Public Health Chronicles

SAVING THE ASBESTOS INDUSTRY, 1960 TO 2006

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(**Editor's note:** Jock McCulloch is an historian employed at an Australian university. Over the past 20 years he has on five occasions worked as a consultant for lawyers representing asbestos plaintiffs. Those cases include the Cape Asbestos case, which was settled out of court in London in 2003. Over a 20-year period, consultancy work has provided less than 1% of his income. He has played no role in any case in which J.C. Wagner was involved, including the Owens-Illinois case.)

THE INDUSTRY

The asbestos industry has its origins in the final decades of the 19th century. Within 30 years, mines were operating in Canada, South Africa, Russia, and Southern Rhodesia, with most fabrication being done in the United States and the United Kingdom. The larger U.S. and British manufacturers of asbestos-based products, such as Johns Manville and Turner & Newall (T&N), owned Canadian and South African mines in what was an early 20th century example of vertical integration. Besides its strategic importance during war time, asbestos was essential to those products and industrial processes that came into vogue after 1945. The industry's peak in North America coincided with what some economists term the Golden Age of Capital (1945–1972) and in that sense asbestos is an exemplar of modern industrial production and its attendant global divisions of labor. Three major commercial varieties of asbestos fiber were mined and used in production: chrysotile (white); and amosite (brown) and crocidolite (blue), which are known as amphiboles. More than 90% of the fiber used during the 20th century was chrysotile.

Asbestos is the most versatile of minerals. It is also an efficient carcinogen. Evidence of the risks of working with asbestos was well established in the early 1930s. By 1960, medical research had proven the hazards of environmental exposure to airborne fiber. Julian Peto et al. estimated that in the UK alone, asbestos will have killed around 250,000 men and women between 1995 and 2029.[1] More recent estimates put the eventual global number of fatalities at more than 5 million.[2] The tide of litigation that began in the mid 1970s saw the major U.S. producers, including Johns Manville and Raybestos-Manhattan, take refuge in bankruptcy and subsequently re-invent themselves as non-asbestos companies. Simultaneously, the industry shifted offshore to the developing world, where despite the known dangers, more than 2 million tons of chrysotile were used during 2004. The industry's survival has been due largely to its success in keeping alive the fiction that asbestos can be used safely. Arguably its most potent weapons have been the suppression of evidence about the hazards of asbestos and even the corruption of science to promote doubt about the mineral's toxicity.

THE SCIENCE

Asbestos causes three major diseases: asbestosis, lung cancer, and mesothelioma, a primary cancer of the lining of the lung or the abdominal cavity. Asbestosis is an occupational disease confined to the workplace, and there are other causes of lung cancer besides asbestos. In contrast, mesothelioma can result from trivial exposure, which means the risk of injury crosses the boundary that usually distinguishes occupational from environmental hazards. Each of the three diseases caused a crisis for the industry: asbestosis in the 1930s, lung cancer in the 1940s, and mesothelioma after 1960. The industry was able to survive each of those episodes without being forced to radically improve conditions in the workplace or entirely lose its markets. It was a

Asbestos workers strip an asbestos carding machine at British Belting & Asbestos, circa 1920s. By the early 1930s, evidence of the risk of working with asbestos was well established.

remarkable achievement due largely to the industry's success in influencing medical discovery.

In the late 1920s the asbestos insulation market was expanding rapidly and the large producers were keen to ensure a reliable supply of fiber. They were also keen to set prices to their advantage. To that end they arranged an international cartel to exchange technical information, coordinate the export of asbestos, and engage in "mutual assistance to secure fiber on the best terms."[3] As the rates of asbestosis among miners in South Africa and Quebec and factory workers in the UK and the U.S. began to rise, the leading companies suppressed evidence of occupational disease.

Legal discovery

As the result of litigation in the U.S. and the UK, the industry's success in concealing the hazards of asbestos is now well documented. Notable examples include the Saranac studies of 1940, which showed a clear association between asbestos and lung cancer, and the South African state- and industry-funded survey of asbestos and mesothelioma in 1962.[4,5] In both instances, the results of important research were withheld from public scrutiny. The stories of Saranac and the South African survey, which only reached the public domain because of litigation, are almost certainly fragments of a more far-reaching process that remains largely unreported. The corruption of science from within is more subtle and potentially far more effective than the suppression of knowledge. It is also more difficult to prove.

The asbestos industry has been almost as resilient as its products. Despite the evidence about lung cancer (1940s) and mesothelioma (1960), the production of asbestos products rose inexorably. It is a chilling statistic that more than half the fiber consumed during the 20th century was consumed after 1975.[6] Those who worked with asbestos were not told of the risks they faced, nor were company shareholders or the consumers of asbestos products. As production levels rose, so too did the tide of illness contracted from workplace exposure. However, until 1960 there was no suggestion that asbestos posed a threat to the relatives of workers or to those who used asbestos-based products. That was all changed by research carried out in South African mining communities.

The mining of amphibole fiber began in the Northern Cape province of South Africa in 1893 and ended just over a century later. The mines were hazardous and the mills released so much fiber into the atmosphere that people living in asbestos towns like Prieska and Kuruman developed the occupational disease asbestosis from environmental exposure.[7] In addition, mill waste was used to seal roads, footpaths, golf courses, and even school playgrounds, thereby increasing the number of those at risk. By 1950, mining had been going on for 60 years and there were sizeable communities with occupational and environmental exposure to a single type of fiber, crocidolite. The area was isolated and there were no significant industries to compromise the results of an epidemiological survey. The Northern Cape was the ideal place to study the effects of asbestos. Unfortunately, apartheid made it relatively easy for the industry to suppress medical evidence of disease.

South African science

In 1954, the government mining engineer in Pretoria became interested in the asbestos fields. To explore the problem of occupational disease, a young scientist named J.C. Wagner was appointed to the Pneumoconiosis Research Unit (PRU) in Johannesburg. Wagner's work was ostensibly on asbestosis. No research had been done on that subject in South Africa since 1930, and Wagner hoped to produce significant results. At medical school he had been told nothing of mesothelioma, which was believed to be extremely rare.[8] Wagner began working on asbestosis but then shifted mid-stream to study the unique tumors that were appearing among people living in the Northern Cape. It was a brave decision, made more difficult by the prevailing medical orthodoxy that viewed mesothelioma as a secondary cancer, and by the growing reluctance of the mining industry to tolerate Wagner's research.[9] Wagner's paper on mesothelioma, published in 1960, is generally credited with being the first to emphasize the association with asbestos, knowledge that was pivotal to the introduction of new safety standards in the UK in 1969, and to the industry's decline in North America.[10] Wagner's article was based on an analysis of 33 cases of pleural mesothelioma, with all but one patient having a proven exposure to Cape blue asbestos. Only eight of the 33 had evidence of occupational exposure, but 20 of the remaining 25 had as infants lived near the mines. Ironically, what was to become one of the great occupational health discoveries of the 20th century was based principally on cases drawn from outside the workplace. Wagner's article changed the understanding of the dangers of asbestos and suggested a nexus between work, the environment, and cancer. The movement of fiber through the cycles of mining, milling, and transport, and the global movement of asbestos as an international commodity, made the discovery even more significant. Wagner's research could not have come at a worse time for the South African industry, which had invested heavily in new mines and mills to meet rising world demand.

Wagner paid a high price for his discovery. His article

caused a storm in Johannesburg and it was rumored that the asbestos industry threatened to have Wagner shot.[11] He was under such pressure to stop researching asbestos-related disease (ARD) in South Africa that in 1962 he accepted a position at the Pneumoconiosis Unit at Llandough Hospital in the UK, where he worked until his retirement in 1988. When Wagner returned briefly to Johannesburg in 1966 he was confronted by senior figures from what he termed "the South African medical establishment" who accused him of damaging the local economy.[8] He was taken aback but glad he had chosen to leave South Africa. If he had been less creative and continued to work on asbestosis rather than mesothelioma, he would probably not have been subject to what was in effect a campaign of intimidation. The PRU, where Wagner had done his research, subsequently bore the full brunt of the industry's fury. The South African Asbestos Producers Advisory Committee (SAAPAC) used its close relations with the Department of Mines and the national government in Pretoria to get its representatives onto key committees at the PRU. From that position it monitored research proposals, and eventually established a right of veto over PRU publications. The SAAPAC was so successful in stifling medical discovery that in the 1980s scientific committees in Johannesburg were still debating whether or not asbestos is a carcinogen.[5] A further measure of its success is the fact that South Africa continued to export crocidolite until 1996.

Wagner went on to a distinguished career at Llandough and in 1985 he received the Charles S. Mott Prize for "the most outstanding recent contribution related to the causes and ultimate prevention of cancer." When he died at Weymouth, UK, in June 2000, the British press rightfully described him as an outstanding international authority on asbestos-related cancer.[12] It is ironic that the obituary also noted that Wagner had left the world a safer place.[12]

THE STRATEGY

The threat to the industry posed by mesothelioma was far greater than from the other two asbestos diseases. The risk was not just to those who worked in mines or factories, but to anyone who came into contact with asbestos products. Wagner's paper and the subsequent research by Irving Selikoff in New York (1964) and Muriel Newhouse in London (1965), based on cohorts with exposure to all types of fibers, suggested there was no safe way of mining or transporting asbestos, and no safe way of manufacturing or using asbestos products.[13,14] There was nothing in the work of Wagner, Selikoff, or Newhouse to indicate that chrysotile was any safer than amphiboles.

In the wake of Wagner's paper, the industry used a number of techniques to counter growing public concern. The primary strategy favored by chrysotile producers in Canada was to distinguish between their fiber and the amphiboles. They argued that only South African amphibole asbestos caused mesothelioma, while chrysotile could be used safely. This was a convenient strategy since the amphiboles comprised less than 10% of the global market and were only mined in South Africa and at a single site in Australia. The Department of Mines in Pretoria believed—with some justification—that Canadian producers had singled out amosite and crocidolite in the hope of gaining a greater market share for their own asbestos.[15]

The research process

The industry has a long history of funding professional and semi-autonomous associations such as the Asbestos Institute, the Textile Institute, and the Asbestosis Research Council to gather and share information. At times of crisis those organizations have been used to counter bad publicity. Acting in concert with U.S. parent companies, in 1965 the Quebec Asbestos Mining Association (QAMA) formed the Institute of Occupational & Environmental Health (IOEH) in Montreal to monitor and fund research. Within six years QAMA had spent more than $2 million on research projects.[16] Most of that money went to Dr. Corbett McDonald, of McGill University, who in 1966 began a cohort study of the health effects of chrysotile.[17] Like most of the industry-funded research that reached the public domain, McDonald found little evidence of disease.

The distinction between fiber types of which the industry has made so much was disingenuous. Asbestos deposits often feature a mixture of fibers and in practice, miners were usually exposed to more than one type of asbestos. A geological survey conducted in the late 1950s documents the presence of crocidolite in Quebec's chrysotile mines.[18] Similarly, the mine at Penge in South Africa's Northern Province was the world's only source of amosite, yet the seams of amosite were often mixed with crocidolite. Once the ore was brought to the mills, both fiber types were processed together. Consequently, those who used amosite downstream were always inadvertently using crocidolite. In addition to the variable seams at Penge and in Quebec, the distinction between fiber types was blurred during asbestos cement manufacture. In that process white and blue asbestos were invariably mixed to enhance the quality of the final product.[19]

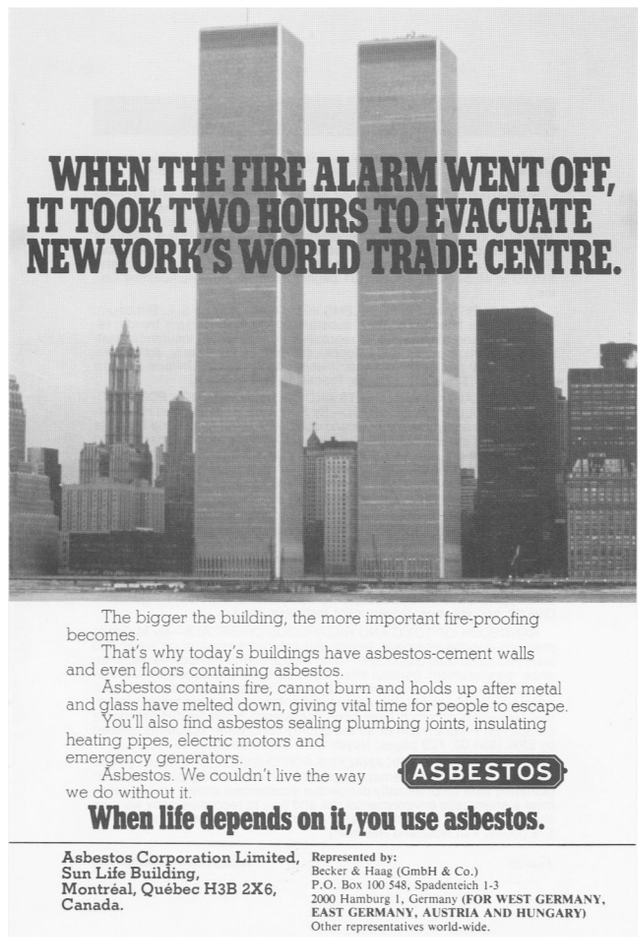
On December 4, 1970, the Asbestos Information Association/North America (AIA) was formed at a meeting at Johns Manville headquarters in New York. The work of the AIA was in addition to the publicity campaign the industry was already running, and to which in 1971 Johns Manville allocated $200,000.[20] The AIA's stated objectives were to provide a channel of communication to the public about asbestos, to rebut "irresponsible and uninformed criticism" of the industry and its products, and to "propagate the benefits and indispensability of asbestos through advertising, publicity, and speeches." Internal documents reveal that operating on an annual budget of almost $300,000, the AIA monitored medical conferences in North America at which asbestos was discussed (such as those by the American Thoracic Society, the American Medical Association annual convention, and the Air Pollution Association), collected papers, then initiated "lines of action" to counter criticism of its products.[21] Such methods were expensive. They also proved futile as medical evidence linking mesothelioma to all types of asbestos continued to accumulate.

As the crisis over mesothelioma deepened, the Canadian and South African governments sided uncritically with industry. In 1984, the Asbestos Institute (AI) was formed in Quebec. From its inception, the AI has been dedicated to the "safe use of chrysotile asbestos," through conferences, public relations initiatives, and the dissemination of scientific information. AI, which describes itself as a "non-profit" organization, has been subsidised by Canadian governments. By 1999 it had received in excess of $40 million in sponsorship.[22] That scale of investment in defense of chrysotile helped the industry shape both the research process in Canada and the public perception of the hazard.

A career

Wagner left South Africa in 1962 to pursue a successful career in the UK. Over the next three decades he made a major contribution to the literature and for most of that period his research and views were orthodox. Like other leading figures, he believed all types of asbestos cause all three types of ARD. As a panel member in 1979, Wagner endorsed the International Agency for Research on Cancer's (IARC's) finding that chrysotile causes mesothelioma, a conclusion supported by his own animal studies.[23] Less than 12 months later, Paul Kotin, Johns Manville's senior vice president, wrote to Wagner asking him if he had evidence about the hazards of low levels of exposure. Wagner's reply can hardly have pleased Kotin: "We did produce 2 mesotheliomas in rats after a single day's exposure," Wagner wrote, "and we did get a few mesotheliomas with the Canadian chrysotile."[24] He went on to comment that he was unsure how regulatory authorities would interpret his results. Wagner's position was in line with that of the IARC, the Environmental Protection Agency, the U.S. Department of Health and Human Services, and the National Institute for Occupational Safety and Health, all of which regarded chrysotile as a cause of mesothelioma.

Ironically, as evidence linking chrysotile to mesothelioma continued to accumulate, Wagner changed his mind. In May 1990, Wagner testified in a court case involving the U.S. conglomerate Raymark, formerly Raybestos-Manhattan.[25] Under oath he endorsed the three pillars of the industry position on mesothelioma: the disease is always dose related, even heavy exposure to chrysotile does not cause mesothelioma, and 20%



This ad appeared in the trade publication *Asbestos* in November 1981. The global death toll from asbestos-related diseases is expected to reach more than 5 million.

of mesotheliomas are not caused by asbestos. He also disputed the toxicity of amosite. Under cross examination, Wagner admitted to providing monthly reviews of the current literature to a lawyer named Shaw, but he could not recall how much he was being paid for these services. He admitted to having sent Shaw and his colleagues drafts of work he was doing with another scientist, E.B. Ilgrin, thereby suggesting the research was commissioned. Wagner denied that in the previous year he had worked for any asbestos company.[25]

In 1991, Wagner served as a member of the Health Effects Institute-Asbestos Research Literature Review Panel.[26] The panel's 18 members included several leading figures in the field noted for their conservatism. Wagner was the only one to dissent from the panel's finding that all types of asbestos, including chrysotile, cause mesothelioma. In a statement appended to the final report, Wagner rejected that orthodoxy.[27] He also argued that there was a background rate of mesotheliomas unrelated to asbestos exposure, and emphasised instead the role played by passive smoking and radon.[28] Wagner's dissent in such an important forum helped keep alive debate about the toxicity of chrysotile.

A day in court

The intensity of asbestos litigation and the vast sums of money involved have sometimes led to a falling out between asbestos companies. One such case was that of Owens-Illinois (O-I), which had used large quantities of amosite and chrysotile, and T&N, a multi-national company based in the UK. The case began in the eastern district court of Texas in June 2000. One of the issues at stake was O-I's level of knowledge about the dangers of asbestos, and in particular the company's attempts to improperly influence the medical literature. An affidavit presented in defense of T&N by Paul Hanley, a New York attorney, involved Dr. Wagner. According to Hanley, on December 16, 1987, Hanley met a lawyer named R. Bruce Shaw, who at that time was representing both T&N and O-I. Hanley recalled: "At the December 16 meeting Mr. Shaw also informed me that O-I had been paying Dr. Wagner $6,000 per month for some period of time irrespective of whether Dr. Wagner did any work for O-I."[29] Hanley agreed to attend a meeting in the UK with Shaw and Wagner to discuss mesothelioma.

According to Hanley, "Mr. Shaw privately confirmed to me after the meeting that he was trying to persuade Dr. Wagner to say or write publicly that only crocidolite asbestos was an undeniable cause of mesothelioma, and that the role of amosite asbestos was non-existent or at most minimal. At the time my lay view was that this position was scientifically unsupportable." For that reason, Hanley thought Shaw would be unable to persuade Wagner. "I was therefore quite surprised when, in a paper written two years later, Dr. Wagner wrote in a published paper that the evidence was overwhelming that the main cause of mesothelioma was crocidolite asbestos—and that amosite asbestos was implicated in just a few cases. The paper fails to mention any financial support from O-I."[30] Documents tended during the Texas case reveal that beginning in 1986 O-I made regular payments to Wagner through its legal firm Nelson, Mullins, Riley and Scarborough. The documents also reveal that the arrangement continued for more than 15 years and in total Wagner probably received in excess of $300,000.[29] That income compares to the £30,000 per year salary typical for medical researchers in the UK at that time. Neither Wagner nor O-I ever acknowledged Wagner's employment at the numerous conferences Wagner attended during the period his association with the asbestos company remained secret. It was an association he even denied under oath.[26] It is equally significant that Wagner's stance on chrysotile shifted at a time when the evidence linking all types of asbestos to mesothelioma had become overwhelming.

CONCLUSION

Robert Procter coined the term "the social construction of ignorance" to describe the strategy used by tobacco and asbestos companies in maintaining doubt about the dangers of their products.[30] So long as there was a counter-discourse about the toxicity of chrysotile, the industry could argue that the banning of asbestos was not justified. It could also use the opinion of its own experts in court to oppose plaintiffs' claims for compensation. Wagner was in a strategic position to mediate the reception of knowledge about asbestos disease. It appears that his brief with O-I was to keep alive doubt regarding the causal link between chrysotile and mesothelioma. If so it was a role he played with some success, as his secret employment by O-I impacted upon both science and the law. During that period the asbestos industry also spent large sums of money on publicity to counter growing public concern about its products. As a result, the industry gained a 25-year reprieve in the industrial states. It flourishes today in the developing world, where in countries like India, Kazakhstan, and Thailand, industry-sponsored research is used to justify the continued mining of asbestos and the manufacture of asbestos-based products.

The asbestos industry was global, as was the produc-

tion of knowledge about ARD. The major companies that operated both mines and manufacturing plants knew far more than regulatory authorities in individual countries about hazards in the workplace. Employers knew, for example, which parts of the production process were most dusty, had access to the health records of employees, and had access to data about disease rates among miners and factory workers. Litigation in the US, the UK, and South Africa over the past two decades has revealed the ever-widening gap between what regulatory and industry leaders knew about risk in the workplace. It is on the basis of such knowledge that courts have found against companies such as Johns Manville, O-I , and Raybestos-Manhattan.

Wagner was forced to leave South Africa in 1962 because of the industry's opposition to his research. He spent the last two decades of his career in the secret employ of an asbestos company. When I interviewed Wagner at his home in Weymouth he complained that beginning in the mid 1950s, the industry set out to frustrate scientific discovery and gave only minimal cooperation to researchers like himself.[8] He added that sometime in the 1970s the whole scientific endeavour was "hijacked" by lawyers and the press and he expressed regret that he had ever worked on asbestos disease.[8] On reflection, it was not such an odd lament.

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