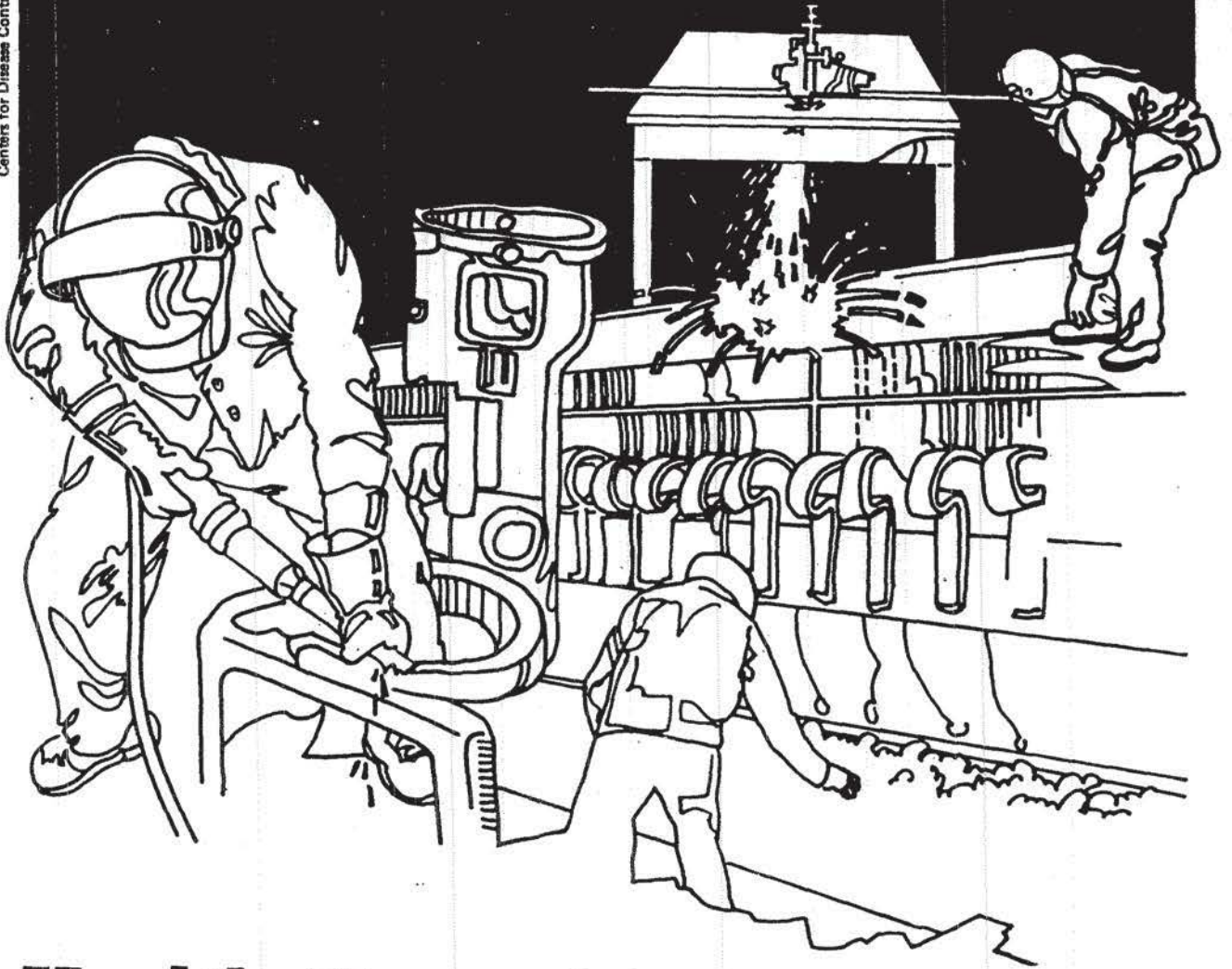


NIOSH



Health Hazard Evaluation Report

HETA 83-073-1293
RUSSELL-ZUHL, INC
NEW YORK CITY, NEW YORK

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

I. SUMMARY

In December 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request to perform a health hazard evaluation from the management of Russell-Zuhl, Inc. The firm sells petrified wood artifacts. The request concerned exposure to asbestos particles at a storage and work area located at 315 East 68th Street, N.Y., N.Y.

On December 21, 1982, a representative of NIOSH visited the facility and collected four bulk samples and three samples of airborne particulate for subsequent analysis. Analyses of these samples indicated that exposure to airborne asbestos was less than the limit of detection (about 0.05 fiber per cubic centimeter). Analysis of a bulk sample of sweeper debris indicated gross contamination of quartz (46% by weight) and a small amount (about 0.1%) of lead.

Although concern for exposure to epoxy resins was not part of the original request, it was noted that a worker at the firm exhibited dermatitis from exposure to epoxy resins used in repair work. Approximately one to four times per month, he repairs minor damage to the petrified wood artifacts. Although he wears protective gloves, he usually smooths out the surface of the epoxy with his bare hands.

Based on the findings of the survey, as detailed in the body of this report, NIOSH concludes that no hazard from exposure to airborne asbestos existed the time of the survey. Based on good industrial hygiene principles, NIOSH makes the following recommendations:

1. The rug should be replaced or thoroughly cleaned to remove the quartz contamination.
2. A NIOSH-approved air purifying respirator should be used while grinding and polishing petrified wood slabs.
3. Epoxy resin should not be applied with bare hands. Protective gloves should be worn when working with epoxy resin.

KEYWORDS: SIC 3281 (ornamental cut stone products), asbestos, quartz, lead, epoxy resin, dermatitis.

II. INTRODUCTION

In December, 1982, the management of Russell-Zuhl, Inc requested a health hazard evaluation from the National Institute for Occupational Safety and Health (NIOSH) to determine if any exposure to asbestos existed at their storage and work facility, 315 East 68th St. New York City. On December 21, 1982, a representative of NIOSH visited the facility and performed a survey to determine exposure to airborne asbestos. An interim report was issued in December, 1982.

III. BACKGROUND

Russell-Zuhl, Inc. is a major supplier of petrified wood. Trunks of petrified trees are occasionally found in the western United States. After inspection and purchase, Russell-Zuhl, Inc. ships the trunks to a firm in New Jersey where they are sliced, epoxied and polished. The 68th Street facility mainly is a storage area where the president of the firm performs occasional restoration work on slabs of petrified wood which do not meet his specifications. The restoration work consists of removal of small areas of the slabs or cementing of damaged slabs using an epoxy resin glue. The restored slabs are then sanded and/or polished. The president of the firm occasionally hires workers to help move the heavy slabs.

The storeroom is located in the basement of a residential apartment building and is approximately 30' x 40' with a 10' ceiling. The storeroom was first occupied by the firm about five years ago. At that time, there were many exposed pipes covered with a white, flaky substance which the firm's president assumes was asbestos. The room was cleaned by the president and two helpers--they wore no respirators or any other type of protection. Those pipes are now permanently enclosed by wooden shelving. The firm's president has since become aware of the dangers of asbestos and is now concerned with exposure from an additional source. A large hot-water pipe is located overhead near the entrance to the storeroom. Over the years, the pipe's wrapping has been damaged and about six linear inches of a white flaky substance have been chipped away. The president wondered if he and his helpers are being exposed to asbestos.

IV. EVALUATION DESIGN AND METHODS

This health hazard evaluation basically involved answering two questions-- Was the site contaminated with asbestos dust? Was there any continuing exposure to asbestos?

A bulk sample of the pipe's covering was collected. The building was constructed in the 1930s, when it was common to insulate pipes with asbestos cement. The material of the pipe's covering is much more friable

than asbestos cement, and appears to be asbestos. The sample was analyzed for asbestos content.

Paint had flaked off the walls and ceiling of the facility in several areas. The president of the firm wondered if the paint might contain lead. A sample of paint chips was obtained for lead analysis.

Bulk samples of debris from the carpet sweeper and dust from the carpet also were collected. Although the main purpose of the evaluation concerned asbestos, the carpet sweeper debris appeared to be hard, granular material. Grinding and polishing of the petrified wood generates a fair amount of dust. The main component of petrified wood is siliceous material, including quartz. These bulk samples were analyzed for asbestos, quartz and lead content using standardized NIOSH analytical procedures.

Three samples of airborne dust were collected on 37 millimeter "AA" filters at a nominal flow rate of 1.5 liters per minute for about 4 hours. The samples were analyzed for asbestos content following a standardized NIOSH procedure described in NIOSH's P&CAM 239 analytical technique for asbestos fibers.

V. EVALUATION CRITERIA

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assignment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical conditions, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the workers to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor (OSHA) occupational health standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based solely on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposure.

Asbestos

The OSHA time weighted Permissible Exposure Limit and the ACGIH TLV for airborne asbestos is 2 fibers per cubic centimeter of air (f/cc). NIOSH recommends that exposure be limited to 0.1 f/cc as a time weighted average. These values were established to protect against the development of asbestosis, a fibrotic lung disease. Exposure to asbestos also is associated with mesothelioma and with lung cancer. The risk for lung cancer in asbestos workers is greatly increased by cigarette smoking.

Quartz

Exposure to quartz (crystalline silica) is associated with the development of a fibrotic lung disease called silicosis. Both the OSHA and the ACGIH (time weighted average) limit for exposure to silica (respirable dust) is 10 milligrams per cubic meter of air, divided by the percent of quartz plus 2; thus if the dust contained 8% quartz, the level would be $10/(8+2)$ or 1 milligram of respirable dust per cubic meter of air. NIOSH recommends that this limit be reduced to 50 micrograms of respirable quartz per cubic meter of air.

Lead

The ACGIH TLV is 0.15 milligram per cubic meter of air (mg/M^3). The OSHA and NIOSH limits are $0.05 \text{ mg}/\text{M}^3$. Exposure to lead is associated with disorders of the nervous, digestive and renal systems.

VI. RESULTS AND DISCUSSION

The activities carried out in the storeroom can best be described as light industry. At the time of the survey, epoxy resin had been used to repair a cracked slab once in the past few weeks. A slab had been buffed four working-days before NIOSH's visit to the facility. The helper had been scheduled to work the day of the visit but never appeared. The firm's president did some light clean-up during collection of the samples to simulate a typical day's activities.

The pipe insulation material was determined to be approximately 25% asbestos. Airborne asbestos fibers were not detected on the filter samples (limit of detection was approximately 0.05 fiber per cubic centimeter of air). Analysis of one filter which was "wiped" across the carpet did not detect asbestos fibers. Analysis of carpet sweeper debris also failed to detect asbestos fibers (limit of detection was approximately 1.5% by weight). As asbestos was not detected in the air or on the rug, there is no reason to believe that asbestos contamination of the premises exists.

Analysis of paint chip samples did not determine the presence of lead (limit of detection was approximately 0.01% by weight). Analysis of the carpet sweeper debris indicated that about 0.1% by weight of the dust was lead. As lead is not used in any operations at the site, a probable

source of the lead contamination is from the material generated by the sanding and polishing of the petrified wood. Petrified wood is mainly composed of siliceous material, however, many other mineral salts were deposited in the wood during the process of silicification (for example, iron oxide is responsible for the red color of many types of petrified wood).

Quartz (crystalline silica or SiO_2) was determined to make up 46% of the carpet sweeper debris. The source of the quartz is from material generated during sanding and polishing of the petrified wood.

Although not part of the specific health hazard evaluation request, mention should be made of the dermatitis problems associated with use of epoxy resins. One of the firm's employees had an obvious case of dermatitis of his hands, even with recent limited use of epoxy resin. He stated that, at times, the skin would peel off his fingers following use of the epoxy. He uses butyl rubber gloves during most of his use of epoxy, but because of the fineness of detail required, he often spreads the epoxy with his bare hands. The active ingredient (plasticizer) of the epoxy used in the storeroom is triethylene tetramine. This compound "causes skin sensitization as well as primary irritation. Exposure to the hot vapors results in respiratory tract irritation and itching of the face with erythema and edema" (1). In this specific operation, the epoxy is not heated, is quick-setting with little heat generation. At room temperature, the vapor pressure of triethylene tetramine is less than 0.01 millimeter of mercury (2), so there should be little air-borne exposure. No limit has been recommended or established for exposure to the vapor. Animal studies have indicated skin absorption with subsequent effects on the kidneys, liver and brain. (1)

In permeation tests with epoxy resins, butyl rubber is rated as providing fair protection. Gloves made of nitrile or a laminate of polyethylene-polyvinyl alcohol-polyethylene would offer better protection against skin absorption.

VII. RECOMMENDATIONS

To prevent any asbestos contamination from the damaged overhead pipe covering, it is recommended that the pipe covering be repaired with fibrous glass batting and duct tape. Proper respiratory protection and clean-up procedures should be used during the repair work. As only a small amount of asbestos is involved, NIOSH suggests the following procedure be used during repair of the pipe covering: A plastic drop-cloth be laid on the floor underneath the area to be repaired. One person perform the clean-up operation wearing a respirator approved for protection against asbestos particles. The fibrous glass batting carefully be wrapped around the damaged pipe and the duct tape carefully be applied. The drop-cloth (along with any asbestos which may have dropped from the pipe) be thrown away after the repair work is finished. The person who performs the repair work should shower as soon as possible.

Grinding, sanding or polishing of petrified wood slabs is an infrequent occurrence at this site. Consideration should be given to the use of a respirator approved for protection against dusts while these operations take place, since the dust generated contains a large percentage of quartz and some lead.

As the silica dust which contaminates the rug may act as a secondary source of exposure, the rug should be vacuumed thoroughly. The silica particles are relatively large, and should easily be contained by the average "bag" type of vacuum cleaner. Since the contamination of the floor covering will be an on-going occurrence, consideration should be given to replacing the rug with a flooring such as tile, which is easier to clean.

Although hazards from exposure to epoxy resins were not part of the formal health hazard evaluation request, it is recommended that alternative types of protective gloves be tried, that the practice of spreading epoxy with bare hands be eliminated, and that the use of an alternative type of epoxy resin be investigated.

The firm in New Jersey where most of the petrified woodslabs are prepared does far more epoxy work than does the New York City facility. NIOSH suggests that the information on the toxicological properties of the epoxy resin be forwarded to the New Jersey plant where epoxy exposure may be pose a hazard to that plant's employees.

VIII. REFERENCES

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Russell-Zuhl, Inc.
NIOSH, Region II
OSHA, Region II
New York State Dept of Health

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.