5/14/74 11:00 am "Chrysotile Asbestos in Plastics"

① Bad Press
② Good Press

Session #11 J. L. Myers
Continental South

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✱ = when to put on Trans

True story is in between and I will discuss that phase of the asbestos/health question.

Asbestos has received a great deal of attention and publicity in recent years, especially after it was designated a "target health hazard" by ③ OSHA and a "hazardous air pollutant" by the EPA. ✱ Many of the articles on asbestos by the press have been emotionally oriented or distorted and in some cases stories have been sensationalized, based on obvious misinterpretation of facts.* * Slide 2 is examp

Asbestos is a commerical term used to describe six naturally- ④ occuring "asbestiform" minerals ✱ that are fibrous, hydrated metal silicates. The six varieties are divided into two classes, serpentine and amphibole, based on their crystal structure. Chrysotile is the only member of the serpentine class while the amphiboles include crocidolite, amosite, anthophyllite, tremolite and actinolite. Chrysotile is by far the most used variety and accounts for over 95% of U.S. consumption.

✱ Crocidolite is imported from South Africa and is used to reinforce ⑤ a limited variety of plastics where its pronounced color is not objectionable. Amosite, also imported from South Africa, is used primarily in thermal insulation. Anthophyllite is imported from Finland and used primarily as a filler for polyprophlene and in insulating materials (RG-600 Ref.). A comparison of the four varieties of asbestos which are of commercial importance is presented in Table 11. It should be noted that there are significant differences between chrysotile and the amphiboles with regard to chemical composition and certain physical properties.

WHERE IS ASBESTOS USED AND WHY?

Asbestos has served mankind for over 100 years in a broad variety of applica- ⑥ tions. ✱ The general areas in which asbestos is used in the United States are shown in Table III. Based on information from asbestos producers and consumption surveys, it is estimated that the plastics industry uses about 1/3 of the 800,000 tons consumed annually, which makes it the largest single user of asbestos fiber.

⑦ ✱ The largest uses of asbestos by the plastics industry are in vinyl/asbestos floor tile and in phenolic molding compounds. It is also used in other plastics as shown in Slide 7. Important functions of asbestos ✱ in plastics are reinforcement, ⑧ dimensional stability, heat resistance, flow control and general-purpose filling. Most of the functions are supplied by short fiber chrysotile asbestos fiber, although longer chrysotile fibers and other asbestos varieties are sometimes required for particular properties.

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WHY USE CHRYSOTILE?

(9) ✱ Among the several advantages of chrysotile, which set it apart from the amphibole minerals and account for its widespread and increasing usage, are world wide availability, mechanical strength, flexibility, positive surface charge, low iron content, softness and low refractive index. It is conservatively estimated that chrysotile asbestos is used in over 3,000 applications and in most of these applications it is an essential ingredient for which no replacement is readily available. ✱

(10) The information in Slide 10 shows that the use of chrysotile asbestos and its share of the total market are steadily increasing. There is increasing evidence that crocidolite and amosite are more hazardous to human health than chrysotile (1). Since 1970 the use of crocidolite in Britain has been restricted after a panel of experts "concluded there was sufficient evidence to suggest (10a) other types of fibre should be substituted for crocidolite wherever possible." ✱

WHAT IS THE ASBESTOS HAZARD?

It is readily accepted that asbestos, like many other foreign bodies, can (11) cause disabling lung damage ([redacted]), commonly referred to as asbestosis. This disease and bronchogenic carcinoma (lung cancer) are the two most common asbestos-related diseases. It is important to note that, based on epidemiological data, these diseases have occurred primarily in workers with high, long-term exposures to asbestos dust. It is of further interest that one noted researcher has reported that neither of these diseases is peculiarly related to or caused solely by the inhalation of asbestos fiber (3). Another important consideration is the relation between cigarette smoking and lung cancer as reported by Dr. E. C. Hammond and Dr. I. J. Selikoff (4). In this study they reported that:

> "It seems clear, then, that lung cancer is uncommon among asbestos insulation workers who have no history of cigarette smoking and that if the risk is increased, such increase is not great."

A third disease, mesothelioma, has more recently been associated with persons exposed to asbestos. Mesothelioma is an extremely rare cancer of the lining of the chest (pleura) or the abdominal cavity (peritoneum). Most researchers concur that there is an association between mesothelioma and crocidolite, but not necessarily with chrysotile.

(12) ✱ The 33 member Advisory Committee on Asbestos Cancers of the International Agency for Research on Cancer (a division of the World Health Organization) has concluded that there is at present no evidence of mesothelioma or lung damage by

asbestos to the general public; and such evidence as there is does not indicate any risk of cancer resulting from asbestos fibers present in water, beverages, food or in the fluids used for the administration of drugs.

While there seems to be general agreement that the public is not in any present danger from asbestos, it is also recognized that excessive, long-term occupational exposure can cause serious health problems. During the past two years, significant legislation has been enacted by the Federal Government to reduce and control occupational exposure to asbestos fibers and to minimize fiber emissions to the environment. The most important regulations are those issued by OSHA.

(13) *The Williams-Steiger Occupational Safety and Health Act of 1970 established the Occupational Safety and Health Administration (OSHA) within the Department of Labor, which has responsibility for administration and enforcement. Research and related functions are handled by the Department of Health, Education and Welfare (HEW) through the National Institute of Occupational Safety and Health (NIOSH). Five million employers and 60 million of the nation's 80 million workers are covered by OSHA. In a news release issued January 4, 1972, OSHA announced a (14) Target Health Hazards Program* aimed at improving health factors associated with working conditions. The following five substances were designated to be the focus of initial and concerted efforts by OSHA and NIOSH: Asbestos, Cotton Dust, Silica, Lead and Carbon Monxide.

(15) *The new Standard for Exposure to Asbestos Dust was published in the Federal Register, Volume 37, No. 110 on Wednesday, June 7, 1972. The basic exposure standard is an 8-hour time-weighted average (TWA) of 5 fibers, longer than 5 micrometers, per cubic centimeter of air. The TWA limit is to be reduced to 2 fibers per cubic centimeter on July 1, 1976. A peak concentration of 10 fibers per cubic centimeter is not to be exceeded at any time. The first basic requirement of the new standard is monitoring to determine whether or not fiber concentrations are in excess of the exposure limits and that monitoring be repeated as necessary to ensure that employees are not exposed to levels in excess of the exposure limits.

*If exposure limits are not exceeded, there are no further compliance (16) requirements except for medical examinations. Medical examinations are required for all employees in any occupation exposed to airborne concentrations of asbestos fibers. The examinations are relatively simple and should cost no more than $50 per year, per employee.

Respirators and special clothing are required in the construction trade (17) for the spray application of insulation and fireproofing materials, and for the removal of such materials.* This special protection is not required for any other

use of asbestos unless exposure limits are exceeded. This is also true for other items such as specially-equipped tools, change rooms, clothes laundering and waste disposal. *Caution labels are required on products containing asbestos except where the fibers have been modified by a bonding agent or other material to prevent dusting during any normal subsequent use or handling. The labeling of a product does not prohibit its use. It should be noted here that in at least 90% of the products containing asbestos, the fibers are solidly locked into the product thereby presenting little danger of dust generation during normal use and handling of the product (6).

(18)

WHAT IS INDUSTRY DOING?

(19)

* The Asbestos Information Association/North America reports that, during the past 30 years, the asbestos industry has spent millions of dollars to improve mining, milling, and manufacturing methods (8). The establishment of safer working conditions has been a prime target and this work continues unabated and in close association with government agencies and independent medical researchers(9). The ultimate goals of the asbestos industry are:

---- Reduction of work-area dust to minimum levels.

---- Protection of workers from asbestos-related diseases.

---- Maintenance of environmental emissions at levels low enough to preclude public endangerment.

~~AIR SAMPLING~~

In order to comply with OSHA Standards and to determine the need for dust control measures, air monitoring should be conducted in areas where asbestos is regularly handled or used. The equipment for collecting air samples costs less than $400 and is readily available. A phase contrast microscope can be obtained for as little as $600 or an existing microscope can be modified for "counting" the asbestos fibers in compliance with NIOSH criteria (11).

Air samples have been collected and analyzed on a regular basis by the asbestos industry for years.* Except for a few applications where dust control is an engineering problem, industry is finding that dust levels are usually within acceptable standards or that minimum changes are necessary to achieve compliance. The summary in Slide 20 is typical of our measurements of dust levels during asbestos handling in various types of plants and operations. The dust levels reported are Ceiling Concentrations and it should be noted that the allowable OSHA level is 10 fibers/cc. Most of the data were collected before the installation of any special dust control measures.* Typical microscope views of dust. Monitoring often

(20)

~~Table II~~

21A
21B
21C

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shows that obviously dusty conditions are caused by materials other than asbestos. This does not preclude the need for controls but it could change their scope and facilitate compliance with government regulations. Because of "bad press", asbestos is frequently ordered out of use without regard to whether or not a hazard actually exists due to air contamination. If acceptable dust levels are feasible, there is no need to replace asbestos at the expense of product quality or ecomomic penalty. Before asbestos is replaced, it should be certain that a safer alternative is available (12).

DUST CONTROL MEASURES

Asbestos producers and users are spending a considerable amount of time and money on various dust control measures. Conventional means to achieve minumum dust levels include: filtered ventilation systems on process equipment, local ventilation for saws and similar tools, conversion to a "wetted" operation, leak-proof packaging, vacuum clean-up, more care in bag disposal and other asbestos waste handling, and automatic bag openers. Unusual innovations include: pelletized asbestos, special packaging, and treated products.

(22) *Only short-fiber chrysotile is available as pellets, but this product serves a fair portion of the asbestos market. Pellets not only reduce dust during conventional handling but they are also available in bulk hopper cars and can be transferred and used in totally enclosed systems. Barring leaks in the system, dust in work areas is virtually eliminated. Used in bulk, asbestos pellets also reduce shipping costs, eliminate warehouse storage and handling, facilitate automation, reduce clean-up, and eliminate bag handling and disposal. The pellets contain no binder and are friable enough to be dispersed in dry form or in aqueous or resinous systems with conventional high-shear grinding equipment (13).

CONCLUSION

Asbestos is one of industry's many raw materials which involves a potential hazard when not used with reasonable respect and care. (23) *The plastics industry uses primarily chrysotile asbestos and in most products the fibers are locked-in to prevent airborne contamination.

Chrysotile asbestos is a ~~important and necessary raw material,~~ vital to the nation's safety and economy; and, with proper control, it can be used safely and in compliance with government regulations. Medical, scientific, government, and industrial personnel must continue to work closely together to establish reasonable exposure limits, provide safe work areas, and eliminate any possibility of public endangerment.

5/14/74 11:00 am Chrysotile Asbestos in Plastics (2)

(1) Bad Press
(2) Good Press

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(1) * Asbestos has received a great deal of attention and publicity in recent years, especially after it was designated a "target health hazard" by (4) OSHA and a "hazardous air pollutant" by the EPA. * Many of the articles on asbestos by the press have been emotionally oriented or distorted and in some cases stories (2) have been sensationalized, based on obvious misinterpretation of facts * ~~Since it is easy~~

Asbestos is a commerical term used to describe six naturally- (3) occuring "asbestiform" minerals * that are fibrous, hydrated metal silicates. The six varieties are divided into two classes, serpentine and amphibole, based on their crystal structure. Chrysotile is the only member of the serpentine class while the amphiboles include crocidolite, amosite, anthophyllite, tremolite and actinolite. Chrysotile is by far the most used variety and accounts for over 95% of U.S. consumption.

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WHERE IS ASBESTOS USED AND WHY?

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(7) ~~* The largest uses of asbestos by the plastics industry are in vinyl/asbestos floor tile and in phenolic molding compounds. It is also used in other plastics as shown in Slide 8.~~ Important functions of asbestos * in plastics are reinforcement, (8) dimensional stability, heat resistance, ~~flow control and general purpose filling~~. ~~Most of the functions are supplied by short fiber chrysotile asbestos fiber~~, although longer ~~chrysotile fibers and other asbestos varieties~~ are sometimes required for ~~particular~~ properties.

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Calidria Product Applications.

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It is readily accepted that asbestos, like many other foreign bodies, can cause disabling lung damage (~~pulmonary fibrosis~~), commonly referred to as asbestosis. This disease and bronchogenic carcinoma (lung cancer) are the two most common asbestos-related diseases. It is important to note that, based on epidemiological data, these diseases have occurred primarily in workers with high, long-term exposures to asbestos dust. It is of further interest that one noted researcher has reported that neither of these diseases is only peculiarly related to or caused solely by the inhalation of asbestos fiber. Another important consideration is the relation between cigarette smoking and lung cancer as reported by Dr. E. C. Hammond and Dr. I. J. Selikoff. In this study they reported that:

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The 33 member Advisory Committee on Asbestos Cancers of the International Agency for Research on Cancer (a division of the World Health Organization) has concluded that there is at present no evidence of mesothelioma or lung damage by

asbestos to the general public; and such evidence as there is does not indicate any risk of cancer resulting from asbestos fibers present in water, beverages, food or in the fluids used for the administration of drugs.

While there seems to be general agreement that the public is not in any present danger from asbestos, it is also recognized that excessive, long-term occupational exposure can cause serious health problems. During the past two years, significant legislation has been enacted by the Federal Government to reduce and control occupational exposure to asbestos fibers and to minimize fiber emissions to the environment. The most important regulations are those issued by OSHA. and I wish the law and its enforcement had as clear a set of guidelines as those discussed by Mr. Andrus.

The Williams-Steiger Occupational Safety and Health Act of 1970 established the Occupational Safety and Health Administration (OSHA) within the Department of Labor, which has responsibility for administration and enforcement. Research and related functions are handled by the Department of Health, Education and Welfare (HEW) through the National Institute of Occupational Safety and Health (NIOSH). Five million employers and 60 million of the nation's 80 million workers are covered by OSHA. In a news release issued January 4, 1972, OSHA announced a Target Health Hazards Program aimed at improving health factors associated with working conditions. The following five substances were designated to be the focus of initial and concerted efforts by OSHA and NIOSH: Asbestos, Cotton Dust, Silica, Lead and Carbon Monxide.

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Respirators and special clothing are required in the construction trade for the spray application of insulation and fireproofing materials, and for the removal of such materials. This special protection is not required for any other

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use of asbestos unless exposure limits are exceeded. This is also true for other items such as specially-equipped tools, change rooms, clothes laundering and waste disposal. Caution labels are required on products containing asbestos except where the fibers have been modified by a bonding agent or other material to prevent dusting during any normal subsequent use or handling. The labeling of a product does not prohibit its use. It should be noted here that in at least 90% of the products containing asbestos, the fibers are solidly locked into the product thereby presenting little danger of dust generation during normal use and handling of the product (). Particularly true of coatings.

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