1

Figure 18: Elevated Area Under Removed Bench in Women's Room, Class-1

HEMATITE PHOTOGRAPHS
ELEVATED AREAS

Figure 19: Drain 01 in Cushman Room, Class-3

APPENDIX B: INSTRUMENT CALIBRATION AND SOURCE CHECK DATA

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Duratek

Duratek Instrument Services
628 Gallaher Rd.
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-833

Packing List

PO number:
313010.999.193.0001

Date Shipped:
10/26/2007

Workorder ID:
2007-04654

Shipped To:

EnergySolutions
Hematite Site
Westinghouse Electric Company LLC
3300 State Road P
Festus MO 63028
Matt Featherston/Duane Quayle/Paul Ely

Shipped From:

Instrument Services Facility

Shipped Via:

Customer Pickup

Qty	Description:
1	Cs-137#1296117 (5microCi)
1	Tc-99#129647 (10nCi)
1	Th-230#119704 (10nCi)

SCN 954 129647

CERTIFICATE OF CALIBRATION

MODEL CAL2703 OPTION 1 BETA STANDARD

Radionuclide:	Tc-99	**Activity:**	24,018 dpm 400.3 Bq (10.82 nCi)
Serial Number:	C528	**Reference Date:**	1200 PDT April 1, 1995
Half Life[1]:	$(2.13 \pm 0.05) \times 10^5$ years		

PRINCIPAL EMISSIONS[1]

Type	Energy (keV)	Intensity (%)
beta	E_{max} = 294 E_{avg} = 85	100

SOURCE DESCRIPTION

The activity is deposited in a 33 mm active diameter on an aluminum backing disc. The active area is sealed beneath 0.9 mg/cm^2 aluminized mylar stretched on an aluminum support ring. This active element was then epoxied into an aluminum outer support ring 47 mm in diameter by 2 mm thick.

METHOD OF CALIBRATION

The source was calibrated by dispensing a gravimetric aliquot of a solution calibrated by liquid scintillation and traceable to the National Institute of Standards and Technology. This standard is indirectly (implicitly) traceable to the National Institute of Standards and Technology.

North American Scientific, Inc. participates in the Radioactivity Measurements Assurance Program conducted by the National Institute of Standards and Technology in cooperation with the Nuclear Energy Institute.

TOTAL UNCERTAINTY (99% Confidence Level)

Systematic uncertainty	2.21%
Weighing uncertainty	0.22%
Total uncertainty (quadratic sum)	± 2.22%

Daniel Kalas
Calibration Laboratory Manager

April 25, 1995
Date

REFERENCES

(1) Table of Radioactive Isotopes, 7th edition, 1986.

• LEAK TEST CERTIFICATION ON REVERSE •

North American Scientific, Inc. 7435 Greenbush Ave., North Hollywood, CA 91605 (818) 503-9201 Fax (818) 503-0764

119704

14 October 1997 Men/wo
Page 1 of 2 pages, Issue 07/95

Amersham Buchler
GmbH & Co KG
Gieselweg 1
D-38110 Braunschweig
Postfach 11 49
D-38001 Braunschweig
Tel. (05307) 930-0
Fax (05307) 930-293
Fax-Zentrale 930-237

Amersham
The Health Science Group

CERTIFICATE

No. 363229

for a Sealed Radioactive Source

Source Type: Alpha Wide Area Reference Source

Product Code	TZRX1922
Drawing	VZ-1368
Dimensions of Active Surface	Ø 36 mm
Overall Dimensions	Ø 47 mm x 3 mm
Source No.	FS 440
Nuclide	Thorium-230

Measurement Data

Activity	18,900 dpm 315 Bq
Overall Uncertainty*	± 10 %
Alpha Surface Emission Rate	147 s^{-1} ± 5 % in 2 π steradian ≈ 8820 d/s
Reference Date	30 September 1997
Traceability*	Defined on page 2

Leakage and Contamination Test(s)

Test Method(s)*	I
Test(s) passed on	13 October 1997

Additional Information

ISO Classification*	C.34645
Recommended Working Life*	10 years
Remark	

* see page 2 for explanation

Amersham Buchler

i. A. Rot

(Production Manager)

SOURCE LEAK TEST

SMEAR	ISOTOPE	AMOUNT	SER #
1	Th-230	315 Bq	119704
2	"	"	"
3	Tc-99	10.819 nCi	129647
4	"	"	"
5	Cs-137	≈5 uCi	1296117
6	"	"	"

SEE ATTACHED SHEET FOR CONTAMINATION RESULTS AND INSTRUMENTATION USED.

HP-AD-105-F1 Rev 0

ENERGYSOLUTIONS

SWIPES USED : 1-6

TYPE OF SURVEY : CONTAMINATION

RWP 078000

DATE : 9-06-07

TIME 0900

RAD INST :

SERIAL # : N/A

CAL DUE :

CON INST : SEE

SERIAL # : ATTACHED

CAL DUE : SHEET

LAB INST :

SERIAL # : N/A

CAL DUE :

TECHNICIAN :

SIGN : W Hoffman

PRINT : W Hoffman

REVIEW BY : R Stone

SIGNATURE : Robert Stone

DATE : 9/06/07

SMEAR SURVEY RESULT FORM

ENERGYSOLU

Counted by W. HOFFMAN (Print) Signature W. Hoffman Date: 9-06-07

All smears are 100 cm2 unless otherwise noted.

B,γ Counter Type/No.: 29291 109555 Bkg = 36.7 CPM Eff.= 16.6% Cal Due Date: 12-13-07

α Counter Type/No.: 29291 109555 Bkg= 0.1 CPM Eff.= 31.0% Cal DueDate: 12-13-07

	βγ	α		Bγ	α		Bγ	α
Smear #	DPM 100cm2	DPM 100 cm2	Smear #	DPM 100cm2	DPM 100 cm2	Smear #	DPM 100cm2	DPM 100 cm2
1	<1000	<100	23			45		
2			24			46		
3			25			47		
4			26			48		
5			27			49		
6	<1000	<100	28			50		
7			29			51		
8			30			52		
9			31			53		
10			32			54		
11			33			55		
12			34			56		
13			35	N/A		57	N/A	
14			36			58		
15	N/A		37			59		
16			38			60		
17			39			61		
18			40			62		
19			41			63		
20			42			64		
21			43			65		
22			44			66		

Remarks: N/D = NO DETECTABLE

ORIGINAL

Page 2 of 2 Signature/Reviewed by: R. Stone / Robert Stone Date: 9/06/07

Duratek

CALIBRATION CERTIFICATE

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

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

Customer Information		Instrument Information	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2929	Serial Number: 102001
Contact Name: Tony Riggs		Probe: 43-10-1	Serial Number: 103276
Customer Purchase Order Number: N/A	Work Order Number: 2007-04661	Calibration Method: Electronic And Source	

Instrument Calibration Information

M&TE	ID Number	Calibration Due Date	Environmental Conditions	
Thermometer	2551	10/18/07	Temperature (°C)	22.8
Barometer	2551	10/18/07	Pressure (mmHg)	742
Hygrometer	958670	05/09/08	Humidity (%)	46%
Pulse Generator	101500	10/06/07	Calibrated in accordance with IN-WI-234.	
DVM	94710023	09/18/08		

Isotope	Source ID Number	Original Activity (dpm)	Source Cert. Date	Decayed Activity (dpm)
Th^{230}	119701	19,080	09/30/97	19,080
Tc^{99}	099608	21,312	08/08/96	21,312
Pu^{239}	019442	13,613	06/01/92	13,613

Frequency Calibration

Desired (cpm)	Tolerances (cpm)	Alpha As Found (cpm)	Alpha As Left (cpm)	Beta As Found (cpm)	Beta As Left (cpm)
40	40	40	40	40	40
400	(392-408)	400	400	399	399
4,000	(3,920-4,080)	3,998	3,998	4,000	4,000
40,000	(39.2K-40.8K)	40,003	40,003	40,011	40,011
400,000	(392K-408K)	400,070	400,070	400,104	400,104

Background Determination	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Counts, C_b	6	6	1,122	1,122
Time, T_b (min)	20	20	20	20
Rate, R_b (cpm)	0.3	0.3	56.1	56.1

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: Mike Paul	Reviewed By: Jeff Dubinsin	Date: 9/21/07
Calibration Date: 09/21/07	Calibration Due: 09/21/08	

CROSS TALK SHEET
Initials/Date:

Instrument ID: 102001

As Found Alpha Threshold (mv)	As Left Alpha Threshold (mv)
170	170

Alpha Source: Cross Talk – Performed using Pu^{239} 019442

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	26,878	26,878	1,327	1,327
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 5375.6$	$R_{s[\alpha]} = 5375.6$	$R_{s[\beta]} = 265.4$	$R_{s[\beta]} = 265.4$
EFF (% c/d) (>25%)	N/A	N/A	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{265.4 - 56.1}{5375.6 - 0.3} = 3.89\%$			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
4.0mv	4.0mv	48mv	48mv

Beta Source: Cross Talk-Performed using Tc^{99} 099608

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	7	7	27,501	27,501
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 0.35$	$R_{s[\alpha]} = 0.35$	$R_{s[\beta]} = 5500.2$	$R_{s[\beta]} = 5500.2$
EFF (% c/d) (>10%)	N/A	N/A	N/A	N/A
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} = \frac{0.35 - 0.3}{5500.2 - 56.1} = 0.0009\%$			

High Voltage Power

Desired Voltage	Tolerance	DVM As Found	DVM As Left	2929 Meter As Found	2929 Meter As Left
600	540 – 660	597	597	600	600
800	720 – 880	800	800	800	800
1,000	900 – 1,100	1,009	1,009	1,000	1,000
1,200	1,080 – 1,320	1,220	1,220	1,200	1,200
1,300	1,170 – 1,430	1,311	1,311	1,300	1,300

High Voltage	As Found	Vern Dial Reading	As Left	Vern Dial Reading
	770V	3.24	770V	3.24

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: Mike Paul

Reviewed By: Jeff Robinson **Date:** 9/21/07

Calibration Date: 09/21/07 **Calibration Due:** 09/21/08

EFFICIENCY SHEET
Initials/Date:

Instrument ID: 102001

As Found Alpha Threshold (mv)	As Left Alpha Threshold (mv)
170	170

Alpha Source: Efficiency determined using Th^{230} #119701

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	30,467	30,467	4,764	4,764
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 6093.4$	$R_{s[\alpha]} = 6093.4$	$R_{s[\beta]} = 952.8$	$R_{s[\beta]} = 952.8$
EFF (% c/d) (>25%)	N/A	31.9%	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{N/A}{N/A} = N/A$			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
4.0mv	4.0mv	48mv	48mv

Beta Source: Efficiency determined using Tc^{99} #099608

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	7	7	27,501	27,501
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 0.35$	$R_{s[\alpha]} = 0.35$	$R_{s[\beta]} = 5500.2$	$R_{s[\beta]} = 5500.2$
EFF (% c/d) (>10%)	N/A	N/A	N/A	25.5%
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} = \frac{N/A}{N/A} = N/A$			

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: Mike Paul **Reviewed By:** Jeff Pukin **Date:** 9/21/07

Calibration Date: 09/21/07 **Calibration Due:** 09/21/08

Initials/Date: **Instrument ID:** 102001

Source and Background Plateau Worksheet								
High Voltage	**Background**		**Alpha Source**		**Beta Source**		**Cross Talk**	
	Alpha	**Beta**	**Alpha**	**Beta**	**Alpha**	**Beta**	**α to β**	**β to α**
600								
650								
700								
750								
800	Not	Required:	As	Founds	Within	Tolerance		
850								
900		HV	Left	As	Found			
950								
1000								
1050								
1100								
1150								
1200								
1250								
1300								

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: Mike Paul **Reviewed By:** Jeff Dubinson **Date:** 9/21/07

Calibration Date: 09/21/07 **Calibration Due:** 09/21/08

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Inc. - Instrument Services Facility		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2350-1	Serial Number: 126172
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range (CPM)	Calibration Standard Value (CPM)	Instrument Response (±10% of Calibration Standard)		Comments	
		Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-239 Rev 0	
400	400	400	400	Pulser: 101500	Cal Due: 10/06/07
4,000	4,000	4,005	4,005	DVM: 94710023	Cal Due: 09/18/08
40,000	40,000	40,037	40,037	D-814: 2551	Cal Due: 10/18/07
400,000	400,000	401,895	401,895	Humidity: 958670	Cal Due: 05/09/08
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	EPPROM Version: 37122N28	
600 (540-660)	600	609	609	Temp: 23.3 °C	
1,200 (1,080-1,320)	1,200	1,218	1,218	Pressure: 740mmHg	
1,800 (1,620-1,980)	1,800	1,826	1,826	Humidity: 47%	
Parameter	Tolerance (±10%)	As Found	As Left		
Threshold T = 100	10 ± (9 to 11) mVDC	9.8	9.8	Geotropism: SAT	ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	47.2	47.2	BAT>4.5: SAT	Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	94.0	94.0	Count: SAT	Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	10	10	Alarms: SAT	Lamp: SAT
Display-to-mV ratio:	100 to 10 mV			Overload Test: SAT	

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: Mike Paul	Reviewed By: Jeff Robinson	Date: 9/27/07
Calibration Date: 09/27/07	Calibration Due: 09/27/08	

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Tony Riggs		Serial Number: 211680
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION			
1) Source Nuclide: Cs^{137}	Serial Number: 019454	Activity: 5μCi nominal	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711	Activity: Variable	Certification Date: 07/19/06

Scaler Information		Precision Test	mR/Hr (Source #2)
2350-1	#126172	Count 1	2.00
Due Date	09/27/08	Count 2	2.04
Threshold	T=100 (10mV)	Count 3	2.03
Cable Length	5ft.	Average	2.02
D-814: 2551	Temp: 23.3 °C	Tolerance ±10%	All counts within ±10% of Average
D-814: 2551	Press: 740mmHg	Pass/Fail	Pass
Humidity	Humidity: 47%		

Low Sample Activity (400uR/hr): Using Source #2 = 68,908	High Sample Activity (2mR/hr) Using Source #2 = 251,094	Dead Time (DT): 1.620227E-05	Calibration Constant (CC): 5.698261E+10

ATTACHMENTS			DETECTOR DATA: DOSE RATE PROBES (mR/Hr)			
Detector Setup Report	YES √	NO	Desired Exposure	Tolerance ±10%	As Found	As Left
Barcode Report	YES √	NO	0.400	0.360-0.440	0.400	0.403
Voltage Plateau:	YES √	NO	1	0.90-1.10	0.945	0.980
High Voltage: 1100V			2	1.8-2.2	2.00	2.03

COMMENTS

****Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector****

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

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

Detector Certified By: Mike Paul	Reviewed By: Jeff Dubenion	Date: 9/27/07
Certification Date: 09/27/07		Certification Due: 09/27/08

BACKGROUND PLATEAU 44-10#211680 9/27/2007

700	47
750	90
800	163
850	263
900	405
950	481
1000	511
1050	551
1100	566
1150	584
1200	614
1250	578
1300	579
1350	619

SOURCE PLATEAU CS-137#019454

700	864
750	1232
800	1901
850	2441
900	2754
950	2997
1000	2851
1050	3193
1100	3246
1150	3230
1200	3194
1250	3323
1300	3284
1350	3294

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 09/27/2007.
The current time of day is: 12:37:55.

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

Comments:

Model 2350 Serial # =	126172.
User I.D. =	
High Voltage =	1100 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.620227E-05.
Detector Calibration Constant =	5.698261E+10.
Detector Model =	44-10.
Detector Serial # =	211680.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.6 volts.

Model 2350 Serial #126172

H1100$F
Set High Voltage: 1100

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU4$F
Set Readout Units = R

SB2$.
Set Readout Time Base = hr

SM0$3
Set Readout Range Multiplier = auto

SL1.620227E-05$S
Set Dead Time: 1.620227E-05

SC5.698261E+10$.
Set Calibration Constant: 5.698261E+10

M44-10$K
Set Detector Model: 44-10

N211680$.
Set Detector Serial #: 211680

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP1$7
SAVE PARAMETERS AS D1

Duratek

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: 43-68A
Contact Name: Tony Riggs		Serial Number: 095522
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Th^{230}	Serial Number: 119704	Activity (dpm): 18,900	Certification Date: 10/14/97

Parameter	As Found	As Left	Precision Test	CPM (Source #1)
Count 1	3,238	3,238	Count 1(Heel)	3,026
Count 2	3,221	3,221	Count 2(Center)	3,310
Count 3	3,156	3,156	Count 3(Toe)	3,170
Average	3,205	3,205	Average	3,169
Background (cpm)	1.4	1.4	Tolerance	All counts within ±10% of Average
Net Counts	3,204	3,204	Pass/Fail	PASS
Efficiency	17.0%	17.0%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): 19.4E-6	Calibration Constant (CC): 1.0

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	126172	9/27/08 MP ~~03/05/08~~	1.4	1400V	40 = 4mV

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

COMMENTS

Calibrated with 25Ft. Cable

10 minute background

Calibrated in accordance with CP-IN-WI-237 Rev 1

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: M. Paul	Reviewed By: Jeff Dalarmin	Date: 9/11/07
Certification Date: 09/11/07		Certification Due: 09/11/08

BACKGROUND PLATEAU 43-68#095522 25FT CABLE 9/11/2007

900	0
950	0
1000	1
1050	0
1100	0
1150	0
1200	0
1250	0
1300	1
1350	1
1400	0
1450	2
1500	2
1550	8
1600	31
1650	57
1700	106
1750	207
1800	343
1850	946
1900	1425
1950	1799

ALPHA PLATEAU TH-230#119701 19,080DPM

900	0
950	0
1000	1
1050	0
1100	1
1150	261
1200	1833
1250	2848
1300	3379
1350	3610
1400	3745
1450	3685
1500	3673

BETA PLATEAU TC-99#099608 21,312DPM

1400	0
1450	4
1500	49
1550	425
1600	1363
1650	2540
1700	4051
1750	5323
1800	5546
1850	6270
1900	6452
1950	6964

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D2 in the Model 2350.
Today's date is 09/12/2007.
The current time of day is: 07:31:31.

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

Comments:

Model 2350 Serial # =	126172.
User I.D. =	
High Voltage =	1400 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.940000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-68A.
Detector Serial # =	095522.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.6 volts.

Model 2350 Serial #126172

H1400$I
Set High Voltage: 1400

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL1.940000E-05$M
Set Dead Time: 1.940000E-05

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

M43-68A$%
Set Detector Model: 43-68A

N095522$%
Set Detector Serial #: 095522

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP2$8
SAVE PARAMETERS AS D2

Duratek

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: Tony Riggs		Serial Number: 095522
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Tc^{99}	Serial Number:129647	Activity (dpm): 24,018	Certification Date: 04/01/95

Parameter	As Found	As Left	Precision Test	CPM (Source #1)
Count 1	5,882	5,882	Count 1(Heel)	5,493
Count 2	5,754	5,754	Count 2(Center)	5,790
Count 3	5,815	5,815	Count 3(Toe)	5,585
Average	5,817	5,817	Average	5,623
Background (cpm)	353.0	353.0	Tolerance	All counts within ±10% of Average
Net Counts	5,464	5,464	Pass/Fail	PASS
Efficiency	22.7%	22.7%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): 22.1E-6	Calibration Constant (CC): 1.0

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	126172	~~03/05/08~~ 9/27/08 MP	353.0	1800V	40 = 4mV

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

COMMENTS

Calibrated with 25Ft. Cable

10 minute background

Calibrated in accordance with CP-IN-WI-237 Rev 1

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: M. Paul	Reviewed By: J. Dabrowski	Date: 9/11/07
Certification Date: 09/11/07		Certification Due: 09/11/08

BACKGROUND PLATEAU 43-68#095522 25FT CABLE 9/11/2007

900	0
950	0
1000	1
1050	0
1100	0
1150	0
1200	0
1250	0
1300	1
1350	1
1400	0
1450	2
1500	2
1550	8
1600	31
1650	57
1700	106
1750	207
1800	343
1850	946
1900	1425
1950	1799

ALPHA PLATEAU TH-230#119701 19,080DPM

900	0
950	0
1000	1
1050	0
1100	1
1150	261
1200	1833
1250	2848
1300	3379
1350	3610
1400	3745
1450	3685
1500	3673

BETA PLATEAU TC-99#099608 21,312DPM

1400	0
1450	4
1500	49
1550	425
1600	1363
1650	2540
1700	4051
1750	5323
1800	5546
1850	6270
1900	6452
1950	6964

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D3 in the Model 2350.
Today's date is 09/12/2007.
The current time of day is: 07:31:50.

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

Comments:

Model 2350 Serial # =	126172.
User I.D. =	
High Voltage =	1800 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	2.210000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-68B.
Detector Serial # =	095522.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.6 volts.

Model 2350 Serial #126172

H1800$M
Set High Voltage: 1800

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL2.210000E-05$D
Set Dead Time: 2.210000E-05

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

M43-68B$0
Set Detector Model: 43-68B

N095522$%
Set Detector Serial #: 095522

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP3$9
SAVE PARAMETERS AS D3

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Inc. - Instrument Services Facility		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2350-1	Serial Number: 98638
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range (CPM)	Calibration Standard Value (CPM)	Instrument Response (±10% of Calibration Standard)		Comments	
		Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-239 Rev 0	
400	400	400	400	Pulser: 101500	Cal Due: 10/06/07
4,000	4,000	4,005	4,005	DVM: 94710023	Cal Due: 09/18/08
40,000	40,000	40,126	40,126	D-814: 2551	Cal Due: 10/18/07
400,000	400,000	401,352	401,352	Humidity: 958670	Cal Due: 05/09/08
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	EPPROM Version: 37122N28	
600 (540-660)	600	609	609	Temp: 23.3 °C	
1,200 (1,080-1,320)	1,200	1,217	1,217	Pressure: 740mmHg	
1,800 (1,620-1,980)	1,800	1,820	1,820	Humidity: 47%	
Parameter	Tolerance (±10%)	As Found	As Left		
Threshold T = 100	10 ± (9 to 11) mVDC	9.6	9.6	Geotropism: SAT	ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	47.7	47.7	BAT>4.5: SAT	Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	95.0	95.0	Count: SAT	Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	10	10	Alarms: SAT	Lamp: SAT
Display-to-mV ratio:	100 to 10 mV			Overload Test: SAT	

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: Mike Paul	Reviewed By: Jeff Dulemso	Date: 9/27/07
Calibration Date: 09/27/07		Calibration Due: 09/27/08

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Tony Riggs		Serial Number: 012269
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION			
1) Source Nuclide: Cs^{137}	Serial Number: 019455	Activity: 5μCi nominal	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711	Activity: Variable	Certification Date: 07/19/07

Scaler Information		Precision Test	mR/Hr (Source #2)
2350-1	#98638	Count 1	2.02
Due Date	~~03/05/08~~ 9/27/08 MP	Count 2	2.00
Threshold	T=100 (10mV)	Count 3	2.03
Cable Length	5ft.	Average	2.01
D-814: 2551	Temp: 20.3°C	Tolerance ±10%	All counts within ±10% of Average
D-814: 2551	Press: 745mmHg	Pass/Fail	Pass
Humidity	Humidity: 50%		

Low Sample Activity (400uR/hr): Using Source #2 = 70,503	High Sample Activity (2mR/hr) Using Source #2 = 260,046	Dead Time (DT): 1.513073E-05	Calibration Constant (CC): 5.803654E+10

ATTACHMENTS			DETECTOR DATA: DOSE RATE PROBES (mR/Hr)			
Detector Setup Report	YES √	NO	Desired Exposure	Tolerance ±10%	As Found	As Left
Barcode Report	YES √	NO	0.400	0.360-0.440	0.401	0.401
Voltage Plateau:	YES √	NO	1	0.90-1.10	0.942	0.957
High Voltage: 1050V			2	1.8-2.2	2.02	2.00

COMMENTS

Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

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

Detector Certified By: M. Paul	Reviewed By: Jeff Robinson	Date: 9/6/07
Certification Date: 09/06/07		Certification Due: 09/06/08

BACKGROUND PLATEAU 44-10#012269 9/6/2007

700	73
750	142
800	221
850	393
900	448
950	533
1000	506
1050	518
1100	525
1150	568
1200	1152
1250	8566
1300	13527

SOURCE PLATEAU CS-137#019455

700	1550
750	2147
800	3187
850	3617
900	3984
950	4159
1000	4159
1050	4317
1100	4455
1150	4558
1200	5373
1250	4612
1300	6751
1350	6667

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 09/06/2007.
The current time of day is: 11:15:41.

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

Comments:

Model 2350 Serial # =	98638.
User I.D. =	
High Voltage =	1050 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.513073E-05.
Detector Calibration Constant =	5.803654E+10.
Detector Model =	44-10.
Detector Serial # =	012269.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.4 volts.

Model 2350 Serial #98638

H1050$J
Set High Voltage: 1050

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU4$F
Set Readout Units = R

SB2$.
Set Readout Time Base = hr

SM0$3
Set Readout Range Multiplier = auto

SL1.513073E-05$S
Set Dead Time: 1.513073E-05

SC5.803654E+10$V
Set Calibration Constant: 5.803654E+10

M44-10$K
Set Detector Model: 44-10

N012269$$
Set Detector Serial #: 012269

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP1$7
SAVE PARAMETERS AS D1

Duratek

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: 43-68A
Contact Name: Tony Riggs		Serial Number: 088917
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Th^{230}	Serial Number: 119704	Activity (dpm): 18,900	Certification Date: 10/14/97

Parameter	As Found	As Left	Precision Test	CPM (Source #1)
Count 1	3,152	3,152	Count 1(Heel)	3,120
Count 2	3,110	3,110	Count 2(Center)	3,135
Count 3	3,251	3,251	Count 3(Toe)	3,080
Average	3,171	3,171	Average	3,112
Background (cpm)	0.6	0.6	Tolerance	All counts within ±10% of Average
Net Counts	3,170	3,170	Pass/Fail	PASS
Efficiency	16.8%	16.8%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): 19.4E-6	Calibration Constant (CC): 1.0

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	98638	~~03/05/08~~ 9-27-08 MP	0.6	1350V	40 = 4mV

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

COMMENTS

Calibrated with 25Ft. Cable

Calibrated in accordance with CP-IN-WI-237 Rev 1

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: M. Paul	Reviewed By: Jeff Dickinson	Date: 9/11/07
Certification Date: 09/11/07		Certification Due: 09/11/08

background plateau 43-68#088917 25ft cable 9/11/2007

900	0
950	0
1000	0
1050	0
1100	0
1150	0
1200	0
1250	1
1300	2
1350	1
1400	5
1450	0
1500	4
1550	17
1600	20
1650	61
1700	186
1750	262
1800	337
1850	483
1900	644
1950	891

BETA PLATEAU TC-99#099608 21,312DPM

1400	1
1450	20
1500	247
1550	1005
1600	2232
1650	3681
1700	5018
1750	5374
1800	5440
1850	5977
1900	6359
1950	7275

ALPHA PLATEAU TH-230#119701 19,080DPM

900	126
950	0
1000	0
1050	0
1100	4
1150	1013
1200	2232
1250	2914
1300	3330
1350	3442
1400	3450
1450	3474
1500	3571

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D2 in the Model 2350.
Today's date is 09/12/2007.
The current time of day is: 07:25:40.

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

Comments:

Model 2350 Serial # =	98638.
User I.D. =	
High Voltage =	1350 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.940000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-68A.
Detector Serial # =	088917.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.5 volts.

Model 2350 Serial #98638

H1350$M
Set High Voltage: 1350

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL1.940000E-05$M
Set Dead Time: 1.940000E-05

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

M43-68A$%
Set Detector Model: 43-68A

N088917$9
Set Detector Serial #: 088917

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP2$8
SAVE PARAMETERS AS D2

Duratek

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: Tony Riggs		Serial Number: 088917
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Tc^{99}	Serial Number:129647	Activity (dpm): 24,018	Certification Date: 04/01/95

Parameter	As Found	As Left	Precision Test	CPM (Source #1)
Count 1	5,859	5,859	Count 1(Heel)	5,602
Count 2	5,723	5,723	Count 2(Center)	5,938
Count 3	5,945	5,945	Count 3(Toe)	5,704
Average	5,842	5,842	Average	5,748
Background (cpm)	335.6	335.6	Tolerance	All counts within ±10% of Average
Net Counts	5,506	5,506	Pass/Fail	PASS
Efficiency	22.9%	22.9%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): 22.1E-6	Calibration Constant (CC): 1.0

SCALER INFORMATION		DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	98638	~~03/05/08~~ 9/27/08 mp	335.6	1800V	40 = 4mV

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

COMMENTS

Calibrated with 25Ft. Cable

Calibrated in accordance with CP-IN-WI-237 Rev 1

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: M. Paul	Reviewed By: Jeff Dubinsky	Date: 9/11/07
Certification Date: 09/11/07		Certification Due: 09/11/08

background plateau 43-68#088917 25ft cable 9/11/2007

900	0
950	0
1000	0
1050	0
1100	0
1150	0
1200	0
1250	1
1300	2
1350	1
1400	5
1450	0
1500	4
1550	17
1600	20
1650	61
1700	186
1750	262
1800	337
1850	483
1900	644
1950	891

BETA PLATEAU TC-99#099608 21,312DPM

1400	1
1450	20
1500	247
1550	1005
1600	2232
1650	3681
1700	5018
1750	5374
1800	5440
1850	5977
1900	6359
1950	7275

ALPHA PLATEAU TH-230#119701 19,080DPM

900	126
950	0
1000	0
1050	0
1100	4
1150	1013
1200	2232
1250	2914
1300	3330
1350	3442
1400	3450
1450	3474
1500	3571

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D3 in the Model 2350.
Today's date is 09/12/2007.
The current time of day is: 07:26:16.

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

Comments:

Model 2350 Serial # =	98638.
User I.D. =	
High Voltage =	1800 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	2.210000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-68B.
Detector Serial # =	088917.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.5 volts.

Model 2350 Serial #98638

H1800$M
Set High Voltage: 1800

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL2.210000E-05$D
Set Dead Time: 2.210000E-05

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

M43-68B$0
Set Detector Model: 43-68B

N088917$9
Set Detector Serial #: 088917

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP3$9
SAVE PARAMETERS AS D3

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-37A
Contact Name: Tony Riggs		Serial Number: 190946
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

Source Nuclide: Th^{230}	Serial Number: 119704	Activity: 18,900 dpm	Certification Date: 10/14/97

Parameter	As Found	As Left	Precision Test	CPM
Count 1	3,409	3,409	Count 1 (Heel)	3,460
Count 2	3,356	3,356	Count 2 (Center)	3,188
Count 3	3,190	3,190	Count 3 (Toe)	3,260
Count 4	3,164	3,164	Average	3,303
Count 5	3,254	3,254	Tolerance	±10%
Count 6	3,238	3,238	Pass/Fail	Pass
Average	3,269	3,269		
Background (CPM)	8.6	8.6		
Net Counts	3,260	3,260		
Efficiency	17.3%	17.3%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): $19.3E^{-06}$	Calibration Constant (CC): 1.0

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	98638	9/27/08 ~~03/05/08~~	8.6	1400V	40 = 4 mV

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

COMMENTS

Caled in accordance with CP-IN-WI-239
10 minute background performed
Efficiency performed on contact with 6Ft. cable

STATEMENT OF CERTIFICATION

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

Detector Certified By:	Reviewed By:	Date: 9/6/07
Certification Date: 09/06/07		Certification Due: 09/06/08

background plateau 43-37#190946 9/6/2007

900	0
950	0
1000	0
1050	0
1100	0
1150	3
1200	3
1250	5
1300	8
1350	7
1400	3
1450	11
1500	5
1550	16
1600	61
1650	135
1700	274
1750	447
1800	818
1850	1145
1900	1203
1950	1235

alpha plateau Th-230#119738 18,600dpm

900	0
950	6
1000	0
1050	0
1100	2
1150	706
1200	2620
1250	3371
1300	3596
1350	3695
1400	3649
1450	3686
1500	3825

beta plateau Tc-99#099608 21,312dpm

1400	6
1450	10
1500	15
1550	133
1600	832
1650	1825
1700	3003
1750	4129
1800	5373
1850	5748
1900	5666
1950	6580

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D4 in the Model 2350.
Today's date is 09/06/2007.
The current time of day is: 11:18:49.

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

Comments:

Model 2350 Serial # =	98638.
User I.D. =	
High Voltage =	1400 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	1.930000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-37A.
Detector Serial # =	190946.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.4 volts.

Model 2350 Serial #98638

H1400$I
Set High Voltage: 1400

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL1.930000E-05$L
Set Dead Time: 1.930000E-05

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

*M43-37A$ *
Set Detector Model: 43-37A

N190946$5
Set Detector Serial #: 190946

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP4$A
SAVE PARAMETERS AS D4

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-37B
Contact Name: Tony Riggs		Serial Number: 190946
Customer Purchase Order Number: N/A	Work Order Number: 2007-04654	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

Source Nuclide: Tc^{99}	Serial Number: 129647	Activity: 24,018 dpm	Certification Date: 04/01/95

Parameter	As Found	As Left	Precision Test	CPM
Count 1	6,756	6,756	Count 1 (Heel)	6,684
Count 2	6,817	6,817	Count 2 (Center)	6,634
Count 3	6,614	6,614	Count 3 (Toe)	6,547
Count 4	6,621	6,621	Average	6,622
Count 5	6,673	6,673	Tolerance	±10%
Count 6	6,521	6,521	Pass/Fail	Pass
Average	6,667	6,667		
Background (CPM)	1,170	1,170		
Net Counts	5,497	5,497		
Efficiency	22.9%	22.9%		

Low Sample Activity: Source #: N/A	High Sample Activity: Source #: N/A	Dead Time (DT): $22.4E^{-06}$	Calibration Constant (CC): 1.0

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2350-1	98638	9/27/08 MP ~~03/05/08~~	1,170	1850V	40 = 4 mV

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 6Ft. cable

STATEMENT OF CERTIFICATION

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

Detector Certified By: M. Pauli	Reviewed By: "Jeff Dickerson"	Date: 9/6/07
Certification Date: 09/06/07		Certification Due: 09/06/08

background plateau 43-37#190946 9/6/2007

900	0
950	0
1000	0
1050	0
1100	0
1150	3
1200	3
1250	5
1300	8
1350	7
1400	3
1450	11
1500	5
1550	16
1600	61
1650	135
1700	274
1750	447
1800	818
1850	1145
1900	1203
1950	1235

alpha plateau Th-230#119738 18,600dpm

900	0
950	6
1000	0
1050	0
1100	2
1150	706
1200	2620
1250	3371
1300	3596
1350	3695
1400	3649
1450	3686
1500	3825

beta plateau Tc-99#099608 21,312dpm

1400	6
1450	10
1500	15
1550	133
1600	832
1650	1825
1700	3003
1750	4129
1800	5373
1850	5748
1900	5666
1950	6580

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D5 in the Model 2350.
Today's date is 09/06/2007.
The current time of day is: 11:19:07.

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

Comments:

Model 2350 Serial # =	98638.
User I.D. =	
High Voltage =	1850 volts.
Threshold =	40.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	60 seconds.
Readout Units =	counts.
Readout Time Base =	min.
Readout Range Multiplier =	auto.
Detector Dead Time =	2.240000E-05.
Detector Calibration Constant =	1.000000E+00.
Detector Model =	43-37B.
Detector Serial # =	190946.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.4 volts.

Model 2350 Serial #98638

H1850$R
Set High Voltage: 1850

T40$T
Set Threshold: 40

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F60$H
Set Scaler Count Time: 60

SU7$I
Set Readout Units = counts

SB1$-
Set Readout Time Base = min

SM0$3
Set Readout Range Multiplier = auto

SL2.240000E-05$G
Set Dead Time: 2.240000E-05

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

M43-37B$$
Set Detector Model: 43-37B

N190946$5
Set Detector Serial #: 190946

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

K1000000$H
Set Scaler Alarm: 1000000

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

SP5$B
SAVE PARAMETERS AS D5

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2360	Serial Number: 193676
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2007-04596	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Ratemeter Response (± 10%)		Calibration Standard Value CPM	Time Base (minutes)	Tolerances (cpm) ± 2%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	40,000 CPM	0.1	3920– 4080	4018	4018
X 1	400	400	400	40,000 CPM	0.5	19.6k – 20.4k	20,090	20,090
X 10	1,000	1,000	1,000	40,000 CPM	1.0	39.2k– 40.8k	40,181	40,181
X 10	4,000	4,000	4,000					
X 100	10,000	10,000	10,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	400,000	400,000	400,000					
				Calibrated in accordance with OEM Technical Manual				

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: 08/15/07
Calibration Date: 08/14/2007	Calibration Date: 08/14/2008

Duratek

Model: 2360 Serial Number: 193676

M&TE					Environmental Conditions		
Volt Meter	ID#	6565015	Cal Due:	10/30/07	Barometer	ID# 2551	Cal Due: 10/18/07
Pulser	ID#	101500	Cal Due:	10/06/07	Thermometer	ID# 2551	Cal Due: 10/18/07
Humidity	ID#	958670	Cal Due:	05/09/08	Temp: 20.7 °C	Pressure: 740 mmHg	Humidity: 47%

Special Test

BAT Check	Sat (√) Unsat ( )	Geotropism	Sat (√) Unsat ( )
LCD Display Check	Sat (√) Unsat ( )	Audio Check	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )	Low BAT Set	Sat (√) Unsat ( )
Reset	Sat (√) Unsat ( )		
HV Analog Display	Sat (√) Unsat ( )		

High Voltage Calibration (± 10%)

Voltage	Tolerance	As Found	As Left	**As Found	As Left
500	450-550	508	508	Alpha Sensitivity = 107 mv	Alpha Sensitivity = 120 mv
1000	900-1100	1009	1009	Beta Sensitivity = 3.0mv	Beta Sensitivity = 3.5mv
1500	1350-1650	1,526	1,526	Beta Window = 26 mv	Beta Window = 30 mv
H.V. Set With Detector Not Connected				Overload to be set with detector to be used	

COMMENTS

Calibrated in accordance with OEM Technical Manual

See detector certificate for High Voltage setting

Calibrated with 25ft cable

** Previously calibrated with 5 foot

Instrument Calibrated By:	Reviewed By: Date: 08/15/07
Calibration Date: 08/14/2007	Calibration Due: 08/14/2008

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2360	Serial Number: 164680
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2007-04776	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Ratemeter Response		Calibration Standard Value (cpm)	Time Base (minutes)	Tolerances (cpm) ± 2%	Scaler Response (cpm)	
		As Found	As Left				As Found	As Left
X 1	100	100	100	40,000	1	39.2K-40.8K	40,300	40,300
X 1	200	200	200					
X 1	400	400	400					
X 10	1,000	1,000	1,000					
X 10	2,000	2,000	2,000					
X 10	4,000	4,000	4,000					
X 100	10,000	10,000	10,000					
X 100	20,000	20,000	20,000					
X 100	40,000	40,000	40,000	Calibrated in accordance with OEM Technical Manual				
X 1000	100,000	100,000	100,000					
X 1000	200,000	200,000	200,000					
X 1000	400,000	400,000	400,000					

STATEMENT OF CERTIFICATION

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

Instrument Calibrated By:	Reviewed By: Date: 11/15/07
Calibration Date: 11/15/2007	Calibration Due: 11/15/2008

Model: 2360 Serial Number: 164680

M&TE				Environmental Conditions		
Volt Meter	ID# 6565015	Cal Due:	11/01/08	Barometer	ID# 2816	Cal Due: 05/15/08
Pulser	ID# 120935	Cal Due:	08/15/08	Thermometer	ID# 2816	Cal Due: 05/15/08
Humidity	ID# 958670	Cal Due:	05/09/08	Temp: 24.0 °C	Pressure: 737 mmHg	Humidity: 43%

Special Test			
Geotropism	Sat (√) Unsat ( )	As Found	As Left
Audio Check	Sat (√) Unsat ( )	Alpha Sensitivity = 120mv	Alpha Sensitivity = 120mv
Mechanical Zero	Sat (√) Unsat ( )	Beta Sensitivity = 3.5mv	Beta Sensitivity = 3.5mv
Reset	Sat (√) Unsat ( )	Beta Window = 30mv	Beta Window = 30mv
HV Analog Display	Sat (√) Unsat ( )		
Battery Check/Set	Sat (√) Unsat ( )		

High Voltage Calibration							
Voltage	Tolerance	As Found	As Left				
500	450-550	503	503				
1000	900-1100	1,001	1,001				
1500	1350-1650	1,490	1,490				
H.V. Set With Detector Not Connected							

COMMENTS

See detector certificate for specific High Voltage setting. Calibrated with 6ft cable.

Instrument Calibrated By:	Reviewed By: Date: 11/15/07
Calibration Date: 11/15/2007	Calibration Due: 11/15/2008

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2360	Serial Number: 193667
Contact Name: Tony Riggs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2007-04596	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Ratemeter Response (± 10%)		Calibration Standard Value CPM	Time Base (minutes)	Tolerances (cpm) ± 2%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	40,000 CPM	0.1	3920– 4080	4026	4018
X 1	400	400	400	40,000 CPM	0.5	19.6k – 20.4k	20,130	20,130
X 10	1,000	1,000	1,000	40,000 CPM	1.0	39.2k– 40.8k	40,258	40,258
X 10	4,000	4,000	4,000					
X 100	10,000	10,000	10,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	400,000	400,000	400,000					
				Calibrated in accordance with OEM Technical Manual				

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: 08/15/07
Calibration Date: 08/15/2007	Calibration Due: 08/15/2008

Duratek

Model: 2360 Serial Number: 193667

M&TE				Environmental Conditions		
Volt Meter	ID# 6565015	Cal Due:	10/30/07	Barometer	ID# 2551	Cal Due: 10/18/07
Pulser	ID# 101500	Cal Due:	10/06/07	Thermometer	ID# 2551	Cal Due: 10/18/07
Humidity	ID# 958670	Cal Due:	05/09/08	Temp: 19.5 °C	Pressure: 739 mmHg	Humidity: 53%

Special Test

BAT Check	Sat (√) Unsat ( )	Geotropism	Sat (√) Unsat ( )
LCD Display Check	Sat (√) Unsat ( )	Audio Check	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )	Low BAT Set	Sat (√) Unsat ( )
Reset	Sat (√) Unsat ( )		
HV Analog Display	Sat (√) Unsat ( )		

High Voltage Calibration (± 10%)

Voltage	Tolerance	As Found	As Left	**As Found		As Left	
500	450-550	502	502	Alpha Sensitivity =	145 mv	Alpha Sensitivity =	120 mv
1000	900-1100	1004	1004	Beta Sensitivity =	3.0mv	Beta Sensitivity =	3.5mv
1500	1350-1650	1,517	1,517	Beta Window =	26 mv	Beta Window =	30 mv
H.V. Set With Detector Not Connected				Overload to be set with detector to be used			

COMMENTS

Calibrated in accordance with OEM Technical Manual

See detector certificate for High Voltage setting

Calibrated with 25ft cable

** Previously calibrated with 5 foot

Instrument Calibrated By:	Reviewed By: Date: 08/15/07
Calibration Date: 08/15/2007	Calibration Due: 08/15/2008

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Road Kingston, TN 37763		Detector Model: 43-37
Contact Name: Tony Riggs		Serial Number: 092765
Customer Purchase: Order Number: N/A	Work Order Number: 2007-04776	Evaluation Method: Source

DETECTOR EVALUATION INFORMATION

Source Nuclide	Serial Number	Certification Date	Activity (dpm)	Net Response (cpm)	Efficiency (%)
Th-230	060101	11/28/00	27,060	3,633	13.4%
Tc-99	119718	10/14/97	20,520	4,047	19.7%

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2360	164680	11/15/2008	α = 3	1675V	α (120mV)
2360	164680	11/15/2008	β = 433	1675V	β (3.5-30mV)

ATTACHMENTS

Voltage Plateau: √YES NO MDA/Cross Talk Evaluation: √YES NO

COMMENTS	LINEARITY TEST performed with Tc^{99} #119718 (Average used for Tc^{99} Efficiency)			
Calibrated with 6ft cable Calibrated in accordance with original equipment technical manual.	Count 1 (Left Toe)	4,496cpm	Count 1 (Right Toe)	4,721cpm
	Count 2 (Left Mid)	4,476cpm	Count 2 (Right Mid)	4,485cpm
	Count 3 (Left Heel)	4,572cpm	Count 3 (Right Heel)	4,623cpm
			Average	4,562cpm
			Pass/Fail	PASS (+/-10% Tolerance)

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: [signature] Reviewed By: [signature] Date: 11/15/07

Certification Date: 11/15/2007 Certification Due: 11/15/2008

Detector 43-37 #092765 Raw Data (Counts)										
	Background		Th-230		Tc-99		N/A		N/A	
Voltage	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1625	1	255	2978	1413	2	3564				
1650	7	376	3298	1487	7	4069				
1675	**3**	**452**	**3464**	**1645**	**2**	**4326**				
1700	8	592	3965	1768	8	4531				

Source Info

Nuclide	**Th-230**	**Tc-99**	**N/A**	**N/A**
ID	60101	119718		
Initial DPM	27060	20,520		
Certification Date	11/28/2000	10/14/1997		
Today's Date	11/15/2007	11/15/2007	########	########
Source Age (Years)	6.96	10.09	107.87	107.87
Half-Life (Years)	7.70E+04	2.13E+05		
Corrected Activity	27058	20519	#DIV/0!	#DIV/0!

Net CPM (Efficiencies determined below only used for selecting operating voltage)														
	MDA/Cross-Talk			Beta Eff.	Alpha Eff.	Th-230		Tc-99		N/A		N/A	
Voltage	Beta MDA	Alpha MDA	Beta-Alpha	(%)	(%)	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1625	477.5	66.9	0.06%	16.13%	11.0%	2977	1158	1	3309	-1	-255	-1	-255
1650	516.3	123.5	0.17%	18.00%	12.2%	3291	1111	0	3693	-7	-376	-7	-376
1675	**538.3**	**84.2**	**0.05%**	**18.88%**	**12.8%**	**3461**	**1193**	**-1**	**3874**	**-3**	**-452**	**-3**	**-452**
1700	603.8	108.5	0.18%	19.20%	14.6%	3957	1176	0	3939	-8	-592	-8	-592
1725	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1725	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1750	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1775	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0

Performed By: Greg [illegible] Date: 11/15/07

Reveiwed By: Jeff Dickinson Date: 11/15/07

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Road, Kingston, TN 37763		Detector Model: 43-68
Contact Name: Tony Riggs		Serial Number: 120548
Customer Purchase: Order Number: N/A	Work Order Number: 2007-04776	Evaluation Method: Source

DETECTOR EVALUATION INFORMATION

Source Nuclide	Serial Number	Activity (dpm)	Net Response (cpm)	Efficiency (%)
Th^{230}	119702	20,580	1,194	5.8%
Tc^{99}	099608	21,312	3,901	18.3%

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2360	193667	08/15/2008	0	1700V	Alpha (120mV)
2360	193667	08/15/2008	156	1700V	Beta (3.5-30mV)

ATTACHMENTS

Voltage Plateau: √YES NO MDA/Cross Talk Evaluation: √YES NO

COMMENTS	Linearity Test (Gross Counts)	
Calibrated with 25 foot cable	Heel	3,955
Detector has two layers of Mylar (0.8mg/cm^2) total	Center	4,257
Precision test performed with Tc^{99} #099608.	Toe	3,960
Calibrated in accordance with original equipment technical manual.	Average	4,057
5 minute background performed	Pass/Fail	PASS (+/-10% Tolerance)

STATEMENT OF CERTIFICATION

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

Detector Certified By: Mike Paul Reviewed By: Jeff Dubinson Date: 11/15/07

Certification Date: 11/15/07 Certification Due: 11/15/08

HV and MDA Data Sheet Only

Detector 43-68 #120548 Raw Data (Counts)										
	Background		Pu-239		Tc-99		N/A		N/A	
Voltage	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1650	0	68	685	372	0	3325				
1675	1	106	1035	374	1	3996				
1700	**0**	**161**	**1093**	**375**	**0**	**4240**				
1725	0	207	1305	412	0	4055				
1750	2	204	1506	449	6	3707				
1775	4	235	1761	417	82	3032				

Source Info

Nuclide	**Pu-239**	**Tc-99**	**N/A**	**N/A**
ID	19442	119715		
Initial DPM	13613	21900		
Certification Date	6/1/1992	10/14/1997		
Today's Date	11/15/2007	11/15/2007	11/15/2007	11/15/2007
Source Age (Years)	15.46	10.09	107.87	107.87
Half-Life (Years)	2.41E+04	2.13E+05		
Corrected Activity	13607	21899	#DIV/0!	#DIV/0!

Net CPM (Efficiencies determined below only used for selecting operating voltage)														
	MDA/Cross-Talk			Beta Eff.	Alpha Eff.	Pu-239		Tc-99		N/A		N/A	
Voltage	Beta MDA	Alpha MDA	Beta-Alpha	(%)	(%)	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1650	276.2	53.8	0.0%	14.87%	5.0%	685	304	0	3257	0	-68	0	-68
1675	284.9	96.9	0.0%	17.76%	7.6%	1034	268	0	3890	-1	-106	-1	-106
1700	**331.5**	**33.7**	**0.0%**	**18.63%**	**8.0%**	**1093**	**214**	**0**	**4079**	0	-161	0	-161
1725	396.4	28.3	0.0%	17.57%	9.6%	1305	205	0	3848	0	-207	0	-207
1750	432.4	84.0	0.2%	16.00%	11.1%	1504	245	4	3503	-2	-204	-2	-204
1775	579.7	93.1	2.6%	12.77%	12.9%	1757	182	78	2797	-4	-235	-4	-235
	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0

Performed By: Mike Paul Date: 11-15-07

Reveiwed By: Jeff Dickinson Date: 11-15-07

Duratek

CALIBRATION CERTIFICATE

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

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

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Road, Kingston, TN 37763		Detector Model: 43-68
Contact Name: Tony Riggs		Serial Number: 119337
Customer Purchase: Order Number: N/A	Work Order Number: 2007-04776	Evaluation Method: Source

DETECTOR EVALUATION INFORMATION

Source Nuclide	Serial Number	Activity (dpm)	Net Response (cpm)	Efficiency (%)
Th^{230}	119702	20,580	1,286	6.2%
Tc^{99}	099608	21,312	3,922	18.4%

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2360	193676	08/14/2008	0.4	1700V	Alpha (120mV)
2360	193676	08/14/2008	182.8	1700V	Beta (3.5-30mV)

ATTACHMENTS

Voltage Plateau: √YES NO MDA/Cross Talk Evaluation: √YES NO

COMMENTS	Linearity Test (Gross Counts)	
Calibrated with 25 foot cable	Heel	4,129
Detector has two layers of Mylar (0.8mg/cm^2)	Center	4,114
Precision test performed with Tc^{99} #099608.	Toe	4,071
Calibrated in accordance with original equipment technical manual.	Average	4,105
5 minute background performed	Pass/Fail	PASS (+/-10% Tolerance)

STATEMENT OF CERTIFICATION

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

Detector Certified By: Mike Paul	Reviewed By: J. Robinson	Date: 11/15/07
Certification Date: 11/15/07	Certification Due: 11/15/08	

HV and MDA Data Sheet Only

Detector 43-68 #119337 Raw Data (Counts)										
	Background		Pu-239		Tc-99		N/A		N/A	
Voltage	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1650	0	91	734	328	1	3939				
1675	0	121	942	323	0	4339				
1700	**0**	**145**	**1263**	**361**	**0**	**4247**				
1725	1	223	1320	400	4	3586				
1750	0	243	1544	368	41	3059				
1775	4	177	1839	476	271	2148				

Source Info

Nuclide	**Pu-239**	**Tc-99**	**N/A**	**N/A**
ID	19442	99608		
Initial DPM	13613	21312		
Certification Date	6/1/1992	8/8/1996		
Today's Date	11/15/2007	11/15/2007	11/15/2007	11/15/2007
Source Age (Years)	15.46	11.27	107.87	107.87
Half-Life (Years)	2.41E+04	2.13E+05		
Corrected Activity	13607	21311	#DIV/0!	#DIV/0!

Net CPM (Efficiencies determined below only used for selecting operating voltage)														
	MDA/Cross-Talk			Beta Eff.	Alpha Eff.	Pu-239		Tc-99		N/A		N/A	
Voltage	Beta MDA	Alpha MDA	Beta-Alpha	(%)	(%)	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1650	260.8	50.2	0.0%	18.06%	5.4%	734	237	1	3848	0	-91	0	-91
1675	272.3	39.1	0.0%	19.79%	6.9%	942	202	0	4218	0	-121	0	-121
1700	**305.2**	**29.2**	**0.0%**	**19.25%**	**9.3%**	**1263**	**216**	**0**	**4102**	0	-145	0	-145
1725	457.5	76.0	0.1%	15.78%	9.7%	1319	177	3	3363	-1	-223	-1	-223
1750	569.4	23.9	1.3%	13.21%	11.3%	1544	125	41	2816	0	-243	0	-243
1775	698.6	89.1	11.2%	9.25%	13.5%	1835	299	267	1971	-4	-177	-4	-177
1800	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1825	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1850	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0

Performed By: Mike Pauli Date: 11-15-07

Reveiwed By: [signature] Date: 11-15-07

Energy Solutions

Daily Response
Checks

(Alpha & Beta)

L2350-1
126172

43-68
095522

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-29-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	119704
Instrument Serial No.	126172	9-27-08	2799	3421	16.5%	Certification Date	10-14-97
Detector Model No.	43-68A	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft. ☒ Cable Length 25 ft. ☐ Temperature ____ °F			Nuclide	Th-230
Detector Serial No.	095522	9-11-08				Activity in dpm (S_{dpm})	18,900

SECTION 1 Reviewed By: Paul C Ely Date: 11/29/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* Sat	✓		10	37	3.7	3083	3079	3086	3082	3174	3170	3110	✓		16.5%	V. Baldwin / VB	11-29-07 850
Sat		✓	10	36	3.6	2993	2989	3022	3018	3107	3103	3037	✓		16.1%	V. Baldwin / VB	11-29-07 2055
Sat	✓		10	25	2.5	3073	3070	3080	3077	3145	3142	3096	✓		16.4%	V. Baldwin / VB	11-30-07 0740
** SAT	✓		10	71	7	3268	3261	3347	3346	3402	3395	3332	✓		18.9%	D. Schumaker	11-30-07 1220
Sat		✓	10	52	5	3211	3204	3302	3297	3396	~~3396~~ 3391	3298	✓		17.4%	V. Baldwin / VB	11-30-07 2000
Sat	✓		10	19	2	3292	3290	3341	3339	3576	3574	3401	✓		18.0%	V. Baldwin / VB	12-1-07 0720
Sat		✓	10	29	3	3247	3244	3281	3278	3504	3501	3341	✓		17.7%	V. Baldwin / VB	12-1-07 1720
Sat	✓		10	22	2	3214	3212	3328	3326	3337	3335	3291	✓		17.4%	V. Baldwin / VB	12-3-07 0720

REMARKS: * Initial Response ** Response Test AFTER Replacing Mylar.

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	126172	9-27-08	43-68A	095522	119704

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by (See Note 1)	
							Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)							
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Mean Net Source Count Rate MNSCR	Eff	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
Sat		✓	10	8.1	8	1	3246	3238	3274	3266	3406	3398	3301	17.5	✓		V. Baldwin/VB	12-3-07 1815
SAT	✓		10	32	3.2	1	3114	3111	3296	3293	3450	3447	3284	17.3	✓		D. Schumaker DS	12-4-07 0630
Sat		✓	10	81	8	1	3067	3059	3246	3238	3353	3345	3214	17.0	✓		V. Baldwin/VB	12-4-07 1615

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-29-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	129647
Instrument Serial No.	126172	9-27-08	4649	5682	21.4%	Certification Date	4-1-95
Detector Model No.	43-68B	Cal Due Date	Operating Conditions: ☒Normal ☐ Abnormal ☐ Altitude____ft. ☒Cable Length 25 ft. ☐ Temperature ____ ☐F			Nuclide	Tc-99
Detector Serial No.	095522	9-11-08				Activity in dpm (S_{dpm})	24,108

SECTION 1 Reviewed By: Paul C Ely Date: 11/29/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

	Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
	Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
*	Sat	✓		10	2671	267	5447	5180	5248	4981	5600	5333	5165	✓		21.4%	V.Baldwin/VB	11-29-07 1900
	Sat		✓	10	2679	15 Sep 07 ~~6~~268	5344	5076	5460	5601	5603	5429	5429		✓	22.5%	V.Baldwin/VB	11-29-07 2100
	Sat	✓		10	2532	253	5218	4965	5205	4952	5663	5410	5109	✓		21.2%	V.Baldwin/VB	11-30-07
**	SAT	✓		10	3762	376	5581	5205	5656	5280	5915	5539	5341	✓		22.0%	D.Schumacher	11-30-07 1200
	Sat		✓	10	2057	206	5101	4895	5416	5210	5759	5553	5219	✓		21.6%	V.Baldwin/VB	11-30-07 2005
	Sat	✓		10	2326	233	~~5516~~ 5308 VB 12-1-07	5075	5589	5356	5773	5540	5324	✓		22.1%	V.Baldwin/VB	12-1-07 0725
	Sat		✓	10	2507	251	5406	5155	5590	5339	5829	5578	5357	✓		22.2%	V.Baldwin/VB	12-1-07 1725
	Sat	✓		10	2460	246	5369	5123	5378	5132	5652	5406	5220	✓		21.7%	V.Baldwin/VB	12-3-07 0735

REMARKS: * Initial Response test. ** DS 11-30-07 ~~Initial~~ Response Test after replacing mylar.

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	126172	9-27-08	43-68 B	095522	129647

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by See Note 1	
							Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)							
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Mean Net Source Count Rate MNSCR	Eff	Pass	Fail	Technician (Name Printed & Initiated)	Date/ Time
Sat		✓	10	2263	226	1	5225	4999	5394	5168	5720	5494 ~~5296~~	5220	% 22.0	✓		V. Baldwin/VB	12-3-07 1835
SAT	✓		10	2570	257	1	5383	5126	5479	5222	5698	5441	5263	21.8	✓		D. Schumacher DS	12-4-07 0630
Sat		✓	10	2859	286	1	5363	5077	5556	5270	5831	5545	5393	22.4	✓		V. Baldwin	12-4-07 1615

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

Energy Solutions Instrument

(Alpha / Beta)

Daily Response Checks

L2360

193667

43-68

PR119337

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-26-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2360	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	119704
Instrument Serial No.	193667	8-15-08	1071	1309	6.30%	Certification Date	10-14-97
Detector Model No.	43-68	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft			Nuclide	Th-230
Detector Serial No.	PR119337	11-15-08	☒ Cable Length 25 ft ☐ Temperature ____ °F			Activity in dpm (S_{dpm})	18,900

SECTION 1 Reviewed By: Paul C Ely Date: 11/29/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* SAT	✓		10	10	1	1174	1173	1198	1197	1202	1201	1190	✓		6.30%	V. Baldwin / VB	11-26-07 1700 **
SAT	✓		10	0	0	1154	1154	1092	1092	1164	1164	1137	✓		6.0%	V. Baldwin / VB	11-27-07 1300
SAT		✓	10	27	3	1083	1080	1045	1043	1193	1190	1104	✓		5.8%	V. Baldwin / VB	11-27-07 1720
SAT	✓		10	8	.8	1060	1059	1252	1251	1117	1116	1142	✓		6.0%	S. Holladay / SH	11-28-07 0840
SAT		✓	10	12	1.2	1211	1210	1267	1266	1150	1149	1208	✓		6.3%	S. Holladay / SH	11-28-07 1850
SAT	✓		10	3	.3	1131	1131	1212	1212	997	997	1113	✓		5.9%	S. Holladay / SH	11-29-07 0705
Sat		✓	10	15	2.0	1168	1166	1140	1138	1229	1227	1177	✓		6.2%	V. Baldwin / VB	11-29-07 2000
SAT	✓		10	6	.6	1155	1154	1037	1036	1179	1178	1122	✓		5.9%	S. Holladay / SH	11-30-07 0740

REMARKS: Alpha * Initial Response test.

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 11/29/07

* This instrument was not used for surveys on 11/26/07 and therefore a post-use source check was not required. PCEly 12/3/07

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
236D	193667	8-15-08	43-68	PR 119337	119704

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by See Note 1	
							Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)							
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Mean Net Source Count Rate MNSCR	% Eff	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT		✓	10	21	2.1	1	1093	1090	994	991	1124	1121	1067	5.6	✓		MChase/MC	11-30-07 1945
Sat	✓		10	9	0.9	1	1151	1150	1049	1048	1258	1257	1152	6.1	✓		N.Baldwin/NB	12-1-07 0700
SAT		✓	10	19	1.9	1	1232	1230	1093	1091	1272	1270	1197	6.0	✓		D.Schumacher RB	12-1-07 1515
Sat	✓		10	6	0.6	1	1200	1199	1032	1031	1272	1271	1167	6.2	✓		V.Baldwin/VB	12-3-07 0710
		✓	10	20	2	1	1180	1178	1103	1101	1242	1240	1173	6.2	✓		V.Baldwin/VB	12-3-07 1755

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

Alpha

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-26-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2360	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	129647
Instrument Serial No.	193667	8-15-08	3997	4885	18.4%	Certification Date	4-1-95
Detector Model No.	43-68	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft. ☒ Cable Length 25 ft. ☐ Temperature ____ ☐F			Nuclide	Tc-99
Detector Serial No.	PR119337	11-15-08				Activity in dpm (S_{dpm})	24,108

SECTION 1 Reviewed By: Paul C Ely Date: 11/29/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* Sat	✓		10	1542	154	4508	4394	4693	4539	4584	4430	4441	✓		18.4%	V. Baldwin / VB	11-26-07 1700
Sat	✓		10	1394	139	4658	4519	4715	4576	4693	4554	4550	✓		18.9%	V. Baldwin / VB	11-27-07 1330
Sat		✓	10	1598	160	4528	4368	4526	4366	4605	4445	4393	✓		18.2%	V. Baldwin / VB	11-27-07 1720
Sat	✓		10	1481	148	4848	4700	5053	4905	4575	4427	4677	✓		19.4%	S. Holladay / SH	11-28-07 0855
Sat		✓	10	1653	165	4511	4346	4572	4407	4572	4407	4388	✓		18.2%	S. Holladay / SH	11-28-07 1855
Sat	✓		10	1480	148	4691	4543	4761	4613	4720	4572	4576	✓		19%	S. Holladay / SH	11-29-07 0655
Sat		✓	10	1402	140	4640	4500	4854	4714	4778	4638	4617	✓		19.2%	V. Baldwin / VB	11-29-07 1950
Sat	✓		10	1457	146	4920	4774	4766	4620	4939	4791	4728	✓		20%	S. Holladay / SH	11-30-07 0720

REMARKS: Beta * Initial response test.

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 11/29/07

Beta

64 of 92

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2360	193667	8-15-08	43-68	PR 119337	129647

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by (See Note 1)	
							Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)							
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Mean Net Source Count Rate MNSCR	% Eff	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
Sat		✓	10	1424	142	1	4736	4594	4601	4459	4722	4580	4544	18.8	✓		M Chase / MC	11-30-07 1930
Sat	✓		10	1524	152	1	4406	4254	4599	4447	4616	4464	4388	18.2	✓		V. Baldwin / VB	12-1-07 0700
SAT		✓	10	1624	162	1	4482	4320	4512	4350	4429	4267	4312	18.0	✓		D. Schumacher	12-1-07 1500
Sat	✓		10	1372	137	1	4631	4494	4577	4440	4732	4595	4510	18.7	✓		V. Baldwin / VB	12-3-07 0715
Sat		✓	10	1565	157	1	4549	4392	4603	4446	4702	4545	4461	18.5	✓		V. Baldwin / VB	12-3-07 1750

REMARKS: Beta

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: [signature] Date: 11-29-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2360	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	129 647
Instrument Serial No.	193676	8-14-08	3758	4594	17.3%	Certification Date	4-1-97
Detector Model No.	43-68	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude_____ft. ☐ Cable Length 25 ft. ☐ Temperature ____ ☐F			Nuclide	Tc-99
Detector Serial No.	120548	11-15-08				Activity in dpm (S_{dpm})	24,108

SECTION 1 Reviewed By: Paul C Ely Date: 11/29/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* Sat	✓		10	503	50.3	4113	4063	4450	4399	4116	4066	4176	✓		17.3%	M Chase / MC	11-29-07 1030
Sat		✓	10	1249	124	4299	4175	3985	3861	4586	4462	4166	✓		17.2%	M. Chase / MC	11-29-07 1030

N/A

REMARKS: * Inital response check No longer in use

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 11/29/07

Beta only

Energy Solutions Instrument

(Alpha / Beta)
Daily Response Checks

L2360
164680

43-37
092765

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-26-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2360	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	119704
Instrument Serial No.	164680	11-15-08	1611	1969	9.5%	Certification Date	10-14-97
Detector Model No.	43-37	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft. ☒ Cable Length 5 ft. ☐ Temperature ____ ☐F			Nuclide	Th-230
Detector Serial No.	092765	11-15-08				Activity in dpm (S_{dpm})	18,900

SECTION 1 Reviewed By: Paul C Ely Date: 11/26/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* Sat	✓		10	36	4.0	1694	1690	1927	1923	1761	1757	1790	✓		9.5%	V. Baldwin / VB	11-26-07 1120 **
VB 12-4-07 ① Sat	✓		10	40	4.0	1746	1742	1961	1957	1887	1883	1861	✓		9.8%	V. Baldwin / VB	11-27-07 1330 **
Sat	✓		10	32	3.0	1792	1789	2346	2343	2311	2308	2146		✓	xxx	S. Holliday	11-28-07 0835
Sat	✓		10	32	3.0	1792	1789	1825	1822	1918	1915	1842	✓		9.7%	S. Holliday	11-28-07 0845 **
Sat		✓	10	71	7.1	1933	1926	1918	1911	1870	1863	1899	✓		10%	S. Holliday	11-29-07 0800
① SAT	VB 12-4-07	✓	10	22	2	1829	1827	2044	2042	1916	1914	1928	✓		10.2%	D. Schumacher	12-4-07 0630

REMARKS: * Initial Response test. floormonitor

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

① Postsource check performed on 12-4-07 as per Gerry Rood & Paul Ely. VB 12-4-07

** Instrument not used to perform surveys and therefor a post-use source check not required. PCE 12/4/07

Alpha floormonitor

Beta

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-26-07

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2360	Cal Due Date	Minus 10%	Plus 10%	Net EFF	DTK ID / Serial No.	129647
Instrument Serial No.	164680	11-15-08	3 254	3978	15.0%	Certification Date	4-1-97
Detector Model No.	43-37	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft. ☒ Cable Length 5 ft. ☐ Temperature ____ °F			Nuclide	Tc-99
Detector Serial No.	092765	11-15-08				Activity in dpm (S_{dpm})	24,108

SECTION 1 Reviewed By: Paul C Ely Date: 11/26/07

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by See Note 1	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
* Sat	✓		10	4754	475	3491	3516	4320	3845	3961	3486	3616	✓		15.0%	V. Baldwin / VB	11-26-07 1120 **
Sat	✓		10	6187	619	4230	3611	4405	3786	4016	3397	3598	✓		15.0%	V. Baldwin / VB	11-27-07 1340 **
Sat	✓		10	5631	563	4044	3481	4429	3866	4201	3638	3661	✓		15.0%	S. Holliday / SH	11-28-07 0845 **
Sat		✓	10	5110	511	4075	3564	4153	3642	4186	3675	3627	✓		15%	S. Holly / SH	11-28-07 1910
(1) SAT	VB 12-4-07 ✓	✓	10	5933	593	4015	3482	4246	3653	3995	~~3995~~ 3402 VB 12-4-07	3562	✓		14.6%	D. Schumacher	12-4-07 0630

REMARKS: * floor monitor * Initial Response test.

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

(1) Post source check performed on 12-4-07 as per Gerry Rood and Paul Ely. VB 12-4-07

Beta ** Instrument not used to perform surveys and therefor a post-use source check was not required. PCE 12/4/07

Energy Solutions Instruments

(Gamma) Daily Response Checks

L2350-1

98638 / 126172

44-10

012269 / 211680

GAMMA DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: [signature] Date: 11-27-07

INSTRUMENT & DETECTOR INEORMATION			ACCEPTABLE INSTRUMENT RESPONSE RANGES			SOURCE INFORMATION	
			Geometry	Minus 20 %Net Counts	Plus 20 %Net Counts	I/D No.	1296117
Instrument Model Number	2350-1	Cal Due Date 9/27/08	Position 1 @ Contact	414443	621665	Certificate Date	5-1-92
Instrument Serial Number	98638		Position 2 @ 6 Inches	13953	20929	Nuclide	CS-137
Detector Model Number	44-10	Cal Due Date 9/6/08	Position 3 @ 18 Inches	1605	2407	Activity in µCi	5
Detector Serial Number	12269		Operating Conditions:	☒ Normal ☒ Cable Length 3 ft.	☐ Abnormal: ☐ Altitude ____ ft. ☐ Temperature 72 °F		

SECTION 1 Reviewed By: [signature] Date: 11/27/07

SECTION 2 (To be completed by RP Technician). Prior to beginning, verify the Instrument SNs listed above.

IF the above information is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Count Time	Gross BKG Counts	BKG CPM	ACTUAL INSTRUMENT RESPONSE: Position 1 @ Contact		Position 2 @ 6 Inches		Position 3 @ 18 Inches		Pass	Fail	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	(min)			Gross Counts	Net CPM	Gross Counts	Net CPM	Gross Counts	Net CPM			Technician Name Printed & Initialed	Date/ Time
SAT	✓		5	13727	2745	520799	518054	20186	17441	4751	2006	✓		D. Schumacker DS	11-27-07 0715
SAT		✓	5	11708	2342	517971	515629	20341	17999	4518	2236	✓		D. Schumacker DS	11-27-07 1700
SAT	✓		5	11824	2365	517661	515296	21052	18687	4440	2375	✓		D. Schumacker DS	11-28-07 0630
SAT		✓	5	11332	2266	516672	514406	20282	18016	4481	2215	✓		D. Schumacker DS	11-28-07 1840
SAT	✓		5	10805	2161	518591	516430	20853	18692	4567	2406	✓		D. Schumacker DS	11-29-07 0630
Sat		✓	5	11767	2353	492983	490630	19969	17616	4474	2121	✓		V. Baldwin / VB	11-29-07 1930

Remarks: Initial Response Test 30 sec s/c performed as per PM Paul Ely

NOTE 1: By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 11/29/07

GAMMA DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician).

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	98638	9-27-08	44-10	12269	129 6117

Alarm Test	Test Type		Background Data			Source Count Data							Tolerance		Performed by See Note 1	
							Position 1 @ contact		Position 2 @ 6 inches		Position 3 @ 18 inches					
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT	✓		5	12644	2529	510093		507564 ~~2529~~	20326	17797	4576	2047	✓		D. Schumaker DS	11-30-07 0640
SAT		✓	5	12266	2453	489947		487494	20203	17750	4470	2017	✓		D. Schumaker DS	11-30-07 1950
SAT	✓		5	12057	2411	521032		518621	20390	17779	4663	2252	✓		D. Schumaker DS	12-1-07 0640
SAT		✓	5	12436	2487	528117		525630	20368	17881	4456	1969	✓		D. Schumaker DS	12-1-07 1700
SAT	✓		5	11379	2276	524087		521811	20341	18065	4301	2025	✓		D. Schumaker DS	12-3-07 0645
SAT		✓	5	11754	2351	525386		523035	20173	17822	4573	2222	✓		D. Schumaker DS	12-3-07 1745
SAT	✓		5	12129	2426	516489		514063	19873	17447	4570	2144	✓		D. Schumaker DS	12-4-07 1140
SAT		✓	5	11816	2363	503157		500794	20110	17747	4545	2182	✓		D. Schumaker DS	12-4-07 1530

REMARKS:

NOTE 1: By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul C Ely Date: 12/4/07

GAMMA DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Vicky Baldwin Date: 11-27-07

INSTRUMENT & DETECTOR INFORMATION			ACCEPTABLE INSTRUMENT RESPONSE RANGES			SOURCE INFORMATION	
			Geometry	Minus 20 %Net Counts	Plus 20 %Net Counts	I/D No.	129 6117
Instrument Model Number	2350-1	Cal Due Date	Position 1 @ Contact	386,842	580,262	Certificate Date	5-1-92
Instrument Serial Number	126172	9-27-08	Position 2 @ 6 Inches	14,138	21,208	Nuclide	Cs-137
Detector Model Number	44-10	Cal Due Date	Position 3 @ 18 Inches	1,636	2,454	Activity in µCi	5
Detector Serial Number	PR 211680	9-27-08	Operating Conditions:	☒ Normal ☒ Cable Length 3 ft.	☐ Abnormal:	☐ Altitude ____ ft. ☐ Temperature ____ °F	

SECTION 1 Reviewed By: Paul Ely Date: 11/27/07

SECTION 2 (To be completed by RP Technician). Prior to beginning, verify the Instrument SNs listed above.

IF the above information is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Count Time	Gross BKG Counts	BKG CPM	ACTUAL INSTRUMENT RESPONSE: Position 1 @ Contact		Position 2 @ 6 Inches		Position 3 @ 18 Inches		Pass	Fail	Performed by (See Note 1)	
Sat/ Unsat	Pre	Post	(min)			Gross Counts	Net CPM	Gross Counts	Net CPM	Gross Counts	Net CPM			Technician Name Printed & Initialed	Date/ Time
*① SAT	✓		5	11487	2297	485849	483552	19970	17673	4342	2045	✓		V. Baldwin/VB	11-27-07 0835
SAT	✓		5	11689	2338	552297	549959	21320	18982	4603	2270	✓		D. Schumacher	11-28-07 0730
SAT		✓	5	12130	2426	556867	554441	20500	18074	4594	2173	✓		D. Schumacher	11-28-07 1850
SAT	✓		5	11137	2227	533646	531419	20381	18154	4621	2394	✓		D. Schumacher	11-29-07 0630
Sat		✓	5	11311	2262	487951	485689	19902	17640	4345	2083	✓		D. Quigley	11-29-07 1800

Remarks: *Initial Response Test 30 sec. s/c performed as per PM Paul Ely.

NOTE 1: By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: Paul Ely Date: 11/29/07

① Instrument not used for survey work on 11/27/07. PCEly 12/3/07

Energy Solutions

L 2929
102001 / PR103276

Daily Response
Checks
2007

Technician: Vicky Baldwin

Reviewer: Paul C Ely

Date: 12/4/2007

Meter	Serial #	Probe #	Range				Acceptable	28380	Background	Background Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	28544	850	20	43	9/21/2008	In Service	~~32.0%~~	26.0 PCE
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28611	16	20	0.8	9/21/2008	In Service	~~26.0%~~	32.0 12/10/07

Note: All source checks are 5 minutes in length

Technician: Vicky Baldwin

Reviewer: Paul C Ely

Date: 12/3/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check(ccpm)	Background	Background Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	28380	801	20	40	9/21/2008	In Service	~~32.0%~~	26.0 PCE
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28553	13	20	0.7	9/21/2008	In Service	~~26.0%~~	32.0 12/10/07

Note: All source checks are 5 minutes in length

Technician: Vicky Baldwin

Reviewer: Paul C Ely

Date: 12/1/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check(ccpm)	Background	Background Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	28654	914	20	46	9/21/2008	In Service	~~32.0%~~	26.0
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28999	4	20	0.2	9/21/2008	In Service	~~26.0%~~	32.0 PCE 12/10/07

Note: All source checks are 5 minutes in length

120107

Technician: S.Holliday

Reviewer: Paul C Ely

Date: 11/30/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check(ccpm)	Background	Background Count Time (min)	Corrected Background	Cal Due	Status	26.0 Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	27910	832	20	42	9/21/2008	In Service	~~32.0%~~	PCE
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28480	12	20	0.6	9/21/2008	In Service	~~26.0%~~ 32.0	12/10/07

Note: All source checks are 5 minutes in length

Technician: Vicky Baldwin Reviewer: Paul C Ely

Date: 11/29/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check(ccpm)	Background	Background Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	28225	1122	20	56	9/21/2008	In Service	32.0%	260
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28542	15	20	0.8	9/21/2008	In Service	~~26.0%~~	320 PCE 12/10/07

Note: All source checks are 5 minutes in length

Technician: Sandra Holiday

Reviewer: Paul C Ely

Date: 11/27/2007 SVB 11-28-07

Meter	Serial #	Probe #	Range				Acceptable	5 Source Check(ccpm)	Background	Backgd Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	28372	1160	20	58	9/21/2008	In Service	~~32.0%~~	26.0
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28571	14	20	0.7	9/21/2008	In Service	~~26.0%~~	32.0 PCE 12/10/07

Note: All source checks are 5 minutes in length

Technician: Vicky Baldwin

Reviewer: Paul C Ely

Date: 11/27/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check(cpm)	Background	Backgrd Count Time (min)	Corrected Background	Cal Due	Status	Efficiency	Notes
2929 beta	102001	PR103276	27855	to	28714	cpm	Yes	27931	862	20	43	9/21/2008	In Service	~~32.0%~~	26.0
2929 alpha	102001	PR103276	28464	to	29161	cpm	Yes	28556	24	20	1.2	9/21/2008	In Service	~~26.0%~~	32.0 JCE 12/10/07

Note: All source checks are 5 minutes in length

112707

Ludlum Model 2929 Daily Usage Sheet

Form CP-IN-WI-234-F2
Rev. 1

Date: 12-4-07

	Background	MDCR	MDA
Beta/Gamma	850 / 42.5 cpm	24.7 cpm	96.9 dpm
Alpha	16 / 0.8 cpm	5.8 cpm	18.2 dpm

Date: _____

	Background	MDCR	MDA
Beta/Gamma			
Alpha			

Date: _____

	Background	MDCR	MDA
Beta/Gamma			
Alpha			

Date: _____

	Background	MDCR	MDA
Beta/Gamma			
Alpha			

Date: _____

	Background	MDCR	MDA
Beta/Gamma			
Alpha			

Date: _____

	Background	MDCR	MDA
Beta/Gamma			
Alpha			

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Ludlum Model 2929 Daily Usage Sheet

Form CP-IN-WI-234-F2
Rev. 1

Date: 11-27-07

	Background	MDCR	MDA
Beta/Gamma	862 / 43.1 cpm	24.9 cpm	97.7 dpm
Alpha	24 / 1.2 cpm	6.5 cpm	20.4 dpm

Date: 11-28-07 corrected on 12-1-07 VB

	Background	MDCR	MDA
Beta/Gamma	~~888~~ 1160 / ~~44.4~~ 58 cpm	~~25.2~~ 28.4 cpm	~~98.9~~ 111.4 dpm
Alpha	~~20~~ 14 / ~~1.0~~ 0.7 cpm	~~6.1~~ 5.6 cpm	~~19.2~~ 17.6 dpm

Date: 11-29-07

	Background	MDCR	MDA
Beta/Gamma	1122 / 56.1 cpm	28.0 cpm	109.9 dpm
Alpha	15 / 0.75 cpm (0.8)	5.7 cpm	17.9 dpm

Date: 11-30-07

	Background	MDCR	MDA
Beta/Gamma	832 / 42.0 cpm	24.5 cpm	96.1 dpm
Alpha	12 / 0.6 cpm	5.4 cpm	17 dpm

Date: 12-01-07

	Background	MDCR	MDA
Beta/Gamma	914 / ~~46~~ 45.7 cpm (PCE 12-10-07)	25.6 cpm	100.4 dpm
Alpha	4 / 0.2 cpm	4.3 cpm	13.5 dpm

Date: 12-3-07

	Background	MDCR	MDA
Beta/Gamma	801 / 40 cpm	24.1 cpm	94.6 dpm
Alpha	13 / 0.7 cpm	5.5 cpm	17.3 dpm

Electronic documents, once printed, are uncontrolled and may become outdated. Refer to the intraweb or the document control authority for the current revision.

MDCR and MDA for Ludlum 2929			
		Date:	12-04-07
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	16	850	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.8	42.5	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
ACE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~ =	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	ACE ~~1.00~~ N/A	ACE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	5.8	24.7	cpm
MDA =	18.2	96.9	dpm

Name: Vicky Baldwin Date: 12-4-07

SR Engineer: Paul C Ely Date: 12/11/07

Paul C Ely 12/22/08

MDCR and MDA for Ludlum 2929			
		Date:	12-03-07
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	13	801	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.65	40.05	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~ =	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE 1.00 N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	5.5	24.1	cpm
MDA =	17.3	94.6	dpm

Name: Vicky Baldwin Date: 12-3-07

SR Engineer: Paul C Ely Date: 12/3/07

Paul C Ely 2/22/08

MDCR and MDA for Ludlum 2929			
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	4	914	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.2	45.7	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~=	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	4.3	25.6	cpm
MDA =	13.5	100.4	dpm

Name: Vicky Baldwin Date: 12-1-07
SR Engineer: Paul C Ely Date: 12/1/07
Paul C Ely 2/22/08

MDCR and MDA for Ludlum 2929			
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	12	832	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.6	41.6	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~ =	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	5.4	24.5	cpm
MDA =	17	96.1	dpm

Name: S. Holladay Date: 11.30-07

SR Engineer: Paul C Ely Date: 11-30-07

Paul C Ely 2/22/08

MDCR and MDA for Ludlum 2929			
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	15	1122	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.75	56.1	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~=	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	5.7	28.0	cpm
MDA =	17.9	109.9	dpm

Name: Vicky Baldwin Date: 11-29-07
SR Engineer: Paul C Ely Date: 11/29/07
Paul C Ely 2/22/08

MDCR and MDA for Ludlum 2929			
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	14	1160	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	0.7	58	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~=	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	5.6	28.4	cpm
MDA =	17.6	111.4	dpm

Name: Paul Ely
SR Engineer: Paul Ely

Date: 11/28/2007
Date: 12/3/07

Paul C Ely

2/22/08

MDCR and MDA for Ludlum 2929			
Equation 7.6.1 & 7.6.2 of CP-IN-WI-234, Rev. 3			
Inputs			
	Alpha Channel	Beta Channel	
C_B =	24	862	Background Counts
t_b =	20	20	Background Count Time (min)
R_B =	1.2	43.1	Background Count Rate (cpm)
t_s =	1	1	Sample Count Time (min)
PCE $\varepsilon_i(4\pi)$ ~~$\varepsilon_i(2\pi)$~~=	0.32	0.26	Instrument Efficiency (c/d)
ε_s =	PCE ~~1.00~~ N/A	PCE ~~1.00~~ N/A	Surface Efficiency (c/d)
ε_{total} =	0.32	0.26	Total Efficiency (c/d)
Outputs			
	Alpha Channel	Beta Channel	
MDCR =	6.5	24.9	cpm
MDA =	20.4	97.7	dpm

Name: Vicky Baldwin Date: 11-27-07

SR Engineer: Paul C Ely Date: 11/27/07

Paul C Ely 2/22/08

INSTRUMENT RESPONSE RANGE CHECK

Meter Model #	Ludlum 2929	**Date**	11/26/2007
Meter Serial #	102001		
Probe Model #	43-10-1	**Source Type**	Tc-99
Probe Serial #	PR103276	**Source Serial #**	129647

instrument background (cpm) 43.0 215

location of source on the detector On Probe

Note: All source readings @ contact

	5 minute source reading (net response)	**(reading - mean)**			**squared**
1	27,997	-287			82598.76
2	28,133	-151			22921.96
3	28,111	-173			30067.56
4	28,444	160			25472.16
5	28,403	119			14065.96
6	28,034	-250			62700.16
7	28,257	-27			750.76
8	28,285	1			0.36
9	28,535	251			62800.36
10	28,645	361			130032.36
total	282,844		**total**	**total**	431410.4
mean	28,284		**total divide 9**		47934
			sqrt.	**sqrt.**	219

upper range = mean +(1.96)(sqrt) = 28714
lower range = mean - (1.96)(sqrt) = 27855

Project Name: Hematite Characterization
Location: Festus, MO
Name: Vicky M. Baldwin

Project Manager Name: Paul C Ely
PRS Name: Paul C Ely

INSTRUMENT RESPONSE RANGE CHECK

Meter Model #	Ludlum 2929	**Date**	11/26/2007
Meter Serial #	102001		
Probe Model #	43-10-1	**Source Type**	Th-230
Probe Serial #	PR103276	**Source Serial #**	119704

instrument background (cpm) 1.0 10

location of source on the detector On Probe

Note: All source readings @ contact

	5 minute source reading (net response)	(reading - mean)			squared
1	29,007	194			37791.36
2	28,513	-300			89760.16
3	28,699	-114			12904.96
4	28,895	82			6789.76
5	28,722	-91			8208.36
6	28,849	36			1324.96
7	28,895	82			6789.76
8	28,610	-203			41046.76
9	28,841	28			806.56
10	29,095	282			79749.76
total	**288,126**		**total**	**total**	285172.4
mean	**28,813**		**total divide 9**		**31686**
			sqrt.	**sqrt.**	**178**

upper range = mean +(1.96)(sqrt) = 29161
lower range = mean - (1.96)(sqrt) = 28464

Project Name: Hematite Characterization
Location: Festus, MO
Name: Vicky M. Baldwin

Project Manager Name: Paul C Ely
PRS Name: Paul C Ely