

FILE NAME: Orton (ORT)

DATE: 2016 Jan 14

DOC#: ORT016

DOCUMENT DESCRIPTION: Legal - Declaration of Barry Castleman

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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

**DECLARATION OF BARRY I.
CASTLEMAN**

Date: January 14, 2016
Time: 1:45 p.m.
Department: 324, Hon. Emilie H. Elias
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

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

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

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

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

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

11 6. I am the author of Asbestos: Medical and Legal Aspects, now in its fifth edition
12 (2005). The first edition was largely identical to my doctoral thesis, which is a major
13 authoritative treatise on "state-of art." My book has been relied upon by the scientific and
14 medical communities and cited as a learned treatise by a number of courts. It is extensively
15 footnoted and annotated and is available in libraries and bookstores throughout the United
16 States. It encompasses a comprehensive review of medical literature of all kinds, as well as
17 other literature available in libraries and published sources such as government publications,
18 safety magazines, engineering journals, trade magazines, insurance publications, encyclopedias,
19 popular magazines, and newspapers. The doctoral thesis also involved research based on
20 unpublished government records. The government records included workers' compensation
21 claims files where claims had been made by individuals alleging that they had asbestos-related
22 diseases of the lungs, claims against various companies that were their employers, some of
23 which companies were also manufacturers of asbestos insulation products these individuals has
24 used in the course of their work. I have also published many articles on the asbestos and
25 industry knowledge of asbestos related health hazards.

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

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

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

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

25 14. Other sources were also remarking on the disease, asbestosis. A journal called
26 National Underwriter, a publication of the insurance industry, in a 1932 article called
27 "Occupational Diseases are Not Generally Understood," repeatedly called attention to
28

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

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

11 16. By 1932 there were 60 or more publications in print on asbestosis. These were noted
12 by way of reference in a bibliography published by the International Labor Organization in
13 1932. These publications continued to emerge from many countries. The first cases of
14 asbestosis in the United States were reported in 1930. Asbestosis was also described in an
15 article in the trade magazine Asbestos in the United States in the March 1930 issue, amid
16 numerous advertisements from asbestos mining and manufacturing companies.

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

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

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

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

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

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

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

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

24 24. The disease was consistently found to affect a large percentage of people who were
25 employed in the industries where asbestos products were manufactured. This was reported in
26 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 than 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

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

5 28. In 1942, Dr. Wilhelm Hueper published a book on occupational cancer called
6 Occupational Tumors and Allied Diseases, nearly 900 pages long. It included a lengthy section
7 on asbestosis and cancer from asbestos, in which a large number of references from the United
8 States, Great Britain and Germany were cited in support of the view that asbestos most likely
9 did cause occupational cancer. Dr. Hueper made unequivocal statements the next year in the
10 article called, "Cancer in its Relation to Occupational and Environment" published in the
11 Bulletin of the American Society for the Control of Cancer. There, Hueper said that asbestosis
12 cancer of the lung as he called it then, was the newest proved occupational cancer of the lung, to
13 be listed with the ones that were already known up at that time. In the Journal of the American
14 Medical Association (JAMA), there appeared an editorial called "Environmental Cancer" in
15 1944, in which asbestos was listed among agents known and suspected of causing occupational
16 cancer.

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

19 C. Mesothelioma

20 30. The disease mesothelioma of the pleura was attributed to exposure to asbestos or
21 asbestosis starting in 1943 with the report of Dr. H.W. Wedler in Heidelberg. There were
22 additional reports in the German literature as well as British literature. The case reports that
23 appeared prior to 1960 are annotated and cited by way of reference in Chapter 2, table 5 of my
24 book. Dr. Wedler was the first to state that he believed the pleural cancers were occupational
25 cancers, and his work was prominently cited in the United States in the 1940s. Other German
26 pathologists starting with Leicher in 1954 would identify peritoneal mesothelioma as an
27 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.

1 35. By this time, The National Safety Council had been established for 28 years as
2 management's response to the industrial safety issue, with its associated problems of disability
3 compensation and labor unrest. Starting in the 1930s the National Safety Council has published
4 numerous articles, pamphlets and other materials concerning the hazards of asbestosis in the
5 1930s. Many of the annual congresses held forums and discussions about dust disease. The
6 transactions of these meetings were automatically mailed to the industrial members.

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

16 37. The refractories industry played a major role in this meeting and subsequent
17 establishment of the Air Hygiene Foundation (renamed the Industrial Hygiene Foundation in
18 1941). As chairman of the Temporary Organizing Committee, Mr. Hitchens, of the American
19 Refractories Institute, oversaw much of the planning of the structure and outline of purposes of
20 the organization. Through Industrial Hygiene Foundation publications, meetings and
21 conferences, its members have been long aware about dust diseases and the responsibilities of
22 manufacturers to warn concerning hazards associated with their products.

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

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

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

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

16 41. Reference to cancer from asbestos appeared in the New York Times on Jan. 7, 1948,
17 Business Week Nov. 13, 1948, Washington Post Nov. 21, 1948, and Scientific American in
18 January 1949 in an article called "Cancer and Environment". It appeared in Newsweek
19 magazine May 15, 1950. The reference to asbestos in Newsweek was in relation to the rising
20 rate of lung cancer in urban dwellers compared with people in the rural areas. This was partly
21 attributed to the presence of carcinogens like asbestos in urban air, according to Dr. Hueper,
22 Chief of the Environmental Cancer Section, US National Cancer Institute. The Los Angeles
23 Times noted the carcinogenicity of asbestos April 6, 1951, the Chicago Tribune on June 10,
24 1951. The Encyclopedia Britannica made reference to asbestos as one of the causes of
25 occupational cancer under the title "cancer" in 1952, and asbestos was described as a lung
26 cancer hazard to steamfitters working with asbestos in the Wall Street Journal on April 7, 1959.

1 42. The *Engineering Index* was first available in 1883. This index contains made trade
2 journals and leans toward engineering applications rather than general interest or basic chemical
3 research. Another source of technical and medical information is the *Bibliographic Index*, which
4 was first published in 1945 by the H.W. Wilson Company and covers the years beginning with
5 1937. This index lists bibliographies and thus could be used as a source of accumulated
6 references. The bibliography sources are listed under subject headings arranged alphabetically.
7 Examples of headings in these indexes, in a search on the health effects of asbestos, include:
8 Asbestos, Dust, Workmen's Compensation, Diseases, Industrial Hygiene, and Pneumoconiosis.
9 The technology indexes were useful in locating articles on asbestos in U.S. trade publications.

10 43. Additionally, an enormous collection of information was available from U.S.
11 government sources. NIOSH has issued *Current Intelligent Bulletins* since 1975; these have
12 included hazard alert notices on asbestos and other occupational health hazards. Prior to the
13 establishment of NIOSH under the Occupational Safety and Health Act of 1970, a predecessor
14 agency existed, the Bureau of Occupational Safety and Health, which was also within the U.S.
15 Public Health Service (PHS) in the Department of Health, Education, and Welfare. Reports on
16 occupational health hazards were published by the PHS in *Public Health Bulletins* (1881-1949)
17 and continued as *Public Health Monographs* (1950-1971). Notable among these on the subject
18 of asbestos were Bulletin No. 241 by Dreesen *et al.* (1938) and Monograph No. 36 by Hueper
19 (on lung carcinogens, 1955). Other subjects covered by these reports include: Bulletin No. 208,
20 Health of Workers in Dusty Trades (1933); Bulletin No. 238, Cement, clay, and pottery
21 industries (1937); Bulletin No. 260, Illness among workers and housewives (1941); Bulletin No.
22 267, Lead arsenate exposure of orchardists and consumers (1941); etc. Some of these files are
23 still retained and are known as the historic toxicology files. They were located in the Cincinnati
24 offices of NIOSH and the American Conference of Governmental Industrial Hygienists
25 (ACGIH).

26 44. The United States Environmental Protection Agency has been in existence since
27 1970, and it primarily regulates air pollution, water pollution, and land disposal of industrial

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

11 E. TLVs

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

19 46. Authors in other countries took issue with the idea that one could recommend an
20 occupational exposure limit of dust in the air and thereby completely control health hazards.
21 Under the heading "The Prevention of the Dust Disease" Dr. McLaughlin, of the Factory
22 Inspectorate in Great Britain, writing in The Lancet in 1953, said that people in some countries
23 who recommend these maximum allowable concentrations seem to think that man is a
24 "standardized machine which he clearly is not." McLaughlin noted a number of factors that
25 would distinguish people in terms of their risks in ways that we could recognize as well as the
26 fact that there are also ways that we can't recognize, where one individual exposed to the same
27 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

1 nothing to warn users of its products until required to do so by federal regulations. Mine Safety
2 Appliances Company published several pamphlets outlining the problems associated with dusts
3 and recommending the usage of respirators, yet did not put warnings on its asbestos clothing. In
4 1964 Eagle-Picher told GREFCO and NARCO that it was putting warning labels on the
5 asbestos products it manufactured for them, but neither company put warnings on its own
6 manufactured asbestos products. These are but a few examples of widespread failure to warn
7 workers concerning the hazards associated with asbestos and other dusts.

8 **G. Household Contact Asbestos Exposure and Disease**

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

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

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

26 55. Corporate physicians advised a number of safeguards that would have protected
27 families of workers at a Chrysler plant being built in 1946. The plant was to use asbestos and
28

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

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

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

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

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

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

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

11 61. Once it was substantially established in the 1940s that asbestos exposure could cause
12 lung cancer, the consequent public health impact of asbestos use was dramatically increased.
13 Cancer is initiated by the malignant transformation of a single cell which replicates itself until it
14 threatens the life of the affected person. This meant that asbestos exposures insufficient to cause
15 death from asbestosis could clearly cause death by cancer. This had been recognized by
16 German workers' compensation authorities in establishing workers' compensation recognition to
17 lung cancer as occupational in the presence of "slight" asbestosis as early as 1939 (Baader,
18 "Asbestosis" German Med. Weekly 65: 407-408, 1939). The danger of less-than-occupational
19 asbestos exposure as a cause of lung cancer was noted by Dr. Wilhelm Hueper, Chief of the
20 Environmental Cancer Section of the US National Cancer Institute, in warning in 1950 that
21 urban air pollution including carcinogens such as asbestos was a factor in the rising incidence of
22 lung cancer in the general population ("Environmental Cancer Hazards Caused by Industrial Air
23 Pollution" Arch. Ind. Hyg. Occ. Med. 2: 325-328, 1950; "Small Studies" Newsweek, p. 53, May
24 15, 1950).²

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

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

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

10 64. Industry was well aware that asbestos was mineral with high resistance to destructive
11 forces such as heat and that asbestos did not decompose even upon prolonged storage. (One
12 scientist borrowed from the language applied to radiation in stating that asbestos in the
13 environment had a "half-life of infinity"). It was also obvious that, absent any safeguards to
14 prevent it, workers typically exposed to dust from asbestos products would take the contaminant
15 home on them, where it would accumulate in carpets, clothing, window curtains and furniture.
16 It was also known that the very young (the developing organism) would be most susceptible to
17 the action of carcinogenic agents, a fact demonstrated in laboratory testing of carcinogenic
18 agents at least as far back as 1938 (cited in Hueper, Occupational Tumors and Allied Diseases,
19 1942, p. 758).

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

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

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

10 67. In 1954, W.R. Grace & Company bought Dewey & Almy Chemical Co., which had
11 made asbestos brake linings before it closed its "Multibestos" plant in Massachusetts in 1936.
12 Bradley Dewey, the company's president, was interested in the subject of asbestosis and
13 corresponded with a state official and others about it in the 1930s. His company had numerous
14 workers' compensation claims brought against it by employees of the "Multibestos" plant, and
15 some of the plant worker asbestosis cases were reviewed at the Saranac Laboratory in the mid-
16 1930s. (Vorwald Patient Files, Nos. P-31-37, P-35-85, P-34-101, P-35-129, and P-36-124,
17 Armed Forces Institute of Pathology, Washington, D.C.)

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

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

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

12 70. In 1965, W.R. Grace was discussing the presence of asbestos in Libby vermiculite,
13 and reports of "men having pulmonary trouble" at Libby, with Grant Industries. (See, e.g., Feb.
14 9, 1965, letter from O.F. Stewart (WRG headquarters) to N. Bushell (Grant Industries).) A
15 March 1969 internal W.R. Grace memorandum advises use of warning labeling on products
16 containing vermiculite, to aid in defense of product liability cases. (See Mar. 11, 1969,
17 Memorandum from P. Kostic to R.W. Sterrett.) Attached to the memorandum was an article
18 referencing the introduction of an "Asbestos Safety Bill" in Congress and reports of
19 mesothelioma in household contacts of asbestos workers and neighbors of asbestos plants. By
20 1977 there were internal discussions at W.R. Grace about the possibility of tremolite asbestos in
21 expanded vermiculite and that tremolite might be carcinogenic in the digestive tract of humans
22 or animals. (See Feb. 18, 1977, Memorandum from H.C. Duecker to J. Yang, in reference to a
23 product called "Verxite," which was an expanded-vermiculite product sold as a food additive
24 for livestock and poultry feeds and dogfood; see also July 14, 1977, Memorandum from J.C.
25 Yang to H.C. Duecker noting a letter from Dr. William Smith, stating that a 50-50 tremolite-
26 vermiculite combination injected into hamsters caused mesotheliomas.)

1 71. W.R. Grace did not close its vermiculite mining operation in Libby, Montana, until
2 1990. Grace was well aware that the tremolite asbestos that was part of the vermiculite ore
3 could give rise to hazardous exposures and warrant warning labeling.

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

5 72. I have reviewed the deposition testimony of plaintiff Roger Packett, in which he
6 identifies a dark-colored vermiculite packing material that came in the boxes of Orton
7 Pyrometric Cones that he and his wife, decedent Donna Packett, used in 1972, 1973, 1974, and
8 1981, as well as at other times. I have also reviewed the declaration of Terry Spear and attached
9 exhibits, including testimony and attestations by Edward Orton Jr. Ceramic Foundation
10 ("Orton") corporate designee and former General Manager Gary Childress. According to these
11 sources, Orton was established in 1932, but it began manufacturing pyrometric cones decades
12 earlier. Orton has manufactured and sold millions of its ceramic arts products in 70 countries; its
13 peak sales were in the 1970s and 1980s. Prior to mid-1963, Orton packaged its pyrometric
14 cones in saw dust. Beginning in 1963, Orton began packaging its pyrometric cones in
15 vermiculite that it obtained from W.R. Grace. Orton did not stop using vermiculite to package
16 its cones in, until 1983. Orton is an Ohio-based company and has its only manufacturing
17 facilities in Ohio.

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

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

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

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

1 I declare under the penalty of perjury under the laws of the State of Maryland and of the
2 United States that the foregoing is true and correct. Executed this 21 day of December, 2015,
3 at Garrett Park, Maryland.

4
5
6 
7 BARRY J. CASTLEMAN, ScD

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