



**Laboratories**

7200 E. ABC Lane, Columbia, MO 65202 • Tel: 573/474-8579 Fax: 573/443-9033

May 30, 2007

Nuclear Regulatory Commission  
Materials Licensing Branch  
US Nuclear Regulatory Commission, Region III  
2443 Warrenville Road, Suite 210  
Lisle, IL 60532-4352

ATTN: Kevin Null

RE: NRC Inspection Report 030-05154/07-001(DNMS) and Notice of Violation –  
Analytical Bio-Chemistry Laboratories, Inc.

Dear Mr. Null:

Please find enclosed the “Reply to a Notice of Violation” which pertains to the “Notice of Violation” sent to Sheila C. Hecht on 19 April 2007. The reply contains the violation reprinted, with required corrective actions listed.

If you have any questions or need further information, please feel free to contact me at 573-443-9070.

Sincerely,

A handwritten signature in cursive script that reads 'Sheila C Hecht'.

Sheila C. Hecht  
Director, Safety and Occupational Health

RECEIVED JUN 08 2007

## Notice of Violation

1. Title 10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present.

Pursuant to 10 CFR 20.1003, survey means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

Contrary to the above, the licensee did not make surveys to assure compliance with 10 CFR 20.1402, which limits radiation exposure to 25 millirems per year from residual radioactivity that is distinguishable from background. Specifically, on September 22, 2006, the licensee released Building G for unrestricted use without conducting reasonable and necessary surveys of the building to verify compliance with the 25 millirems exposure requirement.

### Reply to the Notice of Violation:

- 1) The following were determined to be the reasons for the above violation
  - a. Inadequate personnel training in the performance of radiation contamination surveys, and
  - b. the selection of survey instrumentation.
- 2) Enclosure (1) are the results of the resurvey of Building G. A new Ludlum Model 2241-3 survey meter was purchased which was calibrated for both cpm and dpm readings. One minute counts were taken at locations of fixed contamination. Swipes were collected from each grid location and were counted in cpm and dpm for both C-14 and H-3. The survey results were loaded into RESRAD Build 3.3 which calculated exposure results of less than 25 millirems per year in accordance with the requirements of 10 CFR 20.1402.
- 3) All radiation area surveys are now performed with an appropriate survey meter and detector for the type of radiation involved. Proper survey techniques are being utilized.
- 4) Date of compliance is 25 May 2007.

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  
 USER: 8 COMMENT: BLDE 8  
 OFFSET TIME: 1.00  
 3 LALS: 51 DPM NB YES SAMPLE REPEATS: 1 PRINTER: 1 BYE  
 5M BLANK: NE JCH: NE REPLICATES: 1 RESEC: 1 OK  
 7WD PHASE: NG ACC: NO CYCLE REPEATS: 1  
 COUNT/DL/ADR: LIQUID LUMEX: NO LOW SAMPLE REJ: 0  
 LOW LEVEL: NC HALF LIFE CORRECTION DATE: none

ISOTOPE 1: 14C %ERROR: 0.00 FACTOR: 1.000000 BKG. SUB: 0  
 BACKGROUND QUENCH: CURVE: 044 COLOR QUENCH CORRECTION: 04  
 Quench Limits Low: -6.313 High: 316.90

SAM NO	POS	TIME MIN	H#	14C		14C DPM	14C EFF-1	LUMEX %	ELAPSED TIME
				CPM	%ERROR				
Blank	1	10-1	81.1	29.00	37.14	30.61	94.74	7.33	1.50
Blank	2	10-2	82.0	48.00	28.87	50.69	94.70	54.20	3.12
MISSING SAMPLE									
1	4	10-4	119.4	597.00	8.19	642.28	92.88	84.96	4.88
2	5	10-5	109.4	93.00	20.74	99.47	93.49	10.19	6.47
3	6	10-6	106.0	34.00	34.30	36.30	93.67	11.36	8.08
4	7	10-7	106.6	158.00	15.91	168.74	93.64	78.72	9.72
5	8	10-8	102.8	60.00	25.82	63.95	93.82	39.61	11.36
6	9	10-9	109.6	61.00	25.61	65.25	93.48	11.48	12.94
7	10	10-10	107.6	71.00	23.74	75.87	93.59	9.00	14.56
8	11	10-11	108.2	59.00	26.04	63.06	93.58	19.88	16.14
9	12	10-12	113.3	69.00	24.08	73.96	93.29	41.48	17.76
10	13	10-13	113.9	112.00	18.90	120.10	93.26	47.31	19.28
11	14	10-14	122.2	78.00	22.65	84.07	92.78	39.94	20.90
12	15	10-15	111.1	70.00	23.90	74.94	93.41	21.14	22.82
13	16	10-16	114.1	62.00	25.40	66.49	93.25	28.49	24.13
14	17	10-17	110.0	69.00	24.08	73.82	93.47	12.62	25.73
15	18	10-18	112.6	1744.00	4.79	1868.75	93.32	2.38	27.06
16	19	15-1	103.7	204.00	14.00	217.54	93.78	69.58	29.10
17	20	15-2	102.6	41.00	31.23	43.69	93.84	4.18	30.03
18	21	15-3	110.4	50.00	28.28	53.51	93.44	8.88	32.32
19	22	15-4	108.1	62.00	25.40	66.20	93.66	6.31	33.93
20	23	15-5	98.9	39.00	32.03	41.45	94.09	34.31	35.54
21	24	15-6	104.7	54.00	27.22	57.61	93.93	10.31	37.15
22	25	15-7	111.1	95.00	20.82	101.71	93.41	2.98	38.72
23	26	15-8	110.2	123.00	18.03	131.62	93.48	23.07	41.04
24	27	15-9	99.2	52.00	27.74	55.33	93.89	33.53	42.97
25	28	15-10	108.0	65.00	24.81	69.40	93.67	14.50	43.88
26	29	15-11	114.6	127.00	17.75	136.24	93.22	58.10	45.21
27	30	15-12	113.2	75.00	23.09	80.39	93.29	20.33	46.80
28	31	15-13	112.9	46.00	29.49	49.30	93.31	19.88	48.41
29	32	15-14	146.3	102.00	19.80	111.92	91.14	54.89	50.05
30	33	15-15	139.1	367.00	10.59	386.55	93.35	1.89	51.74
31	34	15-16	112.3	74.00	23.25	79.28	93.34	4.32	53.25
32	35	15-17	107.5	64.00	25.00	68.38	91.89	25.80	54.85
33	36	15-18	107.3	54.00	27.22	57.69	93.61	8.44	56.36
		34	117.3	491.00	9.03	527.57	93.01	82.11	58.21
		35	117.2	994.00	6.89	960.60	93.07	1.04	59.01
36	37	12-1	112.9	61.00	28.01	54.66	93.31	8.09	61.38
37	38	12-2	115.0	83.00	23.47	56.98	93.02	17.41	63.01
38	39	12-3	110.3	51.00	28.01	54.58	93.44	13.92	64.61
39	40	12-4	138.3	66.00	25.00	69.77	91.90	17.37	66.21

SAM NO	POS	TIME MIN	HM	14C		14C DPM	14C EFF-1	LUMEX %	ELAPSED TIME
				CPM	%ERROR				
40	40-1	1.00	101.7	67.00	27.17	50.17	93.68	6.07	87.80
41	41-2	1.00	111.7	64.00	25.00	66.51	93.42	12.04	87.81
42	42-3	1.00	114.2	132.00	19.02	115.84	93.23	6.16	71.24
43	43-4	1.00	121.0	75.00	22.94	81.87	93.81	12.37	71.67
44	44-11	1.00	123.4	82.00	22.09	88.45	92.71	34.61	74.28
45	45-12	1.00	115.3	51.00	28.01	54.77	93.12	14.44	75.00
46	46-13	1.00	114.9	58.00	26.26	62.23	93.20	18.44	77.35
47	47-14	1.00	89.2	24.00	40.82	25.42	94.42	7.03	19.00
48	48-15	1.00	92.4	63.00	25.20	66.82	94.29	54.14	80.30
49	49-16	1.00	111.1	172.00	15.25	184.14	93.41	57.64	81.29
50	50-17	1.00	130.5	271.00	12.15	293.71	93.27	39.85	83.93
51	51-18	1.00	106.0	109.00	19.16	116.37	93.57	1.83	85.53
52	52-1	1.00	92.1	120.00	16.26	127.26	94.30	48.56	87.27
53	53-2	1.00	91.7	45.00	29.81	47.71	94.52	39.61	88.60
54	54-3	1.00	93.4	39.00	32.03	41.38	94.24	57.61	90.50
55	55-4	1.00	91.8	17.00	48.51	18.03	94.31	5.01	92.13
56	56-5	1.00	91.0	27.00	38.49	28.62	94.35	1.57	93.70
57	57-6	1.00	93.4	26.00	39.22	27.59	94.24	1.57	93.30
58	58-7	1.00	91.1	26.00	39.22	27.56	94.34	1.42	94.88
59	59-8	1.00	92.9	71.00	23.74	75.32	94.28	47.88	95.61
60	60-9	1.00	91.6	30.00	36.51	31.84	94.24	1.93	99.18
61	61-10	1.00	93.6	42.00	30.86	44.57	94.24	22.93	101.61
62	62-11	1.00	91.5	34.00	34.30	36.05	94.32	23.74	103.20
63	63-12	1.00	91.9	14.00	50.00	16.97	94.31	4.05	104.81
64	64-13	1.00	89.3	33.00	41.70	24.36	94.42	1.61	106.37
65	65-14	1.00	67.6	70.00	23.90	74.09	94.48	54.10	108.03
66	66-15	1.00	93.7	27.00	38.49	28.65	94.23	5.80	109.62
67	67-16	1.00	93.9	22.00	42.64	23.35	94.22	6.07	111.21
68	68-17	1.00	90.8	29.00	37.14	30.74	94.35	4.39	112.79
69	69-18	1.00	92.5	21.00	43.64	22.27	94.28	3.61	114.40
70	70-1	1.00	91.9	50.00	28.28	53.02	94.31	32.29	116.11
71	71-2	1.00	88.4	29.00	37.14	30.70	94.45	14.39	117.72
72	72-3	1.00	92.1	50.00	28.28	53.02	94.30	28.83	119.32
73	73-4	1.00	93.5	17.00	48.51	18.04	94.23	5.57	120.82
74	74-5	1.00	90.8	48.00	28.87	50.87	94.35	49.00	122.43
75	75-6	1.00	92.0	29.00	37.14	30.75	94.30	6.39	124.02
76	76-7	1.00	90.9	29.00	37.14	30.74	94.35	3.50	125.61
77	77-8	1.00	94.6	48.00	28.87	50.96	94.19	29.88	127.33
78	78-9	1.00	91.8	14.00	50.00	16.97	94.31	3.98	128.81
79	79-10	1.00	94.6	32.00	35.36	33.97	94.19	3.44	130.43
80	80-11	1.00	92.5	24.00	40.82	25.46	94.28	1.63	131.99

ID # HF

10 APR 2007 19:11

USER: S

COMMENT:BLDG 0

PRESET TIME : 1.00  
 A CALD : BL DPM H# : YES SAMPLE REPEATS : 3 PRINTER : STD  
 UN BLANK : NO IC# : NO REPLICATES : 1 RESUME : OFF  
 TWO PHASE : NO AGC : NO CYCLE REPEATS : 1  
 SCINTILLATOR: LIQUID LUMEX: NO LOW SAMPLE REJ: 0  
 LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

USUTOPE 1: 3P XERRDA: 0.00 FACTOR: 1.000000 EXE. SUB: 0

BACKGROUND QUENCH CURVE: 07\* COLOR QUENCH CORRECTION: 07

Quench Limits Low:-1.653 High:308.46

SAM NO	POS	TIME MIN	H#	3H		3H DPM	3H EFF-1	LUMEX %	ELAPSED TIME
				CPM	%ERROR				
1	10-1	1.00	80.8	22.00	42.64	47.49	46.33	0.33	1.51
2	10-2	1.00	81.8	9.00	64.67	19.56	46.02	0.31	2.94
MISSING SAMPLE									
1	4 10-4	1.00	114.9	23.00	40.00	66.98	37.33	2.93	4.55
2	5 10-5	1.00	117.9	48.00	28.27	131.24	36.57	2.55	6.12
3	6 10-6	1.00	114.3	27.00	36.49	72.01	37.50	3.67	7.75
4	7 10-7	1.00	111.8	16.00	50.00	41.94	38.15	4.25	9.33
5	8 10-8	1.00	114.4	31.00	35.92	82.76	37.46	5.10	10.93
6	9 10-9	1.00	117.6	28.00	37.80	76.42	36.64	5.47	12.51
7	10 10-10	1.00	117.6	70.00	23.90	190.97	36.66	1.52	14.09
	11 18-11	1.00	117.9	30.00	36.51	82.03	36.57	4.65	15.67
	12 19-12	1.00	114.1	33.00	34.82	87.90	37.54	6.70	17.27
	13 10-13	1.00	114.1	29.00	37.14	77.25	37.54	5.54	18.85
11	14 10-14	1.00	123.6	23.00	41.70	65.52	35.11	3.87	20.46
12	15 10-15	1.00	115.7	25.00	40.00	67.35	37.12	3.80	22.04
13	16 10-16	1.00	117.8	33.00	34.82	90.16	36.60	8.57	23.66
14	17 10-17	1.00	115.9	43.00	30.50	116.00	37.07	3.55	25.23
15	18 10-18	1.00	129.7	1447.00	5.26	4311.20	33.56	0.22	26.85
16	19 15-1	1.00	115.0	43.00	30.50	115.20	37.33	3.57	28.54
17	20 15-2	1.00	105.8	23.00	41.70	57.92	39.71	3.30	30.13
18	21 15-3	1.00	113.3	50.00	28.28	132.44	37.75	2.75	31.72
19	22 15-4	1.00	111.1	35.00	33.81	91.31	38.33	2.82	33.33
20	23 15-5	1.00	104.0	22.00	42.64	54.74	40.19	3.66	34.91
21	24 15-6	1.00	111.0	29.00	37.14	75.60	38.36	1.64	36.51
22	25 15-7	1.00	112.0	63.00	25.20	165.45	38.08	1.84	38.09
23	26 15-8	1.00	117.2	67.00	24.43	182.32	36.75	2.37	39.70
24	27 15-9	1.00	105.4	19.00	45.88	47.72	39.82	2.88	41.28
25	28 15-10	1.00	114.1	24.00	40.82	63.90	37.56	3.82	42.88
26	29 15-11	1.00	120.6	52.00	27.74	144.93	35.88	2.17	44.45
27	30 15-12	1.00	121.7	42.00	30.86	117.96	35.61	2.67	46.04
28	31 15-13	1.00	117.4	31.00	35.92	84.47	36.70	2.88	47.63
29	32 15-14	1.00	155.4	66.00	29.49	173.71	26.48	5.40	49.25
30	33 15-15	1.00	121.0	232.00	13.02	661.05	35.70	0.60	50.81
31	34 15-16	1.00	115.1	45.00	29.81	120.67	37.29	3.34	52.43
32	35 15-17	1.00	112.2	37.00	32.88	97.25	36.05	3.37	54.02
	36 33-1	1.00	110.1	40.00	31.62	103.76	36.55	2.51	55.62
	37 34-1	1.00	108.7	56.00	26.70	154.04	36.34	1.82	57.20
	38 35-1	1.00	126.4	475.00	9.18	1351.34	35.15	0.35	58.81
36	39 12-3	1.00	144.6	39.00	32.03	130.38	29.91	7.31	60.38
37	40 12-4	1.00	130.7	21.00	35.92	93.02	32.31	3.12	61.95
38	41 12-5	1.00	133.0	32.00	32.44	116.04	32.75	2.32	63.56
39	42 12-6	1.00	133.9	32.00	33.33	129.84	32.70	2.31	65.16

SAM NO	POS	TIME MIN	H#	3H		3H DPM	3H EFF-1	LUMEX %	ELAPSED TIME
				CPM	%ERROR				
40	40-1	1.00	104.4	33.00	34.82	85.11	38.78	3.14	62.77
41	41-8	1.00	113.5	33.00	34.82	88.76	37.12	3.32	62.74
42	42-9	1.00	130.4	70.00	33.90	194.80	35.93	1.65	64.93
43	43-10	1.00	121.1	40.00	31.62	111.92	35.74	2.37	71.53
44	44-11	1.00	133.4	42.00	33.66	125.78	33.39	4.10	72.22
45	45-12	1.00	126.3	31.00	35.92	90.05	34.43	6.93	74.63
46	46-13	1.00	122.4	25.00	40.00	70.71	35.36	2.59	76.40
47	47-14	1.00	93.4	15.00	51.64	34.92	42.95	7.71	78.02
48	48-15	1.00	97.8	19.00	45.88	45.44	41.81	9.25	79.50
49	49-16	1.00	112.9	41.00	31.23	108.30	37.84	6.68	81.20
50	50-17	1.00	122.4	103.00	19.71	290.90	35.41	0.98	82.72
51	51-18	1.00	111.6	68.00	24.25	178.01	38.00	1.41	84.40
52	52-1	1.00	97.9	18.00	47.14	43.08	41.78	8.34	86.08
53	53-2	1.00	97.3	20.00	44.72	47.69	41.93	6.32	87.67
54	54-3	1.00	100.3	17.00	48.51	41.33	41.13	12.21	89.29
55	55-4	1.00	96.8	15.00	51.64	35.66	42.07	9.20	90.87
56	56-5	1.00	95.2	19.00	45.88	44.72	42.48	9.44	92.45
57	57-6	1.00	95.9	16.00	50.00	38.54	41.52	4.71	94.05
58	58-7	1.00	96.5	15.00	51.64	35.59	42.15	6.91	95.63
59	59-8	1.00	96.3	12.00	57.74	28.45	42.19	10.64	97.23
60	60-9	1.00	98.7	17.00	48.51	40.89	41.57	5.96	98.81
61	61-10	1.00	95.7	24.00	40.82	57.73	41.57	5.06	100.41
62	62-11	1.00	94.9	22.00	42.64	51.68	42.57	6.35	102.00
63	63-12	1.00	95.4	15.00	51.64	35.35	42.43	6.75	103.50
64	64-13	1.00	94.9	22.00	42.64	51.68	42.57	6.61	105.08
65	65-14	1.00	91.3	21.00	43.64	48.28	43.50	5.12	106.67
66	66-15	1.00	98.0	55.00	26.97	131.74	41.75	49.45	108.29
67	67-16	1.00	95.9	22.00	42.64	53.00	41.51	10.49	109.90
68	68-17	1.00	95.6	11.00	60.30	25.95	42.39	7.95	111.48
69	69-18	1.00	98.3	19.00	45.88	45.61	41.66	9.22	113.10
70	70-1	1.00	97.1	16.00	50.00	38.12	41.98	11.25	114.79
71	71-2	1.00	91.1	16.00	50.00	36.73	43.56	5.79	116.38
72	72-3	1.00	95.7	29.00	37.14	68.46	42.36	4.84	117.85
73	73-4	1.00	96.7	19.00	45.88	45.14	42.09	4.72	119.46
74	74-5	1.00	94.8	11.00	60.30	25.82	42.60	8.77	121.04
75	75-6	1.00	96.3	18.00	47.14	42.67	42.19	11.49	122.65
76	76-7	1.00	95.8	21.00	43.64	49.61	42.33	5.11	124.23
77	77-8	1.00	100.8	9.00	66.67	21.95	41.01	18.16	125.84
78	78-9	1.00	95.3	24.00	40.82	56.52	42.46	6.32	127.41
79	79-10	1.00	95.1	26.00	39.22	62.73	41.45	6.30	128.90
80	80-11	1.00	97.4	21.00	43.64	50.10	41.92	5.71	130.48

10/2/88

21 11 2000 00 10

US54120 COMMENT:BLDG 6 RESWIPE

PRESET TIME : 1.00  
 DATA CALC : BL DMM 99 YES SAMPLE REPEATS : 1 PRINTER : BTE  
 COUNT BLANK : YES ID# : NO REPLICATES : 1 PAPER : OFF  
 TND PHASE : NO ABC : NO CYCLE REPEATS : 1  
 SCINTILLATOR: LIQUID LUMEX: NO LOW SAMPLE REQ: 0  
 LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

ISOTOPE 14C %ERROR: 0.00 FACTOR: 1.000000 BKG. BUI: 0

BACKGROUND QUENCH CURVE: 077 COLOR QUENCH CORRECTION: 07

Quench Limits Low:6.313 High:316.90

SAM NO	POS	TIME MIN	H#	14C		14C DPM	14C EFF-1	LUMEX %	ELAPSED TIME
				CPM	%ERROR				
B1	42-1	1.00	82.9	27.00	38.49	26.52	94.67	0.61	1.52
B2	42-2	1.00	82.6	25.00	40.00	26.41	94.67	0.45	3.12
Blank Average				DPM	for	14C :	27.46	COEF. OF VAR:	5.442
1-1	42-4	1.00	108.6	55.00	26.97	31.34	93.54	41.10	4.77
4-2	42-5	1.00	114.3	39.00	32.03	14.38	93.21	18.80	6.39
10-3	42-6	1.00	111.8	54.00	27.22	30.37	93.37	8.59	8.01
15-4	42-7	1.00	105.3	32.00	35.36	6.69	93.70	13.56	9.63
16-5	42-8	1.00	116.3	57.00	26.49	33.74	93.13	23.01	11.37
22-6	42-9	1.00	131.1	120.00	18.26	102.65	92.23	16.07	13.00
23-7	42-10	1.00	116.1	69.00	21.20	68.21	93.02	15.53	14.64
26-8	42-11	1.00	117.5	60.00	25.82	37.01	93.06	29.87	16.26
29-9	42-12	1.00	114.1	59.00	26.04	35.81	93.25	12.95	17.89
30-10	42-13	1.00	115.2	144.00	16.67	127.06	93.19	3.46	19.50
34-11	42-14	1.00	124.1	76.00	22.65	56.70	92.67	19.48	21.15
35-12	42-15	1.00	119.0	55.00	26.97	31.69	92.97	12.35	22.67
42-13	42-16	1.00	110.2	53.00	27.47	29.25	93.45	9.96	24.50
49-14	42-17	1.00	126.9	65.00	24.81	42.81	92.50	24.62	26.03
50-15	42-18	1.00	119.7	79.00	23.50	57.54	92.93	14.67	27.89
51-16	6-1	1.00	117.1	84.00	21.82	62.78	93.02	9.85	29.61
52-17	6-2	1.00	115.6	54.00	27.22	30.61	92.92	17.59	31.26

CUMULATIVE EFF: 0.000000  
 SUBJECT: COMPTON BLDG 3 REWRIFES  
 PRESET TIME: 1.00  
 DATA VALID: EL DPM H# YES SAMPLE REPEATS: 1 PRN TSS: 1.500  
 COUNT BLANK: YES LCM: NO REPLICATES: 1 RWTG: 1.000  
 FWC RANGE: NO AWC: NO CYCLE REPEATS: 1  
 CONTINUAL PORT: LIQUID LUMEX: NO LOW SAMPLE REQ: 0  
 LOW LEVEL: NO HALF LIFE CORRECTION DATD: 0.000

SCTYPE: 14 3H XERROR: 0.00 FACTOR: 1.000000 EKE: 5050

BACKGROUND QUENCH CURVE: OFF COLOR QUENCH CORRECTION: 3H

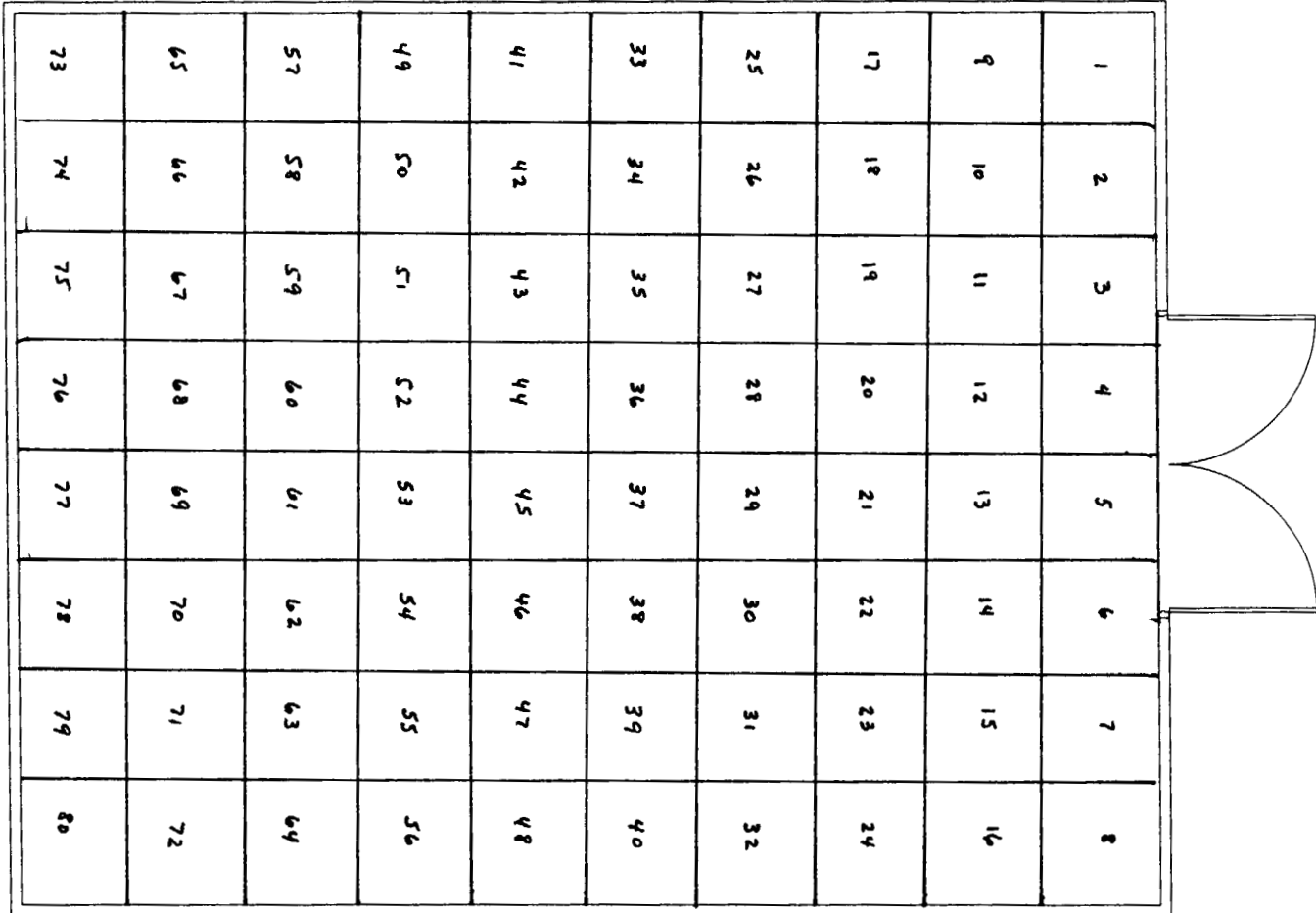
Quench Limits Low: -1.653 High: 308.46

SAM NO	POS	TIME MIN	H#	3H		3H DPM	3H EFF-1	LUMEX %	ELAPSED TIME
				CFM	XERROR				
B1	42-1	1.00	81.6	22.00	42.64	47.76	46.06	0.36	1.83
B2	42-2	1.00	81.6	16.00	50.00	34.77	46.01	0.31	3.12
Blank Average				DPM for	3H :	41.27 COEF. OF VAR: 22.250			
2-3	42-4	1.00	98.4	15.00	51.64	-6.24	41.63	3.20	4.76
7-2	42-5	1.00	101.6	23.00	41.70	15.11	40.79	7.72	6.36
14-3	42-6	1.00	109.0	33.00	34.82	43.65	38.86	7.41	8.00
15-4	42-7	1.00	107.4	32.00	35.36	40.16	39.30	9.24	9.60
16-5	42-8	1.00	115.3	47.00	29.17	84.96	37.23	12.92	11.20
18-6	42-9	1.00	112.8	45.00	29.81	77.56	37.87	22.10	12.85
22-7	42-10	1.00	121.3	102.00	19.80	244.39	35.71	11.40	14.49
23-8	42-11	1.00	117.4	60.00	25.62	122.27	36.69	11.70	16.10
26-9	42-12	1.00	116.8	55.00	26.97	108.03	36.84	21.28	17.76
27-10	42-13	1.00	114.1	57.00	26.49	110.57	37.54	6.01	19.32
29-11	42-14	1.00	114.9	38.00	32.44	60.50	37.34	11.55	21.02
30-12	42-15	1.00	107.0	25.00	40.00	22.20	39.39	13.39	22.67
31-13	42-16	1.00	104.7	52.00	27.74	90.53	39.46	2.77	24.26
33-14	42-17	1.00	113.1	30.00	36.51	39.19	37.29	9.84	25.87
34-15	42-18	1.00	123.7	48.00	28.87	95.59	35.07	14.06	27.57
35-16	39-1	1.00	119.0	41.00	31.23	71.72	36.29	9.32	28.23
36-17	39-2	1.00	115.1	58.00	26.26	117.57	36.52	12.50	30.62
38-18	39-3	1.00	108.8	32.00	35.36	40.97	38.91	7.09	32.81
39-19	39-4	1.00	115.5	71.00	23.74	149.72	37.18	10.42	34.14
42-20	39-5	1.00	104.5	30.00	36.51	34.63	39.57	8.00	35.76
43-21	39-6	1.00	117.4	58.00	26.26	116.80	36.69	9.75	37.41
44-22	39-7	1.00	112.2	39.00	32.03	61.30	38.02	9.15	39.02
49-23	39-8	1.00	125.2	48.00	28.87	97.02	34.71	19.89	40.83
50-24	39-9	1.00	119.9	54.00	27.22	108.51	36.05	10.02	42.57
51-25	39-10	1.00	120.6	47.00	29.17	89.73	35.88	11.73	43.92
66-26	39-11	1.00	115.0	40.00	31.62	65.92	37.32	13.84	45.57



Building G Floor

North



Scale: 1/4" = 1 m

South

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

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RESRAD-BUILD Table of Contents

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Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

```

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RESRAD-BUILD Input Parameters
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```

```

Number of Sources : 4
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 2.300000E-01
    
```

```

===== Receptor Information =====
    
```

Receptor	Room	x [m]	y [m]	z [m]	FracTime	Inhalation [m3/day]	Ingestion(Dust) [m2/hr]
1	1	5.000	4.000	1.000	1.000	1.80E+01	1.00E-04

```

===== Receptor-Source Shielding Relationship =====
    
```

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete
1	2	2.40E+00	0.00E+00	Concrete
1	3	2.40E+00	0.00E+00	Concrete
1	4	2.40E+00	0.00E+00	Concrete

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

==== Building Information ====

Building Air Exchange Rate: 8.00E-01 1/hr

Height[m]	Air Exchanges [m3/hr]	
Area [m2]		
	*****	
	*	*
	*	*
	*	<=Q01: 1.76E+03
H1: 2.500	* Room 1	* Q10 : 1.76E+03
	* LAMBDA: 8.00E-01	*
Area 881.000	*	*
	*	*
	*****	

Deposition velocity: 1.00E-02 [m/s] Resuspension Rate: 5.00E-07 [1/s]

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

==== Source Information ====

Source: 1

Location:: Room : 1 x: 7.00 y: 3.00 z: 0.00[m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]  
 Fraction released to air: 1.000E-01  
 Removable fraction: 5.000E-01  
 Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide Concentration	Dose Conversion Factor (Library: FGR 13 Morbidity)		
	[pCi]	Ingestion [mrem/pCi]	Inhalation [mrem/pCi]
C-14 5.780E+01	2.090E-06	2.090E-06	2.616E-08

Source: 2

Location:: Room : 1 x: 8.00 y: 3.00 z: 0.00[m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]  
 Fraction released to air: 1.000E-01  
 Removable fraction: 5.000E-01  
 Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide Concentration	Dose Conversion Factor (Library: FGR 13 Morbidity)		
	[pCi]	Ingestion [mrem/pCi]	Inhalation [mrem/pCi]
C-14 4.670E+01	2.090E-06	2.090E-06	2.616E-08

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Source: 3

Location:: Room : 1 x: 6.00 y: 2.00 z: 0.00[m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide Concentration Dose Conversion Factor (Library: FGR 13 Morbidity)

	[pCi]	Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
H-3	6.800E+01	6.400E-08	6.400E-08	3.866E-08

Source: 4

Location:: Room : 1 x: 8.00 y: 2.00 z: 0.00[m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide Concentration Dose Conversion Factor (Library: FGR 13 Morbidity)

	[pCi]	Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
H-3	5.560E+01	6.400E-08	6.400E-08	3.866E-08

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 0.00000000E+00 years

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Assessment for Time: 1

Time =0.00E+00 yr

===== Source Information =====

Source: 1

Location:: Room : 1 x: 7.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration
		[pCi]
	C-14	5.780E+01

Source: 2

Location:: Room : 1 x: 8.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration
		[pCi]
	C-14	4.670E+01

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 0.00000000E+00 years

Source: 3

Location:: Room : 1 x: 6.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	6.800E+01

Source: 4

Location:: Room : 1 x: 8.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 5.000E-01

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	5.560E+01



Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 0.00000000E+00 years

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RESRAD-BUILDDose Tables

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---

Source Contributions to Receptor Doses

---

[mrem]

	Source	Source	Source	Source	Total
	1	2	3	4	
Receptor 1	2.54E-09	1.92E-09	8.33E-11	6.81E-11	4.61E-09
Total	2.54E-09	1.92E-09	8.33E-11	6.81E-11	4.61E-09

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 0.00000000E+00 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	3.67E-10	1.30E-12	1.13E-15	5.91E-10	0.00E+00	1.58E-09
Total	3.67E-10	1.30E-12	1.13E-15	5.91E-10	0.00E+00	1.58E-09

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.66E-10	1.05E-12	9.11E-16	4.78E-10	0.00E+00	1.27E-09
Total	1.66E-10	1.05E-12	9.11E-16	4.78E-10	0.00E+00	1.27E-09

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	0.00E+00	0.00E+00	1.84E-15	3.00E-11	0.00E+00	5.32E-11
Total	0.00E+00	0.00E+00	1.84E-15	3.00E-11	0.00E+00	5.32E-11

Source: 4

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	0.00E+00	0.00E+00	1.51E-15	2.46E-11	0.00E+00	4.35E-11
Total	0.00E+00	0.00E+00	1.51E-15	2.46E-11	0.00E+00	4.35E-11

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 0.00000000E+00 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor	Total
	1	
C-14		
C-14	2.54E-09	2.54E-09

Source: 2

Nuclide	Receptor	Total
	1	
C-14		
C-14	1.92E-09	1.92E-09

Source: 3

Nuclide	Receptor	Total
	1	
H-3		
H-3	8.33E-11	8.33E-11

Source: 4

Nuclide	Receptor	Total
	1	
H-3		
H-3	6.81E-11	6.81E-11

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 1.00000000 years

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=====
```

Assessment for Time: 2

Time =1.00E+00 yr

===== Source Information =====

Source: 1

Location:: Room : 1 x: 7.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	C-14	2.890E+01

Source: 2

Location:: Room : 1 x: 8.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	C-14	2.335E+01

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 1.00000000 years

Source: 3

Location:: Room : 1 x: 6.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	3.215E+01

Source: 4

Location:: Room : 1 x: 8.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	2.629E+01

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 1.00000000 years

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RESRAD-BUILDDose Tables

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Source Contributions to Receptor Doses

---

---

[mrem]

	Source	Source	Source	Source	Total
	1	2	3	4	
Receptor 1	1.83E-10	8.31E-11	0.00E+00	0.00E+00	2.66E-10
Total	1.83E-10	8.31E-11	0.00E+00	0.00E+00	2.66E-10



Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 1.00000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor	Total
	1	
C-14		
C-14	1.83E-10	1.83E-10

Source: 2

Nuclide	Receptor	Total
	1	
C-14		
C-14	8.31E-11	8.31E-11

Source: 3

Nuclide	Receptor	Total
	1	
H-3		
H-3	0.00E+00	0.00E+00

Source: 4

Nuclide	Receptor	Total
	1	
H-3		
H-3	0.00E+00	0.00E+00



Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 30.000000 years

```
=====
=====
Assessment for Time: 3
Time =3.00E+01 yr
=====
=====
```

===== Source Information =====

Source: 1

Location:: Room : 1 x: 7.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	C-14	2.880E+01

Source: 2

Location:: Room : 1 x: 8.00 y: 3.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	C-14	2.327E+01

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 30.0000000 years

Source: 3

Location:: Room : 1 x: 6.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	6.356E+00

Source: 4

Location:: Room : 1 x: 8.00 y: 2.00 z: 0.00 [m]

Geometry:: Type: Point

Pathway ::

Direct Ingestion Rate: 0.000E+00 [1/hr]

Fraction released to air: 1.000E-01

Removable fraction: 0.000E+00

Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [pCi]
	H-3	5.197E+00

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 30.0000000 years

---

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RESRAD-BUILDDose Tables

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Source Contributions to Receptor Doses

[mrem]

	Source 1	Source 2	Source 3	Source 4	Total
Receptor 1	1.83E-10	8.28E-11	0.00E+00	0.00E+00	2.65E-10
Total	1.83E-10	8.28E-11	0.00E+00	0.00E+00	2.65E-10



Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Evaluation Time: 30.0000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor	Total
	1	
C-14		
C-14	1.83E-10	1.83E-10

Source: 2

Nuclide	Receptor	Total
	1	
C-14		
C-14	8.28E-11	8.28E-11

Source: 3

Nuclide	Receptor	Total
	1	
H-3		
H-3	0.00E+00	0.00E+00

Source: 4

Nuclide	Receptor	Total
	1	
H-3		
H-3	0.00E+00	0.00E+00

Title : Building G

Input File : C:\Program Files\RESRAD\_Family\BUILD\Building G.bld

Full Summary

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RESRAD-BUILD Dose (Time) Tables

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---

Receptor Dose Received for the Exposure Duration

---

---

(mrem)

	Evaluation Time [yr]		
	0.00E+00	1.00E+00	3.00E+01
1	4.61E-09	2.66E-10	2.65E-10

---

---

Receptor Dose/Yr Averaged Over Exposure Duration

---

---

(mrem/yr)

	Evaluation Time [yr]		
	0.00E+00	1.00E+00	3.00E+01
1	4.61E-09	2.67E-10	2.66E-10

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