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

TECHNICAL ASSISTANCE REPORT
TA 80-49

DEFENSE LOGISTICS AGENCY
HEADQUARTERS, DEFENSE PERSONNEL SUPPORT CENTER
PHILADELPHIA, PENNSYLVANIA

JUNE, 1980

I. SUMMARY

On April 3 and April 25, 1980, the National Institute for Occupational Safety and Health (NIOSH) conducted a technical assistance survey of the air handling machine room and the ventilation system used for the Defense Logistics Agency's Health Clinic and Inspector General's Office in Philadelphia, Pennsylvania. A walk-through survey and bulk residue samples were taken to determine whether or not asbestos fibers had entered the ventilation ducts as a result of insulation removal on an old air handling unit. This created the possibility of exposing these fibers to over 5,500 personnel through activation of the new air handling unit.

Bulk samples were taken from dust lying on the rafters in the air handling machine room, from the main-feed duct and from the return air duct. Samples were analyzed by polarized light microscopy and electron microscopy, for the presence of mineral type, and percent of asbestos.

On the basis of the data obtained in the investigation, NIOSH determined that the insulation contained asbestos in the range of up to 20-30% (by weight) chrysotile asbestos, both as free fibers and large chunks of asbestos-board material. Under present conditions, if this new ventilation system is turned on, workers in the Health Clinic and Inspector General's Office will be potentially exposed to asbestos fibers. It is NIOSH's position that there is no safe exposure limit for asbestos and all forms of asbestos cause disease. Recommendations to alleviate this hazard are presented on page 4.

II. INTRODUCTION

The Defense Logistics Agency requested an investigation from NIOSH on March 31, 1980, to evaluate potential asbestos exposure from the ventilation system in the Health Clinic in Philadelphia, Pennsylvania.

The NIOSH Regional Industrial Hygienist met with the Defense Agency and Health Clinic representatives for opening and closing conferences, walk-through survey and environmental sampling on April 3 and April 25, 1980.

III. BACKGROUND

The air handling room (23 ft. X 45 ft.) contains a 16,000 cubic feet per minute, 40 horsepower compressor unit that supplies air via two main-feed ducts. A return air duct is also hooked into the system for energy conservation. The air supply system feeds to numerous rooms, alcoves and hallways within the Health Clinic and Inspector General's Office. Twelve employees occupy the Health Clinic, and ten employees are in the Inspector General's office full time. Over 5,500 personnel may use the Health Clinic during the year.

During the beginning of January 1980, a contractor began the removal of (asbestos) insulation from the old air handling unit without using the proper techniques and precautions. During this time period, the openings into the main-feed ducts, return duct, and fresh air supply ducts were not covered to prevent insulation (asbestos) from entering. Upon discovery of this situation, the Safety and Health Office at the Defense Logistics Agency set about to ensure proper containment of the work areas and protection for the workers exposed to this insulation. The removal of the old air handling unit and the placement of the new unit covers a time period up until the beginning of March and to date the new unit has not been turned on. The main-feed ducts have been hooked up, but the fresh air supply and return ducts have not.

Since there exists the possibility of contamination of the air handling system, through improper insulation removal techniques and because the Department of Defense is not able to evaluate the airborne asbestos concentration without turning on the system, they requested NIOSH to evaluate the potential health hazard that may exist.

IV. EVALUATION DESIGN AND METHODS[1]

Three bulk insulation samples were taken for analysis of asbestos, mineral type and percent composition. A sample from the rafters in the air handling machine room was collected by "scooping" manually. The sample from the hooked-up main-feed duct was collected by cutting into the duct ($\sim$ 6 ft. from hook-up to air handling unit) and vacuuming up of a sample using a high-efficiency filter industrial vacuum cleaner. The return duct sample was also collected using the industrial vacuum cleaner at a distance of about 5 feet from the duct facing opening.

The three bulk samples were prepared and analyzed by both polarized light microscopy and electron microscopy.

V. EVALUATION CRITERIA[2,3,4,5]

Asbestos

Asbestos is the common name for a group of mineral fiber silicates known as chrysotile (white asbestos), actinolite, amosite (brown asbestos), anthophyllite, crocidolite (blue asbestos) and tremolite. Each contains varying amounts of iron, chromium, calcium, sodium, magnesium, nickel, silicon dioxide, and water.

Asbestos can cause a pneumoconioses of the lung ("dust in the lung") called asbestosis and certain forms of cancer. Asbestosis is a chronic lung disease in which fibrous or scar tissue is produced and over the years results in

respiratory impairment and disability. Lung cancer, mesothelioma (cancer of the pleura or peritoneum), and cancer of the esophagus, colon and rectum are associated with exposure to asbestos.

Cigarette smoking and possibly other "air contaminants" together with asbestos exposure have a synergistic effect upon the lung tissue and exponentially increase the risk of lung cancer.

NIOSH's latest evaluation of available data of human toxicity to asbestos provides no evidence for a threshold of carcinogenic response or for any so called "safe" level. Therefore, the standard is recommended by NIOSH to be set at the lowest reliable level of detection using the generally available analytical equipment and techniques of phase contrast microscopy.

It should be noted that in an April 17, 1980, HEW News Release, Dr. Anthony Robbins, Director of the National Institute for Occupational Safety and Health (NIOSH) announced that a joint NIOSH/OSHA work group has reconfirmed that - "there is no safe exposure limit for asbestos" and "all commercial and several non-commercial forms of asbestos cause disease. It was also recommended that the Department of Labor set a new standard of 100,000 fibers per cubic meter of air, the lowest level which can be accurately measured - for an eight-hour time-weighted average.

The following environmental standards or criteria were considered in this report (none of these criteria apply to the public):

Source	8 Hr.-TWA (*fibers/cc > 5μ)	15 Min. Ceiling (fibers/cc > 5μ)
**NIOSH	0.1 fibers/cc	0.5 fibers/cc
ACGIH	2.0	
OSHA (Current)	2.0	***10.0
OSHA (Proposed)	0.5	5.0

*Fibers/cc of air greater than 5 micron (μ) in length - a fiber being defined as a fundamental form of solid, characterized by relatively high tenacity and a length to width ratio of at least 3 to 1.

**The NIOSH criteria are intended to protect the average working population against the non-carcinogenic effects of asbestos and to reduce the risk of asbestos-induced cancer. This criteria was not intended for the population at large and any extrapolation beyond general occupational exposure is not warranted.

***The OSHA Standard (Current) for short-term exposures requires a 15 minute sampling period to be legally enforceable.

VI. RESULTS AND DISCUSSION[5]

The sample taken from the "rafters" in the air handling machine room was found to contain 2 to 10% chrysotile asbestos in a mixture of a variety of dust, plaster, mineral wool and wood product particulates (by weight).

The sample from the main-feed duct contained 10-25% (by weight) chrysotile asbestos, chiefly in nodules of an insulation board in a mixture of mineral wool and dust particulates.

And the sample from the return duct contained approximately 20-30% (by weight)chrysotile asbestos, both as free fibers and in large chunks of an asbestos-board material mixed with dust.

VII. RECOMMENDATIONS

The following recommendations were given to the Defense Logistics Agency, Philadelphia, Pennsylvania, at the closing conference, in order to avoid the possibility of any asbestos exposures to the employees and their families at the Health Clinic and the Inspector General's Office.

1. A thorough clean-out of the air supply ducts, return ducts, and the air handling machine room. This clean-out should be done by a competent and responsible crew aware of the necessary procedures and methods (e.g. wet-removal, high-efficiency filter vacuuming, containment, personal protection, proper disposal) set up by the Environmental Protection Agency for handling asbestos insulation removal in buildings.

2. A 24-hour purge of the air handling systems using high-efficiency filters over the feed-in louvers in each room, alcove and hallway.

3. This is to be followed up by area air sampling in "representative areas" for final confirmation of the "thoroughness" of the clean-out.

4. Several more "representative area" air samples should be taken over the year to ensure that the system is functioning correctly and that the corrective actions taken have been effective.

5. To avoid mishaps, in the future, any work involving the removal of "insulation" should be directed first to the Safety and Health Office of the Defense Logistics Agency before proceeding.

VIII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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IX. DISTRIBUTION AND AVAILABILITY

Copies of this Technical Assistance 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 thorugh NTIS can be obtained from NIOSH, Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Defense Logistics Agency, Philadelphia, Pennsylvania
2. NIOSH, Region III
3. OSHA, Region III

X. REFERENCES

1. NIOSH Manual of Sampling Data Sheets, 1977 Edition, DHHS, PHS, CDC, NIOSH, March 1977.

2. General Industry, OSHA Safety and Health Standards, 29 CFR OSHA 2206, Revised January 1976.

3. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1978, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.

4. NIOSH Revised Recommended Asbestos Standard, December 1976.

5. "Remarks by NIOSH Director, Dr. Anthony Robbins on the Need for a New Asbestos Standard," HEW News, April 17, 1980.

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16. Abstract (Limit: 200 words)

ABSTRACT: The air handling machine room and the ventilation system in use at the Defense Logistics Agency (SIC-9711) Health Clinic and Inspector General's Office in Philadelphia, Pennsylvania were evaluated to determine potential exposure to asbestos (1332214). A walk through survey and bulk residue sampling were conducted on April 3 and 25, 1980 at the request of the Agency. Improper removal of asbestos insulation from an old ventilator was identified as a potential source of asbestos contamination; fibers may have entered the new ventilation system and could expose over 5,500 personnel to asbestos within 1 year. Analysis by polarized light and electron microscopy revealed that 10 to 30 percent of the bulk samples were chrysotile asbestos (12001295), in the form of free fibers and large chunks of material. The current OSHA asbestos exposure standard for an 8 hour time weighted average is 2.0 fibers per cubic centimer for greater than 5 microns in length, but the authors note that there is no truly safe exposure limit for asbestos. They conclude that a hazard would exist if the new air system at the clinic is put in operation. They recommend a thorough cleaning of the room and the ventilation system, followed by an appropriate air monitoring program.

17. Document Analysis a. Descriptors

b. Identifiers/Open-Ended Terms
Dust-exposure
Fibrous-bodies
Minerals
Asbestos-dust
Risk-factors
Carcinogens
Air-contaminants
Respiratory-protection
Mechanical-ventilation

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