OCCUPATIONAL MEDICINE

PLAINTIFF'S EXHIBIT ASA-127

Partnership for Prevention–

The Insulation Industry Hygiene Research Program

*Irving J. Selikoff, M.D.**

The nation's first cooperative effort by an international labor union, industry, medical science and government to conduct a preventive hygiene research program for insulation workers has been in productive operation for a year and a half. In the development of specific techniques and equipment to control and prevent exposure to dusts, as well as in the experience of cooperative support, the program will have application far beyond the insulation industry.

It is an achievement of modern medical methods and applied industrial hygiene practices that it has been possible in the course of a relatively few years, to detect the long-term effects on workers of an important occupational health hazard, to identify major sources of this hazard, and to take positive steps toward its reduction and, we hope, eventual elimination.

That this required the combined efforts of clinical and epidemiological medicine, the cooperation of an international union and its 18,000 members, and the direct involvement of a major industrial concern and its facilities for applied research should not be surprising.

The Insulation Industry Hygiene Research Program has three major goals: the prevention of dust formation; the control and limitation of dusts that are unavoidable, and preventing inhalation of dust by those exposed to it. The avenues of approach toward these goals involve both human elements — changing work practices of the insulating workmen — and technological elements — changing methods of manufacturing and application of insulating materials.

The program has been functioning for somewhat over a year, and it appears that the threshold of control has been crossed. For example, we have developed a new type of respirator intended specifically for use where fibrous dust generation cannot be avoided. New types of containers for mixing asbestos cements are being used; insulating materials are being coated with a spray that keeps particles from shaking loose during transportation and handling. Prefabricated fittings have been developed that will preclude working with loose materials in tight places. New control methods are being tried for application of sprayed insulation materials on major construction projects. Better methods for collecting and disposing of dust-generating wastes are being tested. Prototype ventilating systems for power saws used in cutting insulating products are proving remarkably effective in preventing production of respirable dusts.

JOINT PROGRAM BEGUN IN 1968

This joint enterprise enlisted the support of the Johns-Manville Corporation, a major producer of insulating materials; the International Association of Heat and Frost Insulators and Asbestos Workers; the Environmental Sciences Laboratory at Mount Sinai School of Medicine; and the Bureau of Occupational Safety and Health of the U.S. Public Health Service. Subsequently, the Sprayed Mineral Fiber Manufacturers Association, Inc. added their participation. The cooperation of insulating contractors throughout the country and regional groups of contractors who are directly involved in all aspects of applying insulating materials, was freely given and appreciated.

For coordination of the program and to assure continuing input of new concepts and new techniques, we established an Advisory Council with representatives of medicine, labor and industry — the elements directly concerned with the application of preventive measures and with their widespread adoption throughout the insulating and related industries.†

While today we can check off the progress already made toward solving some of the occupational health

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...ograms and can look ahead with confidence that ...rther strides will be made, it is instructive to review ...e events leading to the identification of the hazard and ...o consider why recognition and corrective action was ...aken only recently. The lessons learned may be applied to other industrial situations.

It is too easy to indulge in what might be called the demonological theory of industrial hygiene history. One version would place the responsibility for early identification of risk and its correction upon industry and then indict it for trading human health for profits. Similarly, the other side of this counterfeit coin puts the blame on organized labor for having been more interested in premium pay for hazardous work than in eliminating known hazards. Both conclusions are too convenient and are essentially erroneous. It is much nearer the truth to say that both industry and labor shared in ignorance and neglect of the problem. Science and medicine are also at fault here for inadequate attention to environmental and occupational health.

In retrospect, however, it is possible to see why recognition was so long in coming. We now know that it may take 20 to 30 or more years from onset of exposure before the effects of this particular hazard begin to manifest themselves in the morbidity and mortality of the workers.

In the asbestos mining and manufacturing industry, the risk of heavy exposure to the occupational dusts had been recognized for some years. And this primary industry has understood the need to install ventilation systems and other dust control devices to reduce the hazard. Experience had indicated that reduction of dust levels and exposures could result in greatly improved health experience among asbestos factory workers.

But the extrapolation of that experience to another classification of workers — specifically those who fabricate and install insulating materials — was a more sophisticated task for clinical medicine and epidemiology.

An immediate problem is that the insulating workers are not a centralized homogeneous group that can be studied at once, but are composed of units of small numbers that do not immediately exhibit conspicous definable trends or patterns of health. For example, the 18,000 unionized insulation workers in this country are dispersed among some 850 employers — an average of 17 workers per employer, with only one-sixth having more than 20 employees regularly. The unions are organized by locals and only two of these locals have as many as 700 members each. Further difficulties were imposed by the fact that 30 or 40 years after an insulation worker had been first exposed, he frequently was retired and no longer easily traceable.

With the full cooperation of the New York area locals of the Heat and Frost Insulators and Asbestos Workers Union, my associates and I set up in 1962 a program to compile the work history and health records of the 632 men who were members of the union on January 1, 1943. Each of these men was traced through 1962. Among these men with exposure of at least 20 years to asbestos and other insulating dusts, there were 255 deaths, 52 more than the expected number based on comparable U.S. mortality figures. Analysis of causes of death revealed 12 due to asbestosis, 42 deaths attributed

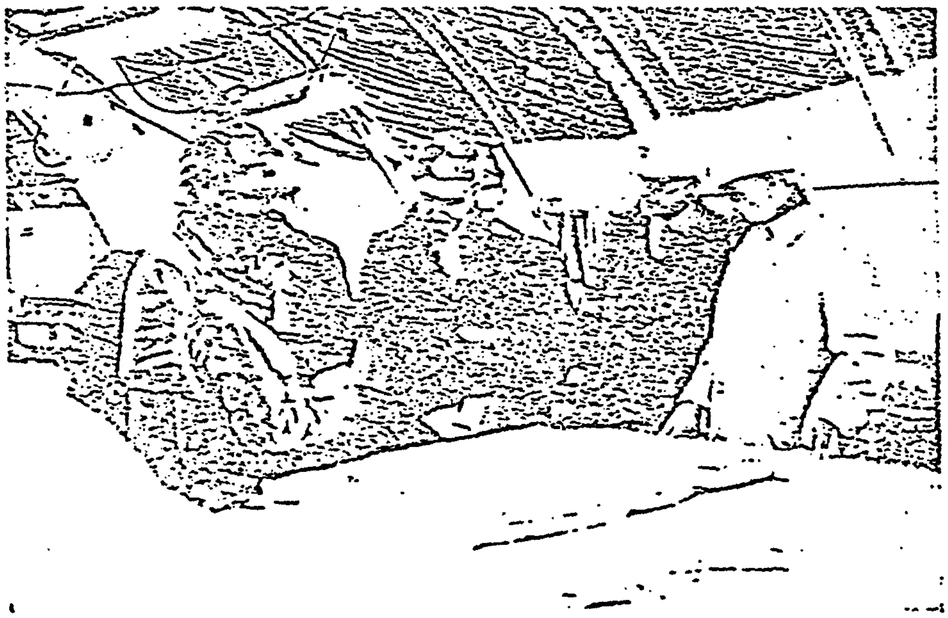

FIGURE 1. Members of the Advisory Council of the Insulation Industry Hygiene Research Program joined a team of industrial hygienists on a construction site field trip to observe environmental conditions of insulation workers. From right, Dr. Irving J. Selikoff, Program [illegible] Hammond, Vice President, American Cancer Society, Dr. Fred I. [illegible], Johns-Manville Corporation.

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to lung cancer, and four from mesothelioma, a malignant tumor rarely reported among the general population.[1]

STUDY SHOWS HIGH RISK OF DISEASE

Here we had, then, the first solid evidence that these insulation workers were experiencing exposures to dust inhalation in the basic asbestos industry. Our continuing study of the work and health records of this group of union members confirms the higher risk of respiratory disease and cancer for the insulating workers than exists among the general population.

There were 632 members of the New York area locals of the asbestos insulating workers' union on Dec. 31, 1942. By Dec. 31, 1968, 300 were dead from various causes, including 30 from asbestosis, 72 from lung cancer, and 22 from mesothelioma.[2]

Apart from the occupational hazard, a most significant relationship between lung cancer and the combination of cigarette smoking and insulating work has been revealed. This particular phase of the study started in January 1963 when 370 men of the original 632 were still alive. By November 1, 1969, 36 cases of lung cancer had developed. The group of 283 cigarette smokers contributed all but one of the lung cancer cases. This finding suggests that among these workers who smoke cigarettes, the risk of dying of bronchogenic carcinoma is 92 times that of men who neither smoke cigarettes nor work in the insulating industry.[3] Here obviously is a preventive problem involving the personal habits rather than the work habits of a large group of workmen.

Confronted with the evidence of job exposure to asbestos and other dust hazards, the first urgent task was to seek to identify the sources of exposure. It is known that a large proportion — something over 50% — of the asbestos used in this country for the past 40 years has gone into the construction industry in one form or another. It is fortunate that the greatest part of this has been in products in which the asbestos is "locked in" — that is, it is bound with cement or plastics or other binder so that there is no release, certainly no significant

FIGURE 2. Insulating workers, members of the Asbestos Workers Union, test prototype dust masks for efficiency and comfort on Illinois job site. Each of these masks incorporates slight design differences.

FIGURE 3. A proposed method to eliminate a major source of dust at construction sites has been the development of a plastic mixing bag for asbestos cement. Bags are partly filled with dry cement at the factory. Water is added on the job through a valve at the top of the bag which accomodates the nozzle of a hose, and the result is mixed up in the bag.

release, of asbestos fiber in either working areas or general air. Such products as floor tiles, roofing felts, asbestos cement products, siding material, and the like contain the locked-in fibers.

Attention therefore was turned to those insulating products which were capable of generating dusts on the job -- through handling, sawing, fabricating, applying, mixing, as with loose asbestos cement, spraying, and waste disposal.

Examination of these activities, where there was obviously generation of dusts, quickly taught us that we were to be concerned with what happens at three levels of exposure: first, the insulating worker who is most directly and intimately subject to dust exposure; secondly, other construction workers who may be working in the vicinity of dust generation or who may be called upon from time to time to come into intimate contact with insulating materials; and third, the nearby ambient air which, under many circumstances, will certainly receive the drift of dusts and fibers from insulating activities.

Our primary concern, of course, is with the insulation worker, not only because we have established the risk for him but because if his exposure is brought under control, then the other problems will be resolved automatically. There is some evidence of increased respiratory disease risk for other construction workers, although we do not know its extent or whether this is because of direct contact with the material or indirect

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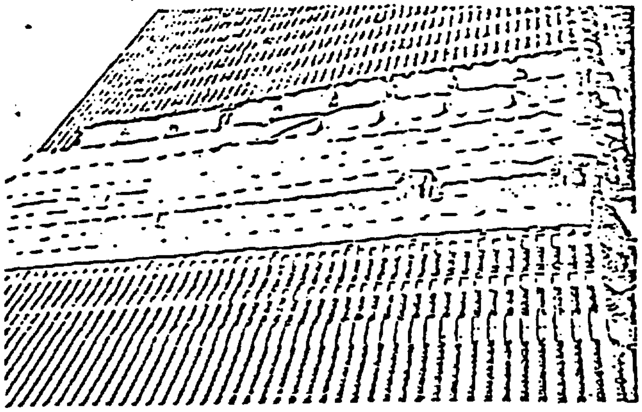


FIGURE 4. Spraying of girders and spandrels with mineral fibers for fire-proofing can be conducted with reduced release of mineral dust into the air through containing the operation behind tarpaulin covers, as shown here on the new World Trade Center building in New York City.

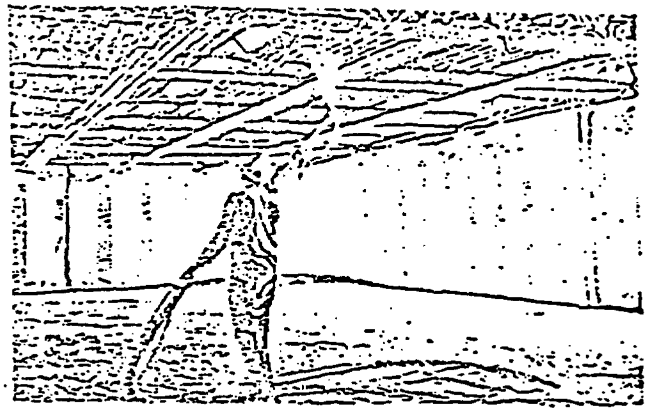


FIGURE 5. An inside view of the spraying of ceiling joists with mineral fiber at the World Trade Center Building. The spray area is sealed from other work areas at the elevator shafts as well as at the windows. The operator wears a respirator.

exposure in the vicinity of insulating work. And while there is at present no evidence of community risk from asbestos fibers in the ambient air, it is only prudent, especially with our concern for reducing general air pollution, that job-generated dusts and fibers be prevented from drifting into the community air.

Much of the technology for dust prevention and control was developed and used in many mines and plants; the technique for adapting these to the particular jobs and job-sites of insulation workers continues to present challenges. We are currently required to work toward these related goals simultaneously — the prevention of dust inhalation by workers who are now exposed, the limitation of dusts that are presently unavoidable, and ultimately, the prevention of dust formation.

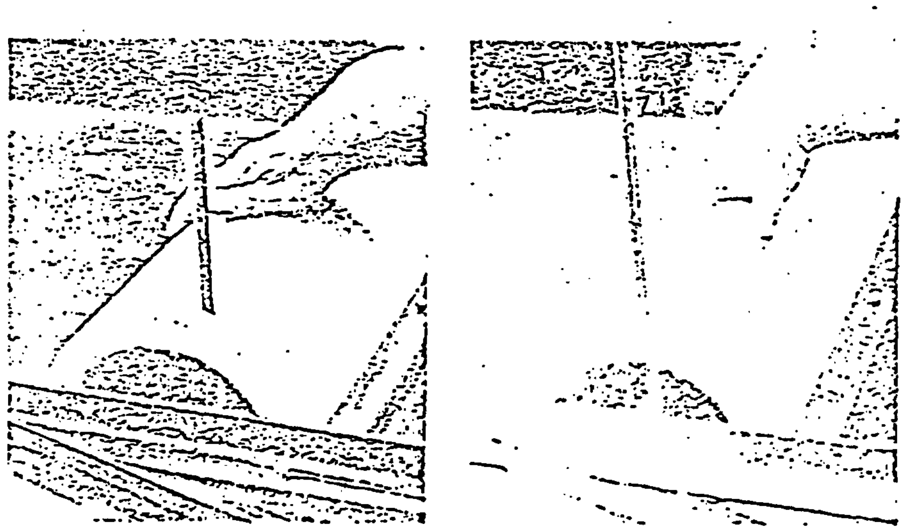
SAFE PRACTICES BEING DEVELOPED

Immediate protection against dust inhalation was among the more urgent problems. Although various respirators and dust masks had long been provided for those working in heavy concentrations of asbestos and other dusts, we found in actual practice only 4% of union members surveyed said they always used a mask on a dusty job and almost 30% said they never used such protection. We immediately turned our efforts toward developing a new type of respirator — one that would not only be effective against the fibers and dusts generated in insulating work but, more importantly, one that would meet the workers' requirements of comfort, convenience, and good vision.

We have not yet achieved our goal, but we are perfecting a new type disposable mask that is specifically designed to meet the requirements of those who will wear it. The first field use tests in the spring of 1969 revealed some shortcomings that sent us back to the design laboratory. We are confident that the result will be a respirator that will be more acceptable to insulating workers and that may be adapted for many other occupations where breathing masks are required — but too seldom worn. As our colleague, Dr. Cuyler Hammond, has said, it is far better to have a mask that is 100% used, even if not fully effective, than one that is fully effective but never used! We are developing a mask that will be both effective and worn.

What we aim to achieve is a working environment in

FIGURE 6. A newly-developed portable suction attachment for portable power saws on construction sites is nearly 100% effective in collecting dust. In the picture on the left, a section of asbestos pipe covering is being cut with the use of the suction attachment. The picture on the right shows the dust which would be released into the air if the attachment was not used.



which dusts are so fully controlled that respirators may never be necessary. One stumbling block has been that in installing insulation it is necessary to mix some asbestos cement on the job site. This is spread and applied to seal joints and to fill in corners where pre-fabricated material is not practical. Previous and present practices call for mixing this combination of asbestos and cement or other binding materials in open troughs or mixing bins. Almost every step in this process generates some dusts – from the emptying of bags to the mixing of the material with water. At present, we are testing two different methods of packing an asbestos-cement mixture so that the water can be poured *into* the container and wetted down into the so-called "mud" without generating dust. We know that this will work, and it is merely a matter of determining practical sizes of containers, the best material for the bags, and the most convenient means of applying the water and mixing within the bags.

Many insulation fittings are manufactured at a plant, packed and shipped in containers that are opened at the job site. It was found that these fittings were shedding during the handling, so that the containers themselves were emitting dusts and the fittings continued to shed during handling. Industry research laboratories developed a method of spraying these fittings with a wax-like substance before packaging. This dust-suppressing spray method, developed at the Johns-Manville Research and Engineering Center, prevents the dust from shaking loose and has, therefore, provided another means by which we *prevent* the generation of dust – our ultimate objective.

Although shaping and fabricating of insulating materials is sometimes done in shops that are fitted with special dust-collecting devices, there continues to be much individual sawing on the job site – either with hand or power saws, which have not had dust collectors. We posed this problem to makers of portable power saws. Now there are pilot models of power saws with suction attachments that are nearly 100% efficient in dust prevention.

Even as these positive and constructive steps are being developed, we discover that new and difficult questions arise. Monitoring for dust counts still needs refinement – and we do not actually know what the minimum necessary level is. Therefore, we seek to achieve as near zero generation as possible. Attention has been turned to the collection, transportation and disposal of construction wastes – which in New York City alone amounts to some 2,000 tons a day. The manufacturers and applicators of sprayed insulating materials are developing new methods and work practices to contain the dusts involved in this operation. Shipyards pose special problems that our technical people are studying.

And there is still the practical problem of making sure that the new methods and techniques are adopted by employers and workers and applied to their daily procedures. Fortunately, we are getting excellent response from contractors and contracting groups, and the participation of union members is assured. Each union member contributed $10 to help support the program (it is thus *his* program!). A quarterly report of progress is published, and is sent to each union member, to contractors, other union groups, industrial hygienists, educators, physicians and other scientists, and government officials involved in occupational health activities.

This partnership for research into prevention of the occupational health hazards of the insulating industry – forged by labor, industry, science and government – has proved useful. It is possible that it will provide a key to similar partnerships in other industries where occupational health problems exist.

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