

## Pu-Plant Dock Airlock

During operation this area was used for weighing waste drums, filling breathing air bottles, and storage of gas cylinders. After initial clean-up our scans indicated no elevated areas of contamination.

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 5560A (low background) automatic sample counter.

W. A. Rogers

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## 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<sup>2</sup>.
3. All hot spots greater than or equal to 100 dpm/100 cm<sup>2</sup> 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<sup>2</sup>.
10. There will be at least 30 survey blocks in each area to be released.
11. Piping and ductwork will be surveyed on all accessible 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<sup>2</sup>.
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 <sup>a</sup>	Average <sup>b,c,f</sup>	Maximum <sup>b,d,f</sup>	Removable <sup>b,e,f</sup>
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm <sup>2</sup>	15,000 dpm α/100 cm <sup>2</sup>	1,000 dpm α/100 cm <sup>2</sup>
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm <sup>2</sup>	300 dpm/100 cm <sup>2</sup>	20 dpm/100 cm <sup>2</sup>
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm <sup>2</sup>	3,000 dpm/100 cm <sup>2</sup>	200 dpm/100 cm <sup>2</sup>
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 <sup>2</sup>	15,000 dpm βγ/100 cm <sup>2</sup>	1,000 dpm βγ/100 cm <sup>2</sup>

<sup>a</sup>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.

<sup>b</sup>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.

<sup>c</sup>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.

<sup>d</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>e</sup>The amount of removable radioactive material per 100 cm<sup>2</sup> 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.

<sup>f</sup>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.





PU Dock Air Lock

LINE NUMBER C-903 DATE 3-27-89  
 INSTRUMENT Ludlum 2220 SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR S.V.  
 SOURCE NUMBER AND VALUE 6816  
 SOURCE RESPONSE AND BACKGROUND AM  
 SOURCE RESPONSE AND BACKGROUND PM 248-266 7kg/1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>		
				cpm	dpm/100cm <sup>2</sup>			
PANEL E-1 CIR 30	Conduit	1/2"	0 METER T	2	28	0		
			B	3	42	0		
			2 METERS W	2	28	0		
			B	2	28	6		
			4 METERS W	1	14	0		
			E	2	28	0		
			6 METERS T	0	0	0		
			B	2	28	0		
			END T	1	14	0		
			B	3	42	0		

P.U. Dock air Lock

LINE NUMBER D-904 DATE 3-27-89  
 INSTRUMENT Ludlum 2220 SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR S.V.  
 SOURCE NUMBER AND VALUE 6816  
 SOURCE RESPONSE AND BACKGROUND AM  
 SOURCE RESPONSE AND BACKGROUND PM 248-266 7kg/1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>		
				cpm	dpm/100cm <sup>2</sup>			
Panel E-1-Cir 30	Conduit	1"	0-meters W	7	98	3		
			E	5	70	3		
			2-meter E	2	28	0		
			W	6	84	3		
			4-meter T	0	0	0		
			B	5	70	3		
			END T	0	0	0		
			B	3	42	9		



P.U. Dock air Lock

LINE NUMBER G-907

DATE 3-27-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50064

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 6816

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 248-266 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>
				cpm	dpm/100cm <sup>2</sup>	
Unity Box on North Wall	Conduit	6"	0 Meters T	2	28	0
			B	NA		6
			2 meter W	0	0	3
			F	N/A		0
			END W	0	0	9
			E	7	14	0

P.U. Dock air Lock

LINE NUMBER I-909

DATE 3-27-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50064

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 6816

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 248-266 Bkg 1

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>
				cpm	dpm/100cm <sup>2</sup>	
Large Box on South side	Conduit	1"	0 meters T	6	28	3
			B	1	14	9
			END T	4	56	6
			B	3	42	0





PU DOCK AIR LOCK

LINE NUMBER N-914

DATE 3-30-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50064

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 242 - 225 Bkg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
South Wall Line	Black Iron	3/4"	0 meters T	3	40	6
Nearest to Earth			B	1	14	0
			2 meters T	5	70	3
			B	2	22	0
			4 meters T	5	70	0
			B	1	14	0
			END S	2	28	0
			N	1	14	6

PU DOCK AIR LOCK

LINE NUMBER O-915

DATE 3-30-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50060

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 6816 - 1078

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 242 - 225 Bkg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
South Wall Line	Black Iron	3/4"	0 meters T	1	14	6
			B	2	28	0
			2 meters T	2	2	0
			B	2	28	0
			4 meters T	2	28	0
			B	1	14	3
			END S	2	28	3
			N	1	14	3

PH Dock Air Lock

LINE NUMBER P-916

DATE 3-30-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50064

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 6816 1078

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 242-225 13kg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>
				cpm	dpm/100cm <sup>2</sup>	
South wall line east of chainstart	Conduit	1/2"	0 Meters T	1	14	0
			B	3	42	0
			2 meters N	1	14	3
			S	4	56	0
			FLW E	0	0	0
			W	5	70	0

PH Dock Air Lock

LINE NUMBER Q-917

DATE 3-30-89

INSTRUMENT Ludlum 2220

SERIAL NUMBER 50064

DETECTOR 43-4

OPERATOR SV

SOURCE NUMBER AND VALUE 10816 1078

SOURCE RESPONSE AND BACKGROUND AM

SOURCE RESPONSE AND BACKGROUND PM 242-225 6kg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable dpm/100cm <sup>2</sup>
				cpm	dpm/100cm <sup>2</sup>	
Below Beam #4	conduit	3/4"	0 Meters T	2	28	3
S.E. Corner			R	0	0	9
			3 meters S	0	0	0
			N	0	0	6
			FLW T	3	42	3
			B	3	42	0

PH Dock Air Lock

LINE NUMBER R-918 DATE 3-30-89  
 INSTRUMENT Ludlum 2220 SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR SU  
 SOURCE NUMBER AND VALUE 6816 1078  
 SOURCE RESPONSE AND BACKGROUND AM  
 SOURCE RESPONSE AND BACKGROUND PM 242-225 Bkg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
Union Box Next to Light dome South	Conduit	1/2"	0 meters N	5	70	0
			S	4	56	0
			2 meters T	5	70	6
			B	2	28	0
			4 meters E	0	0	0
			W	0	0	3
			END N	0	0	0
E	0	0	6			

PH Dock Air Lock

LINE NUMBER S-919 DATE 3-30-89  
 INSTRUMENT Ludlum SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR SV  
 SOURCE NUMBER AND VALUE 6816 - 1078  
 SOURCE RESPONSE AND BACKGROUND AM  
 SOURCE RESPONSE AND BACKGROUND PM 242-225- Bkg 2

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
Union Box Next to Light	Conduit	1"	0 meters S	5	70	3
			N	1	14	3
			END N	4	56	3
			S	0	0	0





PU Dock Air Lock

LINE NUMBER X-924 DATE 3-31-89  
 INSTRUMENT Ludlum 2220 SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR SV  
 SOURCE NUMBER AND VALUE 6816 1078  
 SOURCE RESPONSE AND BACKGROUND AM 277 - 292 Bkg 1  
 SOURCE RESPONSE AND BACKGROUND PM

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
South Wall	SS	1/2"	0 meter T	0	0	6
			B	3	42	0
			2 meter S	0	0	0
			N	1	14	0
			4 meter W	2	28	0
			NA			
			6 meter R	1	14	3
			W	1	14	9
			8 meter N	3	42	0
			S	4	56	3

PU Dock Air Lock

LINE NUMBER Y-925 DATE 3-31-89  
 INSTRUMENT Ludlum 2220 SERIAL NUMBER 50064  
 DETECTOR 43-4 OPERATOR SV  
 SOURCE NUMBER AND VALUE 6816 - 1078  
 SOURCE RESPONSE AND BACKGROUND AM 277 - 292 Bkg 1  
 SOURCE RESPONSE AND BACKGROUND PM

START OF SURVEY	TYPE OF LINE	DIA.	READING LOCATION	Direct		Smearable
				cpm	dpm/100cm <sup>2</sup>	
East Wall	Conduit	3/4"	0 meters T	4	56	6
			B	4	56	3
			2 meters W	1	14	0
			NA			
			4 meters W	0	0	3
			NA			
			Field B	2	28	0
			W	3	42	0

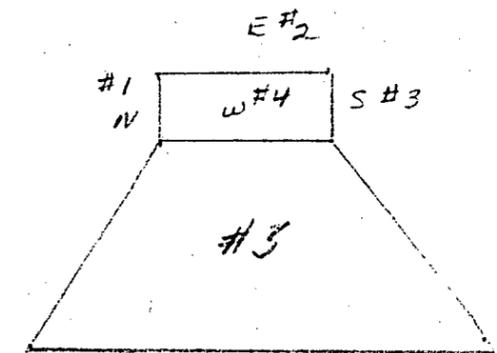
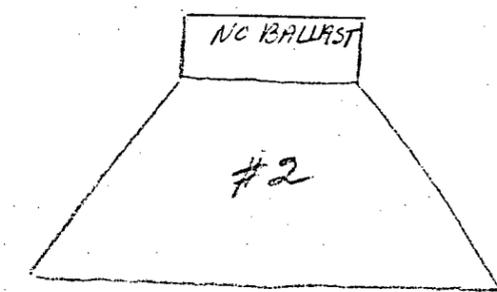
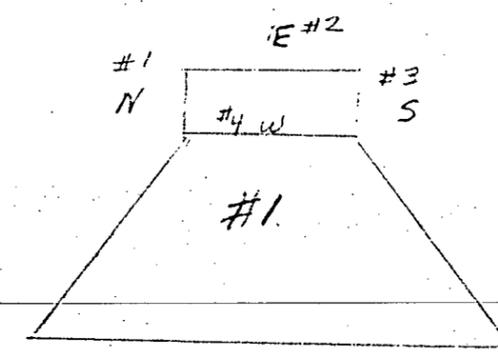


DOCK AIR LOCK - LIGHT FIXTURES

INST. # 37800  
 LUDIUM 2220 43-68

SOURCE VALUE  
 6816 1078 DPM

SOURCE CHECK BKJ  
 3-3-89 229-243 1  
 3-3-89 238-270 1



		DIRECT	SMEAR
MDA	TOTAL DPM	72	48
11.09 DPM/100cm <sup>2</sup>	# READINGS	32	32
	AVG DPM/100cm <sup>2</sup>	2.25	1.5
	MAX DPM/100cm <sup>2</sup>	12	6

PLANT PA AREA Dock AIRLOCK  
 SURVEYED BY S. V. ...  
 INST. LINDUM 2220 # 37800 DET. 43-68  
 SOURCE CK 229-243 BKG. 1  
 DATE: 3-23-89 SOURCE # 16914 VALUE: 10780 DPM

ASC # 83600115  
 CTD. BY Dem ...  
 SOURCE CK. AVG. 32  
 BKG. .3  
 DATE: 4-3-89

READINGS IN DPM/100 cm<sup>2</sup>

SAMPLE # OR DESCRIPTION	DIRECT		SMEAR
	CPH	DPH	
BALLAST #1	1	0	3
	2	0	3
	3	1	4
	4	1	4
BASLLAST #2		N/A	N/A
BASLLAST #3	1	1	4
	2	0	0
	3	0	0
	4	1	4
LIGHT OUTSIDE #1	N	0	0
	S	0	0
	E	0	0
	W	0	0
LIGHT INSIDE #1	N	2	8
	S	0	0
	E	0	0
	W	0	0
LIGHT OUTSIDE #2	N	0	0
	S	0	0
	E	2	8
	W	2	8
LIGHT INSIDE #2	N	0	0
	S	0	0
	E	2	8
	W	0	0
LIGHT OUTSIDE #3	N	0	0
	S	3	12
	E	1	4
	W	0	0
LIGHT INSIDE #3	N	0	0
	E	0	0
	S	0	0
	W	2	8

Dock Air Lock Sealer Recess

7-21-89  
 S. V. ...

Reading in DPM/100cm <sup>2</sup>	D-24 S-0	D-8 S-0
D-12		D-32
S-6	D-8 S-3	D-20 S-0
	D-0 S-0	
	D-8 S-9	D-20 S-0
		D-12 S-3
	D-0 S-0	D-4 S-3

INST. : 37800  
 43-68  
 BKG. : 3  
 SOURCE CK. : 239, 232  
 ASC # 83600108  
 J. Black  
 Date 7-21-89  
 Source AVG 30 Bkg. 2

DIRECT SMEAR  
 TOTAL DPM 376 48  
 # READINGS 23 23  
 AVG DPM/100cm<sup>2</sup> 1635 2.09  
 PLYWOOD MAX DPM/100cm<sup>2</sup> 72 9

D-0	D-12	D-0	D-8
S-0	S-3	S-3	S-6
D-40		D-12	
S-0		S-6	
D-28	D-48	D-4	D-4
S-0	S-0	S-0	S-0

TOP

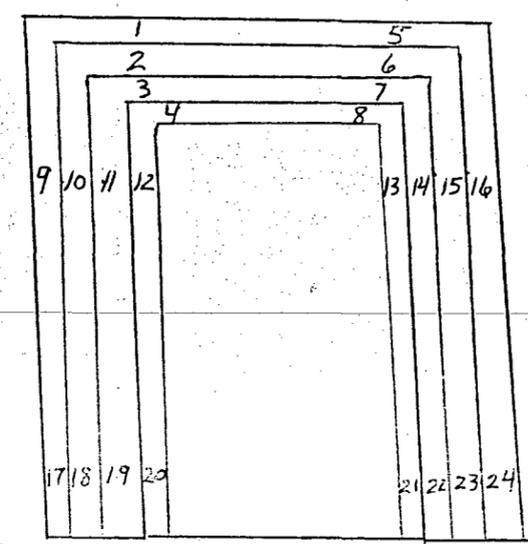
BOTTOM

MDA = 19.20 dpm/100 cm<sup>2</sup>

DOCK AIRLOCK  
DOOR #1  
(EAST DOOR)

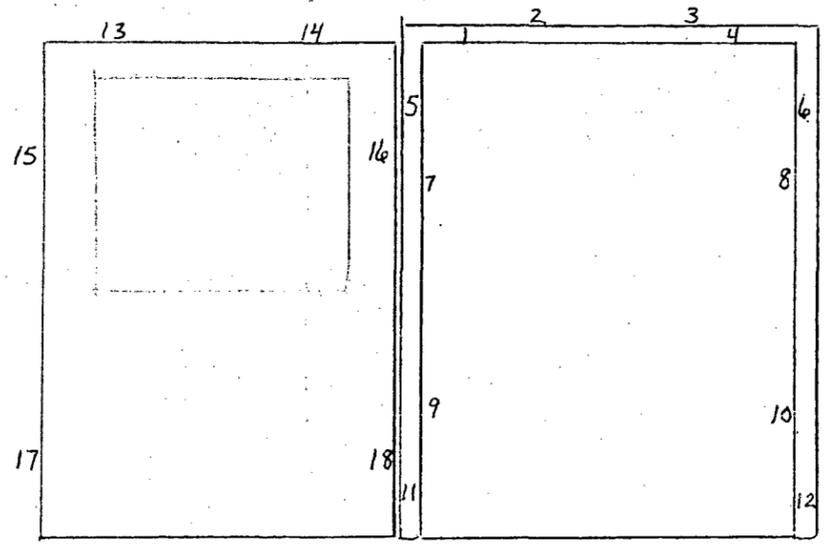
LOCATION OF COUNTS

FRAME



7-28-89  
ILP

DOOR



PLANT PU AREA DOCK AIRLOCK  
SURVEYED BY ILP  
INST. 1.INDIUM 2220 \*#52834 DET. 43-4  
SOURCE CK 280-271 BKG. 3(AM)  
DATE: 7-28-89 SOURCE # 112 VALUE: 1113 DPM

ASC # 83600115  
CTD. BY J. Black  
SOURCE CK. AVG. 27  
BKG. 3  
DATE: 7-28-89

READINGS IN DPM/100 cm<sup>2</sup>

SAMPLE # OR DESCRIPTION	DIRECT		SNEAR
	CPH	DPH	
DOCK AIRLOCK DOOR#1 DOOR			
(EAST DOOR)			
D-1	1	6	0
D-2	1	6	3
D-3	1	6	6
D-4	1	6	0
D-5	3	18	6
6	1	6	3
7	1	6	0
8	1	6	0
9	2	12	3
10	3	18	0
11	1	6	0
12	1	6	0
13	7	42	0
14	0	60	3
15	2	12	6
16	5	30	6
17	11	66	0
18	0	0	3
	Direct	Snear	
Total DPM	666	93	
# Readings	42	42	
Avg. DPM/100 cm <sup>2</sup>	15.86	2.21	
Max DPM/100 cm <sup>2</sup>	66	9	
MDA = 28.81 dpm/100 cm <sup>2</sup>			

PLANT PU AREA DOCK AIRLOCK  
 SURVEYED BY ILP  
 INST. INDIUM 2220 \*52834 DET. 43-4  
 SOURCE CK 280-271 BKG. 3(AM)  
 DATE: 7-28-89 SOURCE # 112 VALUE: 1130pm

ASC # 83600115  
 CTD. BY S. Black  
 SOURCE CK. AVG. 27  
 BKG. 0.3  
 DATE: 7-28-89

READINGS IN DPM/100 cm<sup>2</sup>

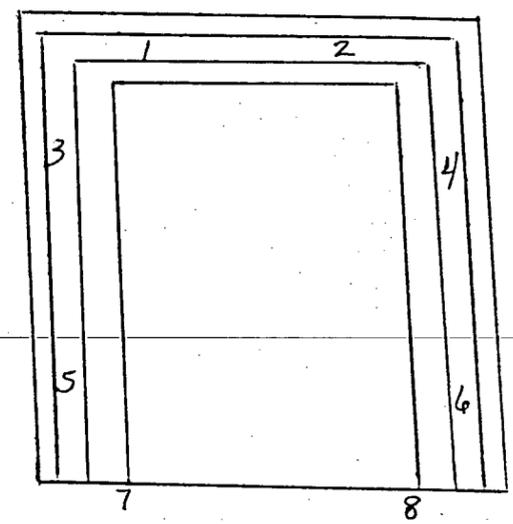
SAMPLE # OR DESCRIPTION	DIRECT		SHEAR
	CPH	DPH	
DOCK AIRLOCK DOOR#1 FRAME			
(EAST DOOR)			
F-1	2	12	0
F-2	1	6	0
F-3	1	6	9
F-4	0	0	3
F-5	2	12	6
6	1	6	3
7	1	6	0
8	0	0	0
9	2	12	0
10	0	0	0
11	1	6	3
12	1	6	3
13	0	0	3
14	9	51	3
15	0	0	6
16	6	36	0
17	2	12	3
18	6	36	0
19	0	0	3
20	5	30	3
21	1	6	0
22	1	6	0
23	3	18	0
24	2	12	6

DOCK AIR LOCK  
 DOOR #2  
 (SOUTH DOOR)

LOCATION OF COUNTS

7-28-89  
 ILP

FRAME



DOOR

