GEN 55 (REV.6/7

Interoffice Memorandum

TO (Name and Location)	DATE
J. E. Rodriguez	March 14, 1984
FROM (Name and Location)	**REFERENCE NO.**
G. C. Robinson	GCR-23-84

cc with attachments:

B. J. Chodkiewicz - C. W. Johnson
W. G. Cornman
C. W. Whaley
Process File: 31.C
Central Files (2) --------- CCCTC

cc without attachments:

K. A. Dunn
C. R. Pennington
W. T. McNair -- CCCTC
D. R. Johnson
N. V. Smith

SUBJECT: Dust Problem in the SFA Catalyst Area

SUMMARY

A dust problem has been identified in the catalyst mixing area of the Synthetic Fatty Acids (SFA) Unit. (1) The dust collection for the oxalic acid hopper is inadequate and there is no dust collection for the copper and manganese acetate hopper. Dust collection for these two hoppers can be provided by using the existing triphenylphosphine (TPP) dust collector.

DISCUSSION

There is a dust problem when mixing oxalic acid and copper and manganese acetate in the SFA Unit. The initial design of the SFA Unit called for dust collection on the oxalic acid hood. The dust collector used for oxalic acid is an American Fan Model DC-10 mounted on a 55 gallon drum. This collector moves about half the volume of air required for adequate dust collection. This problem is further exacerbated by the fact that the oxalic acid solidifies and operators have to break it up by beating on the containers and smashing the chunks that are trapped on the hopper grating. The dust collection on the oxalic acid hopper could be improved by installing a new nozzle on the hood (M-1572) and tying it in to the TPP Dust Collector (M-1654). The hood on the oxalic acid hopper is open and measures 3 ft x 3 ft. This open area should be minimized to provide maximum air velocity at the hood. This could be accomplished by using doors similar to those on the TPP hood (M-1549). Figure 1 illustrates recommended nozzle and hood design. (2)

UNITERMS: Manganese Acetate
Industrial Hygiene
SFA
TPP
Dust
Copper Acetate

The copper and manganese acetate hopper (M-1573) does not have any dust collection on it at this time. A hood should be fabricated for this hopper along with a nozzle to tie in to the TPP dust collector (M-1654). Refer to Figure 1 for details. The copper acetate also solidifies into chunks that have to be broken up to get out of the drum and through the grate. The personnel exposure problem is worsened by the poor reliability of the V-1037 mixer (M-1481). Failure of this mixer forces the operators to use recirculation to mix the catalyst. This leads to excessive turbulence in the vessel and more acid fumes in the area.

The TPP dust collector is made by American Air Filter in Louisville, Ky. It is an Arrestall #1600 and is designed to move 1600 cfm of air at a fan static pressure of 7 inches of water gauge. Appendix I contains a performance curve for the Arrestall #1600 and pressure drop calculations for the proposed modifications. The TPP dust collector is adequately sized to handle the dust collection off of any single catalyst mix hopper. It will not collect the dust effectively from more than one hopper at a time. All of the duct work, hood and doors required to tie in the hoppers to the TPP dust collector should be fabricated of stainless steel. The duct work layout should be designed to produce the minimum pressure drop using 8 inch diameter round duct. Three slide type dampers will be needed to isolate each hopper from the other. Figure 2 illustrates some types of dampers recommended for this service. The proposed modifications for dust collection in the catalyst area are depicted in Figure 3.

An alternative to hard piping the dust collector to each hood would be to have a quick connect on the back of each hood so that the operator could hook up a dust collection hose to the appropriate hood. This alternative would save some money in damper costs but it would be more difficult to work with for operators.

SAFETY/RELIABILITY

From a reactivity and material of construction point of view there is not a problem with collecting the copper acetate, manganese acetate, oxalic acid, and TPP dust in the same vessel. (3) The TPP dust collector (M-1654) is lined with 3 - 5 mils of epoxy. The addition of copper acetate, manganese acetate, and oxalic acid to the TPP dust collector does not pose any safety problems. A potential dust explosion problem was uncovered in the investigation. Copper and manganese acetate and oxalic acid do not represent a potential dust explosion hazard. However, TPP does cause a slight explosion hazard when exposed to open flame. There are three TPP dust collectors at BCP (BuOH, PrOH, SFA). None of these collectors are explosion vented. No data could be found on dust explosion severity of TPP. The dust explosion severity of TPP could be determined by an outside firm such as Hazards Research Corporation in Rockaway, N. J. The study and sizing of the explosion vent would cost about $2000. (4) The study may indicate that explosion venting is not needed.

CONCLUSION/RECOMMENDATIONS

I recommend the following action plan to address the dust problem in the SFA catalyst mix area:

1. Issue an Engineering Work Order to tie in the Oxalic Acid Tank Hopper (M-1484) and the copper and Manganese Acetate Hopper (M-1573) to the TPP Dust Collector (M-1654).

2. Request Maintenance and/or Plant Engineering to investigate the operation of the mixer on V-1037 (M-1481) so that its reliability can be improved. The objective should be to avoid using recirculation to mix the Laso catalyst.

3. Request Purchasing to find a supplier for free-flowing oxalic acid and copper acetate. This aspect of the problem is similar to problems experienced with potassium acetate in the VA Unit.

4. If the above items fail to correct the dust problem, then closing in the catalyst area should be considered. This would reduce the air turbulence created by wind and improve dust collection.

G. Chase Robinson, Jr.
G. Chase Robinson, Jr.

Attachments
bq

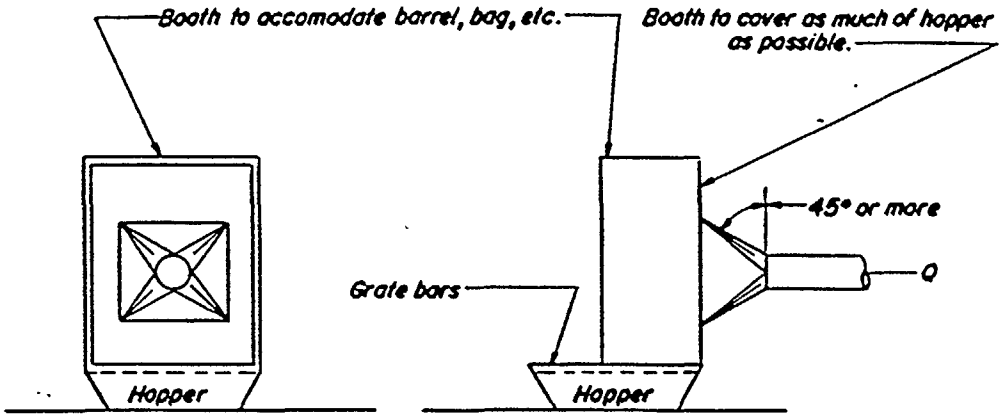
References:

1. Johnson, Don R., Error Cause Removal #15, January 20, 1984.

2. Industrial Ventilation, by American Conference of Government Industrial Hygienists, 1979.

3. Personal communication with T. N. Moody and H. R. Horton, February, 1984.

4. Phone conversation with George Petino of Hazards Research Corporation, Rockaway, N.J. (201-627-4560), March 9, 1984.



Duct velocity = 3500 fpm minimum
Q = 150 cfm/sq ft face
Entry loss = 0.25 VP

MANUAL LOADING

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BIN & HOPPER VENTILATION	
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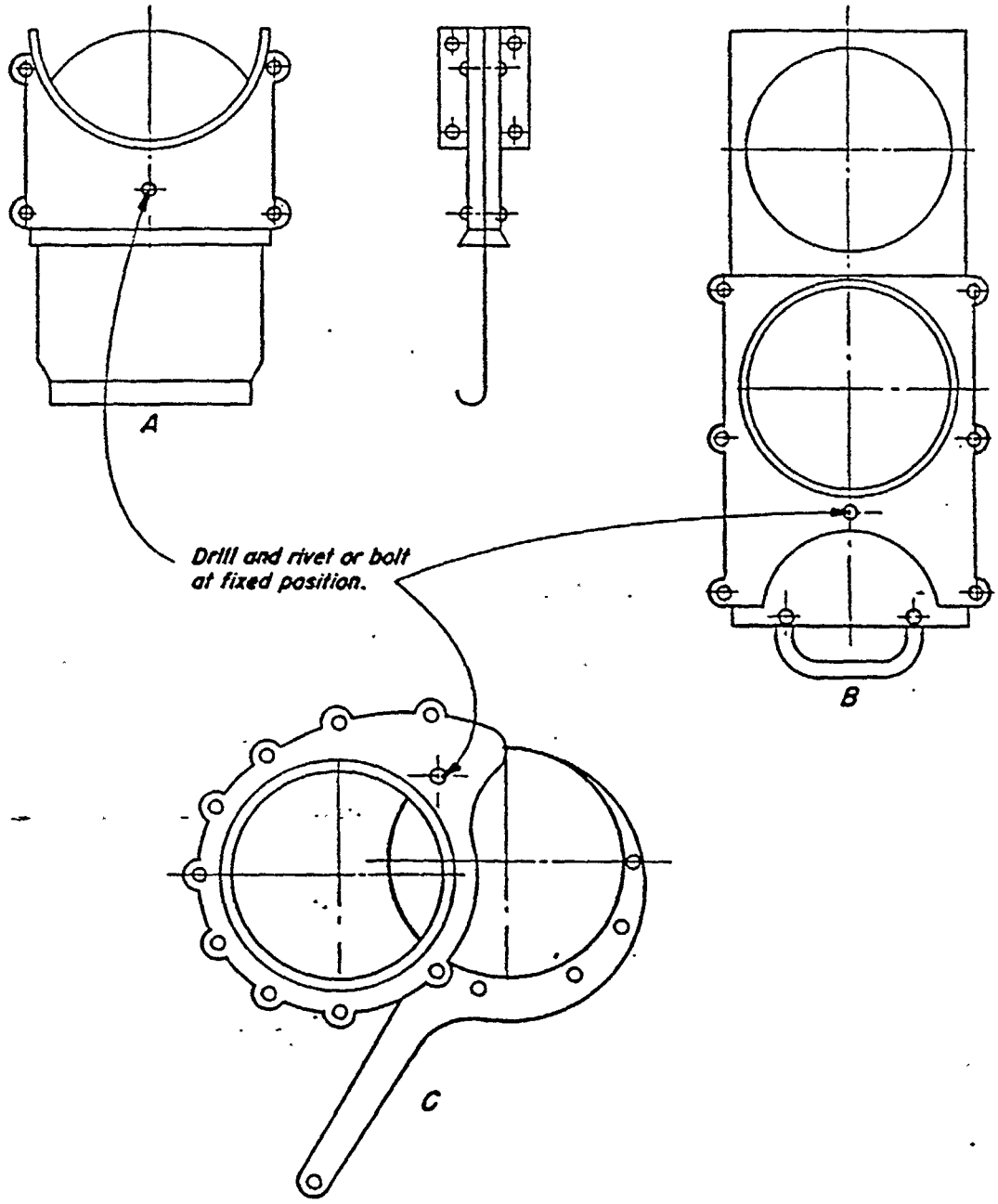
FIGURE 1: DUST COLLECTION HOOD DESIGN



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FIXED DAMPERS

DATE 8-9-55 | Fig. 8-2.

FIGURE 2: RECOMMENDED DAMPERS

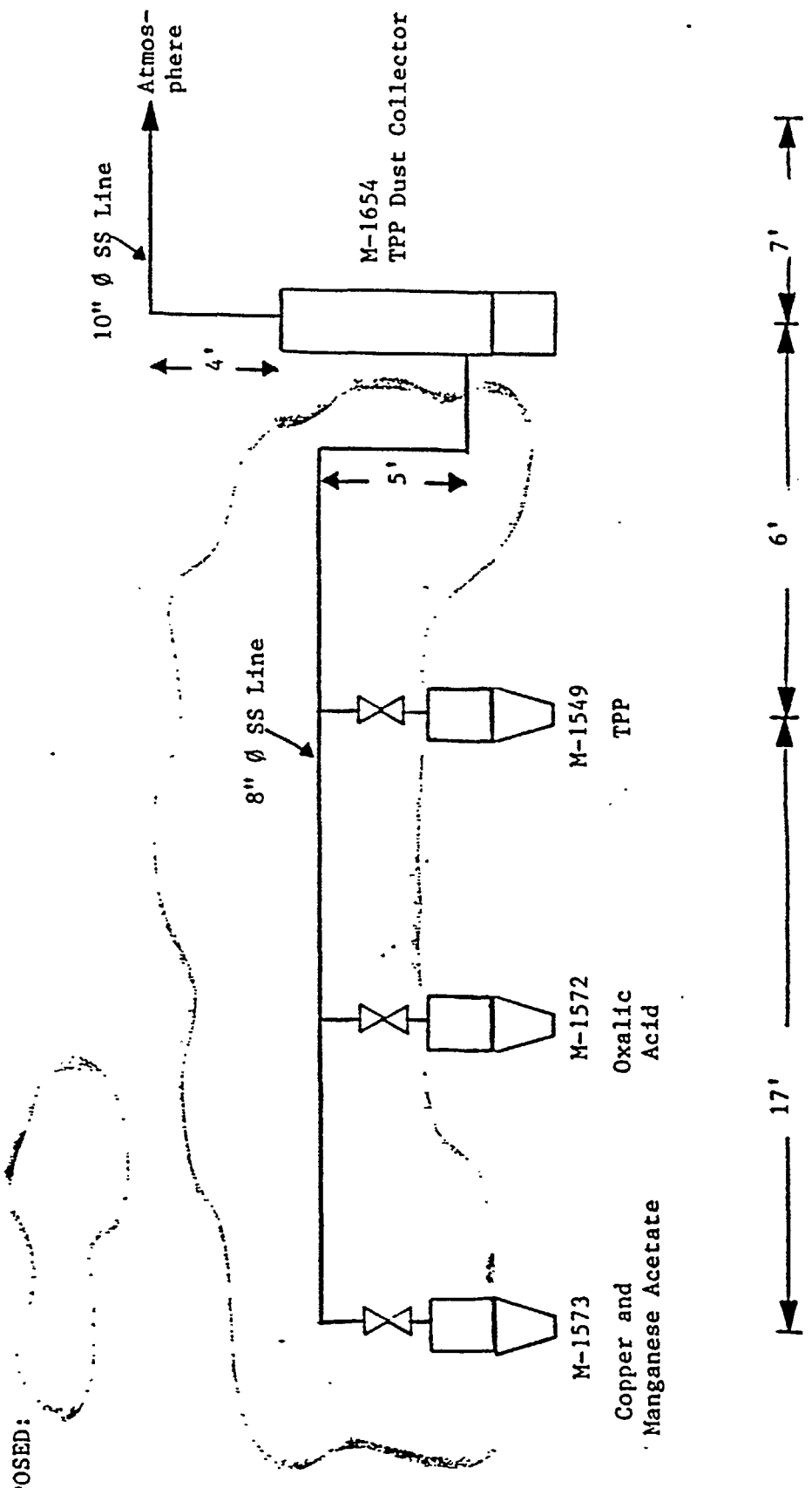


FIGURE 3: PROPOSED DUST COLLECTION FOR SFA CATALYST AREA

APPENDIX I

PRESSURE DROP CALCULATIONS FOR MODIFICATIONS TO TPP DUST COLLECTOR (M-1654)

NOTE: The pressure drop calculation is from the furthest hopper (M-1573) to the dust collector. See Figure 3.

Calculation of Required Air Volume

Open face area at hood = 3 ft x 3 ft = 9 ft^2

From Figure 1 the required air volume is:

$$Q = \frac{150 \text{ cfm}}{ft^2}$$

or: $$\frac{150 \text{ cfm}}{ft^2} \times 9 \text{ } ft^2 = 1350 \text{ cfm}$$

Calculation of Duct Diameter

From Figure 1 the recommended duct velocity = 3500 fpm

Duct cross sectional area $= \frac{1350 \text{ cfm}}{3500 \text{ fpm}}$

$= 0.3857 \text{ } ft^2$

0.3857 ft^2 falls between an 8" and 8½" diameter duct. See Figure 6 - 18. Using 8" diameter:

$$\frac{1350 \text{ cfm}}{0.3491 \text{ } ft^2} = 3867 \text{ fpm}$$

Calculation of Hood Entry Loss

From Figure 1 entry loss = 0.25 VP

From Figure 6 - 16, for 3867 fpm; VP = 0.93

(1 + Entry Loss) VP = 1.25 x 0.93 = 1.16 inches

Hood Suction = -1.16 inches

Pressure Drop From Hood to Collector

28 ft of 8" diameter duct = 28 ft
3 long radius ells (2.0 D); 3 x 10 = 30 ft

Total Equivalent Length 58 ft

From Figure 6 - 15A - for 3800 fpm and 1350 cfm:

$$\text{Friction Loss} = \frac{2.6 \text{ inches}}{100 \text{ ft}}$$

$$\frac{58 \text{ ft}}{100 \text{ ft}} \times 2.6 = 1.51 \text{ inches}$$

Pressure Drop Across Collector

From Figure 4. The pressure drop across the cartridges ranges from 1 - 3 inches water gauge. Use an average of 2.

-2.00 inches

The preceding pressure drops are on the suction side of the fan. The following are on the discharge side.

Entry Loss From Collector to Exhaust

From Figure 6 - 10; entry loss for flanged duct end = 0.49 VP

From Figure 6 - 18, duct velocity 10" diameter:

$$\frac{1350 \text{ cfm}}{0.5454} = 2475 \text{ fpm}$$

From Figure 6 - 16 VP for 2475 fpm = 0.38

(1 + Entry Loss) VP = 1.49 x 0.38 = 0.57 inches

Pressure Drop From Collector to Exhaust

11 ft of 10" diameter duct = 11 ft
(1) 10" ell 1 x 20 = 20 ft

Total Equivalent Length 31 ft

From Figure 6 - 15A - for 2475 fpm and 1350 cfm:

$$\text{Friction Loss} = \frac{0.9 \text{ inches}}{100 \text{ ft}}$$

$$\frac{31 \text{ ft}}{100 \text{ ft}} \times 0.9 = \underline{0.30 \text{ inches}}$$

Fan SP = $SP_{out} - SP_{in} - VP_{in}$

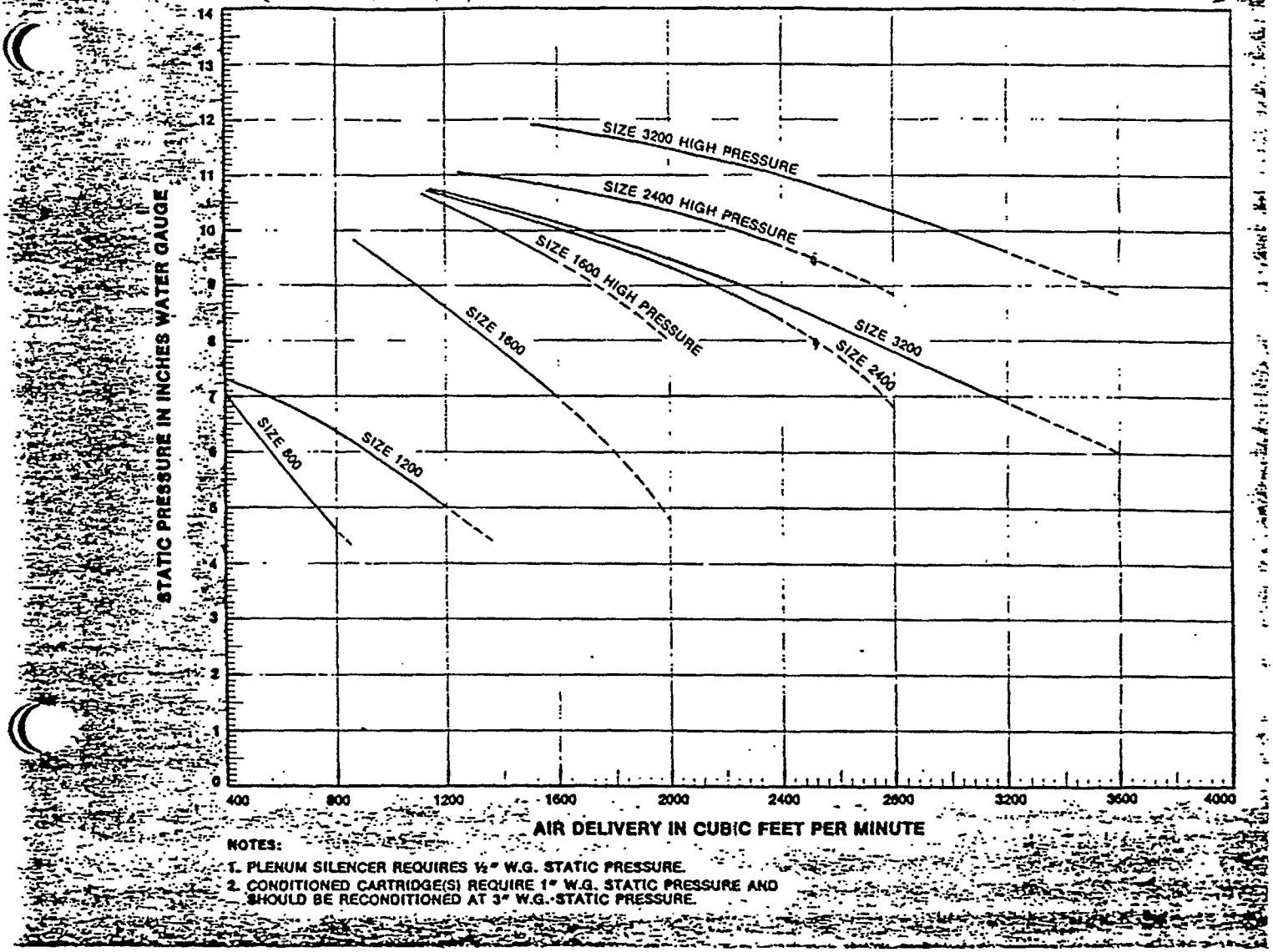
= (0.57 + 0.30) - (-1.16 - 1.51 - 2.00) - 0.93

= 0.87 + 4.67 - 0.93

Required Fan SP = 4.67 inches at 1350 cfm

Available Fan SP = 7 inches at 1600 cfm (from Figure 4)

FIGURE 4: **ARRESTALL FAN PERFORMANCE**

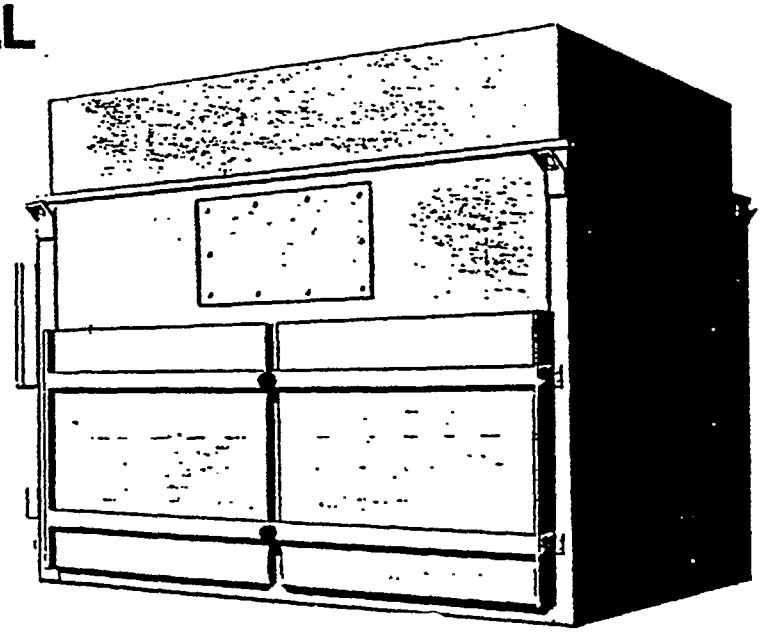


NOTES:
1. PLENUM SILENCER REQUIRES ½" W.G. STATIC PRESSURE.
2. CONDITIONED CARTRIDGE(S) REQUIRE 1" W.G. STATIC PRESSURE AND SHOULD BE RECONDITIONED AT 3" W.G. STATIC PRESSURE.

BIN VENT ARRESTALL

Standard features of the Bin Vent include:

1. Weatherproofing with plenum silencer and weatherhood.
2. Totally enclosed fan and motor.
3. Easy access door for fan and motor servicing.
4. TEFC shaker mechanism motor.
5. NEMA 4 controls.



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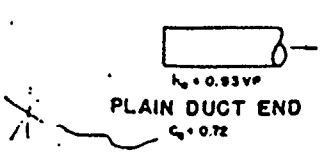
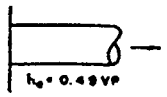
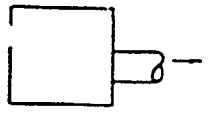


PLAIN DUCT END

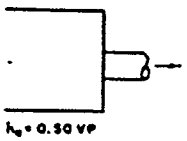


FLANGED DUCT END
$C_e = 0.82$

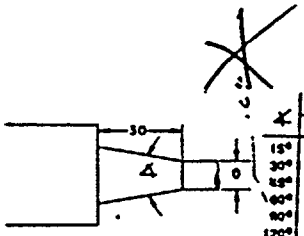
SHARP-EDGED ORIFICE
$C_e = 0.60$



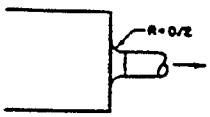
ORIFICE PLUS FLANGED DUCT
(MANY SLOT TYPES)
$C_e = 0.55$ (WHEN DUCT VELOCITY = SLOT VELOCITY)



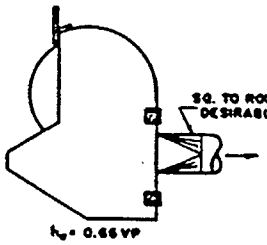
DIRECT BRANCH - BOOTH
$C_e = 0.82$



K	ENTRY LOSS ROUND	ENTRY LOSS RECTANGULAR	ENTRY COEFFICIENT ROUND	ENTRY COEFFICIENT RECTANGULAR
15°	0.15 VP	0.25 VP	0.83	0.88
30°	0.08 VP	0.16 VP	0.84	0.83
45°	0.06 VP	0.15 VP	0.87	0.83
60°	0.08 VP	0.17 VP	0.96	0.92
90°	0.15 VP	0.25 VP	0.83	0.88
120°	0.26 VP	0.35 VP	0.88	0.86
150°	0.40 VP	0.48 VP	0.84	0.82

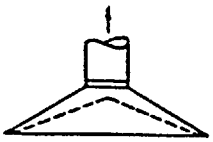


BOOTH PLUS ROUNDED ENTRANCE
$C_e = 0.97$

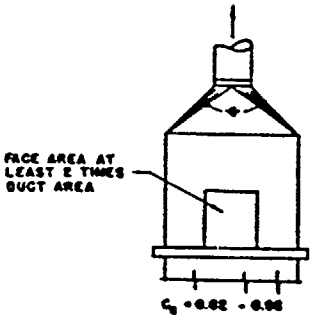


STANDARD GRINDER HOOD
$C_e = 0.78$

TRAP OR SETTLING CHAMBER
$C_e = 0.63$ (approx)

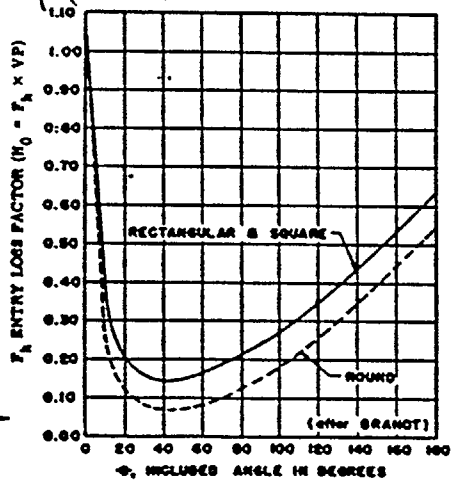


DOUBLE (INNER CONE) HOOD
$C_e = 0.70$ (approx)



TAPERED HOODS
FLANGED OR UNFLANGED: ROUND, SQUARE OR RECTANGULAR.
θ IS THE MAJOR ANGLE ON RECTANGULAR HOODS.

REPRODUCED BY PERMISSION FROM "INDUSTRIAL HEALTH ENGINEERING" BY A. D. BRANDT, PUBLISHED BY JOHN WILEY AND SONS, INC.



$$h_e = \frac{1-C_e^2}{C_e^2} \times VP$$

$$F_h = \frac{1-C_e^2}{C_e^2}$$

$$h_e = F_h \times VP$$

$$Q = 4005\,AC_e\sqrt{SP}$$

F_h = ENTRY LOSS FACTOR
VP = VELOCITY PRESSURE IN DUCT
SP = STATIC PRESSURE AT THROAT, INCHES WATER GAGE
h_e = ENTRY LOSS, INCHES WATER GAGE
Q = AIR VOLUME, CFM
A = CROSS SECTION AT THROAT, SQUARE FEET
C_e = COEFFICIENT OF ENTRY

ENTRY LOSS FOR COMPLICATED HOOD SHAPES:
1. BREAK HOOD INTO SIMPLE COMPONENTS
2. CALCULATE h_e FOR EACH COMPONENT
3. ADD VALUES OF h_e

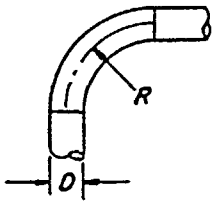
MISCELLANEOUS VALUES

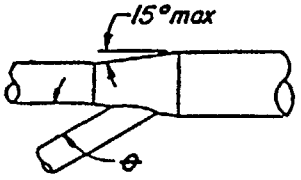
HOOD	ENTRY LOSS, F_h
ABRASIVE BLAST CHAMBER	1.0
ABRASIVE BLAST ELEVATOR	2.3
ABRASIVE SEPARATOR	2.3
ELEVATORS (ENCLOSURES)	0.69
FLANGED PIPE PLUS CLOSED ELBOW	0.8
PLAIN PIPE PLUS CLOSE ELBOW	1.60
TUMBLING MILLS (VARIES WITH DESIGN OF MILL)	AV. 2.0

HOOD ENTRY LOSS

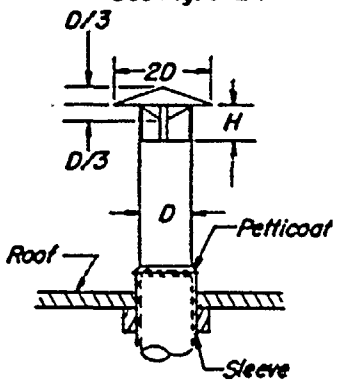
Fig. 6-10

EQUIVALENT RESISTANCE IN FEET OF STRAIGHT PIPE





See Fig. 6-24



Not recommended

Pipe D	90° Elbow * Centerline Radius			Angle of Entry		H, No of Diameters		
	1.5 D	2.0 D	2.5 D	30°	45°	1. D	.75 D	.5 D
3"	5	3	3	2	3	2	2	9
4"	6	4	4	3	5	2	3	12
5"	9	6	5	4	6	2	4	16
6"	12	7	6	5	7	3	5	20
7"	13	9	7	6	9	3	6	23
8"	15	10	8	7	11	4	7	26
10"	20	14	11	9	14	5	9	36
12"	25	17	14	11	17	6	11	44
14"	30	21	17	13	21	7	13	53
16"	36	24	20	16	25	9	15	62
18"	41	28	23	18	28	10	18	71
20"	46	32	26	20	32	11	20	80
24"	57	40	32			13	24	92
30"	74	51	41			17	31	126
36"	93	64	52			22	39	159
40"	105	72	59					
48"	130	89	73					

* For 60° elbows — 0.67 x loss for 90°
45° elbows — 0.5 x loss for 90°
30° elbows — 0.33 x loss for 90°

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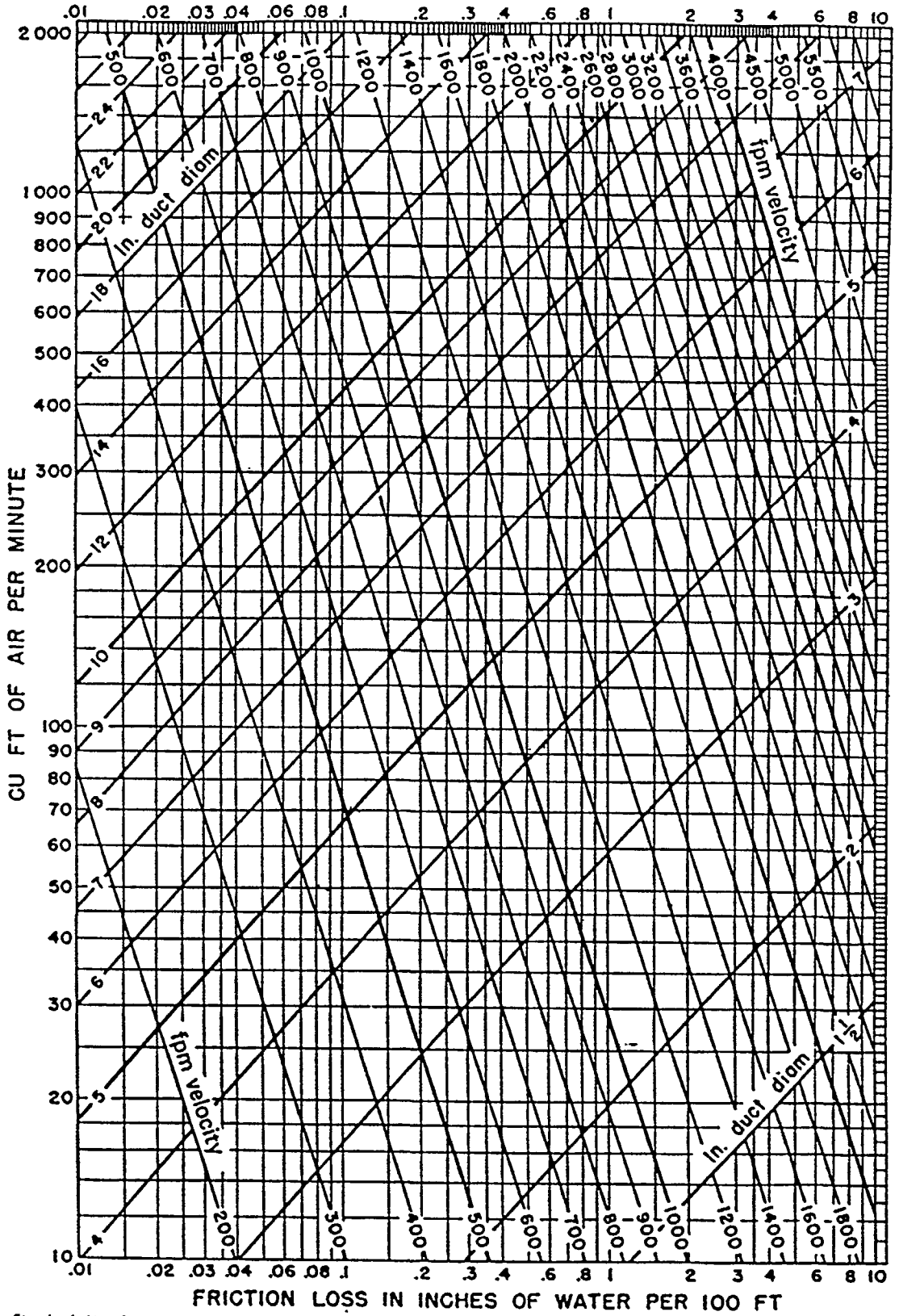
DUCT DESIGN DATA

DATE 1-76 | Fig. 6-11

005067



(Based on Standard Air of 0.075 lb per cu ft density flowing through average, clean, round, galvanized metal ducts having approximately 40 joints per 100 ft.)
Caution: Do not extrapolate below chart.

For proprietary duct, obtain data from manufacturer. Friction of Air in Straight Ducts for Volumes of 10 to 2000 cfm

$$\text{Friction Loss/100'} = \frac{2.74\left[\frac{V_{fpm}}{1000}\right]^{1.9}}{[D_{inches}]^{1.22}}$$

(Ref. 130)

Note: Both "1.9" and "1.22" are exponents.

Fig. 6-15A

VELOCITY PRESSURES FOR DIFFERENT VELOCITIES – STANDARD AIR

FROM: $V = 4005\sqrt{VP}$

V = VELOCITY FPM
VP = VELOCITY PRESSURE, INCHES OF WATER

VP	V	VP	V	VP	V	VP	V	VP	V	VP	V
0.01	400	0.52	2888	1.03	4064	1.54	4970	2.05	5734	3.10	7051
0.02	566	0.53	2916	1.04	4084	1.55	4986	2.06	5748	3.20	7164
0.03	694	0.54	2943	1.05	4103	1.56	5002	2.07	5762	3.30	7275
0.04	801	0.55	2970	1.06	4123	1.57	5018	2.08	5776	3.40	7385
0.05	896	0.56	2997	1.07	4142	1.58	5034	2.09	5790	3.50	7492
0.06	981	0.57	3024	1.08	4162	1.59	5050	2.10	5804	3.60	7599
0.07	1060	0.58	3050	1.09	4181	1.60	5066	2.11	5817	3.70	7704
0.08	1133	0.59	3076	1.10	4200	1.61	5082	2.12	5831	3.80	7807
0.09	1201	0.60	3102	1.11	4219	1.62	5098	2.13	5845	3.90	7909
0.10	1266	0.61	3127	1.12	4238	1.63	5114	2.14	5859	4.00	8010
0.11	1328	0.62	3153	1.13	4257	1.64	5129	2.15	5872	4.10	8109
0.12	1387	0.63	3179	1.14	4276	1.65	5144	2.16	5886	4.20	8208
0.13	1444	0.64	3204	1.15	4295	1.66	5160	2.17	5899	4.30	8305
0.14	1498	0.65	3229	1.16	4314	1.67	5175	2.18	5913	4.40	8401
0.15	1551	0.66	3254	1.17	4332	1.68	5191	2.19	5927	4.50	8496
0.16	1602	0.67	3279	1.18	4350	1.69	5206	2.20	5940	4.60	8590
0.17	1651	0.68	3303	1.19	4368	1.70	5222	2.21	5954	4.70	8683
0.18	1699	0.69	3327	1.20	4386	1.71	5237	2.22	5967	4.80	8774
0.19	1746	0.70	3351	1.21	4405	1.72	5253	2.23	5981	4.90	8865
0.20	1791	0.71	3375	1.22	4423	1.73	5268	2.24	5994	5.00	8955
0.21	1835	0.72	3398	1.23	4442	1.74	5283	2.25	6008	5.10	9044
0.22	1879	0.73	3422	1.24	4460	1.75	5298	2.26	6021	5.20	9133
0.23	1921	0.74	3445	1.25	4478	1.76	5313	2.27	6034	5.30	9220
0.24	1962	0.75	3468	1.26	4495	1.77	5328	2.28	6047	5.40	9307
0.25	2003	0.76	3491	1.27	4513	1.78	5343	2.29	6061	5.50	9392
0.26	2042	0.77	3514	1.28	4531	1.79	5359	2.30	6074	5.60	9477
0.27	2081	0.78	3537	1.29	4549	1.80	5374	2.31	6087	5.70	9562
0.28	2119	0.79	3560	1.30	4566	1.81	5388	2.32	6100	5.80	9645
0.29	2157	0.80	3582	1.31	4583	1.82	5403	2.33	6113	5.90	9728
0.30	2193	0.81	3604	1.32	4601	1.83	5418	2.34	6128	6.00	9810
0.31	2230	0.82	3625	1.33	4619	1.84	5433	2.35	6140	6.10	9891
0.32	2260	0.83	3657	1.34	4636	1.85	5447	2.36	6153	6.20	9972
0.33	2301	0.84	3669	1.35	4653	1.86	5462	2.37	6166	6.30	10052
0.34	2335	0.85	3690	1.36	4671	1.87	5477	2.38	6179	6.40	10132
0.35	2369	0.86	3709	1.37	4688	1.88	5491	2.39	6192	6.50	10210
0.36	2403	0.87	3729	1.38	4705	1.89	5506	2.40	6205	6.60	10289
0.37	2436	0.88	3758	1.39	4722	1.90	5521	2.41	6217	6.70	10366
0.38	2469	0.89	3779	1.40	4739	1.91	5535	2.42	6230	6.80	10444
0.39	2501	0.90	3800	1.41	4756	1.92	5550	2.43	6243	6.90	10520
0.40	2533	0.91	3821	1.42	4773	1.93	5564	2.44	6256	7.00	10596
0.41	2563	0.92	3842	1.43	4790	1.94	5579	2.45	6269	7.50	10968
0.42	2595	0.93	3863	1.44	4806	1.95	5593	2.46	6282	8.00	11328
0.43	2626	0.94	3884	1.45	4823	1.96	5608	2.47	6294	8.50	11676
0.44	2656	0.95	3904	1.46	4840	1.97	5623	2.48	6307	9.00	12015
0.45	2687	0.96	3924	1.47	4856	1.98	5637	2.49	6320	9.50	12344
0.46	2716	0.97	3945	1.48	4873	1.99	5651	2.50	6332	10.00	12665
0.47	2746	0.98	3965	1.49	4889	2.00	5664	2.60	6458	11.00	13283
0.48	2775	0.99	3985	1.50	4905	2.01	5678	2.70	6581	12.00	13874
0.49	2804	1.00	4005	1.51	4921	2.02	5692	2.80	6702	13.00	14440
0.50	2832	1.01	4025	1.52	4938	2.03	5706	2.90	6820	13.61	14775
0.51	2860	1.02	4045	1.53	4954	2.04	5720	3.00	6937	14.00	14986

Fig. 6-16

AREA AND CIRCUMFERENCE OF CIRCLES

Diam. in Inches	AREA		CIRCUMFERENCE		Diam. in Inches	AREA		CIRCUMFERENCE	
	Square Inches	Square Feet	Inches	Feet		Square Inches	Square Feet	Inches	Feet
1	.7854	.0054	3.1416	.2618	30	706.8	4.909	94.25	7.854
1⅛	1.767	.0123	4.712	.3927	31	754.7	5.241	97.39	8.116
2	3.14	.0218	6.28	.5236	32	804.2	5.585	100.5	8.376
2½	4.910	.0341	7.854	.6544	33	855.3	5.940	103.7	8.639
3	7.07	.0491	9.42	.7854	34	907.9	6.305	106.8	8.901
3½	9.620	.0668	11.00	.9164	35	962.1	6.611	109.9	9.163
4	12.57	.0873	12.57	1.047	36	1017.8	7.069	113.1	9.425
4½	15.90	.1105	14.14	1.178	37	1075.2	7.467	116.2	9.686
5	19.63	.1364	15.71	1.309	38	1134.1	7.876	119.4	9.948
5½	23.76	.1650	17.28	1.439	39	1194.5	8.296	122.5	10.21
6	28.27	.1964	18.85	1.571	40	1256.6	8.727	125.7	10.47
6½	33.18	.2305	20.42	1.702	41	1320.2	9.168	128.8	10.73
7	38.48	.2673	21.99	1.833	42	1385.4	9.621	131.9	10.99
7½	44.18	.3068	23.56	1.964	43	1452.2	10.08	135.1	11.26
8	50.27	.3491	25.13	2.094	44	1520.5	10.56	138.2	11.52
8½	56.75	.3940	26.70	2.225	45	1590.4	11.04	141.4	11.78
9	63.62	.4418	28.27	2.356	46	1661.9	11.54	144.5	12.04
9½	70.88	.4923	29.85	2.487	47	1734.9	12.05	147.6	12.30
10	78.54	.5454	31.42	2.618	48	1809.5	12.57	150.8	12.57
11	95.03	.6600	34.56	2.880	49	1885.7	13.10	153.9	12.83
12	113.1	.7854	37.70	3.142	50	1963.5	13.64	157.1	13.09
13	132.7	.9218	40.84	3.403	51	2042	14.19	160.2	13.35
14	153.9	1.069	43.98	3.665	52	2124	14.75	163.4	13.61
15	176.7	1.227	47.12	3.927	53	2206	15.32	166.5	13.88
16	201.0	1.396	50.26	4.189	54	2290	15.90	169.6	14.14
17	226.9	1.576	53.41	4.451	56	2463	17.10	175.9	14.66
18	254.4	1.767	56.55	4.712	58	2642	18.35	182.2	15.18
19	283.5	1.969	59.69	4.974	60	2827	19.63	188.5	15.71
20	314.1	2.182	62.83	5.236	62	3019	20.97	194.8	16.33
21	346.3	2.405	65.97	5.498	64	3217	22.34	201.1	16.76
22	380.1	2.640	69.11	5.760	66	3421	23.76	207.3	17.28
23	415.4	2.885	72.26	6.021	68	3632	25.22	213.6	17.80
24	452.3	3.142	75.40	6.283	70	3848	26.73	219.9	18.33
25	490.8	3.409	78.54	6.545	72	4072	28.27	226.2	18.85
26	530.9	3.687	81.68	6.807	74	4301	29.87	232.5	19.37
27	572.5	3.976	84.82	7.069	76	4536	31.50	238.8	19.90
28	615.7	4.276	87.96	7.330	78	4778	33.18	245.0	20.42
29	660.5	4.587	91.11	7.592	80	5027	34.91	251.3	20.94

005070

Fig. 6-18

[redacted] possible, and adequate exhaust ventilation [redacted] in the system are necessary. / [redacted] is sometimes used to improve the handling characteristics of [redacted] asbestos dusty materials. [redacted] to keep [redacted] the Threshold Limit Value is impractical or impossible, [redacted] and suitable respirators are available for the protection of the employee. A program of [redacted] is highly desirable to determine that Threshold Limit Values are not being [redacted]. In paper manufacturing, it would be desirable to know the dust concentrations where the asbestos is dumped from bags into the pulp slurry. Concentrations should also be determined where dusting occurs in finishing products. While initial dust determinations should be made at frequent intervals, once the level has been established as satisfactory, the frequency may be extended to occasional tests to assure continuation of a satisfactory condition.

Pre-employment and periodic physical examination of workers are desirable. These should include chest X-rays to insure that the worker has no chest condition prior to work with asbestos and to determine that no lung changes are resulting from work with asbestos.

It is believed that the addition of asbestos at the proposed levels during the manufacture of paper products would be harmless to the consumer. Total dusting would

have to be well in excess of any levels acceptable to the consumer for the asbestos concentrations to approach the Threshold Limit Value.

In conclusion, while asbestos dust in excess of the Threshold Limit Value is potentially harmful, as are many other dusts encountered in industry, it is as readily controlled as other such dusts and it can be used safely with appropriate precautions.

[redacted]
Toxicology Department
[redacted]

Q. Dr. Selikoff said once that the incidence or the occurance of the cancer in the non-smokers is extremely low -- is that correct --almost non-existent. Lung cancers, other cancers not turning out to be dormant - apparently with smokers and non-smokers.

Q. I would like to ask this of Dr. Selikoff, as Dr. Harries also did, as to whether there are any indications of hypersusceptibility or susceptibility to mesothelioma. Are the people at special risk? This was in your last slide.

A. I think that Dr. Harries is on to something. I think he's got a sense of something. We had one asbestos worker in Local 32 in Newark, a man who developed a left pleural mesothelioma and died. He came into the trade in 1928. His brother, three years younger came into the trade in 1931. This is a father-son-brother-brother union. You can't get into this union. (laughter). He came into the trade three years in 1931 rather than 1928. He died three years later of a left pleural mesothelioma. He worked in the same conditions and Dr. Churg tells me that he cannot tell the logical sections apart, they look identical. So that there is now some suspicion on the basis of these clinical impressions that there may be some susceptibility factor. Nature is trying to tell us something. We are too dense so far to find out.

Q. I was going to ask you a question on the spraying of asbestos. Most of the formulations that contain asbestos are 9 to 15% asbestos thar are sprayed by and large many cities and states have banned the spraying of asbestos. On the other hand, they substitute synthetic fibers that essentially have the same formulation and that gives us some concern.

A. Let me enlarge on the father-daughter, father-son syndrome in unions. Perhaps the unions will now wish to either have their daughters take on them jds or else give it to somebody else's kids. The first breakthrough I've seen here where the union fathers may not bring their kids into the union. Doctors do this also. Stay with me and don't get excited. In discussion here I recently pointed out that a union man rarely ever brings their daughters into the union, but one sees a great many sons. So equal opportunity hasn't really broken through, but perhaps with amosite and these things in the picture, they may choose to mix. Are there questions of the speaker?

Q. Dr. Harries, I had the privilege of meeting with you the other day, and would you elaborate on that change procedure. If I followed you correctly, and correct me if I'm wrong, the worker come into the locker room area. He removed all these garments including his undergarments and placed them in a locker. He was issued other garments to put on, including the coveralls and the safety paraphernalia.

always does. And what we talked about is breaking that chain and that's what you're talking about, of course, isn't it? Are there questions back there?

Q. I would like to know, Dr. Harries, if the pictures that you show _____ must have been for a grip out of the material and bagging, transporting and disposing of it and so on. And you also indicated that the -- while you were waiting for me I lost my train of thought. Anyway, I'll get to my point here. Do you require any type of respiratory or protective clothing protection for installation of non-asbestos material?

A. Yes, the answer is yes. We are not absolutely certain that the mainly calcium silicate type of material we are now using is going to be safe in the long term. Therefore, we provide a dust respirator and usually a brine nylon overall for work using these materials and the respirator is optional, if the dust concentration is less than 5 milligrams per cubic meter.

But you try to make it obligatory when it is about five milligrams per cubic meter and this means that it is obligatory during all rip-out procedures.

Thank you.

We are now imposing on the next sets of speakers.Would you give us a good hand of applause.

He went to the job site. He accomplished his job and at the end of the shift he removed all these garments and left them in the change room in a clean room atmosphere, showered, picked up his garments and went on home, and when he came back all the garments that he wore the day before were laundered and put into the receptical for use the following day. O.K. I want to be sure of that, because I think that it personally as far as I'm concerned a step ahead. You had one question, Doctor, I would like to comment on that you weren't quite sure about the source of asbestos that that banker had. One of my colleagues suggested that he might have been moonlighting and that may be your source of answer and I would also like to comment on the father-son ban and to lay aside a learned colleague about the daughter. I had two daughters. They didn't get in the business but they married two young men that did get into the business. So it's all in the family.

Of course, it is, and of course, this is the breakthrough the chain. _____when you make them launder the stuff at work. The little lady whose X-rays on my desk at the office is the wife of the guy that ran a business for 40 years. He died of a very peculiar cancer which the pathologists couldn't quite classify three years ago. She's got all this classic stuff which you've been showing me the last 24 hours. And she never went near the damn plant, but she'd been laundering her stuff, as a good housewife

Union Carbide

ASBESTOS TOXICOLOGY REPORT

It has been known for years that some persons working in asbestos production were prone to develop a disabling lung disease. In time, this condition became known as asbestosis and was related to exposure to high concentrations of asbestos dust. With further experience, it was found that men could work with asbestos without development of lung disease if dust concentrations were kept below a certain level.

It has been generally accepted that a worker will not develop asbestosis if he is exposed to no more than 5 million particles per cubic foot of air, even if this exposure continues for his entire working lifetime. Although no cases of asbestosis are known to have occurred when exposures have been maintained at or below this level, the ACGIH (which sets the [redacted] in the U. S. A.) has indicated they intend to lower the TLV for asbestos to 2 million particles per cubic foot in an effort to increase the safety factor incorporated in the limit. The U. S. Department of Labor has already issued a regulation under the Walsh-Healy Act placing the TLV for asbestos at 2 million particles per cubic foot for public contracts in which they have jurisdiction. This concentration of dust is generally not visible in the average work area unless a

beam of light causing a Tyndall effect is present. Usually the dust concentration must be from 8-10 million particles per cubic foot (MPPCF) before its presence it visible in average lighting conditions.

Several years ago, it was reported that there was an increase in the incidence of cancerous tumors, especially of the lung, associated with asbestosis. Recently there have been reports of some cancers occurring in individuals exposed to asbestos dust, but who have not developed clinical asbestosis. It is believed by most authorities that these cases have been associated with exposures significantly exceeding the Threshold Limit Value.

A type of cancer named mesothelioma has been noted to be associated with asbestos exposure in recent years. These tumors, while rather few in number to date, may occur in individuals with histories of only slight exposures, and that as much as twenty to forty years earlier. There is considerable evidence that crocidolite is most frequently associated with mesotheliomas. From the data available it appears that the TLV of 5 MPPCF is not low enough to protect against mesothelioma, and it is quite possible that 2 MPPCF is not, either. Research on the problem continues.

Control of asbestos dust exposure is therefore necessary. The control methods are [redacted]