PU PLANT SOLVENT EXTRACTION

SX contained one U shaped 34 foot high glovebox. This glovebox was anchored to the wall and contamination was spread to the wall and floor during removal of this glovebox. After glovebox removal, the walls and floor were coated with a stripable paint to tie up loose contamination. After removal of the stripable paint and floor coating, direct readings averaged approximately 600 dpm/100 cm^2 with a high of 8000 dpm/100 cm^2. We proceeded to grit blast the walls and floor and reduced all alpha readings to less than 100 dpm/100 cm^2.

Our low energy gamma survey indicated a problem along the south wall floor seam. We removed a small portion of the south floor and a small amount of sand to correct this problem.

We used a Ludlum 2220 with a Ludlum 43-27 (large area detector for scan) and a 43-68 for release survey. All smears were taken on Whatman smear paper and counted in a Hewlett Packard 5560A (low background) automatic sample counter.

William A. Rogers

W.A. Rogers

Pu PLANT RELEASE SURVEY PLAN

1. For initial decontamination all surfaces will be scanned with an Eberline PRM-6 with a Radeco alpha scintillation probe. Background will be maintained at less than 100 CPM(200 dpm). All areas greater than twice background will be marked and reading will be taken with a release survey instrument to document contamination levels and random large area smears will be taken.

2. After these initial areas are decontaminated, all floor surfaces and the base of each wall will be completely surveyed with a digital readout release instrument and a Ludlum large area gas proportional alpha detector and random smear samples will be taken. Release instrumentation shall have a minimum detectable level of at least 50 dpm/100 cm^2.

3. All hot spots greater than or equal to 100 dpm/100 cm^2 identified will be decontaminated.

4. A random survey with a release instrument will be taken on the walls and ceiling to try to identify any other problem areas.

5. If no problems are identified, each room will be gridded off into approximately 2 meter on a side square on the walls and floor and five readings will be taken in each grid. Readings shall be taken in the center and at the midpoint from the center to each corner.

6. Each ceiling has closely spaced rafters that will not be easily divided into 2 meter squares. Because of this, we will take readings on the bottom of each rafter at 2 meter intervals and one reading centered on the ceiling between rafters. Readings on each rafter will be staggered one meter.

7. These release readings will be documented on a map that is drawn to approximately scale measurements in meters.

8. Data provided on each map:

    1. Survey block numbers, identifiable on a scale drawings.

        a. room or area name or number.
        b. surface surveyed.
        c. type of measurement and units.

    2. Name of surveyor taking measurements, date of survey, and location.

3. Type, model number, calibration data, sensitivity limit, background, and source response of instruments used in survey.

4. When a block surveyed is below the sensitivity of the instrument, the fact that such a measurement was made should be included as significant data.

9. All release survey smears will be taken on Whatman smear paper and counted in the automatic sample counters. Each smear will cover approximately 100 cm^2.

10. There will be at least 30 survey blocks in each area to be released.

11. Piping and ductwork will be surveyed on all accessable sides at 2 meter intervals. If more than one line is running parallel in a pipe rack, readings shall be staggered at one meter intervals.

12. All readings taken that only cover part of a probe area will be corrected to dpm/100 cm^2.

13. No survey block will measure less than one meter on a side.

14. No survey block will measure more than 3 meters on a side.

15. All portable release survey instruments will be calibrated quarterly and all instruments in use will be source checked daily.

Table I-1. Acceptable surface contamination levels

Nuclides[a]	Average[b,c,f]	Maximum[b,d,f]	Removable[b,e,f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90 Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and other noted above.	5,000 dpm βγ/100 cm^2	15,000 dpm βγ/100 cm^2	1,000 dpm βγ/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

N
W E
S

AREA SX

TYPE OF SURVEY ∝ DIRECT + SMEAR

TYPE OF INSTRUMENT LUDLUM 2220 / DET. 43-27

SERIAL NUMBER 58302 / Wall scanner

COMPLETION DATE 10-11-88

H.P. SIGNATURE Bob Hopkins

SURVEY UNITS [redacted] = DPM/515 cm²

AUTO. SAMPLE COUNTER #:

8 cm = 1 Meter

D - DIRECT
S - SMEAR

F – FLOOR
C – CEILING
N – NORTH WALL
S – SOUTH WALL
E – EAST WALL
W – WEST WALL

SOURCE #: 184 / VALUE: 273 DPM

INSTRUMENT		
DATE	SOURCE C/M RESPONSE	BKGD C/M
10-10-89	123/97	4
10-10-89	93/123	2
10-11-89	115/94	2
10-11-89	93/101	3

NORTH WALL

SOUTH WALL

EAST WALL

WEST WALL

FLOOR

CEILING

1 BEAM 2 BEAM 3 BEAM

C-1 C-4

RM. 127 FLOOR LEVEL

all of both lower sections needs to be blasted

North side of west wall

entire floor needs to be grit blasted

AREA SX — FINAL GRID

TYPE OF SURVEY ∝ DIRECT + SMEAR

TYPE OF INSTRUMENT LUDLUM 2220/DET. 43-68

SERIAL NUMBER 37800 Probe 43-68

COMPLETION DATE 3-2-89

H.P. SIGNATURE W. G. Rogers

SURVEY UNITS DPM/100cm²

AUTO. SAMPLE COUNTER #: 2 83600108 - #1-83600115

N / W / E / S

1.5cm = 1 Meter

F – FLOOR
C – CEILING
N – NORTH WALL
S – SOUTH WALL
E – EAST WALL
W – WEST WALL

D – DIRECT
S – SMEAR

MDA 15.68 DPM/100cm² AVG. FIXED

SOURCE #: 6816 VALUE: 1078 DPM

INSTRUMENT		
DATE	SOURCE C/M RESPONSE	BKGD C/M
2/23/89 PM	227/237	0
2/24/89 AM	222/238	2
2/24/89 PM	227/248	1
	ASC#2	
2-27-89	32	.1
3-6-89	30	.2
	ASC#1	
3-6-89	32	.2

	DIRECT	SMEAR
TOTAL DPM	3184	366
# READINGS	150	150
AVG DPM/100cm²	21.23	2.44
MAX DPM/100cm²	88	12

NORTH WALL

SOUTH WALL

EAST WALL

WEST WALL

127 Bo-1

AREA SX
FINAL GRID

TYPE OF SURVEY ∝ DIRECT & SMEAR

TYPE OF INSTRUMENT LUDLUM 2220 / DET. 43-68

SERIAL NUMBER 37800 Probe 43-68

COMPLETION DATE 3-2-89

H.P. SIGNATURE W. A. Rogers

SURVEY UNITS DPM/100cm²

AUTO. SAMPLE COUNTER #: 1-83600115

N
W E
S

1.5cm = 1 Meter

F – FLOOR D-DIRECT
C – CEILING S-SMEAR
N – NORTH WALL MDA 15.68
S – SOUTH WALL DPM/100cm² AVG
E – EAST WALL FIXED
W – WEST WALL

SOURCE #: 1681 VALUE: 1078 DPM

INSTRUMENT		
DATE	SOURCE C/M RESPONSE	BKGD C/M
3-2-89	228/258	2
	ASC #1	
3-3-89	32	3

FLOOR

D-52 S-0 | D-8 S-0
D-24 S-3 | D-12 S-3
D-12 S-0 | D-8 S-9
D-16 S-6 | D-84 S-0 | D-36 S-0
D-44 S-3

CEILING

BEAM | BEAM | BEAM

4-3: D S-24 -9 | D-32 S-0 | D-16 S-0
D-16 S-3 | D-16 S-0 | D-24 S-0
32-6: D-48 S-3 | D-0 S-3 | D-8 S-0
D-0 S-0 | D-0 S-3 | D-8 S-0
8-6: D-8 S-3 | D-0 S-3 | D-24 S-3
D-8 S-3 | D-0 S-6 | D-0 S-3

	DIRECT	SMEAR
TOTAL DPM	572	78
# READINGS	31	31
AVG DPM/100cm²	18.45	2.52
MAX DPM/100cm²	84	9

PU - Plywood SX Floor 127 Level

Source # 6868 Value 1055 dpm/100 cm²
Ludlum 2220 DET. 43-68
Inst# 50068
Date 3-14-89 Source Response 240-260 Bkgd. 2
3-14-89 254-272 3

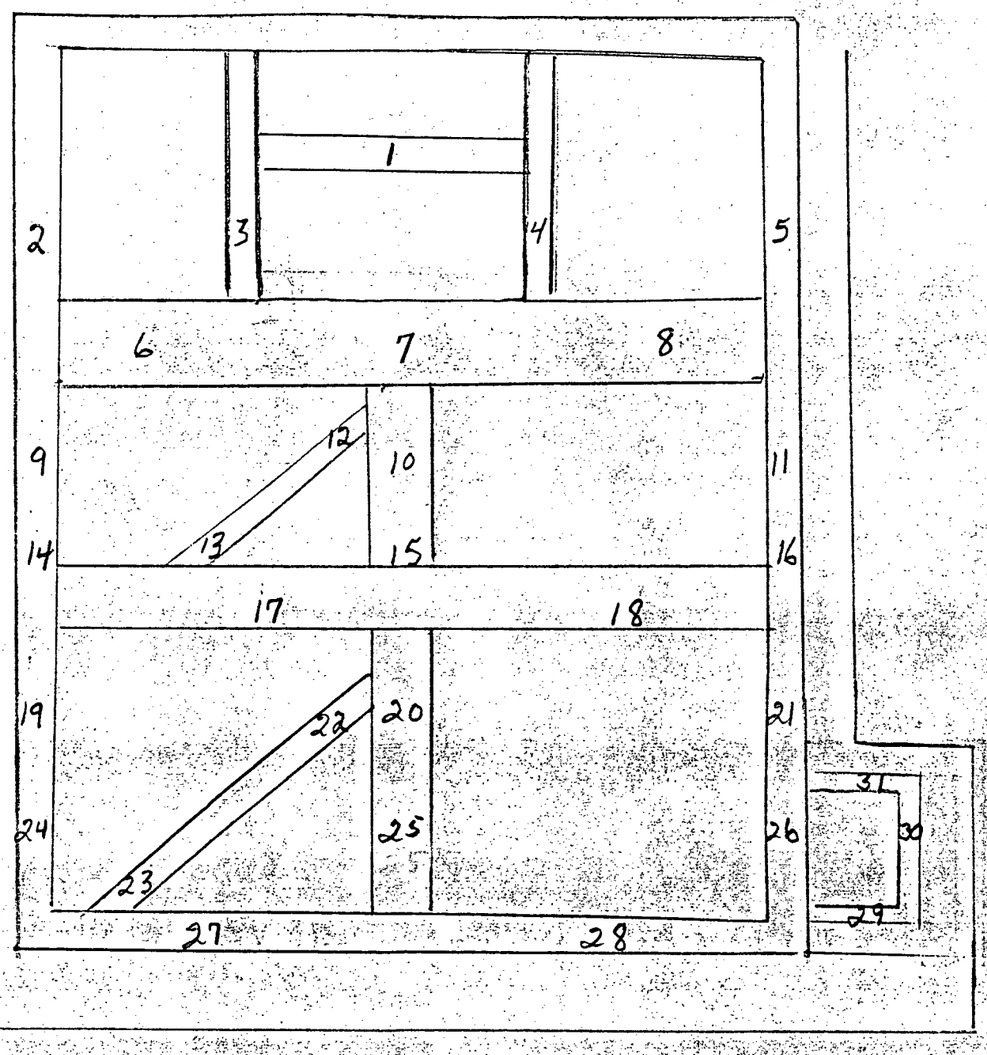
Auto Sample Counter
SN#

Date	Source Response Avg	Bkgd.
3-14-89	250	2
3-14-89	263	3

ASC# 83600115

7-6-89 34 Bkg. 2

SX Beam Platform



READING IN DPM/100cm²

SURVEY #	DIRECT	SMEAR
#1 top	12	0
Bottom	60	0
North	20	6
South	42	0
#2 top	48	3
Bottom	48	3
East	6	0
West	3	0
#3 top	90	3
Bottom	48	3
East	20	0
West	36	0
#4 top	84	0
Bottom	30	0
East	28	0
West	68	6
#5 top	66	0
Bottom	66	3
East	72	9
West	60	0
#6 top	30	9
Bottom	18	9
North	0	0
South	6	0

Total Direct - 4559
Total Readings - 116
Avg DPM/100 cm² - 39.3
Max. DPM/100 cm² 90.0

SURVEY #	DIRECT	SMEAR
#7 top	18	0
Bottom	72	0
North	30	0
South	54	3
#8 top	66	0
Bottom	48	3
North	66	3
South	72	3
#9 top	30	0
Bottom	36	6
East	30	3
West	18	3
#10 top	66	0
Bottom	36	0
East	24	0
West	16	0
#11 top	66	3
Bottom	24	3
East	42	9
West	54	3
#12 Top	6	0
Side	48	3
Bottom	12	3

Total Smear - 282
Total Readings - 116
Avg DPM/100 cm² - 2.43
Max DPM/100 cm² - 9
MDA - 19.20 DPM/100 cm²

READING IN DPM/100 cm²

SURVEY #	DIRECT	SMEAR
#13 top	30	3
Side	48	3
Bottom	12	0
#14 top	30	0
Bottom	18	0
East	6	0
West	18	0
#15 top	42	0
Bottom	30	3
East	12	0
West	54	6
#16 top	78	9
Bottom	72	0
East	78	9
West	60	6
#17 top	18	0
Bottom	18	0
North	36	0
South	18	9
#18 top	12	0
Bottom	60	0
North	0	0
South	30	0
#19 top	24	3
Bottom	6	0
East	30	9
West	18	6

READING IN DPM/100 cm²

SURVEY #	DIRECT	SMEAR
#20 Top	36	3
Bottom	18	0
East	42	0
West	84	3
#21 top	90	9
Bottom	60	0
East	60	6
West	84	0
#22 top	18	3
Side	84	0
Bottom	6	0
#23 top	54	6
Side	48	0
Bottom	30	0
#24 top	48	0
Bottom	36	0
East	6	9
West	78	0
#25 top	6	3
Bottom	30	3
East	42	0
West	24	0
#26 top	42	3
Bottom	60	0
East	42	9
West	42	6

READING IN DPM/100 cm²

SURVEY #	DIRECT	SMEAR
#27 top	36	6
Side	12	3
Bottom	30	9
#28 top	72	0
Side	42	3
Bottom	12	0
#29 top	24	0
Side	18	0
Bottom	36	6
#30 top	48	3
side	48	6
Bottom	24	3
#31 top	90	0
Bottom	54	3
North	36	3
South	54	6

READING IN DPM/100 cm²

SURVEY #	DIRECT	SMEAR

SX
PH - Plywood - Floor 127 Level

Source # 6868 Value 1055 dpm/100 cm²
Ludlum 2220 DET. 43-68
Inst# 50068
Date 3-14-89 Source Response 240-260 Bkgd. 2
3-14-89 254-272 3

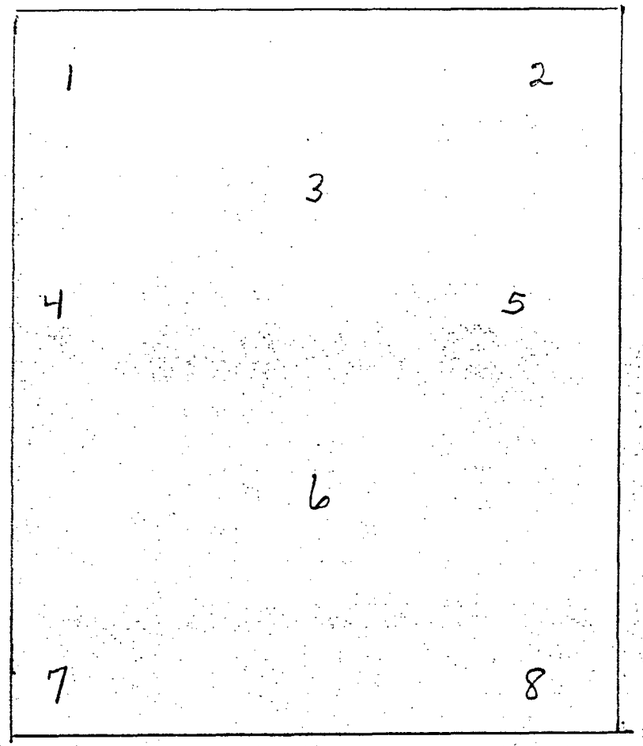
Auto Sample Counter
SN#

Date	Source Response Avg	Bkgd.
3-14-89	250	2
3-14-89	263	3

ASC# 83600115

7-6-89	34	Bkg. .2

4X8 Sheet
PH- Plywood SX Floor 127 level



READING IN DPM/100.cm²

SURVEY #	DIRECT	SMEAR
	Section #1	
1	12	3
2	12	3
3	12	3
4	16	0
5	0	3
6	0	3
7	12	3
8	0	3
	Section #2	
1	8	0
2	16	6
3	0	3
4	0	3
5	0	3
6	0	3
7	8	0
8	0	0
	Section #3	
1	0	3
2	0	0
3	4	0
4	0	0
5	16	6
6	8	3
7	4	0
8	8	3

SURVEY #	DIRECT	SMEAR
	Section #4	
1	12	0
2	0	0
3	4	3
4	0	0
5	12	3
6	0	3
7	0	3
8	0	3

PH-Plywood Floor
127 Level

Direct
Total Direct 164
Total Readings 32
Avg DPM/100cm² 5.13
Max. DPM/100 cm² 16

Smears
Total Smears 69
Total Readings 32
Avg DPM/100cm² 2.16
Max DPM/100 cm² 6

MDA.
DPM/100cm² 19.20

PU - SX Support Beam

Source #6868 Value 1055 DPM/100cm²
Ludlum 2220 DET 43-68
Inst# 50068

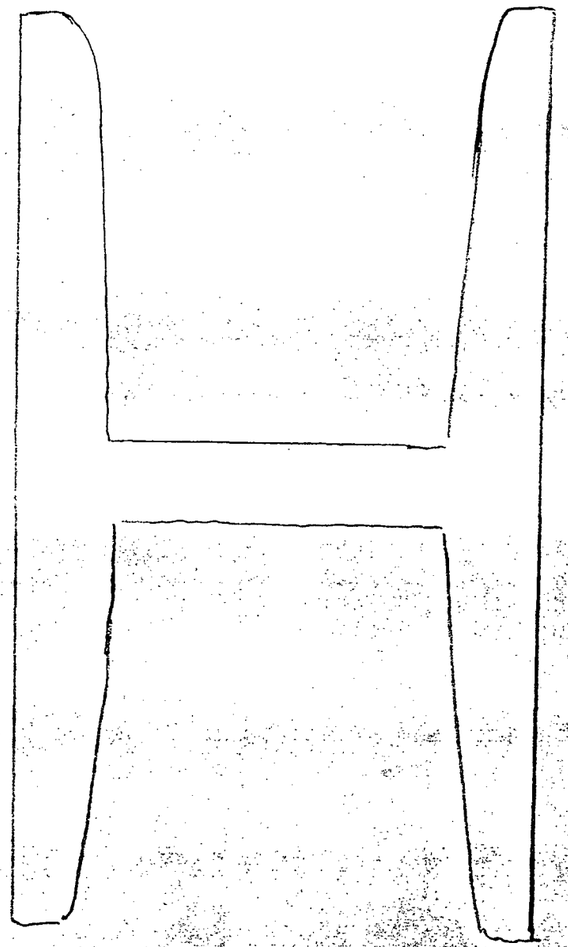
Date	Source Response	Bkgd.
3-14-89	254-272	3
3-15-89	241-263	2

Auto Sample Counter #:
SN 83600108

Date	Source Response Avg	Bkgd.
3-14-89	263	3
3-15-89	252	2

ASC #2

3-15-89	33	.3



SX Support Beam
top View
Approximately 4' Meters tall

READING IN DPM/100cm²

SURVEY #	DIRECT	SMEAR
SX North Beam		
North #1	32	6
2	8	0
3	20	9
4	56	3
South #1	24	3
2	20	9
3	16	9
4	80	0
East #1	12	0
2	12	3
3	28	3
4	40	3
West #1	4	0
2	0	0
3	20	0
4	92	6

SURVEY #	DIRECT	SMEAR
SX South Beam		
North #1	8	9
2	20	3
3	80	3
4	52	6
South #1	24	0
2	16	3
3	24	0
4	60	6
East #1	16	6
2	24	3
3	64	0
4	80	9
West #1	40	3
2	20	0
3	52	3
4	56	3

Direct	
total Direct	1,100
total Readings	32
Avg DPM/100cm²	34.38
M.A. DPM/100cm²	92

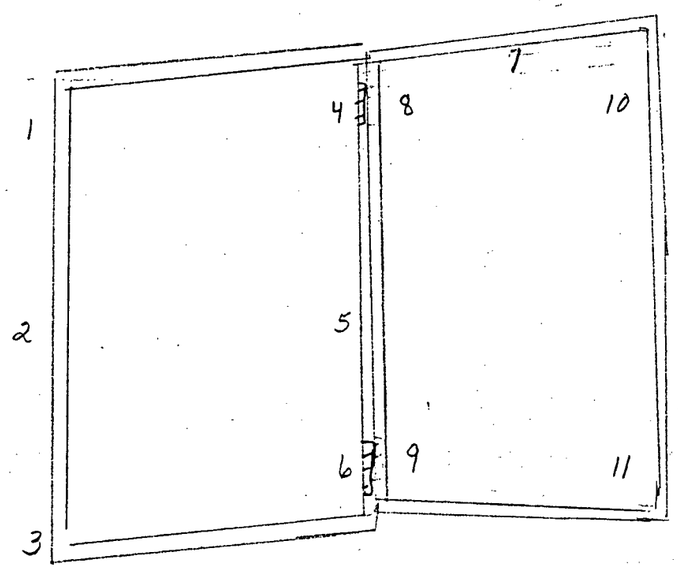
Smears	
total Smears	111
total Readings	32
Avg DPM/100cm²	3.47
MAX DPM/100 cm²	9

17 D.A.
DPM/100cm² - 19.20

6-29-89

Ludlum 2220
Inst # 58318 43-4
Source #6868
1055 DPM
Source Ck.
268-263 Bkg 2
242-280 Bkg 2

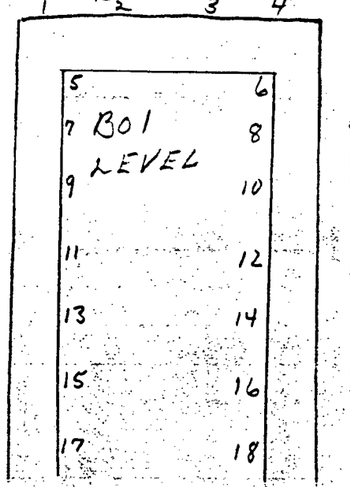
SX PH BUILDING
— DOORS



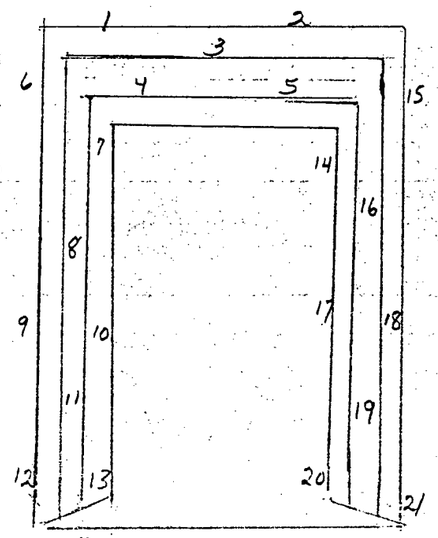
MDA 27.44
DPM/100cm²
FIXED

	DIRECT	SMEAR
TOTA DPM	3,059	138
READINGS	93	93
DPM/100cm² AVG	32.89	1.48
MAX DPM/100cm²	98	9

FRAME OF
DOOR #3



DOOR FRAMES



PLANT PH AREA SX TOP LEVEL
SURVEYED BY IRV POWELL
INST. LUDLUM 2220 # 58318 DET. 43-4
SOURCE CK 268-263 / 242-280 BKG. 2-2
DATE: 6-29-89 SOURCE #: 6868 VALUE: 1055 DPM

ASC # 2 83600108
CTD. BY Jim Bolle
SOURCE CK. AVG. 35
BKG. 12
DATE: 6-30-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
SX PH BUILDING				
DOOR #1 TOP LEVEL	1	1	7	3
	2	1	7	0
	3	2	14	3
	4	4	28	3
	5	1	7	0
	6	1	7	3
	7	1	7	0
	8	1	7	3
	9	12	84	3
	10	2	14	3
	11	0	0	0
DOOR FRAME	1	4	28	0
	2	2	14	0
	3	0	0	3
	4	0	0	0
	5	3	21	0
	6	3	21	3
	7	11	77	0
	8	5	35	0
	9	0	0	3
	10	9	63	0
	11	6	42	0
	12	1	7	0
	13	4	28	0
	14	2	14	0
	15	2	14	0
	16	4	28	3
	17	14	98	0
	18	0	0	3
	19	4	28	3
	20	1	7	0
	21	1	7	0

PLANT PU AREA SX Rm 127 LEVEL
SURVEYED BY IRV POWELL
INST. LUDLUM 2220 # 58318 DET. 43-4
SOURCE CK 263-268 / 242-280 BKG. 2-2
DATE: 6-29-89 SOURCE #: 686 VALUE: 1055 DPM

ASC # 2-83600108
CTD. BY Jm Black
SOURCE CK. AVG. 35
BKG. 2
DATE: 6-30-89

READINGS IN DPM/100 cm^2

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
SX - DOOR #2	1	7	49	3
ROOM 127 LEVEL	2	12	84	3
	3	7	49	0
	4	1	7	3
	5	3	21	3
	6	2	14	3
	7	8	56	6
	8	2	14	0
	9	2	14	0
	10	2	14	0
	11	3	21	3
DOOR FRAME	1	7	42	3
	2	4	28	0
	3	1	7	3
	4	3	21	0
	5	4	28	6
	6	7	49	0
	7	7	49	0
	8	7	49	3
	9	4	28	3
	10	9	63	6
	11	3	21	0
	12	8	56	0
	13	2	14	0
	14	7	49	0
	15	3	21	0
	16	4	28	3
	17	6	42	0
	18	2	14	6
	19	5	35	3
	20	2	14	0
	21	7	49	0

PLANT PU AREA SX B01 LEVEL
SURVEYED BY IRV POWELL
INST. LUDLUM 2220 # 58318 DET. 43-4
SOURCE CK 268-263 / 242-280 BKG. 2-2
DATE: 6-29-89 SOURCE #: 686 VALUE: 1055 DPM

ASC # 2-83600108
CTD. BY Jm Black
SOURCE CK. AVG. 35
BKG. 2
DATE: 6-30-89

READINGS IN DPM/100 cm^2

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
DOOR #3	1	1	7	0
B01 LEVEL	2	3	21	0
	3	6	42	0
	4	11	77	0
	5	8	56	0
	6	11	77	0
	7	3	21	0
	8	7	49	3
	9	4	28	0
	10	2	14	0
	11	13	91	6
DOOR FRAME	1	7	49	0
	2	4	28	9
	3	5	35	0
	4	7	49	3
	5	6	42	0
	6	8	56	0
	7	9	63	0
	8	8	56	0
	9	7	49	0
	10	11	77	0
	11	5	35	3
	12	4	28	0
	13	13	91	6
	14	2	14	0
	15	8	56	6
	16	3	21	3
	17	7	49	0
	18	2	14	0