

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
HE 78-41-491

AMSTAR CORPORATION
PHILADELPHIA, PENNSYLVANIA

MAY 1978

I. TOXICITY DETERMINATION

A Health Hazard Evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) on March 15, 1978 at Amstar Corporation, Philadelphia, Pennsylvania. It has been determined on the basis of environmental samples, employee interviews, observation of work practices and a review of pertinent literature that a health hazard due to employee exposures to free silica and total particulate did not exist within the worksite at the time of this evaluation.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this 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:

- a) Amstar Corporation, Philadelphia, Pennsylvania
- b) Authorized Representative of Employees
- c) President of ILA, AFL - CIO (Local 1650)
- d) U.S. Department of Labor - Region III
- e) NIOSH - Region III

For the purpose of informing the three "affected employees" the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) 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 from an authorized representative of Local 1650 of the International Longshoreman Association AFL - CIO concerning workers' potential exposure to crystalline silica and activated carbon particulate in Building 16, sixth floor.

IV. HEALTH HAZARD EVALUATION

A. Description of Process - Conditions of Use

The Amstar Corporation refines raw sugar into granulated sugar for eventual wholesale and retail sales. The Philadelphia plant employs a total of 450 production employees, three shifts per day. Of the 450 employees, three may be exposed to the alleged potential health hazards. One dryer attendant operator is on duty each of the three shifts and performs the job of dumping Diatomite[®] (diatomaceous silica) and Darco[®] (activated carbon). The operator cuts the 50-pound bags of Diatomite[®] and Darco[®] with a knife and dumps the contents into two 2000-gallon tanks, one a ventilated primary filter pre-coat feed tank and the other a ventilated primary filter slurry tank, both partially filled with raw syrup. During this dumping period, the operator is potentially exposed to crystalline silica and activated carbon particulate.

B. Evaluation Design and Methods

On March 15, 1978 environmental samples were collected to determine airborne levels of total and respirable crystalline silica and activated carbon particulate. Bulk samples were collected of Diatomite[®] and Darco[®].

Total dust levels were measured by drawing air at a flow rate of 1.5 lpm through a tared FWS-B filter mounted in a close-face cassette and then weighing the amount of dust collected. Respirable dust levels were measured by drawing air at a flow rate of 1.7 lpm through a size-selective sampler. The device consisted of a 10 mm nylon cyclone to remove the non-respirable fraction of the total dust prior to collection of the respirable portion on a tared FWS-B filter for weight determination. The quartz and cristobalite content (2 forms of crystalline silica) was determined for each total and respirable dust sample using X-ray powder diffraction.¹

A non-directed questionnaire designed to elicit symptomatology possibly related to health problems arising from their work environment was completed on all workers directly affected.

C. Evaluation Study Criteria

The environmental criteria used to assess the workroom concentrations of the contaminants evaluated are contained in Table of Results (Table I). The criteria are based on the current state of knowledge concerning the toxicity of the substances for an 8-hour or up to a 10-hour work day, 40-hour workweek over a normal lifetime. Because of wide variation in individual susceptibility, however, a small percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness.

A brief review of the known health effects of the substances determined to be causing a toxic or potentially toxic exposure to the workers under conditions used or found follows:

1. Crystalline Silica: Excessive inhalation of crystalline silica results in an increased potential for developing a form of pneumoconiosis (dusty lung) termed silicosis.² Silicosis is a disease due to breathing air containing silica, characterized anatomically by generalized fibrotic change in both lungs, and clinically by shortness of breath, decreased chest expansion, lessened capacity for work, absence of fever unless secondary infection ensues, increased susceptibility to tuberculosis (some or all of which symptoms may be present), and by characteristic X-ray findings. This form of pneumoconiosis usually develops after at least seven years of exposure, although a few cases have developed in as short a period of time as one and one-half years from inhalation of very high levels of silica with a high quartz content. At the other extreme, with exposure to low levels twenty years may have to elapse before the disease develops to a stage when it can be diagnosed. Early silicosis termed "simple silicosis" is usually first diagnosed by chest X-ray examination. At this time there is little if any functional impairment, and there are often no associated symptoms and signs. Symptoms occur when silicosis advances and becomes complicated by infection and emphysema. These changes are marked by intolerance to exertion, episodes of coughing, and production of thick sputum. When silicosis has progressed to this point, the chest X-ray is usually read as "conglomerate silicosis". Conglomerate silicosis many times progresses in spite of termination of exposure, becomes incapacitating to the effected worker, and is irreversible.

2. Nuisance Particulate: Inhalation of excessive amounts of nuisance particulate have few adverse effects in the lungs; elevated concentrations reduce visibility and may result in unpleasant deposits in the eyes and nose, plus injury to the mucous membranes through mechanical action.³

D. Results

1. Environmental

Personal breathing zone samples were collected on March 15, 1978 to evaluate the dryer attendant operator exposures to quartz and cristobalite, and respirable and total dust. Results of the environmental samples showed that the operator was not overexposed to free silica and total particulate. For a detailed description of the environmental samples please refer to Table I.

The results of the bulk sample analyses are contained in Table II. Cristobalite was the only polymorph (form) of crystalline silica present in the bulk powder samples.

2. Medical

The health questionnaire revealed that one employee complained of coughing, nose and throat irritation. The reported symptoms were all related to conditions being "too dusty."

3. Conclusions

It has been determined on the basis of environmental sampling that exposure to free silica and total particulate did not exceed recommended environmental criteria within the worksite area on March 15, 1978.

V. RECOMMENDATIONS

1. An educational program should be instituted so that the employee is made aware of the hazards associated with the materials. Good work practices and first aid procedures should also be included in this program.
2. All local exhaust ventilation systems should be serviced regularly to insure that they are operating at maximum efficiency.

VI. REFERENCES

1. P&CA Method 259, NIOSH Manual of Analytical Methods, 2nd Edition, HEW Publication (NIOSH) No. 77-157A, 1977.
2. Criteria for a Recommended Standard...Occupational Exposure to Crystalline Silica, HEW Publication (NIOSH) No. 75-120, 1974.
3. Documentation of Threshold Limit Values. American Conference of Governmental Industrial Hygienists, pg. 190, 1975.

VII. AUTHORSHIP AND ACKNOWLEDGMENTS

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TABLE I

Airborne Concentrations of Quartz, Cristobalite, and Respirable And Total Dust Measured at the Breathing Zone of the Dryer Attendant Operator

Amstar Corporation
Philadelphia, Pennsylvania

Sample Date	Sample Number	Job Description and/or Classification	Sampling Period	Sample Volume Liters	Respirable Dust mg/M ³ (a)			Total Dust mg/M ³			
					Quartz	Cristo-balite	Dust Level	Quartz	Cristo-balite	Dust Level	OSHA(b) Quartz Std.
3/15/78	FWSB-10	Dryer Attendant Operator	1528-2215	692	LLD(c)	LLD	0.3	--	--	--	--
3/15/78	FWSB-12	Dryer Attendant Operator	1528-2215	692	--	--	--	0.87	LLD	0.9	6.4
Environmental Criteria						0.05(e)	5 mg/M ³ (d)			10 mg/M ³ (d)	

a - denotes milligrams of contaminant per cubic meter of contaminated air sampled.

b - Occupational Health Standard promulgated by U.S. Department of Labor - Federal Register July 1, 1975, Volume 39, Title 29, Part 1910, sub-part 7, Section 1000, the silica standard for quartz in total dust is calculated by dividing 30 mg/M³ by the % quartz + 3, 8-hr. TWA.

c - denotes lower limit of detection for quartz and cristobalite which was 0.03 and 0.04 milligrams per filter, respectively.

d - recommended and proposed Threshold Limit Values and their supporting documentation set forth by the American Conference of Governmental Industrial Hygienists, 1977.

e - the NIOSH 1974 Criteria Document recommends respirable free silica exposure should not exceed 0.05 mg/M³.

TABLE II

Determination of Percent Crystalline Silica in Bulk Powder Samples of Diatomite[®]

<u>Sample Number</u>	<u>Sample Description</u>	<u>Quartz</u>	<u>Cristobalite</u>
Bulk #3	Diatomite [®] (Diatomaceous Silica)	LLD*	15.0%
Bulk #5	Diatomite [®] (Diatomaceous Silica)	LLD	13.8%
Bulk #6	Diatomite [®] (Diatomaceous Silica)	LLD	16.9%

* Denotes lower limit of detection for quartz and cristobalite which was 0.03 and 0.04 milligram per filter, respectively.