



INDUSTRIAL HYGIENE DUST SURVEY
CERTAIN-TEED PRODUCTS CORPORATION
600 ST. CYR ROAD
ST. LOUIS, MISSOURI 63137

PREPARED BY
D. BHATIA
ENGINEERING SUPERVISOR

APRIL 13, 1973

CTD017831



I N D E X

	<u>Page</u>
I. INTRODUCTION	1
II. SUMMARY	1
III. CONCLUSIONS	2
IV. RECOMMENDATIONS	2
V. DISCUSSIONS	3
VI. APPENDIX	5
Industrial Hygiene Survey Data Sheet	6
Industrial Hygiene Analysis Report	8
Field Analysis Report	10

CTD017832



I. INTRODUCTION

At the request of the Management of Certain-Feed Corporation, an Industrial Hygiene Dust Survey of the St. Louis Plant was conducted on March 13th and 14th, 1973. The primary purpose of this survey was to determine the asbestos concentration at those locations where employees were suspected of exposure and to evaluate the effectiveness of some engineering controls. This report documents the results based on the operating conditions found on the days of our survey.

We were assisted by Mr. W. Fisher, Safety Supervisor in the air sampling and the survey of the plant. We reviewed with Mr. S. Layshock, Plant Manager our sampling procedures, locations where samples were collected, and the results of previous test samples.

This survey was completed by Field Assistant Tuttle and the writer.

II. SUMMARY

Asbestos exposure was evaluated by sampling air in the breathing zone of workers at pipe machine feed and in the manufacturing plant, at the re-work saw area, and at the Plant No. 3. The samples were taken to reflect an average concentration and the maximum concentration during work periods. The results indicate that average asbestos concentrations range from 0.34 fibers per ml to 1.16 fibers/ml and that maximum or peak concentrations range from 2.5 to 3.46 fibers/ml for asbestos fibers of greater than 5 microns in length. None of these concentrations exceed the present allowable limits for asbestos which is 5 fibers/ml for 8 hr. time weighted average (TWA), and 10 fibers/ml as a ceiling concentration. No exposure due to asbestos is deemed to exist.

Quartz was also detected in the samples collected in the manufacturing plant, and the concentration of this contaminant in the total dust sample varies from 3 to 20%. The calculations show that Mezzane clean-up man is the only worker who is exposed to silica, the concentration of which is 1.53 mg/M³ on 8 hr. TWA basis. The permissible concentration on the same basis is 1.37 mg/M³ total dust containing 20% quartz.

The performance of several exhaust ventilation hoods for controlling the contaminants levels were evaluated by measuring hood velocities. The duct velocity of several hoods could not be measured as the plant mechanic was not available for drilling holes in these ducts. The velocity measurements indicate that improvements are desirable for hoods which are used in several sawing operations to further reduce the asbestos levels, although sample results show that the asbestos concentrations in the air are not excessive. Improvements are needed in dust removal system for silica transfer and weigh system to reduce the exposure to silica dust.

CTD017833



III. CONCLUSIONS

1. All locations which were sampled in this survey, employee exposure to asbestos fiber (> 5 microns) does not exceed the current permissible limits of 5 fibers/ml.
2. Only Mezzane clean-up man is exposed to silica dust because of deficiencies in silica dust removal system.
3. The design and effectiveness of some of the hoods is not adequate based on contaminant capture velocity requirements recommended by American Conference of Governmental Industrial Hygienists.
4. Leaks at the secondary scrap crusher are one of the causes of the asbestos dust detected in this area.

IV. RECOMMENDATIONS

Although, exposure to asbestos is not deemed to exist, the following recommendations are submitted to improve the performance of engineering controls provided, and to assure that asbestos concentration would continue to remain at the acceptable level.

1. Repair the leaks at the secondary scrap crusher to prevent the dispersion of asbestos fibers in the air. Asbestos dust was observed to be leaking at several points under the scrap crushing system and accumulated at the ground level after falling through air.
2. Increase the hood entrance velocity to 1000 fpm at elbow blank saw, re-work saw, and coupling saw to improve the performance of these hoods. Considerations should be given to possibly redesign these hoods so that the sawing operation can be conducted in an enclosure.
3. Newly installed Moody Fluffer hood should have a face velocity of 75 fpm for capturing any asbestos dust released from the bags.
4. Exhaust air velocity under the Fines Weigh Scale Hopper should be at least 100 fpm to capture silica dust. The present hood is partially plugged and not effective under the hopper where a large volume of silica dust is generated everytime the hopper is emptied.
5. Exhaust ventilation systems in the plant should be monitored periodically (one to two months) to insure their effectiveness in removal of air contaminants. The monitoring program should consist of the following measurements:
 - a) Static pressure at each saw hood
 - b) Face velocities of large hoods

CTD017834



IV. RECOMMENDATIONS

5. (continued)

- c) Pressure drops across each dust collector equipment
- d) Duct velocities in branches and the mains. The velocities should be maintained at 4500 fpm in branches and 3500 fpm in the main lines to assure that dust particles won't settle out in the ducts.

V. DISCUSSIONS

All samples for asbestos exposure were collected within the breathing zone of the workers on membrane filters of 0.8 micron porosity in an open-face holder. The filter holder was attached under the chin of the worker as he went about performing his normal tasks. Samples were collected for the determination of 8 hr. TWA concentrations and of ceiling concentrations of asbestos fiber, with only a few exceptions. The sampling data is recorded on an Industrial Hygiene Data Sheet and analytical results of these samples are shown on an Industrial Hygiene Analysis Report, both of which are attached.

As expected, the samples which were taken to determine the average concentrations i.e. those which were collected for a longer time period showed lower concentration of asbestos than those which were taken for a determination of ceiling concentrations. However, results show that none of these concentrations for asbestos exceed the permissible limits.

Since silica is handled in the manufacturing plant, crystalline quartz was detected in the Samples No. 722A, 709A and 734A. On the basis of percent quartz analyzed in these samples, only Mezzane clean-up man (Sample No. 734A) is exposed to quartz in the total dust sample. His calculated 8 hr. TWA concentration is 1.53 mg/M³ as compared to allowable limit of 1.37 mg/M³ total dust. The allowable total dust concentration is calculated from the following formula for 20% quartz in the dust:

$$\text{Total Dust} = \frac{30 \text{ mg/M}^3}{\% \text{ SiO}_2 \div 2}$$

Silica transfer and weigh system is only source of quartz, and the ventilation measurements showed that local exhaust hood under the weigh scale hopper is ineffective. At present, this exposure is being controlled by use of respirator by the men working in this area. We recommend that the entire silica transportation system should be inspected for leaks, and dust removal ducts and hoods should be repaired to insure that sufficient dust capture and transport velocities are available.

CTD017835



V. DISCUSSIONS (continued)

Air velocity measurements were taken at the face of several hoods to determine their effectiveness in removing contaminants. All hoods for cutting saws have low capture velocities, and their effectiveness is further reduced by entrapment of dust in the pipe being sawed. This entrapped dust is released at the open ends of the pipe (particularly at re-work saws) which consequently disperses into the work environment. The feasibility of capturing dust from an open end of pipe or conducting the sawing operation in a partial enclosure should be investigated.

Observations at the scrap recovery area indicated that there are several leaks at the secondary crusher end which are releasing asbestos fiber into the air. Repairing these leaks would continue to maintain a low concentration of asbestos in the air.

We noticed that all locations where samples were taken, use of approved respirators was enforced to protect the worker.

CTD017836



VI. APPENDIX

CTD017837

ENGINEERING INDUSTRIAL HYGIENE SURVEY DATA SHEET

-6-

THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115

INSUREE Certain Teed Products		LOCATION 600 St. Cyr Road, St. Louis, Mo.	63137	DATE OF SURVEY 3/13-14/73
INSTRUMENTATION USED				
INSTRUMENT	MANUFACTURER	MODEL	SERIAL NUMBER	TIC NO.
Permissible Air	Unico Environmental	C-115	372, 386, 272	1-72, 2-72, 3-72
Sampling - Pump (3)	Instruments, Inc.			

A. SAMPLING MEDIUM 0.8 Micron Membrane Filter - Open Face	D. REASON FOR SURVEY Customer Request
B. MATERIAL SAMPLED Asbestos Fiber	
C. ANALYSIS REQUIRED Asbestos and Quartz concentration in air.	

SAMPLE DATA							COMMENTS
SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	FLOW RATE	SAMPLER POSITION	NUMBER OF PERSONS EXPOSED	EXPOSURE TIME	
	<u>Manufacturing Area</u>	<u>Min.</u>	<u>LPM</u>			<u>Hr.</u>	
722 A	#1 Pipe Machine - Fiber Feed	178	2.0	B.Z	1	7.2	Respirator Some Quartz dust in air
732 A	#2 Pipe Machine - Fiber Feed	9	2.0	B.Z	1	7.2	Respirator Sampled for ceiling concn.
709 A	#2 Pipe Machine - Fiber Feed	210	2.0	B.Z	1	7.2	Respirator Some Quartz dust in air
734 A	Mezzane Clean-up Man	103	2.0	B.Z	1	7.4	Respirator Some Quartz dust in air
	Plant No. 3						
690 A	Rework Saw	17	2.0	B.Z	1	7.4	Respirator Sampled for ceiling concn.
695A	Rework Saw	182	2.0	B.Z	1	7.4	Respirator Local exhaust ventilation
735 A	Coupling Saw	19	2.0	B.Z	1	7.4	Respirator Sampled for ceiling concn.
715 A	Coupling Saw	100	2.0	B.Z	1	7.4	Respirator Insuff. local ventilation.
691 A	Elbow Blank Saw	19	2.0	B.Z	1	1.0	Respirator Sampled for ceiling concn.
728 A	Elbow Blank Saw	77	2.0	B.Z	1	1.0	Respirator Improper hood design

CTD017838

ENGINEER	SIGNATURE	DATE SIGNED
D. Bhatia, E/S	<i>D. Bhatia</i>	3-14-73

OFFICE
St. Louis, Missouri.

C-15826 NEW 4-72 PRINTED IN U.S.A.

INSTRUCTIONS

1. Use a separate sheet for each material sampled.
2. SPECIFY
 - A. Sampling medium - For example, 0.6N acetic acid when sampling for TDI
 - B. Material sampled - For example, lead, asbestos
 - C. Analysis required - In the laboratory, for example - percent of free silica
 - D. Reason for survey - Customer request, routine service, unusual exposure (Explain).
3. Include the following information under "Sample Data":
 - A. Sample number - Use serial numbers of filter or collecting tube where applicable
 - B. Sampling location - Plant area, machine number, etc.
 - C. Sampling time - Total time of sampling period
 - D. Flow rate - Air flow rate of sampling instrument in LPM, CFM, etc.
 - E. Sampler position - Use the following abbreviations:
 - BZ - Breathing Zone
 - GA - General Area
 - P - Personal
 - F. Number of persons exposed - In vicinity of test
 - G. Exposure time - Total time employees are in sampled environment. Specify minutes or hours.
 - H. Type of controls - Local ventilation, respirators, etc.
 - I. Comments - Information which will further assist in evaluating exposure.

ENGINEERING INDUSTRIAL HYGIENE SURVEY DATA SHEET

-7-

THE TRAVELERS INSURANCE COMPANIES
HARTFORD, CONNECTICUT 06115

INSURER		LOCATION		DATE OF SURVEY				
Certain Teed Products		600 St. Cyr Road, St. Louis, Mo. 63137		3/13-14/73				
INSTRUMENTATION USED								
INSTRUMENT	MANUFACTURER	MODEL	SERIAL NUMBER	TIC NO.				
Permissible Air	Unico Environmental -	C-115	372, 386, 272	1-72, 2-72, 3-72				
Sampling Pumps (3)	Instruments, Inc.							
D. REASON FOR SURVEY								
Customer's Request								
A. SAMPLING MEDIUM								
0.8 Micron Membrane Filter - Open Face								
B. MATERIAL SAMPLED								
Asbestos Fiber								
C. ANALYSIS REQUIRED								
Asbestos Concentration								
SAMPLE DATA								
SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	FLOW RATE	SAMPLER POSITION	NUMBER OF PERSONS EXPOSED	EXPOSURE TIME	TYPE OF CONTROLS	COMMENTS
	Plant No. 3 - continued	Min.	LPM			Hr.		
693 A	Fittings Truck Driver	154	2.0	B.Z	1	7.4	Respirator	Implant & Out-plant Work
729 A	Tennant Mobile Sweeper	95	2.0	B.Z	1	7.4	None	Implant & Out-plant work
OFFICE		ENGINEER		SIGNATURE		DATE SIGNED		
St. Louis, Mo.		D. Bhatia, E/S		D. Bhatia		3/14/73		

INSTRUCTIONS

1. Use a separate sheet for each material sampled.
2. SPECIFY:
 - A. Sampling medium – For example, 0.6N acetic acid when sampling for TDI
 - B. Material sampled – For example, lead, asbestos
 - C. Analysis required – In the laboratory, for example – percent of free silica
 - D. Reason for survey – Customer request, routine service, unusual exposure (Explain).
3. Include the following information under "Sample Data":
 - A. Sample number – Use serial numbers of filter or collecting tube where applicable
 - B. Sampling location – Plant area, machine number, etc.
 - C. Sampling time – Total time of sampling period
 - D. Flow rate – Air flow rate of sampling instrument in LPM, CFM, etc.
 - E. Sampler position – Use the following abbreviations:
 - BZ – Breathing Zone
 - GA – General Area
 - P – Personal
 - F. Number of persons exposed – In vicinity of test
 - G. Exposure time – Total time employees are in sampled environment. Specify minutes or hours.
 - H. Type of controls – Local ventilation, respirators, etc.
 - I. Comments – Information which will further assist in evaluating exposure.

Engineering
INDUSTRIAL HYGIENE ANALYSIS REPORT

CHEMICAL, ENVIRONMENTAL &
PRODUCT EVALUATION UNIT

ANALYST'S NO. 142-73(3)	CUSTOMER Certain Teed Prod.	ADDRESS St. Louis
SAMPLE SENT BY Bhatia	DATE RECEIVED 3/16/73	DATE REPORTED 4/4/73
ANALYST		

MATERIAL ANALYZED

Asbestos, % Quartz, Total particulate

SAMPLE NUMBER	LOCATION	TEST RESULTS	THRESHOLD LIMIT VALUE (TLV)
722A	#1 Pipe machine - fiber feed	0.28 mg 356 L 0.79 mg/M ³ total particulate 1.08 fibers/ml 8% quartz	5 fibers/ml >5μ in length asbestos
732A	#2 Pipe machine - Fiber feed	3.37 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
709A	#2 Pipe machine - Fiber feed	0.32 mg 420 L 0.76 mg/M ³ total particulate 0.75 fibers/ml asbestos 3% quartz	5 fibers/ml >5μ in length asbestos
734A	Mezzane Clean-up man	0.35 mg 206 L 1.7 mg/M ³ total particulate 0.65 fibers/ml asbestos 20% quartz	5 fibers/ml >5μ in length asbestos
690A	Rework saw	3.46 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
695A	Rework saw	0.86 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
735A	Coupling saw	2.6 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos

ANALYTICAL METHOD

Gravimetry
Microscopy
Spectrophotometry

CTD017842

Engineering
INDUSTRIAL HYGIENE ANALYSIS REPORT

-9-

CHEMICAL, ENVIRONMENTAL &
PRODUCT EVALUATION UNIT

ANALYSIS NO. 142-73(3)	CUSTOMER	ADDRESS	
SAMPLE SENT BY	DATE RECEIVED	DATE REPORTED	ANALYST
MATERIAL ANALYZED			

SAMPLE NUMBER	LOCATION	TEST RESULTS	THRESHOLD LIMIT VALUE (TLV)
715A	Coupling saw	1.16 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
691A	Elbow blank saw	2.5 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
728A	Elbow blank saw	1.01 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
693A	Fittings truck driver	0.34 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos
729A	Tennant mobile sweeper	1.06 fibers/ml asbestos	5 fibers/ml >5μ in length asbestos

ANALYTICAL METHOD

CTD017843

FIELD ANALYSIS REPORT

CUSTOMER Certain Teed Products Corporation		LOCATION 600 St. Cyr Road, St. Louis, Mo. 63137
SERVICING ENGINEER S. Tuttle and D. Bhatia	SERVICING OFFICE St. Louis, Mo.	DATE OF SURVEY 3/13-14/73

SAMPLE NUMBER	LOCATION	TEST RESULTS	
		<u>Velocity fpm</u>	
		<u>Measured</u>	<u>Recommended</u>
	#1 Fiber Feed Hood	230	150
	#2 Fiber Feed Hood	175	150
	Moody Fluffer Hood	35	75
	Primary Scrap Crusher	90	100
	Re-Work Saw Hood	650	1000-1500
	Fines Weigh Scale:		
	6" away from hood	100	
	Under Weigh Hopper	0	100
	Coupling Saw Hood	1300	1000-1500
	Coupling Saw Stop Hood	430	1000-1500
	Elbow Blank Saw Hood	440	1000-1500
	Elbow Blank Flange Hood	390	1000-1500

INSTRUMENT USED

Alnor Velometer - 6000 P, TIC #8

CTD017844

MATERIAL SAMPLED

Exhaust Hood Velocities