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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

ROGER PACKETT, individually and as successor-in-interest to DONNA L. PACKETT, deceased, Plaintiffs, vs. ALLCRAFT JEWELRY SUPPLY CO., et al., Defendants.	Case Nos.: JCCP4674 & BC525735 **AMENDED DECLARATION OF BARRY I. CASTLEMAN** Complaint Filed: October 25, 2013 Trial Date: February 16, 2016

I, Barry I. Castleman, declare as follows:

1. I am over eighteen years old and not a party to this action. The information stated herein is based on my personal knowledge, and if called as a witness, I could and would testify to the following.

Background/Qualifications

2. I hold a Bachelors degree in Chemical Engineering, a Masters degree in Environmental Engineering, and a Doctor of Science degree in Health Policy from Johns Hopkins School of Hygiene and Public Health. I have more than 40 years of professional experience in the area of asbestos and other occupational and environmental health problems. Currently, I am self-employed as an environmental health consultant. Attached hereto as

Exhibit 1 is a true and correct copy of my curriculum vitae. If called upon to testify, I could and would testify to the qualifications contained therein.

3. I have studied development of state of the art with respect to medical and scientific issues relating to asbestos and asbestos-related diseases for more than 25 years. I have reviewed hundreds of scientific, medical, and corporate documents concerning the hazard of asbestos and the development and history of the knowledge of asbestos hazards. In addition, to publicly available medical and scientific literature, I have extensively researched and reviewed extensive discovery from asbestos litigation, including depositions, documents, and interrogatory responses from asbestos industry companies and their officers and other employees. I have undertaken extensive research in public and private libraries in the United States, Canada, and other countries. This has included U.S. government archives, institutional archives, and the archives of scientists. I have reviewed extensive internal documents of companies involved in the asbestos industry, including mining companies, oil companies, friction product manufacturers, insulation manufacturers and contractors, and railroads. I have reviewed trade association periodicals and meeting minutes, corporate documents, and testimony of doctors, plant managers, executives, and other people who were aware of events that transpired in the history of developing asbestos-hazard knowledge over time.

4. In addition to published information and corporate knowledge that came out of mainly legal discovery, I have also interviewed a bunch of old-timers in the field of industrial medicine and hygiene. They included physicians who were active in the field of occupational medicine, such as Harold Stewart, who first published on asbestosis in 1931, and Alfred Angrist, who first published on asbestos and lung cancer in 1942. They are both pathologists. Another, Dr. Wilhelm Hueper, was a leading United States authority in the field of occupational cancer and first director of the environmental cancer section of the National Cancer Institute. Dr. Irving J. Selikoff was the leading epidemiologist and asbestos authority in the US. Dr. Hueper, Dr. Harriet Hardy, Dr. Thomas Mancuso, Dr. Gerrit Schepers, Dr. Richard Doll, Dr.

Morris Greenberg, and others I have interviewed were involved in the area of asbestos and health over the past decades.

5. I have been qualified as an expert on the history of the asbestos industry and the development of knowledge about asbestos and its hazards, also known as "state-of-art" in numerous asbestos lawsuits, including those that have been brought in California courts. I have testified as a "state of art" expert in many asbestos lawsuits. I periodically testify before congressional committees and have served as an expert consultant to many organizations. My expert testimony is on the subject of my doctoral thesis at the Johns Hopkins School of Hygiene and Public Health, "Asbestos: an Historical Case Study of Corporate Response to an Industrial Health Hazard" (1985)

6. I am the author of Asbestos: Medical and Legal Aspects, now in its fifth edition (2005). The first edition was largely identical to my doctoral thesis, which is a major authoritative treatise on "state-of art." My book has been relied upon by the scientific and medical communities and cited as a learned treatise by a number of courts. It is extensively footnoted and annotated and is available in libraries and bookstores throughout the United States. It encompasses a comprehensive review of medical literature of all kinds, as well as other literature available in libraries and published sources such as government publications, safety magazines, engineering journals, trade magazines, insurance publications, encyclopedias, popular magazines, and newspapers. The doctoral thesis also involved research based on unpublished government records. The government records included workers' compensation claims files where claims had been made by individuals alleging that they had asbestos-related diseases of the lungs, claims against various companies that were their employers, some of which companies were also manufacturers of asbestos insulation products these individuals has used in the course of their work. I have also published many articles on the asbestos and industry knowledge of asbestos related health hazards.

7. Based on my studies and research, I have formed the following conclusions. A sampling of relevant literature and reports is referred to after each conclusion.

Body of Knowledge that Exists

A. Asbestosis

8. First let us consider what was available in published sources and how the published knowledge base developed. The originally published reports in the era of the modern asbestos industry came at just before the turn of the century, and the first reports in the English language were included in the annual reports of the chief inspector of factories and workshops in Great Britain. The reported published in 1899, the report for the year 1898, talked about the observation of lung disease in individuals who had worked in asbestos manufacturing plants and about the "evil effects of asbestos dust."

9. The medical literature of asbestos disease mainly developed after the publication of a case report in the British Medical Journal by Dr. Cooke, a pathologist in Britain in 1924. This was called, "Fibrosis of the Lungs Due to the Inhalation of Asbestos Dust." Dr. Cooke reported on the death of a 33-year-old woman who had worked off and on in asbestos plants from the age of 13. According to Cooke, the scarring of her lung tissues was largely attributable to the inhalation of asbestos in the course of her work. There followed a number of other reports in British sources, and this is reflected as well in the United States in editorials of the Journal of the American Medical Association. In one on January 14, 1928, called "Pulmonary Asbestosis," reference is made to Cooke's case and other reports on the disease now called asbestosis. The Journal of the American Medical Association recommended that further attention be paid to this disease, as it may well be occurring in the United States. The Journal of the American Medical Association issued another editorial in 1930 about asbestosis, this time noting the asbestosis had become a compensable occupational disease in Great Britain under the workers' compensation law. The Journal of the American Medical Association was believed to have been read by 80% of American physicians in those years, medical historians have written.

10. In the meantime, there were additional reports of asbestosis published in the British Medical Journal, which is in every medical library I have ever walked into. The reports mainly involved deaths of individuals who were verified as having asbestosis by autopsy.

11. In 1930, a report was published by a physician, Dr. E.R.A. Merewether, and an engineer named C. W. Price. Merewether and Price reported a survey that had been conducted by the Factory Inspectorate in England, including 363 asbestos workers who were actively employed. Of these individuals, 26% were found to have asbestosis. Merewether and Price reported that the people longest exposed had the highest prevalence of the disease: 80% in workers with 20 years or more in the industry. There were no cases of asbestosis in individuals with less than five years, and Merewether referred to that phenomenon that the disease was delayed in appearance and developed gradually over a period of years. It could in seven years be substantially developed in the most severe cases, but more often 11 years or more would elapse before the disease had become largely developed in exposed individuals. This is the time from the onset of exposure. Merewether urged that workers be Aeducated to a sane appreciation of the risk to health posed by asbestos dust. Merewether's 1930 writings on asbestosis are among those most often cited in the literature on asbestosis.

12. There were reports also of the progression of disease caused by asbestos fibers trapped in the lungs, including a report by the radiologist, Sparks, called "Pulmonary Asbestosis", published in the United States in 1931. Sparks talked about the fact that the disease progressed in some individuals after the cessation of exposure. This was demonstrated by the chest x-rays of the individuals who had been removed from exposure but who had continued to go downhill in terms of their lung conditions.

13. There are also publications by Dr. Harold Stewart, whom I mentioned, and his coworkers in 1931, describing two cases of asbestosis in the Archives of Pathology, published in the United States. One of these individuals had been exposed for only nine months to uncontrolled asbestos dust conditions and nine years later had developed a severe degree of asbestosis when seen at autopsy.

14. Other sources were also remarking on the disease, asbestosis. A journal called National Underwriter, a publication of the insurance industry, in a 1932 article called AOccupational Diseases are Not Generally Understood,@ repeatedly called attention to

asbestosis and referred to asbestos industries as dangerous industries from the standpoint of insurers who might be prevailed upon to sell coverage of various kinds for the health of workers in such industries.

15. In this connection, I would mention that back in 1918 there was a United States publication authored by Frederick Hoffman called Mortality from Respiratory Diseases in Dusty Trades. This made reference to the annual reports of the Chief Inspector of Factories in England and the reports of asbestos disease there. This 1918 report, written by an insurance company actuary, noted that it was the practice of American and Canadian life insurance companies to not sell life insurance to asbestos workers on account of the assumed deleterious conditions in the industry.

16. By 1932 there were 60 or more publications in print on asbestosis. These were noted by way of reference in a bibliography published by the International Labor Organization in 1932. These publications continued to emerge from many countries. The first cases of asbestosis in the United States were reported in 1930. Asbestosis was also described in an article in the trade magazine Asbestos in the United States in the March 1930 issue, amid numerous advertisements from asbestos mining and manufacturing companies.

17. In 1932, the first case of asbestosis in an asbestos product user was reported at a conference held by the Industrial Commission of Wisconsin, proceedings of which were published. Here, Dr. Albert Russell of the United States Bureau of Mines described an individual who had worked maintaining the insulations on pipes in a government hospital and had been diagnosed as having asbestosis and had been compensated by the government for disability sustained from this asbestos condition. This is the first published product user case. There were other cases reported in the United States in 1933 by Philip Ellman and also reported by Ellman in 1934 in The British Journal of Radiology. Wood and Gloyne reported in 1934 reported on cases of asbestosis including a boiler riveter who would have been exposed to asbestos because it was used as an insulation material on boilers. Wood & Gloyne's report was called "Pulmonary Asbestosis: A Review of 100 Cases." That was published in The Lancet, the

world's oldest medical journal, in 1934. The Lancet is, like the British Medical Journal, a general medical journal published in England and available very widely in medical libraries in the English-speaking world. This article was widely cited in subsequent literature. Of the hundred cases of asbestosis they reported on, the shortest duration of exposure in any case was six months, in the case of two women who had worked in an asbestos plant.

18. In 1933 and 1934 in the British journal, Tubercle, Dr. Merewether published "A Memorandum on Asbestosis." He emphatically noted that asbestosis shortened people's lives. Merewether showed that, in the British experience, individuals who had died with silicosis, another occupational lung disease, had an average age at death of 54. In the case of asbestosis, the average age at death was only 41. The duration of exposure was similarly very much different. In the cases of silicosis in which death occurred, the average duration of exposure was 40 years. For asbestosis, the average duration of exposure was only 15 years.

19. In 1935, the Pennsylvania state authorities published a report on asbestosis in the industry in the state. This was called Asbestosis, published by Fulton and his coworkers at the Pennsylvania Department of Labor and Industry. One-fourth of the workers they examined had asbestosis. They included an impressive bibliography of 125 references to asbestos-related disease previously published in journals in the United States, England, France, Italy, Germany and other countries. The Pennsylvania study included an effort to relate dose and response. The authors had sampled the exposure of the workers to dust in four asbestos plants and the found that, overall, average concentrations of dust could be broken down into three groups that varied from 4.64 million particles per cubic foot up to 44 million. Asbestosis was reported in all three groups, with the prevalence and severity of disease greater in the more heavily exposed groups. But no level of exposure was found to be free of the disease. This was one of the first surveys of this kind in the United States similar to that which had been done by Merewether and Price and published in Great Britain and the United States separately in 1930. In all of these studies at least 25% of the workers were diagnosed as having asbestosis.

20. The study by Lanza and his coworkers at Metropolitan Life, published in 1935 and initiated at the request of representatives of the asbestos industry, found that 53% of the workers examined with three or more years of exposure had asbestosis.

21. In 1938, a similar study was done by the Public Health Service, including an effort to account for workers who had been discharged before the Public Health Service was admitted to the North Carolina asbestos textile plants to do the study. An estimated asbestosis rate in the workplace was given as 27 1/2%. The report recommended that dust exposure in asbestos plants be limited to 5 million particles per cubic foot. This guideline was recommended as a tentative occupational exposure limit, though it was noted that the Pennsylvania study had found cases of asbestosis at that level of exposure.

22. Literature on asbestosis was substantially developed by 1935. The disease was shown to have a distinctive pathological appearance with asbestos bodies, types of scarring that would form around the asbestos fibers trapped in the lung tissues. This was commented upon a great deal by pathologists in the 1920s. The disease was shown to have an identifiable radiological appearance on chest X-ray distinctly different from such diseases as TB and silicosis. The disease was also characterized by shortness of breath, which would become more pronounced as the individual became more seriously affected by the disease.

23. The risk of the disease involved not only mining and manufacturing plant workers but by 1935 it had come to include users of some asbestos products, mainly insulation products such as these used by insulation workers. Also, there were two reports on clerical workers in asbestos manufacturing plants with 30 to 40 years of experience, and these individuals were among the victims of asbestosis described in the medical literature published in Britain and the United States in 1934 and 1935.

24. The disease was consistently found to affect a large percentage of people who were employed in the industries where asbestos products were manufactured. This was reported in four surveys in the United States and Britain by the mid to late 1930s.

B. Lung Cancer

25. In 1935, another aspect of the hazard of asbestosis was identified with the publication of medical case reports of asbestosis in combination with lung cancer. The first such reports were published by Lynch and Smith in the United States in 1935 in the American Journal of Cancer and by Dr. Gloyne in Great Britain in Tubercle in two separate reports in 1935 and 1936. In these reports, the question was raised that chronic irritation of the lung tissues from asbestos might be producing cancer as well as lung scarring already well identified as an asbestos-related phenomenon.

26. There were additional reports of lung cancer in combination with asbestosis reported by Egbert and Geiger at Yale in 1936, and Nordmann in 1938. An abstract of this last publication appeared in the United States in the Journal of Industrial Hygiene & Toxicology, also in 1938. The article was entitled "The Occupational Cancer of Asbestos Workers." The German author, Nordmann concluded that asbestosis was definitely related to lung cancer, that lung cancer was in fact an occupational disease of asbestos workers. Various features of the six cases Nordmann knew of were tabulated to justify that. Nordmann noted, among other things, that the prevalence of lung cancer among autopsied victims of asbestosis was one in six both in Germany and Great Britain. This was very much higher that the prevalence of lung cancer in the general population, which tended to be more like 1% or several percent at most. The high rate of lung cancer among people dying with asbestosis would be a most consistent finding around the world.

27. There were additional publications of cases of lung cancer and asbestosis in 1939 in the United States and in 1941 and 1942 in Germany. Holleb and Angrist reported in the American Journal of Pathology on two individuals who had been pipe coverers (users of asbestos products) diagnosed at autopsy as having both asbestosis and lung cancer. These were the first cases of cancer and asbestosis in users of asbestos products published in the medical literature. Holleb and Angrist tabulated a total of 10 cases of lung cancer in combination with asbestosis that had been published in the United States, Britain, and Germany. This gave

readers of their articles the benefit of a review of what had come up until that time in worldwide literature on lung cancer and asbestosis. This was a feature of many medical articles on asbestos disease; that is, they make extensive reference to preceding work. So, that if one finds a single article, one has the windows open on a great deal of knowledge that preceded it.

28. In 1942, Dr. Wilhelm Hueper published a book on occupational cancer called Occupational Tumors and Allied Diseases, nearly 900 pages long. It included a lengthy section on asbestosis and cancer from asbestos, in which a large number of references from the United States, Great Britain and Germany were cited in support of the view that asbestos most likely did cause occupational cancer. Dr. Hueper made unequivocal statements the next year in the article called, "Cancer in its Relation to Occupational and Environment" published in the Bulletin of the American Society for the Control of Cancer. There, Hueper said that asbestosis cancer of the lung as he called it then, was the newest proved occupational cancer of the lung, to be listed with the ones that were already known up at that time. In the Journal of the American Medical Association (JAMA), there appeared an editorial called "Environmental Cancer" in 1944, in which asbestos was listed among agents known and suspected of causing occupational cancer.

29. By 1950, there were more than 80 articles and abstracts referring to the lung cancer hazard of asbestos, including writings in newspapers and popular magazines (see D below).

C. Mesothelioma

30. The disease mesothelioma of the pleura was attributed to exposure to asbestos or asbestosis starting in 1943 with the report of Dr. H.W. Wedler in Heidelberg. There were additional reports in the German literature as well as British literature. The case reports that appeared prior to 1960 are annotated and cited by way of reference in Chapter 2, table 5 of my book. Dr. Wedler was the first to state that he believed the pleural cancers were occupational cancers, and his work was prominently cited in the United States in the 1940s. Other German pathologists starting with Leicher in 1954 would identify peritoneal mesothelioma as an asbestos disease.

31. A major report of pleural mesothelioma came from South Africa by Wagner and his coworkers, published in the British Journal of Industrial Medicine in 1960. Within a very short time it was widely accepted: that asbestos did cause mesothelioma; that levels of asbestos exposure present from environmental exposure as well as occupational exposure were sufficient to cause mesothelioma; and that mesothelioma was affecting a considerable number of workers in shipyards. Reports, such as those in the British Medical Journal in 1962, described the different types of workers who were being affected by mesothelioma in shipyards.

32. In 1964, Dr. Irving Selikoff and his coworkers published a mortality study in JAMA showing that there was a substantial excess of occupational cancer and deaths from asbestosis among people involved in the insulating trades. A group of workers who installed insulation and removed it regularly was found to have 45 deaths from pulmonary cancer in a group where only six or seven such deaths would have been expected. There were four deaths from peritoneal and pleural mesothelioma in this cohort, and this was described as a very rare disease and a substantial excess over what would have been expected. There were also 12 deaths from asbestosis in this work force.

33. Subsequently, later in 1964, at an international conference held in New York and published in 1965, Selikoff and coworkers reported that around 80% of the people who were in the insulating trade had developed asbestosis by the time they had been in trade for 20 or 30 years or more. At the conference in New York, British researchers Newhouse and Thompson presented a report on 76 deceased mesothelioma patients and an equal number of "controls", based on interviews with relatives. Their report showed strong evidence that mesothelioma patients were far more likely to have had occupational, household, or neighborhood exposure to asbestos than the comparison patients who died from other causes at the same hospital.

D. Other Sources of Knowledge

34. The subject of asbestosis was receiving attention in other types of circles. The Encyclopedia Britannica first noted the disease asbestosis in the regular publication of the Encyclopedia in 1940.

35. By this time, The National Safety Council had been established for 28 years as management's response to the industrial safety issue, with its associated problems of disability compensation and labor unrest. Starting in the 1930s the National Safety Council has published numerous articles, pamphlets and other materials concerning the hazards of asbestosis in the 1930s. Many of the annual congresses held forums and discussions about dust disease. The transactions of these meetings were automatically mailed to the industrial members.

36. During the 1930s there were an increasing number of lawsuits for dust diseases contracted in the workplace. To confront this dust disease threat, a meeting of about 250 people representing over 50 industries with industrial disease problems was held on January 15, 1935. The meeting covered the hazards of asbestos and silica dust, and one focus of the meeting was on "the menace of ambulance chasing lawyers in combination with unscrupulous doctors." During this and subsequent meetings of the association, which was initially called the Air Hygiene Foundation, lawyers outlined a plan to limit dust disease lawsuits and compensation. This included eliminating the right to trial and limiting workers' ability to claim workers compensation.

37. The refractories industry played a major role in this meeting and subsequent establishment of the Air Hygiene Foundation (renamed the Industrial Hygiene Foundation in 1941). As chairman of the Temporary Organizing Committee, Mr. Hitchens, of the American Refractories Institute, oversaw much of the planning of the structure and outline of purposes of the organization. Through Industrial Hygiene Foundation publications, meetings and conferences, its members have been long aware about dust diseases and the responsibilities of manufacturers to warn concerning hazards associated with their products.

38. Among the means by which the Industrial Hygiene Foundation disseminated information was the Industrial Hygiene Digest, which published abstracts of articles from hundreds of journals that were being published. The Industrial Hygiene Digest included abstracts of industrial medicine articles that had appeared in the journals included reference to cancers of the lung and pleura reported originally by Dr. Wedler in 1943, in January of 1945.

Wedler's article had been published in the German Medical Weekly. Here, we see the first references to cancers of the pleura as well as cancers of the lungs all being counted as pulmonary, asbestos-related cancers in literature.

39. In 1944, a trade magazine called Heating and Ventilating carried an article called ADust is an Industrial Health Hazard@ by Hutchinson, in which was noted that fatal cases of asbestosis occurred in shorter periods of time than fatal cases of silicosis, and also that the hazard of asbestosis extended to industries including the insulating industry. Hutchinson said at that time there was no known safe level of exposure.

40. The Journal of the American Medical Association carried an editorial called "Asbestosis and Cancer of the Lung" in August of 1949. This reported British statistics on 235 deaths in which asbestosis had played a part. Of these 235, 31 (13%) of the individuals were also found to have cancers of the lung or pleura. This was considered quite excessive compared to the normal rate of lung cancer in the general population of 1% of all autopsies. This editorial in the Journal of the American Medical Association was promptly summarized in the abstract form in the Industrial Hygiene Digest in 1949.

41. Reference to cancer from asbestos appeared in the New York Times on Jan. 7, 1948, Business Week Nov. 13, 1948, Washington Post Nov. 21, 1948, and Scientific American in January 1949 in an article called ACancer and Environment@. It appeared in Newsweek magazine May 15, 1950. The reference to asbestos in Newsweek was in relation to the rising rate of lung cancer in urban dwellers compared with people in the rural areas. This was partly attributed to the presence of carcinogens like asbestos in urban air, according to Dr. Hueper, Chief of the Environmental Cancer Section, US National Cancer Institute. The Los Angeles Times noted the carcinogenicity of asbestos April 6, 1951, the Chicago Tribune on June 10, 1951. The Encyclopedia Britannica made reference to asbestos as one of the causes of occupational cancer under the title "cancer" in 1952, and asbestos was described as a lung cancer hazard to steamfitters working with asbestos in the Wall Street Journal on April 7, 1959.

42. The *Engineering Index* was first available in 1883. This index contains made trade journals and leans toward engineering applications rather than general interest or basic chemical research. Another source of technical and medical information is the *Bibliographic Index,* which was first published in 1945 by the H.W. Wilson Company and covers the years beginning with 1937. This index lists bibliographies and thus could be used as a source of accumulated references. The bibliography sources are listed under subject headings arranged alphabetically. Examples of headings in these indexes, in a search on the health effects of asbestos, include: Asbestos, Dust, Workmen's Compensation, Diseases, Industrial Hygiene, and Pneumoconiosis. The technology indexes were useful in locating articles on asbestos in U.S. trade publications.

43. Additionally, an enormous collection of information was available from U.S. government sources. NIOSH has issued *Current Intelligent Bulletins* since 1975; these have included hazard alert notices on asbestos and other occupational health hazards. Prior to the establishment of NIOSH under the Occupational Safety and Health Act of 1970, a predecessor agency existed, the Bureau of Occupational Safety and Health, which was also within the U.S. Public Health Service (PHS) in the Department of Health, Education, and Welfare. Reports on occupational health hazards were published by the PHS in *Public Health Bulletins* (1881-1949) and continued as *Public Health Monographs* (1950-1971). Notable among these on the subject of asbestos were Bulletin No. 241 by Dreesen *et al.* (1938) and Monograph No. 36 by Hueper (on lung carcinogens, 1955). Other subjects covered by these reports include: Bulletin No. 208, Health of Workers in Dusty Trades (1933); Bulletin No. 238, Cement, clay, and pottery industries (1937); Bulletin No. 260, Illness among workers and housewives (1941); Bulletin No. 267, Lead arsenate exposure of orchardists and consumers (1941); etc. Some of these files are still retained and are known as the historic toxicology files. They were located in the Cincinatti offices of NIOSH and the American Conference of Governmental Industrial Hygienists (ACGIH).

44. The United States Environmental Protection Agency has been in existence since 1970, and it primarily regulates air pollution, water pollution, and land disposal of industrial

wastes. The EPA has supported much research into the potential hazards of asbestos in drinking water. The EPA also calls upon the National Academy of Sciences for reports on the state of knowledge about health risks to the general public from environmental asbestos exposure (*Asbestos/The Need for and Feasibility of Controls,* 1971; *Drinking water and Health,* Volume 1, 1977, pp. 144-168; and Volume 5, 1983, pp. 123-147; and *Asbestiform Fibers/Nonoccupational Health Risks,* 1984.) In 1973, the EPA issued the National Emission Standards for Hazardous Air Pollutants (Fed. Register, Apr. 6, 1973, amended Oct. 14, 1975). These regulations curtail asbestos use in sprayed and molded insulation, ban visible emissions from asbestos mills and manufacturing plants and waste dumps, regulate demolition of buildings containing asbestos, and ban use of asbestos mine tailings for surfacing roads.

E. TLVs

45. Various guidelines have been recommended to limit asbestosis as a hazard in places where asbestos is used. These guidelines included so-called Threshold Limit Values (TLVs) or maximum allowable concentrations. The Public Health Service in its survey in 1938 recommended 5 million particles per cubic foot for dust in which asbestos was present in the workplace, as a ceiling concentration. This was adopted by non-governmental group, a volunteer professional organization. It was recommended as a guideline in some states prior to the enactment of the Occupational Safety and Health Act in 1970.

46. Authors in other countries took issue with the idea that one could recommend an occupational exposure limit of dust in the air and thereby completely control health hazards. Under the heading "The Prevention of the Dust Disease" Dr. McLaughlin, of the Factory Inspectorate in Great Britain, writing in The Lancet in 1953, said that people in some countries who recommend these maximum allowable concentrations seem to think that man is a "standardized machine which he clearly is not." McLaughlin noted a number of factors that would distinguish people in terms of their risks in ways that we could recognize as well as the fact that there are also ways that we can't recognize, where one individual exposed to the same things as another working right next to him gets sick and the other one does not.

47. Others such as that of Dr. May Mayers of New York, in 1952, and Warren Cook, also writing in the United States in 1956, observed that maximum allowable concentrations that were recommended to prevent other effects than cancer could not be considered to be safe if the substances also caused cancer. Asbestos was noted by both of those authors as one such substance that caused cancer.

48. The Documentation of the Threshold Limit Values published in 1962 and in its second edition in 1966, clearly indicated that the asbestos TLV was based on the 1938 Public Health Service study and was only suggested to protect against the disease asbestosis. The word cancer was not even mentioned in the 1966 Documentation, whose most recent cited reference on asbestos was dated 1955.

49. With asbestos, as with many other substances, it was infrequent that the TLV or the basis for them were reviewed in the light of recent literature once the substance was on the list. The limited efforts of unpaid volunteers working on the TLV committees appear to have been mainly devoted to adding new substances to the list during the 1950s and thereafter.

F. End-Product Users

50. There were many articles coming out in the 1940s and 1950s that noted the risk of asbestosis and in some cases cancer in individuals who were exposed to asbestos in the course of using asbestos-containing products; there were more than 50 separate case reports, some involving one or two individuals, some involving as many as ten or more. These case reports were published mostly in the English language in medical journals between 1932 and 1963. These reports are tabulated in Chapter 5, Tables 2 and 3 in my book, Asbestos: Medical and Legal Aspects.

51. Companies marketing products that could give rise to respirable asbestos dust either were or should have been aware that most dusts can either cause or aggravate problems in the lungs of end-product users. Some specific company knowledge includes the following. Westinghouse's medical director wrote a book in 1947 in which he state that asbestos produced serious effects, including the progressive disease of asbestosis, yet the company did virtually

nothing to warn users of its products until required to do so by federal regulations. Mine Safety Appliances Company published several pamphlets outlining the problems associated with dusts and recommending the usage of respirators, yet did not put warnings on its asbestos clothing. In 1964 Eagle-Picher told GREFCO and NARCO that it was putting warning labels on the asbestos products it manufactured for them, but neither company put warnings on its own manufactured asbestos products. These are but a few examples of widespread failure to warn workers concerning the hazards associated with asbestos and other dusts.

G. Household Contact Asbestos Exposure and Disease

52. In 1897, the first physician in modern times to write about lung disease in asbestos workers also commented on ill health among the workers= family members. The families of asbestos-exposed workers in the 20th century were exposed to asbestos brought home on the clothes, shoes, hair, tool boxes, lunch boxes, and automobiles of the workers.

53. As far back as 1913, the text, Safety, by W.H. Tolman and L. B. Kendall (p. 249) emphasized the importance of having workers remove work clothes before leaving a factory where toxic materials are handled, so the poisons would not be carried "into the homes of workers."

54. Some chemical companies provided work clothes and laundered them in plants using toxic and carcinogenic chemicals as early as the 1920s. "Two-compartment lockers, or preferably two individual lockers, should be provided in dressing rooms for employees whose clothes are exposed to poisonous material," said the U.S. Public Health Service in the Manual of Industrial Hygiene (1943). An article that year in the trade magazine Chemical Engineering advised separate lockers for street clothes and work clothes, separated by showers, in plants handling aluminum powder. Hueper wrote in JAMA in 1946 that workers handling carcinogenic materials such as asbestos be provided with showers and special rooms for storing street clothes.

55. Corporate physicians advised a number of safeguards that would have protected families of workers at a Chrysler plant being built in 1946. The plant was to use asbestos and

chemicals that could cause toxic effects and dermatitis. Protective clothing, laundry, showers, and separate lockers for street and work clothing were recommended by the doctors. In a 1948 document, Roy S. Bonsib, an industrial hygienist for Standard Oil of New Jersey stated: "Appropriate work clothes, properly fitted and maintained, play a prominent part in an industrial worker's health and efficiency. This is especially true when persons are working with more or less toxic or carcinogenic materials or where cleanliness is a factor in the maintenance of product quality. Consequently, many of the more progressive industrial organizations, such as E.I. DuPont de Nemours & Company, the American Cyanamid Company and the Borden Company, have for years supplied their employees with work clothing and have instituted a laundry service."

56. A 1951 article, "Industrial Hygiene in the Paint Factory", in the trade magazine Paint and Varnish, recommended the provision of work uniforms not to be worn home and separate lockers for work clothes and street clothes.

57. The United States Department of Labor issued safety and health guidelines in conjunction with contract work for the federal government. A 1952 document entitled Safety and Health Standards for Contractors performing Federal Supply Contracts under the Walsh-Healey Public Contracts Act required that contractors provide facilities to prevent the communication of harmful substances from work clothes by contact to street clothes. Subsequently, Walsh Healey regulations were published in the Federal Register in 1960. These regulations provided that, "Where employees' work clothes are exposed to contamination by poisonous, infectious, or irritating material, facilities shall be provided in change rooms so that street and work clothes will not be stored in contact with each other."

58. Retired Monsanto chemist and industrial hygienist Jack Garrett has testified that in the 1950s, that chemical company's employee protection against asbestos from insulation products included showers and daily changes of clothes: "We went down to shoes and socks, underwear and all. We didn't want it at home." (deposition in *Schmidt*, District Court of Jefferson Co. TX, Dec. 16, 1993). In 1967, Shell Chemicals in Britain adopted a code of

practice for handling asbestos products, including vacuum hoses for removing dust from clothing and shoes, separate lockers for work clothes and street clothes, and hot and cold showers. Work overalls were vacuum cleaned, bagged with warning labeling, and laundered by the company.

59. The Occupational Safety and Health Administration (OSHA) was created by Congress in the last days of 1970. In June of 1972, OSHA asbestos regulations were published in the Federal Register, containing rules for laundering of asbestos-contaminated clothing.

60. The hazard of asbestos exposure to families of the workers, in particular cancer, was scientifically knowable long before it was studied directly, as illustrated by the advice of the Chrysler doctors.

61. Once it was substantially established in the 1940s that asbestos exposure could cause lung cancer, the consequent public health impact of asbestos use was dramatically increased. Cancer is initiated by the malignant transformation of a single cell which replicates itself until it threatens the life of the affected person. This meant that asbestos exposures insufficient to cause death from asbestosis could clearly cause death by cancer. This had been recognized by German workers' compensation authorities in establishing workers' compensation recognition to lung cancer as occupational in the presence of "slight" asbestosis as early as 1939 (Baader, "Asbestosis" German Med. Weekly 65: 407-408, 1939). The danger of less-than-occupational asbestos exposure as a cause of lung cancer was noted by Dr. Wilhelm Hueper, Chief of the Environmental Cancer Section of the US National Cancer Institute, in warning in 1950 that urban air pollution including carcinogens such as asbestos was a factor in the rising incidence of lung cancer in the general population ("Environmental Cancer Hazards Caused by Industrial Air Pollution" Arch. Ind. Hyg. Occ. Med. 2: 325-328, 1950; "Small Studies" Newsweek, p. 53, May 15, 1950).

62. It followed that whatever exposure limits that were considered applicable to limit non-cancer effects of a substance were in no way to be considered protective if the substance also caused cancer. Experts considering this in the mid-1950s recommended that, for a nickel

compound believed to be carcinogenic, the occupational exposure limit should be lowered by a "safety factor" from 1/500th to 1/100th the exposure level that would have applied for "other types of systemic injury" the substance caused (H. Stokinger, "Prepared Discussion" Am. Ind. Hyg. Assoc. Quarterly 17: 284-286, 1956).

63. And it also follows that if a substance is a carcinogen, the population at risk from its use in society has to be broadened to consider environmental exposures such as air pollution, consumer product use, and contamination of workers' homes by carcinogenic dust brought home on the clothes, hair, shoes, lunchboxes, and cars of the unsuspecting workers. This is particularly true in the case of asbestos, a chemically stable solid.

64. Industry was well aware that asbestos was mineral with high resistance to destructive forces such as heat and that asbestos did not decompose even upon prolonged storage. (One scientist borrowed from the language applied to radiation in stating that asbestos in the environment had a "half-life of infinity"). It was also obvious that, absent any safeguards to prevent it, workers typically exposed to dust from asbestos products would take the contaminant home on them, where it would accumulate in carpets, clothing, window curtains and furniture. It was also known that the very young (the developing organism) would be most susceptible to the action of carcinogenic agents, a fact demonstrated in laboratory testing of carcinogenic agents at least as far back as 1938 (cited in Hueper, Occupational Tumors and Allied Diseases, 1942, p. 758).

65. Companies that were or should have been aware that asbestos was carcinogenic should have anticipated that allowing workers to return home, unwarned, with cancer-causing dust all over their clothes etc. would have also endangered the lives of their family members. In the 1950s, the type of cancer most associated with asbestos was lung cancer. The additional widespread recognition that asbestos also caused mesothelioma, which was in fact a signal tumor for asbestos exposure, made it possible for epidemiologists and others to confirm that the cancer hazard of asbestos had indeed spread into the homes of the workers and the neighborhoods of asbestos air pollution point sources.

66. Studies on the occurrence of asbestos disease that included family members of asbestos-exposed workers were not published until the 1960s, and work such as that of Newhouse and Thompson (1965) and Lieben and Pistawka (1967) established that mesothelioma was causing deaths among persons with only household (and not occupational) exposure to asbestos. The contamination of workers' homes and the exposure of their spouses and children was very foreseeable, and with the knowledge that asbestos was carcinogenic came the possibility that household-contact exposures could have disastrous consequences for members of workers' families if not prevented.

H. W.R. Grace and Vermiculite from Libby, Montana

67. In 1954, W.R. Grace & Company bought Dewey & Almy Chemical Co., which had made asbestos brake linings before it closed its "Multibestos" plant in Massachusetts in 1936. Bradley Dewey, the company's president, was interested in the subject of asbestosis and corresponded with a state official and others about it in the 1930s. His company had numerous workers' compensation claims brought against it by employees of the "Multibestos" plant, and some of the plant worker asbestosis cases were reviewed at the Saranac Laboratory in the mid-1930s. (Vorwald Patient Files, Nos. P-31-37, P-35-85, P-34-101, P-35-129, and P-36-124, Armed Forces Institute of Pathology, Washington, D.C.)

68. In 1963, W.R. Grace purchased the Zonolite Company, which operated the world's largest vermiculite mines, which were located in Libby, Montana. Zonolite made "Mono-Kote" fireproofing cement and asbestos-containing acoustical plaster. The Montana operation began mining in 1919 and in fact was originally called the Vermiculite and Asbestos Corporation; both minerals were present in the deposit. Large-scale production began in the 1930s, as vermiculite-expanding factories were built in Spokane, Chicago, and Detroit. Initially the vermiculite was used only for insulation, but in the 1950s, it began to be used in concrete mixes as well.

69. In 1956, Montana State Board of Health industrial hygienist Benjamin Wake visited the Libby mine and mill and took atmospheric dust samples. Total dust counts averaged 40 MPPCF. Company records stated that the dust was 8-21% asbestos. Recommendations were

made to management to improve dust control in the mill. Conditions were still poor, and dust counts high, when Wale returned to the site in 1958, 1962, and 1963. A June 1961 letter from E. Lovick, assistant to the Libby plant manager, to C.A. Pratt, vice president of Western Mineral Products Co., acknowledged that asbestosis was a matter of concern based on "many studies." Montana's inclusion of occupational disease coverage in the workers' comp law in 1959 was accompanied by the company's decision to institute an employee x-ray program. Doctors' reports, which are said to have been inconclusive on the question of whether there was a lung disease hazard in the plant, stated that asbestos in concentrates shipped to vermiculite expanding plants should give rise to "very small" amounts of it in the dust in expansion plants. In an September 1961 letter from Pratt to J.A. Kelley at Zonolite, Pratt mentions that the Minneapolis Health Department had expressed concern about dust in vermiculite plants.

70. In 1965, W.R. Grace was discussing the presence of asbestos in Libby vermiculite, and reports of "men having pulmonary trouble" at Libby, with Grant Industries. (See, e.g., Feb. 9, 1965, letter from O.F. Stewart (WRG headquarters) to N. Bushell (Grant Industries).) A March 1969 internal W.R. Grace memorandum advises use of warning labeling on products containing vermiculite, to aid in defense of product liability cases. (See Mar. 11, 1969, Memorandum from P. Kostic to R.W. Sterrett.) Attached to the memorandum was an article referencing the introduction of an "Asbestos Safety Bill" in Congress and reports of mesothelioma in household contacts of asbestos workers and neighbors of asbestos plants. By 1977 there were internal discussions at W.R. Grace about the possibility of tremolite asbestos in expanded vermiculite and that tremolite might be carcinogenic in the digestive tract of humans or animals. (See Feb. 18, 1977, Memorandum from H.C. Duecker to J, Yang, in reference to a product called "Verxite," which was an expanded-vermiculite product sold as a food additive for livestock and poultry feeds and dogfood; see also July 14, 1977, Memorandum from J.C. Yang to H.C. Duecker noting a letter from Dr. William Smith, stating that a 50-50 tremolite-vermiculite combination injected into hamsters caused mesotheliomas.)

71. W.R. Grace did not close its vermiculite mining operation in Libby, Montana, until 1990. Grace was well aware that the tremolite asbestos that was part of the vermiculite ore could give rise to hazardous exposures and warrant warning labeling.

Edward Orton Jr., Ceramic Foundation's Actual or Constructive Knowledge

72. I have reviewed the deposition testimony of plaintiff Roger Packett, in which he identifies a dark-colored vermiculite packing material that came in the boxes of Orton Pyrometric Cones that he and his wife, decedent Donna Packett, used in 1972, 1973, 1974, and 1981, as well as at other times. I have also reviewed the declaration of Terry Spear and attached exhibits, including testimony and attestations by Edward Orton Jr. Ceramic Foundation ("Orton") corporate designee and former General Manager Gary Childress. According to these sources, Orton was established in 1932, but it began manufacturing pyrometric cones decades earlier. Orton has manufactured and sold millions of its ceramic arts products in 70 countries; its peak sales were in the 1970s and 1980s. Prior to mid-1963, Orton packaged its pyrometric cones in saw dust. Beginning in 1963, Orton began packaging its pyrometric cones in vermiculite that it obtained from W.R. Grace. Orton did not stop using vermiculite to package its cones in, until 1983. Orton is an Ohio-based company and has its only manufacturing facilities in Ohio.

73. The Ohio Safety Congress was an annual meeting held under the auspices of the Industrial Commission of Ohio since the 1930s. After the meeting, the Proceedings of the Ohio Safety Congress would be published by the Industrial Commission of Ohio and made publicly available. Attached as **Exhibit 2** are examples of such publications from 1938 and 1940. In each of those meetings, the danger of inhalation of hazardous dust in the workplace was discussed, including resultant lung diseases such as pneumoconiosis, silicosis, and asbestosis.

74. Additionally, the Ohio Department of Health Division of Industrial Hygiene promulgated regulations in 1946 "for the prevention and control of diseases resulting from exposure to toxic fumes, vapors, mists, gases and dusts in order to preserve and protect the public health." These regulations applied "to every place of employment" within the State "and

particularly to those places of employment where a work or process is carried on by which dusts, fumes, mists, vapors, gases or environmental conditions of a harmful nature are produced or generated, or exist independently of the work or process, which may be inhaled or absorbed or in any other manner enter the body in quantities or concentrations that constitute harmful exposure," defined as exposure that is injurious to the body. (See **Exhibit 3** hereto.) As an Ohio employer during the years when these regulations were in effect, Orton was responsible for protecting its workers from injurious dust in the workplace. Orton could not have successfully met this obligation if it did not undertake the research and investigation necessary to determine whether toxic fumes, vapors, mists, gases or dusts existed at its manufacturing facilities.

75. In light of the information available to large-scale manufacturers such as Orton, throughout the 1950s, 1960s, and 1970s, about the potential for asbestos to cause diseases, including cancers, it is my opinion that Orton, a major manufacturer and Ohio employer subject to regulations governing exposures to toxic dusts in the workplace, could have known, by the time it started purchasing vermiculite from W.R. Grace for use as packing material in its pyrometric cone packaging, that the vermiculite coming from Libby was contaminated with asbestos and had the potential to cause grave harm to persons exposed to dust that might be generated by the handling of this material. By 1963, it was well established in the literature and well-known by the asbestos industry and its major customers in various industries, that asbestos dust was toxic and carcinogenic. In addition, by the early 1950s it was recognized in the medical and scientific literature that individuals could contract asbestos-related diseases as a result of relatively low exposures to asbestos dust. In September 1981, Orton was told by WR Grace that WRG vermiculite contained tremolite asbestos. In December, 1978, Orton received an asbestos analysis report on vermiculite from another source, demonstrating that Orton was aware of the possible contamination of vermiculite with asbestos and the means to independently verify whether or not such materials contained asbestos.

I declare under the penalty of perjury under the laws of the State of Maryland and of the United States that the foregoing is true and correct. Executed this 22 day of January, 2016, at ~~Garrett Park, Maryland~~ St Louis MO

BARRY I. CASTLEMAN, ScD

EXHIBIT 2

PROCEEDINGS

of

All Ohio Safety Congress

Held under the auspices of
THE INDUSTRIAL COMMISSION OF OHIO
and the direct management of
THE DIVISION OF SAFETY AND HYGIENE

Published under the authority
of
The Industrial Commission of Ohio

Deshler-Wallick Hotel
Columbus, Ohio
May 10, 11, 12
1926

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Columbus, Ohio

Cover title page

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*Deceased

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Ninth All Ohio Safety Congress

Deshler-Wallick Hotel

Columbus, Ohio

May 10, 11, 12, 1932

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Thos. W. Ruff & Co., Columbus, Ohio.

INHALATION OF DUST AND CONTROL OF DUST HAZARDS

Mr. William C. James,
Safety Engineer, Portland Cement Association, Chicago, Ill.

Mr. Chairman, gentlemen:

Confusion still seems to be the dominant keynote outside the research laboratory in this question of occupational "dusty-lung" disease. Terms such as pneumoconiosis, silicosis, siderosis, anthracosis, and even silicatosis are bandied about indiscriminately and often without meaning. Usually, the mere mention of dust in a conversation inspires visions of high mortality, high disability rates and a long trail of serious hazards.

The term "pneumoconiosis" is often interpreted to mean a disease of the lungs resulting from dust inhalation. Actually, it means simply "dusty lung." In the early history of lung disease it was thought that all dusts caused the same disease reaction and this term was applied to that disease. Modern research has demonstrated that most dusts are harmless. The term "pneumoconiosis" therefore should assume its primary meaning and when applied to an individual can rightly be interpreted only as indicating that the person has inhaled dust. Dr. Leroy U. Gardner, referring to non-specific pneumoconiosis says, "Such changes have no clinical significance and produce neither symptoms nor interference with working capacity. They are of no more importance than the callouses on the palms of the hands." Any person in any environment may develop this condition. Even office workers in large industrial communities may show X-ray evidence of having inhaled dust, but such evidence is meaningless so far as health is concerned.

Of the various so-called industrial dusts, coal and iron ore are perhaps most spectacular in their appearance in the lung. Early investigators, and by this I mean investigators in the first 16 or 17 centuries of the Christian era, were so impressed by the lung pigmentation of workers in iron ore and coal that they credited these substances with a prominent part in the development of lung disease. Modern research has demonstrated that this coloring of the lung tissue is, in itself, of no significance.

Only two substances are now known to cause a definite lung disease, namely, asbestos and uncombined silica. Research men who have dealt specifically with dust diseases have long recognized that dusts with a low silica content are free from health hazards. Compensation insurance actuaries are also accepting the fact, as is demonstrated by the rates they have set for the cement industry. Cement quarries contain mostly limestone, in which quartz constitutes less than 10% of the total rock formation. In California, cement plants and quarries have been entirely excluded from the occupational disease [illegible] schedule. Indiana and Illinois both have [illegible] occupational disease laws. In these states, a rate of only five cents has been set for both cement mills and quarry operations. That this rate is based on a known absence of hazard is evident when it is considered that quarries other than cement [illegible] have been assigned a rate of $1.15 in Indiana and $1.30, which is 26 times the cement rate, in Illinois.

In Michigan, which has a schedule type law, the cement industry's rate is [illegible] cents. Other quarries have been assessed at the rate of forty cents in this state. New York State, which has a liberal combined schedule and all-inclusive law, has set a rate of [illegible] cents for the cement quarries. Quarries other than cement have been given a rate of $1.07.

Inhalation of free silica dioxide (usually quartz) in excessive quantities over a long period of time causes the disease, silicosis. You will note particularly that three factors are necessary to the causation of this disease:

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1. Free silicon dioxide (usually quartz), in particles less than 10 microns in greatest diameter.
2. Excessive concentration.
3. Long period of exposure.

Particular emphasis should be given to these limiting factors: First, "free silicon dioxide, less than 10 microns in greatest diameter." This means exactly what it says—not silicon carbonate, not iron oxides, not even silicon carbide (which is carborundum), but free silicon dioxide. It seems probable that no little confusion has arisen in the minds of plant superintendents and engineers of the concerned premises by industrial chemists of reporting an analysis in terms of the oxides of the components. For example, a typical reported analysis of Portland cement will show a total silica content of about twenty per cent. Actually, all of this silica is combined in the form of entirely harmless calcium silicates and it has been conclusively demonstrated that it is utterly impossible to acquire silicosis from exposure to cement dust. It should be mentioned that quartz is not the only form of free silica, though it is apparently the most dangerous and certainly the most common form. The various amorphous forms of the compound, such as flint, tripoli and chert, may also produce the silicotic reaction in the lung, but they are known to be less severe in their effect.

The limiting size of ten microns is also of importance. Particles larger than this do not reach the lungs. Furthermore, the percentage of quartz in a given material will vary greatly with the particle size. A petrographic examination of shale at Saranac Laboratory under Dr. L. U. Gardner's direction, recently revealed 30 per cent quartz. In a special fraction containing only large particles, 40 to 50 per cent quartz was found.

Dr. Gardner writes, "this is obviously due to the fact that quartz is so hard it does not fracture into fine particles." It must therefore be emphasized that conclusions as to the hazard inherent in a dusty operation cannot be based with confidence on an analysis of the parent rock. Only an analysis of the dust in the breathing zone of the operator will give an accurate picture of conditions.

The second limiting factor is concentration. The exact amount of silicon quartz that constitutes a dangerous concentration in any particular industry is not easily determined, nor is there as yet any substantial agreement as to what limits of quartz content should be observed.

Dr. A. J. Lanza, Assistant Medical Director of the Metropolitan Life Insurance Company, an outstanding authority on the silicosis problem, gave an excellent summary of what needs to be known about dust concentration in his paper presented before The American Institute of Mining and Metallurgical Engineers in February, 1937. He said:

"In the present state of our knowledge it is not possible to establish permissible limits of dustiness for all dusty occupations or processes in the industries both in the dust content and in mineral composition to be accepted. In mining, however, working conditions are fairly constant and it would be extremely valuable to the industry if the various mining companies [illegible] could establish, with the help of the proper governmental authorities, tentative standards practicable and applicable for their own mines. Some have done so and it is a long step in the right direction."

This recommendation might well be extended to other industries.

The National Silicosis Conference tentatively established a maximum of five million particles per cubic foot as a safe quartz concentration in the case of highly siliceous dusts. This standard is subject to modification as more data are developed by different industries. The National Silicosis Conference report also says, "It is recommended that clinical and engineering studies be carried out as rapidly as pos-

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sible to establish the necessary scientific data upon which we may base practical and effective regulatory standards." The report then states that knowledge of three factors is necessary for establishing safe concentration of atmospheric dust:

1. The relative number and size of the free silica and the other particles suspended at breathing levels in the different parts of the industrial atmosphere.

2. The proportion of the workman's time actually spent in the various dust concentrations.

3. The effects of exposure to environment, as revealed by the occupational and medical histories of old employees, by physical examination and by the roentgenological appearances of their lungs.

Through a knowledge of these three factors, any industry can discover what, if any, hazard it has and what preventive measures are needed. For the past two years, under the direction of Dr. Leroy U. Gardner of the Saranac Laboratory for the Study of Tuberculosis, the cement industry has been making a careful evaluation of the health of its workers, according to the plan just outlined. Many of the statements in this paper regarding the effect of mixed or non-siliceous dusts have been based on the findings of these studies.

One of the outstanding conclusions a student of these researches in the cement industry will reach is that concentrations of free silica appreciably higher than the maximum specified by the Silicosis Conference are safe if the silica constitutes a moderate proportion of the total dust. Apparently a mixture of silica with other minerals, if the other minerals are predominant, tends to inhibit the effect of the silica in the lung. It is not yet possible to recommend, without reservation, the dilution of silica with other dusts as a protective measure. It is far better to remove the dust from the atmosphere. Nevertheless, it is significant that in the Portland cement industry, where a high concentration of raw material dust containing up to 10 per cent of free silica is sometimes found, the X-rays and physical examinations reveal no pathological lung condition attributable to dust.

Although no agreement has been reached as to the maximum safe concentration of free silica in the presence of harmless dusts, agreement as to good housekeeping limits is practically unanimous. Industries with a dusty process, even though dusts are harmless, should endeavor to reach a concentration in the neighborhood of 100 million particles per cubic foot of air in the breathing zone of the workers, in the interests of comfort and increased efficiency.

The third factor in the development of silicosis is duration of exposure. The problem of exposure resolves itself into two parts. First, what proportion of the workers' time is actually spent in the dusty atmosphere? It is evident that a hazardous dust will not affect a man unless he is actually exposed to it and will not have as great an effect on a man who is exposed [illegible] a day as on a man continuously exposed.

The United States Public Health Service has developed a formula for calculating the actual exposure in terms of particle hours. They recommend, in Bulletin 217, "The Determination and Control of Industrial Dust," that the particle concentration in any area be multiplied by the number of hours an employee works in that area, that this product be calculated for each hour of the working day and that the total of these products be divided by the number of working hours to give the equivalent of continuous exposure during the day.

For example, a man may spend two hours a day in a concentration of 200 million particles per cubic foot; three hours in a concentration of 10 million particles; one and three-quarter hours in a concentration of 40 million particles and 15 minutes in a concentration 1,200 million particles. The man's exposure would be calculated:

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Hours per day a	Dust Concentration b	Particle-hours (millions) a and b
2	200	400
3	10	30
2½	40	110
½	1040	260
Total Hours 8		800

$$\frac{800 \text{ particle hours in millions per cubic foot}}{8 \text{ hours}} = 100 \text{ million particles per cubic foot daily exposure}$$

The application of this formula in a practical problem is apparent. If you find, from a study of concentration and silica content, that in two or three areas in your plant atmospheric dust exceeds safe limits, you will make an analysis of the exposure by the P. H. S. method and attack first that point where employee exposure is the greatest.

How long does it take silicosis to develop? The answer to such a question must be equivocal. Much depends on the physical condition of the worker. A man whose respiratory passages have been damaged so that dust is not readily excluded by the usual protective mechanism, may contract silicosis more readily than a man with normal nasal and bronchial passages. Also a man whose lungs have been damaged by pneumonia or tuberculosis may develop silicosis more quickly. We are probably all familiar with the reverse of this, i.e., that the man with silicosis has much less resistance against tuberculosis than a man with unaffected lungs. This fact, incidentally, suggests one of the outstanding differences between the action of silica and other dusts. Medical authorities state that not only does the silicotic lesion in the lung resemble the lesion in tuberculosis, the silica actually stimulates the activity of tuberculosis and, at the same time, conceals its symptoms until it is far advanced. The seriousness of such a condition may readily be imagined. A tubercular with significant quantities of silica in his lungs may be rapidly getting worse, yet diagnostic symptoms are often lacking. Frequently only a careful X-ray examination can reveal the presence of tuberculosis in a silicotic. Mr. P. H. [illegible], speaking before the Metals Section of this Congress last year, emphasized the fact that the real danger from silicosis is not silicosis at all, but tuberculosis. First or even second degree silicosis, uncomplicated by tuberculosis, usually causes relatively slight disability, seldom pronounced enough to interfere with working capacity. No worker should be deprived of an opportunity to earn a living at his regular job just because his X-ray shows some signs of nodulation. The job should be cleaned up by approved engineering methods, of course, but discharge of workers who are perfectly capable, simply because of a non-symptomatic condition which [illegible] out of all proportion, is certainly not the solution of the problem. Inert dusts do not produce the typical nodular lesion, nor do they cause any increased susceptibility to tuberculosis. In the [illegible] industry, for example, only [illegible] of the X-rays of 1700 employees revealed old tuberculosis lesions and [illegible]% of these lesions were healed or quiescent. Studies of [illegible] over a two-year period covering the majority of mills in the industry, confirm the X-ray evidence. The mortality rate from tuberculosis of 0.07 per 1000 employees in 1937 is only 8% of the tuberculosis mortality rate of 0.57 per 1000 employed males established by the National Tuberculosis Association in a comprehensive survey in [illegible].

The various factors which may influence the length of time required to develop silicosis, if we may recapitulate, are (1) intensity of dust concentration, (2) pro-

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portion of free silica in the dust, (2) proportion of working time employee spend in the dusty atmosphere, (3) condition of employee's upper respiratory tract, and (4) condition of employee's lungs.

In any case, it is extremely doubtful that first-stage silicosis will develop in less than seven years, except in the presence of active tuberculosis. Dr. Gardner says that for silicosis to develop in five years, the exposure must be intense. The National Silicosis Conference report, to which we have previously referred, says with admirable succinctness, "There are reports of a few cases of the disease developing in as short a period as one and one-half years. In most instances, the individuals were exposed to excessive concentrations of extremely fine silica in almost a pure state." The report then states that exposure to low concentrations of silica may sometimes continue for thirty years before the condition develops to the stage where it can be called silicosis. In such cases, possibly another 15 or 20 years would be required before any disability would be incurred. A great majority of the cases have had at least seven years' exposure. Thus it will be seen that silicosis is a very slowly developing disease, which, in the absence of infection, is not especially dangerous. In the presence of infection, however, the picture may be different.

No attempt has been made to separate the two sections of this paper, as indicated by the title, since the discussion of the problem is too intimately bound up with the methods of solving it. There are, however, some details of prevention which, for the sake of completeness, should be mentioned.

It might be worth while to think about the methods of determining dust concentrations. The quick sampling, easy counting devices on the market now probably fill a definite need, but their use is not altogether an unmixed blessing. The standards mentioned in this paper are all based on the United States Public Health Service's impinger technique with light field count. It is a complex technique requiring skill and experience to operate successfully, but it is the standard counting method in the United States and samples of short-cut methods have not been shown to be comparable with it. After dust control has been instituted and the impinger technique has shown that concentrations are within safe limits, a simpler technique might be permitted for periodic checks on the efficiency of the control system. But don't be surprised if your counts with the simplified technique are way above the impinger counts. The dark field illumination will recover a large number of particles, apparently too small to have any effect that are recovered only by light field methods. The result is similar to the effect of a strong beam of light in a dark room. This difficulty can be overcome to some extent by taking impinger samples and samples by the other technique simultaneously, as soon as dust control equipment is installed, thus getting as much correlation as possible between the two techniques at the beginning.

A general paper of this type is not a suitable place to discuss the relative merits of different types of dust control systems. There are, though, a few principles which should be properly observed. Whenever possible, dust should be removed at its source, before it reaches the workroom atmosphere. Methods of accomplishing this vary with the process and should be decided upon by competent engineers after a careful study of milling processes. Local exhaust [illegible] collectors may be adequate. Water sprays are sometimes effective where they can be used. In the quarry wet drilling is often as fast as dry drilling and much cheaper. Sometimes more elaborate dust traps are needed, either independently or conjointly with wet drills.

Some processes are not amenable to control at the source. In such cases employees should be required to use respirators or masks of approved type. All of these methods have their place. The right use for each location must be determined by a thorough engineering survey.

The importance of good housekeeping cannot be too strongly emphasized. Much

of the dust nuisance can be eliminated by systematic routine and thorough cleaning programs. The advantages are obvious. The plant is taken better looking and in addition, the atmospheric dust is reduced.

Medical control is equally important. The only sure way to know that a hazard does not exist is the careful observation of the workers over a period of years. Pre-employment examinations are, of course, also important for proper placement of applicants.

In this paper we have presented some of the salient features of the silicosis problem. We have, first of all, emphasized that only two pneumoconioses are acute diseases, silicosis and asbestosis.

We have pointed out that there are three causative factors of silicosis and all three must be present simultaneously to produce the disease.

1. Uncombined silica in small particles, of which the most dangerous is probably quartz.

2. Sufficiently intense concentrations of the dust to be hazardous. This concentration is set at five million particles (light field count) of quartz less than ten microns in greatest diameter, if the quartz constitutes a high percentage of the material. Studies in the cement industry have demonstrated that, in many cases, appreciably higher concentrations of quartz can be allowed when inert dusts, as clay or limestone, are intermixed with the silica.

3. Exposure by the employee over a sufficiently long period to high concentrations of silica of the necessary fineness.

The influence of silica on tuberculosis is strong, whereas inert dusts have no effect on this disease. Serious disability from silicosis, especially in the first two stages, usually results from infection, rather than from the uncomplicated disease. If the working environment is adequately clean, a silicotic need not be denied work as long as he is free from infection and is capable of doing his job.

Methods of control of the disease include pre-employment and periodic medical examinations, removal of dust at point of origin, emphasis on good housekeeping and the use of respiratory protective equipment where removal of dust from the atmosphere is not possible.

It should be emphasized that control, especially engineering control, of the silicosis hazard is the phase of the problem that is of greatest importance to those of us who are interested in the practical methods of preventing the disease.

Dr. A. R. Riddell of the Ontario Department of Health, whose work in the gold fields of Ontario has won for him an international reputation, put the problem squarely up to the engineers when he said: "Silicosis is an occupational disease declining in importance. Its prevention is not a medical problem. As it occurs exclusively through the inhalation of dust containing silica, its prevention depends on the [illegible] engineers. Engineers have met the problem scientifically and with such intelligence that the occurrence of silicosis in many occupations now considered hazardous will cease entirely during the next fifteen or twenty years."

(Applause)

Chairman Wilson: Has anyone any question to ask Mr. James? Dr. Chase, will you please take over the meeting now to discuss the subject?

Dr. Chase, Medical Director, Industrial Commission: I don't know that I have anything to add or discuss. I would like to have anyone here ask Mr. James any questions that they may have in mind in order that they may fully understand the hazards that are present in the quarry industry.

Mr. Nystrom: I understood the speaker to say something about asbestosis.

MR. JAMES: As I understand it, asbestosis is magnesium silicate—it has been developed that the appearance, as I understand it of a lung affected with asbestosis isn't quite the same as silicosis, but at the same time it has been definitely shown to be a progressive disease in case of magnesium silicate, and that is the only one that has been established as being harmful. Its effect is not as great as silica.

MR. NIEMANN: It struck me particularly, it not being harmful.

MR. JAMES: It is a surprise to a great many people, I believe. Do you care to discuss that any further, Dr. Obermeier?

DR. OBERMEIER: No. I can't. I can't give the reason for it, but I know that it is true.

CHAIRMAN WITMER: Anyone else have any questions on this thing? If not we will go on to the next subject which is a round table discussion of our most serious accident hazards. Anyone here going to open the subject in an informal round table discussion? Mr. Adams, do you have anything to say on that subject?

MR. ADAMS: I don't think so.

CHAIRMAN WITMER: Well of course we have been talking all along here about serious things like the handling of dynamite, transportation, and so forth, but from reports sent out by the Industrial Commission I note that the major accident rate and the index to the accident figures for the industry, all three of these industries, lime, cement and quarries, has been in the handling of small tools, and that's true in almost every industry, I think. I know last year the subject of small tools was not discussed very fully and I think that some suggestions along those lines in the prevention of that class of accident should be discussed. Has anyone any comments to make? Dr. Obermeier, probably you can give us some of those industrial figures on that.

DR. OBERMEIER: I am sorry, but Mr. Madison was to be here and outline that part of the meeting, he was called to another session. Anyone have any thoughts along that line?

MR. RUTHERFORD: I might say that I had missed that in one of the hazards that I had listed there, but in my excitement I overlooked it. We have had some in talking of small tools, especially in the quarry, from claw bars and mallets, spawls flying off of these striking the man working, and we have eliminated that to a great extent by tool inspection and repair, in other words keep the spike maul so it isn't flattened out and corners breaking off; the same way with the claw bar, where you are driving a claw bar under the head of a spike, you have some trouble there. I think tool inspection goes a long ways in eliminating hand tool injuries.

MR. ADAMS: I might ask one question. [illegible] some of our accident reports read for particle in left eye or for a particle in right eye. I wonder if we are an exception or, whether we are more careless than someone else in the wearing of goggles or do the rest of the people have the same thing?

MR. L. C. LEWIS, of the Industrial Commission, Division of Safety and Hygiene: I think about every industry I [illegible] come in contact with has the same complaint that you have just mentioned, particularly the coal mining industry. They take a pick, strike a piece of coal, piece of steel, the first thing you know something is in the eye, and the proper wearing of goggles, that is the proper kind of goggles, naturally would eliminate that condition. There is no question about it. Some mines now are one hundred per cent. In the reports of their accidents that they have been sending in to the Industrial Commission, one-fourth or twenty-five per cent of the accidents occurred were from the eye. That one firm has really eliminated the eye accidents.

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ual's the Akron Coal Company over in Guernsey County. Now, hand tools, there are quite a number of injuries come from hand tools, and I am glad to hear Mr. Rutherford suggest that proper inspection of tools. I have gone into different places, and with the hand tools, even the hammer, the handle was loose on the handle, men would take it; I have seen the hammer fly right off when they were trying to drive a nail; I have seen it more sufficiently when they were driving a nail and hold it with their hand, the hammer would hit the wrong nail, consequently it was an injured finger. I think one of the best suggestions that you made is to see that our hand tools are inspected. I have seen steel bars set out in the winter, full of frost, picked up by a man, and to my surprise one day I saw a man, he wanted to take his gloves off, change his gloves, he put the small bar right in his mouth, you know what happened, his tongue was stuck on the bar, he had to wait until it thawed free. I saw another man putting his bar up to his mouth, just that way, moved his cigarette or cigar, whatever it was, and the bar touched; infection set in there, that man was laid up for six weeks just because of an infection that came on his upper lip because of the contact with the frosted steel bar. So if the tools were put in the proper place, kept in the right condition, properly inspected, I think you would eliminate many injuries. Using the goggles, naturally would eliminate the eye trouble, that is at least ninety per cent of it, and I think there should be a rigid enforcement of the proper use of goggles.

Chairman Winder: I think Mr. Lewis has very ably answered your question, but I would like to call on Mr. Weber to give you a little more detailed answer with regard to the frequency of that same accident. Mr. Weber, what has been your experience?

Mr. F. W. Weber (Standard Lime & Stone Co., Woodville, Ohio): We have had quite a few accidents, in fact we had our last one about seven years ago, which was a lost eye, and since that we gradually got the men to wear goggles, and of course we tried to make them wear them at first, and we found out during the program that all goggles didn't fit everybody alike, but we finally got the right kind of goggles, and I think we have about four kinds that we use, and they seem to work out very satisfactorily. Some of these goggles are just ordinary large pairs of rim glasses with a shatter-proof glass in it, where they are using the lime, and I don't think we have had any trouble of anybody getting lime in his eye where they wear them. Of course they wouldn't be much good out doors where the wind was blowing a lot, but I must say we have eliminated our eye accidents. Everybody has to wear goggles, even myself, when I get in a bad place I have got to put them on. I have a pair to fit over these glasses, although I wear them lots of places where ~~glasses are permissible. We are also trying to safety shoes, although we haven't~~ got that a hundred per cent, we hope to have before the year is over. Like many shoes, when they first came out you thought you had to build a pair of shoes and get a piece of iron in the foot and everybody could wear them, but they look would only different, just like you go in a shop and buy a pair of shoes for Sunday wear, if they didn't fit you didn't take them. That was the same way with safety shoes. We finally got around where we could fit most of the men very nicely now, they have got so many good shoes on the market. The same way with other equipment such as respirators, although we don't use them so much any more. We eliminate our dust as much as we can. We don't say we are a hundred per cent free of dust but we are a whole lot different than we used to be.

Mr. Lewis: Just one question. You mention about the goggles not being used outside, if they have the wire gauze protection from the helmet back to the sides of the head, that will protect all right.

MR. WEAVER: The wire gauze is all right, we have men who wear them now. They wear them under their helmet and then they use them for chipping only, they are not much protection for dust, I wouldn't rely on them.

MR. LEWIS: They don't protect from the wind.

MR. WEAVER: Not where you have dust around a cement or lime plant.

MR. LEWIS: That question was discussed by a goggle salesman the other day.

MR. WEAVER: The reason we use this one kind for the welder, he used to have a burning goggles and welding helmet and also another pair for chipping, he was not going to stop to put them on so we got this other type which fits on just like a pair of glasses does, and the minute he ups his helmet back those chipping goggles are right on hand, he goes right on with his work.

MR. CONSTANTINE, Southwestern Cement Company: We use a sun-tight shade on our goggles. It is a transparent material something like celluloid, otherwise no opening there whatever, we find it very effective and helpful under dust conditions.

MR. LEWIS: That protects against the wind dust?

MR. CONSTANTINE: Oh yes. They are open around the inside here, but the sides are closed up entirely, that gives a little ventilation around the nose, but it closes up and protects very well against winds blowing dust around like that. We went through a stage a couple of years ago of eye injuries. In one year I think our eye injuries were about seventy-five per cent of our medical cases, foreign particles in the eye. We went through what we call education or the conscious movement, we tried to make all the fellows feel that the eyes were important enough to protect and did everything we could do to make them wear their goggles and follow their helpers, where they had been doing work that there might not be the least requirement for goggles, put them on, there might be a remote chance of having something get in their eye, give themselves the benefit of the doubt and put their goggles on. For the last year and a half or two years our eye cases have been practically nothing. I don't think we had a case last year, a medical case of something in the eye.

MR. LEWIS: And yet prior to the use of goggles it ran as high as seventy per cent.

MR. CONSTANTINE: We had goggles at that time, but the fellows didn't use them, but we had to get them to see it that they absolutely needed the goggles, and we furnished them to them and all they had to do was go to the storeroom and get them and put them on, we made them available at all points where there wouldn't be any excuse that they couldn't get goggles, we eliminated that part of it, then we got it up to [illegible]. It's got good results [illegible]. So far we have got our eye condition under control.

MR. LEWIS: One statement I would like to make about John Rigby, [illegible] when he went down to Chicago the use of goggles at [illegible]. They had been wearing them one hundred per cent. He went away on a [illegible] with the [illegible] again; he came back, he saw the goggles piled in the office, 510 pairs of them. The next morning he met the men at the gate. He says, "What is the matter with these goggles?" "We are not going to wear them any more." "Aren't you? All right, it is up to you." They walked over to the gate to go down the shaft, they said: "When are you going to open the gates?" "The gates are not going to be opened until those goggles are in you men's possession, and you agree to wear them. You men are going to be technical, so am I. Your eyes are getting hurt, not mine. If you haven't got judgment enough to protect your own eyes, I don't feel [illegible]

have got judgment [illegible]
and the men [illegible]
fore he came. So [illegible]

CHAIRMAN WITH[illegible]
minor injuries? If [illegible]
for next year. We [illegible]
time, might as well [illegible]

Thereupon Mr. [illegible]

MR. CONSTANTINE: [illegible]

CHAIRMAN WITH[illegible]
chosen. In view of [illegible]
ates your signify by [illegible]
Motion carried.

CHAIRMAN WITH[illegible]
in past years it has [illegible]
he passed the buck [illegible]
for the important [illegible]
Vice Chairman?

MR. [illegible]

MR. WEAVER: I [illegible]

CHAIRMAN WITH[illegible]
tions for Vice Chairman[illegible]

Thereupon Mr. C[illegible]

MR. WEAVER: I [illegible]

Motion seconded [illegible]

CHAIRMAN WITH[illegible]
my gratitude to Mr. [illegible]
here today, and I am [illegible]
business to come before [illegible]

MR. LEWIS: I was[illegible]
There are quite a [illegible]
would make a suggest[illegible]
division of Safety and [illegible]
we possibly can. Mr. [illegible]
for your President. [illegible]
the Industrial Commis[illegible]
it sent out if you wish [illegible]
quarter of the [illegible]
you can't make this [illegible]
the bigger [illegible]
get more [illegible]

MR. WEAVER: I [illegible]

MR. LEWIS: Don't [illegible]
Industrial Commission [illegible]
work except type [illegible]

MR. WEAVER: We [illegible]
here at these meetings[illegible]
unless you doing them [illegible]

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have got judgment enough to work for the Akron Coal Company." They went home and the next morning they came back and all the glasses were out of the office before he came. So sometimes it takes discipline to handle the problem.

CHAIRMAN WITMER: Any more comments on this problem of small loads and minor injuries? If not I will call for nominations for chairman for the committee for next year. We have got to nominate a chairman for next years' session sometime, might as well get up and nominate a chairman.

Thereupon Mr. Rutherford was nominated as chairman.

MR. CORNELIUS: I move to close the nominations.

CHAIRMAN WITMER: It is moved by Mr. Cornelius that the nomination is closed. In view of that, all those in favor of Mr. Rutherford for chairman of next year signify by saying "Aye".

Motion carried.

CHAIRMAN WITMER: Mr. Rutherford has been elected chairman for next year. In past years it has been the experience that the Chairman never gets to chairman, he moves the back seat and the Vice Chairman. Therefore we now hold nominations for the important office that of Vice Chairman. Do I hear any nominations for Vice Chairman?

MR. RUTHERFORD: I nominate J. E. Weaver.

MR. WEAVER: I believe I will decline to accept that nomination.

CHAIRMAN WITMER: It is still open for nomination. Do I hear any nominations for Vice Chairman?

Thereupon Mr. Cornelius was nominated as Vice Chairman.

MR. WEAVER: I move the nomination be closed and Mr. Cornelius be elected.

Motion seconded and carried.

CHAIRMAN WITMER: Mr. Cornelius elected Vice Chairman. I again express my gratitude to Mr. Rutherford and Mr. James who gave us such wonderful talks here today, and I am sure that we all profited accordingly by it. Is there any more business to come before the meeting, or any other remarks?

MR. LEWIS: I would like to say something before the new president takes office. There are quite a number of queries in Ohio that never send anyone here. I would make a suggestion, it is only a suggestion, I want you to understand that our division of Safety and Hygiene is interested to help and assist in every way that we possibly can. Mr. Keenan gave me this order, I would suggest that you get a list, your President, Secretary and Vice President get a list of the queries from the Industrial Commission and write a letter, and if you write a letter we will have [illegible] quarters of the State of Ohio requesting them to get here this session and see if you can't make this one of the real big sessions. I compliment you here today, you are bigger here today than you were last year. Now if you go after it right you can get more next year than you have this year.

MR. WITMER: I think so.

MR. LEWIS: Don't you think it would be? In order to get that list from the Industrial Commission and have them type the letter, they wouldn't have to do the work except type the letter.

MR. WITMER: We have a man four miles from us, still we don't see anybody here at these meetings. I have been over to see them, but I can't get them to come unless you drag them in here.

CHAIRMAN W[illegible]: I might explain that this week the National Lime Convention was held down at Cincinnati and it is still in progress today, in fact at ten o'clock this morning there was a safety meeting down there, and many of the men were attending that convention and stayed down there for the meeting this morning rather than come up here. That's one reason why there are so many of the lime manufacturers there.

MR. LEWIS: Can you tell me if the Alpha Portland Cement Company had representatives down there from Ironton?

CHAIRMAN W[illegible]: I don't know. If there is no other business the meeting is adjourned.

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Melissa Hatfield

March 28, 2008

Melissa Hatfield
Library Administrator
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene

Date

Kay E. Goodman

KAY E. GOODMAN
NOTARY PUBLIC, STATE OF OHIO
My Commission Expires 06-28-2010

Sworn to me this 28th day of March, 2008
in Franklin County, State of Ohio.

KG

PROCEEDINGS

of

All Ohio Safety Congress

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Program

Chairman: Carl L. Smith, Managing Director, Cleveland Safety Council.

Exhibits

Chairman: Buell W. Nutt, President, Safety Equipment Service Company, Cleveland, Ohio.

Entertainment

Chairman: H. G. Ehret, Safety Director, Division of Factory and Building Inspection, Department of Industrial Relations of Ohio.

Publicity

Chairman: Harry M. Paul, Supervisor of Printing and Publications, Division of Safety and Hygiene, Industrial Commission of Ohio.

Reception

Chairman: Harry L. Sain, Assistant Superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio.

Registration

Chairman: C. C. Beaner, Statistician, Division of Safety and Hygiene, Industrial Commission of Ohio.

BUREAU OF INFORMATION ON SAFETY, COMPENSATION AND CLAIMS

SAFETY

Chairman: George P. Meehan, Mechanical Engineer.

Staff of the Division of Safety and Hygiene of the Industrial Commission of Ohio

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James Fisher	Special Investigator
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Arnold Bill	Special Investigator
A. R. Taubman	Special Investigator

COMPENSATION

Robt. W. Nutt, Supervisor of Information, Industrial Commission of Ohio

OCCUPATIONAL DISEASE HAZARDS — THEIR CAUSE AND CONTROL

Wednesday Afternoon Session

April 17, 1940

This Section of the All Ohio Safety Congress devoted to Occupational Disease Hazards—Their Cause and Control was called to order at 2 o'clock by Dr. Sidney McCurdy, Director, Medical Division, Industrial Commission of Ohio, Columbus, Ohio, Chairman.

Chairman McCurdy: Our meeting will now come to order. We have to discuss a subject that is really momentous. In the state of Ohio recently we have entered a new phase of taking care of people. We have placed the burden upon industry for practically all diseases that are peculiar to the industry in which a man works and which he customarily would not meet and would not be subjected to elsewhere. The history of our occupational disease law up to this point has been that we have carefully selected specific diseases easily capable of proof and named them, and no others were applicable to compensation. I think that was in 1921. In 1928 or 1929 we added six or seven in the same manner, by making them specific, and we went on rather slowly, and somewhat discouragedly, until 1937, when we took our place with others who had been ahead of us in recognizing, specifically, silicosis. Apparently with some fear and trembling we did that, because we stuck around that law some safeguards to limit what might be classed as a previous accrued liability. In any event, we took on silicosis with those safeguards that seemed to protect fairness and merit and in some instances, I fear, we were a bit unfair to the claimant. But there had to be a starting point and we made it in 1937. In 1939 we threw all discretion to the winds, burned our bridges behind us, and took on all diseases not classified hitherto by name, and which, of course, in this modern day and age is a step in advance. It also introduces the Industrial Commission very definitely in Ohio into the business of preventing diseases as well as accidents. We have done something that is a little bit peculiar in our section. Perhaps it might be classed a trifle experimental. When we took on silicosis, we set up a Board of Medical Referees. These referees were to be men especially versed upon the subject of silicosis and with special knowledge of it, two of whom could be most any specialist that we desired to choose, but one of whom had to be a roentgenologist. Their opinion was not final, but the cases had to be submitted to them; before the Commission could allow or disallow the claim. As a matter of fact, that silicotic board is made up, I believe, of three as good men as we could get in Ohio, and who have been so recognized in the communities in which they practice. I believe from working with them, that they are dealing with the cases fairly and honestly, but upon a scientific basis. That Board has been obliged, of course, to turn down some, but it has been, I believe fairly liberal in passing those cases that had merit. Remember that Board was not final. But when we took on the additional number of twenty-three other diseases, we set up again a new principle in Ohio and, I think, a new principle everywhere.

in that each claimant who was dissatisfied with the ruling of the Commission, upon medical facts, had a right to appeal to a medical Board, upon a medical fact, and upon the judgment of that Board, the case would be decided. They were final, on medical fact. That is as it stands today. Now we haven't had occasion to use that new Board. I have attempted to set it up on this basis—specialists in each of the larger cities, covering practically every field that we can expect to meet, so that if in Cleveland or Cincinnati or Toledo or Dayton or Columbus, we want to pick a special Board for a skin disease controversary, we can do it without going out of those cities. That made it necessary to select a great many men. I believe the number is forty-four. I think one of the proudest moments in our lives was when I wrote to these men, requesting that they serve upon this new Board, telling them frankly that I couldn't tell them at that time how much we could pay them, but telling them what I wanted them to do and giving them the list of those that I was asking, and not one man turned us down, and most of them wrote, thanking us for the opportunity to render their service in behalf of this new principle. We speak of this whole problem, and it is so labelled here, as "Occupational Disease Hazards." When you get into public health matters, it is spoken of as industrial diseases. I think perhaps their terminology is better than ours, because after all, these cases must arise out of, or in the course of employment. With the liberality that we now have, I think the word "industrial" could well take the place of the word "occupational." At the beginning of this symposium today, we are going to discuss first occupational diseases occuring in Ohio. Let us change the word "occupational" to "industrial" diseases occuring in Ohio.

Our first speaker has had a tremendous amount of experience in that he has been with the State Board of Health for a number of years, at the head of their Occupational Disease Division. I will introduce him in a moment, but I want to state first the rules of the game. After each speaker is through, I will throw it open to discussion. I wish each discussant would stand upon his feet and announce his name and where he comes from and if he represents anybody, I wish he would introduce who he represents. He must do that as many times as he speaks. I shall allow anyone who cares to discuss, five minutes, and I shall be rough when the five minutes is up, because others may want to talk too, and our time is more or less limited. I will rap upon the table or indicate by a sign, he must sign off very soon. With those preliminary remarks, I wish to present to you our first speaker, Dr. Kenneth D. Smith, formerly director of Division of Occupational Diseases, State Department of Health, Columbus, Ohio. Dr. Smith. (Applause).

THE OCCURRENCE OF OCCUPATIONAL DISEASES IN OHIO

By Kenneth D. Smith, M. D.

Dr Smith: When Mr. Kearns and Dr. Obetz asked me to speak on the medical aspects of Occupational Diseases at this Safety Congress, they asked me to give an informal discussion rather than read a formal paper. It was their opinion, with which I heartily agreed, that I should review certain topics which color the picture of these diseases but which are seldom seen in print and which we quite often neglect in appraising the present status of these diseases. Therefore, this discussion will be more or

less a hodge-podge of miscellaneous information. I shall not burden you with many statistics. If there are any of these data that you desire in actual figures they can readily be obtained from either the Industrial Commission or the Ohio Department of Health.

Whenever it has fallen to my lot to discuss a subject I have usually consulted the dictionaries for two reasons: I wanted to be sure that I knew what my subject meant to me after I had read the definition given by those who were experts and qualified to tell me; but more important has been my desire not to give an entire discussion which would be erroneous because I had erred in my understanding of the words. I made no exception when the title of this paper was given to me. However, when I read the many definitions of "occurrence" I found among them this: "The act of occurring." Obviously this definition, although correct, takes us to the word "occur" where we find first "to befall, to happen, to take place." Again a correct definition but inadequate here because we do not know the exact number of workers who suffer from occupational diseases because of faulty diagnoses and the wide-spread lack of reliable statistics. The next definition was more to my liking for it stated, "To exist as to being able to be found or seen; to be found; to come under observation; . . . ." Here was something to sink my teeth in for we can discuss only those things which are found or come under our observation.

Definitions which adequately and accurately tell us just what occupational diseases are have been the cause of more headaches to the industrial hygienists than the diseases themselves, and I have finally come to the conclusion that these headaches are the most prevalent of occupational diseases.

If we consider occupational diseases from a medical standpoint, a definition would appear to be obvious. Unfortunately, however, except for those specifically occupational illnesses such as certain poisonings, the pneumoconioses, and some infections (such as anthrax), we encounter erroneous reasoning bases on a priori reasoning. Diseases now classified as "partly occupational," "industrial illnesses," and other such terms must be clarified.

Weyl insists on the inclusion as occupational diseases not only those illnesses generally caused by the personal activity of the worker, but any frequent manifestation of symptoms affecting a given occupational class. This definition follows closely that of Van den Borght who believes that "occupational diseases are the consequences of long continued exposures to harmful effects in the exercise of a calling, and that they arise exclusively or with particular frequency amongst the workers in a given industry." Gilbert believes that "those diseases which appear in any given calling with an incidence exceeding the normal, as well as those obviously due to occupational risk," should be considered occupational. Certainly these definitions are open to criticism. The inclusion of the statement that the exposure must of necessity be over a long period of time renders those definitions fallacious when one considers wool-sorter's disease. We must remember that time is relative and whether we call afflictions which follow short exposures accidents or acute specific occupational diseases, the pathology is none the less dangerous and the occupational etiology remains unchanged.

I can't agree with those previously mentioned definitions for two reasons: One is that I saw a case of lead poisoning in a dairyman and a case of silicosis in a hog sorter. Each of these were proved to be correct diagnoses. The dairyman had been soldering milk cans; holding his face

over the cans, and had been at this work for quite some time. The hog sorter worked in a stock yard situated on the lake front. The ground and floors were covered with sand and the constant milling of the stock had created an extremely dusty atmosphere. This worker had been employed for many years. Obviously the man incurred his silicosis as the result of his job. But, of course, hog sorters usually don't develop silicosis. Am I correct, Mr. Bloomfield, that we were shown a case of a tap dancer who developed silicosis when we were in Washington in 1936?

Mr. Bloomfield: Perhaps so. I don't recall, Doctor.

Dr Smith: If I recall correctly, this chap had incurred his silicosis by breathing the dust from the sand that was sprinkled on the stage when he danced. He had been a dancer for several years and the exertion of his routine entailed deep breathing.

Because of these facts, I again repeat that I cannot accept definitions which insist that an occupational disease must be one which is a frequent manifestation of a certain calling or that it must arise exclusively, or with a particular frequency within a certain industry. "Wool sorters' disease," or more correctly, Pulmonary Anthrax, proves that the exposure need not necessarily be of long duration.

Dr Hayhurst has long since stated that "an occupational disease is any affliction which is the result of exposure to an industrial health hazard," and I read a paper which had been given by an attorney stating that this definition was too loose. From the standpoint of the legal mind perhaps that is true. I don't know. As a medical man it is not too loose to me.

Certainly we have no quarrels over the definition of the word "disease." It is universally accepted to mean any state of the living body in which the natural functions of the organs are interrupted or disturbed, either by defective or preternatural action, without a disruption of the parts by violence, which is called a wound. I often wonder if we are not in the position of those, if I must use a hackneyed expression, who cannot see the forest for the trees. I believe that an occupational disease, after all, is a disease that can be proved, after the exclusion of any reasonable doubts, to have occured as a result of hazardous exposures which the worker encountered in no other place but his place of employment. To me that is adequate and all inclusive.

It may seem that I have taken an undue amount of time to discuss what diseases we can blame on the working environment alone, but it is good for us to take the time occasionally for such thought in order to appreciate the problems that confront our compensation boards and courts, and well as the worker and his employer.

The next question, obviously, would be: What are the hazards which cause occupational diseases? I shall skip that until later in order to discuss the difficulties which face us when we attempt to determine the exact relation between cause and effect, and pass on to the next questions that would arise. Without exception we all want to know two facts. How many workers are exposed to hazards that might produce occupational diseases and how many cases of occupational diseases occur? No less important is the question: What, specifically, are these diseases.

We know from the last census that there were approximately two and a half million gainfully employed people in this state, almost a million of whom were employed in the manufacturing, and mechanical industries and

here are vitally interested in this and there are a great number of misconceptions concerning this disease.

Chairman McCurdy: I think all the men would be interested in it, if you will speak up good and loud.

Doctor Smith: I believe that we should mention first that various types of reactions are produced by the different kinds of dusts. Toxic systemic diseases may follow the inhalation of poisonous dusts such as lead, cadmium, and arsenic. Allergic symptoms may follow the inhalation of certain dusts. A good example of this reaction may be found in the occurrence of asthma in workers who inhale cotton dust. Although some writers include metal fume fever, or "founders' shakes" as the result of the inhalation of zinc fumes and class fumes as a dust, I have never liked fumes being classed as dust. Technically, perhaps, that is true. To me the dusts, as we think of them in industry, are generated mechanically and fumes are the result of subjecting the metals to heat. Any dust, if the concentration in the air becomes great enough may cause irritation of the upper respiratory system and bronchitis. We are not concerned with any of these dusts, however, and shall not mention them except here. They are of no importance in a discussion on silicosis except to call attention to them in passing.

The first and foremost thing that we should remember about silicosis is that it can only be produced by free silica. Silica, or silicon dioxide, has the chemical formula, SiO_2, or in other words two atoms of oxygen have united with one atom of silicon. When we speak of silicosis we usually refer to the chronic form that follows many years of exposure to the dust. In foundry workers, for example, the disease does not usually manifest itself until the worker has been exposed to a harmful concentration fifteen, twenty, or thirty years.

The words, "Pneumoconiosis" and "Silicosis", have often been used interchangably, although incorrectly. Pneumoconiosis means a dusted lung or a disease of the lungs caused by breathing dust. Therefore, it includes silicosis as one of the pneumoconioses. Asbestos is also a pneumoconiosis.

You are all familiar with the definition of silicosis that is given in our law: "Silicosis shall mean a disease of the lungs caused by breathing silica dust (silicon dioxide) producing fibrous nodules and distributed through the lungs and demonstrated by x-ray examinations or by autopsy."

Obviously, only dust from material composed in whole or in part of free silica can cause the disease. Quartz is almost synonymous with silica. Sand is almost one hundred percent silica. Sandstone and granite contain varying amounts. I should mention, too, that the silica in granite is present as free silica mixed with the other constituents and not joined chemically. When free silicon dioxide, or silica, joins and forms a chemical compound by uniting with sodium, potassium, aluminum, and the other bases, we know these compounds and combinations as silicates. At the present time only one silicate is known to cause a disabling fibrosis of the lungs. This silicate is asbestos and the disease resulting is called asbestosis. It is interesting to note that silica enters into the composition of many rocks and that about sixty percent of the crust of the earth is composed of these.

I believe that it is certainly of importance to name a few substances which we have had reported to us on occupational disease report forms and which have never been known to cause the disease. Among these are marble, limestone, carborundum and other artificial abrasives, rock wool, glass wool, gypsum, cement, coke, and soapstone. Coal, either anthracite or bituminous,

EXHIBIT 3

LEGAL REQUIREMENTS FOR THE PREVENTION AND CONTROL OF INDUSTRIAL PUBLIC HEALTH HAZARDS

Division of Industrial Hygiene
Ohio Department of Health
Columbus, Ohio
1946

REGULATIONS FOR THE PREVENTION AND CONTROL OF DISEASES RESULTING FROM EXPOSURE TO TOXIC FUMES, VAPORS, MISTS, GASES AND DUSTS IN ORDER TO PRESERVE AND PROTECT THE PUBLIC HEALTH

Adopted by the Ohio Public Health Council February 16, 1946. Filed with the Secretary of State March 1, 1946. Effective January 1, 1947

Regulation 244. (Application of Regulations.) These regulations shall apply to every place of employment and particularly to those places of employment where a work or process is carried on by which dusts, fumes, mists, vapors, gases or environmental conditions of a harmful nature are produced or generated, or exist independently of the work or process, which may be inhaled or absorbed or in any other manner enter the body in quantities or concentrations that constitute harmful exposure as hereinafter defined.

Regulations 245. (Modifications.) When strict compliance with all of the provisions of these regulations would involve undue hardship, the Ohio Department of Health may, upon application in writing, permit modification of the requirements when protection practically equivalent to that required by these regulations has been provided. The application for the modification of any of these regulations in any particular case shall be accompanied by a full statement of the existing conditions and the reasons for requesting such modification. Any modification granted under the provisions of this paragraph shall be limited to the particular case covered by the application for such modification.

Regulation 246. (Definitions.)

(1) A "Gravity System of Ventilation" means one which depends wholly upon relative air density.

(2) A "Mechanical System of Ventilation" means one which depends upon the operation of power-driven equipment.

(3) "General Ventilation" means the ventilation of the general atmosphere in the place of employment.

(4) "Dilution Ventilation" means ventilation provided to dilute the concentration of dusts, fumes, vapors, or gases in the atmosphere of all or part of the place of employment.

(5) "Local Exhaust Ventilation" means that type of ventilation in which suction is applied at the point of generation or escape of dusts, fumes, mists, vapors or gases.

(6) "Exhaust System" means a complete suction device, including all hoods, ducts, fans, separators, and receptacles when required, and any other part necessary for the proper installation and operation thereof.

(7) "Hood" means that part of an exhaust system into which the contaminated air or dust, fume, mist, vapor or gas first enters. Ordinarily it consists of an enlargement of the end of the duct of such shape and design as to facilitate the entry of dust or other impurities to the exhaust system.

(8) "Duct" means any pipe, flume, or channel, forming a part of a ventilating system, used to convey air, dusts, fumes, mists, vapors, or gases.

(9) "Fan" means the machine which creates the movement of air in a mechanical system of ventilation.

(10) "Separator" means that part of an exhaust system in which the contaminant or entrained material is separated from the air which conveys it.

(11) "Refuse Receptacle" means that part of the exhaust system into which dust or other material separated from the air is deposited.

(12) "Approved" means approved by the Ohio Department of Health.

(13) "Dust" means particles of solid matter that have undergone comminution.

(14) "Fumes" means solid particles generated by condensation from the vapor or gaseous states, usually of metals, and often accompanied by oxidation.

(15) "Mist" means liquid droplets suspended in air.

(16) "Vapor" means the gaseous form of a substance normally in the liquid or solid state.

(17) "Gas" means a formless fluid occupying the space of enclosure.

(18) "Harmful" as applied to the effect of dusts, fumes, vapors, mists, or gases, and any environmental condition, arising from industrial operations or processes means any mechanical or toxic action which in any way injures any part of the body.

(19) An "Isolated Operation" means one which is carried on in a location where, or at such time that, no employee except such as actually engaged in the operation involved is subjected to the harmful exposures resulting therefrom.

(20) "Silica (free or uncombined)" is the name given to the chemical compound silicon dioxide (SiO_2).

(21) "Singular and Plural Number". Whenever in these regulations the singular is used the plural shall be implied and whenever the plural is used the singular shall be implied.

Regulation 247. (Harmful Exposure.)

(1) No employer shall use or permit to be used in the conduct of his business, manufacturing establishment or other place of employment, any process, material or condition known to have an adverse effect on health, unless reasonable provisions have been made to prevent injury to the health of the employees and of the public.

(2) The concentration of dusts, fumes, mists, vapors, or gases, in the air breathed by employees shall not exceed the following maximum allowable concentrations for an 8-hour daily exposure:

GASES AND VAPORS	CONCENTRATION Parts per million (by volume)
Acetone	500
Acrolein	0.5
Acrylonitrile (Vinyl Cyanide)	20
Ammonia	100
Amyl Acetate	400
Butyl Acetate	400
Ethyl Acetate	400
Aniline	5
Arsine	1
Benzene (Benzol)	100
Butanone (Methyl Ethyl Ketone)	300
Butyl Alcohol	100
Carbon Disulfide	20
Carbon Monoxide	100
Carbon Tetrachloride	100
Chlorine	5
Chloroform	100
Dichlorbenzene	75
Dichlorethyl Ether	15
Dimethyl Aniline	5
Ether (Ethyl)	400
Ethylene Dichloride	100
Ethylene glycol monomethyl ether (Methyl "Cellosolve")	100
Formaldehyde	10
Hydrogen Chloride	10
Hydrogen Cyanide	20
Hydrogen Fluoride (Calculated as H F)	3
Hydrogen Sulfide	20
Methyl Alcohol	200

GASES AND VAPORS	CONCENTRATION Parts per million (by volume)
Methyl Bromide	20
Methyl Chloride	200
Naphtha:	
Coal Tar	200
Petroleum	1,000
Nitrobenzene	5
Nitrogen Oxides	25
Ozone	1
Phosgene	1
Phosphine	1
Styrene (Monomer)	400
Sulfur Dioxide	10
Tetrachlorethane	10
Tetrachlorethylene (Perchlorethylene)	200
Toluene (Toluol)	200
Trichlorethylene	200
Turpentine	200
Xylene (Xylol)	200

METALLIC DUSTS AND FUMES	CONCENTRATION Milligrams per cubic meter
Cadmium	0.1
Chromic Acid and Chromates (Calculated as chromic oxide, CrO_3)	0.1
Lead	0.15
Manganese	6.0
Mercury	0.1
Zinc Oxide	15.0

OTHER DUSTS AND FUMES	
Chlorinated Diphenyls	1.0
Chlorinated Naphthalenes:	
Trichlornaphthalene	5.0
Pentachlornaphthalene	0.5

MINERAL DUSTS	CONCENTRATION Million particles per cubic foot
Asbestos	5
Silica, free or uncombined: Over 40%	5
20 to 40%	10
10 to 20%	20

RADIATION	
X-ray (Roentgens per day)	0.1
Radium (Roentgens per day)	0.1
Radon gas (Curie per liter)	10^{-11}

"Explanatory Note:

(1) At least three atmospheric samples, spaced at intervals to yield an average measurement of exposure over the entire cycle of operation under test shall be collected in the breathing zone of the worker or wherever such exposures are suspected or known to exist.

(2) The sampling and analysis of contaminated air and the interpretation of the data in relation to the stated maximum allowable concentrations shall be done only by technically qualified and competent persons using methods approved by the Ohio Department of Health.
(3) Temporary concentrations in excess of the maximum allowable concentrations listed shall not be permitted if exposure to such concentrations for a period of one hour or less may result in an adverse effect on health as determined by the Ohio Department of Health.
(4) For the purpose of the above maximum allowable concentrations for silica, the free silica content shall be the percent of free silica in the fraction of the air-borne dust in the breathing zone of the worker that is smaller than 5 microns in maximum diameter.
(5) For all other dust determinations millions of dust particles per cubic foot of air by the light field microscope counting technique shall include all microscopically visible particles up to 10 microns in size."

Regulation 248. (General Ventilation). Special Requirements: Wherever harmful concentration of dusts, fumes, mists, vapors or gases exist, or are produced in the course of the employment, and prevention, elimination, or control of said harmful exposures is not practical by local exhaust, or by other means as hereinafter provided, the capacity of the general ventilation system, be it a gravity or mechanical means of moving air, shall be augmented, or sufficient dilution ventilation provided, so as to provide for the elimination of said harmful exposures to a degree specified under Regulation 247.

Regulation 249. (Local Exhaust Ventilation).

(1) Where Required: All equipment and processes that emit or create harmful dusts, fumes, mists, vapors, gases, or other contaminants in quantities that tend to be harmful to the health of the employees exposed thereto, and where general ventilation alone or in conjunction with other provisions of these regulations, is inadequate to furnish the required protection, shall be connected to an exhaust system for the removal of said hazards, as far as practicable at their point of origin. Wherever practicable, application of local exhaust ventilation is preferred.

(2) General Requirements: Exhaust fans, ducts, hoods, separators, and all necessary appurtenances including refuse receptacles shall be so designed, constructed, maintained and operated as to insure the required protection in the production of volume and velocity of exhaust air sufficient to gather dusts, fumes, mists, vapors, or gases from said equipment or process and to convey them to suitable points of safe disposal thereby preventing their dispersion in harmful quantities into the atmosphere of work rooms, or other places where persons are employed.

(3) Duration of Operation: The exhaust system shall be in operation continually during all operations which it is designed to serve. If the employee remains in the contaminated zone, the system shall continue to operate for some time after the cessation of said operations, the length of time to depend upon the individual circumstances and effectiveness of the general ventilation system.

(4) Disposal of Exhaust Materials: The air outlet from every dust separator and the fumes, mists, vapors, or gases collected by an exhaust system shall discharge in such a manner that the discharged materials shall not reenter places of employment in harmful quantities or in concentrations which exceed the maximum allowable concentrations specified in Regulation 247. Dust, and refuse discharged from an exhaust system shall be burned (when feasible), buried, treated, or otherwise disposed of in a manner that will prevent its harmful dispersion.

Regulation 250. (Dust Allaying Media). Use shall be made of water, oil or chemicals in such non-injurious quantities and with such frequency, as may be necessary to suppress and allay harmful dust wherever the provisions of Regulation 249 are impracticable or inadequate to prevent harmful exposure. The use of dust allaying media may also be supplementary to other provisions of these regulations.

Regulation 251. (Personal Protective Equipment).

(1) When to be Worn: Where the removal of harmful dusts, fumes, mists, vapors or gases at their source, as provided for in Regulation 249 is impracticable the employees who may be liable to harmful exposure shall be protected by means of respiratory or other protective equipment approved

by the Ohio Department of Health for the specified employment involved.

(2) Protection of Temporary Nature: The use of respiratory equipment shall in general, be regarded as emergency protection against occasional and/or relatively brief exposure.

(3) Approval Required: Respiratory protective equipment including filter, cartridge and supplied-air respirators, hose masks, canister-type gas masks, supplied air-hoods and helmets, and self contained oxygen breathing apparatus shall be of a type approved by the Ohio Department of Health.

(4) Education and Use of Equipment Required: Employers and employees shall familiarize themselves with the use, sanitary care and limitations of such respiratory equipment as they may have occasion to use.

(5) Provision and Care of Equipment Required: Duty of Employer and Employee: It shall be the duty of the employer to provide and replace when necessary, such respiratory and other personal protective equipment as may be required, and to maintain same in efficient and sanitary condition.

It shall be the duty of the employee to use such equipment provided for him to exercise due care to maintain same in efficient and sanitary condition. Protective devices and protective clothing shall be worn or used at all times during the period of exposure.

(6) Air Supply to Positive Pressure Equipment: Air supplied to hose masks and positive-pressure air helmets shall be free from harmful dusts, fumes, mists, vapors or gases to the extent that the inhalation of such air shall not constitute harmful exposure as set forth in Regulation 247. The air should, preferably, be supplied by means of a blower-type fan. Whenever compressed air is used an approved filter shall be inserted in the supply line to remove any oil, sediment or condensation that it may contain. Such filter shall be maintained in efficient working condition.

(7) Wherever air is delivered to respiratory equipment, the intake to the blower-type fan, low pressure compressor or ordinary compressor shall be so located as to prevent harmful contamination of the air by carbon monoxide. Internally lubricated compressors are not recommended for supplying air to respirators and, if internally lubricated compressors are so used they must be provided with a suitable temperature regulator to prevent overheating of the compressors and with a carbon monoxide alarm device to insure adequate warning of exposure to carbon monoxide.

(8) Air Pressure to be Regulated: Wherever positive-air respiratory equipment is used, an automatic pressure relief valve shall be installed in the supply line. The maximum allowable pressure shall be 10 pounds per square inch. This does not apply to self-contained oxygen breathing apparatus.

a. The standard of health protection when using positive-pressure air respiratory equipment is the maintenance of positive pressure within the equipment. The minimum of air pressure to be maintained within such equipment is therefore that which will assure a steady and continuous outward flow of air from within the apparatus.

(9) Sanitation of Respiratory Equipment: The employer shall provide an approved means for cleaning and sterilizing all respiratory equipment, and it shall be the duty of the employer to cause such equipment to be maintained in a clean and sanitary condition. Respiratory equipment shall not be passed on from one man to another until such equipment is cleaned and sterilized. When filter or cartridge type respirators are used, each employee shall have such respirator for his own exclusive use. Respiratory equipment and replacement units shall be stored, when not in use, in approved containers.

Regulation 252. (Isolation of Hazardous Operations).

(1) In every place of employment where a work or process is carried on, in which, or in connection with which, dusts, fumes, mists, vapors or gases are produced in quantities or concentrations and under conditions which may injure the health of the employees, or where environmental conditions harmful to the health of employees are produced, such operations shall be isolated unless the employer elects to control said harmful exposures under other provisions of these regulations.

(2) Whenever practicable, the industrial operation or process shall be effectively controlled or enclosed to prevent harmful chemicals or injurious substances from coming in contact with the skin.

Regulation 253. (Sanitation and Cleanliness).

(1) Maintenance: The interiors, exteriors and environs of buildings that contribute to a harmful exposure to which these regulations apply shall be cleaned and maintained in such conditon as will prevent harmful exposure as set forth in Regulation 247.

(2) Cleaning: When to be Done: Cleaning shall be done at such time of day or night as will cause a minimum of exposure of employees. Employees engaged in cleaning operations and all others who may be exposed shall wear approved respiratory equipment unless such cleaning is done by means of suction apparatus capable of preventing harmful exposure.

Regulation 254. (Warning of Health Hazards). In all places of employment where harmful exposures exist from infective agents in materials used, from toxic dusts, fumes, mists, vapors or gases and from heat, radiation, humidity, radioactive material or any other injurious substance or cause, the employer shall call attention to such hazards, and shall periodically instruct all employees regarding the harmful exposures connected with their duties and the best preventive measures and methods to protect themselves therefrom.

Regulation 255. (Violation). A violation of any of the provisions of the foregoing regulations, or failure to comply with any orders made pursuant thereto by the Ohio Department of Health, shall subject the persons so violating or failing to comply to the penalties provided by law.

Regulation 256. (Interpretation). If any of the foregoing regulations shall be held to be unlawful, such holding shall not affect the validity of any other of the foregoing regulations.

AFFIDAVIT

I, Susan H. Banchefsky, being first duly sworn on oath says:

1. I am the Secretary of the Public Health Council of the Ohio Department of Health;

2. The Department received a request from Mr. Walter J. Kosydar, Legal Assistant, Owens-Illinois for copies of the State of Ohio "Legal Requirements for the Prevention and Control of Industrial Public Health Hazards" which became effective on January 1, 1947;

3. In response to this request, I made xerox copies of the chapter entitled "Regulations for the Prevention and Control of Diseases Resulting From Exposure to Toxic Fumes, Vapors, Mists, Gases, and Dusts In Order to Preserve and Protect the Public Health" adopted by the Public Health Council on February 16, 1946 and effective January 1, 1947;

4. I hereby certify that these are true and exact copies of these regulations.

Further affiant sayeth not.

Susan H. Banchefsky
Susan H. Banchefsky
Secretary
Public Health Council

Subscribed and sworn to before me this 9th day of May, 1983.

Martha P. Baxter
Notary Public
My commission has no expiration date.

File & ServeXpress Transaction Receipt

File & ServeXpress Transaction ID:	58473154
Submitted by:	Crystal Foley, Simmons Hanly Conroy
Authorized by:	Crystal Foley, Simmons Hanly Conroy
Authorize and file on:	Jan 25 2016 11:55AM PST

Court:	CA Superior Court County of Los Angeles
Division/Courtroom:	N/A
Case Class:	Asbestos-JCCP 4674 In Re: LAOSD Asbestos Litigation
Case Type:	Personal Injury-Asbestos
Case Number:	BC525735
Case Name:	Packett, Roger vs Allcraft Jewelry Supply Co et al (Simmons Browder)

Transaction Option:	Serve Only - Public
Billing Reference:	
Read Status for e-service:	Not Purchased

Documents List

1 Document(s)

Attached Document, 77 Pages **Document ID: 75977458**

Document Type:	**Access:**	**Statutory Fee:**	**Linked:**
Declaration	Secure Public	$0.00	

Document title:
Amended Declaration of Barry I. Castleman

Expand All

Sending Parties (2)

Party	Party Type	Attorney	Firm	Attorney Type
Packett, Roger	Plaintiff	Angelides, Nicholas	Simmons Hanly Conroy	Attorney in Charge
Packett, Roger	Plaintiff	Foley, Crystal	Simmons Hanly Conroy	Attorney in Charge

Recipients (13)

Service List (13)

Delivery Option	Party	Party Type	Attorney	Firm	Attorney Type	Method
Service	C B S CORP	Defendant	Pond, Frank D	Pond North LLP	Attorney in Charge	E-Service
Service	California Superior Court County of Los Angeles	Interested Party	Elias-JU, Emilie	California Superior Court-Los Angeles County-CCW Courthouse-Elias (324)	Attorney in Charge	E-Service
Service	Crown Cork & Seal Co Inc	Defendant	Olson, Dean A	Morris Polich & Purdy LLP-Los Angeles	Attorney in Charge	E-Service
Service	Edward J Orton Jr Ceramic Foundation	Defendant	Chiosso, Anthony C	Jackson Jenkins Renstrom LLP	Attorney in Charge	E-Service
Service	FOSTER WHEELER ENERGY CORP	Defendant	Agopian, Shaghig	Hugo Parker, LLP - San Francisco	Attorney in Charge	E-Service
Service	FOSTER WHEELER ENERGY CORP	Defendant	Sham, Elsa	Hugo Parker, LLP - San Francisco	Attorney in Charge	E-Service
Service	GEORGIA PACIFIC LLC	Defendant	Biderman, David T	Perkins Coie LLP-San Francisco	Attorney in Charge	E-Service
Service	Industrial Holdings Corp	Defendant	Pietrykowski, Michael J	Gordon & Rees-San Francisco	Attorney in Charge	E-Service
Service	INGERSOLL RAND CO	Defendant	Prindle, Kenneth	Prindle Decker & Amaro LLP-Long Beach	Attorney in Charge	E-Service
Service	INGERSOLL RAND CO	Defendant	Milbrodt, Jeremy	Prindle Decker & Amaro LLP-Long Beach	Attorney in Charge	E-Service
Service	JOHN CRANE INC	Defendant	Gowin, Julia	Hawkins Parnell Thackston & Young LLP - San Francisco	Attorney in Charge	E-Service
Service	Packett, Roger	Plaintiff	Rosenthal, Deborah R	Simmons Hanly Conroy - San Francisco	Attorney in Charge	E-Service

Service	Soco West Inc	Defendant	Murrin, Charles P	Murrin & Associates LLC	Attorney in Charge	E-Service

Additional Recipients (0)

Case Parties

Close