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The State of Wisconsin

WISCONSIN STATE BOARD OF HEALTH
INDUSTRIAL HYGIENE DIVISION
STATE OFFICE BUILDING
1 WEST WILSON STREET
MADISON 2

WELDROCK DUST STUDY

Plant: Algoma Plywood and Veneer Company

Location: Algoma, Wisconsin (Plant No. 2)

Date of Study: June 18, 1956

Officials Contacted: Mr. G. R. Mercer, Superintendent
Mrs. Gertrude G. Price, R.N., Plant Nurse

A study was made March 19, 1956, in this plant with the assumption that the air-borne dust contained less than 50% free silica, resulting in a "Medium" free silica dust. "Medium", according to Threshold Limit Values, refers to dusts containing from 5% to 50% free silica. "Low" is less than 5% and "High" is over 50%.

To specifically determine the free silica content of air-borne dust around weldrock operations, a gross air sample was taken on the second floor of Plant No. 2 in the visinity of the Veneer. The gross air sample represented a continuous sampling of the air for 3 hours, at the rate of about 20 cubic feet per minute. The dust was collected on a layer of salicylic acid crystals and sent to the U. S. Public Health Service for analysis. The result of the analysis is shown in Table I.

Table I

COMPOSITION OF AIR-BORNE DUST AT WELDROCK OPERATIONS

Free Silica	9.3%
Asbestos	10.3%

Midget impingers were used in collecting atmospheric dust samples for the purpose of determining the number of dust particles in the air around various operations on Weldrock in Plant 2. Normal propyl alcohol was the collecting medium and dust counts were made using the light-field microscopic technique. Summer conditions existed during the course of air sampling, in that an appreciable amount of natural ventilation was provided through open windows.

The results of the dust counts are given in Table II.

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Table II

ATMOSPHERIC DUST CONCENTRATIONS

Sample No.	Location and Description	Millions of Particles Per Cubic Foot of Air
	FIRST FLOOR, 1:45 to 2:45 P.M.	
1.	B.Z. (Breathing Zone) Drum Sander operator. Feed end. North side.	4.2
2.	B.Z. Drum Sander operator. Feed end. South side.	1.7
3.	B.Z. Drum Sander operator. Feed end. East side.	4.3
4.	G.A. (General Atmosphere) 10' from feed end of drum sander.	2.8
5.	B.Z. Drum Sander operator. Off-bearing end. North side	3.6
6.	B.Z. Drum Sander operator. Off-bearing end. West side.	6.5
7.	B.Z. Drum Sander operator. Off-bearing end. North side.	8.1
8.	G.A. 20' Northwest of belt sander.	2.7
	SECOND FLOOR, 3:00 to 4:00 P.M.	
9.	B.Z. Straight line rip saw. Feed end.	1.7
10.	" " " " " " Off-bearing end.	2.0
11.	B.Z. Tenoner. Off-bearing end.	1.6
12.	B.Z. Tenoner. Off-bearing end.	3.6
13.	B.Z. Tenoner. Feed end.	5.3
14.	B.Z. Tenoner. Feed end.	2.5
15.	G.A. End of room occupied by Tenoner	2.0
16.	G.A. " " " " " "	0.6

SUMMARY

From the results of the analysis of the gross air sample (Table I), it was decided to use 20 million particles per cubic foot of air as the M.A.C. (Maximum Allowable Concentration) for the air-borne dust in the vicinity of weldrock operations. This value is the same as the value that was assumed in the March, 1956 study, from information on a previous analysis made on Kalo dust in the collector system.

From the free silica content standpoint, it is seen that the 5.3% value is on the conservative end of the 5% to 50% free silica content range assigned to "Medium" silica dusts. In other words, the "Medium" and "High" ranges are very broad (5% to 50% and 50% to 100% respectively). Thus a dust containing 30% free silica would still be classed as a "Medium" silica dust, the same as a dust containing 5.3% free silica. It stands to reason, however, that in equal concentrations the 5.3% free silica dust would present less of a health hazard than the 30% free silica dust. Technically, a 4.7% free silica dust would have an M.A.C. of 50 m.p.p.c.f. (50 million particles per cubic foot of air) although physiologically there would probably be no difference between 4.7% and 5.3%. We would conservatively give the 4.7% free silica dust an M.A.C. of 20 m.p.p.c.f., since these ranges are not treated as sharp lines of distinction.

By the same token, the M.A.C. value for asbestos dust is 5 m.p.p.c.f. The analysis shows 10.3% asbestos in the air-borne dust. An M.A.C. value of 20 m.p.p.c.f. is again on the conservative side.

The atmospheric dust concentrations listed in Table II, range from a high of 8.1 m.p.p.c.f. to a low of 0.6 m.p.p.c.f., and are all under the M.A.C. value of 20 m.p.p.c.f. It should be remembered, however, that this study was made under summer conditions. When natural ventilation is at a minimum, an occasional operation will tend to produce atmospheric dust concentrations which are above the 20 m.p.p.c.f. threshold limit (See March, 1956 study).

LOCAL EXHAUST VENTILATION SYSTEMS

Each machine operating on weldrock is equipped with local exhaust ventilation hoods of varying design. These hoods appear to be doing a satisfactory job. It should be remembered, however, that an exhaust system having a bag collector becomes less efficient as the collected material in the bag offers more and more resistance to air flow into the hood. Thus, unless the bag collectors are automatically cleaned or "rapped", they should be cleaned before air flow is appreciably diminished.

In observing the performance of the exhaust hoods, it was felt that high atmospheric dust concentrations around an operation would in most cases not be as much a reflection upon the exhaust hood as upon the material handling before and after processing. Piling of finished panels on hand trucks and other similar operations appeared to be as much, if not more, of a dust source than the actual sanding or sawing.

RECOMMENDATIONS

The following recommendations are made on the basis of conditions existing during the March and June 1956 studies.

1.) It is recommended that the local exhaust systems be maintained in such a manner that maximum efficiency is realized. It is felt that the low atmospheric dust concentrations under summer conditions, and fairly low dust concentrations under winter conditions are due primarily to the local exhaust systems.

2.) Some consideration should be given to the handling of the weld-rock panels, as well as scrap handling and sweeping, to keep the dust dispersion at a minimum.

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