PLAINTIFF'S EXHIBIT
UC-5371

STATUS SUMMARY - MID 1970

ASBESTOS TOXICOLOGY

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UCASS00719151

INTRODUCTION

Over the past several years a great deal has been said in the public press regarding the potential health hazards of asbestos. Much of this has been based on a classic work of environmental medicine by Dr. Irving J. Selikoff now at the Mt. Sinai School of Medicine in New York City. Although Dr. Selikoff's work covered only a single end use, sprayed asbestos for the insulation of steel frame buildings, it has been extrapolated and interpreted by others to give a widely held impression that asbestos is an extremely dangerous material. This report is intended to provide some of the most recent information on this subject so that objective judgments may be made.

CONCLUSIONS

These references lead to the conclusion that there is a hazard in the use of asbestos. As the McGill study points out, however, even under poorly controlled dust conditions ..."the total number of respiratory diseases attributable to asbestos was very small." Asbestos thus appears to be a typical industrial raw material, i.e., it has some handling hazards but can be used safely as long as reasonable care is exercised. There are explicit government specifications on allowable dust levels that constitute safe handling.

The Union Carbide Corporation Industrial Medicine and Toxicology Department has prepared a more detailed summary of the current state of knowledge on asbestos toxicology. It is attached for reference.

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EXPERIENCE WITH SPRAYED ASBESTOS IN THE BUILDING TRADES

A synopsis of Dr. Selikoff's latest thinking is given in an article in the Engineering News Record of April 2, 1970.. A copy of this article is attached for reference with the following quotations particularly pertinent here:

> "From buildings under construction there is often a gentle floating fall of a cottony material. This material that fails to adhere to the steel as it should and blows up, down, around and across a job and sometimes over wide sections of a city on windy days."

> "The resulting storm of asbestos dust is a potential danger to everyone on the job, according to Dr. Selikoff. He has not as yet gathered extensive data on the threat to the general public and will not guess the possible incidence of asbestosis or lung cancer among those not directly working with asbestos but intermittently exposed to it in a casual way."

> "Dr. Selikoff says that products in which asbestos has been bonded into the material, such as floor and ceiling tiles, roofing, siding, and pipe, are not considered a cause of cancer."

This position is also amplified by the following additional quotations of Dr. Selikoff from another source.(1)

SELIKOFF

> Of the eighty-seven men who didn't smoke cigarettes, we didn't expect any to die of lung cancer, because people who don't smoke cigarettes by and large don't die of lung cancer, although a few do. That has been our experience among the asbestos workers as well. We have yet to see in New York City a death due to lung cancer in an asbestos worker who didn't smoke cigarettes. On the other hand, of the two hundred and eighty-three men who had a history of cigarette smoking, we should have expected, as cigarette smokers, two or three deaths due to lung cancer. There have

(1) Men and Molecules, American Chemical Society News Service, 1155 Sixteenth St. N.W., Washington, D.C. 20036

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been twenty-seven. This indicates that there is some combined multiple effect between asbestos and lung cancer. Dr. Hammond has calculated that an asbestos worker who smokes cigarettes has ninety-two times the risk of dying of lung cancer as compared with a person who neither works with asbestos, nor smokes cigarettes. Therefore, if asbestos workers will stop smoking cigarettes, and many have, we can probably eliminate a large part of the risk of lung cancer among them.

NARRATOR

Unfortunately, at this point, there is no simple way to reduce the other possible result of working with asbestos--the appearance, twenty-five to thirty years after the fact, of mesothelioma, the cancer of lung and abdominal tissue, that is now a fatal and virtually incurable disease.

SELIKOFF

We have observed mesothelioma among asbestos workers who do not smoke cigarettes. Therefore, a second approach is necessary: the approach of sharply decreasing the exposure to asbestos. Now, most of these men began work, and were exposed to asbestos, at a time when the risk was not known. Therefore, precautions were either minimal or non-existent. We now know these risks, and, therefore, it is important for us to design measures, knowing these risks, to eliminate them.

It is important to note that Dr. Selikoff worked with men who generally had extended exposure to generally high levels of asbestos. This leading medical expert in the field is advocating that asbestos be handled with reasonable care, not that it be banned.

EXPERIENCE IN ASBESTOS MILLS AND GENERAL ENVIRONMENT

The most recent information in this area was reported in the magazine Asbestos in May 1970. A copy of this article is attached for reference. The results of a three-year survey by a research team from the medical faculty of McGill University provides the following key information:

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> "...at present levels of dust exposure in modern asbestos mills, even 30 years' employment would probably not carry any measurable risk of lung cancer."

> "Two points must be emphasized," declared Dr. McDonald. "First that the dust exposure experienced by these workers occurred many years ago when environmental conditions in the asbestos mills were poorly controlled and second, that the total number of respiratory diseases attributable to asbestos was very small."

> "The two sets of results confirm the association between occupational exposure to asbestos and these two varieties of respiratory cancer. The results are nevertheless encouraging in that they suggest the risk is virtually confined to levels of dust exposure which are controllable, if not already controlled, in most Canadian asbestos mines and mills."

Perhaps the most significant aspect of this work is the finding that:

> "There was no increased number of cases whose contact was limited to residence in the neighborhood of asbestos mines or mills."

It is noteworthy that these workers also find that additional factors beyond asbestos are probably involved in mesothelioma.

> "Close surveillance over the occurrence of suspected mesotheliomas in Canada, so as to better understand their cause. Asbestos exposure has failed to explain most of them and is probably not the only factor when present." Dr. McDonald commented.

ACTION BY THE U.S. GOVERNMENT

Allowable levels of industrial dusts have long been controlled by the Federal and State governments. The latest thinking has been incorporated into the Walsh-Healy Public Contracts Act which went into effect on February 17, 1969. A copy is attached.

This Act reduces the allowable level of asbestos dust from 5 to 2 million particles per cubic foot. Although it has been generally

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accepted that a worker will not develop asbestosis if he is exposed to no more than 5 million particles per cubic foot of air, even if the exposure continues for his entire working lifetime, the reduction in allowable limit represents an effort to increase the safety factor.

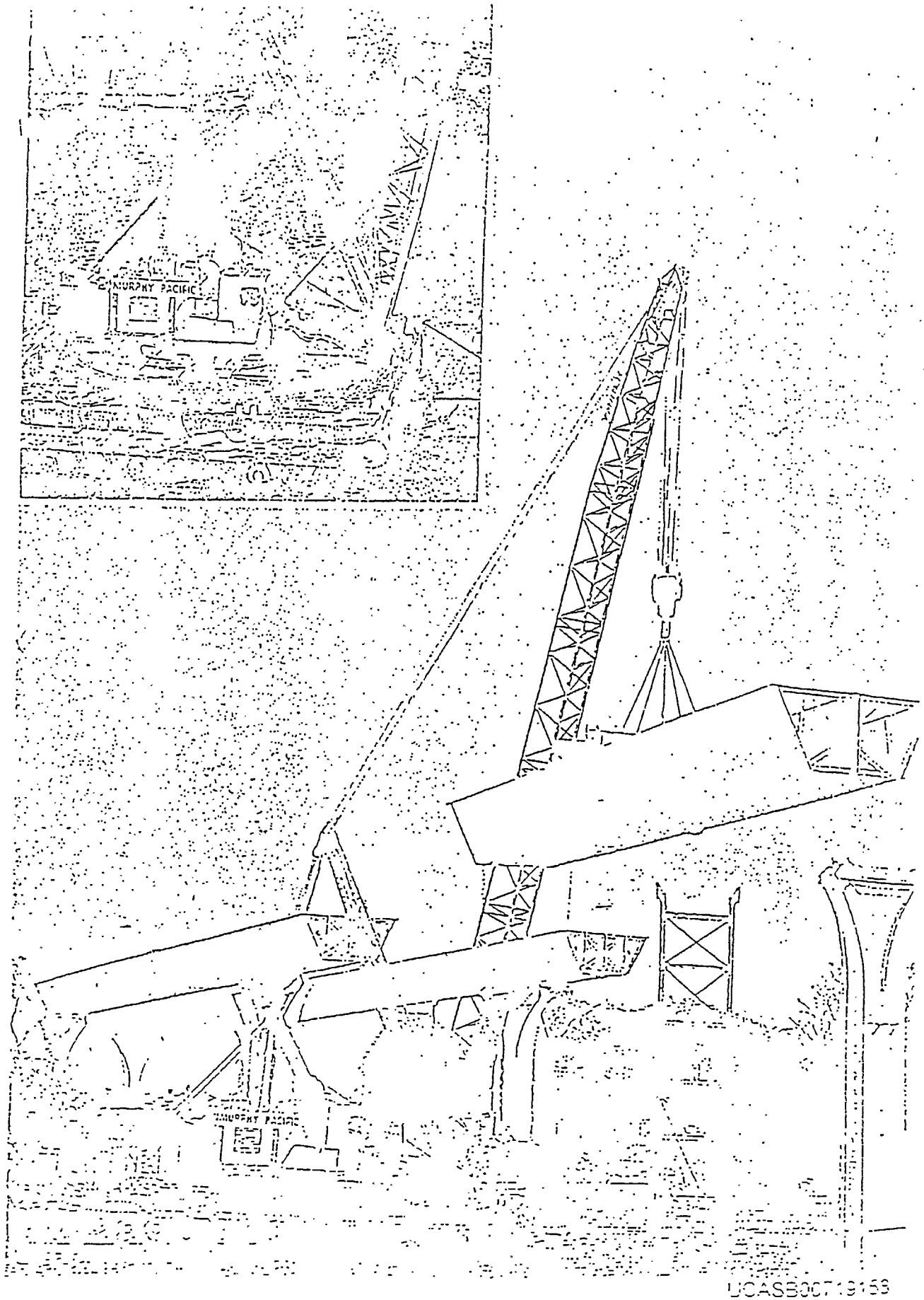
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Engineering News-Record
McGRAW-HILL'S CONSTRUCTION WEEKLY
APRIL 2 1970 / 75¢

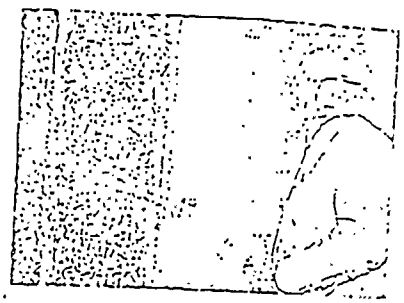
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Does sprayed asbestos cause lung cancer?

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Loose asbestos fiber seen as cancer threat to men in building trades



Medical researchers have found strong evidence that sprayed asbestos used in fireproofing steel-framed buildings causes cancer in men who work on these buildings.

The hazards of asbestos are becoming a public issue. New York City is considering regulating its use and a California legislator introduced a bill this year to prohibit installation of asbestos inside air duct systems in public buildings. So far, however, no positive legislative action to control its use or method of application has been enacted.

The most likely victims are the men who spray the asbestos mixture on exposed steel members and ductwork and apparently inhaled the heaviest amounts of asbestos fiber.

Once asbestos fibers enter the pulmonary or gastro-intestinal tract, they never leave the body, never break down. Medical research is making an increasingly strong case against these fibers as a source of cancer.

The asbestos fibers and dust particles, those highly visible during a spraying operation and the millions of microscopic ones, also cause asbestosis, which is associated with lung cancer.

Three physicians have statistically tied asbestos to cancer among workers in or closely allied to the building trades. They are: Dr. Irving J. Selikoff, director of the Division of Environmental Medicine at Mt. Sinai Hospital, in New York City; Dr. Jacob Churg, chief pathologist at Barnert Memorial Hospital, of Paterson, N.J.; and Dr. E. Cuyler Hammond, vice president for epidemiology and statistics of the American Cancer Society.

In 1962 they compiled a list of 632 men who, as of Dec. 31, 1942, had been members of two metropolitan New York City locals of the International Association of Heat and Frost Insulators and Asbestos Workers (IAHFIAW), AFL-CIO, and who had been exposed to asbestos for 20 years or more. Union, medical and insurance records showed that in the 1932-1962 period, 262 out of the 632 had died, seven before 20 years of exposure. On the basis of ages of the study group, the normal death total should have been 203.

Moreover, 45 died of lung cancer, when actuarial tables anticipated only six. And another 50 deaths resulted from other types of cancer. Of this number, 29 died of gastro-intestinal cancer, although only 10 would have been the normal number for this disease.

Still working with the original list, Dr. Selikoff later found that between January, 1963, and March, 1969, of the 370 survivors of the original 632 men, 113 more had died, while standard mortality tables would predict only 50 deaths. Of the 113 deaths, 28 were caused by cancer in the pulmonary tract, eight by gastro-intestinal cancers and 15 from asbestosis, which is a build-up of scar tissue in the lungs resulting from the presence of asbestos particles.

The scarring impairs the lungs so severely that they cannot absorb sufficient oxygen. There is no cure. Death, a strangulating, coughing demise, is the only end.

Dr. Selikoff says that products in which asbestos has been bonded into the material, such as floor and ceiling tiles, roofing, siding and pipe, are not considered a cause of cancer.

The data that scares. The data disclosed by Dr. Selikoff pushed the New York City Department of Air Resources into a start on writing regulations that would regulate the spray application of asbestos for both fireproofing and insulation.

The regulations would require: Before insulating and fireproofing material is applied, the entire floor of the area involved in the operation be cleared of all objects, materials and equipment except that needed to apply the material.

- As the material falls to the floor, fragments be swept up immediately and placed in special containers.
- Wet sweeping of the area, and vacuuming to pick up the material that had dried.
- Enclosure tarpaulins not be dismantled for 24 hours after completion of clean-up unless adequate mechanical means are provided to clean the air within the enclosed area.

Great Britain already has strict regulation of sprayed asbestos fireproofing (see box).

Richard L. Ottinger a Democratic member of the House of Representatives from Westchester County, N.Y., last week latched on to the sprayed-asbestos operation as an environmental issue with political appeal.

Ottinger, a cosponsor of the federal Air Quality Act of 1967, charges that New Yorkers are exposed to tons of cancer-causing asbestos dust every year. He specifically cites the sprayed-asbestos method of fireproofing buildings and demands that the federal government impose regulations governing the use of asbestos.

He says the federal Air Pollution Control Administration can act now under authority already provided by the Air Quality Act.

The apparent virulence of asbestos is more than a table of death rates to Ottinger. Five years ago it struck at Mike Kitzmiller, now Ottinger's legislative aide. When Kitzmiller was making repairs on his house, some loose asbestos insulation fell into an open cut on his shoulder.

The cut healed, but one year later the scar developed a "mean-looking dark area around it," according to Kitzmiller. By last summer, the scar became painful. Tests showed it was malignant. Surgery removed the cancer.

Hitting the obvious. Ottinger, now seeking the Democratic nomination for U.S. senator from New York, was calling attention to a phenomenon seen by

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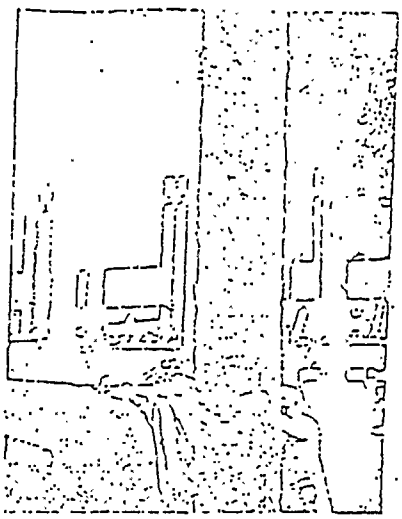
many persons in cities across the country, but understood by a relatively small number. From buildings under construction there is often a gentle floating fall of a cottony material. This is material that fails to adhere to the steel as it should and blows up, down, around and across a job and sometimes over wide sections of a city on windy days.

The fireproofing material is a mixture of asbestos, rock wool and cement. It is contained on the job in a cone-shaped hopper equipped with a worm gear at the bottom that feeds the mix into a hose. Compressed air, at about 22 psi, pushes it through the hose to a nozzle. Approximately 1 in. beyond the nozzle's end, the dry asbestos-rock wool-cement mix interacts with a stream of water running through a second hose.

The wet fireproofing material then is sprayed directly against the steel members previously hosed down with water to improve bonding.

About 200 tons of sprayed fiber material is used on a 30-story building. Depending on weather conditions and measures taken to provide some enclosure, as much as 50% of the sprayed material may be wasted.

The resulting storm of asbestos dust is a potential danger to everyone on the job, according to Dr. Selikoff. He has not as yet gathered extensive data on the threat to the general public and will not guess the possible incidence of asbestosis or lung cancer among those not directly working with asbestos but intermittently exposed to it in a casual way.



Asbestos airborne is source of worry.

The helping hands. Dr. Selikoff has received support from the insulators and asbestos workers international union since mid-1950. The union first provided the health histories of its members. Then in October, 1968, Johns-Manville Corp., of New York City, the largest producer of asbestos in this country, joined with the international union in backing Dr. Selikoff's work with cash. The company and the union provided $362,500 to finance a new program called the Insulation Industry Hygiene Research Program (IIHRP). Dr. Selikoff directs the program out of Mt. Sinai Hospital.

IIHRP's primary purpose is to develop methods of minimizing exposure of all insulation workers to dust and fumes encountered on the job.

The program has already had some repercussions. Chief among them is the sprayed asbestos fireproofing operation at the twin 110-story towers of the World Trade Center in New York City. On this job, which will require an estimated 5,000 tons of sprayed fireproofing, specially designed tarpaulins cover the exterior of the floors being fireproofed. The tarps extend through the window openings and are tucked back under the sprandrels so that material being sprayed will not escape from the area and fall on other floors, or surrounding streets. Moreover, the area being sprayed is closed off inside the building with plastic sheeting so that the materials will not drift into adjacent work areas.

New York City has also taken an initial step by preparing rules to control the application of sprayed-asbestos fireproofing. But the regulations have not gone much further than an initial draft since the city's Environmental Protection Administration and the Department of Air Resources have not had commissioners at the helm for several weeks. The rules, therefore, have not been pushed.

As proposed the regulations would require that sprayed asbestos fireproofing contractors obtain a license. In addition, the area of a building being sprayed would be tightly sealed, the precautions approximating, and in some cases, exceeding those now in effect at the $600-million World Trade Center project.

Should such regulations ever become effective, they would raise costs of fireproofing with sprayed asbestos. A structural engineer reports the costs now range between 30 cents and 60 cents a sq ft.

And another broad estimate came from Mario & DiBonno Plastering Co., Inc., of Great Neck, N.Y., which said the approximate cost of fireproofing a 30-story building is $250,000.

One of the five major companies that make the spray-asbestos material has sought and succeeded in developing a spray-on fireproofing compound that contains no asbestos. The manufacturer, U.S. Mineral Products Co., of Stanhope, N.J., said that the new product, Cafco Type D-C/F, will be on the market in about a month.

It contains mineral wool and proprietary binders it will not identify. It will cost about 10% more than spray-on asbestos fireproofing material.

Company officials say that they developed the new material because of the controversy starting to develop over asbestos.

Great Britain restricts asbestos spraying

The United Kingdom, with extensive statistical material linking asbestos to cancer, only last year cracked down on the use of asbestos in the building trades.

The thorough, detailed and apparently restrictive regulations have all but eliminated asbestos-spray fireproofing as a method, according to an officer in the National Federation of Plastering Contractors. He says that instead of using sprayed asbestos as the fireproofing agent, contractors are boxing asbestos panels around the structural members.

The regulations require:

- Filing by the contractor of an application with the Department of Employment and Productivity 28 days before asbestos is to be applied on a structure.
- Operation of exhaust and ventilating equipment in the area of asbestos application.
- Mandatory use of respirators by workers in asbestos-contaminated areas, and wearing of special clothing. The mask and clothing must be provided by the contractor
- Storage of asbestos in "suitable containers," marked with blue paint or ink, "asbestos—do not inhale."
- Vacuuming of all surfaces, machines and equipment in areas where asbestos is applied.

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THE INFLUENCE OF ASBESTOS ON HEALTH

Three-Year Survey

The results of a three-year survey by a research team from the Medical Faculty of McGill University into the health of workers in Quebec's asbestos mining industry suggest that, at present levels of dust exposure in modern asbestos mills, even 25 years employment would probably not carry any measurable risk of lung cancer.

The influence of asbestos on health has been the subject of intensive research in many parts of the world mainly because of the discovery that, in certain circumstances, exposure to the mineral fiber may be related to cancer of the lung and to mesothelioma, a cancer of the covering of the lung.

Supported by substantial grants from the Institute of Occupational and Environmental Health of the Quebec Asbestos Mining Association as well as from the U.S. Public Health Service, the epidemiological studies formed part of an international research program coordinated by the Union Internationale Contre le Cancer.

Headed by Dr. J. C. McDonald, of McGill University's Department of Epidemiology and Health, the international research team's investigations were aimed at assessing the risks of lung cancer to persons exposed to Canadian Chrysotile asbestos. Another primary purpose was to review all aspects of the health of workers in Quebec's asbestos mines and mills to ensure that it is efficiently protected.

Dr. McDonald reported on the findings of a study of mortality and causes of death in some 12,000 industry employees born between 1890 and 1920. The survey showed that the 10% of these employees who belonged to the highest dust-exposure group had an overall death rate about 12% higher than the others, mainly due to asbestosis, lung cancer and other respiratory complaints. The lung cancer death rate in this same group was about three times higher than that of employees with minimal dust exposure. Seventy per cent of this group of employees who belonged to the lowest dust-exposure categories had little or no increased mortality from these diseases.

"Two points must be emphasized," declared Dr. McDonald. "First, that the dust exposure experienced by these workers occurred many years ago when environmental conditions in the asbestos mills were poorly controlled, and, second, that the total number of respiratory diseases attributable to asbestos was very small."

Dr. McDonald then reported on the results of findings from surveys throughout Canada of deaths due to mesothelioma. During the 1960-63 period only 165 fatal cases had been recorded by pathologists throughout the entire country. Field inquiries confirmed that in a minority of cases there was a definite history of having worked with asbestos. Almost all the histories were of exposure in the manufacture and industrial application of the mineral, rather than in the production of asbestos fiber. There was no increased number of cases whose contact was limited to residence in the neighborhood of asbestos mines or mills.

The two sets of results confirm the association between occupational exposure to asbestos and these two cancers of respiratory cancer. The results are nevertheless encouraging in that they suggest the risk is virtually confined to levels of dust exposure which are controllable, if not already controlled, in most Canadian asbestos mines and mills.

In light of the researchers' findings, it has been decided to continue the research program, with Asbestos Industry support, for a further five years. The extended research program into the health of Quebec's 9,000 asbestos workers will have these main objectives:

(1) To record and analyze deaths and their cause to enable the present approximate estimation of what constitutes a safe level of dust concentration to be more accurately defined.

(2) Close surveillance over the occurrence of suspected mesotheliomas in Canada, so as better to understand its cause. "Asbestos exposure has failed to explain most of them and is probably not the only factor when present," Dr. McDonald commented.

(3) In collaboration with the Industry's industrial clinics in Thetford Mines and Asbestos, it is planned to introduce new procedures for the regular periodic medical supervision of asbestos workers, based on the lessons learned during the three-year study just completed.

DECISION-MAKING SYMPOSIUM—The 9th International Symposium on *Techniques for Decision Making in the Mineral Industry* will be held in Montreal, Canada, June 14-19, 1970.

TITLE 41—PUBLIC CONTRACTS AND PROPERTY MANAGEMENT

Chapter 50—Public Contracts, Department of Labor

PART 50–201—GENERAL REGULATIONS

PART 50–204—SAFETY AND HEALTH STANDARDS FOR FEDERAL SUPPLY CONTRACTS

Safety and Health Standards

On November 6, 7, and 8, 1968, interested persons were afforded an opportunity to submit orally data, views, and arguments on proposals to revise Part 50–204 of Title 41, Code of Federal Regulations, and section 50–201.502 of that title published in the FEDERAL REGISTER on September 20, 1968 (33 F.R. 14252). Interested persons were also afforded an opportunity to submit written data, views, and arguments concerning the proposals.

After consideration of all such relevant matter as was presented by interested persons, Part 50–204 and § 50–201.502 are hereby revised as indicated below. The revised § 50–204.50 republishes the radiation standards for mining published in the FEDERAL REGISTER on December 28, 1968 (33 F.R. 19947), which are presently in effect.

The revisions shall become effective 30 days following the date of publication in the FEDERAL REGISTER.

1. Part 50–204 is revised to read as follows:

Subpart A—Scope and Application

Sec.
50–204.1 Scope and application.

Subpart B—General Safety and Health Standards

50–204.2 General safety and health standards; incorporation by reference.
50–204.3 Material handling and storage.
50–204.4 Tools and equipment.
50–204.5 Machine guarding.
50–204.6 Medical service and first aid.
50–204.7 Personal protective equipment.
50–204.8 Use of compressed air.
50–204.10 Occupational noise exposure.

Subpart C—Radiation Standards

50–204.20 Radiation—Definitions.
50–204.21 Exposure of individuals to radiation in restricted areas.
50–204.22 Exposure to airborne radioactive material.
50–204.23 Precautionary procedures and personnel monitoring.
50–204.24 Caution signs, labels and signals.
50–204.25 Exceptions from posting requirements.
50–204.26 Exemptions for radioactive materials packaged for shipment.
50–204.27 Instruction of personnel; posting.
50–204.28 Storage of radioactive materials.
50–204.29 Waste disposal.
50–204.30 Notification of incidents.
50–204.31 Reports of overexposure and excessive levels and concentrations.
50–204.32 Records.
50–204.33 Disclosure to former employee of individual employee's record.
50–204.34 AEC licenses—AEC contractors operating AEC plants and facilities—AEC agreement State licenses or registrants.
50–204.35 Application for variation from radiation levels.
50–204.50 Radiation standards for mining.

Subpart D—Gases, Vapors, Fumes, Dusts, and Mists

50–204.60 Gases, vapors, fumes, dusts, and mists.
50–204.65 Inspection of compressed gas cylinders.
50–204.66 Acetylene.
50–204.67 Oxygen.
50–204.68 Hydrogen.
50–204.69 Nitrous oxide.
50–204.70 Compressed gases.
50–204.71 Safety relief devices for compressed gas containers.
50–204.72 Safe practices for welding and cutting on containers which have held combustibles.

Subpart E—Transportation Safety

50–204.75 Transportation safety.

Subpart F—Variations

50–204.80 Variations.

AUTHORITY: The provisions of this Part 50–204 issued under secs. 1, 4, 49 Stat. 2036, 2038, as amended; 41 U.S.C. 35, 38; 5 U.S.C. 558.

Subpart A—Scope and Application

§ 50–204.1 Scope and Application.

(a) The Walsh-Healey Public Contracts Act requires that contracts entered into by any agency of the United States for the manufacture or furnishing of materials, supplies, articles, and equipment in any amount exceeding $10,000 must contain, among other provisions, a stipulation that "no part of such contract will be performed nor will any of the materials, supplies, articles, or equipment to be manufactured or furnished under said contract be manufactured or fabricated in any plants, factories, buildings, or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of said contract" (sec. 1(a), 49 Stat. 2036, 41 U.S.C. 35(a)). This Part 50–204 expresses the Secretary of Labor's interpretation and application of this provision with regard to certain particular working conditions. In addition, §§ 50–204.27, 50–204.30, 50–204.31, 50–204.32, 50–204.33, and 50–204.35 contain requirements concerning the instruction of personnel, notification of incidents, reports of exposures, and maintenance and disclosure of records.

(b) Except in the conduct of formal enforcement proceedings provided for in Part 50–201 of this chapter and as otherwise provided in this part, every investigator conducting investigations and every officer of the Department of Labor determining whether there are or have been violations of the safety and health requirements of the Walsh-Healey Public Contracts Act and of any contract subject thereto, and whether a settlement of the resulting issues should be made without resort to administrative or court litigation, shall treat a failure to comply with, or violation of, any of the safety and health measures contained in this Part 50–204 as resulting in a working condition which are "unsanitary or hazardous or dangerous to the health and safety of employees" within the meaning of section 1(a) of the Act and the contract stipulation it requires. Every such investigator or every such officer shall have technical competence in safety, industrial hygiene, or both as may be appropriate, in the matters under investigation or consideration.

(c) Whenever any applicable standard in this Part 50–204 is relied upon by the Department of Labor in a formal enforcement proceeding under section 5 of the Walsh-Healey Public Contracts Act to support a finding of violation of the safety and health provisions of the Act and of a contract subject thereto, any respondent in the proceeding shall have the right and shall be afforded the opportunity to challenge the validity, fairness or propriety of any such reliance.

(d) The standards expressed in this Part 50–204 are for application to ordinary employment situations; compliance with them shall not relieve anyone from the obligation to provide protection for the health and safety of his employees in unusual employment situations. Neither do such standards purport to describe all of the working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees. Where such other working conditions may be found to be unsanitary or hazardous or dangerous to the health and safety of employees, professionally accepted safety and health practices will be used.

(e) Compliance with the standards expressed in this Part 50–204 is not intended, and shall not be deemed, to relieve anyone from any other obligation he may have to protect the health and safety of his employees, arising from sources other than the Walsh-Healey Public Contracts Act, such as State, local law or collective bargaining agreement.

(f) Whenever this part adopts by reference standards, specifications and codes published and available elsewhere, it only serves to adopt the substantive, technical portions of such standards, specifications and codes.

Subpart B—General Safety and Health Standards

§ 50–204.2 General safety and health standards; incorporation by reference.

(a) Every contractor shall protect the safety and health of his employees by complying with the applicable standards, specifications, and codes developed and published by the following organizations:

United States of America Standards Institute (American Standards Association).
National Fire Protection Association.
American Society of Mechanical Engineers.
American Society for Testing and Materials.
United States Government agencies, including by way of illustration the following publications of the indicated agencies:

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(1) *Atomic Energy Act Sources.* Any employer who possesses or uses source material, byproduct material, or special nuclear material, as defined in the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), and has either registered such sources with, or is operating under a license issued by, a State which has an agreement in effect with the Atomic Energy Commission pursuant to section 274(b) (42 U.S.C. 2021(b)) of the Atomic Energy Act of 1954, as amended, and in accordance with the requirements of that State's laws and regulations shall be deemed to be in compliance with the radiation requirements of this part, insofar as his possession and use of such material is concerned, unless the Secretary of Labor, after conference with the Atomic Energy Commission, shall determine that the State's program for control of these radiation sources is incompatible with the requirements of this part. Such agreements currently are in effect only in the States of Alabama, Arkansas, California, Kansas, Kentucky, Florida, Mississippi, New Hampshire, New York, North Carolina, Texas, Tennessee, Oregon, Idaho, Arizona, Colorado, Louisiana, Nebraska, and Washington.

(2) *Other sources.* Any employer who possesses or uses radiation sources other than source material, byproduct material, or special nuclear material, as defined in the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), and has either registered such sources with, or is operating under a license issued by a State which has an agreement in effect with the Atomic Energy Commission pursuant to section 274(b) (42 U.S.C. 2021(b)) of the Atomic Energy Act of 1954, as amended, and in accordance with the requirements of that State's laws and regulations shall be deemed to be in compliance with the radiation requirements of this part, insofar as his possession and use of such material is concerned, provided the State's program for control of these radiation sources is the subject of a currently effective determination by the Secretary of Labor that such program is compatible with the requirements of this part. Such determinations currently are in effect only in the States of Alabama, Arkansas, California, Kansas, Kentucky, Florida, Mississippi, New Hampshire, New York, North Carolina, Texas, Tennessee, Oregon, Idaho, Arizona, Colorado, Louisiana, Nebraska, and Washington.

§ 50–204.35 *Application for variations from radiation levels.*

(a) In accordance with policy expressed in the Federal Radiation Council's memorandum concerning radiation protection guidance for Federal agencies (25 F.R. 4402), the Director, Bureau of Labor Standards may from time to time grant permission to employers to vary from the limitations contained in §§ 50–204.31 and 50–204.32 when the extent of variation is clearly specified and it is demonstrated to his satisfaction that (1) such variation is necessary to obtain a beneficial use of radiation or atomic energy, (2) such benefit is of sufficient value to warrant the variation, (3) employees will not be exposed to an undue hazard, and (4) appropriate actions will be taken to protect the health and safety of such employees.

(b) *Applications* for such variations should be filed with the Director, Bureau of Labor Standards, U.S. Department of Labor, Washington, D.C. 20210.

§ 50–204.36 Radiation standards for mining.

(a) For the purpose of this section, a "working level" is defined as any combination of radon daughters in 1 liter of air which will result in the ultimate emission of 1.3×10^5 million electron-volts of potential alpha energy. The numerical value of the "working level" is derived from the alpha energy released by the total decay of short-lived radon daughter products in equilibrium with 100 pico-curies of radon 222 per liter of air. A working level month is defined as the exposure received by a worker breathing air at one working level concentration for 4⅓ weeks of 40 hours each.

(b) (1) Occupational exposure to radon daughters in mines shall be controlled so that no individual will receive an exposure of more than 2 working level months in any consecutive 3-month period and no more than 4 working level months in any consecutive 12-month period. Actual exposures shall be kept as far below these values as practicable.

(2) In enforcing this section, the Director of the Bureau of Labor Standards may at any stage approve variations in individual cases from the limitation set forth in subparagraph (1) of this paragraph to comply with the requirements of the Act upon a showing to the satisfaction of the Director by an employer having a mine with conditions resulting in an exposure of more than 4 working level months but not more than 12 working level months in any 12 consecutive months that (i) under the particular facts and circumstances involved the working conditions of the employees so exposed are such that their health and safety are protected, and (ii) the employer has a bona fide plan to reduce the levels of exposure to those specified in subparagraph (1) of this paragraph as soon as practicable, but in no event later than January 1, 1971.

(c) For uranium mines, records of environmental concentrations in the occupied parts of the mine, and of the time spent in each area by each person involved in underground work shall be established and maintained. These records shall be in sufficient detail to permit calculations of the exposures, in units of working level months, of the individuals and shall be available for inspection by the Secretary of Labor or his authorized agents.

(d) For other than uranium mines or for surface workers in all mines, not paragraph (b) of this paragraph will be applicable: *Provided, however,* That no environmental sample shows a concentration greater than 0.33 working level in any occupied part of the mine the maintenance of individual occupancy records and the calculation of individual exposures will not be required.

(d) (1) At the request of an employee (or former employee) a report of the employee's exposure to radiation as shown in records maintained by the employer pursuant to paragraph (c) of this section, shall be furnished to him. The report shall be in writing and contain the following statement:

> This report is furnished to you under the provisions of the U.S. Department of Labor, Radiation Safety and Health Standards (41 CFR 50–204.36). You should preserve this report for future reference.

(2) The former employee's request should include appropriate identifying data, such as social security number and dates and locations of employment.

Subpart D—Gases, Vapors, Fumes, Dusts, and Mists

§ 50–204.50 *Gases, vapors, fumes, dusts, and mists.*

(a) No employee shall be exposed by inhalation, ingestion, skin absorption or contact to any material or substance at a concentration above that specified in the "Threshold Limit Values of Airborne Contaminants for 1968" of the American Conference of Governmental Industrial Hygienists except for the following standards—the values listed in Table I of this section which are the subject of current USASI standards and except for the values of Mineral Dusts—Table II of this section as they appear herein.

(b) In all cases, feasible engineering controls must first be determined and implemented. Methods of control in the working environment include local exhaust ventilation, general room air ventilation for dilution of the contaminant, substitution of less toxic material, and isolation or enclosure of the process or operation. In cases where protective equipment or protective equipment in addition to other measures is used as the method of protecting the employee, such protection must be approved for each specific case by a competent industrial hygienist.

TABLE I

	8-hr. time weighted average
Sulphuric Acid (237.2–1943)	1ppm
Toluene (237.12–1957)	100ppm
Formaldehyde (237.16–1957)	3ppm
Carbon Tetrachloride:	
(237.17–1957)	10ppm
Trichloroethylene (237.18–1957)	100ppm
Tetrachloroethylene (237.20–1957)	100ppm
Hydrogen Fluoride (237.22–1943)	3ppm
Fluoride Dust as F (237.28–1943)	2.5mg/m³

JCASS0019163

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Table Z

Workplace

Substance	Type	Limit
Silica: Crystalline— Quartz (respirable).....	10f	[illegible]
Quartz (total Dust).....	[illegible]	[illegible]
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz. Tridymite: Use ½ the value calculated from the formulae for quartz. Amorphous, including natural diatomaceous earth.....	20	[illegible]
Silicates (less than 1% crystalline silica): Asbestos—(5 fibers per milliliter greater than 5 microns in length) Mica..... Soapstone..... Talc..... Portland Cement..... Graphite (natural)..... Coal Dust (Respirable fraction less than 5% SiO2).....	2	Ampoule or [illegible]
Lead or Inorganic Dust: Respirable Fraction..... Total Dust.....	15	[illegible]

Note: Conversion factors

mppcf x 35 = million particles per cubic meter
= particles per cc

* Millions of particles per cubic foot of air, based on impinger samples counted by Konimeter methods.
† The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.
‡ As determined by the membrane filter method at 430 X plane polarized illumination.
§ As counted by the standard impinger, Konimeter count technique.
¶ Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a discriminator with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percentage passing selector
[illegible]	[illegible]

§ 50–204.65 Inspection of compressed gas cylinders.

Each contractor shall determine that compressed gas cylinders under his control are in a safe condition to the extent that this can be determined by visual inspection. Visual and other inspections shall be conducted as prescribed in the Hazardous Materials Regulations of the Department of Transportation (49 CFR Parts 171–179 and 14 CFR Part 103). Where these regulations are not applicable, visual and other inspections shall be conducted in accordance with Compressed Gas Association Pamphlets C–6–1963 and C–8–1962.

§ 50–204.66 Acetylene.

(a) The in-plant transfer, handling, storage, and utilization of acetylene in cylinders shall be in accordance with Compressed Gas Association Pamphlet C–1–1966.

(b) The piped systems for the in-plant transfer and distribution of acetylene shall be designed, installed, maintained, and operated in accordance with Compressed Gas Association Pamphlet G–1.3–1959.

(c) Plants for the generation of acetylene and the charging (filling) of acetylene cylinders shall be designed, constructed, and tested in accordance with the standards prescribed in Compressed Gas Association Pamphlet G–1.4–1966.

§ 50–204.67 Oxygen.

The in-plant transfer, handling, storage, and utilization of oxygen as a liquid or a compressed gas shall be in accordance with Compressed Gas Association Pamphlet G–4–1962.

§ 50–204.68 Hydrogen.

The in-plant transfer, handling, storage, and utilization of hydrogen shall be in accordance with Compressed Gas Association Pamphlets G–5.1–1961 and G–5.2–1966.

§ 50–204.69 Nitrous oxide.

The piped systems for the in-plant transfer and distribution of nitrous oxide shall be designed, installed, maintained, and operated in accordance with Compressed Gas Association Pamphlet G–8.1–1964.

§ 50–204.70 Compressed gases.

The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tankcars or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P–1–1965. Compressed gas cylinders, portable tanks, and cargo tanks shall have pressure relief devices which shall be installed and maintained in accordance with Compressed Gas Association Pamphlets S–1.1–1963 (with 1965 addenda) and S–1.2–1963.

§ 50–204.71 Safety relief devices for compressed gas containers.

Compressed gas cylinders, portable tanks, and cargo tanks shall have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets S–1.1–1963 and 1965 addenda and S–1.2–1963.

§ 50–204.72 Safe practices for welding and cutting on containers which have held combustibles.

Welding or cutting or both on containers which have held flammable or combustible solids, liquids, or gases, or have contained substances which may produce flammable vapors or gases will not be attempted until the containers have been thoroughly cleaned to effect accordance with the rules and procedures embodied in American Welding Society Pamphlet A–6.0–65, edition of 1965.

Subpart I—Transportation Safety

§ 50–204.75 Transportation safety.

Transportation in connection with public contracts, as listed in § 50–

204.3(a)(3) shall be conducted in accordance with the U.S. Department of Transportation requirements. Where such requirements do not apply, Chapters 10, 11, 12, and 13 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances, 1962 Edition, shall be used.

Subpart J—Variations

§ 50–204.80 Variations.

(a) Upon the written request of any interested person, the Director of the Bureau of Labor Standards may in particular cases apply variations from the provisions of this part in enforcing the Walsh-Healey Public Contracts Act following consideration of the particular facts and circumstances involved whenever he is satisfied that the safety and health of employees is equally protected by such variations.

(b) The provisions of this section shall not apply to §§ 50–204.35 and 50–204.36, which contain separate and specific variations procedures.

2. Section 50–201.502 is revised to read as follows:

§ 50–201.502 Record of injuries.

(a) Every person who is or shall become a party to a Government contract which is subject to the provisions of the Walsh-Healey Public Contracts Act and the regulations thereunder, or who is performing or shall perform any part of such contract subject to the provisions of such act or regulations, shall maintain the records specified below which shall be available for inspection by authorized representatives of the Secretary of Labor:

(1) Records of all injuries to employees, including a brief description of the manner of occurrence and the date and duration of disability.

(2) Records of injury frequency rates, calculated annually on a calendar year basis commencing the first of January of each year, as defined in United States of America Standards Institute, Z16.1–1967 "Method of Recording and Measuring Work Injury Experience."

(3) Records of injury severity rates, calculated annually on a calendar year basis commencing the first of January of each year, as defined in United States of America Standards Institute, Z16.1–1967 "Method of Recording and Measuring Work Injury Experience."

(b) The records required in paragraph (a) of this section shall be kept on file at least 3 years from the date of entry.

(c) Where records are kept on a fiscal or insurance year basis, they shall be accepted as being in compliance with subparagraphs (2) and (3) of paragraph (a) of this section.

(Sec. 4, 49 Stat. 2036; 41 U.S.C. 353)

Signed at Washington, D.C. this 10th day of January 1969.

William Wirtz,
Secretary of Labor.

[F.R. Doc. 69-433; Filed, Jan. 15, 1969; 8:45 a.m.]

UC-SE00719164

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THE DISCOVERY COMPANY

Calidria ASBESTOS

ASBESTOS TOXICOLOGY REPORT

It has been known for years that some persons working in asbestos production were prone to develop a disabling lung disease. In time, this condition became known as asbestosis and was related to exposure to high concentrations of asbestos dust. With further experience, it was found that men could work with asbestos without development of lung disease if dust concentrations were kept below a certain level.

It has been generally accepted that a worker will not develop asbestosis if he is exposed to no more than 5 million particles per cubic foot of air, even if this exposure continues for his entire working lifetime. Although no cases of asbestosis are known to have occurred when exposures have been maintained at or below this level, the ACGIH (which sets the threshold limit value (TLV) in the U. S. A.) has indicated they intend to lower the TLV for asbestos to 2 million particles per cubic foot in an effort to increase the safety factor incorporated in the limit. The U. S. Department of Labor has already issued a regulation under the Walsh-Healy Act placing the TLV for asbestos at 2 million particles per cubic foot for public contracts in which they have jurisdiction. This concentration of dust is generally not visible in the average work area unless a beam of light causing a Tyndall effect is present. Usually the dust concentration must be from 8-10 million particles per cubic foot (MPPCF) before its presence is visible in average lighting conditions.

Several years ago, it was reported that there was an increase in the incidence of cancerous tumors, especially of the lung, associated with asbestosis. Recently there have been reports of some cancers occurring in individuals exposed to asbestos dust, but who have not developed clinical asbestosis. It is believed by most authorities that these cases have been associated with exposures significantly exceeding the Threshold Limit Value.

A type of cancer named mesothelioma has been noted to be associated with asbestos exposure in recent years. These tumors, while rather few in number to date, may occur in individuals with histories of only slight exposures, and that as much as twenty to forty years earlier. There is considerable evidence that crocidolite is most frequently associated with mesotheliomas. From the data available it appears that the TLV of 5 MPPCF may not be low enough to protect against mesotheliomas. Research on the problem continues.

Control of asbestos dust exposure is therefore necessary. The control methods are the standard ones applicable to a variety of dusty operations. They include closed flow systems, wet processes where possible, and adequate exhaust ventilation where openings in the system are necessary. Pelletizing is sometimes used to improve the handling characteristics of otherwise dusty materials. Where satisfactory containment to stay within the Threshold Limit Value is impractical or impossible, efficient and reliable respirators are available for the protection of the employee. A program of environmental monitoring is highly desirable to determine that Threshold Limit Values are not being exceeded. In manufacturing industries it would be desirable to know the dust concentrations where the asbestos is dumped from bags into the process. Concentrations should also be determined where dusting occurs in finishing products. While initial dust determinations should be made at frequent intervals, once the level has been established as satisfactory, the frequency may be extended to occasional tests to assure continuation of a satisfactory condition.

Pre-employment and periodic physical examination of workers are desirable. These should include chest X-rays to insure that the worker has no chest condition prior to work with asbestos and to determine that no lung changes are resulting from work with asbestos.

It is believed that the addition of asbestos at the proposed levels during the manufacture of products would be harmless to the consumer. Total dusting would have to be well in excess of any levels acceptable to the consumer for the asbestos concentrations to approach the Threshold Limit Value.

In conclusion, while asbestos dust in excess of the Threshold Limit Value is potentially harmful, as are many other dusts encountered in industry, it is as readily controlled as other such dusts and it can be used safely with appropriate precautions.

Industrial Medicine And
Toxicology Department
Union Carbide Corporation

5/8/69

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H52.

Material Safety Data

September 1, 1972

UNION CARBIDE CORPORATION • 4625 ROYAL AVENUE • NIAGARA FALLS, NEW YORK • 14302
TELEPHONE: (716) 278-3376

4.1.5.11

PRODUCT: Chrysotile Asbestos — CHEMICAL FORMULA: $Mg_6(OH)_8Si_4O_{10}$

TRADE NAMES: "Calidria" Asbestos

I. PHYSICAL DATA

BOILING POINT AND MELTING POINT: Not Pertinent

SPECIFIC GRAVITY ($H_2O = 1$): 2.45

VOLATILE CONTENT: Absorbed Water 1 – 4% By Weight. Structural Water Approximately 13% by Weight.

APPEARANCE: Pellets or Fine White Powder. No odor. Very Slight Solubility in Water.

II. HAZARDOUS INGREDIENTS

Not Applicable.

III. FIRE AND EXPLOSION HAZARD DATA

Material is not Combustible. No Fire or Explosion Hazard.

IV. REACTIVITY DATA

INERT MATERIAL: No Decomposition or Polymerization Conditions.

V. HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE TO AIRBORNE CONCENTRATION:

The current standard of the Occupational Safety and Health Act of 1970 contains the following exposure limits:

"The 8-hour time-weighted average airborne concentration of asbestos fibers to which employees are exposed shall not exceed 5 fibers per milliliter greater than 5 microns in length, as determined by the membrane filter method at 400-450X magnification (4 millimeter objective) phase contrast illumination. No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers per milliliter, longer than 5 microns." (Federal Register – Vol. 37, June 7, 1972, page 11320).

EFFECTS OF OVER EXPOSURE: Prolonged over exposure may result in lung damage.

EMERGENCY AND FIRST AID PROCEDURES: Not applicable. Material has no acute toxicity.

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Avoid inhalation of dust. Remove spilled material by vacuum cleaner or by water wash.

WASTE DISPOSAL METHOD:

If reasonably foreseeable handling will not produce airborne concentrations in excess of exposure limits, no special procedures are required. When limits are likely to be exceeded, waste and scrap shall be collected and disposed of in impermeable sealed bags or other closed, impermeable containers, suitably labelled.

Union Carbide Corporation assumes no responsibility and makes no warranty, expressed or implied, representation, promise, or statement as to completeness, accuracy, or currency of any data provided.

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VI. SPECIAL PROTECTION INFORMATION

VENTILATION:

Local exhaust for each operation is preferable. (See American National Standards Institute booklet, Z9.2 – 1971.) General area exhaust is acceptable. No special considerations.

PROTECTIVE GLOVES: None	EYE PROTECTION: None

OTHER PROTECTIVE EQUIPMENT:

If time weighted average or ceiling concentration limits are exceeded, clothing providing whole body covering shall be supplied and its use required.

RESPIRATORY PROTECTION[1]

The current standard of the Occupational Safety and Health Act of 1970 contains the following guidelines:

AIRBORNE CONCENTRATION[2]			
8-HOUR EXPOSURE[3]	CEILING CONCENTRATION	REQUIRED MASK TYPE	ACCEPTABLE MODEL[4]
5 maximum	10 maximum	None required.	–
50 maximum	100 maximum	U.S. Bureau of Mines Schedule 21B. Negative pressure on breathing. Covers nose and mouth.	Willson Model 1009 with R-520 Filter and M-S-A No. 86432 with Type H, Ultra Filter and others.
500 maximum	1000 maximum	U.S. Bureau of Mines Schedule 21B Powered filter positive pressure.	Personal Environment Systems, Inc. Hood 330 or 351 with 1900 Series filter.
Over 500	–	U.S. Bureau of Mines Schedule 19B Type C positive pressure, air supplied.	Willson GA2H M-S-A Lead-Foe and others.

(1) Allowed only during the time required for installation of engineering controls, when engineering controls are not technically feasible or adequate, and in emergencies. An employee may not be assigned to tasks requiring respirator if his most recent medical examination indicates he will be unable to function normally.

(2) Fibers per milliliter greater than 5 microns in length, as determined by the membrane filter method at 400-450X magnification (4 millimeter objective) phase contrast illumination.

(3) 8-Hour time weighted average.

(4) Examples of masks approved by U.S. Bureau of Mines under the appropriate schedule.

Reference – Federal Register, Volume 37, Pages 11318-11322, June 7, 1972.

VII. SPECIAL PRECAUTIONS

If the time weighted average and ceiling concentration limits are not exceeded, no special precautions are required except:

a) Bag damage and dusting should be minimized and dust inhalation avoided.

b) Every place of employment where asbestos fibers are released must be monitored by December 7, 1972 to determine exposure levels.

c) A comprehensive medical examination is required for any employee exposed to airborne fibers within 30 days of first such employment, annually thereafter and on termination of employment.

When exposure limits are exceeded, reference should be made to the regulation for details on caution signs, monitoring, change rooms, protective clothing laundering and record keeping.

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