

Rachel's Environment & Health News

#444 - A Carcinogen That's Everywhere

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An industrial process for making glass fibers was first patented in Russia in 1840.[1, pg.292] At the Columbian Exposition in Chicago in 1893, Edward Libbey, an American, exhibited lamp shades, a dress, and other articles woven from glass fibers. In 1915, the Allied Forces blockaded Germany, creating an asbestos shortage which resulted in commercial production of fiber glass in the U.S., as an asbestos substitute. (Asbestos is a naturally-occurring fibrous material that can be woven into cloth, does not burn readily, has excellent properties for thermal insulation, and therefore came into commercial use during this century.[2, pgs.390-392] Fiber glass has many of the same characteristics as asbestos.)

In 1938, the Owens Corning Fiberglas Company was formed, and three years later, in 1941, evidence of pulmonary [lung] disease was reported by Walter J. Siebert, who investigated the health of workers in cooperation with Owens Corning.[1, pg.292] That same year another investigator reported finding "no hazard to the lungs" of workers exposed to glass fibers in the air. Scientific disagreement of this sort has characterized the study of fiber glass ever since; meanwhile fiber glass production has increased steadily.

That same year (1941), the U.S. Patent Office issued patents for 353 glass wool products. Glass wool, fiber glass, fiberglas, fibrous glass, and glass fibers are all names for the same thing: thin, needle-shaped rods of glass, which nature does not make but humans do.

Fiber glass is now used for thermal insulation of industrial buildings and homes; as acoustic insulation; as fireproofing; as a reinforcing material in plastics, cement, and textiles; in automotive components; in gaskets and seals; in filters for air and fluids; and for many other miscellaneous uses. More than 30,000 commercial products now contain fiber glass.

As asbestos has been phased out because of health concerns, fiber glass production in the U.S. has been rising. In 1975, U.S. production of fiber glass was 247.88 million kilograms (545.3 million pounds); by 1984 it had risen to 632.88 million kilograms (1392.3 million pounds). [1, pg.302] If that rate of growth (10.4% per year) held steady, then production of fiber glass in the U.S. in 1995 would be 4365 million pounds.

Fiber glass is now causing serious health concerns among U.S. officials and health researchers. As we reported in REHW #74, in a series of papers published from 1969 to 1977, Dr. Mearl F. Stanton of the National Cancer Institute found that glass fibers less than 3 micrometers in diameter and greater than 20 micrometers in length are "potent carcinogens" in rats; and, he said in 1974, "it is unlikely that different mechanisms are operative in man." A micrometer is a millionth of a meter (and a meter is about three feet). Since that time, studies have continued to appear, showing that fibers of this size not only cause cancer in laboratory animals, but also cause changes in the activity and chemical composition of cells, leading to changes in the genetic structure and in the cellular immune system. Although these cell changes may be more common (and possibly more important) than cancer, it is the cancer-causing potential of glass fibers that has attracted most attention.

In 1970, Dr. Stanton announced that "it is certain that in the pleura of the rat, fibrous glass of small diameter is a potent carcinogen." The pleura is the outer casing of the lungs; cancer of the pleura in humans is called mesothelioma and it is caused by asbestos fibers. Stanton continued his research and showed that when glass fibers are manufactured as small as asbestos fibers, glass causes cancer in laboratory animals just as asbestos does.[4] Asbestos is a potent human carcinogen, which will have killed an estimated 300,000 American workers by the end of this century.[5] The finding that fiber glass causes diseases similar to asbestos was chilling news in the early 1970s, and an additional 25 years of research has not made the problem seem less serious. Workers in fiber glass manufacturing plants are exposed to concentrations of fibers far lower than the concentrations to which asbestos workers were

exposed, yet several industry-sponsored epidemiological studies of fiber glass workers in the U.S., Canada, and Europe have reported statistically significant increases in lung cancer.[6]

The International Agency for Research on Cancer (IARC), of the World Health Organization, listed fiber glass as a "probable [human] carcinogen" in 1987. In 1990, the members of the U.S. National Toxicology Program (NTP) --representatives of 10 federal health agencies --concluded unanimously that fiber glass "may reasonably be anticipated to be a carcinogen" in humans.[3] NTP members were preparing to list fiber glass that way in the SEVENTH ANNUAL (1992) REPORT ON CARCINOGENS, the NTP's annual listing of cancer-causing substances, which is mandated by Public Law 95-622. But industry intervened politically.

As we reported in REHW#367, four major manufacturers of fiber glass insulation campaigned for three years to prevent their product from being labeled a carcinogen by NTP (see REHW #367). They managed to delay the publication of the NTP's SEVENTH ANNUAL REPORT ON CARCINOGENS for more than two years, but on June 24, 1994, the Secretary of Health and Human Services (HHS), Donna E. Shalala, signed the REPORT and sent it to Congress, thus making it official policy of the U.S. government that fiber glass is "reasonably anticipated to be a carcinogen." In the U.S., fiber glass must now be labeled a carcinogen.

Announcing this decision, government officials tried to play down its significance. Bill Grigg, a spokesperson for the U.S. Public Health Service (a subdivision of Health and Human Services) told the WASHINGTON POST, "There are no human data I'm aware of that would indicate there's any problem that would involve any consumer or worker." [7] To make such a statement, Mr. Grigg had to ignore at least six epidemiological studies showing statistically-significant increases in lung cancer among production workers in fiber glass factories.[6] Indeed, according to researchers in the Occupational Safety and Health Administration (OSHA, another division of Health and Human Services) fiber for fiber, fiber glass is a more potent carcinogen than asbestos. [8, pg.580]

Fiber glass --a material that nature does not make --is now measurable everywhere in the air. The air in cities, rural areas,[1, pgs.311-314] and remote mountain tops[4] now contains measurable concentrations of fiber glass. If the dose-response curve is a straight line (that is to say, if half as much fiber glass causes half as much cancer) and if there is no threshold dose (no dose below which the cancer hazard disappears), then exposing the Earth's 5.7 billion human inhabitants to low concentrations of fiber glass will inevitably take its toll by causing excess cancers in some portion of the population.

According to OSHA researchers, an 8-hour exposure to 0.043 glass fibers per cubic centimeter of air is sufficient to cause lung cancer in one-in-every-thousand exposed workers during a 45-year working lifetime.[8, pg.580] In rural areas, the concentration of fiber glass in outdoor air is reported to be 0.00004 fibers per cubic centimeter, about 1000 times below the amount thought to endanger one-in-every-thousand fiber glass workers.[1, pg.314] But people in rural areas breathe the air 24 hours a day, not 8 hours. Furthermore, a human lifetime is 70 years, not the 45 years assumed for a "work lifetime." Moreover, one-in-a-thousand is not adequate protection for the general public; U.S. Environmental Protection Agency uses one-in-100,000 or one-in-a-million as a standard for public exposures. (And, finally, in urban air, there's 10 to 40 times as much fiber glass as in rural air.) Therefore, the amount of fiber glass in the outdoor air in the U.S. and Europe (and presumably elsewhere) already seems higher than prudent public health policies would permit. Assuming a straight-line dose-response curve and no threshold, we believe there is ample reason to be concerned about the human health hazards posed by fiber glass in the general environment. (And this says nothing about the hazards to wildlife.)

It has been 25 years since researchers at the National Cancer Institute concluded that fiber glass is a potent carcinogen in experimental animals. During that time, additional research has confirmed those findings again and again.[8] During the same period, the amount of fiber glass manufactured has increased rapidly year after year. Ninety percent of American homes now contain fiber glass insulation. All of this fiber glass will eventually be released into the environment unless special (and very expensive) precautions are taken to prevent its release. We believe the likelihood of Americans taking such precautions is nil. Billions of pounds of fiber glass now in buildings will eventually be dumped into landfills, from which it will leak out slowly as time passes. Elevated concentrations of fiber glass are already measurable in the air above landfills today.[4]

In 1991, PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, a standard reference book on work-place safety and health, said about fiber glass, "...it is prudent for industrial hygienists to treat these materials with the same precautions as asbestos." [1, pg. 324] How do we treat asbestos? In the U.S., all new uses of asbestos have been banned. A ban of fiber glass is long overdue.

--Peter Montague

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[1] Jaswant Singh and Michael A. Coffman, "Man-Made Mineral Fibers," in George D. Clayton and Florence E. Clayton, editors, PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY FOURTH EDITION, VOLUME 1, PART B (New York: John Wiley & Sons, 1991), pgs. 289-327.

[2] Michael A. Coffman and Jaswant Singh, "Asbestos Management in Buildings," in George D. Clayton and Florence E. Clayton, editors, PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY FOURTH EDITION, VOLUME 1, PART B (New York: John Wiley & Sons, 1991), pgs. 387-420.

[3] The annual list of carcinogens is drawn up by an inter-agency Working Group for the Annual Reports on Carcinogens, which includes representatives from the Agency for Toxic Substances and Disease Registry (ATSDR); the Centers for Disease Control (CDC); the National Institute for Occupational Safety and Health (NIOSH); the Consumer Product Safety Commission (CPSC); the U.S. Environmental Protection Agency (EPA); the Food and Drug Administration (FDA); the National Cancer Institute (NCI); the National Institute of Environmental Health Sciences (NIEHS); the National Library of Medicine (NLM); and the Occupational Safety and Health Administration (OSHA).

[4] Reported in Katherine and Peter Montague, "Fiber Glass," ENVIRONMENT Vol. 16 (September 1974), pgs. 6-9.

[5] Philip J. Landrigan, "Commentary: Environmental Disease--A Preventable Epidemic," AMERICAN JOURNAL OF PUBLIC HEALTH Vol. 82 (July 1992), pg. 941.

[6] See Peter F. Infante and others, "Fibrous Glass and Cancer," AMERICAN JOURNAL OF INDUSTRIAL MEDICINE Vol. 26 (1994), pgs. 559-584, which reviews the following studies, among others: L. Simonato and others, "The International Agency for Research on Cancer Historical Cohort of MMMF Production Workers in Seven European Countries: Extension of the Follow-Up," ANNALS OF OCCUPATIONAL HYGIENE Vol. 31, No. 4B (1987), pgs. 603-623; Philip E. Enterline and others, "Mortality Update of a Cohort of U.S. Man-Made Mineral Fibre Workers," ANNALS OF OCCUPATIONAL HYGIENE Vol. 31, No. 4B (1987), pgs. 625-656; Harry S. Shannon and others, "Mortality Experience of Ontario Glass Fibre Workers--Extended

Follow-Up," ANNALS OF OCCUPATIONAL HYGIENE Vol. 31, No. 4B (1987), pgs. 657-662; and John R. Goldsmith, "Comparative Epidemiology of Men Exposed to Asbestos and Man-Made Mineral Fibers," AMERICAN JOURNAL OF INDUSTRIAL MEDICINE Vol. 10 (1986), pgs. 543-552; G.M. Marsh and others, "Mortality Among a Cohort of US Man-Made Mineral Fiber Workers: 1985 Follow-Up," JOURNAL OF OCCUPATIONAL MEDICINE Vol. 32 (1990), pgs. 594-604; P. Boffetta and others, "Lung Cancer Mortality Among Workers in the European Production of Man-Made Mineral Fibers--A Poisson Regression Analysis," SCANDINAVIAN JOURNAL OF WORK, ENVIRONMENT, AND HEALTH Vol. 18 (1992), pgs. 279-286.

[7] Frank Swoboda and Maryann Haggerty, "U.S. Suspects Fiberglass as Carcinogen, Calls Insulation Safe," WASHINGTON POST July 2, 1994, pg. C1.

[8] Peter F. Infante and others, "Fibrous Glass and Cancer," AMERICAN JOURNAL OF INDUSTRIAL MEDICINE Vol. 26 (1994), pgs. 559-584.

Special thanks to the advocacy organization, Victims of Fiberglass (VOF), for keeping us informed about these issues over the years. VOF publishes an excellent newsletter, FIBERGLASS ROOTS OF CANCER; contact Bob Horowitz, Victims of Fiberglass, P.O. Box 894, Bryte, CA 95605-0894; phone (916) 371-0656.

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