

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
CENTER FOR DISEASE CONTROL  
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

HEALTH HAZARD EVALUATION No. 78-97-559  
HOMESTAKE FOREST PRODUCTS  
SPEARFISH, SOUTH DAKOTA

JANUARY 1979

I. TOXICITY DETERMINATION

It has been determined that the wood dust present in the sawmill and planer mills is not toxic as used or found. This is based on 38 eight-hour time weighted average wood dust samples which were all 15% or less of the evaluation criteria of 5 mg of wood dust per cubic meter of air, and that only one of 38 workers stated that he had an adverse health effect (stuffy nose) when working a particular job.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this complete Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Homestake Forest Products, Spearfish, South Dakota.
2. United Steelworkers of America, Local 7044, Lead, South Dakota.
3. U.S. Department of Labor, Occupational Safety and Health Agency (OSHA) Region VIII, Denver, Colorado.

For the purpose of informing the "affected employees," the employer will promptly "post" this Determination Report in a prominent place(s), near the work area of the affected employees for a period of thirty (30) calendar days.

### III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following receipt of a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health received such a request from the authorized representative of the United Steelworkers of America, Local 7044, to determine if the wood dust present in the sawmill and planer mill was toxic as used or found.

### IV. HEALTH HAZARD EVALUATION

#### A. Description of Process - Conditions of Use

##### 1. Sawmill

The sawmill cuts pine logs into rough sawn dimensional lumber. The logs are sorted in the yard, debarked and proceed to the head rig where they are cut into boards and cants. The lumber removed at the first grading point proceeds to the gang saw where it is cut into dimensions. From there the lumber is separated with some proceeding directly to the trim saw and the remainder passing to the edger and then on to the trim saw. The trim saw cuts the lumber into specific lengths. After the trim saw it is automatically sorted according to the dimensions. The excess wood that is cut off at each operation is conveyed to the chipper where it is chipped into small chips. Wood dust is emitted from each of the cutting operations listed above. There are 60 employees, 30 on each of the 2 shifts in the sawmill.

##### 2. Planer Mill

Rough sawn dimensional pine lumber is brought into the planer mill for planing. The lumber is passed through a planer, is graded, trimmed to various lengths, and sorted according to grade and length. Wood dust is emitted from the planer and the trim saw. There are 18 employees on day shift and 14 on night shift in the planer mill.

B. Evaluation Design

1. General

The survey was conducted on August 1 and 2, 1978. The environmental sample results (Tables 1 and 2) were sent to the company and the union on November 27, 1978.

2. Environmental Sampling

The sampling was designed to determine the pine wood dust 8-hour time weighted average exposure of the employees in the sawmill and planer mill. This is normally accomplished by collection of the dust in the breathing zone of the workers whereby a small battery operated sampling pump is attached to the belt and the filter is attached to the shirt lapel. The company officials felt that this created a safety hazard and would not permit this type of sampling. In lieu of this, area samples were collected. The sampling filters were placed near the employees' work stations. In most cases, the filters were between the dust source and the employee, but in some instances, this was not possible.

3. Medical

A questionnaire was administered by a physician's aide to 38 sawmill and planer mill workers during the work shift. The questionnaire consisted of an occupation history, the employee's history of coughing, phlegm, breathlessness, wheezing, nasal drainage, chest and lung illnesses and smoking history.

C. Evaluation Method - Environmental

The sampling method consisted of collection of total wood dust samples on tared vinyl metricel filters using closed face cassettes at a flow rate of 1.9 liters per minute. The filters were weighed as received by the laboratory to determine the total weight gain.

D. Evaluation Criteria

The evaluation criteria used in this evaluation is the criteria established by the American Conference of Governmental Hygienists (ACGIH) Threshold Limit Values (TLV) for Chemical Substances and Physical Agent in the Workroom Environment for 1978. The criteria is an 8-hour time weighted average concentration limit of 5 mg of nonallergenic wood dust per cubic meter of air and/or a fifteen

minute short term limit of 10 mg/cubic meter. The U.S. Department of Labor (OSHA) has no specific standards for wood dust.

The health effects from exposure to wood dust concerns four categories: cancer, dermatitis, respiratory disease and miscellaneous. Cases of carcinoma of the nasal cavity and accessory sinuses have been reported to occur among cabinet and chair makers and wood machinists in the furniture industry in Great Britain. Carpenters and jointers not employed in the furniture industry appear to have no increased risk.(1)

Allergenic woods, such as certain members of the pine family, may cause allergic manifestations, including asthma and contact dermatitis in sensitized individuals.(2)

Pine wood contains a variety of small amounts of organic materials, such as alcohol, ketones, pinenes, terpenes, resin acids, etc., and thus may produce irritation of the respiratory tract.

#### E. Evaluation Results and Discussions

The results of the wood dust samples collected in the sawmill are shown in Table 1, and those collected in the planer mill are shown in Table 2. All the samples were general area samples. The reason for the general area samples in lieu of breathing zone samples is stated in Section B-2, Page 3.

Seventeen samples of wood dust (total particulates) were collected in the sawmill (chipper excluded) over two shifts. The concentrations ranged from 0.07 to 0.76 mg/cu m of air, with a mean of 0.45 and a median of 0.44 mg/cu m. The concentrations of the six wood dust samples from the chipper area had a range of 0.03 to 0.13 mg/cu m of air with a mean of 0.08 and a median of 0.08 mg/cu m.

Fifteen samples of wood dust (total particulates) were collected in the planer mill. The concentrations ranged from 0.15 to 0.46 mg/cu m of air with a mean of 0.32 and a median of 0.32 mg/cu m.

The concentrations in the sawmill were 15% or less of the evaluation criteria of 5 mg/cu m; in the chipper, they were less than 1% of the evaluation criteria; and in the planer mill, they were less than 10% of the evaluation criteria.

Although the samples were general area rather than breathing zone samples, they were fairly representative of the workers' exposure, as most of the sample locations were between the worker and the source of the wood dust.

Thirty-eight workers were administered a questionnaire. Eighteen of the 38 had no positive response to any of the questions regarding adverse health effects. Six (2 smokers, 4 nonsmokers) stated that they have stuffy noses and nasal drainage in the winter; one, a smoker, coughs during the day; one, a smoker, has phlegm in the winter and some occasional wheezing; eleven (7 smokers, 4 nonsmokers of whom 3 were former smokers) had symptoms of coughing, occasional phlegm, occasional wheezing and shortness of breath when hurrying in level ground or when going uphill. Only one individual, a nonsmoker, stated that when he operates the trim saw in the sawmill, he gets a stuffy nose. The symptoms experienced by the others were occasional or seasonal, many were consistent with their smoking history and they were not correlated to wood dust exposure.

It is concluded that the employees' exposure to pine wood dust is not toxic as used or found in the sawmill and planer mill. This is based on the environmental measurements which were all less than 15% of the evaluation criteria, and that only 1 of 38 workers stated that he had an adverse health effect when exposed to wood dust on a particular job.

F. Recommendation

1. Employee exposure to wood dust should be measured on a periodic basis. Records should be maintained for all sampling schedules. Each employee should be able to obtain information on his own environmental exposures.
2. If a worker experiences adverse health effects from his exposure to wood dust on a particular job, efforts should be made to place him in a job where the wood dust exposure is reduced.
3. Dust levels should be maintained at or less than the concentrations measured to prevent future adverse health effects.
4. NIOSH approved respirators for use against wood dust should be provided to those who desire to wear them.

V. REFERENCES

1. Documentation of the Threshold Limit Values for Substances in Workroom Air. Third Edition - American Conference of Governmental Industrial Hygienists.
2. Occupational Diseases, A Guide to Their Recognition. June 1977, U.S. Department of Health, Education, and Welfare, PHS, CDC, NIOSH.

VI AUTHORSHIP AND ACKNOWLEDGMENTS

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TABLE 1  
RESULTS OF WOOD DUST SAMPLES  
TOTAL PARTICULATE CONCENTRATIONS

SAWMILL

Homestake Forest Products  
Spearfish, South Dakota

HHE 7β-97

SAMPLE LOCATION+	DATE	SAMPLE NUMBER	SAMPLE TIME MINS.	SAMPLE VOL. LITERS	CONCENTRATION TWA * mg/cu m**
In head sawyer booth	8-1-78	910	481	914	0.15
"	8-2-78	945	495	941	0.18
By head rig off-bearer	8-1-78	897	477	906	0.61
"	8-2-78	924	495	941	0.60
3' from gang saw #1	8-1-78	931	467	887	0.41
"	8-2-78	926	494	939	0.75
Down from gang saws 30'	8-1-78	930	472	897	0.32
"	8-2-78	938	487	925	0.58
By chipper-edger controls	8-2-78	899	493	937	0.30
Near lumber sorter operator, before edger	8-2-78	927	488	927	0.53
At edger controls	8-1-78	895	475	903	0.44
"	8-2-78	929	496	942	0.64
By upper trim saw (16')	8-1-78	896	462	878	0.65
"	8-2-78	906	491	933	0.76
By lower trim saw (20')	8-1-78	928	458	870	0.38
"	8-2-78	901	489	929	0.29
Near sorter after trim saw	8-1-78	886	456	866	0.07
Chipper, ground floor	8-2-78	943	500	950	0.06
Chipper, first deck	8-1-78	947	483	919	0.08
"	8-2-78	923	499	948	0.03
Chipper, second deck	8-1-78	922	482	916	0.11
"	8-2-78	925	498	946	0.13
Chipper, third deck	8-1-78	913	481	914	0.08

+ All samples were area samples due to company policy. They felt that the wearing of sampling pumps by employees constituted a safety hazard.

\* TWA - Time Weighted Average

\*\* mg/cu m - milligrams of substance per cubic meter of air.

TABLE 2  
RESULTS OF WOOD DUST SAMPLES  
TOTAL PARTICULATE CONCENTRATIONS

PLANER MILL

Homestake Forest Products  
Spearfish, South Dakota  
HHE 78-97

SAMPLE LOCATION+	DATE	SAMPLE NUMBER	SAMPLE TIME MINS.	SAMPLE VOL. LITERS	CONCENTRATION TWA * mg/cu m**
#1 Planer, between Planer and Feeder	8-1-78	954	502	954	0.34
#1 Planer, at operator's control panel	8-2-78	951	505	960	0.30
Inside #1 Planer housing	8-1-78	916	502	954	0.29
"	8-2-78	932	505	960	0.15
By #2 Planer operator	8-1-78	912	496	942	0.46
"	8-2-78	887	500	950	0.39
Inside #2 Planer housing	8-1-78	915	496	942	0.44
"	8-1-78	888	500	950	0.29
By Grader, approx. 30 ft. from trim saw	8-1-78	909	500	950	0.26
"	8-2-78	919	497	944	0.26
By trim saw operator	8-1-78	934	490	931	0.42
"	8-2-78	920	495	941	0.45
By Planer chain, approx. 10 ft. from trim saw	8-1-78	933	490	931	0.32
By Planer chain, approx. 80 ft. from trim saw	8-1-78	939	488	927	0.42
"	8-2-78	935	493	937	0.30

All samples were area samples due to company policy. They felt that the wearing of sampling pumps by employees constituted a safety hazard.

\* TWA - Time Weighted Average

\*\* mg/cu m - milligrams of substance per cubic meter of air.