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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 76-103-349

HARDRIC LABORATORIES
WALTHAM, MASSACHUSETTS

DECEMBER 1976

I. TOXICITY DETERMINATION

It has been determined on the basis of environmental sampling that a health hazard from exposure to beryllium did not exist within the worksite area at the time of this evaluation. The investigation was conducted on September 9, 1976 and no levels of beryllium were detected. The lower limit of detection for beryllium in the sampling method used is 0.5 ug/filter. Medical interviews also revealed no work related health complaints.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information 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:

a) Hardric Laboratories, Waltham, Massachusetts
b) U.S. Department of Labor - Region I
c) NIOSH - Region I

For the purpose of informing the approximately 12 "affected employees" the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place near where exposed employees work.

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 a written request by an 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 (NIOSH) received such a request on August 5, 1976 from the employer regarding employees' exposure to beryllium. The employer was concerned about possible toxic effects from exposure to beryllium which may result from machining beryllium parts.

IV. HEALTH HAZARD EVALUATION

A. Condition of Use

Hardric Laboratories manufactures precision components from various metals including beryllium. Employees are engaged in machining small beryllium parts to meet various specifications. The metal machining operations include turning, drilling, boring and milling. A low-volume high velocity local exhaust ventilation system is employed at each work station. Measured air flow at the worksites were greater than 800 fpm and 300 to 500 fpm in a four inch radius around the cutting tools. (The recommended minimum capture velocity for machining beryllium parts is 500 fpm.)

B. Evaluation Methods

Air samples for beryllium were collected using AA filters in the breathing zone of the exposed workers. Because of the ceiling concentration limit, several fifteen minute samples were collected along with the eight-hour samples. A total of six samples were collected.

A NIOSH nurse officer administered medical questionnaires to all employees in the plant. The questionnaire which was used was obtained from the Beryllium Case Registry at Massachusetts General Hospital in Boston. The NIOSH medical officer also spoke to the physician responsible for the medical surveillance of the plant employees.

C. Evaluation Criteria

Toxic effects of beryllium include both acute and chronic forms. Acute effects include the results of skin and eye exposure. Skin exposure may produce contact dermatitis in which a variety of rashes may develop after an incubation period of 10-14 days. Accidental implantation of a metal sliver in the skin may produce a "beryllium ulcer," which may be chronic. Ocular effects may also occur in association with contact dermatitis. Inhalation of beryllium may produce acute berylliosis. The mucous membranes of the upper respiratory tract become inflamed and swollen. Tracheobronchial involvement may occur and if exposure is severe and intense, an acute chemical pneumonia may develop. Recovery is generally 1 to 6 weeks. Chronic beryllium disease may have a latent period of 10 to 15 years. The clinical features include shortness of breath, cough, weight loss, fatigue, generalized lymphadenopathy, skin lesions and salivary gland enlargement.

Pulmonary dysfunction and systemic effects include heart enlargement which leads to cardiac failure and the appearance of kidney stones. Progression of the disease is generally slow and a survival time of 15 to 20 years is relatively frequent. Beryllium is also suspected of inducing cancer in man.

The proposed Occupational Safety and Health Administration (OSHA) standard sets permissible employee exposure for an 8-hour time period at 1.0 microgram of beryllium per cubic meter of air (1.0 ug/M^3) and sets a 5 ug/M^3 ceiling limit. The standard also contains a proposed dermal exposure limit. The proposed standard would not allow skin and eye contact with bulk forms of beryllium. The current OSHA standard for beryllium is 2 ug/M^3.

D. Evaluation Results and Discussion

Five personal breathing zone samples which included two 8-hour samples were taken on employees machining beryllium parts. One area sample was also collected. No beryllium was detected on any of the samples. Medical interviews also revealed no work related health complaints. Based on this information, there is no environmental or medical evidence to suggest that a health hazard exists.

After observing work procedures, the following recommendations were made to the employer and employees:

1. More consistent wearing of safety glasses.
2. No smoking in the beryllium room. (This was a practice sometimes not followed by all workers).
3. No food or beverages should be allowed in the beryllium room.
4. Provide a vacuum system for clean-up operations.

The following practices were observed or reported during the visit to Hardric Laboratories.

1. A separate room was designated as the Beryllium Room where all work on beryllium was conducted. The area was well labeled and contained an effective ventilation system. The room also contained washing facilities and employees washed their hands before leaving the area for breaks or to leave the building.

2. All employees were provided with clean uniforms on a daily basis. Uniforms including shoes, were changed at the end of the day or whenever leaving the building. A shower was also present.

3. All employees appeared to be well informed of the hazards associated with beryllium. (A copy of the Federal REgister on beryllium had been circulated to all employees to read.) There appeared to be a general awareness of safety and health practices.

4. Work practices and handling of beryllium parts were good. (For example, grinding small parts with an emery stick was done using an oil suspension so beryllium dust would not become airborne.)

5. General housekeeping in the plant is excellent. Periodic cleaning of the dust collection system is also done. The employee doing the work is provided with a respirator approved for beryllium dust.

6. All employees received a thorough medical examination annually from a physician knowledgeable of their exposures to beryllium and possible health effects.

It is the opinion of the author that Hardric Laboratories provides an excellent example of how a small company can provide a safe and healthy work environment for its employees. Both employer and employees should be proud of their company and the safe and healthy working conditions that they have created and maintained.

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