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ASBESTOS: A NATURAL SUBSTANCE FOR MODERN NEEDS

PACKINGS

CLUTCH FACINGS
PIPE WRAP
FELTS
A/C PIPE
SHINGLES
BRAKE LININGS
A/C SHEETS



VINYL FLOORING
SHINGLES
ROOFING PRODUCTS
OIL SEALS
GASKETS
FLOOR TILE
FRICTION MATERIALS

TEXTILES

ASBESTOS INFORMATION ASSOCIATION/NORTH AMERICA

II. Control of Asbestos in the Workplace and the Environment

Since the early 1970's, asbestos has been extensively regulated by federal agencies. Workplace exposures, historically the area of greatest concern, are regulated primarily by the Occupational Safety and Health Administration (OSHA). OSHA regulations apply to all workplaces except mines, which are governed by very similar standards of the Mine Safety and Health Administration (MSHA). On the other hand, the Environmental Protection Agency (EPA) regulates the release of asbestos fibers into the ambient air and water. Industry also has been working for many years to develop new procedures and products to minimize the release of asbestos fibers and to protect its workers.

Asbestos was among the first substances to be regulated by OSHA after the agency was established within the Department of Labor in April 1971. A standard for occupational exposure to asbestos was included in the initial promulgation of OSHA standards published on May 29, 1971. The standard established a permissible exposure limit of 12 fibers, greater than 5 microns in length, per cubic centimeter of air. The permissible exposure limit was subsequently lowered twice, first to 5 fibers per cubic centimeter of air on July 1, 1972, then to 2 fibers per cubic centimeter on July 1, 1976, which is the current standard.[18]

The OSHA standard also regulates the use of personal protective equipment, such as respirators; requires monitoring of workplaces for asbestos levels and annual medical examinations for employees; provides for caution signs and labels, and procedures for asbestos waste disposal; and specifies what records an employer must maintain.

The regulations of MSHA also established a 2 fibers per cubic centimeter exposure limit for mines and provide for methods of compliance.[19]

As OSHA is concerned with establishing standards for workplaces, EPA's concerns reside primarily in controlling emissions into the ambient air and water. The EPA has promulgated asbestos regulations under both the Federal Water Pollution Control Act and the Clean Air Act.

Regulations issued under the Federal Water Pollution Control Act established limits on the amount of total suspended solids, chemical oxygen demand, and the level of pH in wastewater that may be discharged to water. For the purposes of these regulations, the asbestos manufacturing industry is divided into ten subcategories, each of which is responsible for maintaining plant discharges within the permissible limits.[20]

The EPA has also issued regulations under section 112 of the Clean Air Act which apply to a broad range of asbestos-related activities from milling to waste disposal.[21] These regulations establish a standard of no visible emissions to the outside air from asbestos milling or manufacturing operations.

Other concerns addressed in the Clean Air Act rules are procedures to govern demolition and renovation operations. These procedures require that the EPA be notified whenever such operations will involve more than 80 meters (in length) of asbestos covered pipe or 15 square meters of friable asbestos material. All demolition and renovation work must employ dust emission control procedures, such as the wetting down of surfaces and materials which are to be worked. If wetting is not practical, local exhaust and ventilation systems may be used, provided that emissions from the system meet the "no visible emission" standard.

Asbestos-containing wastes must similarly be handled so as to prevent emissions of dust and be disposed of in a properly operated disposal site. Waste disposal sites that accept asbestos wastes must not emit visible emissions and may require warning signs and fences erected around the property. Wastes at the site must be covered with a specified thickness of nonasbestos material or with a resinous dust suppression agent.

Apart from occupationally-related settings, most efforts of government and industry have focused on controlling asbestos uses and products which may release excessive fibers into the environment. For example, the Consumer Product Safety Commission has banned consumer patching compounds used to join or repair interior walls and ceilings, and artificial emberizing materials used in fireplaces to simulate live embers and ash.[22] Similarly, EPA's regulation bans the use of friable sprayed insulation having more than one percent asbestos. As will be discussed in the following section, industry is continually working to develop new products and procedures to minimize the possibility of fiber release. Through the joint efforts of government,

III. Asbestos Use Today

Because of its many favorable characteristics, asbestos has often been cited as having thousands of practical applications. Today, with an awareness of the potential health hazards involved, certain of these applications have been phased out as industry concentrates its efforts on developing safer products. Reflecting this development is the assignment of asbestos-containing products into one of three categories according to their potential for fiber release: friable, locked-in, or encapsulated.

The term "friable" refers to products that are brittle and easily crumbled by hand pressure alone. Included in this category would be many kinds of sprayed-on insulations, low density thermal insulations, untreated textiles, and unsaturated papers and felts. Because of their high potential for release of fibers into the air, friable products have been virtually eliminated from general use through the efforts of both government and industry.

Locked-in products are those in which asbestos fibers are held fast by binders and are not released during routine handling and use. Asbestos can be "locked-in" by a variety of binders, although the most common are cement and resins or plastic binders. Products in this category include asbestos cement pipe, asbestos cement sheet and shingles, and friction materials.

Asbestos fiber, locked-in by rigid plastic binders, is an ideal friction material because of its heat resisting and reinforcing properties. It has long been an invaluable component in brake linings and clutch facings.

Combining asbestos with cement produces a very cost-effective construction material. The locked-in asbestos in asbestos cement is structurally strong, corrosion resistant, and practically maintenance-free. Asbestos cement shingles and siding are inexpensive, high performance, low maintenance building materials for a wide variety of climates and living conditions. Asbestos cement pipe for water and sewage lines has given the public incomparable service and convenience. It is structurally strong, corrosion resistant and one of the most economical pipe products available.

Good work practices, such as the use of special tools and equipment, are required during fabrication and installation of locked-in products. For example, because of the potential for fiber release, asbestos cement sheet or pipe should not be cut or drilled

small, if not non-existent. The study reports on the mortality experience of a cohort of 5,645 workers in two asbestos-cement factories in Louisiana with follow-up beginning twenty years after first exposure. The authors concluded:[15]

> In this study, whereas excess risk of respiratory cancer was detected in workers with moderate and heavy exposure, *the categories of lowest exposure to asbestos dust* [which were still above current exposure levels] *did not exhibit excess risks of respiratory malignancy.* Such findings are not necessarily incompatible with a linear response curve at low does because of the relative insensitivity of currently used epidemiologic methods in detecting slight increases in risks when compared to background. They do indicate, however, *that any excess risks at low degrees of exposure are small.*

Complete, definitive evidence on the absence of any risk to workers under today's low level asbestos conditions must await follow-up studies of more recent workers because of the long latency period that normally occurs between exposure and disease. Nonetheless, the absence of disease in cohorts of workers such as the two described above—who experienced asbestos exposures well above today's prevalent levels—provides us with confidence that significant risks no longer exist for workers in the asbestos industry.

In light of the medical evidence indicating an absence of any significant risk from working with asbestos in the present occupational setting, it can be concluded that for the general public, asbestos risks are minimal, if they exist at all. Asbestos concentrations to which consumers might be exposed are at least several orders of magnitude (that is, thousands or tens of thousands of times) lower than those of today's asbestos workers. On this point, the Advisory Committee on Asbestos of the United Kingdom Health and Safety Commission concluded: "there is no quantitative evidence of a risk to the general public from exposure to asbestos dust."[16]

Among the evidence supporting the above conclusion is a recent study finding no adverse health effects on Paterson, New Jersey, residents living near a factory using amosite asbestos.[17] Mortality statistics of the exposed community when compared with a control community without exposure were virtually identical, even though the past asbestos exposures in the neighborhood of the factory were likely to be much greater than those of the average consumer. The reported deaths from lung cancer and

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the risk of lung cancer is increased by between four and five times among such workers as opposed to an increase of ten times for cigarette smokers who do not work with asbestos.[8] However, the greatest risks continue to be associated with exposures to both asbestos dust and cigarette smoking. Where both factors are present, the risk of lung cancer has been estimated to increase by as much as fifty-five times.[9]

Asbestos has also been linked to mesothelioma, a rare cancer of the linings of the chest (pleura) or abdomen (peritoneum). The mechanism of this disease in association with the inhalation of asbestos fibers remains a medical mystery. Until recently, asbestos was the only substance associated with the development of this disease, but it could not account for all reported cases. Now, additional substances, including ethylene dibromide, ethylene oxide, and cytembena, have been linked to this malignancy.[10,11,12] Crystalline fibers of erionite, a mineral of the zeolite family, are thought to be responsible for high rates of mesothelioma in some villages of central Turkey.[13]

It should be kept in mind that the diseases associated with asbestos exposure are not acute but chronic. This means that they develop with exposure over time, or that there is a latency period before any symptoms are manifested. A latency period of 30 years or longer is not unusual.

The latency period is one reason why asbestos is presently so much in the public eye. Again, it should be stressed that the diseases of today are rooted in the heavy workplace exposures of the past.

Much of the evidence available on the effects of low dose exposure to asbestos indicates that the risk to workers today is very small. In a comprehensive study of Quebec chrysotile mining and milling workers, for example, the authors note:[14]

> If the only subjects studied had been the 1904 men with at least 20 years' employment in the lower dust concentrations, averaging 6.6 million particles per cubic foot (or about 20 fibres/cc) [i.e., ten times higher than the current OSHA standard], *excess mortality would not have been considered statistically significant, except for pneumoconiosis.*

Moreover, concluded the investigators, for the lower asbestos concentrations prevalent in modern workplaces, "the order of risk may now approximate to less than 1 cigarette a day."

A recent study of asbestos-cement workers in the United States similarly finds low level asbestos exposure risks are very

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with power tools unless such tools are properly fitted with a vacuum hose to remove the dust created by such activities. The use of hand tools is recommended because they create larger, heavier particles which do not become airborne. Once a locked-in product is in place, however, the fibers are so firmly bound in that there is little chance of their escaping into the environment. Work practice guides for asbestos cement pipe and sheet and other products have been developed by the industry and are available from the manufacturers or the Asbestos Information Association/North America.

Encapsulated products are those in which the asbestos fiber is completely enshrouded by asphalt, latex, rubber or some other resilient material. Some common examples of encapsulated asbestos products are roof coatings, flooring products, mechanical packings, and oil seals and gaskets.

Asphalt and asbestos make an excellent combination. The high surface area of asbestos thickens the asphalt so it does not flow when exposed to high temperatures. The fibrous nature of asbestos prevents the asphalt from cracking as it dries and shrinks, and the use of asbestos in asphalt is cost effective.

In roofing felt, asphalt encapsulated asbestos is less susceptible to shrinkage. The high surface area of asbestos holds the asphalt securely, and there are no problems with roof rot. In all, asbestos provides a low cost, dependable roof with a long, useful life.

Pipe wrap containing asbestos is durable, economical, and resistant to soil chemicals. As such, it continues to play an important role in protecting the nation's underground network of steel pipelines.

In gaskets, strong and resilient latex-bound asbestos provides a seal which requires less bolt pressure. These gaskets maintain their size and integrity under high stresses, temperatures, and chemical attacks. The gasketing material can be infused with a special parting agent so that when the gasket is removed, there is no need for excessive grinding or scraping.

The backing of some vinyl sheet flooring contains asbestos encapsulated by a latex binder. This backing is then covered with vinyl and a wear layer. These floors are durable, comfortable, and require little maintenance. The same can be said of vinyl asbestos floor tile. The asbestos helps tile floors withstand the constant traffic and abuse found in many offices, light duty warehouses, and public buildings.

times below those which are associated with hazards to health. Properly handled, asbestos is an economically valuable industrial raw material which can continue to be used in many beneficial applications.

The issues related to the use of asbestos cannot be fairly or adequately addressed on the basis of emotional reactions. What is needed is a balanced, realistic view which accurately reflects the use of asbestos today.

I. Asbestos and Health

The public's concern about possible adverse health effects from asbestos exposure is understandable. There is no doubt that very high exposures to asbestos in workplaces many years ago have led to serious health consequences. Although we still do not have a complete understanding of how asbestos causes disease, there are areas of general agreement concerning its health effects.

Microscopic fibers of asbestos, invisible to the human eye, can enter the body through two routes, ingestion or inhalation.

Asbestos fibers are most commonly ingested, or swallowed, with drinking water, which in many areas naturally contains hundreds of thousands of fibers per liter. Studies, both in the United States and abroad, strongly support the conclusion that ingestion of asbestos is not considered to be a significant health risk.

The National Academy of Sciences Safe Drinking Water Committee reported in 1977: "The available data with respect to asbestos orally ingested through drinking water do not suggest an immediate hazard to public health."[1]

The International Agency for Research on Cancer, after surveying and evaluating all the available published literature on asbestos also concluded: "At the present time, there is no evidence that exposure of the general population to past levels of asbestos dust in the ambient air or in beverages, drinking-water, food, or pharmaceutical preparations increases the risk of cancer."[2]

The Advisory Committee on Asbestos of the United Kingdom Health and Safety Commission completed in 1979 an exhaustive three-year study of the health risks from asbestos. In its final report, the Advisory Committee states: "there is . . . no evidence of the existence of risk in animals associated with the ingestion of asbestos."[3]

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Introduction

The purpose of this pamphlet is to provide the reader with an overview of significant matters relating to asbestos and asbestos-containing products. It includes information on asbestos and health, federal regulation of asbestos, and current uses of asbestos. The asbestos related health problems which are occurring today are problems that had their origin many years ago. This pamphlet will provide the reader with a better understanding as to why asbestos and today's asbestos-containing products can continue to be used safely.

Asbestos is a generic term used to describe a number of fibrous minerals found in various concentrations across the earth's surface. As defined by federal regulatory agencies, the term encompasses six minerals: chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite. Of these, chrysotile is the most widely used, accounting for over 90 percent of world consumption.

Because minute amounts of asbestos are commonly found in the natural environment of many areas, asbestos is sometimes referred to as being ubiquitous, or present everywhere. Commercially viable deposits are far less common. The largest deposits are found in Canada, especially in the Province of Quebec, the U.S.S.R., and South Africa. In the United States, asbestos is mined in California and Vermont.

Asbestos has found broad use in many essential applications because of its high tensile strength, superior flexibility and durability, favorable friction properties, and resistance to fire, heat, and corrosion. This unique combination of properties remains unmatched by any other natural or man-made fiber. Indeed, in the recent past asbestos was very favorably perceived by the public and hailed as a "miracle" fiber.

It is now known that asbestos is one of a growing number of substances which can, with excessive exposure, cause disease in humans. The current asbestos-related health problems are an unfortunate legacy of the past and have led to much fear, uncertainty, and misinformation concerning the use of asbestos today. Yet the high visibility of these problems should not obscure the very different working conditions which now exist in the industry.

Improved handling techniques and the selective development or elimination of product lines now allow asbestos and asbestos-containing products to be used at exposure levels many

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