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PLAINTIFF'S EXHIBIT

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Editorials

- 685 Childhood Lead Poisoning: A Disease for the History Texts *H. L. Needleman*
687 Can Stress Cause Cancer? *D. T. Janerich*

Commentary

- 689 Drake Chemical Workers' Health Registry: Coping with Community Tension over Toxic Exposures *L. C. Leviton, G. M. Marsh, E. Talbott, D. Pavlock, and C. Callahan*

Featuring Environmental and Occupational Health

- 694 Asthmatic Responses to Airborne Acid Aerosols *B. D. Ostro, M. J. Lipsett, M. B. Wiener, and J. C. Selner*
703 A Randomized Trial to Evaluate the Risk of Gastrointestinal Disease due to Consumption of Drinking Water Meeting Current Microbiological Standards *P. Payment, L. Richardson, J. Siemiatycki, R. Dewar, M. Edwardes, and E. Franco*
709 Risk Assessment and Control of Waterborne Giardiasis *J. B. Rose, C. N. Haas, and S. Regli*
719 Cancer Rates after the Three Mile Island Nuclear Accident and Proximity of Residence to the Plant *M. C. Hatch, S. Wallenstein, J. Beyea, J. W. Nieves, and M. Susser*
725 Effectiveness of Source Documents for Identifying Fatal Occupational Injuries: A Synthesis of Studies *N. Stout and C. Bell*
729 Female Homicides in United States Workplaces, 1980-1985 *C. A. Bell*
733 Occupation, Industry, and Fatal Motor Vehicle Crashes in 20 States, 1986-1987 *D. P. Loomis*
736 An Analysis of Occupational Blood Lead Trends in Manitoba, 1979 Through 1987 *A. Yassi, M. Cheang, M. Tenenbein, G. Bawden, J. Spiegel, and T. Redekop*
741 Occupational Carpal Tunnel Syndrome in Washington State, 1984-1988 *G. M. Franklin, J. Haug, N. Heyer, H. Checkoway, and N. Peck*
775 Public Health and the Law: OSHA's Four Inconsistent Carcinogen Policies *George J. Annas*

Public Health Then and Now

- 781 Understanding History to Shape the Future—The New Editors' Vision *E. Fee and R. R. Korstad*
782 The United Mine Workers of America and the Recognition of Occupational Respiratory Diseases, 1902-1968 *A. Derickson*
791 The Silence: The Asbestos Industry and Early Occupational Cancer Research—A Case Study *D. E. Lilienfeld*

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The Silence: The Asbestos Industry and Early Occupational Cancer Research—A Case Study

David E. Lilienfeld, MD, MPH, MS Engin

ABSTRACT

The asbestos industry, corporate and governmental, systematically developed and then suppressed information on the carcinogenicity of asbestos. The development of warnings for those exposed to the asbestos was delayed. As a result, millions of workers were exposed to the carcinogen and hundreds of thousands died. These events are placed into the context of similar activities in other industries during this time. (*Am J Public Health*, 1991, 81:791-800)

If an ox gores someone that they die, then the ox shall be killed, and his flesh shall not be eaten; but the owner of the ox will not be liable. But if the ox has given indications of goring persons, and his owner was so informed, and the ox was not kept in and he killed someone; the ox shall be killed and his owner also shall be killed. Exodus 22: 28-29

The Industrial Revolution brought with it widespread occupational exposures to pathogenic agents, such as silica and lead. Recent legislative initiatives in the United States have greatly reduced such exposures. However, in the absence of major enforcement efforts, the effectiveness of this legislation depends on corporate cooperation and compliance. Many of the corporations whose products cause occupational diseases sponsored the initial development of that etiologic knowledge.¹⁻⁶ Recent legal actions by some members of the asbestos industry have disclosed documents describing the development and subsequent suppression of data concerning the hazards of asbestos. Members of both the insurance industry and the academic medical community participated in such activities which permeated the asbestos industry.

This paper describes the development of these actions and how the concern with asbestosis which had developed first, was extended to cancer. It discusses the industry's growth, the development of concerns about asbestosis, and the formation of a research program to counter them. When these studies found that asbestos was a carcinogen, this information was suppressed. The ensuing cover-up, effected through industry associations and research compacts, resulted in thousands of deaths.^{7,8}

The Asbestos Industry, 1850-1927

The attributes of asbestos, a silicate, that fostered its widespread use have been known for at least two millenia.⁹ Yet it was the unique confluence of the Industrial Revolution, innovations in building construction, and the economic growth in the United States that led to its wide-

spread use during the past century. Insulation was needed for efficient energy use to maximize engine power.¹⁰ Resistance to both heat degradation and combustion was desirable. Asbestos was such a material.

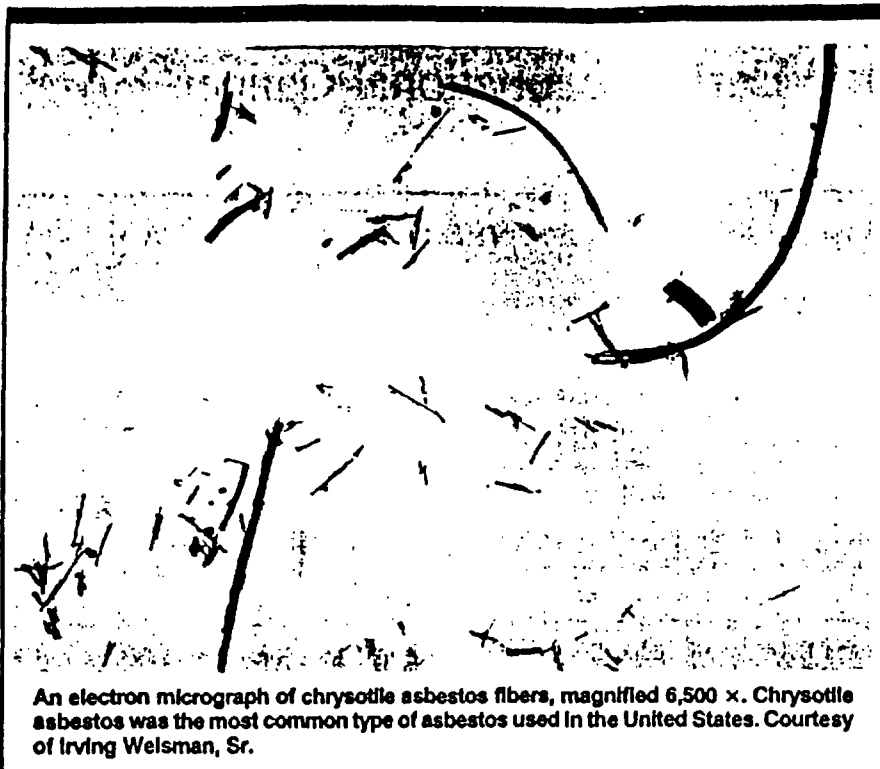
The asbestos industry developed as a response to this need for insulation. It grew in tandem with the post-Civil War development of heavy industry. During the late 1800s, many in the industry thought that if asbestos felts could limit engine heat loss, then asbestos roofing felts might similarly limit building heat loss. Asbestos became a construction material. Rapid growth of the industry was not without serious consequences.¹¹ In the 1920s, for example, the medical community recognized a fibrotic lung condition, similar to silicosis, that resulted from asbestos exposure.^{9,12}

The Hazard Suggested

In the late 1800s and early 1900s, the hazards of occupational silica exposure were recognized, and the widespread nature of such exposures became apparent.¹³ They were made clear in a landmark 1917 report by a young Public Health Service (PHS) physician, Anthony Joseph Lanza.¹⁴ After entering the PHS in 1907, Lanza was detailed to the Fort Stanton, New Mexico, Marine Hospital Tuberculosis Sanatorium. He left that assignment with an interest in pulmonary medicine and the clinical skills to pursue it.

In 1914, Lanza was appointed as the Chief Surgeon to the Bureau of Mines. He was assigned to the Joplin, Missouri, lead and zinc mining areas "to investigate and report on the prevalence, causes, and methods of control of pulmonary diseases among miners."¹⁵ A series of investigations followed that quickly established him as an expert in the pneumoconioses.¹⁴

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An electron micrograph of chrysotile asbestos fibers, magnified 6,500 $\times$. Chrysotile asbestos was the most common type of asbestos used in the United States. Courtesy of Irving Welsman, Sr.

Further assignments in occupational medicine followed. In 1920, Lanza left the PHS to practice and consult in the private sector. Six years later, he was hired by the Metropolitan Life Insurance Company to "provide industrial medicine and industrial hygiene services to companies whose group life insurance policies were held by the Metropolitan."¹⁴ The Metropolitan also provided these services to companies whose disability or workmen's compensation policies it carried.

The recognition of silicosis and its association with employment practices, coupled with a high injury rate in many industries (particularly in mining), led to the enactment of workmen's compensation statutes in the United States between 1910 and 1930.^{16,17} Corporations bore this system's cost as a business expense. It was therefore only in the 1920s that the Metropolitan's services were needed by industry. At the same time, asbestosis was identified as a distinct entity caused by asbestos.⁶ No direct evidence exists that these reports were alarming to the industry. However, subsequent events suggest that the companies did not immediately acknowledge (or desire to do so) the hazard created by asbestos exposure.

One response was a 1929 request by several asbestos companies to the Metropolitan for an industrial hygiene survey of several of their plants. The survey also was to determine if asbestosis even exist-

ed.^{6,18} If the disease did not exist, then there could be no liabilities from it. An additional concern was whether asbestosis led to tuberculosis in a manner akin to silicosis, since asbestos was a silicate. If asbestosis did so, the compensation costs would be much greater. Lanza, an expert in the pneumoconioses, was to direct the study.

Lanza was well aware of the legal implications of such work. For example, in November 1929, he had sent to Mr. Allan Wardwell (of Davis and Polk, a Wall Street law firm and Johns-Manville's outside corporate counsel) a bibliography on asbestosis.¹⁹ A year later, Lanza wrote to Wardwell concerning the definition of asbestosis to be used in the workmen's compensation schedule for New Jersey, then being codified.²⁰

The surveys found that asbestosis, present in large segments of the industry's workforce, did not predispose to tuberculosis.²¹⁻²³ In 1931, Lanza sent the American plants survey findings to Wardwell, noting: "It is, of course, understood that this report is confidential and it will be given no publicity by us except with the consent of the firms concerned."²⁴ A similar report for the Canadian plants (written by Lanza's superior, E. McConnell, MD) was also sent to Wardwell.²⁵ Three months later, at a meeting with Johns-Manville officials, Lanza recommended the inclusion of asbestosis under work-

men's compensation: "[He] is very strongly of the opinion that asbestosis should be made compensable. . . . He feels that this is the only protection which the industry has . . . permitting the disease to remain outside the compensable class lends encouragement to unethical lawyers and physicians to work up claims."²⁶

By 1932, Johns-Manville had several suits against it from workers with asbestosis.²⁷ In contesting these suits, the corporation sought to question the diagnosis of pulmonary disease. In February, Lanza wrote to F.V. Meriwether, MD, of the US Bureau of Mines, requesting his assistance in reviewing some x-rays from the Manville, New Jersey, plant.²⁸ In a follow-up letter from S.A. Williams (Johns-Manville Vice President for Mines and Production), Meriwether was told "you will readily appreciate that we desire the results of your readings to be held in strictest confidence and that no unnecessary publicity be given to the fact that you are making these readings for us . . . we wish, if possible, to prevent the results of our efforts being used against us either in the pending suits or in any suits which may be brought against us."²⁷ Meriwether subsequently agreed.²⁹ Vandiver Brown, Johns-Manville's general counsel, coordinated the logistics.³⁰

In 1933, Williams wrote to A. R. Fisher (manager of the Manville, New Jersey, plant) concerning Lanza's reply to questions from a physician at Johns-Manville's Waukegan, Illinois, plant.³¹ The Waukegan physician had reportedly asked Lanza, "Do you agree with my recommendation that employees definitely be made aware of the fact that asbestos dust is hazardous to their health?" Lanza replied: "I doubt if the hazard is sufficient to justify warning posters. . . . This is especially true in view of the extraordinary legal situation." The legal aspects of the situation had had an impact on a physician's (i.e., Lanza's) approach to a medical problem, i.e., they led him to ignore it. Later in the exchange, the plant physician noted: "I have made a diagnosis of asbestosis. . . . In my judgment the best disposition of such a case is to remove him from the dust and give him a job in some other part of the plant." Lanza replied: "It is difficult. . . . One of the difficulties and vexations . . . of pneumoconiosis is that economics as well as production factors, must be balanced against the medical factors." In November 1933, Lanza met with Johns-Manville executives to discuss the completion of the Metropolitan surveys.³² Attendees included W. R. Seigle (chair-



Asbestos being sprayed during construction. Courtesy of Mitchell Cohen.

man of the board), E. M. Voorhees (secretary and treasurer), Brown, and Williams. Lanza thought that resurveys of both the plants and the employees would be necessary. He stated that it would be advantageous if Wardwell spoke with the Metropolitan's president to stress the importance of the project's completion. Voorhees asked about obtaining annual dust counts in the plants "in the event we should ever be involved in litigation." Lanza suggested that the Saranac Laboratory, a tuberculosis sanatorium and research facility, would be better positioned for such a task.

A follow-up meeting, again in Seigle's office, was held in late December, 1933.³³ Joining the meeting were S. Simpson (president of Raybestos-Manhattan) and M. F. Judd (another Raybestos-Manhattan official). Among the topics of discussion was pending litigation: "It was decided that this committee . . . would . . . obtain Dr. Lanza's recommendation with respect to locating or developing an expert whose services might be utilized from the standpoint of court work."

At the same time, L. U. Gardner, MD (medical director at the Saranac Laboratory) wrote to Lanza concerning the disposition of some mine workers at the Philip Carey Company (in Canada) who had developed silicosis.³⁴ When any of these workers filed a compensation claim, the Saranac Laboratory would review the x-rays for the Metropolitan. Gardner noted that the closing of the Carey mine would precipitate the filing of many such claims for silicosis and silico-tuberculosis. Carey had dealt with this situation by

transferring these men to its operations across the border in Michigan, where there was no compensation law.

By the end of 1933, it was clear that the industry and at least one of its insurers were concerned with asbestosis-related litigation and wanted to minimize the associated economic impact. A key figure in these activities was an employee of Metropolitan Life, Lanza. It was through his association with the asbestos industry that the foundation was laid for future formal concerted action to conceal research findings relating asbestos exposure to both asbestosis and cancer.

The Codification

At an early 1934 meeting, officials of Johns-Manville, Raybestos-Manhattan, and Metropolitan Life were "advised . . . as to the relatively better position in which the companies would be placed in the event of litigation if . . . an outside expert of recognized reputation . . . would state that he had made certain recommendations . . . and that these recommendations had been followed."³⁵ Lanza stated that he would discuss this role with Dr. P. Drinker of Harvard University.

Until late 1934, the efforts of the industry, of the Saranac Laboratory, and of the Metropolitan had been directed at keeping research findings confidential. For instance, in 1933, the Saranac Laboratory had released confidential data on silicosis.^{36,37} As a result, the Wisconsin Industrial Commission was able to publish a report on silicosis and tuberculosis that was none-too-favorable to the industry. Lanza scolded the Saranac Laboratory for this unauthorized release.³⁸ Outright deception began in December 1934.³⁹ Lanza was publishing the results of the 1931 survey. Brown, concerned about the article (then in galley proofs), discussed some changes with one of Johns-Manville's outside counsels (G. Hobart). Within a week, Hobart sent Brown a marked-up version of the paper, noting that "one of our principal defenses . . . has been that the scientific and medical knowledge has been insufficient until a very recent period to place upon the owners of plants or factories the burden or duty of taking special precautions against the possible onset of the disease to their employees."⁴⁰ A week later, Brown forwarded these comments to Lanza, noting that "I trust that you will give his comments and suggestions, as well as those mentioned in my letter, your most serious consideration. I am sure that you understand fully that no one in our

organization is suggesting for a moment that you alter by one jot or tittle any scientific facts or inevitable conclusions revealed or justified by your preliminary survey. All we ask is that all of the favorable aspects of the survey be included and that none of the unfavorable be unintentionally pictured in darker tones than the circumstances justify."⁴¹ The desired changes were made prior to publication.^{42,43}

In early 1935, Lanza sent a reprint of the published article to Wardwell, noting: "the Public Health Reports publication gives this piece of work authoritative and dignified presentation."⁴⁴ Subsequently, S. E. Whiting (Assistant Chief Engineer of the Liberty Mutual Casualty Insurance Company), requesting a reprint from Lanza, referred to the continued funding of the Saranac Laboratory by Liberty Mutual and the Metropolitan.⁴⁵ He also suggested that the Saranac Laboratory release the Lanza survey results to these insurance companies, who would in turn convey the findings to the industry. The data were subsequently so released.⁴⁶

In late 1936, the asbestos industry again found itself in legal troubles as it had compensation cases to settle. Simpson described the problem in a letter to H. D. LaMont of the Asbestos Manufacturing Company: "They claim it [asbestosis] leads to Tuberculosis, but we do not find this to be the case. Still, we cannot go into court and state definitely and specifically that it will not do so."⁴⁷ Simpson went on to describe the Saranac Laboratory's capability to address the tuberculosis-asbestosis issue. He also suggested that members of the industry (Johns-Manville, Thermoid Rubber, Keasbey and Mattison, Asbestos Manufacturing, Russell Manufacturing, and Raybestos-Manhattan) contract with the Saranac Laboratory to conduct these experiments: "to have four or five (or even more if we could get them) Asbestos manufacturers take over this study . . . and then we could determine from time to time after the findings are made, whether we wish any publication or not . . . it would be a good thing to distribute the information among the medical fraternity, providing it is of the right type and would not injure our companies."

On November 9, 1936, Simpson met with Lanza, McConnell, Brown, and Gardner to discuss the possibility of conducting such studies.⁴⁸ Nine days later, these companies (Appendix A) so contracted with the Saranac Laboratory, with the provision that "the results obtained will be considered the property of those

who are advancing the required funds, who will determine whether, to what extent, and in what manner they shall be made public. In the event that it is deemed desirable . . . the manuscript of your study will be submitted to us for approval prior to publication."^{49,50}

There matters rested for three years. Gardner was unable to complete his experiments. The medical literature continued to accumulate on the noxious effects of asbestos.^{6,9} In the winter of 1940, Brown advised Gardner that the funding would be extended by a year and that the terms of the original agreement continued to apply.⁵¹ Presumably, this last comment referred to the provision concerning industry approval prior to publication.

In 1942, Ivan Sabourin (chief counsel for Canadian Johns-Manville) joined in these endeavors. On May 6, he sent a medical report to Gardner that he (Sabourin) had "taken the liberty of drafting for you . . . for the benefit of my clients."⁵² The report was to be sent by Gardner to various state workmen's compensation boards. Soon afterwards, Sabourin became the general counsel for the Quebec Asbestos Producers Association (a Canadian asbestos industry association), which would undertake much of the asbestos-cancer research conducted during the coming decade.

Cancer

Gardner's asbestos work continued. An interim report noted that 81.8 percent of animals exposed to asbestos had developed lung tumors, an overly high rate.⁵³ Gardner thought the result to be important: "The question of cancer susceptibility now seems more significant than I had previously imagined." A copy of the report was sent by one sponsor, Keasbey and Mattison, to its parent, Turner and Newall (a major asbestos manufacturer) in England, with the comment "we feel that reference to the question of cancer susceptibility should be omitted from the report since it is inconclusive."⁵⁴

Concurrently, the asbestos industry and the Metropolitan turned their attentions to Canada. This change in focus began with a Metropolitan actuary's report to G. W. Wheatley, MD (assistant director of the Metropolitan's Medical Division) of a high tuberculosis rate at the Johnson Company in Thetford, Quebec.^{55,56} This finding again raised the issue of asbestosis and tuberculosis. The Metropolitan decided that a survey of the Johnson Company was needed.⁵⁷

During a trip to Quebec in October, 1944, Wheatley met with Sabourin, among others.⁵⁸ Sabourin's clients had been dealing with asbestosis compensation claims and were in the process of establishing an asbestosis clinic at Thetford, Quebec. The Quebec view was that asbestosis increased the risk of tuberculosis. At a meeting of Sabourin, O. C. Smith (president of Bell Mines), A. Penhale (manager of the Asbestos Corporation mines), A. Johnson (president of the Johnson Company), and the Metropolitan staff, the logistics of establishing the clinic (the Thetford Clinic) were discussed. Dr. P. Cartier, of the Montreal Anti-Tuberculosis Society, was to direct the clinic.

In the United States, meanwhile, the concerns about Gardner's findings continued. One sponsor wrote to Brown in April 1946, indignant that the draft mentioned cancer.⁵⁹ After Gardner's death in October 1946, Brown wrote the other sponsors to suggest that someone else at the Saranac Laboratory complete the report. As work proceeded accordingly, the sponsors reiterated their right of approval of all public releases of the findings.^{60,61} In the interim, Lanza sent Gardner's last draft to Professor Kenneth Lynch, MD, of the Medical School of South Carolina for review. Lynch recommended the publication of the report without revision.⁶²

As the drafting of a final report neared completion in late 1947, Fisher wrote to J. P. Woodard (a Johns-Manville senior executive) that the final report should be reviewed by "the top man of the Quebec Asbestos Producers Association."⁶³ By late November 1947, Sabourin was very anxious to have the report completed to counter local Quebec groups upset about the health effects of asbestos exposure. Yet there was still no final report. In March 1948, a frantic Woodard noted to Lanza that labor problems in Quebec were related to asbestos.⁶⁴

Two months later, Brown wrote to Muehleck (president of Keasbey and Mattison) suggesting that the Asbestos Textile Institute (ATI) review the report. (The ATI, an industry trade association, had been founded in 1944 to promote asbestos textiles. Its membership (Appendix B) had considerable (but not total) overlap with the sponsors.⁶) Muehleck thought that the sponsors should review the work.⁶⁵ Brown noted that although some sponsors were not ATI members, the ATI members had provided most of the funding.⁶⁶ Therefore, Brown argued, the ATI, not the sponsors, should conduct the review. Muehleck finally agreed.^{67,68}

By this time, A. J. Vorwald, MD, had been appointed as Gardner's successor.⁶ With much urging from Woodard, he completed a draft of the Gardner report (including a cancer section) that was ready for review.^{69,70} One sponsor had already indicated that the cancer section should be removed; now, other sponsors concurred.^{59,68-76} Brown agreed; Lanza was told to handle the matter.⁷⁶⁻⁷⁸

In the process of this review, all of the sponsors (except Keasbey and Mattison, and Raybestos-Manhattan) received copies of the draft that had been numbered by Brown. The reason was simple: "It is obviously undesirable that the report in its present form receive any distribution or publicity outside a limited number of people in our respective organizations."⁷⁶ The next month, Dr. Hamlin, medical director for American Brake Block, reassured his superiors that the report was not controversial "since most of the basic facts with the exceptions of the more detailed studies mentioned in the report are already known . . . no unfavorable reaction need be anticipated."^{76,79} About two weeks after the review committee decided to remove the cancer section, Brown communicated this conclusion to W. T. Kelly (Hamlin's boss at American Brake Block). Brown noted that all of the copies of the report had been "retrieved . . . except the one we sent you, which . . . Dr. Hamlin would like to keep. I wish, however, you would prevail upon him to return it. . . . Everyone felt that it would be most unwise to have any copies of the draft report outstanding."⁷⁶ Kelly subsequently asked Dr. Hamlin to return the draft.⁸⁰

The January 31, 1949, draft of the report had the section entitled "Neoplasm" marked through with the word "out."⁸¹ The revised report was published in 1951.⁸² One member of the investigative team has stated that this act was unrelated to sponsor pressure.⁸³

On March 8, 1949, Brown wrote Sabourin that "because of our close association in Canada with others interested in the solution of the asbestosis problem, the results of these experiments should be made available to them in advance of publication. . . . I am providing you . . . as counsel to Quebec Asbestos Mining Association [the successor to the QAPA]—with two copies of the report."⁸⁴ By June, 1949, the report had begun to be promoted in the United States. For instance, Gatke noted that the Massachusetts Industrial Board "would likely be more lenient in

their decisions if they had the advantage of the information disclosed in this report."⁸⁵

As K. Smith, MD (the medical director of Canadian Johns-Manville) noted, the report left many questions unanswered, including the importance of fiber size, and specific aspects of the asbestos-cancer issue.^{86,87} Vorwald wrote to Smith in October, 1949, suggesting that the x-rays of the Quebec workers be reviewed for lung cancer.⁸⁸ A study protocol was quickly formulated.⁸⁹ Smith wrote to Lindell (president of Canadian Johns-Manville) that "there has been a tremendous increase in the number of articles in medical journals during the past year which deal with the subject of occupational cancer. Very high on the list of causes . . . is asbestos. There seems to be increasing proof that asbestos fibers do cause lung cancer. This conclusion is drawn only from articles reported in the journals. . . . I have been unable to find any x-ray evidence of lung cancer among our employees . . . but this whole subject could cause our companies unlimited embarrassment and untold expense if labor leaders made use . . . of the subject. . . . If we are to defend ourselves in the compensation courts, we must have proof. I believe that we should discuss this matter at a Q.A.M.A. Meeting and . . . ask . . . [the Saranac Laboratory] to outline a suggested plan of study."⁹⁰ (Smith had already reviewed the Saranac Laboratory report at the QAMA meeting in 1949.⁹¹) He noted: "As far as J-M is concerned, I know of two hazards in our operations which may lead to pulmonary malignancy, namely asbestos and silica. There is ever increasing evidence in the medical literature today that these materials lead to lung cancer." A study was needed.

By March, 1950, the issue had become whether further study should be undertaken by William Smith, MD (a toxicologist at Lanza's unit) or by the Saranac Laboratory.^{92,93} (Following Lanza's retirement from the Metropolitan in 1948, he founded the Institute of Industrial Medicine at New York University.⁹⁴) Site visits suggested that both facilities could complete the work.⁹⁵⁻⁹⁷ Lanza drew up a contract which left "little choice to the donor if the results of the study are unfavorable to company interest and are submitted for publication. However, I [K. Smith] fail to see how they can find anything more unfavorable than that which already has been published. . . ."⁹⁸ In September, Vorwald submitted a competing contract for the Saranac Laboratory,

which stated that "the Saranac Laboratory reserves the right to publish the results of its investigations in the recognized manner . . . whereby the manuscript prior to its publication is submitted to the sponsoring company for its review and approval."⁹⁹

Later that month, the QAMA noted that "a relationship between the inhalation of asbestos dust and pulmonary cancer has been stated publicly by certain health authorities. . . . It is necessary for us to . . . prove that this statement is not correct or to accept it and the consequences that go with it. Our position in this matter is the same as the Association and Industry found itself in 1937 as regards to asbestosis."¹⁰⁰ The proposed study would use "the same methods as our antagonist." Animal studies were also suggested. Another activity "would consist of more publicity coming from our association . . . rather than taking the defensive attitude that we have. . . . That we arrange to have our doctors lecture at medical schools yearly. That we attempt to affiliate our doctors in some manner with research centers such as Saranac and in such organizations as the Industrial Hygiene Association and the Institute of Industrial Medicine [Lanza's New York University group]"

Despite the long association between Lanza and his industry colleagues, the lack of sponsor control of publications in the New York University proposal led to the Saranac Laboratory's being awarded the contract.⁹⁹⁻¹⁰¹ In November, Lanza, Sabourin, and Woodard met with Vorwald to review the project.¹⁰¹ The studies began and were soon almost complete.¹⁰² Smith (now medical officer for Johns-Manville) thought that an epidemiologic approach was needed. He wrote Johns-Manville officials that "we would be wise to wait [for a news release] until we have proof of no causal relationship between asbestosis and pulmonary cancer . . . we might not wish to bring attention to the asbestos industry if the cancer research is not entirely favorable."¹⁰³

In July, 1951, Cartier reviewed cancers among eight asbestos workers.¹⁰⁴ He observed: "some causal factor will produce the same variety of tumors and therefore why do we observe such a variety of [cancers] . . . [if] we may assume that the asbestos factors might produce a bronchogenic carcinoma . . . then only two cases of the series would serve as evidence because the other cases are mesothelioma or lymphosarcoma or secondary malignancy in cases without exposure

or without asbestosis." (Ironically, Johns-Manville would argue two decades later that mesothelioma was not a distinct cancer.⁵)

In October, Vorwald presented his initial findings to the QAMA: "Although only six months had elapsed . . . animals which were killed during this time presented no greater incidence of pulmonary cancer in the dusty group than in the non-dusty group . . . he is certain that there is no association between the cancer and asbestos, but . . . cannot state this scientifically, for at least twenty months must elapse before conclusive evidence can be produced and in the meantime, this statistical survey [the epidemiologic study] should be carried on."¹⁰⁵

In February, 1952, A. L. Fisk, Jr. (Johns-Manville's Legal Department) wrote to Lanza: "As you are aware, the Industrial Commission of Illinois has promulgated rules as to the labeling of substances harmful to the health and safety of employees . . . in our opinion asbestos fiber comes within the preview of the regulations. . . . It is our intention to label our bags containing asbestos fiber, using the following:

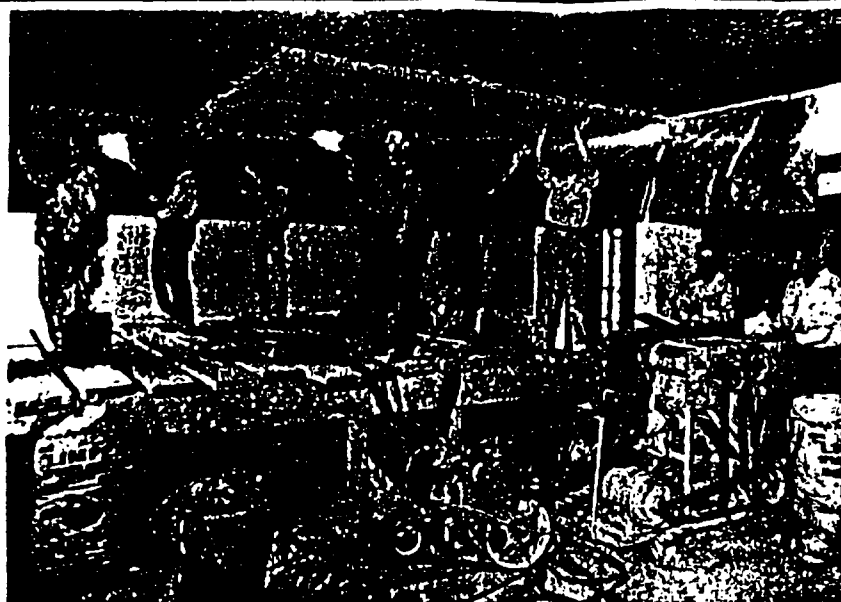
"CAUTION—ASBESTOS FIBER"

Inhalation of asbestos fiber over long periods MAY BE harmful. The material should be used as not to create dust or, if this is not possible, employees should be equipped with adequate protective devices."¹⁰⁶

For unknown reasons, a warning label was not added to the bags for another 13 years.⁶

The QAMA-sponsored Saranac Laboratory animal study continued. At 14 months, the animals exposed to asbestos had a higher incidence of cancer than those not exposed.¹⁰⁷ The study was not published. The industry was well aware of the stakes involved. For example, in 1953, the Indiana State Division of Industrial Hygiene contacted National Gypsum concerning the safety of asbestos spray products.¹⁰⁸ The National Gypsum safety director wanted to reply that the applicators should wear respirators. A National Gypsum executive characterized the suggestion as "full of dynamite," stating that "I am much concerned that National Gypsum is on record . . . that Thermacoustic is hazardous business. If this snowballs, we are out of the Thermacoustic business."

Vorwald's tenure at the Saranac Laboratory was ended in 1953, after he attempted to investigate further the asbestos-cancer relation.⁶ He sought employment as a professor at a California



"LIMPET" sprayed asbestos application. LIMPET was a product of the Keasbey and Mattison Company. Note the two men at the far right feeding the machines. Courtesy of Mitchell Cohen.

institution. Lanza flew to California to prevent that Vorwald would be offered the position (personal communication, W. Smith).¹⁰⁹⁻¹¹¹ The trip is alleged to have been paid for by the Metropolitan. A similar fate befell W. Smith (a toxicologist in Lanza's unit) after he had indicated an interest similar to Vorwald's (personal communication, W. Smith).

At the Seventh Saranac Symposium in 1952, the asbestos-cancer relation was discussed and the carcinogenic potential of each of the fiber types noted.¹¹² Attending this meeting, in addition to industry physicians, were representatives of the Liberty Mutual, the Travelers, the American Mutual, and other insurance companies. Turner and Newall (in Rochdale, England) sent a physician, J. Knox, to attend this meeting. At the Seventh Saranac Symposium, he met W. Smith. Stimulated by the reports at the symposium, Knox decided to examine the Rochdale asbestos workers' lung cancer experience. He began to trace the Rochdale workforce, collaborating with Sir Richard Doll (then an epidemiologist at the London School of Hygiene) on the data analysis. By December 1953, both men had realized that lung cancer mortality was much above what it should have been.¹¹³ A paper was drafted with Knox as the senior author.¹¹⁴

In June, 1954, Knox wrote W. Smith, describing Turner and Newall's response to the research findings: "This letter is addressed to you in your private capacity. The letter of 31/5/54 is the official answer

which I must give at present. Its tone must have given you quite a jolt. When your letter came in February, Doll and I had not finalized our paper. On completion we sought permission to publish and, to my great surprise, were refused by the company—at present. Up until a few days ago, I had hopes of a more favorable turn of events but the ban remains. The headline news about lung cancer has scared people over here and it was thought we might attract undesirable publicity in our area. . . . I am sending you personally a copy of our paper. Perhaps the people to whom it would be most unwise to mention it would be those associated in any way with our industry."¹¹⁴ When Doll learned of the ban, he wrote Knox: "For my own part, I feel that any positive findings with regard to the cause of cancer must be made available to all research workers on the subject. . . it is by free publication that the work can be tested and utilized (or disproved) by others."¹¹⁵ In 1955, the manuscript was published; Knox was acknowledged anonymously.¹¹⁶ That industry-supported investigators in North America had previously gleaned the causal association could not have been known by Doll.

Discussions of the cancer-asbestos link within the asbestos industry ensued. The QAMA and the Asbestos Textile Institute, for example, communicated with each other about the subject.¹¹⁷ Yet an industry manual compiled by the Magnesia Insulation Manufacturers Association

(another industry trade association) stated that asbestos "offers no hazard to the worker."¹¹⁸ Also, it is apparent that, at a National Cancer Institute (NCI) discussion in 1955 on asbestos and cancer, attended by Vorwald and K. Smith, no disclosure of either Gardner's or Vorwald's findings was made.¹¹⁹ The meeting concluded that "there have been no asbestos-cancer animal experiments." It noted that given the widespread use of asbestos, if it were carcinogenic, the public health implications would be great. Also in attendance was an NCI staff member, W. Hueper, PhD. Hueper was very much convinced of the causal relationship between asbestos and lung cancer.¹²⁰

In February 1956, K. Smith wrote to Daniel Braun, MD, [the medical director at the Industrial Hygiene Foundation (IHF)], concerning Hueper's statements that asbestos caused cancer.¹²¹ (The IHF [Appendix C] was established in 1936 to provide dust control information to its membership, which included many members of the asbestos industry.^{5,6}) K. Smith noted that "we have too much at stake to allow . . . such indiscriminate statements." In response, Braun prepared a report on asbestos and lung cancer for the QAMA (under the auspices of the IHF).¹²²⁻¹²⁴ (The Asbestos Textile Institute had rejected an IHF proposal for further work on asbestos and cancer because it would "stir up a hornet's nest and put the entire industry under suspicion."^{125,126}) A final report was soon completed.¹²⁷ The copies were numbered. Braun stated that "a comparison of relative frequency of lung cancer and asbestosis is less reassuring . . . this is because of an underreporting of asbestosis cases. The incidence of asbestosis indicated by the medical records is far below that which would be expected. . . . However, this may be 12.5% of the recorded cases of asbestosis in this state of development of lung cancer, a figure slightly lower than those quoted by authors who confine themselves to this type of comparison." The consequences of the industry's previous underreporting of asbestosis now became clear. The concluding sentence of the report was less equivocal: "The results suggest that a miner who develops the disease asbestosis does have a greater likelihood of developing cancer of the lung than a person without this disease."

Once the QAMA had received the report, Sabourin met with Braun to produce a "condensation" for publication.¹²⁸ Concurrently, K. Smith wrote to Sabourin that "[we] have noted deletion of all ref-

ferences to the association of asbestosis and lung cancer. . . . While we believe that this information is of great scientific value, we understand the desire of the QAMA to emphasize exposure of the asbestos miner and not the cases of asbestosis."¹²⁹ K. Smith noted that the published condensation would be criticized "because all of the authors today correlate lung cancer to cases of asbestosis."

In 1958, the *Archives of Industrial Health* published the "condensed" Braun report (without the quoted concluding sentence).¹³⁰ In his letter of acceptance, Stokinger, the editor (a major figure in the development of threshold limit values) noted his pleasure that "the main conclusion of the paper was against the association of lung cancer with asbestosis, for I had come to a similar conclusion on obviously far less information. . . . I am enclosing a review which contains a few statements that I have marked in this connection that appears in the *Annual Review of Medicine, Volume 7, 1956*. You will recall at this time evidence greatly favored the positive correlation of lung cancer and exposure to asbestos."^{131,132} At a 1958 symposium, the "condensed" report was presented. Sabourin reported to the QAMA that the news of this symposium provided "wonderful public relations value."¹³³

By the early 1960s, the industry and its associates had succeeded in suppressing much of the knowledge gleaned over the prior two decades concerning asbestos and cancer. During the 1960s, academic scientists and physicians, such as Selikoff and Wagner, discerned the relationship between asbestos with cancer.¹³⁴ These findings were quickly appreciated by the general medical community.¹³⁵ The industry was in a compromised position. In 1963, K. Smith suggested the purchase of a shredding machine to "destroy completely all copies of correspondence which you do not wish to retain. . . . I believe that this is highly essential but all copies of correspondence of such confidential nature should be thoroughly destroyed so that our position in Workmen's Compensation claims cannot be doubted."¹³⁶

In the mid-1960s, the industry began to place warnings either on the bags of asbestos or on the sides of the wooden crates used to ship the products containing asbestos. In 1965, a series of Johns-Manville memos clearly state that for products exported from the United States, the warning on the bags should be covered and those on the crates, sanded off.^{137,138} Similar memos exist for other members of

the industry. For instance, a 1964 Eagle-Picher memo concerning such warning labels stated the following: "This is large enough type face [1/8 inch height] to be completely legible, yet does not 'shout CAUTION from the roof tops.'"¹³⁹ In 1970, an Owens-Corning memo succinctly stated the reluctance to use such labels: "Reference is made . . . regarding the warning label. . . . Are you saying that we have to do this now? I naturally would like to delay this requirement as long as possible."¹⁴⁰

A little more than a decade ago (in 1977), the following exchange took place within the Phillip Carey Company: "I got very strong reactions in Japan to our requirement to translate the . . . [warning] Label into Japanese. . . . Confidentially, the Kakiuchi staff told me that they deliberately left out the word cancer from the text because this must not even be mentioned in Japan in connection with asbestos. Altogether they are against a warning label because they do not wish to raise problems with the workers. They are already attaching a label on each bag according to Japanese law. Kakiuchi would prefer to sign a certificate holding us blameless from harm. . . . Asbestos Corporation and Bell have both gone this route per attached blank forms. Kakiuchi are of the opinion that we cannot impose American law on foreign counties and on Japan in particular. . . . I do not believe that we should raise problems with people who are more primitive than we are, or less educated."¹⁴¹ The reply: "As far as the caution label is concerned . . . we must be sure to cover ourselves only where the law of the land requires. I suggest we go ahead with the new caution label in English and French only. What do you think the Japanese, Finns, Swedes and Dutch will have to say about that?"¹⁴²

By the late 1970s, the industry was under attack in the courts and in the press. One Johns-Manville memo, labeled "Confidential", dated January 12, 1979, addressed to John A. McKinney, president of the company, assessed events:

The situation confronting Johns-Manville and asbestos has changed dramatically in recent days . . . now the integrity of present-day management is being severely challenged. The shift in the thrust of public opinion is crucial in that favorable legislation on compensation will not be possible if the credibility of the corporation . . . is questioned by Congressmen and, more importantly, their constituents.

I believe the seriousness of the situation has now gone beyond the implementation of a communication effort, though that should be done . . . here are a few examples:

1. JM position: Prior to 1964, we lacked scientific knowledge about cancer hazards of asbestos.
FACT: In the mid-50s, JM officials knew of scientific studies showing a relationship between cancer and asbestos.
2. JM statement to North Carolina judge: So-called "cover-up letters" not available.
FACT: Letters had been used in a New Jersey trial several weeks before . . .
3. JM position: though sprayed asbestos inappropriate for use in schools, we see no evidence of danger.
FACT: If no problem, then why an inappropriate use?
4. JM position: There will be no future problems with workers.
FACT: Workers in Mexico are not being protected.
5. JM position: Knoxville trial shows there was no conspiracy.
FACT: Knoxville judge tells the Associated Press "off the record" that his ruling on punitive damages does not clear the company of a "cover-up" charge.
6. JM position: Since 1964, JM has "come clean" with employees about asbestos hazards.
FACT: A current 41 year employee of JM has called me to say that he has a spot on his lung . . . but no one at JM has ever communicated with him about it.
7. JM position: There was no cover up.
FACT: A current employee . . . says his father worked for JM for 35 years at Manville and was never told about dangers. Father was dismissed because of 'miners' asthma' . . . he had to take JM to court to get compensation for an asbestos-related disease.
8. JM position: We have communicated openly with employees about illnesses.
FACT: . . . it was company practice into the early 70s not to tell a person about his illness.
9. JM position: JM has taken precautions to prevent excessive exposure to fiber glass workers.
FACT: Plant manager . . . is reluctant to post HS & E bulletin because precautions not taken at his plant . . .

I can easily see why we have members of Congress calling us "liars".¹⁴³

Conclusions

This case study illustrates how a series of concerted actions was planned and carried out during half a century, in which data were generated and then suppressed. Some of the principals in these activities were also leaders in occupational medicine. The societal response to the ambivalence and inaction by these leaders with respect to industrial carcinogens was the Occupational Safety and Health Act of 1970. The Occupational Safety and Health Administration removed some of these leaders from the dominating positions they had held in the development of na-

tional policy on industrial carcinogens. The success of this approach remains unclear.

Another interesting aspect of this episode is how the information became public. It was by legal actions that these documents were produced (through "discovery," the legal process of information disclosure). None of the companies involved provided these papers freely to the general public. Indeed, to have done so would have greatly compromised 50 years of corporate safety and health policies. If major legal reform had been enacted prior to this litigation, it is possible that these documents would not have become public knowledge. It is equally disturbing that none of these data were obtained through the existing occupational safety and health enterprise erected during the past two decades. The effectiveness of the current framework for developing and enforcing occupational safety and health considerations must therefore be questioned. However, a complete discussion of this issue is beyond the scope of the present work and should be considered by the occupational health policy community.

The degree to which scientific fraud permeated published reports is also of concern. The activities described suggest that fraud in non-governmentally supported research occurs, and that it has potentially great impact on health policy. However, unemployment or withdrawal of research support may be the ultimate "reward" for those who do not participate in such activities. The implementation of mechanisms to prevent such fraud should not await yet another public health tragedy. Despite the disclosures of suppression and fraud, no mechanisms have been implemented to prevent future such occurrences.

It was not only in the asbestos industry that voluntary corporate compliance with societal norms of conduct in worker health and safety were violated. Michaels has shown that similar problems existed in the aniline dye industry.³ As the recent A. H. Robins-Dalkon Shield episode illustrates, in the 1970s, some corporations (outside the asbestos industry) thought little about suppressing detrimental medical knowledge. Until such activities cease, the potential for future similar public health disasters to occur continues. □

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Note: The references for this paper include exhibits used as evidence in several legal proceedings. All of the correspondence, reports, etc., for which no other identification information is provided were used as exhibits at the *Johns-Manville v. United States*. CV 465-83 (Federal Circuit Claims Court, DC) 1983. All such exhibits are available from the Claims Court in the District of Columbia. Other cases in which these exhibits were used are also cited. If no case citation appears for a given letter, memo, or nonpublished article, then the reader may assume that the reference may be found as part of the evidence introduced in the *Johns-Manville v. United States* litigation. The other proceedings (with corresponding abbreviations used in the reference list) are as follows:

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**APPENDIX A—Signatories to
Saranac Laboratory
Contract**

American Brake & Block Corporation
Asbestos Manufacturing Company
Johns-Manville Corporation
Keesbey and Mattison, Incorporated
Russell Manufacturing Company
Southern Asbestos Company
Thermoid Rubber Company
Union Asbestos and Rubber Company
United States Gypsum Company

**APPENDIX B—Membership of the
Asbestos Textile
Institute (c. 1945)**

Johns-Manville
Raybestos-Manville
Keesbey and Mattison
Carolina Asbestos
Southern Asbestos
J. Franklin Burke & Company
H. K. Porter
Turner and Newall

**APPENDIX C—Some Asbestos
Industry Members
of the Industrial
Hygiene
Foundation**

GAP-Ruberoid
Eagle-Picher
Owens-Corning
Owens-Illinois
Pittsburgh-Corning
Raybestos-Manhattan
Johns-Manville