T. L. L.

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BACKGROUND INFORMATION — PROPOSED NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS:

Asbestos

Beryllium

Mercury

COPIES TO:

O.A STEWART /ENVIREE

I. L. LYALL

W. R. WRIGHT

R. E. SCHNEIDER

P. HOSTIC.

FOR YOUR INFO

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ENVIRONMENTAL PROTECTION AGENCY
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INTRODUCTION

This document provides background information on the derivation of the proposed national emission standards for asbestos, beryllium, and mercury. The proposed standards, published in the Federal Register under Title 36 CFR Part 62, are being distributed concurrently with this document. The information presented herein was prepared for the purpose of facilitating review and comment prior to promulgation of the standards.

The proposed national emission standards were developed after consultation with appropriate advisory committees, independent experts, and appropriate representatives of the Federal government. The National Air Quality Criteria Advisory Committee has been consulted on air quality considerations, the assessment of adverse effects, and the approaches and protective philosophy underlying the proposed standards. Members are outstanding scientists and/or administrators concerned with the quality of the environment and resident in universities, State or local governments, research institutions, or industry. They are selected for their recognized expertise and/or interest in the establishment of air quality criteria or for their recognized expertise in the evaluation and interpretation of scientific evidence indicative of adverse and preventable effects of atmospheric pollutants.

Review meetings were held with the Federal Agency Liaison Committee and the National Air Pollution Control Techniques Advisory Committee. The proposed standards reflect consideration of comments provided by these committees and by other individuals having knowledge regarding the control of these pollutants.

The National Air Pollution Control Techniques Advisory Committee is made up of 16 persons who are knowledgeable concerning air quality, air pollution sources, and technology for the control of air pollutants. The membership includes state and local control officials, industrial representatives, university professors, and engineering consultants. Members are appointed by the EPA Administrator pursuant to Section 117 (d), (e), and (f) of the Clean Air Act of 1970, Public Law 91-604. In addition, persons with specific expertise regarding these pollutants participated in the meeting of the Advisory Committee.

The Federal Agency Liaison Committee includes persons knowledgeable concerning air pollution control practices as they affect Federal facilities and the nation's commerce. The committee is made up of representatives of 19 Federal agencies.

[illegible] adopting more stringent emission limitations for these pollutants. Furthermore, the promulgated standards themselves may require revision from time to time [illegible] development of [illegible] information.

TECHNICAL REPORT NO. 1 —

ASBESTOS

SUMMARY OF PROPOSED STANDARDS

Because routine, standardized techniques for sampling and analyzing asbestos emissions are not available, the proposed standards for asbestos are not given in terms of numerical values. Instead, the standards are expressed in terms of required control practices that limit emissions to an acceptable level. In part, control of atmospheric emissions would be achieved by:

1. Utilizing industrial fabric filters to clean forced exhaust gases from asbestos mining, milling, and manufacturing industries and from fabricating operations that involve materials containing asbestos.

2. Eliminating visible emissions of particulate matter from ore dumps, open storage areas, external conveyors, and tailing dumps associated with asbestos mining and milling facilities as well as from manufacturing and fabricating operations carried out with asbestos-containing materials in areas directly open to the atmosphere.

3. Prohibiting certain applications of asbestos fireproofing and insulation by spraying processes.

Also, indirect atmospheric emissions of particulate matter would be controlled at manufacturing and fabricating sites where visible emissions normally result from operations using commercial asbestos. The maximum allowable emissions would be equivalent to those attained by either ventilating an entire work space through a fabric filter or by hooding emission sources and subsequently passing the required dust-control air through a fabric filter.

EFFECTS ON HEALTH

The inhalation of asbestos fibers has been related to a number of human diseases. Among these is asbestosis, which has been related to occupational exposures and is characterized by interstitial fibrosis, pleural fibrosis, and pleural calcification.[1]

[illegible] asbestosis.[1]

[illegible] of the pleura, which has been noted in asbestos workers, typically occurs after an extended period of time following exposure and is frequently accompanied by pulmonary fibrosis, i.e., asbestosis. The asbestos dosage that causes [illegible] has not been established; however, nonindustrially exposed populations have exhibited substantial incidences of such disease.[2,3]

It has been recognized since 1947 that among industrial employees asbestos workers have an increased risk of bronchogenic carcinoma.[4] For populations exposed to asbestos only in ambient air, there are no data that define the excess risk, if any, of developing this disease.

An association between asbestos exposure and mesothelioma, a fatal malignant tumor of the pleura and peritoneum, was established in 1960 by a study of 33 cases of mesothelioma in South Africa.[1] Seventeen of the patients were occupationally exposed, and 10 resided in the vicinity of an asbestos mine. No history of asbestos exposure was discovered for one patient. A subsequent study of mesotheliomal malignancies identified patients with minimal or no known exposure to asbestos. The existence of a prolonged period, averaging 40 years, between initial exposure and appearance of a mesotheliomal tumor complicates the study of this disease. There are no data that specify the minimum amount of asbestos exposure associated with an increased risk of developing mesothelioma.

A quantitative definition of the asbestos air pollution problem can not be formulated at this time because of the lack of a dose-response relationship between levels of airborne asbestos and the resulting human diseases. Nevertheless, available evidence clearly implicates asbestos as a serious air pollution threat. This evidence includes the discovery of asbestos fibers in lungs of nonoccupationally exposed persons,[1] the qualitative demonstration that asbestos fibers are present in ambient air,[5] and the cited epidemiologic studies relating asbestos exposure to disease.

Research efforts directed toward the establishment of a dose-response relationship for human exposure to airborne asbestos are in progress. The only measure available at this time to protect the public health from airborne asbestos is to control asbestos emissions to the greatest degree practicable for the following reasons:

1. A safe exposure level to asbestos has not been established.

2. Exposure to asbestos in community air may produce disease.

Asbestos fibers enter the atmosphere from a wide variety of sources extending from the weathering and disturbance of natural deposits of asbestos-bearing materials to operations for the ultimate disposal of products containing asbestos. Industrial emission sources include asbestos mining and milling sites, manufacturing facilities for asbestos-containing products, and construction sites employing asbestos insulating, fireproofing, and structural materials. More than 3,000 products contain commercial asbestos. As these products are used, asbestos is frequently released to the atmosphere. Among these products are automotive brake linings and asbestos-asphalt concrete for paving roadways. Asbestos is also present as a natural constituent in some widely employed materials, such as talc. The asbestos emissions from use of these materials can be significant.

Because asbestos is exceptionally resistant to thermal degradation and chemical attack, labiled particles are persistent in the environment and subject to reentrainment into the atmosphere. It can readily be mechanically subdivided into fibers of submicron diameter, which can remain airborne for long periods of time. These factors, coupled with the presence of large numbers of emission sources, as noted above, would indicate the presence of a background level of asbestos in the atmosphere. Semiquantitative data confirm this conjecture and show that urban background concentrations are significantly larger than nonurban ones.

Asbestos emissions are now being controlled to a limited extent, primarily from milling and manufacturing sources to which gas-cleaning devices are readily applicable. The formulation of recommended codes of trade practices governing such operations as the transport, fabrication, application, and disposal of asbestos-containing materials has not proved to be an effective emission control technique. Control of asbestos emissions from some sources, for example, spray-applied asbestos fireproofing, has been made possible by the use of substitute materials for asbestos. It is also true, however, that there is interest in expanding the already vast number of applications for asbestos fibers.

DEVELOPMENT OF PROPOSED STANDARDS

The intent of these proposed standards is to minimize asbestos emissions into the atmosphere from all clearly identifiable stationary sources, subject to the availability of a sufficiently definitive characterization of emissions from such sources and subject to the availability of feasible control techniques. Where practical, these control techniques include direct prohibition of activities that generate asbestos emissions.

regulated by these standards. Several specific manufacturing operations that incorporate commercial asbestos into products have been identified as significant emission sources.[5] These, as well as the numerous manufacturing facilities for other asbestos-containing products, would be subject to these proposed standards. From among the many end uses of asbestos-containing products, a relatively small number has to date been singled out as contributing significantly to the overall problem of air pollution. The field fabrication of asbestos-bearing products, particularly insulating materials, and the spray application of asbestos fireproofing are two specific end uses that would be controlled by the proposed standards. The direct limitation of asbestos emissions from mobile sources, such as those associated with the wearing of automotive brake linings, the transport of asbestos-containing materials, and the dispersion of powdery asbestos-bearing materials from vehicles, lies outside the authority of Section 112 of the Clean Air Act. A program for determining the extent and nature of asbestos emissions from automotive brake linings is now in progress in the Office of Air Programs. Other asbestos emission sources are now under study for possible inclusion within proposed standards at a future date. Included in these studies are roadways paved with asbestos-asphalt concrete and talc mines, in which asbestos occurs as a natural contaminant.

Current standardized measurement techniques for asbestos, namely those for testing occupational asbestos exposures, are not designed for isokinetic sampling, which is necessary for the determination of the asbestos content of forced-gas streams. Further, these methods fail to take into account large numbers of asbestos fibers present in the samples. At least three ambient air sampling and analysis techniques, which employ electron microscopy to render visible even the smallest asbestos fibers, are currently undergoing development. To date, these methods are capable of providing estimates of asbestos mass concentrations, but not number concentrations of asbestos fibers in unprocessed samples, and reproducibility of results obtained by the three methods has not been established. Until these new techniques are perfected, emission control must be based upon the best feasible control technology. Accordingly, the proposed standards would require the operation of specified control equipment.

Fabric filtering devices have been specified as the mainstay of these standards because they possess (1) demonstrated high-efficiency collection across a wide range of solid particulate sizes and (2) reasonable investment and operating costs. It is prudent to require control techniques that provide high collection efficiency for submicron-size particulates because research studies have shown that the largest number of asbestos fibers in emissions generated by some industrial

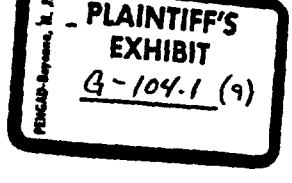
efficiency [illegible] manufacturing facilities, and some operations routinely recycle filter-cleaned air for ventilation of work spaces. In exceptional operations amenable to emission control by gas cleaning, but where technical difficulties preclude the application of fabric filters, these standards would permit the use of other control equipment of somewhat lesser efficiency.

The proposed regulations that would prohibit visible emissions apply to sources not readily controlled by gas-cleaning devices. Flexibility with regard to choice and development of the most effective control techniques would be provided in that the proposed standards would not specify control equipment. The exception of uncombined water from the prohibition would be made to accommodate situations in which water would be used as a control medium. Processes that are properly operated could be controlled by feasible techniques to secure compliance.

The surfacing and resurfacing of roadways with asbestos tailings would be banned because of the probable ineffectiveness of control measures during both application and an extended period of usage. The proposed ban on the spray application of products that contain asbestos is based upon experience with spray-fireproofing operations wherein efforts to control emissions by the use of containment and good housekeeping practices have repeatedly failed. Several large municipalities in the United States have already put into effect procedures that exclude the use of sprayed asbestos materials. Asbestos-free substitute materials are available for both sprayed asbestos fireproofing and high-temperature asbestos insulation.

ECONOMIC IMPACT OF PROPOSED STANDARDS

The basic processing of domestic asbestos ores is carried out in nine mills with production capacities ranging from 200 to 65,000 tons per year. These mills produce approximately one-sixth of the total consumption of asbestos in the United States. The estimated additional annualized costs required of these existing sources for compliance with the proposed standards range from zero to $5.96 per ton of asbestos fiber produced per year; this represents a range of zero to 6.7 percent of the average selling price per ton of domestically produced asbestos in 1969. The average investment, for the entire industry, is estimated to be $0.78 (0.9 percent) per ton of asbestos fiber produced per year. Actual investments range from $2,780 for an essentially uncontrolled mill of 200-ton/year capacity to $183,000 for a partially controlled mill of 40,000-ton/year capacity.



textiles, a total additional investment of $5,281,[illegible] is estimated to be required to bring existing, partially controlled sources into compliance with the proposed [illegible]. This represents an increase [illegible] of the total value of product output, or an annualized cost of 0.3 percent of the output product value. In terms of alterations in product price, there would result an average increase of 0.3 percent; the most significant increase would be 2.6 percent for asbestos paper products.

The use of asbestos in spray-applied fireproofing and insulation represents only approximately 0.5 percent of the annual domestic consumption of asbestos. No major impact on the price of asbestos or upon producers of asbestos would result from the prohibition on spray application of asbestos fireproofing and insulation. Further, increased costs for substitute materials, available or scheduled for introduction in the near future, would [illegible] to a maximum of 15 percent. The use of these asbestos-free substitute materials does not require new equipment or extensive retraining of personnel.

REFERENCES

1. Airborne Asbestos. National Academy of Sciences. Washington, D.C. 1971.

2. Kiviluoto, R. Pleural Calcification as a Roentgenologic Sign of Non-Occupational Endemic Anthophyllite-Asbestosis. Act. Radiol., Suppl. 1, 194:1-67, 1960.

3. Zolov, C., J. Bourilkov, and L. Babjov. Pleural Asbestosis in Agricultural Workers. Environ. Res. 1(3):287-292, 1967.

4. Merewether, E.R.A. Asbestosis and carcinoma of the lung. In: Annual Report of the Chief Inspector of Factories for the Year 1947. London: H. M. Stationary Office, 1949. 79 p.

5. Sullivan, R.J. and Y.C. Athanassialis. Preliminary Air Pollution Survey of Asbestos. DHEW, PHS, CPEHS, National Air Pollution Control Administration. Raleigh, N.C. Publication No. APTD 69-27. 1969.

6. Asbestos. In: National Inventory of Sources and Emissions. W. E. Davis and Associates. Leawood, Kansas. Report to National Air Pollution Control Administration. Durham, N. C. Contract No. CPA 22-69-131. February 1970. 46 p.