International Ban Asbestos Secretariat

The Question Of Asbestos In The United States Of America

by Barry Castleman, ScD

Safer substitutes for asbestos products include both products where alternative fibrous materials have been substituted for the asbestos component, and products that serve the same purpose as the asbestos-containing product but are made of entirely different materials. The substitution of asbestos products is a public health matter, in which the technical availability of safer alternatives is necessary but not sufficient to assure that manufacture and use of the dangerous asbestos products will be stopped.

Historical Recognition of Asbestos Hazards and Substitution in Thermal Insulation

Substitution of asbestos in products, for health reasons, did not occur in the USA to a significant extent until the 1970s, even though the hazards of asbestos were well known to industry since the 1930s. It is important to understand the reasons for this, in understanding some of today's problems with asbestos in Brazil. Both the social policy issues and the technical ones are important in the replacement of discredited, hazardous asbestos technologies.

The asbestos product that has caused more death and disease than any other is thermal insulation used mainly on hot pipes and boilers. Cases of asbestosis among insulation workers in shipyards and construction were first published in industrial medicine and hygiene journals in the 1930s. By the mid-1940s, major U.S. railroads, shipyards, steel, and oil companies were aware of this danger to their workers. Safer, mineral wool insulation products were available and used on steam-powered railroad locomotives and in some oil refineries. But asbestos insulation continued to be the dominant type of thermal insulation used in industry.

To understand why this was so, we need to go back to the 1920s, when the first case reports of asbestosis were published in medical journals, primarily the **British Medical Journal**. The word "asbestosis" was first used in several articles in this journal in December of 1927. The authors described the ways to diagnose this disabling and potentially fatal, lung-scarring disease, using the microscope and chest X-ray. In the next two years, the world's largest asbestos companies took steps to protect the market for the asbestos from their mines, in thermal insulation. Johns-Manville in the USA bought two companies, a large rock wool company and another with patents on calcium silicate insulation which could be made with or without asbestos. Turner & Newall in England bought a number of smaller companies making thermal insulation. Producers of non-asbestos mineral wool insulation and fiber-glass insulation were somehow induced to develop some asbestos product lines as well.

Owens-Corning, for example, was mainly a fiber-glass producer, but within two years after the company was created, it had a line of insulating cement in which both fiberglass and asbestos were used. Internal corporate documents from 1942 spoke of the vast scientific literature on asbestos and disease, and a plan was even developed to use this as a "weapon in reserve" to compete against asbestos. But this never happened; the company decided to withhold this information from the Asbestos Workers' union, the union of construction workers who installed thermal insulation. And no company was left to compete in safety, to denounce asbestos as a killer and say, "We have an alternative, safer product." A tremendous amount of asbestos insulation was used in US shipyards during World War II, during which time 4.5 million workers were employed in these workplaces.

Sales of asbestos insulation continued to rise after the war for more than 20 years. And though dozens of reports of death and disease from asbestos insulation were published in medical journals from many countries, the workers knew nothing about this. The asbestos took decades to exert its deadly effects, and it had no warning properties -- unlike many other toxic substances which cause headaches, dizziness, irritation of the mucous membranes (like an acid mist), nausea, and other immediate symptoms. The asbestos companies, for their part, placed no warning labels of any kind on sacks of asbestos fiber or on cartons of asbestos insulation and other asbestos products. Government regulation of worker health hazards was practically nonexistent, and the era of consumer and environmental protection would not come until the 1970s. Almost all of the experts in industrial hygiene and medicine worked for industry, and they were under constant pressure to not create labor problems or make recommendations that were too costly. In big companies like Westinghouse, there were staffs of competent people in these technical areas, but they had little authority, and there is very little evidence that their recommendations to control asbestos exposures (dating from 1946 at Westinghouse) were implemented.

Things began to change in the United States with the emergence of Dr. Irving Selikoff, an epidemiologist in New York. Selikoff worked with the Asbestos Workers' Union, statistically analyzing death certificates of former union members to show a tremendous toll of occupation-related deaths. Where 6 or 7 deaths from lung cancer would have been expected in this group, 45 occurred, accounting for almost 1/5 of all deaths in this cohort of men whose exposure had started at least 20 years before the year of follow-up. In addition, 5 percent (12) of these men died from asbestosis, there were 4 deaths from mesothelioma, and there were three times as many deaths from gastrointestinal cancer as would have been expected. Selikoff published his mortality study in the **Journal of the American Medical Association** in April of 1964 and organized an international conference on asbestos later that year in New York. At the conference, Selikoff's group announced that, by the time they had been in the trade 20 years or more, most insulation workers developed asbestosis. That year, Johns-Manville finally began to place the first mild "caution" labels on shipping cartons of asbestos insulation.

Selikoff's contact with the unions was terrifying to the asbestos industry. His willingness and great ability to tell the people in the U.S. about the hazards of asbestos through the media were legendary. Johns-Manville executives had no idea how to deal with the problems created by him. And their greatest fears were finally realized, as insulation workers with asbestos diseases began to file "product liability" lawsuits, claiming damages for the industry's historic failure to warn users of asbestos products about their health hazards. The most important "precedent case" of this kind was decided by a Texas jury and confirmed by an appeals court in 1973. The courts held a manufacturer responsible for having the knowledge of an "expert" about the hazards of his products. Even as sales of asbestos in the U.S. reached an all-time high, top people in the industry saw disaster ahead. Leading manufacturers of thermal insulation, Johns-Manville and Owens-Corning, stopped using asbestos in insulation sold in the U.S. in 1972-1973. The U.S. Environmental Protection Agency (EPA) banned asbestos insulation as an air pollution hazard in 1975.

Johns-Manville continued making asbestos insulation at its plant in Guarulhos. A company hygienist wrote of seeing uncontrolled hazards in the use of such products at Brazilian shipyards, construction sites, and refineries in 1977. It appears that J-M finally substituted asbestos in its insulation products at Guarulhos in 1980. Plant conditions at another firm in which J-M held a minority interest, Asberit (located in Rio), were described as "disgraceful" and "extremely bad". In the asbestos textile operations, "extreme dust" in the air made it hard to see across the room. "Quantities of fibers were visible on the workers' clothing, their skin, and their hair." The J-M hygienist recommended in 1978 that "we either force our partner to clean up this operation or we take steps to remove ourselves totally" from it. (WB Reitze, "Safety and Environmental Quality Review of Our South American Operations", Johns-Manville internal correspondence, Oct. 2, 1978)

Johns-Manville's liabilities forced the corporation into bankruptcy court in 1982, and soon afterwards the company sold all of its asbestos interests. A fund was created by the bankruptcy court, the Manville Trust, to compensate asbestos victims, and this fund now owns 80 percent of the stock of Johns-Manville Corporation. A number of other companies have gone bankrupt from asbestos liabilities, as thousands more people develop asbestos diseases and file civil suits each year in the USA.

Asbestos in Automobile Brakes and Engine Gaskets

"Semimetallic" brakes were developed and used on police cars in Los Angeles in the 1960s. These are widely used today, especially in the 12 or more European countries where asbestos is banned. These products are made from steel wool, sponge iron, and graphite held together with a phenolic resin binder. Aramid fiber is also used in non-asbestos brakes. Despite asbestos industry warnings that the non-asbestos brakes might increase highway safety hazards, this has not occurred.

The U.S. EPA tried to ban asbestos in most of its major uses in 1989. EPA's rules would have eliminated the use of various classes of products, the last ones in 1997. However, the asbestos industry challenged the rules in court and was successful in getting them overturned. EPA then asked the big automobile companies to sign a voluntary agreement to stop using asbestos. The auto companies responded favorably to the idea of eliminating asbestos, but the asbestos industry lawyers stopped this effort, too, by threatening an anti-trust suit.

General Motors told EPA in 1992 that they intended to stop using asbestos by 1997, as specified in the overturned EPA regulations. The company was able to easily eliminate the use of asbestos engine gaskets at around that time in all vehicles sold in North America. GM still uses asbestos-containing brakes on some of its new cars made in North America, and in replacement brake parts for older cars in North America. GM cars and replacement parts sold in the major countries of Western Europe are now required to be asbestos-free.

Liability and regulation have led U.S. auto makers to largely reduce their use of asbestos in brakes. The current volume of 6000 m.t. of asbestos used per year in brakes and other friction products is down 90 percent from the peak volume of 20 years ago. Of course, the overturning of the EPA ban means that asbestos brake parts can also continue to be imported into the U.S. from other countries, including Brazil.

General Motors still uses asbestos gaskets in the manufacture of new automobile engines in Brazil. This was discovered in July of 1998 by Dr. Giannasi, after GM of Brazil sent her a letter denying that asbestos-containing parts were used in their San Jose dos Campos plant. We are only starting to know what conditions are like in the companies where asbestos-containing GM parts are manufactured.

Johns-Manville's former affiliate, Asberit, is now called Teadit, and uncontrolled hazards in the cutting of asbestos gaskets were readily apparent at their plant in Campinas when we went there last week. No dust capture was applied in equipment used to cut asbestos gaskets, nor were wet methods used to reduce the dust. The company also produces non-asbestos gaskets which are individually stamped "non-asbestos," but the asbestos-containing gaskets are not individually stamped "asbestos". A report by corporate consultants to Teadit indicated that airborne asbestos exposures in gasket cutting operations were 0.14-0.36 f/cc, which is permissible under the Brazilian occupational exposure limit of 2 f/cc but would all be in violation of the limit in force in the U.S. (0.1 f/cc). Teadit asbestos gaskets are used by General Motors at San Jose dos Campos.

Asbestos-free gaskets are made from such things as aramid fiber combined with cellulose pulp, glass fiber with mineral fillers (wollastinite, talc, mica), semimetallic compositions including graphite or polytetrafluoroethylene, and solid metal. (PTC Harrison et al., **Chrysotile and Its Substitutes**, Institute for Environment and Health, report to U.K. Health and Safety Executive, 6 April 1998) A number of companies manufacture both asbestos-containing and non-asbestos gaskets and brakes in Brazil today.

Asbestos-Cement Building Products

Asbestos-cement pipes, sheets, and tanks account for 92 percent of asbestos use today in Brazil. This is by far the major use of asbestos in the world today.

When I was visiting EPA in 1973, a medical doctor there showed me an internal Johns-Manville report showing that water flowing through A-C pipes picked up small amounts of asbestos, measurable by electron microscopy. With my chief at the Center for Science in the Public Interest, I then drafted a petition to EPA to ban additional use of A-C pipe in drinking water distribution systems. We also expressed concern for the health of workers who installed and maintained the water supply lines. EPA was unwilling to ban A-C pipes for water supply systems at that time, partly because there were by then about 300,000 km of A-C pipe already in use in U.S. water supply systems. Over the following years, however, tremendous publicity about environmental asbestos hazards led municipal water system managers and local governments to gradually change over to other types of pipes for installations of new water supply pipelines. By 1982, at least 6 A-C pipe manufacturing plants in North America had closed. Similarly, construction companies wanted to avoid public controversies, labor problems, and the cost of complying with government regulations for asbestos and virtually stopped using A-C sheet products. The last A-C pipe and sheet plants in the U.S. closed in 1992-1993.

Substitutes for A-C water pipe include ductile iron pipe, high-density polyethylene pipe, and metal-wire-reinforced concrete pipe. For sewer systems, where pressure demands are not as great, clay pipe can be used. Numerous A-C sheet substitutes exist for interior building walls and ceilings, including fiber-cement and other materials (e.g., brick). In fiber-cement sheet products, polyvinyl alcohol fibers and/or cellulose fibers can be used, sometimes combined with mica or wollastonite to enhance fire resistance. For roofing, lightweight concrete tiles can be made and used in the most remote locations, using locally available plant fibers including jute, hemp, sisal, palm nut, coconut coir, wood pulp <JMPARRY@COMPUSERVE.COM.UK>. Galvanized iron roofing and clay tiles are other alternative materials.

The French-based multinational corporation, Saint Gobain Pont-a-Mousson, converted its A-C manufacture to glass-fiber-reinforced cement after asbestos was banned in France; however, St. Gobain continues to own interests in asbestos mining and A-C product manufacturing in Brazil. Reorganization of St. Gobain's subsidiaries' asbestos interests in Brazil in May, 1998 may have been aimed at reducing St. Gobain's liability for asbestos disease here in the future.

Asbestos Textiles

These products have been used as heat-protective gloves and garments in industries where molten metal splash, welding sparks, and open flames are present; asbestos cloth has been used to wrap pipecovering. Manufacture of these products began shifting out of the U.S. in the early 1970s, at the same time as imports increased from Mexico, Venezuela, Brazil, and Taiwan. Studies published in 1975 showed very high levels of asbestos exposure were associated with the use of asbestos textile products; in addition, the manufacture of these products was notoriously dusty and costly to bring under strict control. These products have thus not been made or used in the U.S. for a number of years. Substitutes include fiber-glass and aramid fiber. I am told by Dr. Giannasi that asbestos textiles are still made in Brazil.

Conclusion

Regulation and liability of asbestos in the United States have caused a decline in consumption to 20,000 m.t./y, about 3 percent of the peak level in 1974. U.S. asbestos consumption has steadily declined to about 100 grams/y per person, including imported asbestos products as well as those made in the USA. The same concerns about product liability that devastated the asbestos industry have played a role in U.S. industry's selection of safer substitute materials. For example, there has been an effort to manufacture synthetic fibrous substitutes that are large enough in diameter to not be respirable. Even so, significant hazards are involved in the use of some alternative materials, and appropriate protective measures should be taken in the use of asbestos substitutes. Refractory ceramic fibers (RCF) appear to be especially dangerous, and available data indicate that these relatively new materials are no less carcinogenic and fibrogenic than asbestos; moreover, the highly dangerous form of crystalline silica, cristobalite, is formed from the thermal degradation of RCF, presenting a silicosis hazard to workers in such industries as foundries and steel.

Deliberate business decisions, not technical difficulties, are the cause of today's continued high usage of asbestos in Brazil (about 1400 g/y per person). The politics of phasing out asbestos are made more difficult by the fact that Brazil is a major chrysotile asbestos mining country. A lesson might be learned by observing that the world's largest exporter of chrysotile asbestos, Canada, consumes only 1 percent of the asbestos it mines. Canadian construction workers would not work with A-C construction materials, and so these products are not made at all in Canada.

To the extent that foreign business interests have left behind a legacy of asbestos disease by developing asbestos mining and manufacturing industries in Brazil, they should be required to establish reliably secure means of paying their predictable liabilities here. To the extent that multinational corporations observe poorer standards of asbestos control in their operations in Brazil than in other countries, they should be prompted by Brazilian governmental agencies, unions, the scientific community, and other respected institutions in Brazil to put a quick end to this deadly practice of double standards. Europe has demonstrated that any country can stop adding this deadly material to its living environment now, for the benefit of present and future generations, if the political will is there to accomplish the task.

An additional reference on history of knowledge about asbestos hazards worldwide: B. Castleman, **Asbestos: Medical and Legal Aspects** (4th Ed.), Aspen, 1996.

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