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Abstract (Limit: 200 words)

Personal air samples were analyzed to determine the asbestos (1332214) exposure resulting from the use of proximity suits made of aluminized asbestos fabric at the Orlando Fire Department Training Center (SIC-9224), Orlando, Florida, on November 27, 1978. The evaluation was requested by the fire chief on behalf of an unspecified number of fire fighters, paramedics and fire officers. Samples were collected on membrane filters. All samples are analyzed by phase contrast microscopy techniques. Fiber counts in all samples were below detectable limits. Average fiber size could not be measured since so few were collected. The investigators note that the OSHA standard for asbestos is a time weighted average concentration of 2.0 fibers greater than 5 microns long per cubic centimeter of air with a peak concentration of 10.0 fibers greater than 5 microns in length per cubic centimeter of air. They conclude that an asbestos hazard did not result from the wearing of aluminized asbestos clothing. They recommend that asbestos lined clothing be replaced, wherever feasible, by other materials with lower chronic toxicities, and occasional air sampling for asbestos exposure.

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HAZARD EVALUATION AND TECHNICAL ASSISTANCE
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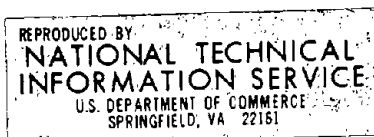
ORLANDO FIRE DEPARTMENT STATION #6
100 S. HUGHEY AVENUE
ORLANDO, FLORIDA

A STUDY OF FIRE FIGHTER'S EXPOSURES TO ASBESTOS
FIBERS WHILE WEARING ASBESTOS PROXIMITY SUITS

FEBRUARY 1979

Study Requested By:
Fire Chief, Station #6
Orlando, Florida

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I. SUMMARY

Air sampling for asbestos exposures was conducted on November 27, 1978, at the Orlando Fire Department Training Center, Orlando, Florida, during pit fire fighting maneuvers. The purpose of the study was to determine if fire fighters proximity suits are a potential for asbestos exposure during use. All air samples resulted in non-detectable asbestos levels (less than 0.07 fibers per cubic centimeter of air) which is well below the 0.5 fibers/cc. NIOSH 15 min ceiling recommendation. Although no significant levels of asbestos were detected, it is recommended that the Fire Department continue with their plans and efforts to acquire protective clothing that does not use asbestos linings.

II. INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH), by request from the Fire Chief, Orlando Fire Department, Orlando, Florida, conducted an industrial hygiene investigation during pit fire training maneuvers to determine if the protective clothing used by the fire fighters, paramedics, and fire officers presented a significant asbestos exposure potential. The investigation included personnel from Fire Station No. 6 and the Greater Orlando Aviation Authority. Those employees participating in the investigation wore either new or used proximity suits (jackets, gloves and hoods) made of aluminized asbestos fabric.

III. EVALUATION

A. DESCRIPTION OF FACILITY

The training facility used by the Orlando Fire Department serves 10 fire stations as well as the Greater Orlando Aviation Authority. Both classroom and open air pit fire training sessions are conducted at this site. The pit fire training sessions were of major concern during the survey since these sessions required continuous use of the asbestos clothing.

The apparatus used to suppress the fires during fire fighting maneuvers was an Oren 1250 GPM pump with a 500 gallon booster tank. The agents used for the fires were Light Water Aqueous Film with a 6% foam concentration, and/or a National Aer-O-Water-3% foam solution.

The major bulk of the asbestos lined protective clothing used during fire fighting is the hood which is usually donned as the fire crew responds to the burning site. In emergency situations the hoods may be donned five to ten minutes prior to actual fire fighting i.e. aircraft landing. The duration of hood wearing depends on the amount of fuel burning and the agent used to extinguish the flame. Continuous wearing usually ranges from 10 to 15 minutes, however the hoods have been worn for 45 minute periods.

B. METHODS AND RESULTS

Since the purpose of this survey was to determine if a significant asbestos exposure problem existed during the wearing of asbestos lined proximity suits, individual air samples were collected in the breathing zone (under the hoods) of each fire fighter during fire fighting maneuvers. The results of these samples have been tabulated and are recorded in table I. Also presented below this table are the current Occupational Safety and Health (OSHA) and NIOSH recommended standards for the control of asbestos dust.

All air samples were collected on 37 mm diameter Millipore Type AA* cellulose membrane filters with an 0.8 micrometer pore size, held open-faced in plastic field monitoring cassettes. Personal sampling pumps calibrated at 2.0 liters per minute (l/m) were used to draw air through the filtered cassettes. The monitoring cassettes which were attached to the lapel of the worker (under the aluminized hoods) were connected to the sampling pump via tygon tubing. Sampling times per sample were 32 minutes.

All samples collected were analyzed according to NIOSH Method P&CAM #239 which utilizes phase contrast microscopy techniques. The sample results recorded in Table I are reported in fibers greater than 5 microns in length per cubic centimeter of air (fibers/cc).

C. ENVIRONMENTAL STANDARDS

The NIOSH Revised Recommended limit for asbestos fibers (table 1) is 0.1 fiber greater than 5 μ m in length per cc of air based on an eight-hour time weighted average (TWA) with a peak concentration not to exceed 0.5 fibers greater than 5 μ m in length per cc of air based on a 15-minute sample period. ①

The U.S. Department of Labor Standard (OSHA) is 2.0 fibers greater than 5 min length per cc of air based on a TWA sample and a peak concentration of 10.0 fiber greater than 5 μ m in length per cc of air.

D. PHYSIOLOGICAL EFFECTS ②

It is well accepted today that asbestos is a hazardous material. Breathing asbestos fibers can directly cause asbestosis and several kinds of lung cancers. These diseases are more frequently found in workers who are exposed to asbestos and smoke cigarettes than in persons who are nonsmokers. Asbestosis is a lung disease characterized by scarring and thickening of the lung walls. Breathing becomes difficult thus causing a strain on the heart. The NIOSH recommendations were designed primarily to prevent cancer as well as decreasing the chance of developing asbestosis among workers exposed to asbestos fibers.

* Mention of commercial names or products does not constitute endorsement by NIOSH.

Carcinoma associated with asbestos exposures are cancer of the chest or abdominal lining, cancer of the trachea, cancer of the colon and stomach, and cancer of the lungs-the most prevalent. There is a latency period of 20-25 years between exposures to asbestos and development of a tumor with the exposure/disease relationship not being well defined.

E. DISCUSSION

On the basis of the sample results (table I) it does not appear that asbestos fibers present a hazard during the wearing of aluminized asbestos clothing. All samples resulted in fiber counts below detectable limits. Average fiber size could not be measured since so few fiber like materials were collected on the filters. Because it is not possible to specify a safe exposure level for a carcinogen, only a ban on the use of asbestos can ensure complete protection against this material carcinogenic effect. Therefore, asbestos lined clothing should be replaced, where technically feasible, by substitutes with lower chronic toxicities.

IV. RECOMMENDATIONS

In view of the above information, the following recommendations are submitted to management to alleviate the potential for asbestos exposure hazards:

1. Asbestos lined clothing should be replaced, where technically feasible, by substitutes that will provide the same fire protection but will reduce the possibility of chronic toxicity.
2. Air sampling to measure asbestos levels need not be performed on a regular basis. However, on occasion, this may be indicated as the condition and use of the clothing may present a potential for asbestos dust exposure.

V. REFERENCES

1. NIOSH Revised Recommended Asbestos Standard DHEW Publication No. 77-169, December 1976.
2. NIOSH Manual for Insulation Installers, DHEW Publication No. 77-188, August 1977.
3. NIOSH Manual of Analytical Methods, HEW Publication No. 75-121, P&CAM. 239.
4. OSHA 2206 - Safety and Health Standards 29 CFR 1910, U.S. Department of Labor, January 1976.

TABLE I

Concentrations of Asbestos in Fibers Per Cubic Centimeter of Air
(fibers/cc)

Orlando Fire Department
Orlando, Florida

November 27, 1978

Job Title	Sample #	Sample Type	Sampling Time	Sample Volume	Concentration
Fire Fighter	A-11	Personal	32 min	64 liters	<0.07 f/cc
Fire Fighter I	A-10	Personal	32 min	64 liters	<0.07 f/cc
Fire Fighter I	A-9	Personal	32 min	64 liters	<0.07 f/cc
Lieutenant	A-8	Personal	32 min	64 liters	<0.07 f/cc
Fire Fighter	A-5	Personal	32 min	64 liters	<0.07 f/cc
	A-7	G Area	32 min	64 liters	<0.07 f/cc
		Blank	32 min	64 liters	<0.07 f/cc

The above numbered samples were analyzed according to NIOSH method P&CAM #239 using phase contrast microscopy. ③

* Present OSHA Standard

2.0 f/cc - 8 hr TWA
10.0 f/cc - 15 min ceiling

** Recommended NIOSH Standard

0.1 f/cc - 8 hr TWA
0.5 f/cc - 15 min ceiling

* U.S. Department of Labor, January 1976, (29 CFR 1910) OSHA.

** DHEW (NIOSH) Publication No. 77-169, December 1976, Revised Recommended Asbestos Standard.

