

A-12
A

ENGINEERING REPORT

for

Certain Teed Products Company
Pipe Plant
Ambler, Penn.

Asbestos Evaluation

FEB 01 1978

prepared by

Robert C. Benashski
The Travelers Insurance Cos.
One Tower Square
Hartford, Conn. 06115



Date(s) Surveyed

December 13th and 14th, 1977

**THE TRAVELERS
ENGINEERING DIVISION**

PLAINTIFF'S EXHIBIT

CT-1215

Engineering Services Protecting People and Property Since 1894

Distribution:

1 cc Asst Claims Mgr. Syrek - Philadelphia Claims Dept.
1 cc Eng. Acct. Mgr. Wilms - Philadelphia Engineering
1 cc Certain Teed
1 cc Sect. Hatch, CP Claim, H.O.
1 cc File (H.O.)
1 cc Reg. Asst. Yekenchik - CP Claim - 8 PB

TABLE OF CONTENTS

- I. Introduction
- II. Summary
- III. Discussion of Results and Evaluation
 - 1. Crusher Operation
 - 2. Fibre mixing
 - 3. Boring Mill (30")
 - 4. Coupling cutoff saw
 - 5. Lehman Short Lathe
 - 6. Rework Saw (dry)
- IV. Sampling, Analytical Procedures and Standards
 - A. Sampling Procedure
 - B. Analytical Procedure
 - C. Standards
- V. Data
 - A. Industrial Hygiene Survey Data Sheets
 - B. Laboratory Analysis Results

I. INTRODUCTION

On December 13th and 14th, 1977, the Certain Teed Pipe Division Plant in Ambler, Penn., was surveyed. The purpose of the survey was to determine if the plant workers were exposed to asbestos as a result of their work environment.

Our Home Office Claim Department requested we survey this location to determine the extent of asbestos exposures to the plant workers. This in-plant air sampling and survey of operations was done during the days of December 13th and 14th, 1977, and completed by the following Travelers' representatives:

L. Wilms, Eng. Acct. Mgr. - Philadelphia Eng.
R. C. Benashski, Asst. Dir. - H.O. Eng.

II. SUMMARY

Air samples were taken in the workers breathing zone and collected on membrane filters of 0.8 micron pore size mounted in an open face filter cassette. The asbestos fibres longer than 5 microns and with an aspect ratio of 3:1, found on the membrane filter, were counted by phase contrast microscopy at 450 magnification.

Swipe samples using a membrane filter, were also taken of selected workers clothing to determine whether their clothes were contaminated with asbestos.

Samples of settled dust were taken at selected operations to determine the presence of Asbestos fibres and also the percentage of quartz in the settled dust.

General area samples were taken for respirable dust at two locations to determine the concentration of respirable quartz dust near the operators work area.

Workers are exposed to asbestos fibres in the workplace as well as taking contaminated clothing home, since no change of work clothes was observed at this plant.

We met with Plant Manager Benhardt for a short time before and after our survey.

Mr. Magers, the plant engineer and safety manager accompanied us during our entire sampling program.

Mr. Arthur Neilson, an Industrial Hygiene Consultant met Mr. Wilms and I on the second day of the visit for about an hour (11:00 AM to 12:00) and left. He was not observed to have sampled. He represented Fred S. James Insurance Agency.

TABLE I

SUMMARY OF ASBESTOS SAMPLES

SAMPLE NO.	TIME MIN	Item	Asbestos Concentration Fibres/cc
140G	6 MIN	2 Fibre mixer (A. Semioes)	2.8 ✓
155	3 MIN	2 Fibre mixer (W. Edleman)	3.4 ✓
157G	53	3 Rework Saw (W. Ball)	0.6 ✓
152G	90	4 Lehman Short Lathe (J. Silva)	3.9 ✓
247G	35 30/55	1 Crusher Operation (Gullo) 2nd shift	5.3 ✓
98G	67	1 Crusher Operation (R. Johnson) 1st shift	2.4 ✓
92G	27	6 30" Boring Mill (C. Handsekin)	0.9 ✓
85G	92	6 30" Boring Mill (C. Handsekin)	0.3 ✓
93G	78	5 Coupling Cut-off Saw (E. Wharton)	0.7 ✓
94G		Swipe Sample (C. Handsekin) -	Asbestos fibres present
8		Swipe Sample (R. Johnson) -	Asbestos fibres present
82P		Settled Dust (Boring Mill) -	Asbestos fibres present
79A		Settled Dust (Vacuum box crusher)	Asbestos fibres present

TABLE II

<u>RESPIRABLE QUARTZ DUST CONCENTRATION</u>				
<u>SAMPLE NO</u>	<u>TIME MIN</u>		<u>Concentration</u>	<u>% Quartz</u>
83A	85	Crusher Machine (afternoon)	0.61 mg/m ³	5.3%
70A	73	Crusher Machine (morning)	0.63 mg/m ³	6.1%
77A	155	30" Boring Mill	0.15 mg/m ³	12.2%
82P		Settled Dust (Boring Mill)	-	15%
79A		Settled Dust (Vacuum Box-Crusher)	-	10%

III. DISCUSSION OF RESULTS AND OBSERVATIONS

The Certain Teed plant in Ambler, Penna., is engaged in the manufacture of cement asbestos pipe of various sizes. The operation consists of charging raw materials, cement, asbestos and water to a mixer producing a slurry which is transferred to a pipe machine which forms the various size pipes. They are then dried and cooked in an autoclave and finished in lathes and milled to couplings and fittings of various sizes by saws and milling machines.

Also, scrap pipe material is sent to the Crusher Operation where the pipe is reduced to a powder to be reintroduced in the process to be added to the raw slurry.

1. Crusher Operation

The crusher operation handles scrap pipes of various sizes and feeds them to the crusher to reduce them to a fine dust size for re-use in the pipe manufacturing process.

Two different shifts were sampled on a representative or typical work cycle basis. This is a three shift operation, and shifts one and two were sampled to determine any differences in work styles.

Shift one showed an air concentration of 2.4 fibres per cc., while shift two average 5.3 fibres per cc. The time sampled was 67 minutes and 55 minutes, respectively. The results are typical of their respective exposures for an 8-hour day since the work style did not vary during the observed process work.

The first shift operator's clothing was swipe tested and asbestos fibres were found on the membrane filter used and analyzed by the phase contrast microscopy technique.

Two general area samples for respirable dust was also taken and both air concentrations were below the T.L.V. (Threshold limit value) or allowable level. However, the quartz percentage of the dust was found to be over five percent and therefore, a possible silicosis hazard could exist.

Settled dust samples showed asbestos fibres present as well as 10 per cent quartz.

Both of these workers wore street clothes which were obviously contaminated with asbestos fibres. There was no change of clothes before leaving work.

Respirators were also worn (3M disposable) but not properly. This is a two strap mask and only one strap was used allowing unfiltered air to be brought around the chin of the wearer.

Observed was the use of an air hose to blow off the dust on the workers clothing. A broom and shovel were also used to clean up settled dust.

*Respirator Test
4 of 100 lbs
to be in the tank*

2. Mixing Operation

The workers in this operation move various types of asbestos bags ($\approx$ 100 lbs) and dump them into an enclosed and ventilated dump station. They are also responsible for weighing operations to be sure proper mixing and addition of the asbestos has occurred in the batches.

Two shifts were sampled. A 13 minute sample was taken on the second shift to represent the dumping of asbestos for one batch, 20 one hundred pound bags. The level measured was 3.4 fibres per cc which is below the allowable peak level for a 15 minute period. The first shift worker was measured for 64 minutes at the breathing zone in the morning and the result found was 2.8 fibres per cc.

This was indicative of an average exposure over an hour period during and after dumping and very similar in concentration to the shorter term sample. This would indicate that the average concentration would be over the allowable level of 2 fibres per cc since 8 to 10 batches are dumped per shift.

These workers also wore street clothing and 3 M approved respirators incorrectly (one strap). They were observed using the vacuum system to clean themselves of the dust. Also available to them was an air hose which was not observed to be used.

The respirators were stored cup face up on the electrical switches. These respirators had settled dust in them from the process.

3. Rework Saw

Pipe is cut dry for reuse and the operation was sampled for 50 minutes at his breathing zone for asbestos fibre concentration. The concentration measured was 0.6 fibres per cc. He also wore street clothing and a 3M approved respirator. The respirator was also worn incorrectly (one strap used).

4. Lehman Short Lathe

Dry pipes are finished at the lathe by cutting the rough ends of the pipe. An hour and 30 minutes sample was taken to

4. Lehman Short Lathe (Cont'd)

represent his eight-hour exposure and a concentration of 3.9 fibres per cc was found on the breathing zone sample. A respirator was not worn during the operation. Also street clothes were worn.

5. Coupling Cut-off Saw

The saw operator was sampled in his breathing zone for one hour and 18 minutes with a resultant concentration of 0.7 fibres per cc. He wore a 3M approved respirator and also street clothing.

6. 30" Boring Mill

Grooves are cut in pipe fittings and two breathing zone samples were taken for 27 minutes and 1 hour and 32 minutes with a resultant fibre count of 0.9 fibres/cc and 0.3 fibres per cc.

He did not wear a respirator and wore his street clothes. A swipe sample of his clothes was taken using a membrane filter and asbestos fibres were found when analyzed by phase contrast microscopy.

Also settled dust was taken from the machine and asbestos was detected in this dust as well as 15% quartz. A general area sample on the machine at breathing zone height was taken for respirable dust and the concentration was found to be 0.15 mg/m^3 containing 12.2% quartz.

EVALUATION

All samples for asbestos were taken in the workers breathing zone and attached to the workers. Samples were taken to represent their eight hour-work style, since the workers were at the stations and operating their equipment on a consistent basis except for short breaks. It is felt therefore, the samples represent 8-hour concentrations of asbestos fibres. The fibre mixing operation, Lehman short lathe and the crushing operation personnel are all exposed to asbestos fibres above the allowable 8-hour concentration of two fibres per cc, but no sample revealed a high short term peak (15 minutes) of 10 fibres per cc.

However, all workers are exposed to asbestos fibres as witnessed by the air samples the lowest of which was 0.3 fibres per cc, the swipe samples, observed dust on the workers clothing, and asbestos observed in the settled dust.

Our asbestos air samples were generally higher than those recorded by the plant who maintains a log of their results.

Though all operations tested had exhaust ventilation, some of the piping had holes in it, the workers tended to lean into the exhaust air and dust did settle around areas of poorly designed exhaust systems. This was evidenced by the contaminated clothing.

The respirable dust samples showed high quartz percentages as did the settled dust. There could be a potential silicosis exposure which should also receive further review and sampling by the plant, on a personal sampling basis.

IV. SAMPLING, ANALYTICAL PROCEDURES AND STANDARDS.

A. Sampling Procedures

Bendix permissible pumps with 0.8 micron membrane filters were used in collecting asbestos air samples at 2 liters per minute at workers breathing zone.

The general area respirable samples were taken with a Bendix permissible pump and size selective cyclone with PVC filters of 0.5 micron pore size. The size selector filters out the non-respirable dust at 10 microns and above allowing the respirable dust to be collected by the filter.

Swipe samples of workers clothes for asbestos were collected on membrane filters which are also used to collect air samples.

Bulk samples at various points of the process were collected and analyzed by our laboratory for the presence of Asbestos and Quartz.

B. Analytical Procedures

The membrane filters were analyzed in our laboratory for asbestos fibres longer than 5 microns and with an aspect ratio of 3:1 by phase contrast microscopy at 450 magnification as recommended by OSHA. The % quartz determination was made by x-ray diffraction following NIOSH criteria.

C. Standards

The 8-hour time weighted average concentration of asbestos fibres currently permitted by OSHA is two fibres per cc. A ceiling value or peak level of 10 fibres per cc is permitted for 15 minutes. However, OSHA has proposed a rule to lower the above levels to an exposure limit at 8 hours (TWA) of 0.5 fibres per cc larger than 5 microns and a ceiling of 5 fibres per cc for a 15 minute sampling period. NIOSH was requested to study this proposal on December 2, 1975. The resultant criteria document of December 1976 concurs with the above OSHA proposal.

The threshold limit value for respirable dust recommended by the American Conference of Governmental Industrial Hygienist is developed by calculation based on the percent of quartz found on the filter sample; such that the eight-hour time weighted average is:

$$\text{TLV (TWA)} = \frac{10}{\% \text{ quartz} + 2}$$

therefore, a 10% quartz concentration would give an allowable concentration of

$$\text{TLV (TWA)} = \frac{10}{10 + 2} = \frac{10}{12} = 0.83 \text{ mg/m}^3$$

R. C. Benashski C.I.H. #747
R. C. Benashski

ENGINEERING HYGIENE SURVEY DATA SHEET

THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115

INSURED		LOCATION		DATE OF SURVEY	
Certain-Teed		Ambler, PA		12-13-77	
INSTRUMENT		MANUFACTURER		INSTRUMENTATION USED	
Pump		Bendix		C-115	
				144	
				4-72	

D. REASON FOR SURVEY

A. SAMPLING MEDIUM
AA filter
B. MATERIAL SAMPLED
Asbestos
C. ANALYSIS REQUIRED
Asbestos (fibre conc)

SAMPLE DATA

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE TIME		SAMPLING DURATION	FLOW RATE	SAMPLER POSITION	NUMBER OF PERSONS EXPOSED	EXPOSURE TIME	TYPE OF CONTROLS	COMMENTS
144 G	Fibre mixer (dumping)	Start	End	64 min	2 Lpm	PS	1	8 hr	Exhaust	M disp resp TC-21C-132
23 5/16	(A. Sem: oes)	10:45	11:49							dumps for 2/5 mins ever
3.4 5/16										45 to 50 min. and 2-1020
137 G	Blank									dumps per day of 100 it.
										asbestos bags
										Street clothes worn only
95 G	Fibre mixer (dumping)	Start	End	13 min	2Lpm	PS	1	8 hr	Exhaust	one strap of resp worn.
3.4 5/16	(W. Edlemen)	3:12	3:25							Broom and air hose used
										to clean up
88G	Blank									3 shifts
										Resp hung on equipment
										for storage.

OFFICE Phil/H.O. ENGINEER Wilms/Benashski SIGNATURE *W. Benashski* DATE SIGNED 12-13-77

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

D. REASON FOR SURVEY

C. ANALYSIS REQUIRED	
Asbestos (fibre conc)	
1	Asbestos (fibre conc)

OF FICE	Phil/H.O.	ENGINEER	Wilms/Benashski	SIGNATURE		DATE SIGNED	12-13-77
---------	-----------	----------	-----------------	-----------	---	-------------	----------

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

CTD018613

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

[illegible]

OFFICE	ENGINEER	SIGNATURE	DATE SIGNED
Phil/H.O.	Wilms/Benashski	<i>Phil Wilms</i>	12-13-77

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

C-15826 REV 9-73 PRINTED IN U S A

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

D. REASON FOR SURVEY	
A. SAMPLING MEDIUM	PVC Filter
B. MATERIAL SAMPLED	Dust (Cement Asbestos)
C. ANALYSIS REQUIRED	Resp Dust conc & % Quartz

OFFICE	Phil/H.O.	ENGINEER	Wilms/Benashski	SIGNATURE	<i>W. Benashski</i>	DATE SIGNED	12-14-77
--------	-----------	----------	-----------------	-----------	---------------------	-------------	----------

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

C-15826 REV 9-73 PRINTED IN U.S.A.

INDUSTRIAL HYGIENE SURVEY DATA SHEET

THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115

INSURED	Certain-Teed	LOCATION	Ambler, PA	DATE OF SURVEY	12-14-77
INSTRUMENT	MANUFACTURER	INSTRUMENTATION USED		SERIAL NUMBER	TIC NO.
Pump	Bendix	C-115		423	34-72

D. REASON FOR SURVEY

A. SAMPLING MEDIUM	AA Filter
B. MATERIAL SAMPLED	Asbestos
C. ANALYSIS REQUIRED	Asbestos (fibre conc)

SAMPLE DATA

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE TIME		SAMPLING DURATION	FLOW RATE	SAMPLER POSITION	NUMBER OF PERSONS EXPOSED	EXPOSURE TIME	TYPE OF CONTROLS	COMMENTS
		Start	End							
92 G 0.97/cc	30" boring mill (C. Handsekin)	9:33am	10:00am	27 min	2Lpm	PS	1	8 hr	Exhaust	No resp worn Street clothes
96 G	Blank									
85 G 0.34/cc	30" boring mill	10:23am	11:55am	92 min	2Lpm	PS	1	8hr	Exhaust	
94 G	Swipe sample of clothing (C. Handsekin)									

OFFICE	Phil/H.O.	ENGINEER	Wilms/Benashski	SIGNATURE	W. Benashski	DATE SIGNED	12-14-77
--------	-----------	----------	-----------------	-----------	--------------	-------------	----------

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

C-15026 REV 9-73 PRINTED IN U.S.A

**THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115**

[illegible]

OFFICE	ENGINEER	SIGNATURE	DATE SIGNED
Phil/H.O.	Wilms / Benashski	<i>PC Benashski</i>	12-14-77

1965 FEB 23 - 73 DATED 1405A

INDUSTRIAL HYGIENE ANALYSIS REPORT

PRODUCT EVALUATION

ANALYSIS NO. 629-77 (16-20)	CUSTOMER Certain Teed	ADDRESS Ambler, Pa.
SAMPLE SENT BY Benashski/Wilms	DATE RECEIVED 12-16-77	DATE REPORTED 1-4-78
ANALYST MIM; DAR		

AA Filters; PVC Filters; Bulk Samples; Swipe Samples

SAMPLE NUMBER	TIME	LOCATION	TEST RESULTS	THRESHOLD LIMIT VALUE (TLV)
144G	64	Fibre Mixer (dumping) (A. Semies)	Asbestos 2.8 fibers/cc	Asbestos* 2 fibers/cc
95G	13	Fibre Mixer (dumping) (W. Edlemen)	Asbestos 3.4 fibers/cc	10 f/cc
157G	58	Rework Saw (dry) (Wm. Ball)	Asbestos 0.6 fibers/cc	2 f/cc
152G	90	Lehman Short Lathe (Joada Silva)	Asbestos 3.9 fibers/cc	2 f/cc
247G	255	Crusher Oper. (G. Gullo)	Asbestos 5.3 fibers/cc	
83A	85	Crusher Machine (QUARTZ AREA SAMPLE)	Resp. Part. 0.61 mg/m ³ Quartz Less than 5.3%	Resp. Part. 1.37 mg/m ³
77A	155	30" Boring Mill (QUARTZ AREA SAMPLE)	Resp. Part. 0.15 mg/m ³ Quartz Less than 12.2%	Resp. Part. 0.70 mg/m ³

ANALYTICAL METHOD

Microscopy
X-ray Diffraction

*OSHA Limit

Page 1

INDUSTRIAL HYGIENE ANALYSIS REPORT

PRODUCT EVALUATION DATA

ANALYSIS NO. 629-77 (16-20)	CUSTOMER Certain Teed	ADDRESS Ambler, Pa.
SAMPLE SENT BY Benashski/Wilms	DATE RECEIVED 12-16-77	DATE REPORTED 1-4-78
SERIAL ANALYST ERIAL ANALYST	ANALYST MTM; DAR	

AA Filters; PVC Filters; Bulk Samples; Swipe Samples

SAMPLE NUMBER	LOCATION	TEST RESULTS	THRESHOLD LIMIT VALUE (TLV)
82P	Bulk Sample of Settled Dust on Boring Mill	Asbestos Fibers Present Quartz 15%	
92G <i>TIME MIN 27</i>	30" Boring Mill (C. Handsekin)	Asbestos 0.9 fibers/cc	Asbestos* 2 fibers/cc
85G <i>92</i>	30" Boring Mill (C. HANDSEKIN)	Asbestos 0.3 fibers/cc	
94G	Swipe Sample of Clothing (C. Handsekin)	Asbestos Fibers Present	
78A <i>73</i>	Crusher Machine	Resp. Part. 0.63 mg/m ³ Quartz Less than 6.1%	Resp. Part. 1.23 mg/m ³
98G <i>67</i>	Crusher Oper. (R. Johnson)	Asbestos 2.4 fibers/cc	Asbestos* 2 fibers/cc
79A	Bulk Sample of Settled Dust on Vacuum Box	Asbestos Fibers Present Quartz 10%	

ANALYTICAL METHOD

Microscopy
X-ray Diffraction

*OSHA Limit

Page 2

INDUSTRIAL HYGIENE ANALYSIS REPORT

PROJECT EVALUATION UNIT

ANALYST, INC.	CUSTOMER	ADDRESS
629-77 (16-20)	Certain Teed	Ambler, Pa.
SAMPLE SENT BY	DATE RECEIVED	DATE REPORTED
Benashski/Wilms	12-16-77	1-4-78
SERIAL ANALYST	ANALYST	
	MTM; DAR	

AA Filters; PVC Filters; Bulk Samples; Swipe Samples

SAMPLE NUMBER	LOCATION	TEST RESULTS	THRESHOLD LIMIT VALUE (TLV)
87G	Swipe Sample of Clothes (R. Johnson)	Asbestos Fibers Present	
93G	Coupling Cut Off Saw (E. Wharton)	Asbestos 0.7 fibers/cc	Asbestos* 2 fibers/cc

ANALYTICAL METHOD

Microscopy
X-ray Diffraction

*OSHA Limit

Page 3