Pu-Plant Maintenance Shop (Room, 116)

During production, this room contained one glovebox used for rebuilding contaminated equipment. The major source of contamination in this area was the glovebox exhaust duct and solvent extraction exhaust duct, that ran through the overhead of this room. We had some leakage from these two systems due to condensate build up inside these ducts.

After removal of these systems, we removed some piping and supply duct that had been dripped on by this condensate, and removed the floor coating. We blasted the wall and floor before final release surveys were started.

We used a Ludlum 2220 with a Ludlum 43-17 low energy gamma probe to survey all cracks and seams. A Ludlum 2220 with a Ludlum 43-68, 43-4, or 43-27 was used with P-10 gas for all alpha release surveys. All smears were taken on Whatman smear paper and counted in a Hewlett -Packard 5560 A (low background) automatic sample counter.

W. 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 cm²	15,000 dpm α/100 cm²	1,000 dpm α/100 cm²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm²	300 dpm/100 cm²	20 dpm/100 cm²
Th-nat, Th-232, Sr-90 Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm²	3,000 dpm/100 cm²	200 dpm/100 cm²
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 cm²	15,000 dpm βγ/100 cm²	1,000 dpm βγ/100 cm²

[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 cm².

[e] The amount of removable radioactive material per 100 cm² 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.

AREA ROOM 116 — FINAL GRID

TYPE OF SURVEY α DIRECT + SMEAR

TYPE OF INSTRUMENT Ludlum 2220 / DET. 43-27

SERIAL NUMBER 58302

COMPLETION DATE 7-10-89

H.P. SIGNATURE W.A. Boyce

SURVEY UNITS

AUTO. SAMPLE COUNTER #:

N / W / E / S

1.5cm = 1 Meter

D - DIRECT
S - SMEAR

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

SOURCE #: 1832 VALUE: 342 DPM

INSTRUMENT		
DATE	SOURCE C/M RESPONSE	BKGD C/M
7-10-89	121-111	2
	113-109	3

NORTH WALL

SOUTH WALL

SUPPORT BEAM

BOTTOM

NORTH

NORTH TOP

NORTH UP-RIGHT

SOUTH

SOUTH TOP

SOUTH UP-RIGHT

FLOOR

AREA ROOM 116 — FINAL GRID

TYPE OF SURVEY ∝ DIRECT + SMEAR

TYPE OF INSTRUMENT Ludlum 2220 / DET. 43-68

SERIAL NUMBER 58308, 37807 / 45957, 44487 / 48395, 50069 / 46172, 46173

COMPLETION DATE 10-20-89

H.P. SIGNATURE W.G. Rogers

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

SURVEY UNITS DPM/100cm²

N / W / E / S

1.5cm = 1 Meter

D - DIRECT
S - SMEAR
F - FLOOR
C - CEILING
N - NORTH WALL
S - SOUTH WALL
E - EAST WALL
W - WEST WALL

MDA 15.68 DPM/100cm² FIXED

SOURCE #: 7272 6816 VALUE: 1028 DPM 850

INSTRUMENT		
DATE	SOURCE C/M RESPONSE	BKGD C/M
10-11-88	208 48395	0
10-11-88	221 50069	1
10-18-88	226 58308	2
10-19-88	245 37807	1
10-19-88	248 58308	2
10-19-88	251 37807	2
	ASC #1	
10-13-88	33	.2
10-20-88	34	.2
	ASC #2	
10-12-88	27	.1

NORTH WALL

D-8 S-0	D-12 S-0	D-16 S-0	D-28 S-6	D-8 S-0	D-12 S-3
	D-8 S-0		D-8 S-3	D-0 S-0	
D-16 S-0	D-16 S-0	D-16 S-0	D-12 S-0	D-0 S-6	D-16 S-3
D-12 S-3	D-28 S-6	D-16 S-3	D-16 S-0	D-48 S-6	D-36 S-3
	D-16 S-3		D-8 S-0	D-8 S-6	
D-24 S-3	D-28 S-0	D-16 S-0	D-32 S-9	D-12 S-3	D-8 S-3
D-8 S-3	D-16 S-3	D-12 S-0	D-12 S-0	D-8 S-3	D-24 S-3
	D-8 S-0		D-16 S-0		D-16 S-0
D-12 S-3	D-4 S-0	D-8 S-0	D-8 S-0	D-0 S-0	D-4 S-0

SUPPORT BEAM

BOTTOM	D-12 S-0	D-12 S-3	D-16 S-3	D-12 S-3	D-24 S-3	D-24 S-6
NORTH	D-20 S-3	D-24 S-6	D-24 S-0	D-20 S-0	D-8 S-0	D-8 S-0
NORTH TOP	D-12 S-0	D-28 S-0	D-16 S-0	D-8 S-0	D-8 S-3	D-12 S-0
NORTH UP-RIGHT	D-4 S-0	D-0 S-0	D-20 S-0	D-4 S-3	D-12 S-6	D-8 S-3
SOUTH	D-16 S-0	D-12 S-0	D-24 S-0	D-4 S-0	D-20 S-3	
SOUTH TOP	D-32 S-3	D-16 S-0	D-4 S-0	D-12 S-0	D-20 S-0	
SOUTH UP-RIGHT	D-12 S-0	D-12 S-9	D-12 S-3	D-20 S-0	D-16 S-0	

SOUTH WALL

D-24 S-6	D-32 S-0	D-20 S-0	D-20 S-0	D-16 S-3	D-24 S-3
	D-40 S-6		D-4 S-3	D-8 S-0	
D-24 S-3	D-16 S-3	D-12 S-6	D-12 S-3	D-12 S-0	D-12 S-3
D-20 S-0	D-12 S-6	D-16 S-3	D-24 S-3	D-24 S-0	D-16 S-3
	D-16 S-0		D-8 S-3	D-20 S-0	
D-32 S-0	D-24 S-3	D-16 S-0	D-4 S-3	D-20 S-0	D-24 S-0
D-8 S-0	D-0 S-0	D-4 S-0	D-8 S-0	D-16 S-0	D-16 S-3
	D-36 S-3		D-8 S-3	D-8 S-0	
D-12 S-0	D-20 S-0	D-16 S-0	D-16 S-0	D-20 S-6	D-12 S-0

164 MAX DPM/100cm²

DIRECT

1088 TOTAL DPM

394 READINGS

15.45 DPM/100cm² AVG.

SMEAR

588 TOTAL DPM

394 SMEARS

1.49 DPM/100cm² AVG

12 MAX DPM/100cm²

FLOOR

D-12 S-6		D-20 S-0	D-8 S-0		D-24 S-3
	D-12 S-0			D-20 S-0	
D-0 S-3		D-8 S-0	D-16 S-0		D-16 S-0
D-16 S-0		D-4 S-0	D-24 S-3		D-8 S-0
	D-12 S-0			D-12 S-0	
D-8 S-0		D-20 S-3	D-20 S-0		D-8 S-0
D-24 S-0		D-12 S-0	D-8 S-0		D-12 S-6
	D-20 S-0			D-4 S-0	
D-24 S-0		D-12 S-0	D-0 S-0		D-28 S-0
D-20 S-0		D-8 S-0	D-8 S-0		D-4 S-3
	D-24 S-3			D-4 S-0	
D-8 S-0		D-8 S-0	D-8 S-3		D-16 S-0
D-12 S-0		D-16 S-0	D-12 S-0		D-12 S-0
	D-4 S-0			D-4 S-0	
D-28 S-3		D-4 S-0	D-4 S-0		D-28 S-0

AREA Room 116 — Final Grid

TYPE OF SURVEY α DIRECT & SMEAR

TYPE OF INSTRUMENT LUDLUM 2220 / DET. 43-68

SERIAL NUMBER 58308, 37807 / 48395, 50069, / 47957, 44487 / 46172, 46173

COMPLETION DATE 10-20-89

H.P. SIGNATURE W.G. Rogers

SURVEY UNITS DPM/100cm²

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

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

SOURCE #: 7272 6816 1078 VALUE: 850 DPM

INSTRUMENT			
DATE	SOURCE RESPONSE C/M		BKGD C/M
10-7-88	205	48395	0
10-7-88	187	50069	0
10-10-88	195	48395	0
10-10-88	176	50069	1
10-10-88	196	48395	0
10-10-88	208	50069	0
10-11-88	209	48395	0
10-11-88	185	50069	1
10-11-88	208	48395	0
10-11-88	221	50069	1
10-19-88	248	58308	2
10-19-88	251	37807	2
	ASC #1		
10-13-88	33		.2
10-14-88	36		.3
10-20-88	34		.2
	ASC #2		
10-12-88	27		.1

WEST WALL

D-44 S-6	D-20 S-0	D-28 S-0	D-12 S-3	D-32 S-3	D-20 S-0	D-16 S-0	D-12 S-3	D-16 S-3	D-8 S-0
D-12 S-3		D-20 S-6		D-20 S-6		D-16 S-0		D-4 S-0	
D-20 S-6	D-12 S-3	D-24 S-0	D-24 S-0	D-12 S-3	D-20 S-0	D-16 S-0	D-16 S-0	D-20 S-0	D-4 S-3
D-8 S-3	D-12 S-0	D-8 S-6	D-8 S-0	D-8 S-0	D-0 S-6	D-0 S-0	D-20 S-12	D-8 S-0	D-28 S-0
D-16 S-0		D-16 S-0		D-12 S-0		D-40 S-9		D-4 S-3	
D-24 S-0	D-36 S-6	D-16 S-3	D-8 S-0	D-8 S-3	D-20 S-0	D-12 S-3	D-4 S-3	D-16 S-0	D-20 S-0
D-8 S-0	D-8 S-0	D-20 S-0	D-4 S-0	D-16 S-6	D-0 S-3	D-24 S-0	D-20 S-0	D-16 S-0	D-8 S-3
D-4 S-0		D-20 S-0		D-12 S-0		D-8 S-0		D-28 S-3	
D-12 S-3	D-8 S-0	D-20 S-0	D-4 S-0	D-20 S-6	D-20 S-0	D-16 S-3	D-20 S-0	D-0 S-0	D-32 S-3

EAST WALL

D-12 S-0	D-16 S-3	D-24 S-0	D-12 S-0	D-4 S-0	D-12 S-0	D-12 S-0	D-24 S-0	D-12 S-0	D-40 S-0
D-16 S-0		D-36 S-3		D-32 S-3		D-4 S-0		D-16 S-3	
D-16 S-0	D-16 S-0	D-24 S-0	D-12 S-0	D-24 S-3	D-12 S-3	D-44 S-3	D-12 S-0	D-24 S-3	D-12 S-0
D-44 S-0	D-32 S-0	D-8 S-3	D-24 S-0	D-24 S-3	D-40 S-0	D-20 S-0	D-24 S-0	D-32 S-3	D-16 S-0
D-16 S-3		D-16 S-0		D-16 S-3		D-20 S-3		D-20 S-6	
D-16 S-0	D-20 S-0	D-16 S-0	D-8 S-0	D-20 S-3	D-164 S-0	D-24 S-6	D-20 S-0	D-8 S-0	D-36 S-0
D-20 S-0	D-16 S-3	D-8 S-0	D-8 S-0	D-20 S-3	D-20 S-0	D-24 S-0	D-12 S-0	D-12 S-0	D-4 S-0
D-0 S-3		D-60 S-3		D-12 S-3		D-24 S-3		D-8 S-0	
D-28 S-0	D-8 S-0	D-20 S-3	D-20 S-0	D-20 S-0	D-8 S-0	D-8 S-0	D-8 S-0	D-24 S-0	D-12 S-0

BEAM

	D S N/A		D S N/A		D S 4 0	D S 4 6		D S 12 0	
D-12 S-3	D-4 S-0		D-0 S-0		D-8 S-3	D-4 S-6		D 12 S 0	
	D S 12 3		D S 12 6		D S 4 3	D S 4 0		D S 0 0	
D-4 S-0	D-4 S-0		D-12 S-3		D-8 S-0	D-12 S-0		D-36 S-0	
	D S 8 3		D S 8 0		D S 12 6	D S 8 3		D S 12 0	
D-12 S-3	D-4 S-3		D-32 S-0		D-12 S-0	D-4 S-3		D-20 S-6	
	D S 8 0		D S 12 3		D S 12 6	D S 0 3		D S 0 0	
D-12 S-3	D-28 S-3		D-16 S-3		D-8 S-0	D-4 S-0		D-20 S-3	

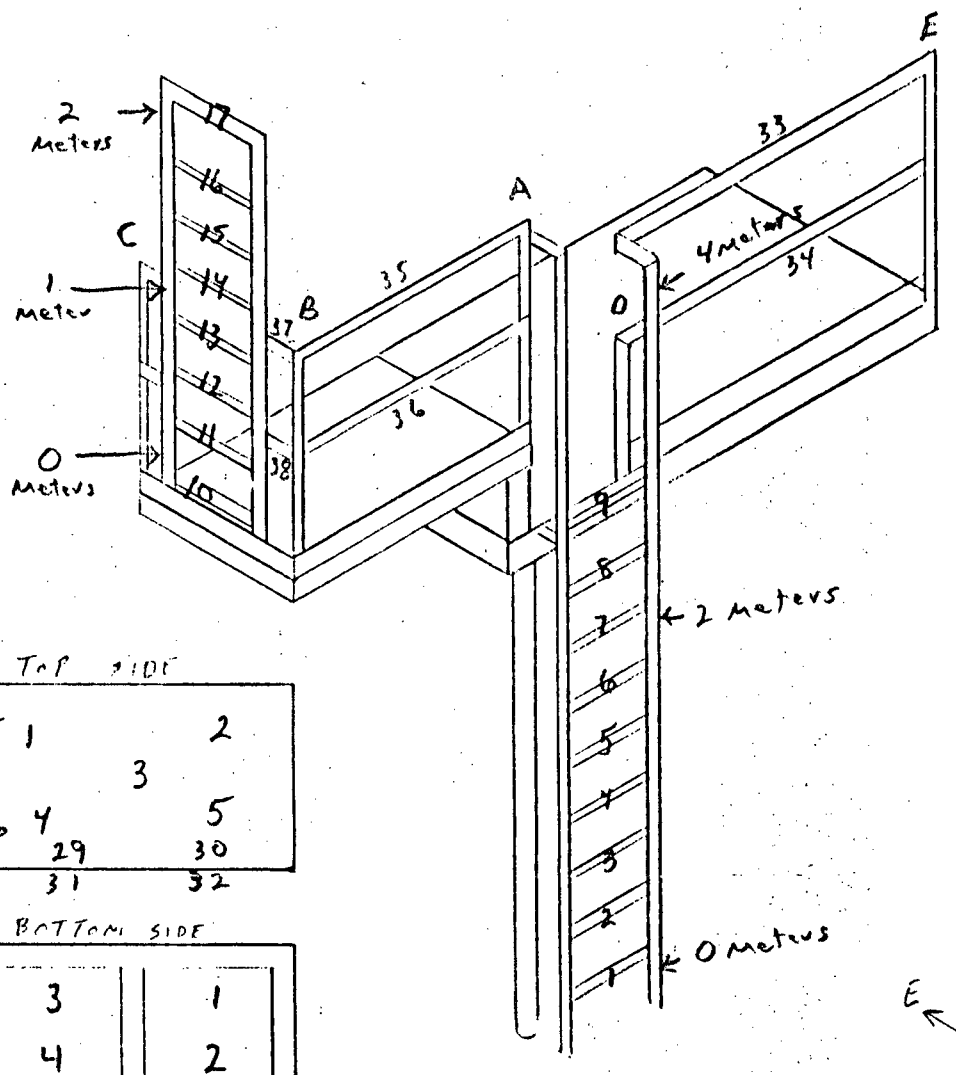
SUPPORT BEAM

D-8 S-0	D-12 S-3		D-0 S-3		D-4 S-0		D-72 S-3		
	D S 20 3		D S 16 0		D S 28 0		D S 24 3		
D-28 S-0	D-4 S-0		D-8 S-0		D-24 S-3		D-8 S-3		
	D S 4 0		D S 8 9		D S 0 3		D S 12 3		
D-12 S-0	D-12 S-3		D-16 S-0		D-28 S-3		D-12 S-0		

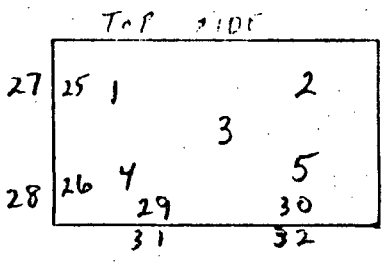
BEAM BEAM BEAM BEAM

CEILING

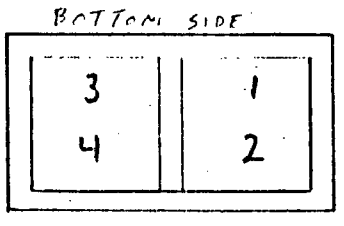
ROOM 116 LADDER TO EXHAUST FAN ROOM



TOP SIDE

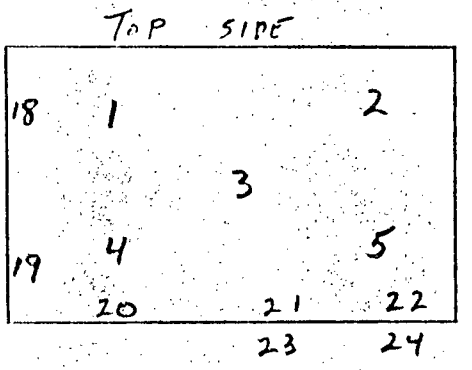


BOTTOM SIDE

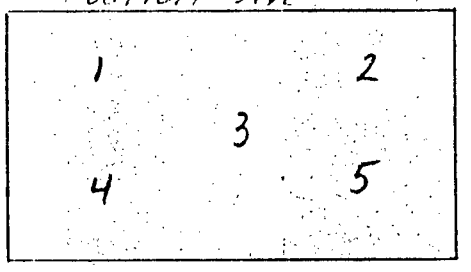


UPPER PLATFORM

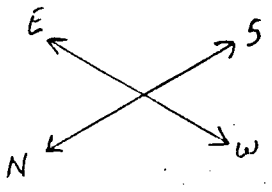
TOP SIDE



BOTTOM SIDE



LOWER PLATFORM



	Direct	Smear
Total DPM	3632	156
# Readings	105	105
Avg. DPM/100 cm²	34.59	1.49
Max. DPM/100 cm²	98	9

MDA - 38.81 dpm/100 cm²

PLANT Pu AREA Room 116
SURVEYED BY J. Handley
INST. LUDLUM 2220 # 50064 DET. 43-4
SOURCE CK 302/259 BKG. 0
DATE: 7-26-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600108
CTD. BY J. Black
SOURCE CK. AVG. 30
BKG. .2
DATE: 7-27-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
Ladder From 116 to Exhaust Fanroom				
Ladder Steps	1	5	70	3
	2	4	56	0
	3	2	28	0
	4	4	56	3
	5	4	56	3
	6	3	42	0
	7	2	28	0
	8	3	42	0
	9	5	70	0
	10	2	28	0
	11	4	56	0
	12	4	56	0
	13	4	56	3
	14	2	28	0
	15	1	14	3
	16	3	42	0
	17	1	14	0
Ladder leg: North 0 meters E		2	28	0
W		4	56	6
2 meters E		5	70	0
W		6	84	0
4 meters E		6	84	0
W		7	98	0
South 0 meters E		6	84	0
W		1	14	3
2 meters E		3	42	0
W		4	56	0
4 meters E		3	42	3
W		1	14	0

PLANT Pu AREA Room 116
SURVEYED BY J. Handley
INST. LUDLUM 2220 # 48395 DET. 43-68
SOURCE CK 231/251 BKG. 1
DATE: 7-26-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600115
CTD. BY J. Black
SOURCE CK. AVG. 33
BKG. .3
DATE: 7-27-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
Ladder From 116 to Exhaust Fanroom				
Ladder legs East 0 meters N		2	28	0
S		2	28	3
1 meter N		1	14	0
S		3	42	6
2 meters N		0	0	0
S		5	70	0
West 0 meters N		0	0	6
S		0	0	0
1 meter N		0	0	3
S		1	14	0
2 meters N		6	84	3
S		3	42	0
South landing 43-68				
Top	1	10	40	0
	2	3	12	0
	3	9	36	0
	4	6	24	0
	5	7	28	3
Bottom	1	2	8	3
	-2	1	4	3
	3	1	4	0
	4	1	4	0
	5	3	12	0
Toe Board	18	4	16	0
	19	5	20	6
	20	2	8	0
	21	3	12	0
	22	3	12	0

PLANT Pu AREA Room 116
SURVEYED BY J. Handley
INST. LUDLUM 2220 # 148395 DET. 43-68
SOURCE CK 259/245 BKG. 1
DATE: 7-26-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600115
CTD. BY J. Black
SOURCE CK. AVG. 33
BKG. 3
DATE: 7-27-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
SOUTH LANDING outside Toeboard	23	2	8	3
	24	1	4	3
North Landing				
Top	1	3	12	3
	2	12	48	0
	3	6	24	3
	4	7	28	0
	5	5	20	0
Bottom	1	9	36	0
	2	14	56	0
	3	17	68	0
	4	7	28	0
Toe Board inside	25	4	16	3
	26	7	28	0
outside	27	15	60	0
	28	8	32	9
inside	29	3	12	0
	30	1	4	3
outside	31	6	24	3
	32	7	28	0
Guardrail post A				
Top E		5	70	0
W		2	28	0
Bottom E		6	84	3
W		2	28	3
post B				
Top E		2	28	3
W		1	14	3
Bottom E		1	14	3
W		1	14	0

PLANT Pu AREA Room 116
SURVEYED BY J. Handley
INST. LUDLUM 2220 # 150064 DET. 43-4
SOURCE CK 267/294 BKG. 1
DATE: 7-26-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600108
CTD. BY J. Black
SOURCE CK. AVG. 30
BKG. 2
DATE: 7-27-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
Guardrail post C				
Top N		2	28	3
S		2	28	0
Bottom N		2	28	0
S		3	42	3
post D				
Top E		1	14	0
W		2	28	0
Bottom E		4	56	0
W		4	56	0
post E				
Top E		1	14	6
W		1	14	0
Bottom E		3	42	0
W		3	42	6
33 Top		4	56	3
33 bottom		1	14	6
34 Top		6	84	3
34 bottom		2	28	6
35 Top		5	70	3
35 bottom		0	0	6
36 Top		4	56	0
36 bottom		4	56	0
37 top		4	56	0
38 Top		2	28	3

PLANT Pu. Duct Work AREA Maint. Shop
SURVEYED BY JH + JD
INST. LUDLUM 2220 # 48395 DET. 43.68
SOURCE CK 226-259 BKG. 1
DATE: 7-25-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 2 83600108
CTD. BY J. Black
SOURCE CK. AVG. 29
BKG. .3
DATE: 7-26-89

READINGS IN DPM/100 cm^2

T - TOP
B - BOTTOM
N - NORTH
S - SOUTH
E - EAST
W - WEST

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM X4	SMEAR
Duct Start on East wall goes South to center of Room goes North to North wall at center of North wall.				
	0-meter T	2	8	6
	B	0	0	0
Direct	N	1	4	0
Total DPM - 188	S	[illegible]	[illegible]	3
# Readings - 28	2-meter W	[illegible]	7	0
Avg. DPM/100cm² - 6.71	E	[illegible]	[illegible]	0
Max. DPM/100cm² - 36	S	2	8	0
	W	7	28	3
Smear	4-meter T	2	8	3
Total DPM - 51	B	2	8	3
# Readings - 28	E	8	36	0
Avg. DPM/100cm² - 1.82	W	1	4	0
Max. DPM/100cm² - 9	6-meter T	1	4	6
	B	1	4	3
MDA - 11.08 dpm/100cm²	E	2	8	0
	W	0	0	6
	8-meter T	1	4	0
	B	0	0	0
	E	0	0	3
	W	2	8	0
	10-meter T	1	4	0
	B	0	0	0
	E	4	16	9
	W	1	4	0
	[illegible] T	[illegible]	[illegible]	0
	B	[illegible]	[illegible]	6
	E	0	0	0
	W	4	16	0
Finished 7-25-89				

Room 116 PIPE SURVEY PAGE 1 OF 35

LINE NUMBER 928 DATE 7-19-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR DUNCAN - HANDLEY
SOURCE NUMBER AND VALUE 6816 - 1078
SOURCE RESPONSE AND BACKGROUND AM 7-20-89 - 273-279 Bkg-0 (6- meters)
SOURCE RESPONSE AND BACKGROUND PM 7-19 268-260 - Bkg-1 (0-4 meters)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION		Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	Conduit	4"	0 meters	T	1	7	6
Maint shop		X7		B	0	0	0
goes through			2 meters	T	4	28	3
East wall				B	0	0	0
Maint. shop			4 meters	T	7	49	0
				B	2	14	6
			6 meters	T	7	49	3
				B	3	21	0
			Complete 7-20-89				
					Direct	Smear	
	Total DPM				8,568	579	
	# Readings				243	278	
	AVG DPM/100cm²				35.26	2.08	
	MAX DPM/100cm²				99	9	

MDA 38.81 DPM/100cm²

Room 116 PIPE SURVEY PAGE 2 OF 35

LINE NUMBER 929 DATE 7-19-89

INSTRUMENT LUDLUM - 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR DUNCAN - HANDLEY

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273 279 Bkg 0 6 meters

SOURCE RESPONSE AND BACKGROUND PM 7-19-89 268 - 260 Bkg 1 (0-4 meters)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	CONDUIT	3/4"	0 meters T	0	0	3
Maint Shop		X14	B	0	0	3
Goes through			2 METERS T	0	0	3
East Wall			R	6	84	3
Maint Shop			4-meters T	7	98	0
			B	1	14	0
			6-meters T	1	14	0
			B	3	42	6
			Complete 7-20-89.			

Room 116 PIPE SURVEY PAGE 3 OF 35

LINE NUMBER 930 DATE 7-19-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR DUNCAN - HANDLEY

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 - 273-279 Bkg 0 6- meters

SOURCE RESPONSE AND BACKGROUND PM 7-19-89 268 260 - Bkg 1 (0-4 meters)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	CONDUCT	1/2"	0 Meter T	NA	—	0
Maint Shop		X14	B	2	28	3
Goes through			2 meter T	0	0	6
East wall			B	1	14	3
Maint Shop			4-meter T	3	42	6
			B	4	56	3
			6-Meter T	NA	NA	3
			B	1	14	3
			Complete 7-20-89.			

LINE NUMBER 931 DATE 7-19-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273-279 Bkg-0 (6-meters)

SOURCE RESPONSE AND BACKGROUND PM 7-19 268 - 260 - Bkg 1 (0-4 meters)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION		Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
WEST WALL RUNS	CONDUIT	½"	0 Meters	T	NA	NA	0
EAST THROUGH		X14		B	NA	NA	3
EAST WALL OF			2 meters	T	0	0	0
MAINT SHOP				B	1	14	0
			4 meters	T	4	56	0
				B	NA	NA	0
			6 meters	T	NA	NA	3
				B	NA	NA	0
			Complete 7-20-89.				

LINE NUMBER 932 DATE 7-19-89

INSTRUMENT LUDLUM 222 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR DUNCAN - HANDLEY

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273-279 Bkg-0 6-meters

SOURCE RESPONSE AND BACKGROUND PM 7-19 268 - 260 - Bkg - 1 (0-4 meters)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION		Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	CONDUIT	½"	0-meter	N	2	28	0
Maint Shop		X14		S	3	42	3
East Through			2-meter	N	0	0	0
East Wall				S	6	84	0
Maint Shop			4-meter	N	4	56	0
				S	3	42	6
			6-meter	N	2	28	6
				S	NA	NA	0
			Completed		7-20	-89	

Room 116 PIPE SURVEY PAGE 6 OF 35

LINE NUMBER 933 DATE 7-19-89

INSTRUMENT L4DLUM 2220 SERIAL NUMBER 50069

DETECTOR L13-4 OPERATOR DUNCAN - HANDLEY

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273-279 - Bkg - 0 - 6 meters

SOURCE RESPONSE AND BACKGROUND PM 7-19-89 268 - 260 Bkg 1 0-4-meters

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	CONDUCT	4"	0 Meter T	1	7	6
maint Shop		X7	B	NA	NA	0
Goes through			2 Meter T	2	14	0
East wall			B	0	0	0
maint Shop			4-Meter T	12	84	0
			B	3	21	0
			6-Meter T	6	42	0
			B	NA	NA	0
			Completed 7-20-89			

Room 116 PIPE SURVEY PAGE 7 OF 35

LINE NUMBER 934 DATE 7-19-89

INSTRUMENT L4DLUM 2220 SERIAL NUMBER 50064

DETECTOR L13-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273-279 - Bkg 0 - 6 meters

SOURCE RESPONSE AND BACKGROUND PM 264-260 Bkg - 1 0-4-meters

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West wall	CONDUCT	3/4"	0-meter T	NA	NA	3
maint Shop		X14	B	1	14	6
goes through			2-meter T	4	56	0
East wall			B	0	0	3
maint Shop			4-meter T	2	28	9
			B	1	14	3
			6-meter T	NA	NA	6
			B	5	0	0
			Complete 7-20-89			

LINE NUMBER 935 DATE 7-19-89

INSTRUMENT LUDLUM-2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89. 273-279 - Bkg-0 - (6-7 meter)

SOURCE RESPONSE AND BACKGROUND PM 7-19-89 268-260 Bkg-1 (0-4 meter)

7-21-89 - AM - 269-274 Bkg-1 (8-12 meter)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct X 7 cpm	Direct X 7 dpm/100cm²	Smearable dpm/100cm²
West Wall	Black Pipe	10 in	0-meter T	3	21	0
East - North		X7	B	0	0	6
East through			2-meter T	2	14	3
East Wall			B	0	0	3
			4-meter T	2	14	0
			B	2	14	0
			6-meter T	9	63	0
			B	1	7	6
			8-meter T	4	28	6
			B	3	21	3
			10-meter T	8	56	0
			B	6	42	3
			12-meter T	10	70	0
			B	1	7	0
			Complete	7-21-89		

LINE NUMBER 936 DATE 7-20-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-1 OPERATOR HANDLEY-DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 - 273-279 - Bkg-0 (6-8 meter)

SOURCE RESPONSE AND BACKGROUND PM 7-19-89 268 - 260 Bkg-1 (0-4 meter)

AM - 7-21-89 - 269 - 274 Bkg-1 - (10-14)

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct X 7 cpm	Direct X 7 dpm/100cm²	Smearable dpm/100cm²
West Wall	Black Pipe	10 in	0-meter T	5	35	6
East - North		X 7	B	2	14	3
East through			2-meter T	7	49	6
East wall			B	3	21	3
			4-meter T	4	28	3
			B	3	21	0
			6-meter T	3	21	0
			B	3	21	0
			8-meter T	3	21	6
			B	2	14	6
			10-meter T	3	21	6
			B	1	7	3
			12-meter T	7	49	3
			B	0	0	3
			14-meter T	2	14	3
			B	0	0	0

Room 116 PIPE SURVEY PAGE 10 OF 35

LINE NUMBER 937 DATE 7-19-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 - 273-279 - Pkg 0 - 0-2 meter

SOURCE RESPONSE AND BACKGROUND PM 268-260 - Pkg 1 (1-6 meter)

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start - with	CONDUCT	1/2	0-meter E	2	28	3
Well case		X 14	W	6	84	0
through 1st Well			2-meter E	2	28	0
Electric			W	5	70	0
			4-meter T	5	70	0
			B	1	14	6
			6-meter T	7	98	0
			B	3	42	0
			Completed 7-20-89.			

Room 116 PIPE SURVEY PAGE 11 OF 35

LINE NUMBER 938 DATE 7-20-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR DUNCAN - HANDLEY

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 7-20-89 273-279 Pkg 0 - 6- meter

SOURCE RESPONSE AND BACKGROUND PM

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start Past well	CONDUCT	3/4	0 - meter S	4	56	3
Maint Shop		X 14	N	NA	NA	0
Down South			2 - meter E	0	-	0
Well - meter			W	4	56	3
East well to			4 - meter T	2	28	0
Electric Switch			R	2	28	0
Box			6 - meter N	3	42	0
1			S	2	28	0
			Completed 7-20-89			

LINE NUMBER 939 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 - Bkg-0
SOURCE RESPONSE AND BACKGROUND PM 264-284-Bkg-0
AM 7-21-89 269-274 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	Conduit	1in	0 meter T	2	28	6
wall moist		X14	South	4	56	0
Sump on floor			2 meter T	1	14	6
N.W. Room			S	4	56	0
			4 - meter T	4	56	0
			S	5	70	3
			6-meter - T	6	84	0
			S	NA	NA	3
			Completed 7-21-89			

LINE NUMBER 940 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 Bkg 0
SOURCE RESPONSE AND BACKGROUND PM 264-284 Bkg 0
AM-7-21-89-269-274 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start West	conduit	1 in	0 meter T	4	8.4	3
Wall Moist		X14	B	NA	NA	3
Sump on floor			2. meter T	5	70	3
East wall			B	NA	NA	3
			4 - meter T	4	56	0
			B	NA	NA	6
			6- meter T	1	14	0
			B	NA	NA	0
			Completed 7-21-89.			

LINE NUMBER 941 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 - Bkg 0
SOURCE RESPONSE AND BACKGROUND PM 264-284 Bkg 0
7-21-89-AM 269-274 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west wall maint Shop go through East wall	conduct	1in X14	0 meter T	5	70	0
			R	NA	NA	0
			2 meter T	5	70	9
			R	4	56	0
			4 meter T	3	42	6
			R	4	56	6
			6 meter T	1	14	0
			R	0	0	3
			Completed	7-21-89.		

LINE NUMBER 942 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 Bkg 0
SOURCE RESPONSE AND BACKGROUND PM 264-284- Bkg 0
AM-7-21-89- 269-274 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west wall maint go through East wall	conduct	1in 14	0 - meter T	6	84	0
			R	4	56	0
			2 - meter T	4	56	0
			R	3	42	0
			4 - meter T	7	98	0
			R	2	28	0
			6 - meter T	1	14	3
			R	2	28	6
			Completed 7-21-89			

LINE NUMBER 943 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816 - 1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 Bkg-0
SOURCE RESPONSE AND BACKGROUND PM 264-284- Bkg. 0
7-21-89-AM - 269-274 - Bkg-1

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	conduit	1in	0-meter T	3	42	9
wall maint		X14	B	0	0	0
Shop entrance			2 meter T	2	28	0
Dust wall			B	4	56	0
			4 meter T	4	56	0
			B	2	28	6
			6-meter T	2	28	3
			B	1	14	0
			Complete 7-21-89			

LINE NUMBER 944 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN
SOURCE NUMBER AND VALUE 6816 - 1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 - Bkg. 0
SOURCE RESPONSE AND BACKGROUND PM 264-284 - Bkg 0
7-21-89 - AM 269-274 - Bkg-1 86-8 meter

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	conduit	1in	0-meter T	5	70	3
wall maint		X14	B	4	56	0
Shop entrance			2- meter T	4	56	3
Dust wall			B	2	28	0
			4- meter T	5	70	3
			B	3	42	0
			6- meter T	5	70	6
			B	4	56	3
			8- meter N	3	42	6
			S	2	28	0
			Completed 7-21-89			

Maintenance Shop PIPE SURVEY PAGE 18 OF 35

LINE NUMBER 945 DATE 7-20-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 273-279 - Bkg. 0

SOURCE RESPONSE AND BACKGROUND PM 264-284 - Bkg. 0

7-21-89-AM - 269-274 Bkg-1

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	Conduct	3½ in	0-meter T	5	70	3
wall Maint		X 14	B	4	56	0
Shop entrance			2-meter T	3	42	3
East wall			B	2	28	3
			4-meter Top	7	98	6
			Bottom	0	0	3
			6-meter East	4	56	6
			South side	1	14	0
			Complete	7-21-89		

Maintenance Shop PIPE SURVEY PAGE 19 OF 35

LINE NUMBER 946 DATE 7-20-89

INSTRUMENT LUDLUM-2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 273-279 — Bkg. 0

SOURCE RESPONSE AND BACKGROUND PM 264-284 - Bkg 0

7-21-89-AM - 269-274 - 0 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	Conduct	3½ in	0-meter T	NA	NA	6
wall Maint		X 14	B	3	42	3
Shop entrance			2 meter T	NA	NA	6
East wall			B	4	56	0
			4-meter T	NA	NA	3
			B	2	28	3
			6-meter T	NA	NA	3
			B	1	14	0
			Complete	7-21-89		

Maintenance Shop PIPE SURVEY PAGE 20 OF 35

LINE NUMBER 947 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 Bkg-0
SOURCE RESPONSE AND BACKGROUND PM 264-284-Bkg-0
7-21-89 AM 269-274-Bkg-1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west	Conduit	3/4	0-meter T	NA	NA	0
Wall mount		X14	B	5	70	0
Shop go through			2-meter T	NA	NA	0
East wall			B	2	28	3
			4-meter T	NA	NA	3
			B	4	56	0
			6-meter T	NA	NA	0
			B	2	28	0
			Complete 7-21-89			

Rm 116 Maintenance Shop PIPE SURVEY PAGE 21 OF 35

LINE NUMBER 948 DATE 7-20-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816-1078
SOURCE RESPONSE AND BACKGROUND AM 273-279 - Bkg 0
SOURCE RESPONSE AND BACKGROUND PM 264-284 - Bkg 0
7-21-89-AM- 269-274- Bkg-1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start west wall	Conduit	1in	0-meter B	1	14	3
maint Shop		x14	N	1	14	0
go through			2-meter B	6	84	0
East wall			N	5	70	3
			4-meter B	0	0	6
			N	5	70	6
			6-meter B.T.	1	14	6
			NORTH	1	14	3
			Complete 7-21-89			

LINE NUMBER 949. DATE 7-20-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 1.816 - 1678.

SOURCE RESPONSE AND BACKGROUND AM 273 - 279 - Bkg 0

SOURCE RESPONSE AND BACKGROUND PM 264 - 284 - Bkg 0

7-21-89 - AM 269 - 274 - Bkg - 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start at west	Black	8 cm	0 - Meter T	2	14	3
Goes North East		X7	B	0	0	6
Goes through East			2 - Meter T	6	42	9
Wall -			B	4	28	0
			4 - Meter T	4	28	3
			B	4	28	6
			6 - Meter T	3	21	0
			B	7	49	0
			8 - Meter T	0	0	0
			B	4	28	6
			10 - Meter T	6	42	6
			B	0	0	3
			12 - Meter T	2	14	6
			B	1	7	0
			Completed	7-21-89		

LINE NUMBER 950 DATE 7-20-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43.4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078.

SOURCE RESPONSE AND BACKGROUND AM 273 - 279 Bkg 0

SOURCE RESPONSE AND BACKGROUND PM 264 - 284 - Bkg - 0

7-21-89 - AM - 269 - 274 - Bkg - 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start at west	Black	9 cm	0 - Meter T	6	42	3
Goes - North		X7	B	0	0	0
East area			2 - Meter T	7	49	0
through East			B	1	7	3
wall.			4 - Meter T	4	28	0
			B	1	7	6
			6 - Meter T	5	35	3
			B	0	0	0
			8 - Meter T	0	0	3
			B	1	7	0
			- Meter T	4	28	0
			B	1	7	0
			Completed	7-21-89		

Rm 116 Maintenance Shop PIPE SURVEY PAGE 24 OF 35

LINE NUMBER 951 DATE 7-21-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN
SOURCE NUMBER AND VALUE 6816 - 1078
SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg - 1
SOURCE RESPONSE AND BACKGROUND PM 289 - 261 - Bkg - 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start West wall	Conduit	3in	0-meter T	2	28	3
to East wall		X14	B	3	42	0
to Desk end.			2-meter T	6	84	3
			B	4	56	0
			4-meter T	4	56	0
			B	7	98	0
			6-meter T	4	56	0
			B	0	0	0
			7-meter W	2	28	0
			S	2	28	0
			Completed	7-21-89		

Rm 116 Maintenance Shop PIPE SURVEY PAGE 25 OF 35

LINE NUMBER 952 DATE 7-21-89
INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064
DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN
SOURCE NUMBER AND VALUE 6816 - 1078
SOURCE RESPONSE AND BACKGROUND AM 269 - 274 Bkg - 1
SOURCE RESPONSE AND BACKGROUND PM 289 - 261 - Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West Wall	CONDUCT	3in -	0-meter T	2	28	0
		X14	B	3	42	3
to East wall			2-meter T	3	42	0
			B	4	56	0
			4-meter T	6	84	3
			B	2	28	0
			6-meter T	2	28	3
			B	1	14	0
			7-meter W	2	28	3
			S	4	56	0
			Completed 7-21-89.			

Rm 116 Maintenance Shop PIPE SURVEY PAGE 26 OF 35

LINE NUMBER 953 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY- DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg - 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 Bkg, 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
West wall	CONDUCT	3/4 in	0 meters T	2	28	0
across across		X 14	B	4	56	3
East wall			2 - meters T	2	28	3
			B	1	14	3
			4 - meters T	4	56	6
			B	2	28	3
			6 - meters T	3	42	0
			B	1	14	0
			Completed	7-21-89		

Rm 116 - Maintenance Shop PIPE SURVEY PAGE 27 OF 35

LINE NUMBER 954 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY- DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg - 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 - Bkg - 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start on East	CONDUCT	3 in	0 - meters W	3	42	3
wall + go		X 14	E	NA	NA	0
Down [illegible]			1 - meters W	1	14	0
			E	NA	NA	3
			Completed	7-21-89		

LINE NUMBER 955 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg-1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 - Bkg-1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start on Roof	CONDUIT	3 in	0 - meter W	2	42	6
with wand		X14	E	NA	NA	0
go Down			1-meter W	2	28	3
1 meter			E	NA	NA	3
			Completed 7-21-89			

LINE NUMBER 956 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start on Roof	CONDUIT	3 in	0 - meter W	6	84	6
with wand		X14	E	NA	NA	0
down 1 meter			1-meter W	1	14	3
			E	NA	NA	3
			Completed	7-21-89		

Rm 116 - maintenance Shop PIPE SURVEY PAGE 30 OF 35

LINE NUMBER 957 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 269-274- Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289-261 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm^2	Smearable dpm/100cm^2
Start on East	CONDUCT	3 in	0-meter W	2	28	0
wall + go		X14	S	0	0	0
Down 1-meter			1-meter W	2	28	0
			E	NA	NA	0
			Complete 7-21-89			

Rm 116 maintenance Shop PIPE SURVEY PAGE 31 OF 35

LINE NUMBER 958 DATE

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY-DUNCAN

SOURCE NUMBER AND VALUE 6816-1078

SOURCE RESPONSE AND BACKGROUND AM 269-274- Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289-261 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA	READING LOCATION	Direct cpm	Direct dpm/100cm^2	Smearable dpm/100cm^2
	CONDUCT	1 in	0-meter N	4	56	3
Start on East		X14	S	1	14	0
wall and			1-meter W	2	28	0
go down			S	NA	NA	3
1 meter						
			Complete 7-21-89			

Rm 116 maint. Shop PIPE SURVEY PAGE 32 OF 35

LINE NUMBER 959 DATE 7-2-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start 4" Conduit Box	CONDUCT	½	0 - meter T	1	14	0
Conduit Box		X14	B	2	28	0
SE corner,			2 - meter N	1	14	0
goes North			S	4	56	3
then up thru roof.						
			Completed 7-2-1-89			

Rm 116 maint. Shop PIPE SURVEY PAGE 33 OF 35

LINE NUMBER 960 DATE

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 - Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 - Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start Conduit Box	CONDUIT	½	0 - meter N	7	98	0
Behind TRAN Door		X14	S	3	42	3
going to Door			1 - meter T	4	56	3
Room, East			B	4	56	0
+ South 1 meter						
goes thru Ceiling			Completed 7-2-1-89			

Run 116 - Maint Shop PIPE SURVEY PAGE 34 OF 35

LINE NUMBER 961 DATE 7-21-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR HANDLEY - DUNCAN

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 269 - 274 Bkg 1

SOURCE RESPONSE AND BACKGROUND PM 289 - 261 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start North well	CONDUCT	½	0 - meter T	4	56	3
goes South 2 meter		X14	B	4	56	0
Down to Light			2 - meter T	3	42	6
fixture			E	2	28	0
			4 - meter N	6	84	0
			S	4	56	6
			Completed 7-21-89			

Run 116 Maintance Shop PIPE SURVEY PAGE 35 OF 35

LINE NUMBER 962 DATE 7-24-89

INSTRUMENT LUDLUM 2220 SERIAL NUMBER 50064

DETECTOR 43-4 OPERATOR DUNCAN -

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM 264 - 280 - Bkg 0

SOURCE RESPONSE AND BACKGROUND PM

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct cpm	Direct dpm/100cm²	Smearable dpm/100cm²
Start north	CONDUCT	½	0 meter T	3	42	0
light fixture		X14	R	4	56	6
goes to South			1 meter T	4	56	3
light fixture			B	3	42	0
			2 - meter T	3	42	0
			R	0	0	0
			Completed	7-24-89		

Maintance Shop

Light Fixtures

	Direct	Smear
Total DPM	1036	78
# Readings	64	64
Avg. DPM/100 cm²	16.19	1.22
Max DPM/100 cm²	77	9

W. G. Rogers

PLANT PH AREA Maint. Shop
SURVEYED BY JD
INST. LUDLUM 2220 # 50064 DET. H3-4
SOURCE CK 289-287 BKG. 0
DATE: 7-24-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600108
CTD. BY J Black
SOURCE CK. AVG. 29
BKG. .2
DATE: 7-25-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
Light Fixture North set				
West to East #1 Ballast outside	W	3	21	0
	E	4	28	6
Inside	W	0	0	3
	E	0	0	0
Cover Inside	W	3	21	0
	E	0	0	3
outside	W	1	7	0
	E	1	7	0
#2 Light Cover Outside	W	1	7	0
	E	3	21	3
Inside	W	4	28	0
	E	5	35	3
Cover Inside	W	2	14	0
	E	3	21	0
Outside	W	1	7	0
	E	1	7	3
#3 Light Fixture outside	W	22	154	
Second	W	4	28	0
	E	4	28	0
Inside	W	0	0	0
	E	2	14	0
Cover Inside	W	0	0	3
	E	0	0	0
Outside Cover	W	3	21	6
	E	3	21	3
#4 Light Fixture North set				
West to East #4 outside	W	3	21	0
	E	4	28	0
Inside	W	3	21	0
	E	1	7	0
Cover Inside	W	1	7	0
	E	4	28	0

PLANT PH AREA Maint. Shop
SURVEYED BY JD
INST. LUDLUM 2220 # 50064 DET. 43-4
SOURCE CK 289-287 BKG. 0
DATE: 7-24-89 SOURCE #: 6816 VALUE: 1078 DPM

ASC # 83600108
CTD. BY J Black
SOURCE CK. AVG. 29
BKG. .2
DATE: 7-25-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
#4 Light Fixture Cover Outside	W	1	7	3
	E	1	7	0
#5 Light Fixture #1 outside	W	4	28	0
South Set West to East	E	5	35	0
Inside	W	4	28	0
	E	0	0	0
Cover Inside	W	2	14	0
	E	1	7	0
Outside	W	0	0	0
	E	0	0	0
#6 Light Fixture Outside	W	6	42	3
	E	7	49	3
Inside	W	5	35	6
	E	1	7	0
Cover Inside	W	1	7	0
	E	1	7	3
Cover Outside	W	1	7	3
	E	1	7	0
#7 Light Fixture Outside	W	0	0	0
	E	2	14	0
Inside	W	2	14	6
	E	11	77	0
Cover Inside	W	0	0	9
	E	0	0	0
Cover Outside	W	0	0	0
	E	2	14	3
#8 Light Fixture Outside	W	6	42	0
South Set West to East #8	E	5	35	0
Inside	W	3	21	0
	E	7	49	6
Cover Inside	W	0	0	0
	E	1	7	0
Outside Cover	W	2	14	0
	E	2	14	0

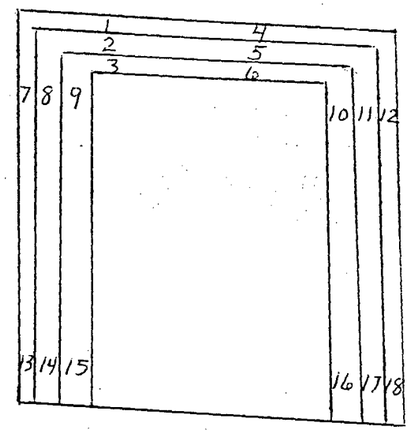
MAINT DOOR

7-19-89

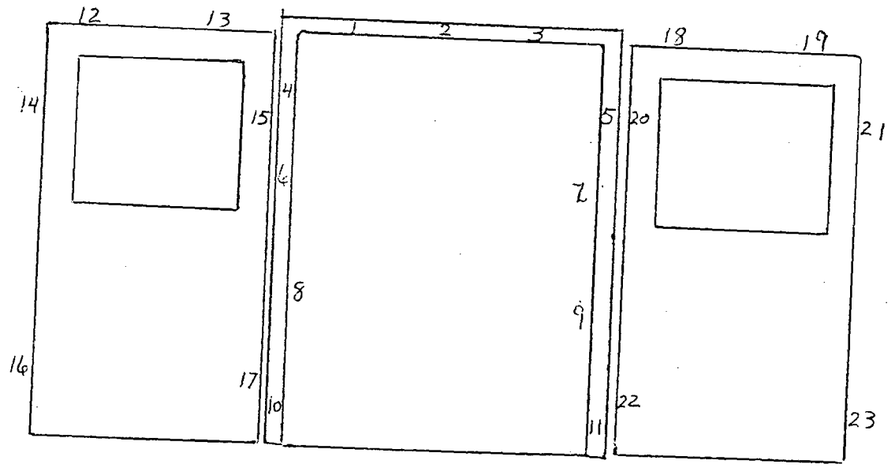
LOCATION OF COUNTS

ILP

FRAME



DOOR



PLANT PU AREA MAINT.
SURVEYED BY ILP
INST. LUDLUM 2220 * 52834 DET. 43-4
SOURCE CK 288-280 BKG. 1(AM)
DATE: 7-19-89 SOURCE #: 112 VALUE: 1113 DPM

ASC # 2-83600108
CTD. BY Jim Black
SOURCE CK. AVG. 27
BKG. 2
DATE: 7-20-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
MAINT DOOR	DOOR			
	D-1	3	17	6
	D-2	8	47	3
	D-3	4	24	0
	D-4	1	6	0
	D-5	0	0	0
	6	1	6	3
	7	1	6	0
	8	4	24	3
	9	10	60	3
	10	0	0	0
	11	1	6	0
	12	13	77	0
	13	4	24	0
	14	6	36	3
	15	3	18	0
	16	6	36	6
	17	2	12	0
	18	5	30	0
	19	12	72	3
	20	2	12	0
	21	3	18	3
	22	2	12	0
	23	15	90	3
	Direct	Smear		
Total DPM	1038	69		
# Readings	41	41		
AVG DPM/100cm²	25.32	1.68		
Max DPM/100cm²	90	9		
MDA 16.63				
DPM/100cm² FIXED				

PLANT PU AREA MAINT.
SURVEYED BY ILP
INST. LUDLUM 2220 * 52834 DET. 43-4
SOURCE CK 288-280 BKG. 1(AM)
DATE: 7-19-89 SOURCE #: 112 VALUE: 1113 DPM

ASC # 2-83600108
CTD. BY Jim Black
SOURCE CK. AVG. 27
BKG. 2
DATE: 7-20-89

READINGS IN DPM/100 cm²

SAMPLE # OR DESCRIPTION		DIRECT CPM	DIRECT DPM	SMEAR
MAINT DOOR	DOOR FRAME			
	F-1	1	6	0
	F-2	1	6	0
	F-3	2	12	0
	F-4	2	12	3
	F-5	1	6	6
	6	5	30	3
	7	5	30	0
	8	1	6	0
	9	6	36	3
	10	3	18	6
	11	7	42	0
	12	1	6	3
	13	2	12	0
	14	1	6	0
	15	7	42	0
	16	6	36	3
	17	3	18	3
	18	2	12	3