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DATE: 1974 June 13

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TODD SHIPYARDS CORPORATION
LOS ANGELES DIVISION

DATE 7-24-78

FROM: RAY COURTOIS

TO: Cliff Jones

Here are the results of the tests, as
per our telephone conversation this date.

JUL 26 1978

Ray

	INITIAL	DATE
CEJ	8	7-27
AFC		
FHC		
EG	/	7-26
AD	/	7/28

FREDERIKSEN

ENGINEERING CO., INC.

EXECUTIVE CENTER BUILDING

1755 BROADWAY - OAKLAND, CA 94612

TELEPHONE AREA 415 452-3970 OR 465-0644



TODD SHIPYARD CORPORATION

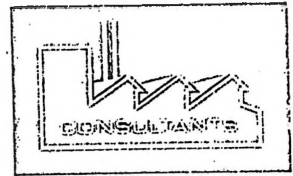
LOS ANGELES DIVISION

ASBESTOS FIBER SAMPLING

J - 669-1

Frederiksen Engineering Co., Inc.
Tishman Airport Center 6151 W. Century Blvd.
Los Angeles, Ca.

June 13, 1974



FREDERIKSEN ENGINEERING

J - 669-1

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TODD SHIPYARD CORPORATION

LOS ANGELES DIVISION

ASBESTOS FIBER SAMPLING

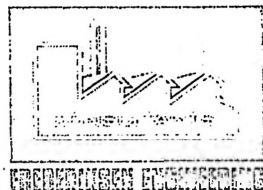
Frederiksen Engineering was engaged by Todd Shipyard Corporation to monitor concentrations of airborne asbestos particles at their Los Angeles shipyard. In accordance with Todd Purchase Order LA 27790, monitoring was undertaken to provide data for compliance with the Occupational Health and Safety Standards, 29 CFR 1910.93a "Asbestos." Monitoring took place May 22, 1974, in the Joiner Shop (6-samples) and the Hull Area (2-samples).

SUMMARY OF RESULTS

With the exception of one sample taken aboard ship, the results indicate that the concentrations of airborne asbestos fibers are within the current quantities allowed for ceiling or short-time concentration by OSHA standards. All samples indicate concentrations of airborne asbestos fibers are within the current quantities allowed for eight-hour exposures allowed. Complete results are tabulated at the end of this report.

DISCUSSION OF RESULTS

OSHA standards (29 CFR 1910.93a Asbestos) provide that no employee may be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air or more than 5 fibers per cubic centimeter on an 8-hour time-weighted average airborne concentration basis. The standards change as of July 1, 1976, to decrease the 8-hour



TODD SHIPYARD CORPORATION

LOS ANGELES DIVISION

ASBESTOS FIBER SAMPLING

Frederiksen Engineering was engaged by Todd Shipyard Corporation to monitor concentrations of airborne asbestos particles at their Los Angeles shipyard. In accordance with Todd Purchase Order LA 25336, monitoring was undertaken to provide data for compliance with the occupational health and safety standards, 29 CFR 1910.93a "Asbestos." Monitoring took place November 14, 1973, in the Joiner Shop (3-samples), the Hull 100 Area (2-samples) and the Pipe Shop (1-sample).

SUMMARY OF RESULTS

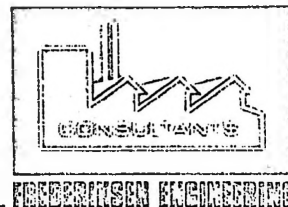
With the exception of the gasket cutting operation, sample results indicate that the concentration of airborne asbestos fibers is in excess of the quantity allowed for ceiling or short-time concentration by OSHA standards. Control of fiber emitted or personnel protection will be required.

Complete results are tabulated at the end of this report.

DISCUSSION OF RESULTS

OSHA standards (29 CFR 1910.93a Asbestos) provide that no employee may be exposed at any time to airborne concentrations of asbestos fibers in excess of

Todd Shipyard Corporation
June 13, 1974
J-669-1



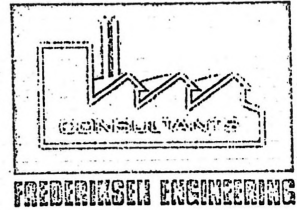
time weighted average to 2 fibers longer than 5 micrometers. The sampling method used does not specifically determine the ceiling concentration but does determine a very short time concentration. By sampling immediately before, during and after the generation of airborne particles, an indication of ceiling concentrations is obtained.

Test results indicate that the ceiling or short-time concentrations were exceeded during one sample period while cutting took place aboard ship. The other sample taken aboard ship indicates that compliance with the ceiling or short-time concentrations can be achieved using your existing method. The use of a hand-held suction device aboard ship does not provide consistent control. The difference in results points out the need for more positive control than currently exists aboard ship.

A shroud system should be made to fit the drill and sabre saw in order to capture the dust from the cutting operations before it has a chance to escape into the air. Consideration should also be given to the collection of asbestos dust on the side of the material opposite the drill or saw. Such a system of dust collection would lower the total asbestos in the hull and would also tend to minimize the peak concentrations.

All other stations sampled indicate compliance with the OSHA standards for both eight-hour and short-time or ceiling concentrations.

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RECOMMENDATIONS

The engineering solutions you have used in the joiner shop have been successful in controlling airborne asbestos particles. The use of shrouds or shields on board ship should result in complete compliance there.

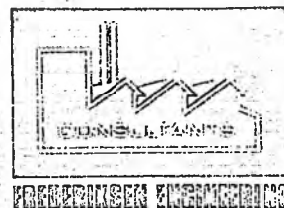
TEST METHOD

All testing was done in accordance with the standards outlined in OSHA Standard 29CFR 1910.93a Paragraph e.

Air from the breathing zone of an employee was drawn at 2.04 liter/minute through a millipore filter during and after the asbestos or marinite cutting operation. After 15 minutes, the air flow was shut off.

The samples were analyzed using phase contrast illumination.

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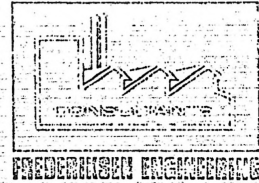


TODD SHIPYARD ASBESTOS MONITORING

Sample Number	Location - Circumstances of Sample	Number of Fibers Exceeding 5 Micrometers in Length	
		Actual No. Measured	Predicted No. for 8-Hr. Per Under Actual Working Cond.
1	Joiner Shop - Panel Saw	0.5	Same
2.	" "	1.6	"
3.	" "	1.3	"
4.	" "	3.1	"
5.	" "	0.6	"
6.	Joiner Shop - Skill Saw	1.0	"
7.	On Board - Drill/Sabre Saw	2.6	1.3 ¹
8.	" "	13.9 ²	6.9 ¹

¹ Based on letter of November 15, 1973.

² In excess of ceiling or short-time concentrations allowed by OSHA.



TODD SHIPYARD CORPORATION

LOS ANGELES DIVISION

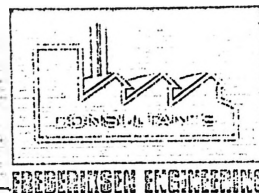
ASBESTOS FIBER SAMPLING

J - 669

Frederiksen Engineering Co., Inc.
Tishman Airport Center 6151 W. Century Blvd.
Los Angeles, Ca. 90045

Dec. 5, 1973

Todd Shipyard Corporation
December 5, 1973
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10 fibers, longer than 5 micrometers, per cubic centimeter of air or more than 5 fibers per cubic centimeter on an 8-hour time-weighted average airborne concentration basis.

The sampling method used does not specifically determine the ceiling concentration but does determine a very short time concentration. By sampling immediately before, after and during the generation of airborne particles, an indication of ceiling concentrations is obtained.

Test results indicate that ceiling concentrations were definitely exceeded in the Hull 100 Area and in the Joiner Shop when no control was used. The 8.2 fibers per cubic centimeter measured in the Joiner Shop when using a saw with a vacuum attachment, indicated that the upper limit of 10 fibers was probably exceeded during the period when actually cutting.

The fiber concentration at the asbestos gasket cutting operation was well below both the maximum allowable and 8 hour exposure limits.

The results show that a person witnessing a marinite cut in the Joiner Shop or entering the Hull Area of a ship where marinite has recently been cut probably has exposed himself to a level of asbestos fibers greater than allowed by the standards.

Since the eight-hour time-weighted average is only applicable when the maximum concentration is less than 10 fibers per cubic centimeter, controls or personnel protection must be provided at all areas, except at the gasket cutting machine, regardless of the duration of exposure.

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RECOMMENDATIONS

The OSHA standards are such that there are two ways to meet the compliance regulations. The first is to control the fibers at the source using vacuums, ventilation, and special tools or handling the asbestos fibers wet. The second method is to let the fibers get into the environment and control personnel exposure by respirators, special clothing, change rooms, lockers and medical examinations.

The regulations specify that the exposure limits shall not be achieved by the use of respirators or shift rotation except during the time of installation of engineering controls and in situations where engineering controls are technically infeasible or feasible to an extent that is insufficient to reduce the concentrations below the prescribed limits. The key words are "technically infeasible" which at this juncture have not been well defined.

We believe that controlling airborne asbestos in the Joiner Shop by engineering methods is technically feasible; controlling the fibers aboard the ship by engineering methods may be technically feasible. We believe that a combination of engineering and hygienic controls could be developed to satisfy the OSHA requirements aboard ship.

In the interim between now and the time engineering controls are installed, we recommend the following steps:

Joiner Shop

- 1) Limit personnel entering the Joiner Shop to those with approved respirators.

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- 2) Provide separate change facilities and clothes as required.
- 3) Install self-closing doors between Joiner and Planner Shops.
- 4) Eliminate or partition off the storage area in the Joiner Shop.
- 5) Vacuum asbestos particles during cleanup.

Hull Area

- 1) Limit personnel in room during marinite installation to those with respirators.
- 2) Vacuum asbestos dust at each shift termination.

FINAL ENGINEERING SOLUTIONS

Joiner Shop

- 1) Permanent dust collection system should be installed on all tools. Dust collection system should terminate in a baghouse mounted outside the building.
- 2) Install mechanical ventilation system to draw in air from the outside and ventilate.

Hull Area-

- 1) Acquire portable dust collection system to be placed on ship during marinite installation. Each tool should be connected to the vacuum system. System should exhaust through a baghouse to the outside of the ship.

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- 2) Acquire portable ventilation system to exhaust at high volume the air in the cabin where marinite is being installed. Exhaust must be to the outside of the ship away from personnel.

TEST METHOD

All testing was done in accordance with the standards outlined in OSHA Standard 29CFR 1910.93a Paragraph e.

Air from the breathing zone of an employee was drawn at 2.04 liter/minute through a millipore filter during and after the asbestos or marinite cutting operation. After 15 minutes, the air flow was shut off.

The samples were analyzed using phase contrast illumination.

AIR CONTAMINATION SURVEY OF ASBESTOS

TODD SHIPYARDS CORPORATION
LOS ANGELES DIVISION
P.O. BOX 231
SAN PEDRO, CALIFORNIA

Prepared by:

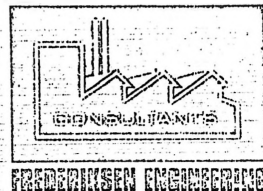
ROY E. NUTTER
ENGINEERING REPRESENTATIVE
THE TRAVELERS INSURANCE COMPANY

January 10, 1975

Distribution

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Engineering, Seattle

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TODD SHIPYARD ASBESTOS MONITORING

Sample Number	Location/Circumstances of Sample	Number of Fibers Longer Than 5 Microns per Cubic Centimeter	
		Actual Measured	Predicted Time Weighted Average Concentration 1, 2
1.	Joiner Shop-skill saw with vacuum attachment operating	8.2	1.0 ³
2.	Joiner Shop - skill saw	71.8	N. A.
3.	Joiner Shop - panel saw	82.8	N. A.
4.	Hull 100 - cargo officers quarters - various hand tools	22.8	N. A.
5.	Hull 100 - cargo officers quarters - various hand tools twice the number of operations as sample 4	51.9	N. A.
6.	Pipe Shop - gasket cutting machine	0.4	0.2

- (1) Predicted exposure level is based on personnel working in the asbestos or marlinite cutting activities for the time periods stated in Todd letter dated November 15, 1973. Personnel would then not be exposed to work involving the handling of marinite panels or working where airborne asbestos is present.
- (2) N. A. indicates not applicable due to maximum concentration being exceeded.
- (3) This value may not be applicable since maximum concentration was probably exceeded during period of actual cutting.

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I INTRODUCTION

On November 13, 1974, an Air Sampling Survey for Asbestos was conducted at Todd's San Pedro Shipyard. The survey was conducted at the request of Mr. Ray Courtois, Director of Industrial Insurance, Safety Engineer, for the purpose of determining employee exposure levels.

It was indicated that there were two primary areas of concern; panel cutting in the Joiner Shop and installation aboard ship. It was further indicated that the shipboard activities consisted of short-term intermittent work.

II SUMMARY

Samples were taken in the Joiner Shop to determine both peak and time-weighted average concentrations during the panel sawing operation. The employees wore personal respiratory protective equipment during the actual sawing operation. The time-weighted average concentrations found were below the permissible limit, however, the peak concentration exceeded the ceiling values.

There was no hull activity, involving asbestos, on the day of our survey. To obtain some indication of concentrations aboard ship, these activities were simulated in the Joiner Shop. The simulations were judged by observers to generate higher concentrations of asbestos than was normal aboard ship. The concentrations found were above the permissible levels on a time-weighted average basis. The results for the simulated drilling and knife cutting are below the ceiling values, but the concentration during saber-saw cutting was more than three times larger than the ceiling value.

All of the results from the simulation indicate the need to sample during actual shipboard insulation.

III CONCLUSIONS and RECOMMENDATIONS

1. Asbestos Fiber Concentration

During the actual cutting of panels in the Joiner Shop may be an excessive employee exposure. Personal protective equipment is worn.

2. Average Asbestos Fiber Concentration

The average asbestos fiber concentration in the Joiner Shop (except during actual cutting) does not represent an excessive employee exposure.

III CONCLUSIONS and RECOMMENDATIONS (Cont'd.)

3. Asbestos Fiber Concentration During Simulated Saber-Saw Cutting

Asbestos fiber concentration during simulated saber-saw cutting indicates an excessive employee exposure.

4. Asbestos Fiber Concentration During Simulated Drilling

Asbestos fiber concentration during simulated drilling indicates possible excessive employee exposure.

5. Asbestos Fiber Concentration During Simulated Knife Cutting

Asbestos fiber concentration during simulated knife cutting indicates possible excessive employee exposure.

RECOMMENDATIONS

74-1 To better establish employee exposure to asbestos, additional asbestos sampling should be done aboard ship during actual installation activities.

74-2 To prevent excessive employee and public exposure to asbestos, the precautions outlined in Title 8 (California's General Industry Safety Orders), Section 5208, should be met regarding the following:

1. Engineering controls.
2. Work practices (including disposal).
3. Respiratory protective equipment.
4. Change rooms and special clothing.
5. Laundering.
6. Monitoring and record keeping.
7. "Caution" signs.
8. "Caution" labels.
9. Medical examinations.

IV DISCUSSION

Sampling

The actual sampling time and data regarding the collection of the samples are given in the attached Industrial Hygiene Survey Data Sheet. In the column marked "Sampler Position" the abbreviation "P", "B2", are used. These stand for the position of the instrument and the type of sample taken.

IV DISCUSSION (Cont'd.)

Sampling - Continued:

The personal samples, designated by "P", were taken by attaching the sampling pump to the employees. These samples represent the best average of what the employee is exposed to. The personal sample (509D), taken during actual panel cutting, was collected during most of the morning. This is a repetitive operation involving the same set-up, equipment, physical layout, etc., and therefore, this sample should give a good indication of what exposure exists for the entire day or any other time duration.

The "BZ" samples were taken so as to approximate the peak exposures during short-term operations that were likely to effect the asbestos fiber concentration.

The "BZ" sample 495D was taken when the skill saw was actually being used to cut the panels. The sample was taken by holding the filter as close as practical (6 to 12 inches) from the saw operator's nose and mouth. Sampling was begun when the saw was started, and ceased when the saw was stopped. We followed this procedure during the cutting of 15 panels (30 cuts). Notice that the actual sampling time for these cuts was only 4.8 minutes. This is because we started and stopped our timing (using a stop-watch) so as to record the actual sampling time.

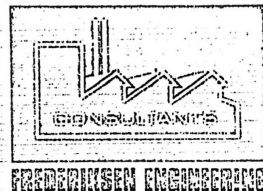
The three "BZ" samples taken during simulated knife cutting, simulated drilling, and simulated saber-saw cutting were intended to give some approximate indication of what conditions were like aboard ship. These samples were taken using a high-volume sampler running at 8.9 LPM. This equipment was used because we were not sure of how low the concentration would be and wanted to guarantee that sufficient samples were collected for analysis. The normal sampling technique to evaluate peak levels of asbestos is through the use of a 2.0 LPM flow rate. Since these were simulated conditions, we chose to reduce the sampling time needed to obtain a significant sample by using the higher flow rate. The sampler position was an approximation of the breathing zone, however, the sampler was not moved as the operator's position changed.

Analysis

The laboratory analysis of the samples is given on the Industrial Hygiene Analysis Report. The sample numbers coincide with the Industrial Hygiene Survey Data Sheet. The "Test Results" column shows the material tested for, and the calculated concentration in fibers per cubic centimeter.

Cal/OSHA Standards, as provided in Title 8 of the California General Administrative Code, Section 5208, of the General Industry Safety Orders explains the permissible levels of exposure to asbestos. This Section states:

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TODD SHIPYARD ASBESTOS MONITORING

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- 2) Provide separate change facilities and clothes as required.
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- 4) Eliminate or partition off the storage area in the Joiner Shop.
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Hull Area

- 1) Limit personnel in room during marinite installation to those with respirators.
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FINAL ENGINEERING SOLUTIONS

Joiner Shop

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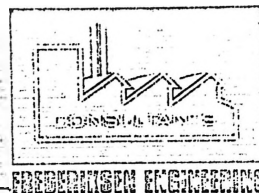
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10 fibers, longer than 5 micrometers, per cubic centimeter of air or more than 5 fibers per cubic centimeter on an 8-hour time-weighted average airborne concentration basis.

The sampling method used does not specifically determine the ceiling concentration but does determine a very short time concentration. By sampling immediately before, after and during the generation of airborne particles, an indication of ceiling concentrations is obtained.

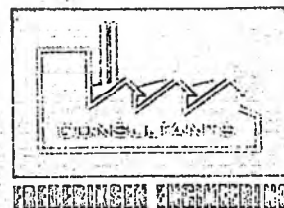
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The results show that a person witnessing a marinite cut in the Joiner Shop or entering the Hull Area of a ship where marinite has recently been cut probably has exposed himself to a level of asbestos fibers greater than allowed by the standards.

Since the eight-hour time-weighted average is only applicable when the maximum concentration is less than 10 fibers per cubic centimeter, controls or personnel protection must be provided at all areas, except at the gasket cutting machine, regardless of the duration of exposure.

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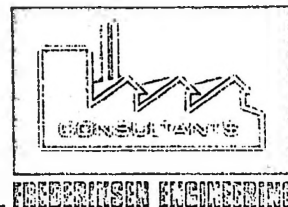
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¹ Based on letter of November 15, 1973.

² In excess of ceiling or short-time concentrations allowed by OSHA.

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