

U.S. Shipyards: A History of Massive Asbestos Exposure and Disease

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Abstract

The United States was once one of the world's leading centers for ocean vessel construction. Over twenty major yards employed millions of workers from the 1920s to the 1980s. This construction utilized primarily two substances, steel and asbestos.

Although the shipyards were one of the most supervised and accounted for industrial operations, due to the huge government subsidies from wartime and defense spending, asbestos exposure proved deadly to large sections of the workers. The author will evaluate the human cost arising from this asbestos exposure and suggest methods to prevent future toxic exposure in ship construction.

It is quite ironic that the disposal of U.S. ships has created an international pollution incident. The ships are too toxic to be sunk in the ocean; they are too toxic to be economically disassembled in the United States (Englund, p. A1). Recently, some of these ships were sent to Great Britain for disposal. The communities there have refused the work due to the toxic pollution that would be released in the ship-breaking operation (Alvarez, p. B1). Environmental activists have documented the toxic exposure associated with the breaking of U.S. ships in poverty stricken areas of India, Bangladesh and Pakistan. They report that desperate men literally tear these toxic wrecks apart with levers, bars and crude saws (Greenpeace, p. 4).

Specifications for the construction of a medium vessel, such as the Liberty Ship, (de Kerchove, p. 448) required tons of asbestos (Asbestos Based Materials), petroleum distillate products, lead, arsenic, mercury and other toxins. It is no wonder that today's world shrinks from these ships. The salvaged metal is worthless compared to the cost of disposing of the asbestos and other toxins (Ollove, p. A1). Asbestos was contained in ship batts, boards (Asbestos Cement Boards), pipes (Asbestos Cement Waste...), decks (Asbestos Cement fully compressed Flat Sheets), ducts (Asbestos Insulation Boards), insulation (Muir) paint, oils, lubricants, gaskets, cords and heating and communication

systems. (Peters and Peters, pp. 57-194) Ship-breaking today is very expensive unless done in a society where there is little protection of the environment or the workers.

The building of these ships injured so many workers with asbestos that both the health care and legal system in the U.S. are threatened with collapse (Hudak and Hagan, p. 1). We have already seen over 62 corporations, including many huge shipbuilders, go into bankruptcy because they cannot pay for the damages to the health of those who constructed the ships (Burke, part 5). This bankruptcy is their cost for failing to act and prevent asbestos exposure (LaDou, p. 289).

In 1944, the shipbuilding capacity of the United States stood at the greatest level in world history, with almost fifty new merchant vessels a day hitting the water. (Grabner, Fite, p. 763) In the United States shipyard employment rapidly increased between 1939 and 1943 when 1,722,500 men and women were employed in shipyards (Lilis, p. 8-1). After the war shipyard employment averaged around 220,000. In 1974 there were 210,000 shipyard workers, of which 147,000 were in commercial yards (Lilis, p8-2). By 1978 there were 241,000 employees in US shipbuilding and repair. It is estimated that between 1930 and 1978 over 4.5 million workers worked in U.S. shipyards (Selikoff, p. 35).

During World War II a new Liberty Ship hit the water in Baltimore every 37 hours and a few hundred miles South, in Hampton Roads Virginia, three ships hit the water each day (Burke, p. 9). Trucks and ships delivered thousands of pounds of asbestos and asbestos products to the shipyards. This was part of a huge shipbuilding process, which mixed 25 million tons of asbestos and 4.5 million workers to produce one of the greatest slaughters of human beings from a single toxin.

Workers in all trades breathed the asbestos used by insulators, boiler mechanics, carpenters, machinists, painters and joiners (Norwinski, 122). We used raw fiber as a reinforcing agent in slurries of insulating mud, preformed blocks of insulation (up to 70% asbestos) (Asbestos Watch, p 12), asbestos millboard (20%) (Asbestos Textile Products), gaskets (30%), boiler blocks (20%), paint (8%) and many other specialty products including spray insulation (5%) (Selikoff, 1st Annual Report, pp. 255) and patching compound (10%) (Selikoff, p. 257).

Large amounts of crocidolite (Lee, p. 49) and chrysotile (Lehman, p. 24-26) were used in shipyards, but one of the most widespread uses of asbestos in naval vessels was amosite based pipe insulation. This pipe covering weighs about 14 pounds per cubic foot, with a temperature limit of 750 degrees F. This compares to magnesia with a weight of 16 lbs per cubic foot and a temperature limit of 500 degrees F. These efficiencies drove the use of amosite. Development of amosite felt started in 1934 and pipe covering was brought out in 1935 (Asbestos Watch, p.16). Most of the naval and many merchant marine

vessels used asbestos containing block and felt pipe covering in new construction until 1974 (Winer, p. 48).

The tens of thousands of shipyard workers shared asbestos and high wages with their brothers and sisters in steel and metal production, auto and aircraft assembly and building construction. After the war, military and commercial shipbuilding continued and shipbuilders represented one of the most prosperous and stable sections of the economy. We had no idea our later years would be racked with poverty and disease (Ollove, p 6). Once we were represented by powerful union leaders and elected representatives. Rich compensation lawyers and baseball team owners now represent us. Six months ago the steelworkers widows' pensions were cut off. The only protest came from the sick workers of the White Lung Association. They were holding protest signs at busy intersections in Dundalk, Maryland (WLA).

Just as I came to work as an outside machinist, Dr. Selikoff was preparing to evaluate the x-rays from our Bethlehem Shipyard on Key Highway. Of the workers with twenty years of shipyard experience, eighty-nine percent of whose x-ray showed changes consistent with asbestos exposure (Selikoff, Nicholson, p. 21). They found more disease than was forecast in 1968 (Harries, Asbestos Hazards). As early as 1982, medical students were advised that mesotheliomas, when viewed around the world, seemed to cluster around shipyards (Lilis, 8-12). "For this reason, rigorous, uniform industrial hygiene practices should be applied to avoid asbestos exposure among ship repair workers in the future" (Lilis, p. 8-13). Key Highway shipyard was closed nineteen months after Dr. Lilis' suggestion and the monitoring of its workers for asbestos disease was turned over to the compensation lawyers.

The warnings of Dr. Lilis, Dr. Merryweather and the Maritime Commission were ignored or rejected by shipyard owners (Felton, p. 25). During times of intense disease and death, various methods were used to suppress knowledge about the hazards of asbestos. The Navy could find no asbestosis disease in shipyard workers in 1941 (Norwinski, p107). In a major public health survey of shipyards, published in 1945, Fleicher and Drinker concluded that pipe covering was not a dangerous occupation (Norwinski, p. 111). The following year, Fleicher stated that the dust to death ratio found in asbestos textile production could not be utilized for shipyards (Norwinski, p.110). Fleicher and Drinker were also involved in studying over 1,000 shipyard workers, 88% of whom had less than 10 years experience, and concluded that the low number of asbestosis cases proved pipe covering work was not hazardous (Castleman, pp. 403-405).

Another trick used to continue the use of asbestos was the reliance on air measurement and threshold limit values (Castleman, p. 358). It was not until 1980, after hundreds of thousands of asbestos related deaths from the shipyards (Burke, Part 1), that the U.S. government recognized that there was no safe level of asbestos exposure (NIOSH, p. 32).

Over several decades both naval and commercial shipyards declined to warn workers of this fact (Grim Cancer Legacy, p. 31)

In the twenty years prior to World War II and for twenty-five years after it, dozens of studies in England and the United States showed asbestos disease in shipyard workers (Castleman, pp. 408-425), (Norwinski, p. 119). Asbestos disease was found in most sections of the workforce (Fowler, p. 8-11). It was found in the general population (Langer, p.165). However, with shipbuilders the increased rate of disease was almost universal (Nicholson, p. 202) and included high rates of lung cancer (Selikoff and Hammond, p. 98). Our Proportionate Mortality Ratio (PMR) was 15.70 (CDC, p.10). More workers died of asbestos disease due to building ships during WWII than died on the battlefield (Burke, part 1).

In the tight confines of ships, both construction workers and sailors were exposed to asbestos (Norwinski, p.112). In almost every case the construction and repair workers were exposed at a heavier rate as they were cutting, pulverizing, breaking, sanding, scraping and otherwise disturbing the product matrix and releasing fibers (Lehman, pp. 24-26), (Ferris, p.145). The asbestos containing dust from these operations reached levels that were too high to be measured or seen through (Norwinski, pp.110-112), (Harris, p. 239), (Harris, p. 254). Even today, workers are allowed to breathe 100,000 fibers per hour without any personal or engineering protection (OSHA, p. 3).

The Shipbuilding corporations ignored these warnings both during and after World War II (Norwinski, p.112). The medical and industrial hygiene staff that observed the conditions and the effects of asbestos exposure, yet failed to protect the workers, serviced the shipyard management (Fleisher, et al, pp. 9-16). The asbestos exposure to shipyard workers was so great that it contaminated not just their lungs, but their lives, as hundreds of family members succumbed to asbestos disease as a result of fibers unknowingly brought home on work clothing (Anderson, Lilies, et. al., p. 2).

Even when I went to work at Bethlehem Key Highway Shipyard in 1977, shipyards formed a substantial section of the economy of Baltimore, MD. There were over 15,000 shipyard workers. There were several unionized shipyards, which provided employment support for over 50,000 people. Today, there are less than 1500 workers employed in ship repair and no new construction. We were outside machinists, we fixed machines onboard. As we peeled off giant hunks of asbestos containing pipe insulation, cut gaskets and tore off boiler insulation in the course of our jobs nothing was said to us about potential danger from asbestos. I was shocked thirty years later when I read that the Navy recommended that we do this work in type C supplied air respirators (Savin).

Shipbuilding and ship-breaking have been exported so the coastline can support luxury condominiums. The use of asbestos and other toxins in shipbuilding was very expensive (Selikoff, Late effects). It cost the United States its shipbuilding industry and its

shipbuilding workers (Burke, Part 4). The entire economy around shipbuilding in the United States collapsed and now is a mere shell of a generation ago. It is now reduced to a few shipyards that build submarines or repair ocean going military and commercial vessels. The ability of the United States to quickly produce a fleet is gone.

Each year tens, if not hundreds of thousands of workers and their families apply for compensation for death and diseases resulting from asbestos exposure. Many of these are shipyard workers. There is no shipyard infrastructure to support these sick and jobless veterans of the once proud U.S. shipbuilding industry. The capital has moved on to other industries, markets and countries. State systems of workers compensation and medical benefits for the impoverished and the sick have grown very stingy. The stable neighborhoods, which once were filled with the shipyard workers and their families, now frequently house populations grown listless, with unemployment, crime and disease. The International Union Shipbuilding Workers of America has sold its union halls and merged with the other unions. Not only have the shipyards been closed due to the cost of using asbestos, so have the suppliers to the shipyards and the insurers of the shipyards (Burke, Part 5). The records and the pension funds have disappeared (Steele, pp. 6-7).

The insurance companies and remaining asbestos industry defendants are trying to exclude asbestos victims from legal protection under the U.S. constitution (Hampel, p A1). Instead of trying to solve the problem of the sick workers and their families, again industry attempts to ignore it, conceal it and shift the high cost of asbestos use onto the backs of the workers.

The White Lung Association has called for a World Wide Ban on Asbestos. The horrible example of asbestos use in U.S. shipyards is an excellent reason to endorse this ban immediately. The lesson of the shipyards is straightforward, the victims must be compensated, the pollution must be cleaned and cancer cursed asbestos must be banned throughout the world!

References

Alvarez, L. British Greet Navy Rust buckets With a Volley of Venom. New York Times. 2003 Dec.1.

Anderson H, Lilis R, Daum S, Fischbein A, Selikoff IJ. Household exposure to asbestos and risk of subsequent disease. In: Lemen R , Dement JM, editors. Dusts and Disease. Chicago: Pathotox Publishers; 1979. pp. 145-156.

Asbestos Cement Boards (Incombustible) for electrical Purposes Unimpregnated, Proposed Specification Survey. Electrical Research Association, Ltd. 1974.

Asbestos Cement Fully Compressed Flat Sheets, British Standard 4036 (July, 1965).

Asbestos-Cement Waste and Ventilating Pipes and Fittings, British Standard 582 (July, 1975).

Asbestos Based Materials for the Building and Shipbuilding Industries and Electrical and Engineering Insulation. Control and Safety Guide No 5. London: Asbestos Research Council (May, 1977).

Asbestos Insulation Boards and Asbestos Wall Boards, British Standard 582 (July 1975).

Asbestos Textile Products, CAF/ Asbestos Beater Jointing and Asbestos Millboard. Control and Safety Guide No. 4. London: Asbestos Research Council (April, 1977).

Asbestos Watch, Newsletter of the White Lung Association, ed. Joe Oliver, WLA, Baltimore, MD January 2003.

Burke B, Earley S, Chapman T. Shipbuilding's Deadly Legacy. The Virginian-Pilot, Hampton Roads, Virginia. 2001 May 6.

Center for Disease Control, (2003) Work-related lung disease surveillance report 2002, NIOSH, Cinn.,OH DHHS (NIOSH) Number 2003-1001.

Englund, Will and Gary Cohn. The Ship Breakers Scrapping Ships, Sacrificing Men. The Sun, Baltimore, Maryland. 1997 Dec 8.

de Kerchove, Rene. International Maritime Dictionary. 2nd ed. New York: Van Nostrand Reinhold; 1961.

Felton JS. A Comprehensive Program in Asbestos Hazard Surveillance and Education. Amer Ind Hyg Ass J. 1979 Jan;40(1):11-19; also see Ind Hyg Dig. 1979 Mar;43(3):25.

Ferris BG, Jr. Shipyard Health Problems. Environmental Research. 1976 Apr;11(2):140-150.

Fowler, Robert. Asbestos Dust: Everyone's Problem. Western Institute for Occupational /Environmental Sciences, Inc. State of California, San Francisco, California. April, 1979.

Fleisher WE, et.al. A health survey of pipe covering operations in construction of naval vessels. Ind Hyg toxicol. 1946; 28:9-16.

Graebner N, Fite G, White PL. A History of the American People. 2nd ed. Vol II. New York: McGraw-Hill; 1975.

Grim Cancer Legacy from World War II: Attempts to Persuade Navy to Locate Former Shipyard Workers Exposed to Asbestos-Caused Cancer. Business Week. 1975 Sept. 29; p. 31.

Greenpeace, The Continuous Evasion of the "Polluter Pays Principle." Amsterdam, Netherlands: Greenpeace 2003 Nov.

Hampel, Paul. Lack of Trust Poisons Efforts to Reform Asbestos Litigation. St. Louis Post-Dispatch. 2004 Sep 21.

Harries PG. Asbestos Hazards in Naval dockyards. Ann Occ Hyg. 1968;11(2):135-145.

Harries PG. A Comparison of Mass and Fiber concentration in Asbestos Dust in Shipyard Insulation Processes. Ann Occ Hyg. 1971;14:234-240.

Harries PG. Asbestos Dust Concentrations in Ship Repairing; A practical approach to Improving Asbestos Hygiene in Naval Dockyards. Ann Occ Hyg. 1971;14:241-254.

Hudak, Stephen and John F. Hagan. Asbestos Litigation overwhelms courts. Cleveland Plain Dealer. 2002 Nov 5.

LaDou, Joseph. The Asbestos Cancer Epidemic. Environmental Health Perspectives. 2004 Mar; 112(3).

Lee GI, Smith DJ. Steelwork Insulated with sprayed crocidolite asbestos: controlling a potential hazard. Ann Occ Hyg. 1974 Aug;17(1):49-52.

Lehman BJ. Shipbuilding Safety: Mechanics, Insulation, Tests and Trials. Hazard Prevention. 1979 May-June;15:24-26,32.

Lilis R. United States experience in shipbuilding and ship repair. In: Scientific basis for Evaluation of Asbestos-Associated Disease. Environmental Sciences Laboratory, Mount Sinai School of Medicine of the City University of New York; 1982 Dec. 13-16; New York.

Muir DCC. Health Hazards of thermal Insulation Products. Ann of Occ Hyg. 1979;19:137-145.

Nicholson WJ, Lilis R, Frank AL, Selikoff IJ. Lung cancer prevalence among shipyard workers. Am J Ind Med. 1980;1(2):191-203.

NIOSH (National Institute of Occupational Safety and Health). Workplace exposure to asbestos. Washington, DC: US Government Printing Office; 1980.

Norwinski, Peter. Chronology of asbestos regulation in Unites States workplaces. In: Antman K, Aisner J, editors. Asbestos-related Malignancy. New York: Grune and Stratton; 1986.

Ollove, Michael, "Deadly Dust: The Asbestos Epidemic" The Sun, Baltimore, MD. 1992 Oct. 25.

OSHA. Asbestos Standard Shipbuilding and Repair. Washington, DC: US Government Printing Office; 1986.

Peters, Barbara J and George Peters, Sourcebook on Asbestos Diseases: Medical, Legal, and Engineering Aspects. Vol 2. New York, London: Garland Law Publishing; 1986.

Savin RB. Respiratory Safety Precautions in Shipyards. Lifeline. 1978 Nov/Dec;7(6).

Selikoff IJ, Principle Investigator First Annual report to the National Institute of Environmental Health Sciences. Center For The Study of Biological Effects of Environmental Agents. Environmental Science Laboratory. New York. 1974.

Selikoff IJ. Disability Compensation for Asbestos Associated Disease in the US. Environmental Sciences Laboratory, Mount Sinai School of Medicine of the City University of New York. 1978.

Selikoff IJ and Hammond EC. Asbestos-associated disease in United States shipyards. CA. Cancer J Clin 1978 28(2):87-99.

Selikoff IJ, Nicholson WJ, Lilis R. Radiological evidence of asbestos disease among ship repair workers. Am.J.Ind.Med.1980 1(1):9-22.

Selikoff I.J. Late Effect of Occupational Exposure to Asbestos in US Shipyards in WW II. Presented at: Int. Symposium on Safety and Health in Shipbuilding, Helsinki (1971).

Steele KD. Broken Promises Shattered Lives. Steelabor. 2004 Summer;60(3).

Winer A, Holtgren WD. Asbestos, A case Study of the U.S. Navy's Response to Upgraded Safety and Health Requirements. Naval Engineering Journal. 1976 Dec;88: 41-48.

WLA, "After All these Years, Is this our Reward?" Meeting Announcement, Jan 5, 2004.