INDUSTRIAL HYGIENE SURVEY

OF

Pomona Pipe Products, Co.
Greensboro, North Carolina

SURVEY DATE

August 20-22, 1975

IWS-30.20

SURVEY CONDUCTED BY

James Jones
Mark Jones
Robert Phillips

REPORT WRITTEN BY

Mark Jones

DATE OF REPORT

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Industrial Hygiene Section
Industry-Wide Studies Branch
Division of Surveillance, Hazard Evaluations and Field Studies
National Institute for Occupational Safety and Health
Cincinnati, Ohio

PLACE VISITED:	Pomona Pipe Products Company Greensboro, North Carolina
DATE OF VISIT:	August 20-22, 1975
PERSONS MAKING VISIT:	James Jones Robert Phillips Mark Jones
PERSONS CONTACTED:	Art Jabusch Plant Manager Max Palmer Personnel Manager Charles Caudill North Carolina State Mine Inspector
PURPOSE OF VISIT:	To conduct an industrial hygiene survey of the Pomona Pipe Products Company operations in Greensboro, North Carolina.

INTRODUCTION

The Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS) of the National Institute for Occupational Safety and Health has underway an "industrywide" study of the pipe and brick-making industry of North Carolina. Of particular interest in this study was the reported high exposure levels to silica dust but yet no cases of employees developing silicosis.

As the result of a walk-through survey conducted by Harry Donaldson, Frances Wolf and John Dement at the Pomona Pipe Products Company in Greensboro, North Carolina, on August 12, 1975, it was decided to conduct a thorough study of this facility. The survey was conducted by James Jones, Robert Phillips, and Mark Jones during August 20-22, 1975. Concurrently, the Medical Investigations Branch of DSHEFS was conducting a medical survey.

During the visit, 23 air samples were taken for evaluation of silica dust exposures. In addition, air samples were taken to evaluate exposure to styrene, ethyl benzene, and benzene.

DESCRIPTION OF THE FACILITY

The plant was built in 1866 and consists of approximately 10 buildings and 29 beehive kilns located on 85 acres.

The major products of the Pomona Pipe Products plant are different types and sizes of sanitary sewer pipe and flue linings.

In 1974 a new operation began. In this operation a new type of connector was developed to replace the old bell-shaped pipe ends. A polyester-fiberglass resin is now applied to form the female connector and a polyester resin applied to form the male connector.

The entire work force of the plant is 85 persons. There is no union at this plant.

MEDICAL, INDUSTRIAL HYGIENE AND SAFETY PROGRAM

There is no regularly employed physician or nurse available at the plant but every supervisor has had first aid training. There is no pre-employment examination given to new employees but after employees are on the job for a few months the company sends them to a local physician for a medical examination.

Protective headgear is the only safety equipment supplied by the company. Employees may rent uniforms commercially at their own expense and purchase safety shoes. There are few employees who use safety equipment, although a few employees in the grinding area do use dust respirators.

DESCRIPTION OF PROCESS

Ground shale from the Gulf, North Carolina mine is reground, screened, and conveyed to a pug mill where water is added. The resulting thick mud is passed through a vertical extruder to form the pipe and then dried. From the drier, the pipe is taken to the beehive kiln where the firing operation begins. The heating and cooling temperatures must be controlled carefully and takes about 5 days.

After firing, a connector must be added to both ends of the pipe. The female connector is made by winding one end of the pipe with a fiberglass yarn which is passed through a tray where it is impregnated with styrene, dimethylaniline, using cobalt naphthenate as a catalyst and peroxy acetone as an oxidant. The styrene acts both as a solvent and a co-polymer in the polymerization process which takes place. The male connector is made by placing the other end of a pipe into a mold and filling this mold with a polyester resin. After the polyester resin has polymerized the pipe is finished and ready for shipment to the customer.

INSPECTION OF THE PLANT

Potential Health Hazards

Potential health hazards observed uring this survey were as follows:

1. Respiratory exposure to free silica dust
2. Respiratory exposure to styrene
3. High noise exposure in the grinding and screening area

Ventilation

In the polyester-fiberglass operation, exhaust ventilation is provided at each work area. The system consists of a hood over the work area which takes the air from the immediate area and discharges it to a higher elevation in the same building.

This system is very inadequate as the air flow passes by the worker on its way to the ventilation hood and the discharge of the system is into the same enclosed area and not outside the plant.

Housekeeping

Housekeeping is kept up fairly well throughout the facility. The floors are cleaned by power vacuum sweepers and manually.

SURVEY PROCEDURES

General

Air samples were collected in this plant for evaluating exposure to silica

dust, styrene, ethyl benzene and benzene. The following paragraphs describe the methods used to collect and analyze the air samples.

Silica Dust

Samples for respirable silica dust were taken throughout the entire plant. Both area and personal samples were taken using pulsation dampened Mine Safety Appliance (MSA) Model G pumps. The pumps equipped with a 10mm nylon cyclone were operated at a flow rate of 1.7 lpm for approximately 6-7 hours. The respirable dust was collected on 37mm diameter MSA (FWS-B) polyvinyl chlorinde membrane filters (5μm pore size). All filters were tared and re-weighed on a "Cahn Gram Electrobalance" to obtain the sample weight.

Total respirable dust concentrations are reported in milligrams per cubic meter of air sampled. The present standard for silica dust depends on the per cent free silica. The TLV for respirable dust is calculated by the equation:

$$TLV^{1} = \frac{10\ mg/M^3}{\%S_1O_2 + 2}$$

A number of samples were analyzed for % free silica by x-rayed diffraction. An average per cent free silica of 10.4 was used to calculate a TLV. The TLV for respirable dust was calculated to be 0.81 mg/M^3.

Styrene, Ethyl Benzene, and Benzene

Samples for styrene, ethyl benzene and benzene were only collected in the polyester-fiberglass resin operation. A low-flow Sipin SP-1 pump was used to collect all these samples on charcoal tubes.

The tubes contain a coconut shell charcoal and have a 100 mg primary section and a 50 mg backup section. Samples were collected for approximately one hour at a flow rate of 200 cc/min. Styrene, ethyl benzene and benzene are desorbed from the charcoal by using carbon disulfide and were analyzed by gas chromatography at the Western Area Occupational Health Laboratory, Salt Lake City, Utah.

RESULTS AND DISCUSSION

Silica Dust

The results of the silica dust samples are given in Tables I and II. Contrary to earlier reports of high levels of exposure, all personal samples were below the present OSHA Standard.

However, NIOSH has recommended a standard of 50 micrograms free silica per cubic meter of air.[2] Three of the personnel samples were above this recommended standard.

The area samples collected in the screening and grinding area contained a greater per cent free silica than the personnel samples. Because of this increase in percent free silica, the calculated TLV for this area was 0.40 mg/M^3.

Styrene, Ethyl Benzene and Benzene

No detectable levels of ethyl benzene or benzene were found in the fiberglass-polyester resin area.

Results of the styrene samples in the fiberglass-polyester resin area are shown in Table III. The highest styrene concentration detected was 54 ppm which is well below the current Federal Standard of 100 ppm.

CONCLUSIONS AND RECOMMENDATIONS

It is understood that this facility is not presently in operation and these recommendations are made in light that the facility may be used in the future.

Based on observations made during this survey and the results of the air samples, the following conclusions are drawn and recommendations for improvements made.

The grinding operation, extruding operation and the unloading of the kilns are health hazards with exposure levels above the NIOSH recommended standard. Ways those levels might be lowered are as follows:

1) Proper engineering controls should be used to control exposures in these operations. This would include proper ventilation system as prescribed by the Safety and Health Regulations, Part 1910. (Copy is attached)

2) If the proper engineering controls are not feasible, either respirators should be worn or the amount of time spent working in this area should be limited.

TABLE I

Job Description	Filter #	Air Volume (M^3)	Dust Wt. (mg)	Conc. mg/M^3	% TLV	mg/M^3 Respirable Free Silica	% NIOSH Recommended Standard
Grinding Control Room Area	1407	.678	.167	.246	30.5	.026	51.0
" " " "	1405	.714	.143	.200	24.5	.021	41.6
Grinder	1363	.677	.187	.276	34.2	.063*	127.0
Pug Mill Operator	1334	.615	.166	.270	33.5	.028	56.0
" " "	1244	.711	.180	.253	31.4	.026	52.6
" " "	1100	.420	.173	.412	51.1	.043	85.7
Extruder Operator	1030	.607	.109	.180	22.3	.019	37.4
" "	1330	.719	.173	.241	30.0	.025	50.1
Asst. Extruder Operator	1257	.750	.490	.653	81.0	.068	135.8
" " "	1345	.716	.199	.278	34.5	.029	57.8
Front End Loader	1400	.709	.205	.289	35.8	.030	60.1
" " "	1249	.672	.321	.478	59.3	.050	99.4
Pipe Checker	1138	.553	.211	.382	47.4	.040	79.4
Unload Kiln	1078	.400	.097	.243	30.1	.025	50.5
" "	1335	.689	.308	.447	55.4	.046	93.0
" "	1084	.689	.286	.415	51.5	.043	86.3
" "	1020	.695	.453	.652	80.8	.068	135.6

Average % free silica in dust = 10.4%

TLV for respirable dust = 0.806 mg/M^3

*Based on an average % respirable free silica of 23.0.

TABLE II

Job Description	Filter #	Air Volume (M^3)	Dust Wt. (mg)	Conc, mg/M^3	% TLV
Screening Area	1080	.666	.262	.393	98.6
" "	1381	.726	.266	.363	90.8
" "	1361	.672	.309	.460	115.0
Grinding Control Room Area	1266	.666	.070	.105	26.3
" " " "	1332	.723	.401	.555	138.8
" " " "	1408	.677	.426	.629	157.3

Average % free silica in dust = 23.0%

TLV for respirable dust = 0.400 mg/M^3

TABLE III

Job Description	Filter #	Air Volume (M^3)	Styrene Collected (mg)	Conc. (mg/M^3)	Conc. (ppm)
Fiberglass Operation					
End Mold Installation	2	.0127	2.17	170.9	40.1
"	23	.01183	0.89	75.2	17.7
"	25	.01224	0.55	44.9	10.5
Wind Fiberglass	6	.00262	0.07	26.7	6.3
"	13	.01429	2.65	185.4	43.5
Mix resin	1	.01186	0.61	51.4	12.1
"	15	.0128	0.40	31.3	7.3
"	16	.01307	0.43	32.9	7.7
"	29	.00936	0.09	9.6	2.3
Remove Mold	3	.00413	0.06	14.5	3.4
"	8	.01252	0.21	16.8	3.9
"	17	.01182	0.39	33.0	7.7
"	19	.01121	0.24	21.4	5.0
"	20	.01185	0.08	6.7	1.6
"	30	.00903	0.09	10.0	2.3
Cast Polyester Ends	4	.01037	0.28	27.0	6.3
"	9	.01244	0.43	34.6	8.1
"	21	.01199	0.52	43.4	10.2
"	22	.01183	0.34	28.7	6.7
"	20	.00947	0.18	19.0	4.5
Fork Lift	5	.01204	2.78	230.9	54.2
"	14	.01199	1.18	98.4	23.1
"	26	.01063	0.11	10.3	2.4

TLV for styrene - 100 ppm