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FROM THE INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM

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New Asbestos Standard Proposed Cancer Risk Specifically Considered



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On October 9, 1975, the Department of Labor proposed a new standard for occupational exposure to asbestos. The proposed standard would, among other things, lower the permissible asbestos exposure to 500,000 fibers per cubic meter of air (0.5 asbestos fibers per cubic centimeter) for an eight-hour, time-weighted average exposure, and likewise reduce the permissible ceiling exposure to five million asbestos fibers per cubic meter (5 f/m³) for any period not exceeding 15 minutes. The proposal would reduce to one-tenth the current U.S. time-weighted average exposure standard of 5 f/ml. A reduction to 2 f/ml on July 1, 1976 is already mandated in the current standard.

Special Provisions for Construction

The standard, as revised, would apply to all workplaces where occupational exposure to asbestos occurs, but would exclude the construction industry at this time. However, the Occupational Safety and Health Administration (OSHA) plans to soon put forth special regulations for this segment of the asbestos industry.

In the proposed rules published by the Secretary of Labor, it is stated that, "It is OSHA's intention to develop and propose a separate revision to the existing asbestos standard for the construction industry. Approximately three-fourths of all asbestos products in 1972 were used in the construction industry. In addition, the uniqueness of the construction industry itself (viz., the multiplicity of non-fixed workplaces, and the utilization of highly transient work forces) strongly suggests separate treatment. These structural differences were reflected in the 17-18 September 1975 deliberations of the OSHA Advisory Committee on Construction Safety and Health...

"Although OSHA believes that health hazards faced by employees in

the construction industry with regard to occupational exposure to asbestos are similar to those faced by their counterparts in other covered employments, OSHA recognizes that alternative administrative and engineering controls may be more appropriate and feasible for the construction industry. Therefore OSHA intends to consult with the Construction Advisory Committee in order to further explore such alternatives. Upon publication of the proposal to revise the existing asbestos standard for the construction industry, OSHA will consider the possibility of consolidated hearings on that proposal and the proposal contained herein for all other covered employments."

This recognition that the construction industry is unique is highly desirable. Earlier data on the effectiveness of monitoring in the construction industry (see *Insulation Hygiene Progress Reports*, Summer 1973), have shown that few dust counts are ever taken in this segment of the industry. Thus, specification of procedures is of much greater importance here. Individual workers must be able to judge whether or not they are working in a safe environment on the basis of materials and methods rather than dust counts.

As much of insulation is now asbestos-free, work practices for installation of new material can be developed that would lead to a time-weighted average exposure less than that proposed in the new standard. With care, even rip-out can be done safely, but special precautions must be taken. Wetting techniques have now been developed that would allow removal of asbestos to be accomplished within the proposed regulations.

Millions of Workers Exposed

In the preamble to the standard, OSHA estimates that millions of workers are occupationally exposed to asbes-

tos. They state, "An estimated 50,000 workers are involved in the manufacture of asbestos-containing products. However, this figure does not include secondary manufacture of products which contain asbestos, such as electrical or thermal insulation, or products which include previously manufactured components containing asbestos.

"There are approximately 40,000 field insulation workers in the United States who are exposed to asbestos dust. The activities of these workers is estimated to cause secondary exposures to approximately three to five million other buildings construction and shipyard workers. However, since the dust exposure to the individual worker is extremely variable, and the number of asbestos workers at any one location is small, the primary and secondary asbestos dust exposures to all workers have never been satisfactorily estimated."

Cancer-producing Substance

The impetus behind the new proposal is the acknowledgement by OSHA of the cancer-producing properties of asbestos. The current United States standard was based to a large extent on one developed earlier in Great Britain and put into effect in 1970. That standard, in turn, was designed solely to protect against lung scarring (asbestosis). Cancer was recognized as an occupational hazard from exposure to asbestos but the British committee developing their standard stated that since a quantitative relationship between asbestos exposure and cancer risk was not known, it was not possible at that time to specify an air concentration which was known to be free of risk in this respect. It was hoped by the British, and by the United States agencies, that application of control measures that would protect against asbestosis would

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**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.

Asbestos Risk Exists from Use of Taping Compounds

In spite of the introduction of asbestos-free insulation materials and the existing bans on the use of asbestos-containing spray fireproofing, a serious asbestos hazard remains in the construction industry, with members of the Painters Brotherhood of the Building and Construction Trades Department being at greatest risk. Wallboard finishing compounds and spackle have been found to contain significant amounts of chrysotile asbestos, which is released into the air as dust either during the dry mixing of these compounds or during sanding.

Drywall taping compounds came into widespread use shortly after World War II. Until fairly recently, most of the material used was mixed at the construction site, raising large clouds of dust. In the past few years, many contractors have switched to premixed compounds, thereby eliminating one major source of asbestos dust. This practice, though, depends entirely on the contractor and what he supplies; several tapers interviewed recently by Mount Sinai personnel said they still had occasion to use the dry-mix brands.

Sanding can be Dangerous

The problem that remains, even when ready-mixed compounds are used, is that of the dust produced when the dried compound is sanded, prior to painting. In some areas of the country, tapers, or their apprentices, stay and do their own sanding; in others, the painters are left to finish the job, often sanding while other men are working in the same room. Sanding is done either by hand or with a pole.

The Environmental Sciences Laboratory took air samples at selected job sites in New York City while tapers were at work. Personal samples taken during pole sanding ranged from 1.2 fibers per milliliter (f/ml) to 19.3 f/ml; in an adjacent room, at a distance of 25 feet from the sander, a level of 8.8 f/ml was found. Levels for hand sanding ranged from 1.3 to 16.9 f/ml in the breathing zone of the workers, and a high of 7.1 f/ml was obtained in an adjacent room, at a distance of 15 feet. During dry mixing, a breathing zone sample was found to contain 59 f/ml, though after a 15-minute lapse the level went down to 0.5 f/ml.

The sweeping of floors after sanding was also found to stir up considerable quantities of settled dust. Thirty-five minutes after sweeping at the site of the sanding, a fiber concentration of 26.4 f/ml was obtained. The current U.S. standard in industry is an average not to exceed 5 f/ml, mandated to go to 2 f/ml in July, 1976. The Department of Labor has recently initiated procedures to have the standard lowered to 0.5 f/ml.

The results of this sampling, especially when contrasted with the current standard in industry, emphasize the importance of both respiratory protection and careful cleanup in order to reduce the risk of inhaling asbestos fibers. A respirator should be worn by sanders and by any other workers who must be in adjacent areas while this work is in progress. If possible, other workers should wait to allow the dust to settle and be removed before proceeding with

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Mixing of asbestos containing spackle material. Dust concentrations during this process can ex-

ceed the current asbestos standard by more than ten times.

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New Information on Health Effects Reviewed

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also protect against the various asbestos cancers.

Important new information has been forthcoming subsequent to the promulgation of the current U.S. standard. This has included data obtained by Drs. Irving J. Selikoff and E. Cuyler Hammond on the mortality experience of all insulation workers in the United States. This large research project showed unequivocally the high risk of lung cancer and mesothelioma experienced by asbestos workers, and in addition, demonstrated that gastro-intestinal cancer was also increased in incidence among asbestos workers. As data from this large study were reviewed, it was suggested that the risk of developing cancer of the larynx, oropharynx, or esophagus was also increased from asbestos exposure. Research with the International Association of Heat and Frost Insulators and Asbestos Workers was quoted many times by the Department of Labor. Further studies of other large groups of workers occupationally exposed to asbestos in factory employment or mining and milling also indicated excess carcinogenic risk.

New Information

The Department of Labor particularly noted information forthcoming from the British Textile mill whose workers' health experience served as basis for the current British standard. "Of significant importance, new data have recently been made available concerning the cancer risk of workers at the textile mill reviewed for the British standard, including those workers first employed after 1933. It was found that there was excess mortality from lung cancer among those workers who entered scheduled areas after 1 January 1933. There was clear evidence of some excess of lung cancer and respiratory deaths among those first exposed between 1933 and 1950. Equally important was the finding that there still appears to be an excess of deaths due to lung cancer after 15 or more years' exposure even among those first exposed in 1951 and subsequently. Indeed, it is known that mesothelioma deaths have occurred among the specific group of 290 workers whose experience prior to 1966 had led to the development of the current standard, as detailed above."

Additionally, they noted the increase occurrence of mesothelioma in workers only indirectly exposed to asbestos,

where it appears that average exposure levels would often be considerably less than the projected 2 f/ml standard.

Shipbuilding Data Important

"Of considerable industrial importance has been the recent description of asbestos disease among shipbuilding and ship repair workers, few of whom actually work with asbestos, but many of whom were, in the past, inadvertently exposed to the asbestos dust resulting from the use of asbestos products by a relatively few of their work mates. In 1968, Harries of the Royal Navy reported cases of mesothelioma among shipyard workers at the Royal Navy dockyard in Devonport, in trades which did not directly involve workers exposure to asbestos, but in which there had been occasional opportunity for exposure merely by virtue of working in the same areas. This original finding has been widely confirmed and numerous cases of mesothelioma have since been reported in former shipyard workers. Studies of populations of current shipyard workers have shown much radiological evidence of asbestos abnormalities among workers in trades only indirectly exposed to asbestos in the yards."

"Further, evidence has indicated that asbestos also acts as a lung carcinogen at levels much below those which will produce asbestosis. Two surveys of shipyard workers who had x-ray evidence of pleural plaques, but generally not of pulmonary fibrosis, showed a 2.5-fold excess risk of death from lung cancer and high risk of mesothelioma."

Finally, a recent study by NIOSH was reviewed which showed that the mortality experience of underground metal miners exposed to asbestiform minerals produced a threefold increased risk of bronchogenic carcinoma in workers. Fiber concentrations in the mine average 0.24 f/ml.

In discussing considerations applicable to standards for carcinogens, OSHA stated that, "In the case of asbestos, we are dealing with a substance that poses a range of health risks to the working population. These include the threat of cancer, as well as asbestosis. In considering the controversial issue of carcinogenicity, OSHA is relying upon not only the new data reviewed above, but the leading scientific principles and options believed to reflect the research conclusions of international cancer ex-

perts, which were developed since or not known to OSHA at the time that the original standard was promulgated.

"A. THE LATENCY CARCINOGENIC EFFECTS

"In humans, the latency period for chemical carcinogens may well extend between 20 to 40 or more years. Analogous periods exist for test animals. This means that the disease may undergo a long development before a tumor is actually detected. At that point, it has reached a stage where removal of the worker from the workplace may be of no avail and where treatment may be extremely difficult, if not futile. Prudent policy would therefore seem to indicate that every reasonable measure should be taken to eliminate human exposure to chemical compounds as soon as their carcinogenic nature is identified.

"B. VARIABILITY IN INDIVIDUAL SUSCEPTIBILITY IN RELATION TO THE CONCEPT OF A THRESHOLD

"Cancer development may be influenced by such factors as the differing susceptibility of various body organs. In animal studies, it has been found that individual variability in a response to carcinogens is great depending upon factors such as age, sex, hormonal status, diet, and genetic factors. Thus, in the working population, certain groups, such as those already biologically compromised, may be more susceptible than other groups.

"C. A 'THRESHOLD' LIMIT

"Because of the variability of individual response to carcinogens and other factors, the concept of a no effect or threshold level may have little real significance on the basis of existing knowledge. While some level, below which exposure to a carcinogen does not cause cancer, may conceivably exist for any one individual, other individuals in the working population may have cancer induced by doses so low as to be effectively zero. This is not to say that researchers will never find a threshold level for a carcinogenic substance, but it does mean that the threshold concept for carcinogens is, at present, more a matter of responsible regulatory policy than a precise, scientific determination.

"These theoretical concepts have a

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Sanding of Spackle Material Should be Limited

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their own trades. The area should be cleaned, preferably with a vacuum, as soon as the dust has settled. If no vacuum is available, the floor should be dampened prior to sweeping, and the sweeper should wear a mask.

Health Effects Seen

Simply because sanding is only a small part of this construction activity is no reason to minimize the importance of the problem. Although exposure duration may be short, the cumulative effect of repeated short-term exposures to measurable concentrations of asbestos fibers can be serious. In the course of a medical study of 69 drywall tapers belonging to Local 1974 of the Drywall Tapers and Painters of Greater New York, two-thirds of whom had had an exposure of ten years duration or longer and 61 of whom were smokers or ex-smokers, X-ray abnormalities characteristic of asbestos exposure were found in 37 out of 63 films. There is a close similarity between these findings and those among insulators.

At least one brand of commercial wallboard finishing compound is currently available containing no asbestos. It is likely that, as the negative aspects of asbestos-containing compounds become more widely known, other manufacturers will develop new formulations that are free of asbestos. Until then, only premixed materials should be used and the sanding of dry material eliminated or reduced as much as possible.



Sanding of dried spackle material with a pole sander. Dust concentrations here often exceed the current asbestos standard.

Comments Solicited on Proposal

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bearing on the asbestos issue, particularly as to the question of the existence, or nonexistence, of a threshold level of carcinogenic effect. A no effect level theoretically may exist, but it has not been demonstrated.

"In previous rulemaking proceedings, OSHA has considered these issues and determined that in the absence of evidence to establish a safe level on the basis of present knowledge, employee exposure must be reduced as low as feasible."

In a further discussion of the major provisions of the proposed standard, OSHA explicitly recognized that, "since the promulgation of the current standard, several distinguished individuals and many agencies, both public and private, have made valuable contributions to the field of toxic substances generally, and asbestos specifically."

"Exposure Levels. Recently, the National Institute for Occupational Safety and Health (NIOSH) has informed OSHA that it is currently reviewing data which may provide significant information with respect to the margin of safety afforded by the existing asbestos exposure limits. In a memorandum dated 29 September 1975 to the Deputy Assistant Secretary of Labor for OSHA, the Director of NIOSH stated:

Multiple and consistent epidemiological studies leave virtually no doubt that asbestos is carcinogenic to man.

"OSHA also believes sufficient medical and scientific evidence has now been accumulated to warrant the designation of asbestos as a human carcinogen. Therefore, it is incumbent upon OSHA to propose the establishment of safeguards to protect the lives of affected workers.

No Safe Level for a Carcinogen

"OSHA deems it appropriate to propose that the 8-hour exposure limit (TWA) be lowered to 500,000 asbestos fibers per cubic meter (0.5 asbestos fibers per cubic centimeter), and that the ceiling exposure limit be 5,000,000 asbestos fibers per cubic meter (5 asbestos fibers per cubic centimeter) for any period up to 15 minutes. OSHA recognizes that there is no assurance of a safe exposure for a substance with known carcinogenic property, in this case asbestos, and thus there should be no detectable concentrations. However, the

Act requires that the Secretary establish standards to extent feasible, and therefore the Secretary must take into consideration technological and economic factors.

"OSHA believes that it may be appropriate to postpone the effective date of the proposed exposure level because of the existence of problems of feasibility of a technological and economic nature. OSHA expressly invites comments on this issue, including comment on the appropriateness of a phased schedule for compliance with any new exposure level, based on such feasibility factors. In this respect, OSHA particularly invites comments on the structure of the asbestos industry generally including factors distinguishing particular sub-industries in terms of methods of asbestos use and capabilities of compliance."

The deadline for submission of comments on the proposed regulations is December 8, 1975.

Additional provisions in the proposal put forth by OSHA would "extend the retention period for medical and monitoring records to forty years, or for the duration of employment plus twenty years, whichever is longer; provide procedures for the transfer of medical and monitoring records of certain former employers; require specific minimum data on medical and monitoring records; revise the procedures for initial and subsequent monitoring; modify the definitions of asbestos and asbestos fiber; add provisions for employee hygiene, information and training; revise and update the requirements for respirators, and warning signs and labels; and establish a time parameter for sampling ceiling concentrations. In addition, the proposal will suggest work practices to be followed for certain operations and processes involving asbestos."

Of particular importance is a proposal that would add sputum cytology as a diagnostic test. This is proposed only for workers who are forty-five years old, or who have been employed in the asbestos trades for ten years or more. Here, analysis of cells coughed up from the lung may be useful in indicating the early stages of lung cancer, at a point where more successful treatment can be accomplished. This procedure was recently proposed to NIOSH by President Haas for all members of the IAHFIAW and is being considered by the Institute.

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