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Machining of Marinite

KAISER ALUMINUM & CHEMICAL CORPORATION
INTER-OFFICE MEMORANDUM

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TO: J. D. Fandal
AT: Chalmette

DATE: March 9, 1961 TROMMERHAUSEN

CC: J. O. Presley
A. J. Trommerhausen
E. H. Lutton
L. J. McAdams
M. O. Scheuermann
W. F. Lienhard, M.D.

FROM: R. S. McIlintock

AT: Chalmette

SUBJECT: Dust Hazards from Asbestos in
the Machining of Marinite

Marinite is a manufactured material containing a large percentage of asbestos. This material is received on the plant site in large sheets measuring 4' x 8' in varying thicknesses from 1/2" to 2". These large pieces of Marinite are first cut into pieces of approximately 2' x 4' and placed in a curing oven. These smaller pieces of Marinite are then cut into a variety of still smaller sizes and subsequently machine-cut to a desired shape. Typical woodworking machinery such as table saws and band saws are used to cut the Marinite. Drill presses equipped with router bits, hole cutters and special forming tools are used to form the finished product. Bench operations such as filing and hand sanding are occasionally required.

The finished product consists of a variety of different sized and shaped objects for use in the Metal Products Department to control the flow of molten metal in the casting operations.

Severe dust concentrations are generated when the larger pieces of Marinite are cut on the table saw. The forming and shaping operations on the Marinite when the drill presses are employed also produce large volumes of dust.

I. ATMOSPHERIC SAMPLING & DUST COUNTING PROCEDURE

- A. Dust samples were collected in midjet impingers at a sampling rate of 2.55 liters of air per minute (.089 cubic feet) over a five minute period. Distilled water containing an aerosol wetting agent was used as the dust collecting medium.
- B. The dust samples were counted employing standard dust counting techniques. Only those particles having the characteristic rod shaped appearance of asbestos were counted.

II. EVALUATION

- A. Dust samples #1, #2 and #3 were collected while Marinite was being cut into blocks approximately 2" square and 24" long on an 8" table saw.
 1. Sample #1. Sample taken in the breathing zone of the saw operation. Large volumes of dust discharging from the saw blade were visible in cloud form. The dust cloud did not, however, visually engulf the saw operation breathing zone. Dust count as asbestos was 24.8 million particles per cubic foot of air.

1. Primary dust source at the drill press operation is the scrap saws where large pieces of Marinite are thrown or dropped and where Marinite dust which remains trapped in concave sections of the finished pieces are tapped out.
2. Because of the large variety of shapes made from Marinite, exhaust hoods for the drill presses do not exist for some drill press operations or they are ineffective. Although dust samples were not taken, under the above circumstances, it is apparent from observation that when drill press operations are performed without local exhaust ventilation or with ineffective hooding and exhaust, large dust clouds are generated and a hazardous dust condition exists.

IV. RECOMMENDATIONS

- A. Exhaust ventilation should be provided for the table saw operations and the drill press operations involving Marinite.
 1. Local exhaust ventilation on the table saw may be difficult to design to provide effective dust control and simultaneously retain the multi-purpose characteristics of the table saw. In the event that effective dust control cannot be achieved by local exhaust ventilation, the saw operator and his helper would be required to wear respiratory protective equipment during the sawing operations and further dust studies would be required to determine dust loads in the general area.

2. A combination of local exhaust ventilation and an exhausted booth to enclose the table saw would provide maximum control and insure that the dust would not contaminate the surrounding work areas.
3. Some of the present drill press operations are currently effectively controlled by existing exhaust hoods. Operational and Engineering studies are required to add or improve the exhaust system and hoods for operations not presently controlled.
4. Exhaust ventilation should be extended to provide control of dust generated at the scrap cans located near each drill press.
5. A laboratory type hood should be provided where bench work such as hand sanding and filing of Marinite is performed.
6. Should it be impractical or impossible to provide improved ventilation of the Marinite operations within the next 60 to 90 days, it is then recommended that a program be initiated requiring all Carpenter Shop employees to wear approved type respiratory protective equipment.
7. The Medical Department should be advised by the Department Supervisor of completion of any exhaust system installed in conjunction with the Marinite operations in order that further dust studies can be made to determine the effectiveness of the system.

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2. Sample #2. General air sample taken in the vicinity of north east corner of the Carpenter Shop approximately 50' from the table saw. Visible dust haze issuing from the saw filled a major portion of the room while this sample was being taken. Dust count as asbestos was 22.2 million particles per cubic foot of air.
3. Sample #3. Sample taken in the breathing zone of a drill press operator performing operations on Marinite approximately 15' to the rear and west of the table saw. Visible dust haze filled a major portion of room but did not appear to engulf the area in which this sample was taken. Dust count as asbestos was 8.5 million particles per cubic foot of air.

The foreman responsible for the area, upon questioning, reported that the visible dust haze which existed in the room at the time the above samples were taken was typical of conditions which exist during the table saw cutting of Marinite.

- B. Samples #4 and #5 were collected on the day following the first three samples. The table saw and band saw had been used for about 10 minutes to cut Marinite approximately 1-1/2 hours prior to the time samples #4 and #5 were collected.

1. Sample #4. Sample taken in breathing zone of drill press operation forming Marinite with cone-shape cutters. No visible dust haze in room. Dust count as asbestos was 1.77 million particles per cubic foot of air.
2. Sample #5. Sample taken in breathing zone of drill press operation cutting Marinite with circular cutter approximately 3" in diameter. No visible dust haze in room. Dust count as asbestos was 2.22 million particles per cubic foot of air.

III. CONCLUSIONS

Asbestos is recognized as a harmful dust. When inhaled and deposited in the lungs, this dust produces the disease Asbestosis. The maximum allowable concentration for asbestos dust as established by the American Conference of Governmental Industrial Hygienists is 5 million particles per cubic foot of air.

- A. Extremely high and hazardous dust concentrations are generated when Marinite is being cut on the table saw. The dust generated during this operation is distributed in hazardous concentrations throughout the room (Carpenter Shop). This operation may be performed several times per week with a duration of 1/2 to 4 hours depending on need.
- B. The drill press operations which were studied without the table saw simultaneously in operation generated dust in non-hazardous quantity. Observations made during the collection of the dust samples and during random visits to the area indicate: