PLAINTIFF'S
EXHIBIT
USX-83

H. J. DUNSMORE
DIRECTOR—ENVIRONMENTAL CONTROL

United States Steel Corporation

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PITTSBURGH, PENNSYLVANIA 15230

October 11, 1971

Professor Bernard B. Berger
Chairman, Environmental Quality
Management Committee, SRL, ASCE

Director, Water Resources Research Center
University of Massachusetts
Amherst, Massachusetts 01002

Dear Bernie:

I have read the proposed statement of the Committee on Environmental Quality proposed by Harold Romer, and have only the minor clerical changes shown on page 1.

Sincerely,

Attachment

bcc: Mr. J. H. Long
Dr. Merle Bundy
Mr. K. M. Morse

HCD

The Commonwealth of Massachusetts
University of Massachusetts
Amherst 01002

ATER RESOURCES RESEARCH CENTER
Office of the Director

Graduate Research Center

September 29, 1971

RECEIVED
UNITED STATES STEEL CORPORATION
OCT 5 1971
H. J. DUNSMORE
DIRECTOR
ENVIRONMENTAL CONTROL

TO: MEMBERS OF THE ENVIRONMENTAL QUALITY MANAGEMENT COMMITTEE, SED, ASCE

Harold Roman has prepared a draft of a statement on the use of asbestos containing material for the Committee on Environmental Quality Management. You will recall (refer to minutes of meetings of January 27, 1970 and July 14, 1971) that the Committee decided to recommend a policy statement for ASCE adoption.

Please examine the attached draft in that light and let me have your comments by November 1, 1971. At that time, Harold and I will make such revisions as appear to be appropriate and the statement will be submitted to ASCE with the recommendation that it be published in the SED Journal.

BBB:edr

Bernard B. Berger
Chairman, Environmental Quality
Management Committee, SED, ASCE

Director, Water Resources Research Center

P.S. Attached is a Corps of Engineers -- EPA publication on the "Refuse Act Permit Program".

USEI0001118

Engineering Evaluation of the use of Sprayed Asbestos-Containing Material

By The Committee on Environmental Quality
Management of the Sanitary Engineering Division
. . . . . Draft by H. Romer 9/14/71

The consumption of asbestos in the United States has assumed large proportions and its use in increasing at a rapid rate. The 1968 consumption in the U.S. was equal to 25% of the total world production. Annual world production in 1930 was 500,000 tons; in 1967, four million tons of asbestos were produced.

During the past 10 years, asbestos-containing material has been used extensively in sprayed form at an increasing rate, to protect steel structures from fire. In 1970, approximately three million pounds of asbestos were used to fireproof structures. It is particularly with reference to this use of sprayed asbestos that this report is addressed.

In the United States, almost 90% of the asbestos used is of the chrysotile fibre type that easily fragments into fibrils, 200 to 400 angstrom units in diameter and often 2,000 angstrom units or smaller in length (200 angstrom units equals approximately a millionth of an inch). Thus, 10^{-9} grams of chysotile asbestos (one billionth of a gram) could represent a million fibrils. Asbestos fibrils can only be identified by use of the electron microscope in association with other sophisticated instrumentation. There are approximately one million fibrils lying side-by-side in a linear inch of chrysotile asbestos. 70% of the asbestos in this country is used in the construction industry.

From the published medical reports and epidemiological studies it would be fair to state that the individual, invisible asbestos

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fibril represents a built-in "time bomb" set eons ago when the fibrous silicate crystals cooled and began to grow within the fractures of the serpentine rock. The mechanism can be activated when these fibrils are inhaled or ingested -- albeit it may take 20-25 years to wreak its havoc in the form of excessive cancer incidence rates including the invariably fatal pleural and peritoneal mesotheliomas.

Several statistical and medical references are noted:

1. The following material is abstracted from a 1969 U.S. Public Health Service report, "Preliminary Air Pollution Survey of Asbestos - A Literature Review".

" - - a large fraction of the people in the U.S. have been exposed to asbestos, including the following:

a) approximately 100,000 workers using asbestos in their occupations.

b) approximately 3,5000,000 construction workers exposed indirectly to asbestos as they work with asbestos products or near those who handle asbestos products.

c) approximately 50,000,000 Americans who possibly have "asbestos bodies" in their lungs.

2. In November, 1970, in a court case against the City of New York, Dr. Irving Selikoff was called upon to provide expert medical testimony. Dr. Selikoff is a renowned researcher and pioneer in the field of asbestos diseases; he is also Director of Environmental Science Laboratories at the Mt. Sinai School of Medicine in New York City. The following quotes are abstracted from his testimony:

"In New York, in 3,000 consecutive autopsies at Elmhurst Hospital in Queens, the V.A. Hospital in the Bronx, and Mt. Sinai Hospital in Manhattan, examination of --- lung tissues has shown that asbestos bodies exist in 45% of all

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cases. Smaller particles of asbestos, seen only by electron microscopy, were found to be commonly present in almost all cases examined. It now appears that virtually all New Yorkers' lungs contain asbestos."

"Among asbestos workers, for example, the incidence of death from lung cancer among smokers is about 20 times as high as for non-smokers. If a person is both an asbestos worker and a cigarette smoker, his chance of dying from lung cancer is 92 times the chance of a man who neither smokes cigarettes nor works with asbestos."

"Recently, I conducted an investigation with respect to asbestos-related conditions among the members of Local 12 (New York City) and Local 32 (Newark) of the International Association of Heat & Frost Insulators and Asbestos Workers, one of the building trade unions."

"As of April 30, 1970, 103 of the original 632 union members in our study were dead, 72 of lung cancer. Currently deaths among members of Local 12 in New York include one in 5 of lung cancer, one in 10 of mesothelioma, one in 10 of asbestosis, and one in 10 of gastro-intestinal cancer."

"Asbestos-related cancers occur not only in occupationally exposed workmen, but may occur among people living or working in an area where asbestos fibers are disseminated. Mesothelioma, for example, which is invariably fatal, has occurred among people living in the contaminated households of asbestos workers as well as among people living within a half-mile of major asbestos sources such as asbestos factories, mines and mills. Investigations by Wagner in South Africa, Newhouse in London, Leiben in Pennsylvania, Bohlig in Germany, and others, reveal a substantial health hazard to such persons. In London, an examination of records in one hospital revealed that of 76 recorded mesothelima

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cases, 31 had worked in an asbestos factory, 9 of the remaining 45 had lived in the household of an asbestos worker, and 11 simply lived within a half-mile of an asbestos plant. My group at Mt. Sinai has investigated the homes of asbestos workers and has found the air there contaminated by asbestos particles carried home on the clothing of the workers. We have also seen cases of mesothelioma among relatives of asbestos workers and people who lived near an asbestos-using facility".

"In Manhattan ambient levels far removed from construction sites are now $20\text{-}60 \times 10^{-9}$ grams per cubic meter of air, up to 6 times more than in, say, Staten Island, or Ridgewood, N.J. Indeed, ambient air levels about construction sites are even several times higher than these background levels. At these levels the average person might inhale 10 to 15 million asbestos fibrils in one 24 hour day." "In New York City, the construction industry is a major source, of airborne asbestos particles. Three-quarters of all asbestos used, is used in the construction industry".

At the request of the Commissioner of Air Resources, the Health Research Council of the N.Y.C. Department of Health studied the hazards of the sprayed asbestos problem in November, 1969 and reported:

> "Experience in industry clearly indicates that inhalation of asbestos may cause serious disease, and that some asbestos related disease may be found after exposure to relatively low levels of asbestos. This committee, therefore, recommends that steps be taken immediately to eliminate contamination of the community atmosphere by asbestos."

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The April 1, 1971 issue of the New York Times reported that Federal EPA began publishing a list of air pollutants, which in the opinion of Administrator William D. Ruckelshaus "may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness." Mr. Ruckelshaus "named three such pollutants - asbestos, beryllium and mercury."

It is because of the relative indestructibility of the asbestos fibril, and its inherent potential for harm, as well as the unsatisfactory experience of many cities in their efforts to control asbestos spraying operations, that the Cities of New York, Philadelphia and Chicago in 1970 and 1971, urged the banning of the spraying of any substance containing asbestos in or upon a building or other structure during its construction, alteration or repair.

Because of the recognition of the intense health hazard of asbestos exposure, and the amount of construction using sprayed asbestos in densely populated areas, a number of cities set up interim regulations prescribing containment and clean-up methodologies.

Efforts at controlling the emission of asbestos from spray operations were not successful. On numerous occasions, emissions were such that heavy asbestos "snowfalls" were observed and accumulations of asbestos as deep as 3 inches at curbs and at other vertical rises occurred within a radius of several blocks of the spraying site.

Since there are 25 to 40 skyscraper asbestos insulation-spray operations in progress at any one time in New York City, for example, it would take virtually the entire field staff of The Department of Resources to provide adequate surveillance for this one function.

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Even if this were feasible, the ability of the industry to prevent the emission of asbestos into the outside air under actual, day-to-day conditions of construction is strongly questioned.

Court actions, resulting from the issuing of many summonses, had but limited deterrent value; adjournments were endless and the fines, when finally imposed, were only a minor overhead to the contractors.

The interim enclosure and clean-up regulations were intended to provide a workable methodology which could be implemented immediately by the construction industry. To provide for a methodology which would assure positive containment of this carcinogenic material, would have resulted in the complete cessation of construction on all high rise buildings.

However, experience clearly indicated that, with the present enclosure methodology, even with conscientious follow-through by the contractor, asbestos dust, in lesser or greater quantities, was found in almost any part of the building under construction. In industry, where asbestos products are manufactured, "clean-room" procedures often are employed, including an exhaust system and filter baghouse placed directly above or below such processes as cutting operations to preclude the likelihood of asbestos dust reaching the face of the worker or entering the workroom or outside air. This positive type of control is required when handling asbestos, if confidence in the methodology and protection of the public and worker are to be assured.

Visible emissions, prohibited by codes, are difficult to observe, especially when spraying occurs on the upper floors of skyscrapers,

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unless there is a veritable snowstorm of asbestos into the outside air. Perhaps more important than the visible emissions, however, are the fine asbestos particles which are not visible to the naked eye, but which are more hazardous because they can penetrate the lungs' smallest alveoli. Again, note that a billionth of a gram of chrysotile asbestos may contain a million fibrils of asbestos. Sampling for such particulates is not only extremely difficult at upper stories, but also time-consuming and expensive. By the time laboratory results would become available, the spraying procedure of the specific area sampled would be long completed.

Demolition:

Even if a methodology were developed which could protect the ambient air from sprayed-asbestos particulates, a problem, for which no solutions are currently known, would dictate the banning of sprayed asbestos. The problem of demolition dust is being referred to. It is difficult to visualize the demolition of a magnificent 30, 40 or 50 story structure. Nevertheless, based upon the construction and demolition history of buildings in cities such as New York, it should be anticipated that a significant percentage of these "old fashioned" structures will be demolished 30, 40 or 50 years hence.

The present state of the art is such that there is reasonable assurance that our cities will be coated with asbestos when these buildings are demolished. Whereas, it is hoped that ways and means to cope with demolition dust problems will be developed, there is no certainty of success, particularly because of the inherent difficulties and high costs.

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Hazard to Workers:

Last, and certainly not least, is the extreme hazard to workers employed in spraying asbestos. The tremendously high incidence of lung cancer, the 100% fatal mesotheliomas and other carcinogenic cause of death experienced by asbestos-insulation workers cry out against the use of sprayed-asbestos.

With the knowledge that it was, at best, a most difficult task adequately to supervise all construction sites using sprayed asbestos insulation; with the problem of multiple adjournments and meaningless fines in court; and with the preponderance of medical evidence as to the pathogenicity of asbestos, a campaign was undertaken to encourage manufacturers to eliminate asbestos and develop suitable substitute fireproof materials. As a result, there are now several satisfactory substitute materials on the market at a competitive price.

Because of the known hazards of sprayed asbestos and with the availability of adequate substitute materials, the cities of New York, Philadelphia and Chicago have banned the spraying of asbestos-containing materials.

The ASCE has great concern not only with sprayed asbestos but also with all sprayed insulating materials ~~Accordingly~~ Accordingly, because of potential, though unknown, hazards to health, provisions which regulate such applications should be promulgated.

The same problems of emissions into the open air experienced with sprayed asbestos-containing insulation are being and, doubtlessly, will continue to be experienced with non-asbestos sprays, as long as the present methodology of temporary enclosure is practiced. (Cont.)

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The use of tarpaulins for enclosure is not satisfactory on a continuing basis.

Several alternatives are proposed:

1. Fireproofing of peripheral columns, spandrels, etc., by non-spray means, such as boxed beam with lathe and plaster, drywall encasement, concrete encasement, etc. Spraying of peripheral steel is a major source of visible emissions into outer air.
2. Design structure so that skin and windows can be installed before any spraying is done.
3. In any insulation spraying operation, install exhaust system and baghouse to ameliorate the astonishingly bad conditions under which sprayworkers now operate and to reduce emissions outside the building.

Many architects, engineers and builders agree that there are virtually insurmountable problems associated with insulation spraying.

There are many available alternatives to spraying, however, each is more costly than spraying. Reported costs for the various alternatives differ widely. Some average figures indicate that for high rise structures the cost of spray insulation is 3/4 of 1% to 1% of the total cost. What does "total cost" mean? Some mean "bricks and mortar"; others include bricks and mortar, foundation, land costs, architectural fees, financing charges, profit, etc. Costs for drywall encasement vary from 2-3% of "total cost"; boxed beam with lathe and plaster from 2-3% of "total cost", concrete encasement as high as 5%.

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If one of the less costly, approved alternatives were selected, the increase in cost would be in the area of 1 3/4%. No one wants to spend more than he is required, however, this additional cost does not appear prohibitive and, above all, will protect both public and worker.

Product manufacturers are developing competitive non-asbestos insulating materials and methodologies. Among these are application of insulation at the steel fabrication mill; insulation in rolls and strips which can be applied to the steel with adhesives; application by trowelling; intumescent mastics; insualtion blankets wrapped around steel members on the site, etc.

"With all the current emphasis on the systems approach, it is curious that a practical factory assembled enclosure has not yet been developed for the fire protection of steel beams. In addition to obtaining the usual advantages of factory production, the problem of air pollution would be avoided. The prefabricated units could consist of two sides and a bottom that enclose the beam and are attached to the floor slab by stud welds or powder-actuated fasteners, or the units could be hung from studs welded to the bottom flange while the sides are braced by studs welded to the web." (Ira Kaiser, Modern Steel Construction, 1971).

A Final Item of Importance:

State and federal labor departments have set up the working atmosphere dust standard of not more than 5 fibers per c.c., 5 microns or larger. What does this mean in view of recent experience? A recent study by the NYC Department of Air Resources produced air analyses yielding no fibers 5 microns or larger; all particulates (asbestos fibrils) were submicron. (cont.)

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The concentration of the submicron fibrils was approximately 200 per c.c. This is 40 times greater than the industrial standard for fibers. By definition, the air met industrial quality standards since there were no fibers 5 microns or larger. Normally, industrial air analyses do not include examination for submicron particulates. A sample of air having a zero count of fibers, 5 microns or larger, would be considered excellent. Obviously, the standard must be re-examined, especially since the submicron particulates are highly respirable and present a greater hazard to health.

. . . . . .

CONCLUSION:

It is obvious that each of us and our families have a major stake in this matter. With the cooperation of each individual concerned, with the cooperation of industry and government, rational and meaningful solutions can be attained without undue hardship to any quarter and with better health to all.

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