Environmental Sciences Laboratory
MSM MOUNT SINAI SCHOOL OF MEDICINE
of The City University of New York

INSULATION HYGIENE PROGRESS REPORTS

FROM THE INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM

Irving J. Selikoff, M.D., Program Director
Vol. 6 No. 1 and 2 Summer 1976

U.S. Navy Prohibits Installation of Asbestos Insulation Material

The United States has ordered a halt to the use of thermal insulation materials in ship construction and maintenance. An order promulgated by the Naval Sea Systems Command on October 24, 1975, stated, "Asbestos and materials containing asbestos shall not be used in the construction, overhaul, repair and maintenance of naval vessels, nor shall such materials be used in any facility or operational application where suitable alternate materials have been designated. However, in the locations where asbestos materials are presently installed, rip-out operations shall not be performed for the sole purpose of eliminating asbestos."

While this order was specifically directed to the use of thermal insulation materials, as additional substitute materials are developed for other asbestos uses, provisions will be made extending this policy.

Respirators Required During Ripout

It was recommended that removal of asbestos previously applied only be undertaken by personnel fully aware of the hazards of asbestos exposure and the procedure for its control and that personnel engaged in asbestos removal be provided with and required to use proper respiratory equipment and special clothing. In general, this would require air-supplied respirators, as dust concentrations during removal can easily exceed 100 fibers per milliliter (f/ml) unless appropriate wetting techniques are utilized.

While few data exist on the removal of insulation material aboard United States ships, considerable information is available from Great Britain. During the removal of pipe or machinery insulation, air concentrations from 2 to 490 f/ml were observed in data obtained at

Continued on page 4



Asbestos Fireproofing Material Poses Continuing Problem

Spray fireproofing with asbestos-containing materials was banned by the Environmental Protection Agency in the United States in 1973. From 1958 through 1972, the steel work of many new high-rise buildings was fireproofed using spray techniques with asbestos-containing materials.

Recent data point to a continuing legacy of health risk from this procedure. This risk extends from maintenance personnel who must work in plenum spaces sprayed with asbestos to office building occupants breathing contaminated air from the erosion of fibers within the air supply system.

Maintenance a Problem

Any work by building trades personnel—electricians, plumbers, insulators repairing ducts and others—in the plenum space can lead to high asbestos concentrations if the sprayed fireproofing is dislodged. This was identified as a significant problem during the construction of such buildings, and it remains a continuing one. If such repair activities are to take place safely, asbestos must not be disturbed or it must be removed wet, prior to the maintenance activities.

The contamination of air supplies of buildings with sprayed asbestos fireproofing within return air plenums has been documented in studies at the Mount Sinai School of Medicine.

One hundred and nineteen air samples were taken in 19 buildings in four United States cities. The samples were taken in buildings in which both fibrous and cementitious asbestos spray materials were applied. Additionally, samples were taken of the outside air and in buildings containing no asbestos as fireproofing.

Contamination Present

The results showed that in those buildings in which fibrous asbestos spray fireproofing had been used, contamination was present in approximately half the samples analyzed. On the other hand, there was no significant difference in the distribution of air concentrations between buildings using cementitious fireproofing and the outside air.

In those cases where high asbestos levels were measured, it was not possible to ascertain the origin of the contamination. However, maintenance ac-

Continued on page 4

Blumberg No. 5113
PLAINTIFF'S EXHIBIT
RMC-105

TX TINER
RMC0002807

Insulation Hygiene Progress Reports
Vol. 8 No. 1 and 2 Summer 1976
from the
Insulation Industry Hygiene Research Program
Editor: W. J. Nicholson, Ph.D., published at the Environmental Sciences Laboratory (Irving J. Selikoff, M.D., Director), Mount Sinai School of Medicine of the City University of New York, N.Y. 10029

Advisory Council of IIHRP

Irving J. Selikoff, M.D., Program Director and Chairman

E. Cuyler Hammond, Sc.D., Vice President, American Cancer Society, New York, N.Y.

Andrew Haas, General President, International Association of Heat and Frost Insulators and Asbestos Workers, Washington, D.C.

PURPOSES OF THE INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM

1. To develop improved methods for minimizing exposure of insulation workers to dusts and fumes encountered in their work.
2. To disseminate knowledge of these improved methods of dust control wherever they may be applied advantageously and to offer cooperation, advice and assistance toward their universal adoption.

Chrysotile Miners Also at Risk of Asbestos Disease

A recently completed study by Dr. William Nicholson and Dr. Irving J. Selikoff of the Environmental Sciences Laboratory and Herbert Seidman and Dr. E. Cuyler Hammond of the American Cancer Society, has shown that Quebec chrysotile miners and millers have an unhappy health experience from their occupational exposure to asbestos. This research comparing the mortality experience of miners and millers with that of insulation workers and asbestos factory workers was presented at the International Conference on Occupational Health in Brighton, England during September 1975.

Of the three groups of workers considered, cancer mortality, particularly of the lung, was elevated in all three groups, but was higher among insulation workers than either factory employees or miners and millers. Overall mortality for all causes of death including abestosis was similar among all three groups of workers, and considerably higher than that expected from general population statistics.

Excess Mortality Present

In the study it was found that miners and millers who had begun employment at least 25 or more years previously had a 30% excess mortality compared to the general population of Canada. Lung cancer and asbestosis in particular were found to be principal sources of excess death among these workers. Asbestosis accounted for approximately 13% of the deaths, and lung cancer for 17%, more than three times as much as would have been expected.

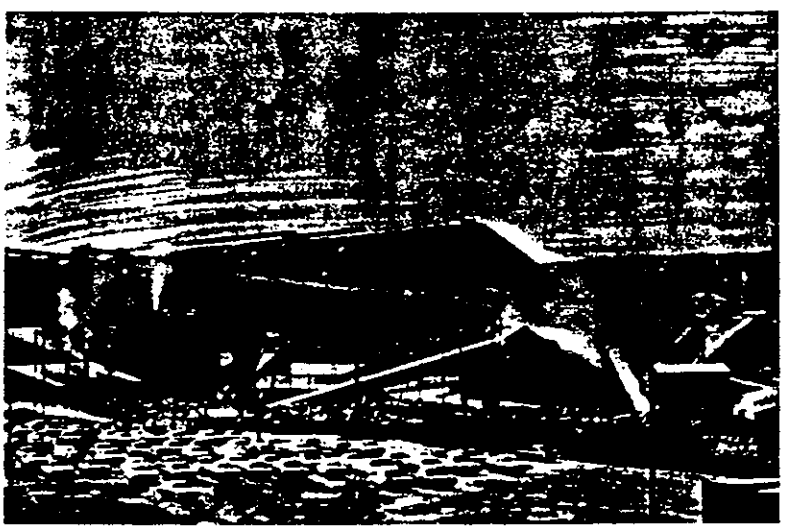
Comparable figures for insulation workers show that 22% of the deaths of the workers first employed twenty-five years previously are from lung cancer and 12% from asbestosis.

All Asbestos Produces Cancer

The results of this survey are of importance in that they demonstrate that chrysotile alone can produce excess asbestos-related cancers. Thus the suggestion that amosite or other materials in pipe covering need be responsible for the excess mortality in asbestos workers was found without firm basis.

These results help pinpoint the materials in insulation work which have resulted in the serious cancer risk of pipecoverers. From this and other research at Mt. Sinai it is clear that excess concentrations of both chrysotile and amosite give rise to serious disease.

Also included in the comparison was the mortality experience of a large manufacturing plant that produced much of the United States thermal insulation. Here the overall mortality was quite similar, although somewhat less lung cancer and asbestosis was found among employees employed for similar time periods.



TX TINER
RMC0002808



E.P.A. Wins Suit on Demolition of Insulation

The Department of Justice and the Environmental Protection Agency have received a favorable verdict in a court case testing the validity of EPA's asbestos emissions standard for removal of insulation material during the demolition of a building.

In a two count information (indictment) a Florida demolition company was charged with causing emissions of asbestos during demolition of a hospital in New Orleans. The charge was based upon the failure to follow procedures prescribed in the National Emission Standard for Asbestos.

Stringent Requirements

These included the requirements that all friable asbestos materials, such as thermal insulation, be wetted and removed from any building prior to wrecking or demolition, that no asbestos covered material shall be dropped, knocked down or thrown to the ground, and that all waste asbestos after wetting shall be sealed in leak-tight containers and deposited at specified and controlled waste disposal sites.

During the trial, it was brought out that friable asbestos materials lining pipes throughout the building had not been wetted and removed prior to demolition with a large iron ball. Moreover, the waste asbestos material was simply thrown into an open truck to be driven through the streets of New Orleans. Information from the Insulation Hygiene Research Program on the air concentrations found during removal of asbestos insulation material was entered as evidence in the trial.

Air Measurements Not Required

A crucial element in the emission standard is the absence of a requirement that air measurements be taken off site to verify that emissions have occurred. Such measurements are difficult to obtain, costly and time consuming to analyze and would be ineffective in assuring compliance with the intent of the regulations.

The alternative, that of specifying work procedures that must be followed by contractors during demolition, has been challenged by some demolition contractors, who argued that the regulation by itself does not constitute an emission standard.

This argument was dispelled by Judge James Comisky in pretrial hearings held in the Federal District Court in New Orleans. Judge Comisky wrote in dismissing this argument that "the uncontradicted scientific evidence is that ambient asbestos poses a significant health hazard related through insulation to various diseases.

Work Procedures Best

"Thus, given the extreme options of either ignoring a known health hazard and flatly imposing an absolute ban on any and all asbestos emissions, the agency (EPA) adopted a pragmatic approach. It arrived at a standard of emission control, not by means of maximum quanitative level, but by means of a work procedure.

"The evidence demonstrates that control of asbestos emissions through a work standard was the most, and perhaps the only practical means of combatting a health hazard."

The final jury verdict in the Federal District Court proceeding, which was concluded on March 25th, 1976, in essence validated the EPA regulations based on work practices.

T.V.A. Adopts Comprehensive Program

The Tennessee Valley Authority (TVA) has developed a comprehensive program to control airborne asbestos fibers in steam-electric generating plants as part of its overall hazard program.

The multifaceted program, recently described by Jack H. Fontaine and David M. Trayer in the American Industrial Hygiene Association Journal, integrates industrial hygiene controls, medical surveillance, and worker education. Substitution of nonasbestos materials is central to the program.

Extensive Removal Work

Currently, TVA employs as many as six full-time insulators at each of its twelve coal-fired, steam-electric generating plants. These men are exposed to asbestos during repair and maintenance of each generating unit, at approximately six-month intervals. During this time, old insulation containing large amounts of asbestos, principally amosite, is removed from systems scheduled for maintenance, and new insulation installed.

Personal and area sampling results have shown that while the time-weighted average concentration of total fibers was less than the current TLV, peak single-sample concentrations more than doubled the current standard of 10 fibers per milliliter.

The new control strategy of TVA is based on the OSHA asbestos dust standard. Utilization of local exhaust, wet methods and substitution are central to the program. Air sampling of fiber concentrations before and after installation of local exhaust ventilation proved the value of this control in reducing airborne dust produced by the cutting of block and pipe insulation with a band saw.

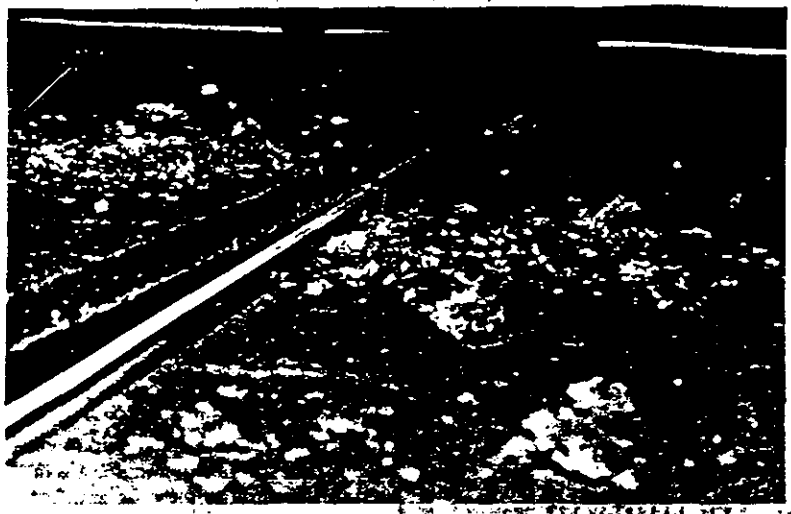
Wetting Important

Wetting has reduced by 85% the airborne asbestos dust from cutting asbestos-containing wallboards with high-speed radial saws. Wetting is also being used in scrap cleanup, where tests showed airborne asbestos fiber concentrations reduced from 0.3-13.8 f/ml (dry removal) to 0.0-0.3 f/ml (wet removal).

Equally impressive data have been forthcoming from Great Britain where wetting techniques have been devel-

Continued on page 4

TX TINER
RMC0002809



Removal of Spray Insulation May be Necessary

Continued from page 1

tivities within plenum spaces could have been a cause. Among the recommendations of the Mount Sinai study was the development of procedures for use during maintenance activities that may be required in asbestos-lined plenum spaces. Here, system isolation, area enclosure, localized wetting, and cleanup by vacuuming were suggested.

High asbestos levels found within buildings have led to complete removal of the material from several buildings. These have included a U.C.L.A dormitory, the Long Beach, California, Courthouse, and the Yale University Art and Architecture building.

High Levels Found

In the latter, fibrous asbestos spray material had been used for accoustical and decorative purposes on the ceilings. Flaking was found to occur, especially where the ceiling was low and within reach of the occupants of the building. Measurements using optical microscopy on air samples taken while the building was in use showed exposures could be as high as 18 fibers per milliliter (f/ml), more than three times the current *occupational standard.*

Such concentrations would occur during the replacement of books on library shelves where asbestos had fallen down. During routine custodial operations, concentrations of approximately 5 f/ml were observed. General room air values were approximately ½ f/ml.

These concentrations led to serious concern on the part of Yale University, and an extensive removal program was undertaken. Seventy thousand square feet of asbestos was removed, bagged, inserted in 50-gallon cardboard drums and buried. The total cost of the operation was approximately $750,000.

Double Barrier System

When contamination was first observed, a paint overspray was applied to the ceilings in the hope that this would reduce the contamination. While some reduction was observed, it was deemed insufficient and total removal was concluded to be the only course of action.

During asbestos removal, to keep fiber dispersal at a minimum, work areas were sealed by a double barrier system using plastic sheets. At the work area, fiber concentrations were maintained at less than 5 f/ml using a water spray with wetting agent. Without such precautions, dry removal produced fiber concentrations as high as 140 f/ml.

When working in asbestos sprayed plenum spaces, insulators or other workmen should:

1. Wet and remove any fireproofing that might be dislodged during maintenance work,
2. Exercise care not to disturb remaining fireproofing material,
3. Vacuum any loose asbestos material that may have fallen on ducts, ceiling tiles, or other service facilities before and after work, and
4. Wear approved respirator during work and cleanup.

T.V.A. Program

Continued from page 3

oped that maintain dust concentrations below 0.2 f/ml during insulation removal.

Substitution is being utilized to cut workers' asbestos exposure. No longer is pure asbestos specified in new plant design and construction; in addition, utilization of asbestos for maintenance in existing plants is being phased out. Fibrous glass, rock wool, mineral wool, and ceramic fibers are common substitutes.

NIOSH- and U.S. Bureau of Mines-approved air purifying respirators with replaceable filters are used by TVA. If the air concentrations are reasonably expected to exceed 10 times but not more than 100 times the prescribed limit, powered air purifying respirators or supplied-air respirators and special clothing will be worn during removal of old asbestos-containing insulation.

The health effects of asbestos work are stressed through an annual respiratory health evaluation that includes a chest X-ray and pulmonary function tests, as well as a training program to inform insulation workers of the health risks and various methods of protection.

Navy Insulation Work

Continued from page 1

the Devonport Naval Dockyard under the direction of Dr. Peter G. Harries. Some general air concentrations even exceeded 3000 f/ml (in contrast, the Department of Labor has recently recommended that no worker be required to work where there was, on the average, more than ½ f/ml.)

During the removal of spray fireproofing insulation from the aircraft carrier, wide dispersal of the material was observed. Excess concentrations occurred as far as two decks away from asbestos removal work.

As can be seen, the fibers are widely distributed. In the current U.S. Naval directive, prevention of exposures to other personnel directly engaged in the asbestos operation was called for.

The above fiber concentrations were observed when the insulation material was removed without the use of special wetting techniques. Workers were enclosed in air-supplied impervious suits, and areas where removal was taking place were sealed off from the rest of the ship. Even though precautions were taken, some dispersal of the fibers occurred beyond the containment areas.

TX TINER
RMC0002810