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Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000

by

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Abstract

The use of asbestos is one of the most controversial issues surrounding the industrial minerals industry. Its carcinogenic nature, an overall lack of knowledge of minimum safe exposure levels, its widespread use for more than 100 years, and the long latency for the development of lung cancer and mesothelioma are the main contributing factors to these controversies. Another factor is that, despite decades of research, the mechanisms responsible for its carcinogenic properties are still largely unknown. The United States has produced about 3.28 million metric tons of asbestos fiber and used approximately 31.5 million tons between 1900 and 2000. About half of this amount was used since 1960. Cumulative world production during that same time period was about 173 million tons. Assuming that unusually large stocks are not maintained and that world consumption roughly equals production, about half of the world production and consumption occurred since 1976. The United States and western European nations were the largest consumers of asbestos during the first two-thirds of the 20th century. They were surpassed by the collective production and consumption of States within the former Soviet Union by the 1970s. With the onset of the health issues concerning asbestos in the late 1960s and early 1970s, world production and consumption began to decline during the 1980s. In 2000, world consumption, estimated to be 1.48 million tons, was only 31% that of 1980. Countries in Asia, South America, and the former Soviet Union remain the largest users of asbestos. More specifically, Brazil, China, India, Japan, Russia, and Thailand are the only countries that consumed more than 60,000 tons of asbestos in 2000. These six countries accounted for more than 80% of world's apparent consumption in 2000.

1. INTRODUCTION

Asbestos has been used for more than 3000 years. Early evidence of its use to strengthen clay pottery as long ago as 2500 B.C. has been found in Finland (Gross and Braun, 1984, p. 9). Anecdotal stories of its use have been reported by many including Pliny the Elder (circa 79) and Marco Polo (circa 1250). Some of the earlier uses were crematory shrouds, lamp wicks, and incombustible napkins and tablecloths. The tablecloths could be tossed in the fire to be cleaned without fear of damage. Ben Franklin reportedly used an asbestos purse not to protect his money, but to prevent it from burning the proverbial hole in his pocket (Alleman and Mossman, 1997, p. 70-71; Anonymous, 1928, p. 14-16; Bowles, 1937, p. 5-7; Bowles, 1946, p. 13-14; Natural Resources Board of Southern Rhodesia, 1963, p. 14; Selikoff and Lee, 1978, p. 6-7; Sinclair, 1959, p. 1-3).

The beginnings of the modern asbestos industry began in the early 1800s when the Italians established a textile manufacturing industry. Products such as fabrics, string, and book covers were made partly with asbestos (Alleman and Mossman, 1997, p. 71; Bowles, 1946, p. 14; Sinclair, 1959, p. 3, 277). Consumption at that stage still was extremely low compared with 20th century usage. As nations became more industrialized, new uses that took advantage of the strength, heat resistance, and flexibility of asbestos fibers began to appear by the mid-1800s. Asbestos soon was used in packings in steam glands of high-temperature machines, insulation on steam pipes, and fireproof paint and roofing materials. Textiles still provided a ready, yet small market, during this period of expanded use (Alleman and Mossman, 1997, p. 72; Sinclair, 1959, p. 278).

The discovery and opening of large asbestos deposits in Canada, Russia (collectively grouped with the other States of the former Soviet Union and henceforth referred to as the FSU unless specified), and South Africa in the late 1800s overcame the problem of providing a large and steady supply of asbestos to meet growing demand (Selikoff and Lee, 1978, p. 8; Sinclair, 1959, p. 3). The development of the Hatschek machine for making asbestos-cement flat and corrugated panels in 1900 resulted in a significant increase in demand for asbestos (Rosato, 1959, p. 63; Sinclair, 1959, p. 279). This technology enabled the mass production of inexpensive, fireproof building materials. Soon to follow was the development of a method to mass produce asbestos-cement pipe in 1929, which proved invaluable for the construction of municipal water supply and waste lines (Rosato, 1959, p. 79). The rise of the automobile industry in the early 1900s brought about an ever-increasing demand for asbestos to manufacture brakes, clutch components, and engine gaskets (Sinclair, 1959, p. 278).

With the growth of the world economies and population after World War I and the Great Depression of the 1930s, there was growth in construction and other market sectors. Sales and use of asbestos increased to meet the demands of these new and expanding markets. In addition to automotive and asbestos-cement products, demand grew for asbestos millboard and paper for electrical panels; textiles for insulating electrical wiring; spray-on asbestos products for protecting steel girders in buildings; reinforcing, heat-resistant fillers for plastics; fire-resistant roofing materials such as asbestos felts, shingles, and asphalt roofing compounds; inexpensive, durable, and dimensionally stable flooring products such as vinyl asbestos tile and flooring felts; heat- and acid-resistant gaskets and packings; thermal insulation on boiler systems for buildings and homes; fireproof suits for firefighters; reinforcement for plasters and caulking compounds; and filler and reinforcer in paints and asphalt road surfacing (Rosato, 1959, p. 23-27; Selikoff and Lee, 1978, p. 19-20). In all, asbestos was used in about 3,000 applications or product types by 1958 (Quebec Asbestos Information Service, 1959, unpaginated). A time line listing significant developments in the early history of the asbestos industry was published in 1953 (Anonymous, 1953, p. 4-6). Selikoff and Lee (1978, p. 17-18) also presented a historical time line of significant events regarding the development of the asbestos industry through 1972. Several of these developments are listed in Table 1. Over time, asbestos has been honored for its “service to humanity” (Alleman and Mossman, 1997, p. 72) and called a “boon to humanity” and “faithful servant of mankind” (Bowles, 1946, p. 6, 37), “the most important of the non-metallic mineral products of the world—and certainly one of the most wonderful” (Summers, 1919, p. 10), and even the “magic mineral” (Quebec Asbestos Information Service, 1959, unpaginated).

For much of the 20th century, the United States was the leading user of asbestos (Buckingham and Virta, 2002; Ross and Virta, 2001, p. 84-85; Appendix A). This occurred because much of the early manufacturing research was conducted in the United States, industrial demand for asbestos grew rapidly in the early 1900s, and a ready supply of asbestos just across the border in Canada (Sinclair, 1959, p. 279). In the United States and, to a lesser extent, in many European countries, the bubble burst on asbestos’ popularity in the late 1960s and early 1970s (Alleman and Mossman, 1997, p. 74). While health research from the 1920s to 1940s demonstrated an association between exposure to asbestos and asbestosis, it wasn’t until the late 1950s and early 1960s that an association between asbestos exposure and lung cancer was conclusively demonstrated (Gross and Braun, 1984, p. 20-21; Selikoff and Lee, 1978, p. 22-23, 31-32; U.S. Department of Health and Human Services, 1992, p. 289-290). With these findings, public opposition to the use of asbestos increased significantly. Liability eventually became a major issue for producers and manufacturers. In the United States, asbestos producers and manufacturers of asbestos products began facing an increasing number of large class action lawsuits filed on behalf of those suffering from asbestos-related diseases (Virta, 2002, p. 15). This liability contributed to a shift by product manufacturers to asbestos substitutes, such as aramid fiber, cellulose fiber, polyvinyl alcohol fibers, or wollastonite or alternative products such as fiberglass shingles, mineral wool insulation, ductile iron and polyvinyl chloride pipe, graphite packings, metallic disk brake pads, and aluminum siding (Hodgson, 1989; Virta, 1994). Similar movements toward the use of non-asbestos products followed in many other countries, particularly in western Europe. It should be noted, however, that many industrial minerals followed a pattern of growth through the 1960s and 1970s and then, as markets matured, the rate of growth flattened or even declined. The effect of maturing asbestos markets probably was superimposed on top of the effects of the asbestos health issue in the United States and many European nations, exacerbating the situation for the industry.

These factors resulted in a dramatic decline in the use of asbestos in the industrialized countries, a movement toward increasingly strict exposure limits for occupational settings, new consumer and environmental regulations, and, by the early 2000s, full or partial bans on the use of asbestos in 16 countries, including Argentina, Austria, Belgium, Chile, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Saudi Arabia, Sweden, Switzerland, and the United Kingdom. Additionally, the European Union has voted to phase out the use of asbestos, with exceptions, by 2005. However, some 60 countries still favor the controlled use approach regarding chrysotile asbestos (B.J. Pigg, Asbestos Information Association/North America, oral commun., 2002).

Of interest, from a historical and exposure standpoint, is how much asbestos was used in each country over time. This information provides a means by which to determine past, current, and future markets for asbestos and some insight as to the potential for past occupational asbestos exposures in various countries. Total and market specific usage data for asbestos generally are lacking because most countries did not have the resources or feel the need to gather and evaluate that kind of information. Even in the United States, only asbestos production (sales) has been tracked for more than 100 years; import data were not gathered until 1931 and asbestos consumption, by market, was not documented until about 1972, with only estimates extending back to 1965. This paper reviews production and market changes throughout the world and provides some insight as to the levels of asbestos used in individual countries over time.

2. ACKNOWLEDGMENTS

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3. DATA SOURCES

The data cited in this report were extracted from a variety of sources. This was necessary because no single source contains a complete set of all statistics used in this paper. These include the USGS Minerals Yearbook chapters on asbestos after 1995 (Vol. I, Metals and Minerals); the U.S. Bureau of Mines (USBM) Minerals Yearbook chapters on asbestos before 1996 (Vol. I, Metals and Minerals) and the corresponding International volumes of the Minerals Yearbooks between 1963 and the present; the Statistical Summary of the Mineral Industry published between 1923 and 1973 by the Institute of Geological Sciences, Mineral Resources Division, Her Majesty's Stationery Office, London; the World Mineral Statistics published between 1983 and 2001 by the British Geological Survey (BGS), Keyworth, Nottingham, England; the World Mineral Statistics published between 1981 and 1983 by the Institute of Geological Science, Natural Environment Research Council, Her Majesty's Stationery Office, London; the 1973, 1990, and 1999 Canadian Minerals Yearbooks, Natural Resources Canada (and its predecessor Energy, Mines, and Resources Canada); Internal Report No. 5 by the Department of Mines, Minerals Bureau, Braamfontein, Republic of South Africa, 1977; the 1988 and the 1998/1999 editions of the South Africa's Mineral Industry, by the Department of Minerals and Energy, Mineral Economics Directorate, Minerals Bureau, Pretoria, Republic of South Africa; and Griffiths, Joyce, 1989, South Africa's Minerals (p. 21), Industrial Minerals, no. 263, August, p. 18-53.

In general, data in publications have been revised as new data were received. These revisions, however, have not been published in any systematic fashion. As a result, data from the various sources frequently do not agree for any given year. Another problem is that data by country are often revised but not published; only the revised total world production data were published. Thus, the sum of production of individual countries may not equal the revised world production. Another problem is that the data are a mix of ore production, fiber production, and fiber sold or used. Also, data were not always available from all countries for all years. When estimates were made in publications, usually there was no indication which data were estimates nor any indications of how the estimates were made. There is no way to resolve these problems short of the impossible task of retrieving all of the survey data, so they will have to be accepted as a limitation of this historical review.

When possible, data were extracted from one source to maintain consistency over the longest period of time. For the section entitled "World supply and trade," data extracted from the USGS and USBM Minerals Yearbook chapters on asbestos were used as the basis for the evaluation. Some of the data are available on the USGS web site at URL <http://minerals.usgs.gov/minerals/pubs/of01-006/asbestos.html>. Some of the numbers under "World supply and trade" do not match those on the USGS web site because estimates for non-responding survey countries are included in this report. These estimates are based on world asbestos market conditions, accounts from other data sources, and long-term production trends within the country. Adjustments also were made for countries reporting crude ore production rather than fiber production. For the section "World consumption," data extracted from the publications of the BGS and its predecessors were used to calculate the apparent consumption for each country. When discrepancies arose or data were not available in the BGS publication, data extracted from the previously mentioned references or estimates that were the most consistent with market conditions at the time were used. Despite these caveats, the data are deemed sufficiently reliable to make a fairly accurate evaluation of asbestos consumption trends worldwide as well as those of regions and individual countries. The reader should note, however, that the tables presented in this report and appendices are snapshots of world activities at a particular

time. Activities that may have occurred during the time gaps are not taken into consideration. Also, data on some countries were not available in 1999 and 2000 so their absence in Appendix A tables does not necessarily mean that there was no asbestos production, exports, or imports for a particular country for a particular year.

4. WORLD SUPPLY, DEMAND, AND TRADE

4.1 United States

Supply

Commercial asbestos production was recorded in 15 States since 1900: Alaska, Arizona, California, Georgia, Maryland, Massachusetts, Montana, North Carolina, Oregon, Pennsylvania, South Carolina, South Dakota, Vermont, Virginia, and Wyoming. There probably were small amounts of unrecorded production in additional States. The largest producer States were Arizona, California, North Carolina, and Vermont. Most of the asbestos mined in the United States was chrysotile although much of the early production was of amphibole asbestos. These amphibole asbestos mines generally were short-lived. The longest sustained production of amphibole asbestos was from North Carolina, where anthophyllite asbestos was mined from the early 1930s to 1979 (Bowles, 1934, p. 2-7; Bowles, 1959, p. 6-7; U.S. Geological Survey and U.S. Bureau of Mines Minerals Yearbook chapters on asbestos, 1900 to 2000).

U.S. asbestos production was relatively low at the start of the 20th century, less than 10,000 tons per year until 1936. After the Great Depression of the early 1930s and with onset of World War II, U.S. production increased through 1942 to meet increased war demands. After 1942 and during the recessionary period following World War II, demand and consequently U.S. production declined, not reaching its former level for another six years. It wasn't until 1965 that the United States reached the 100,000 metric-ton-per-year production mark. World production, by 1965, had already exceeded 2.8 million tons. U.S. production exceeded 100,000 tons per year for only 10 years, 1965 to 1973 and in 1976. Peak production was about 136,000 tons in 1973, which was 3% of the world's asbestos production and only 17% of the U.S. demand for that year (table 2). It was at that stage that the asbestos health controversy began to seriously affect demand, causing U.S. production to stagnate and then take a precipitous decline. The production of 5,000 tons in 2001 was only 4% of the peak in 1973. In 2002, the last asbestos mine in the United States closed, marking the end of more than 110 years of U.S. asbestos production.

Despite having produced 3.28 million tons between 1900 and 2000, the United States almost always was dependent on imports to meet most of its demand. Imports have supplied more than 88% of the U.S. asbestos needs over the century. Only for 5 of the past 100 years has U.S. import dependence been less than 90%. Canada was the major supplier of asbestos to the United States throughout most of the century, averaging 94% from 1900 to 2000. The RSA supplied up to 6% of U.S. imports but averaged 4% since the 1930s (table 2). Swaziland and Zimbabwe were two other small, yet important, suppliers of asbestos to the United States.

About 97% of the 29.5 million tons of asbestos imported into the United States during the 20th century was chrysotile, mostly from Canada. Crocidolite imports were 365,000 tons (1.2% of total asbestos imports) and amosite imports were 282,000 tons (0.9% of total imports). The United States has not imported any amosite since 1985. Most of the asbestos imports that have been reported as crocidolite for the past 5 or so years are believed to be chrysotile based on its source and Customs value (table 2).

Demand

Asbestos consumption in the United States was minimal in the 1800s. At that stage, markets primarily were low technology applications such as textiles (i.e., fireproof cloth such as theater curtains, boots, gloves, etc.) and insulation and packings for steam locomotive and other boiler systems (Bowles, 1937, p. 8-10). Consumption did not increase significantly until the early 1900s when an expanding population and increased industrialization resulted in a demand for a steady supply of cost-effective, mass-produced construction materials. Asbestos products that filled these needs included asbestos-cement pipe and sheet, coatings and compounds, flooring, friction materials such as brakes and clutches, and insulation. These were the large tonnage uses for asbestos. Other smaller, but still important applications, were in asbestos paper, asphalt emulsions, packings and gaskets, plastics, roofing felts, shingles, and textiles (U.S. Bureau of Mines, 1985, p. 62-64).

Starting from a rather small 15-20,000 tons per year consumption around 1900, markets expanded to a peak of 801,000 tons in 1973. Demand after 1900 was fairly continuous with a short period of rapid growth in demand during World War I. The end of the Great Depression by the middle 1930s and the onset of World War II in the late 1930s brought about a brief surge in demand to meet U.S. demands. Demand dropped back to pre-war levels after the war and then increased in step with economic growth in the United States. There was a general flattening of the demand curve in the 1950s during the Korean conflict and later in the early 1970s. The flattening of demand occurred after the early 1970s because the use of asbestos was becoming controversial and markets for asbestos in the United States appear to have matured. After 1973, asbestos consumption declined rapidly. By 2000, consumption was only about 15,000 tons or 1.9% of 1973's level and equivalent to consumption in the late 1800s (table 2).

In relation to overall world consumption, the United States was the largest market economy and world user of asbestos during much of the 20th century. The U.S. consumed about 18% of the world's asbestos production between 1900 and 2000. This, in itself, is

remarkable considering that for the last 35 years of the 20th century, the U.S. share consistently has been less than 10% and it has been less than 1% for the past 12 years. Until 1950, the ratio of U.S. apparent consumption to world production was between 37% and 99%, averaging 62%. This clearly demonstrated the strength of the U.S. asbestos industry in its early history. As more countries developed asbestos manufacturing industries after World War II, the U.S. share of the world market declined, averaging only 14% from 1950 to 2000 (table 2).

Following World War II, demand for asbestos fiber increased at a faster rate in other parts of the world than in the United States. Much of this growth was spurred by the massive reconstruction efforts in Europe after the war and later by growing economies. Consumption in the United States declined from 51% of the world production in 1950 to 19% in 1970. With the onset of the asbestos health issues, U.S. consumption declined even further. By 1975, U.S. consumption was 13% of world production; by 1985, 4%; and by 2000, less than 1% (table 2).

More than 71% of the U.S. consumption of asbestos occurred between 1950 and 2000 and about 39% since 1965, which is the earliest available estimate of U.S. asbestos consumption, by market share. Thus, a fair idea of the markets into which a sizable share of the asbestos went throughout most of the history of U.S. asbestos usage can be determined. Table 3 presents the end use data for asbestos from 1965 to 2000 (U.S. Bureau of Mines Mineral Facts and Problems, 1975, p.113; 1980, p.63; 1985, p. 58; U.S. Bureau of Mines Minerals Yearbooks, 1984-2000). The totals in table 2 do not match exactly those of table 3 because of rounding of data and exclusion of entries of less than 1,000 tons in table 3. With that caveat, the average percent breakout of the major U.S. markets between 1965 and 2000 was asbestos-cement pipe, 18%; asbestos-cement sheet, 6%; coatings and compounds, 2%; electrical insulation, 2%; flooring, 22%; friction products, 11%; packing and gaskets, 4%; paper, 3%; plastics, less than 1%; roofing products, 12%; textiles, 2%; thermal insulation, less than 1%; and other, 18% (table 3).

Because of the asbestos health issue, markets changed over this time period (table 2). The largest losses were in asbestos-cement pipe and sheet, coatings and compounds, flooring, and insulation. In 1965, before the asbestos health issue intensified, flooring accounted for 25% market share, followed by asbestos-cement pipe (19%), roofing (9.9%), friction products (8.9%), asbestos-cement sheet (6.9%), electrical insulation and packing and gaskets (3% each), paper and textiles (2% each), coatings and compounds, thermal insulation, and plastics (less than 1% each) and unknown uses (20%). By 1980, consumption was 19.5% for flooring, followed by friction products (14.5%), asbestos-cement pipe (11.7%), roofing (6.7%), asbestos-cement sheet (6.4%), packing and gaskets (3.3%), coatings and compounds (3.1%), electrical insulation (1.7%), thermal insulation (0.8%), plastics and textiles (0.6% each), paper (0.3%), and unknown uses (30.9%). In 2000, the end use markets were roofing (60%), gaskets (20%), friction products (13.3%), coatings and compounds, plastics, and unknown uses (6.7%).

Some anecdotal information on markets prior to 1965 is available. Josephson and Marsh (1948, p. 146-147) reported that U.S. usage of asbestos fines in floor tile began to increase rapidly following the development of suitable production methods. A 1939 and 1947 U.S. Bureau of the Census report also illustrates the growth in the U.S. asbestos manufacturing industry. Production of asbestos floor tile increased to 34,681 million square meters (41,479 million square yards) in 1947 from just 4,124 million square meters (4,933 million square yards) in 1939, an 8-fold increase in as many years. Corrugated sheet production increased to 4,258 million square meters (45,839 million square feet) in 1947 from 698 million square meters (7,551 million square feet) in 1939. Less dramatic but still substantial increases are observed in many other product categories (Josephson and Barsigian, 1951a, p. 146). Kennedy and Foley (1960, p. 200) reported that 96% of the chrysotile used in the United States was short fiber, used principally in asbestos-cement and asbestos-asphalt building materials.

4.2 Canada

Chrysotile mining began in Canada around 1878 (Bowles and Barsigian, 1945, p. 1481; Sinclair, 1959, p. 3). By 1920, Canada already was producing about 162,000 tons per year or 84% of the world's production. Production suffered in the early 1930s because of the Great Depression in the United States (the largest Canadian market) and recessions worldwide that affected the entire asbestos industry. By 1935, the U.S. economic recovery bolstered the Canadian asbestos industry. The onset of World War II slowed production around 1940 but it recovered around 1946. During that time, mines and mill capacities in Canada were being increased rapidly to meet growing world demand (Josephson and Marsh, 1946, p. 150). Production was slowed briefly by a strike in the Canadian industry in 1949 (Josephson and Barsigian, 1951b, p. 145-146) but quickly resumed following resolution of the dispute. Despite the FSU emerging as a major asbestos producing nation, Canada still retained 62% of global production in 1950.

Competition arose as the FSU, Italy, the RSA, Swaziland, the United States, and Zimbabwe began to increase their production in the 1940s and 1950s, soon to be followed by China in the early 1960s and Brazil and Cyprus in the middle 1970s. By 1960, Canada's share of global production declined to 46% despite an increase in its production. Canadian production peaked in the 1970s, almost coinciding with the peak U.S. consumption as would be expected because the United States was the major destination for Canadian fiber. Then, in 1975, the Canadian asbestos producers suffered from a major mill fire, a landslide in a major mine, strikes, and political and transportation issues, resulting in a sharp (36%) decline in production (Northern Miner, 1975, p. B-12). The industry rebounded quickly, however, only to face the asbestos health issue, which began in the United States in the early 1970s and quickly spread to other countries. Two other factors affecting sales were declines in some of the world economies and political instability in some of the developing nations, which were important purchasers of Canadian fiber in the late 1970s (Roskill Information Services, 1983, p. 20). Canadian production declined through 2000 as asbestos markets worldwide waned. By 2000, Canadian production was

320,000 tons or 15% of world production, down from 43% in 1970. Canada produced about 61 million tons of asbestos between 1900 and 2000, all of it chrysotile (table 4).

Canada, for the most part, has been a major exporter of asbestos fiber over time. Roughly 77% of Canadian production has been exported since 1900 with exports exceeding 80% since 1960. The United States was the largest market for exported Canadian fiber. In 1930, U.S. asbestos imports from Canada were 181,000 tons or about 83% of Canadian production. This declined during the Great Depression in the United States in the early 1930s but picked up again during World War II. The United States imported about 65% of Canadian production in 1940. The ratio of U.S. imports from Canada to Canadian production was 78% in 1950, 37% in 1970 (as the asbestos health issue was developing), 6% in 1990, and 5% in 2000 (U.S. Geological Survey and U.S. Bureau of Mines Minerals Yearbook chapters on asbestos, 1900 to 2000).

Canadian asbestos producers had developed a broad range of customers before the decline of the U.S. market so those countries soon moved ahead of the United States as the major Canadian customers. As U.S. markets changed, the proportions of asbestos grades exported to the United States also changed. In 1973, the United States share of all Canadian exports was 34% (11 of 32 tons) of crude fiber, 24% (203,000 of 837,000 tons) of milled fiber (groups 3, 4, and 5) and 59% (498,000 of 846,000 tons) of short fiber (groups 6 to 9). Groups are asbestos product designations with group 3 containing a higher proportion of longer fibers than group 4, group 4 containing a higher proportion of longer fibers than group 5, and so forth. The United States was followed by Japan for crude fiber, West Germany, Britain, France, and Japan for the milled fiber, and Japan and Britain for short fiber. In all, Canada exported to more than 70 countries in 1973. By 1990, the United States had dropped to third (8% of 938 tons), behind Japan and Taiwan for the crude fiber, fifth (1% of 268,000 tons) behind Spain, the United Kingdom, India, and Sri Lanka for the milled fiber, and second (15% of 203,000 tons) behind Japan for short fiber. In 1999, the United States was grouped with other countries for all but the crude fiber because of the low import tonnage (Vagt, 1973, p. 43; Hoskin, 1990, p. 10.4-10.5; Perron, 1999, p. 17.9-17.11). Thus, Asian markets were relatively small in the 1970s but grew in dominance as markets shifted away from the United States and European countries in the 1980s. While a detailed account of all exports from Canada is beyond the scope of this paper, the Canadian Minerals Yearbook chapters on asbestos, published by Natural Resources Canada, contain such information if required.

4.3 Other market economy countries

Brazil

Brazil is a relative newcomer in the asbestos industry. While small amounts of asbestos were mined as early as 1932, it wasn't until 1967 that Brazil began significant production of chrysotile (Harben, 1984, p. 63). Even then, production was only 16,000 tons in 1970. In 1971, the industry received a boost because of the Brazilian Goals and Bases Program. About \$9.2 million was invested by the government to increase production (Clifton, R.A., 1973, p. 188). Within 10 years, production was almost 170,000 tons. Production peaked in 1991 at 237,000 tons. Following a decline to about 170,000 tons in 1995, production seems to have stabilized. Markets in Brazil were primarily those dealing with the manufacturing of asbestos-cement products (85% of sales for the dominant Brazilian producer) and friction products, including brakes and clutches (Kendall, 1996, p. 49; O'Driscoll, 1989, p. 34).

Export of asbestos began from Brazil in about 1980. In 1986, the major destinations for the largest Brazilian asbestos producer were Argentina, India, and Mexico with smaller shipments being made to China, Japan, Portugal, and Spain (Roskill Information Services, 1986, p. 14). By 1987, exports accounted for 25-30% of sales (O'Driscoll, 1989, p. 34). Exports were 73,000 tons in 1995 compared with 127,450 tons for domestic markets (Kendall, 1996, p. 49). Major destinations for exported fiber include Africa, Asia, the Far East, island nations of the Gulf of Mexico, and Latin America in the late-1980s (O'Driscoll, 1989, p. 34).

Cyprus

Cyprus was a small producer of chrysotile. Although mention of asbestos products appears in early Greek history, systematic mining of small amounts of asbestos did not occur until around 1907 (Anonymous, 1928, p. 39; Howling, 1937, p. 48). Significant commercial production did not begin until about 1950. Prior to that time, production was less than 15,000 tons, with that being attained only in the late 1940s. Production was affected drastically by World War II because Cyprus had an export-oriented asbestos industry. The industry recovered after the war. Within 25 years, production peaked at about 38,000 tons in 1976 (Maliotis and Ilich, 1986, p. 4). From there, a rapid decline occurred and production ceased around 1988. Exports were the key to the industry's survival. In 1962, about 69% of production was exported (May, 1964, p. 256, 259). By 1980, exports had reached 95% of production (Shekarchi, 1982, p. 280). As with Greece and Italy, markets were in Europe (Belgium-Luxembourg, Czechoslovakia, Denmark, France, West Germany, Greece, Ireland, United Kingdom), Africa (Egypt,), and Asia (India, Indonesia, Japan, Syria, Taiwan, and Thailand) (Roskill Information Services, 1990, p. A4). The bulk of these exports were used by the asbestos-cement industry (Virta, 1987, p. 148).

Greece

The earliest report of asbestos production in Greece was by Strabo in the 1st century and later by Solinus and Plutarch. They

indicated that the fiber was carded and woven into handkerchiefs (Evans, 1906, p. 143-144). Despite this early start, large-scale production of asbestos (mainly chrysotile) in Greece did not begin until the 20th century and even then, production was sporadic. Significant production did not begin until the early 1980s as production declined in other parts of the world. In 1981, a new mill and mine near Zidani were opened. Production progressed slowly as technical difficulties were encountered and the world asbestos markets were soft (Sassos, 1983, p. 66). Production increased to 66,000 tons in 1990, from 17,000 tons in 1982. In 1991, the mining operation had one of several financial problems, resulting in a drastic downturn in production. In 1992, the company began operating again under new management (Skillen, 1993, p. 37). Production in Greece increased to 80,000 tons in 1996, declining to 50,000 tons in 1998. Mining ceased in 1998 although fiber recovery from stockpiles and sales from stocks may have continued through 2001.

When the Zidani mine opened, the largest planned market was in asbestos-cement products. About 10% of the mine's output was to be used in other products such as floor tiles, asbestos paper products, putties, and paints (Industrial Minerals, 1978, p. 49). In 1980, 20% to 25% of production was used domestically (Clifton, 1981, p. 98). By 1993, 95% of the fiber was exported to Europe, the Far East, Middle East, and Brazil, predominantly for asbestos-cement and roofing applications (Skillen, 1993, p. 37). Around 1978, Greece was importing about 30,000 tons per year of asbestos for its own asbestos-cement industry (Industrial Minerals, 1978, p. 49).

Italy

Italy was the 2nd largest producer of asbestos in Europe, behind the FSU, for most of the 20th century. Italy was surpassed by Greece in 1989 only with the shut down of the Italian asbestos industry. Systematic production of Italian deposits began in the middle of the 19th century although manufacturing had been reported earlier (Alleman and Mossman, 1997, p. 71; Howling, 1937, p. 59). Even at that, production remained below 10,000 tons until 1941. Prior to the discovery of the Canadian deposits in the late 1800s, Italy supplied much of the world's asbestos needs (Bowles, 1934, p. 19; Howling, 1937, p. 59). Most of that early production was tremolite. After World War I, the Balangero mine near San Vittore opened and chrysotile comparable to Canadian fiber was produced in larger amounts (Howling, 1937, p. 62). After a brief decline during World War II, production increased steadily. Around 1968, the only operating mine in Italy upgraded its facilities to increase production (Icke, 1969, p. 187). Asbestos production peaked at 165,000 tons in 1976 and ceased in 1992. The Italian industry collapsed after the passage of government legislation banning the use of asbestos (Loughbrough, 1992, p. 43). Markets for Italian fiber included adhesives, asbestos-cement products, bitumen, electrical insulation, friction products, jointings, paper, and plastics (Mining Magazine, 1987, p. 25). In 1985, it was estimated that about 70% of domestic sales were for asbestos-cement applications (Craynon, 1988, p. 482).

Italy, having an active asbestos manufacturing industry, exported less than half of its asbestos production. Exports of 63,818 tons accounted for about 40% of production in 1981. The remainder was used domestically in asbestos-cement products (Roskill Information Services, 1983, p. 45). In 1984, exports were estimated to be 57,700 tons. Some of the countries importing Italian fiber were France, Germany, Poland, and Spain in Europe, Turkey in the Middle East, and India, Japan, Taiwan, and Thailand in Asia (Craynon, 1988, p. 470, 477). European countries and Japan were the largest customers, accounting for more than 50% of exports at times. Out of 57,659 tons exported in 1984, West Germany received 15,804 tons; France, 5,700 tons; and Japan, 5,699 tons. Italy imported crude fiber to meet demands, requiring 41,400 tons in 1984 (Sondermayer, 1987, p. 486).

South Africa

South Africa was probably the second most important market economy producer. Not only was South Africa the second largest market economy producing country from about 1950 to the 1980s, South Africa was unique in being a major source of several varieties of asbestos, mainly chrysotile, amosite, crocidolite, but also including smaller amounts of tremolite and anthophyllite. Asbestos production in South Africa began in the late 1800s but had progressed to only a few hundred tons by the start of the 20th century. Production increased slowly from 1900 to about 25,000 tons in the 1940s with only a mild downturn in the 1930s. After World War II, production grew rapidly, undoubtedly aided by major rebuilding efforts worldwide and growing economies starting in the 1950s. The number of mills in the Transvaal area increased from 6 to 27 in 1948-49, allowing for increased fiber production (South African Mining Journal, 1949, p. 527). Mining increased from 41,000 tons in 1948 to its peak of 380,000 tons in 1977 with only minor setbacks. Around 1956, the amosite and crocidolite producers resolved problems with mine pumping and ventilation although these problems didn't appear to affect production significantly (Kennedy and Mattila, 1958, p. 218-219). Chrysotile production capacity received a boost with the completion of a new mill near Barberton in 1969 (Readling, 1971, p. 190). With the asbestos health issue in the early 1970s, sales began to decline and, by 1977, producers were reporting higher than expected stocks, indicating that production was outpacing demand (Clifton, 1980, p. 154). Production in South Africa steadily declined to 18,800 tons in 2000. Chrysotile accounted for the largest share of production prior to 1938 and after 1982. Chrysotile production peaked in 1989 at about 115,000 tons.

South Africa was unique in that it was the major world supplier for amosite and crocidolite. Chrysotile, whose production began in 1905, was produced in lesser amounts in the country's early mining history (Anonymous, 1928, p. 30). Amosite was first mined in the Barberton District in 1907 and in the Pietersburg District in 1914 (Anonymous, 1928, p. 30; Kupferburger, 1930, p. 571). Crocidolite production was reported as early as the 1893 (Anonymous, 1928, p. 29; Diller, 1921, p. 555; Munzhelele, N.N., 1999, p. 194). Following an expansion program begun in 1948, amosite production increased through 1973 when it peaked at 106,000 tons;

crocidolite production peaked in 1977 at 201,000 tons. Amosite accounted for the largest share of production between 1938 and 1955. crocidolite dominated from 1956 to 1982. Demand for amosite and crocidolite began to decline in the early 1970s and late 1970s, respectively, in response to changes in the asbestos markets. Amosite mining ceased around 1992 although stocks still were sold after that time. Crocidolite mining ended in 1997 (Industrial Minerals, 1993; Mining Journal, 1992, p. 354; Munzhelele, 1999, p. 194; Republic of South Africa Department of Minerals and Energy, 1997, p. 20-22). Only small amounts of anthophyllite and tremolite were produced, generally on the order of only a few thousand tons annually, combined.

Like Canada, South Africa has been a net exporter of asbestos. More than 75% of South African production after 1960 was exported annually (Gössling, 1977, p. 75; Munzhelele, 1999, p. 197). For most years, exports were between 85% and 95% of production (although some of this amount was probably shipped from stocks during some years). Exports went to the Far Eastern countries, Middle Eastern countries, and European markets. Between 1935 and 1955, the United Kingdom and United States were the largest importers of fiber from South Africa. These two countries accounted for 27 % and 23% of exports, respectively, in 1954. These countries were followed by other European countries, Australia, Japan, India and Pakistan, and Latin American countries in 1954 (Bowles, 1959, p. 44). Total exports from South Africa in 1935 were 21,500 tons and 116,000 tons in 1954. By 1970, major importers of South African asbestos were Japan (33%), Italy (11.7%), the United Kingdom (9.5%), West Germany (9.3%), and France (6%). Only three years later, these export markets had changed to Japan (33.7%), Spain (15.2%), Italy (9.4%), the United Kingdom (7.8%), West Germany (5.8%), France (5.6%), and the United States (5.6%) (Gössling, 1977, p. 74). These same countries continued to be major markets as late as 1985. Other historical destinations included Austria, Belgium, Denmark, Taiwan, and Yugoslavia. South African exports peaked around 1975 at 339,000 tons, compared to a peak of 1.69 million tons in 1973 for Canadian exports. As with producers elsewhere, exports were impacted by the asbestos health issue (van der Merwe, 1989, p. 141). Partial or total bans on asbestos use in several European countries in recent years eliminated some former markets for the South African producers. Smaller losses in markets occurred with the downturn of the U.S. market after 1970.

Swaziland

Swaziland was a relatively small producer of chrysotile. Except for some sporadic mining, commercial production didn't really begin until 1939 with reported production to be about 7,000 tons. That was the year that the Havelock mine began operating (Bowles and Warner, 1940, p. 1372). Within three years, production had broken the 20,000-tons-per-year mark. Installation of an aerial ropeway through to the rail lines in 1941 eased a major transportation problem (Bowles and Petron, 1943, p. 1437). Over the next 35 years, demand rose slowly, intermixed with brief periods of downturns. For a brief period in the early 1970s, production suffered because of problems with rock stability in one of the underground mines (Clifton, 1975, p. 178). Production peaked in 1976 at 42,000 tons. After that, sales declined steadily. Production in 2000 was about 11,000 tons.

Like the other asbestos producing countries in Africa, Swaziland depended on exports to sustain its industries. The bulk of the production is shipped to other African nations, Europe, and the Far East. Most of the asbestos is used to produce asbestos-cement products. Shorter fibers were used for friction applications (Roskill Information Services, 1990, p. 48).

Zimbabwe (former Southern Rhodesia)

Zimbabwe is renowned for its production of low-iron, long fiber chrysotile. Mining began around 1908 (Anonymous, 1928, p. 35; Natural Resources Board of Southern Rhodesia, 1963, p. 16). By 1930, Zimbabwe, with 34,000 tons of production, was the third largest producer after Canada and the FSU. The opening of the Shabanie Railway in 1927 helped spur production by eliminating a major transportation issue (Bowles and Stoddard, 1930, p. 306). Competition from Russia affected Zimbabwean producers in the early 1930s although this was resolved by European customers apportioning orders between the two sources (Bowles and Stoddard, 1933, p. 750). Production again picked up by the mid-1930s and continued to increase as markets grew. Much of the increase was attributed to increased sales of short fiber chrysotile used by the asbestos-cement industry, albeit at the expense of the unit price (Bowles and Cornthwaite, 1937, p. 1368). Despite growing sales, Zimbabwe lost its third place standing to South Africa by 1950 but regained it again in 1985 when markets for South Africa's amphibole asbestos declined. Between those times, Zimbabwe declared its independence from the United Kingdom in 1965 and had United Nations economic sanctions imposed in 1966. Despite the sanctions from 1966 to 1979 and strikes in 1972, the companies continued to upgrade their production facilities and production and sales increased (British Sulfur Corp., 1972, p. 3; Clarke, 1982, p. 23; Clifton, 1974, p. 178; Clifton, 1982, p. 110). Production peaked at 281,000 tons in 1976. However, markets reversals resulted in a decline in sales and build-up of large stocks between 1978 to 1980 (Roskill Information Services, 1983, p. 68). Production declined to 115,000 tons in 1999 but rebounded to 145,000 tons in 2000. Markets for Zimbabwe remained strong through at least 2001.

Like South Africa, Zimbabwe depended on export markets to sustain its industry. About 97% of its production was exported to 50 countries by the early 1980s (Clarke, 1982, p. 23). The United Kingdom was the leading importer from 1935 to 1956 except during World War II, when the United States became the leading importer of Zimbabwean fiber. Other important markets were other European countries, Australia, India, and Latin America (Bowles, 1959, p. 43). In 1980, southeast Asia was a major market for Zimbabwean fiber because of its use in textiles (Industrial Minerals, 1980, p. 8). In 1982, it was estimated that Zimbabwe supplied about 50% of the world's asbestos fiber for textiles (Clarke, 1982, p. 23). Another market for the fiber was in asbestos-cement

products (Roskill Information Services, 1983, p. 68).

4.4 Current or former centrally-planned economy countries

China

Production of asbestos (mainly chrysotile) in China is difficult to track over time. As with many of the industrial minerals mining industries in China, accurate production and trade data on asbestos are difficult to obtain and frequently not available. The use of asbestos in China began more than 2,000 years ago, when asbestos was used to make fire insulation, asbestos paper, and fire pots (by mixing lime with asbestos). The most famous and earliest source for asbestos mined in China was Szechuan Province (Wang, 1981, p. 256). Production by individual companies operating in China between 1918 and 1928 was reported to be less than 100 tons combined (Anonymous, 1928, p. 44). Around 1934, production was estimated to be less than a few hundred tons (Bowles, 1934, p. 22). China became a moderate-sized producer of asbestos around 1960 when production was estimated to be 81,600 tons. By 1965, 10 new asbestos projects were believed to have been completed in Szechuan Province, after which asbestos production increased fairly rapidly (Wang, 1967, p. 1115-1116). Production was reported to be 209,000 tons in 1973. More than 12 up-to-date facilities mining and processing asbestos were on-line in Szechuan Province by 1975. By that time, Hopeh (Hebei) Province became the second largest producing region in China (Wang, 1978, p. 297-298). Production declined in the mid-1970s and early-to-mid 1980s. It was about 221,000 tons in 1990. Production increased to a peak of about 370,000 tons in 2000. With declining world markets, increased use of asbestos within China probably accounts for a large part of its increased production. Market data in China are not routinely published, but in 1985, it was reported that asbestos-cement products account for 51% of the asbestos usage in China (Chin, 1988, p. 216). Asbestos-cement markets still dominated in 1996, followed by friction products, rubber, textiles, and insulation products (Lu, 1998, p. 19).

China for the most part consumed most of its production internally and cannot be considered a world supplier of asbestos. Exports were mostly to southeast Asian markets. In 1962, exports were estimated to be 4,383 tons of the 90,700 tons of production, mainly to Japan and Poland. Asbestos exports were reported only to be 2,180 tons in 1974 (Japan receiving 1,394 tons in 1974 and Poland receiving 1,200 tons in 1975) and 10,430 tons in 1979. Exports in 1979 were shipped mainly to Hong Kong, Indonesia, and Thailand. Despite increased production, exports fell to 553 tons in 1986. Hong Kong, Singapore, and Thailand were the major destinations (Wang, 1967, p. 1112, 1115-1116; Wang, 1978, p. 289, 298; Chin, 1983, p. 233). Exports were reported as 9,392 in 1996, with Vietnam being the largest importer of Chinese asbestos (7,763 tons) (Lu, 1998, p. 19). Imports generally were not reported or not available over much of the history of the asbestos industry in China. Imports were reported to be 179 tons in 1973 and 839 tons in 1985 (Wang, 1978, p. 291; Chin, 1988, p. 207). By the 1990s, imports had increased, rising from 2,249 in 1991 to 77,958 tons in 1996. Of significance was the increased import of long-fiber asbestos. The major source for imported asbestos in 1996 was Russia (77,091 tons) (Lu, 1998, p. 19.).

FSU

Sinclair (1959, p. 3) reported that deposits in the Ural Mountains were first opened around 1720 with systematic mining of chrysotile on a commercial scale beginning in the early 1800s (Anonymous, 1928, p. 27; Howling, 1937, p. 62). Production in the FSU was initially concentrated in Bajenova in the Ural district, providing about 85% of the supply by the 1920s (Bowles and Stoddard, 1931, p. 110; RuKeyser, 1933a, p. 335). By 1927, the FSU provided 11% to 15% of the world's supply of asbestos. Production, however, essentially stopped with federalization of the mines in 1918, World War I, the Russian revolution, and establishment of the Soviet State following the War (Bowles and Stoddard, 1930, p. 309, Howling, 1937, p. 62). Completion of a rail line that connected to the Trans-Siberian Railway in 1927 greatly improved access to the Uralasbest chrysotile deposit and made possible intensive development of the mines (RuKeyser, 1933b, p. 375). This rail line was replaced by a new line in 1931. The new line improved efficiency because it conformed to standard FSU gauge rail lines, eliminating the need to transfer equipment and product at the rail head (RuKeyser, 1933b, p. 375).

By the late 1930s, the FSU began to develop a large asbestos products industry, making the FSU both a major asbestos producer and consumer, and thereby reducing its dependence on foreign markets (Bowles and Stoddard, 1933, p. 751-752). Bowles (1934, p. 18) notes that exports declined from 51% in 1922-23 to 21% in 1934, reflecting the rapidly expanding domestic manufacturing industry. By the late 1930s, the FSU began taking steps to return to the status of a significant world producer. Around 1937, a 5-year plan (one of many) was developed that would increase capacity in the FSU to 220,000 tons per year (Bowles and Barsigian, 1943, p. 1432). Production increased gradually through 1982, except perhaps for World War II, for which data were not available. Contributing to the increase was the commissioning of the Dzhetygara chrysotile deposit in Kustanay Oblast in Kazakhstan in 1965. This was a year after the Tuvaasbestos complex in the Tuva Autonomous Republic was developed (Roskill Information Services, 1990, p. 57).

By 1975, the FSU had surpassed Canada as the world's leading producer of asbestos. Production in the Urals accounted for about 73% of the FSU output of asbestos, followed by Kazakhstan with 24%, and the Tuva Republic with 3% (Sutulov, 1973, p. 176). The Kiyembay asbestos combine in the Orenburg Oblast began operating around 1979-80. Upgrades were completed at Uralasbest

complex to improve mine efficiency. In addition, the Baikal-Amor Mainline Railway was developed to improve access to the Kiyembay complex (Industrial Minerals, 1985, p. 67). With these changes, the Uralbest complex's share of FSU production declined to about 62%. Uralbest, however, continued to provide all of the asbestos exported from the FSU (Clifton, 1982, p. 110). Production continued to increase until 1982, when production in the FSU peaked at about 2.7 million tons. By then, the health issue had begun to affect some of the export markets for FSU fiber. Further complicating the matter was the breakup of the Soviet Republic in 1991. Many industries, not just the asbestos industry, were affected by the ensuing financial difficulties immediately after the break up. Today, markets in the FSU are much less than in the peak production era although production was reported to have rebounded in 2001. The FSU continues to be the leading world producer of chrysotile with more than 900,000 tons of production annually.

In the 1960s, more than 80% of asbestos consumed in the FSU was used in roof tiles, wall panels, pipes, molded articles, and other building materials. Lower grades were used in manufacturing heat insulations and heat-resistant plastics. Treated mill wastes were used to make reinforced asphalt and roofing paper, filler in portland cement for concrete pipe, plaster, and protective coatings for metallic structures. Untreated asbestos mill wastes were used as railroad ballast and cold asphalt (Tverskoi, 1968, p. 31). In the late 1960s, major markets were roof tiles, wall panels, pipes, heat insulations, asphalt, roofing paper, asbestos-cement products, plasters, etc. (Tverskoi, 1968, p. 31). Asbestos-cement products are likely to be the dominant market in recent years.

Unlike China, the FSU eventually became a major factor in the world asbestos economy. In its early history, a significant percentage of production was exported. However, Bowles and Stoddard (1933, p. 751-752) observed that the asbestos manufacturing industry in the FSU was expanding rapidly in the early 1930s and consuming a larger share of domestic production. By 1961, exports from the FSU were 158,600 tons. The bulk of the exports went to Eastern and Western European markets, including West Germany (27,500 tons), France (25,500 tons), East Germany (14,000 tons), Czechoslovakia (12,700 tons), Bulgaria (12,000 tons), Poland (11,300 tons), Hungary (10,100 tons), and Japan (8,800 tons), in decreasing order by tonnage (Sokoloff, 1964, p. 760). By 1964, exports had increased to 180,000 tons. Exports expanded rapidly after that, reaching 346,500 tons in 1969 and 385,000 tons in 1970. In 1968, Tverskoi (1968, p. 31) reported that the FSU exported asbestos fiber to more than 30 countries. By 1970, Japan had moved into second position with regard to export destination with 43,900 tons, preceded by France with 53,000 tons. West Germany followed with 43,100 tons, Poland (31,500 tons), Bulgaria (21,200 tons), Czechoslovakia (21,100 tons), Yugoslavia (20,600 tons), and Romania (16,300 tons) (Strishkov, 1973, p. 832). Exports increased to 527,971 tons in 1974. There appears to be a major unexplained decline in exports in the late 1970s to early 1980s. Exports were only 315,780 tons in 1980. Some of this may be the result of health concerns in western countries regarding exposure to asbestos. Also, exports to the western European and Asian markets had declined somewhat but it does not explain the entire phenomenon. Exports recovered by 1985 (reported as 600,000 tons). In the early 1980s, centrally-planned economy countries accounted for about 50% of exports from the FSU (Roskill Information Services, 1983, p. 64). By 1988, declining asbestos consumption worldwide and possibly internal issues resulted in a decline in exports to 400,000 tons. Exports in 2000 were estimated to be about 506,000 tons (British Geological Survey, 2002, p. 26).

4.5 Other producing countries

While the bulk of the asbestos was produced by the above countries, many other countries produced small amounts of asbestos that filled essential markets. For example, Finland was the world's primary source for anthophyllite asbestos from about 1919 to 1975. Production in Finland was relatively low over time, exceeding 15,000 for only a few years in the late 1960s. After that production declined and finally stopped in 1975. Crocidolite was produced in Australia and Bolivia. Australia began producing asbestos around 1916. Production increased slowly to 16,200 tons in 1962. It declined rapidly to 666 tons in 1967 after Australian Blue Asbestos Pty. closed its Wittenoom mine in 1966 (Morrell, 1969, p. 99). Production increased in the early 1970s to meet world demand, peaking at 92,000 tons in 1980. No production, however, was reported after 1983. Bolivia produced only small amounts of crocidolite over the years, on the order of only a few hundred tons. India was a source for anthophyllite and tremolite asbestos as well as chrysotile. Production began around 1917 and eventually reached 44,100 tons in 1993. Production declined to 14,500 tons in 2000. Japan and South Korea also were important sources of mainly chrysotile for Far Eastern asbestos markets during various periods of the 20th century. Production in Japan began by 1920, peaked at 27,000 tons in 1967, and declined to 18,000 tons in 2000. Production in Korea began in the early 1930s. Its production peaked at 15,900 tons in 1982. Production was last reported in 1992. A host of other countries also provided even smaller amounts (less than 5,000 tons) of asbestos for domestic or export markets.

5. WORLD CONSUMPTION

As with all commodities, world consumption patterns for asbestos have evolved over time. Changes have occurred because of technological progress (industrialization and the development of an asbestos manufacturing industry), availability of asbestos either domestically or through imports, political changes (civil unrest, independence movements, or sanctions), regulatory bans on its use, world conflicts, liability issues, and foremost in recent years, health issues. By tracking apparent consumption (production plus imports minus exports), a general idea of the changes that have occurred in the worldwide use of asbestos over time is possible.

Bowles (1955, p. 59; 1959, p. 32) noted that it is much more difficult to determine apparent consumption than production. What applied in the 1950s is still true today. Manufacturing from consumer stocks, sales from producer stocks, and consumer and producer stocks that have been held over from year to year complicate the estimation of apparent consumption as do the limitations of the data

as discussed in the “Data Sources” section. Overcapacity, particularly after the asbestos health issue was raised, resulted in a significant share of production going into stocks for some countries in some years. The changes in stocks result in some error in the apparent consumption since the calculation does not typically account for additions and subtractions from stocks. Overcapacity and a build-up of stocks resulted in an overestimation of consumption in Canada, the RSA, Swaziland, and Zimbabwe at times. Overcapacity and questionable export data for the FSU began to appear after 1997, skewing the calculated consumption in Europe and the world total consumption. Consequently, the following discussion should be viewed as an approximate measure of apparent consumption and utilized to determine trends in the apparent consumption of asbestos rather than its absolute consumption. A detailed breakout of calculated apparent consumption, by country, is given in Appendix A for 1920 to 1970 in 10-year intervals, 1970 to 1995 in 5-year intervals, and 1996 to 2000 annually.

Although the modern asbestos industry first began in Asia and Europe, it was the United States that fully embraced its potential, becoming the largest consuming country in the world for much of the 20th century (table 5). The reason is that the United States offered the greatest opportunities for the relatively new asbestos industry. The country's population centers were expanding rapidly with the surge in immigration in the early 1900s, there was available capital for investment in the asbestos industry, and there was a large demand for construction of housing, public buildings, and roads. To meet these demands, the construction industry not only expanded but also evolved through technological developments, creating an opportunity for the relatively new asbestos industry to establish itself. Thus, the use of asbestos exploded in the United States unlike anywhere else in the world. The United States became a world leader in usage within a couple of decades of having begun its asbestos industry and held that position through the 1960s.

From 1920 through the 1960s, the United States accounted for 30% to 83% of world apparent consumption for the 10-year intervals examined. It wasn't until the 1960s that the United States was replaced by the FSU as the leading consuming country (Appendix A). The next nearest competitor was Japan, which had attained a consumption level of 319,000 tons in 1970. A detailed discussion of U.S. consumption of asbestos has already been presented in the “World supply and trade” section of this paper.

Other countries in North America also consumed small relative amounts of asbestos. These included Canada, Costa Rica, Cuba, the Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, and Panama. Most of these countries were small consumers, using only a few thousand tons annually. Canada was primarily an exporter but its calculated apparent consumption was 106,000 tons of asbestos in 1980. This, however, was probably a case of oversupply as world markets began to decline. A large part of the 106,000 tons probably went into stocks rather than commerce. Consumption of around 45,000 tons annually probably would have been the norm from 1940 to 1970 and less after the 1980s. Consumption in Mexico gradually built up to 79,000 tons in 1980 from an annual consumption of only 390 tons in 1930. After 1980, consumption declined, eventually reaching 26,900 tons in 2000. In 2000, El Salvador and Panama were the only other North American countries indicating consumption.

After the United States, Europe was the next region to develop an asbestos manufacturing industry. The United Kingdom, receiving its asbestos from other parts of its world empire, became the major European consumer through the first half of the 20th century (table 5). The United Kingdom was soon followed by many other European countries. By 1930, Belgium-Luxembourg, Germany and the United Kingdom were major suppliers of asbestos products throughout Europe and Asia. The FSU was the next largest producer and consumer of asbestos with its need to supply itself and other centrally-planned economy countries. Demand in the FSU exceeded that of the United Kingdom by 1950 and by 1970 that of the United States, thanks largely to large construction demands.

There were 16 European countries consuming 40,900 tons of asbestos in 1920. By 1930, estimated consumption had increased to 127,700 tons. Austria, Belgium-Luxembourg, Cyprus, Germany, Italy, the FSU, and Spain experienced the largest growth in consumption before 1950 (table 6 and Appendix A). Between 1950 and 1960 the asbestos industry in Europe experienced its greatest expansion up to this time, increasing to 1.17 million tons from 507,000 tons in 1950. During the decade of the 1950s, consumption in Austria, Belgium-Luxembourg, Czechoslovakia, Denmark, France, the FSU, West Germany, Italy, the Netherlands, Poland, Spain, Sweden, Switzerland, the United Kingdom, and Yugoslavia increased considerably. The largest gains were in the FSU (317,000 tons), the United Kingdom (55,400 tons), and West Germany (52,400 tons). Much of the growth in consumption in the late 1940s and a large portion of the 1950s can be attributed to the massive reconstruction efforts in Europe following World War II. Estimated consumption in Europe increased to 1.8 million tons in 1970 and 2.8 million tons in 1980. The largest growth was in the FSU, increasing by slightly more than 1 million tons between 1960 and 1980.

The asbestos health issue, which affected U.S. markets by the mid-1970s, also began to affect asbestos in Europe. After 1980, demand in all large consuming European countries, except the FSU, began to decline. This pattern continued through 1990, with only the FSU maintaining its consumption levels. In 1990, consumption in Europe was 2.58 million tons.

The 1990s was a decade of change for the European manufacturing industry. During that time, the FSU was restructured and many European countries and eventually the European Union voted to ban the use of asbestos. From a tonnage standpoint, the restructuring of the FSU had the biggest impact. By 1995, estimated consumption in Europe had declined to 928,056 tons and by 2000, it reached an estimated 341,000 tons. Several important consumers of asbestos in Europe are Azerbaijan, Belarus, Croatia, Hungary, Kazakhstan, Kyrgyzstan, Portugal, Romania, Russia, and Spain (Appendix A). There still many smaller yet important consumers, including Greece, Ireland, and several of the former Soviet bloc countries.

There is some uncertainty in the consumption data from 1998 to 2000 because of an imbalance in the reported supply and demand relationship. More exports than imports were reported during this period worldwide. Most of the imbalance resulted from an apparent increase in reported exports from former FSU countries. Exports from other producing countries are in line with current world

consumption trends. It is likely that the FSU export data are overestimated, with some asbestos of the reported exports being stockpiled, some asbestos being consumed within the FSU, and some actually being asbestos waste used as road gravel rather than fiber. Apparent consumption for all countries, except possibly Kazakhstan and Russia, are believed to be reasonably accurate during this time period despite the supply and demand imbalance.

Growth in the Asian (including Middle Eastern countries in the following discussion) asbestos manufacturing markets lagged behind that of Europe and the United States. This can be partially attributed to less initial industrial development in most Asian countries in the early 20th century, slower population growth which resulted in lower demand for infrastructure development, cultural differences guiding infrastructure and technological development, Governmental policies regarding industrial development, and fiscal restraints affecting the start-up of new industries or importation of new products.

Very little asbestos was used in Asia in 1920; only 6,810 tons by 3 consuming nations (table 5). It wasn't until the 1950s that a serious manufacturing industry developed. Estimated consumption in 1960 was 222,000 tons in 16 countries, a dramatic increase from only 25,400 tons in 1950. China and Japan accounted for the bulk of this increase (table 6 and Appendix A). Asbestos consumption in Asia increased to 667,000 tons in 1970 from 222,000 tons in 1960. Again, China and Japan accounted for the largest increases in consumption. Smaller increases occurred in India, Iran, South Korea, Malaysia, Thailand, and Turkey. Japan was the most consistent large user of asbestos from 1920 to 1970. Estimated consumption in Asia increased to 1.06 million tons in 1980. By this time, more Asian countries were manufacturing asbestos products and considerable gains were made in China, India, Indonesia, Iran, Japan, South Korea, Malaysia, Saudi Arabia (a one-time occurrence), Taiwan, Thailand, and Turkey.

The 1980s brought about a shift in manufacturing in Asia. Estimated consumption declined in China, Japan, Malaysia, Saudi Arabia, and Taiwan but increased in India, Indonesia, Iran, South Korea, and Thailand. There was an increase through 1995 in Asian consumption to 1.26 million tons from 975,000 tons in 1990. China accounted for the bulk of the increase followed by, in decreasing order by tonnage, Thailand, Indonesia, South Korea, and Malaysia. By 2000, estimated consumption had declined to 871,000 tons, less than in 1990. Iran, Japan, and South Korea experienced the largest declines (table 5 and Appendix A).

In 2000, China accounted for 50% of the apparent asbestos consumption in Asia, which was used mainly to satisfy its own domestic needs. Thailand was the next largest consumer with 15% of the market, followed by Japan with 12%, India with 8%, Indonesia with 7%, and South Korea with 4%. Consumption in most Asian countries has continued to decline through 2000, the exceptions being China, India, Indonesia, and Thailand (Appendix A). Countries such as Iran, Oman, Pakistan, Singapore, Taiwan, Turkey, and the UAR still maintain a small presence in the asbestos-manufacturing sector.

Consumption in Africa has been rather low throughout most of the 20th century, peaking only in the 1990s. Slow population growth, limitations on land amenable for development, slower dissemination of technological developments, Governmental policies toward development, and fiscal restraints influenced the development of the asbestos industry in Africa. Even the asbestos-producing African nations, despite having manufacturing facilities, exported the bulk of their fiber production to foreign manufacturing markets. Only a few African countries used asbestos in the 1920s. Estimated consumption was about 3,530 tons in 1920 (table 5 and Appendix A). Egypt, Madagascar, and Zimbabwe and probably South Africa had small manufacturing industries. This situation did not really change significantly until the 1950s. In that decade, consumption had risen to 9,600 tons and 11 countries were involved in asbestos manufacturing. Algeria, the Belgian Congo, Egypt, Morocco, Swaziland, and Zimbabwe were the largest consumers. Estimated consumption increased to 90,300 tons in 1970 from 28,600 tons in 1960. Between this time, the number of countries involved with manufacturing asbestos products increased from 12 to 15. The largest increase in consumption was in Nigeria, having the largest population, where consumption increased by 34,400 tons, and Zambia, which increased to 15,600 tons in 1970 from no reported consumption in 1960 (table 6). Nigerian imports varied considerably over time, suggesting stockpiling during one year and use over several years. Nigeria's asbestos manufacturing industries grew after the 1960s to accommodate its growing population needs. After the 1970s, consumption in most countries in Africa began to decline. The notable exception was Algeria, whose consumption was 21,300 tons in 1980 and 17,400 tons in 1990. Its consumption, however, had declined to 10,000 tons by 1995, 900 tons in 2000, and 4,100 tons in 2001. A few other African countries, particularly in recent years, have developed small manufacturing industries to meet demand for construction materials. Apparent consumption data for Africa in 2000 is difficult to ascertain as reliable data is not yet available for Egypt, Morocco, Nigeria, Tunisia, and Zambia.

The asbestos industry in South America did not begin to have significance in the world markets until the 1960s. Prior to that time, there was little asbestos production or consumption (table 5). What little production there was existed to fill niche markets rather than to meet growing world demands. Argentina, Bolivia, Brazil, Chile, Peru, Uruguay, and Venezuela were the major South American consumers of asbestos during the early part of the 20th century. Up until 1960, consumption in South America was about 38,100 tons.

Brazil had just begun production to supply its own markets, but South America was dependent on imports for about 65% of its fiber consumption. By 1970, Argentina, Brazil, Colombia, and Venezuela had the most active of the asbestos manufacturing industries in South America. Even at that, consumption was estimated only to be 99,200 tons. By the mid-1970s, though, Brazilian production expanded to meet the country's demands, and Brazil soon became the dominant South American producer and consumer of asbestos (table 5 and 6). In 1980, Brazil accounted for about 73% of the continent's asbestos usage of 267,000 tons. Brazil was followed by Colombia with 27,100 tons, Argentina with 21,400 tons, and Venezuela with 9,100 tons. Chile, Ecuador, Peru, and Uruguay used lesser amounts (Appendix A). With the onset of the asbestos issue, consumption in most South American countries declined. That of Brazil, however, still exceeded 182,000 tons in 2000.

Oceania consists of Australia and New Zealand. Both countries produced and consumed asbestos in the early part of the 20th

century. Consumption rose gradually through the mid-1970s when it peaked at 85,700 tons in 1975. Australia accounted for 73,200 tons of this total. With the asbestos health issue of the 1970s, production and consumption declined rapidly. By 1990, New Zealand had stopped using asbestos and in 2000, Australia's consumption was only 1,250 tons (table 5).

In general, economic, political, and social agendas; different philosophies on how to meet those agendas; and different asbestos resources available guided the development of the asbestos manufacturing industry in any given country in terms of the size of its industry and the types of products manufactured. If countries required an asbestos industry to meet their expansion needs, the industry developed. The growth was logical in that demand for asbestos products, most notably asbestos-cement products, was greatest in countries undergoing extensive infrastructure development.

Few historical data on asbestos markets are available. Even in the United States, an annual survey of consumption was not developed until 1972 with projections back in time to 1965 (table 3). Bowles (1937, p. 82-87) reported on the asbestos manufacturing industries in major producing countries. From his qualitative descriptions of the industries in the manufacturing countries, it can be inferred that asbestos-cement corrugated and flat sheet, pipe, and roofing tile were the major markets for asbestos around 1930. The low cost of asbestos-cement products, their durability and effectiveness, and the relatively unsophisticated technology required to produce asbestos-cement products were major factors leading to its widespread use, particularly for developing countries with limited mineral and monetary resources. In regions where there were alternative construction materials, the demand for asbestos-cement products was proportionally smaller, and a much wider variety of other asbestos products was developed. In 1980, asbestos-cement products accounted for approximately 66% of world consumption of asbestos. The United States and western European countries were less dependent on asbestos-cement products than other regions. Asbestos-cement accounted for 45% and 43% of the U.S. and western European market usage, respectively. Asbestos-cement products accounted for 80% of asbestos products manufactured in Africa; 76% in Asia, eastern European countries, and South America; and 60% in Oceania in 1980 (Roskill Information Services, 1983, p. 85-86). With the decline in the use of asbestos in the 1980s and 1990s, markets shifted even more to favor asbestos-cement products. In 2002, asbestos-cement products are thought to account for more than 98% of the world's consumption of asbestos (Virta, 2002, p. 18).

6. DISCUSSION

Asbestos has had a long and, until the past 35 or so years, illustrious role in modern society. Over the course of its history, asbestos has been used in thousands of products for a vast number of applications. These applications ranged from roofing shingles to water supply lines to fire blankets to plastics fillers to medical packings (Rosato, D.V., 1959). It was used commonly by both industry and the general public. A glance at almost any home repair book written before about 1955 will show that asbestos was treated as just another tool by the home handyman (Cobb, 1948, p. 129-130). That it was so widely accepted is a tribute not only to its versatility but also, ironically, to a lack of knowledge about the risks posed by exposure to high levels of airborne asbestos dust. The British first raised health concerns in the early part of the 20th century, but it was not until the late 1950s and early 1960s that a correlation between excess exposure to asbestos fibers and respiratory cancer diseases was established (Gross and Braun, 1984, p. 20-21; Selikoff and Lee, 1978, p. 22-23, 31-32; U.S. Department of Health and Human Services, 1992, p. 289-290). Thus, the asbestos health issue did not arise until long after asbestos had been used by society for a long period of time. Asbestos is not alone in this respect. The discovery of adverse health effects after a material has been used for decades or even centuries is not unusual. A few examples are arsenic, beryllium, lead, mercury, uranium, and some fertilizers and insecticides.

With these concerns over the health risk, many ask why and how the asbestos industry developed in the first place and why it continues to operate. One has to consider the knowledge of health risks throughout history and the state of technological development.

As mentioned in the previous paragraph, the connection between excessive exposure and lung cancer was not firmly established until the late 1950s and early 1960s. Thus, the industry was more than 100 years old before the lung cancer and mesothelioma issues would be fully recognized and addressed. Further complicating the matter was that health researchers had different opinions themselves over the health risks posed by excessive exposure to asbestos. Even more recently, some researchers have suggested that chrysotile is not as carcinogenic as amphibole asbestos varieties and that little risk has been posed by nonoccupational exposures to chrysotile (Hoskins, 2001, p. 251; Ross, 1984, p. 51).

From a technological standpoint, asbestos was and still is, in some cases, the best choice and sometimes the only choice for a product. Had the asbestos industry not been developed in the late 1800s, solutions to problems that were readily solved by using asbestos would have been more complex. The reason is that many substitute materials or substitute products on the market today that were not available or were not practical to use until late in the 20th century. For example, wollastonite is a substitute for asbestos in some applications. Wollastonite was not even considered as a substitute for asbestos until the 1960s and from a supply side, large-scale wollastonite mining did not begin until the 1950s. Cast iron water supply pipe was not the best choice for use in alkaline soils, as in the southwestern United States. Asbestos-cement pipe was the solution to that problem. Plastic pipe, another possible solution to the alkaline soil problem, was not developed until the later part of the 20th century. In the 1800s, wooden structures were still commonplace and a fire could be devastating for a city. Hence, a demand for asbestos textiles and asbestos board developed. One substitute for asbestos in textiles, the fire-resistant aramid fiber, was not commercialized until the 1970s. Early brake and clutch components had limited performance capabilities so asbestos brakes and clutch components were developed. These are just a few of the reasons as to why the industry established itself and thrived. Although a health risk was posed by excessive exposure to airborne asbestos, asbestos solved many health and safety issues (reducing fire risks and improving component performance) and energy

conservation issues (thermal insulations) as well as proving itself a valuable construction material that helped to further the development of society. Its use continues today in many parts of the world because of a need for inexpensive and durable (primarily asbestos-cement) products that require simple technology to make and do not require large capital investments.

Despite its continued use, the overall trend in asbestos consumption is downward. The largest declines have been in the United States, most European countries, Oceania, and even in many developing countries. There was a slight increase in asbestos consumption in Africa between 1990 and 1996 (excluding South Africa, Swaziland, and Zimbabwe, which already had small yet long established manufacturing industries). Countries such as Algeria, Egypt, Morocco, Tunisia, and Zambia increased their consumption starting in the late 1970s. Since the mid-1990s, however, consumption in those countries has declined. Only Nigeria and Senegal maintained their levels of consumption through 1999. Nigeria, having the largest population, probably was the largest consumer of asbestos in Africa through 1999, assuming that some of the apparent consumption in South Africa, Swaziland, and Zimbabwe was overestimated because of asbestos actually being placed into stocks. Firmer data for 2000 and 2001 will be required to determine if the overall decline in 1998 and 1999 in African consumption continued.

Asbestos consumption in Latin America declined in recent years although Mexico still remained a sizable consumer in 2000. El Salvador was the only Latin American country that appears to have increased consumption through 2000. The overall trend in South America also has been downward from the mid-1990s. Exceptions in Brazil, whose consumption increased slightly through 2000 and Ecuador and Venezuela, whose consumption declined through 1990 and then began to increase after 1995. Consumption in Colombia declined from 1996 to 1999 but increased in 2000. It is not known if this trend will continue. Consumption in Bolivia, Chile, Peru, and Uruguay was the reverse, with consumption increasing through the mid-1990s and then declining.

In Asia the overall trend has been downward for consumption. China, India, Japan, and Thailand were the largest Asian consumers of asbestos in 2000. There are a few lesser-consuming countries (Indonesia, Malaysia, Sri Lanka, and Thailand) whose consumption has rebounded in the past couple of years. Additionally, Iran, Oman, Pakistan, Philippines, Republic of Korea, and Taiwan are a few Asian countries that still appear to be maintaining low levels of asbestos manufacturing capability in recent years.

In Europe, Azerbaijan, Belarus, Kyrgyzstan, Portugal, Romania, Russia, and Spain were important consumers in 2000. Consumption in most western and central European countries declined sharply in the 1990s. A few FSU countries (Azerbaijan, Belarus, and to some extent, Kyrgyzstan and Russia) have increased their consumption but most have not. Apparent consumption in countries such as Bulgaria, Croatia, the Czech Republic, Hungary, Lithuania, Portugal, Romania, Spain, and Yugoslavia, yet they have maintained low consumption levels (less than 5,000 tons per year with the exception of Spain) for the past few years. With the European Union ban on asbestos becoming effective in the next couple of years, presumably the FSU countries will remain as the largest consumers of asbestos in Europe.

In summary, world consumption has declined. Those countries experiencing the largest declines or gains in consumption over time are given in table 6. Where low-level asbestos manufacturing industries remain, they appear mainly to be remnants of a past industrial capacity. In a few countries with small manufacturing industries, though, consumption has increased, possibly owing to the loss of foreign sources for some asbestos products. It is doubtful if the industries in these countries will expand much beyond their current capacity given the negative atmosphere regarding the use of asbestos worldwide and the greater availability of asbestos substitutes (many of whose potential long-term health risks, ironically, are unknown) and alternative materials.

7. CONCLUSIONS

Asbestos, despite being a carcinogen, was widely used by society. Without asbestos, the development of many products would have been delayed and ironically, without many of the asbestos-containing products, health and safety could have been jeopardized. That asbestos is more versatile than many of its contemporary competitors cannot be denied. Following World War II, there was a large effort to synthesize asbestos and to develop asbestos substitutes from a strategic, not a health, viewpoint. Neither the synthesis nor the substitutes were immediately successful. An additional 20 years would elapse before substitutes would make inroads into the asbestos market. To its credit, it has taken a plethora of materials to substitute for asbestos in manufacturing.

The adverse publicity on asbestos and lawsuits have taken their toll on asbestos markets, despite much stricter asbestos regulation. Worldwide consumption declined from an estimated 4.84 million tons in 1980 to about 1.48 million tons in 2000. Public pressure and liability issues have forced most companies to stop manufacturing asbestos-containing products and forced many companies into bankruptcy. While there are still a few countries that have increased or maintained their production in recent years, consumption has fallen off dramatically in most countries. The largest consumers in 2000 were Brazil, China, the FSU, India, Japan, and Thailand, which accounted for more than 90% of world estimated consumption (83% of apparent consumption). Consumption has increased in India, Indonesia, and Thailand during the past couple of years while that of Japan has declined. Several countries have maintained low levels of consumption and a few of these small consumers have increased consumption in recent years.

BIBLIOGRAPHY

- Alleman, J.E., and Mossman, B.T., 1997, Asbestos revisited: *Scientific American*, v. 277, no. 1, July, p. 70-75.
- Anonymous, 1928, Asbestos—Its sources, extraction, preparation, manufacture, and uses in industry and engineering: Berlin, Becker & Haag, 88 p.
- Anonymous, 1953, The asbestos fact book, 3rd ed.: Willow Grove, PA, Stover Publishing Co., 19 p.
- Bowles, Oliver, 1934, Asbestos—Domestic and foreign deposits: U.S. Bureau of Mines Information Circular 6790, June, 24 p.
- Bowles, Oliver, 1937, Asbestos: U.S. Bureau of Mines Bulletin 403, 92 p.
- Bowles, Oliver, 1946, Asbestos—The silk of the mineral kingdom: New York, NY, Ruberoid Co., 39 p.
- Bowles, Oliver, 1955, The asbestos industry: U.S. Bureau of Mines Bulletin 552, 122 p.
- Bowles, Oliver, 1959, Asbestos—A materials survey: U.S. Bureau of Mines Information Circular 7880, 94 p.
- Bowles, Oliver, and Warner, K.G., 1940, Asbestos—Review of 1939: U.S. Bureau of Mines Minerals Yearbook 1940, 1363-1372 p.
- Bowles, Oliver, and Petron, A.C., 1943, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1941, p. 1427-1438.
- Bowles, Oliver, and Barsigian, F.M., 1943, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1942, p. 1423-1434.
- Bowles, Oliver, and Barsigian, F.M., 1945, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1943, p. 1473-1483.
- Bowles, Oliver, and Mentch, F.B., 1956, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1953, v. I, p. 183-194.
- Bowles, Oliver, and Stoddard, B.H., 1930, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1927, v. II, p. 299-311.
- Bowles, Oliver, and Stoddard, B.H., 1931, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1928, v. II, p. 97-111.
- Bowles, Oliver, and Stoddard, B.H., 1933, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1932-33, v. I, p. 745-752.
- Bowles, Oliver, and Cornthwaite, M.A., 1937, Asbestos—Review of 1936: U.S. Bureau of Mines Minerals Yearbook 1937, p. 1363-1370.
- British Geological Survey, 2002, World mineral statistics 1996-2000: British Geological Survey, Nottingham, 304 p.
- British Sulfur Corp., 1972, Rhodesia—A special survey of the mining industry: British Sulfur Corp., London, February, 95 p.
- Buckingham, D.A. and Virta, R.L., 2002, Asbestos statistics: web site at <http://minerals.usgs.gov/pubs/of01-006/#data>. (Accessed June 18, 2002.)
- Chin, Edmond, 1983, China: U.S. Bureau of Mines Minerals Yearbook 1981, v. III, p. 225-249.
- Chin, Edmond, 1988, China: U.S. Bureau of Mines Minerals Yearbook 1986, v. III, p. 197-221.
- Clarke, G.M., 1982, Zimbabwe's industrial minerals—Optimism for the future: *Industrial Minerals*, no. 172, January, p. 19-31.
- Clifton, R.A., 1973, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1971, v. I, p. 181-189.
- Clifton, R.A., 1974, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1972, v. I, p. 169-180.
- Clifton, R.A., 1975, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1973, v. I, p. 171-179.
- Clifton, R.A., 1980, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1977, v. I, p. 145-157.
- Clifton, R.A., 1981, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1980, v. I, p. 91-101.
- Clifton, R.A., 1982, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1981, v. I, p. 103-112.
- Cobb, Hubbard, 1948, The complete home handyman's guide: William H. Wise and Co., Inc., NY, 500 p.
- Craynon, J.R., 1988, Italy: U.S. Bureau of Mines Minerals Yearbook 1986, v. III, p. 463-483.
- Diller, J.S., 1921, Asbestos: U.S. Geological Survey Mineral Resources 1918, v. II, p. 545-556.
- Evans, J.W., 1906, The identity of the amiantos or Karystian stone of the ancients with chrysotile: *Mineral Magazine*, v. 14, May, p. 143-148.
- Gössling, H.H., 1977, Asbestos—A commodity study: Minerals Bureau, Dept. of Mines, Republic of South Africa, Internal Report No. 5, 82 p.
- Gross, Paul, and Braun, D.C., 1984, Toxic and biomedical effects of fibers—Asbestos, talc, inorganic fibers, man-made vitreous fibers, and organic fibers: Park Ridge, NJ, Noyes Publications, 257 p.
- Harben, Peter, 1984, A profile of SA Mineração de Amianto—Brazil's asbestos producer: *Industrial Minerals*, no. 198, March, p. 63-65.
- Hodgson, A.A., 1989, Asbestos alternatives, in Carr, D.D. and Herz, N., eds., *Concise Encyclopedia of Mineral Resources*: New York, NY, Pergamon Press, p. 15-20.
- Hoskins, J.A., 2001, Toxicological insight into low-level exposure to chrysotile, in Nolan, R.P., Langer, A.M., Ross, M., Wicks, F.J., and Martin, R.F., eds., *The Health Effects of Chrysotile Asbestos*: Ottawa, Mineralogical Association of Canada, p. 251-259.
- Hoskin, W.M.A., 1991, Asbestos: Energy, Mines, and Resources Canada Minerals Yearbook 1990, p. 10.1-10.11.
- Howling, G.E., 1937, Asbestos: Imperial Institute, London, 88 p.
- Icke, P.W., 1969, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1968, v. I-II, p. 179-188.
- Industrial Minerals, 1978, Greek asbestos breaks ground: *Industrial Minerals*, no. 129, June, p. 47-49.
- Industrial Minerals, 1980, Rhodesian mineral musings: *Industrial Minerals*, no. 148, January, p. 7-8.
- Industrial Minerals, 1985, Company news and mineral notes: *Industrial Minerals*, no. 212, May, p. 67.
- Industrial Minerals, 1993, Amosite asbestos era ends: *Industrial Minerals*, no. 306, March, p. 12.
- Josephson, G.W., and Marsh, D.I., 1948, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1946, p. 143-151.
- Josephson, G.W., and Barsigian, G.W., 1951a, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1948, p. 144-155.

Josephson, G.W., and Barsigian, G.W., 1951b, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1949, p. 139-148.

Kendall, Tom, 1996, Brazil—Dancing to a new tune: *Industrial Minerals*, no. 350, November, p. 21-51.

Kennedy, D.O., and Mattila, A.L., 1958, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1957, v. I, p. 209-221.

Kennedy, D.O., and Foley, J.M., 1960, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1959, v. I, p. 199-209.

Kupferburger, W., 1930, Mining amosite asbestos in the Pietersburg District, South Africa: *Engineering and Mining Journal*, v. 130, no. 11, December 8, p. 571-574.

Loughbrough, Roger, 1992, Italy's industrial minerals: *Industrial Minerals*, no. 301, October, p. 35-57.

Lu, Wen, 1998, Asbestos, in Griffiths, Joyce, ed., *Chinese Industrial Minerals*: Surrey, England, Industrial Minerals Ltd., p. 16-19.

Maliotis, G., and Ilich, M., 1986, The nonmetallic minerals industry of Cyprus—Its present state and future prospects, in Clarke, G.M. and Griffiths, J.B., eds.: *7th Industrial Minerals International Congress: Proceedings*, Monte Carlo, Monaco, April 1-4, 1986, p. 1-12.

May, T.C., 1964, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1963, v. I, p. 251-265.

Mining Journal, 1992, Gefco announces closure: *Mining Journal*, v. 318, no. 8173, May 15, p. 354.

Mining Magazine, 1987, Balangero: *Mining Magazine*, no. 157, v. 1, July, p. 20-25.

Morrell, L.G., 1969, The mineral industry of Australia: U.S. Bureau of Mines Minerals Yearbook 1967, v. IV, p. 83-102.

Munzhelele, N.N., 1999, Asbestos 1998/1999, in South Africa's mineral industry: Pretoria, Republic of South Africa, Dept. of Minerals and Energy, Minerals Economics (Minerals Bureau), p. 193-198.

Natural Resources Board of Southern Rhodesia, 1963, Asbestos: Natural Resources Board of Southern Rhodesia, Minerals of Southern Rhodesia—Minerals Year 1963, p. 14-17.

Northern Miner, 1975, Asbestos weathers storm: *Northern Miner*, v. 61, no. 37, November 27, p. B-12.

O'Driscoll, Mike, 1989, Brazil's industrial minerals: *Industrial Minerals*, no. 266, November, p. 23-69.

Perron, Louis, 2001, Chrysotile: *Energy, Mines, and Resources Canada Minerals Yearbook 1999*, p. 17.1-17.13.

Quebec Asbestos Information Service, 1959, The strangest mineral ever known: Montreal, Canada, Quebec Asbestos Information Service, September, [unpaginated].

Readling, C.L., 1971, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1969, v. I, p. 183-191.

Republic of South Africa Department of Minerals and Energy, 1997, Minerals and energy: Republic of South Africa Department of Minerals and Energy, p. 20-22.

Rosato, D.V., 1959, Asbestos—Its industrial applications: New York, NY, Reinhold Publishing Corp., 214 p.

Roskill Information Services Ltd., 1983, The economics of asbestos: Roskill Information Services, Ltd., London, 175 p.

Roskill Information Services Ltd., 1986, The economics of asbestos: Roskill Information Services, Ltd., London, 181 p.

Roskill Information Services Ltd., 1990, The economics of asbestos: Roskill Information Services, Ltd., London, 190 p.

Ross, Malcolm, 1984, A survey of asbestos-related disease in trades and mining occupations and in factory and mining communities as a means of predicting health risks of nonoccupational exposure to fibrous minerals, in Levadie, B., ed., *Definitions for asbestos and other health-related silicates*: Philadelphia, American Society for Testing and Materials, Special Publication 834, p. 51-104.

Ross, Malcolm, and Virta, R.L., 2001, Occurrence, production, and uses of asbestos, in Nolan, R.P., Langer, A.M., Ross, M., Wicks, F.J., and Martin, R.F., eds., *The Health Effects of Chrysotile Asbestos*: Ottawa, Mineralogical Association of Canada, p. 79-88.

RuKeyser, W.A., 1933a, Chrysotile asbestos in the Bajenova District, U.S.S.R.: *Engineering and Mining Journal*, v. 134, no. 8, August, p. 335-339.

RuKeyser, W.A., 1933b, Mining asbestos in U.S.S.R.: *Engineering and Mining Journal*, v. 134, no. 9, September, p. 375-381.

Sassos, M.P., 1983, Greece gears for a 100,000-mt/yr rate from its first asbestos complex: *Engineering and Mining Journal*, v. 184, no. 4, April, p. 66-67.

Selikoff, I.J., and Lee, D.H.K., 1978, Asbestos and disease: New York, NY, Academic Press, 549 p.

Shekarchi, Ebrahim, 1982, Cyprus: U.S. Bureau of Mines Minerals Yearbook 1980, v. III, p. 275-284.

Sinclair, W.E., 1959, Asbestos—Its origin, production, and utilization: London, Mining Publications, Ltd., 512 p.

Skillen, Andy, 1993, Greek minerals outlook: *Industrial Minerals*, no. 313, October, p. 31-49.

Sondermayer, R.V., 1987, Italy: U.S. Bureau of Mines Minerals Yearbook 1985, v. III, p. 473-490.

Sokoloff, V.P., 1964, U.S.S.R.: U.S. Bureau of Mines Minerals Yearbook 1963, v. IV, p. 749-778.

South African Mining Journal, 1949, Mining in N. Transvaal: *South African Mining Journal*, v. 60, no. 2956, October 8, p. 153.

Strishkov, V.V., 1973, U.S.S.R.: U.S. Bureau of Mines Minerals Yearbook 1971, v. III, p. 821-871.

Summers, A.L., 1919, Asbestos and the asbestos industry—The world's most wonderful mineral and other fireproof materials: New York, NY, Sir Isaac Pitman & Sons, Ltd., 107 p.

Sutulov, Alexander, 1973, Minerals resources and the economy of the USSR: New York, NY, McGraw-Hill Publication, 192 p.

Tverskoi, Igor, 1968, Asbestos in the USSR: *Mining in Canada*, v. 41, no. 6, June, p. 31-32.

U.S. Bureau of Mines, 1976, Mineral Facts and Problems 1975: U.S. Bureau of Mines Bulletin 667, p. 107-121.

U.S. Bureau of Mines, 1980, Mineral Facts and Problems 1980: U.S. Bureau of Mines Bulletin 671, p. 55-71.

U.S. Bureau of Mines, 1985, Mineral Facts and Problems 1985: U.S. Bureau of Mines Bulletin 675, p. 53-64.

U.S. Department of Health and Human Services, 1992, Asbestos publications: U.S. Department of Health and Human Services, Cincinnati, OH, June, 190 p.

- Vagt, G.O., 1975, Asbestos: Energy, Mines, and Resources Canada Minerals Yearbook 1973, p. 41-49.
- Van der Merwe, C.J., 1989, Asbestos—1988 *in* South Africa's mineral industry: Braamfontein, Republic of South Africa, Dept. of Mineral and Energy Affairs, Minerals Bureau, p. 141-145.
- Virta, R.L., 1987, Asbestos: U.S. Bureau of Mines Minerals Yearbook 1985, v. I, p. 143-149.
- Virta, R.L., 1994, Asbestos substitutes *in* Carr, D.D., ed., Industrial Minerals and Rocks, 6th ed.: Littleton, Colorado, Society for Mining, Metallurgy, and Exploration, Inc., p. 429-434.
- Virta, R.L., 2002, Asbestos: U.S. Geological Survey Open File Report 02-149, 35 p.
- Wang, K.P., 1967, China: U.S. Bureau of Mines Minerals Yearbook 1965, v. IV, p. 1107-1126.
- Wang, K.P., 1978, China: U.S. Bureau of Mines Minerals Yearbook 1975, v. III, p. 285-304.
- Wang, K.P., 1981, China: U.S. Bureau of Mines Minerals Yearbook 1978-1979, v. III, p. 233-269.

TABLE 1
EARLY DEVELOPMENTS OF THE ASBESTOS INDUSTRY

1857-1880	First packings and flat seals
1866	First bonded and molded asbestos product for heat insulation
1868-1969	First U.S. use of asbestos in roofing felt and cement
1866-1876	Start of systematic textile processing in Italy
1878	Asbestos paper first made in the United States
1882	Concept of asbestos-containing magnesia insulation developed
1890	Textile processing begins in Canada
1893	First spinning of crocidolite in Republic of South Africa
1896	First woven brake bands made in England
1899	Wet machine process of making asbestos-cement developed
1900	Hatschek machine for manufacturing asbestos-cement pipe designed
1903	Asbestos-cement pipe industry begins in the United States
1904	Flat asbestos-cement board manufactured in the United States
1906	Asbestos first used as brake lining
1918	Molded clutch facing developed
1931	Technique for spraying asbestos developed in England
1940s	Asbestos-cement pipe introduced into England
1944	Spraying of deckheads and bulkheads began in British naval ships

Sources: Anonymous, 1953, p. 4-6; Selikoff and Lee, 1978, p. 17-18.

TABLE 2
SALIENT U.S. STATISTICS AND WORLD PRODUCTION
(Metric tons)

	Domestic sales or use	Asbestos imports	Imports from Canada	Imports from South Africa	Crocidolite imports	Amosite imports	Asbestos exports	Apparent consumption ¹	World production
1900	956	19,500 ^e	NA	NA	NA	NA	NA	20,400 ^e	20,600
1901	678	33,500 ^e	NA	NA	NA	NA	NA	34,200 ^e	30,500
1902	912	41,100 ^e	NA	NA	NA	NA	NA	42,000 ^e	28,400
1903	805	31,500 ^e	NA	NA	NA	NA	NA	32,400 ^e	34,300
1904	1,343	36,500 ^e	NA	NA	NA	NA	NA	37,900 ^e	41,100
1905	2,820	51,000 ^e	NA	NA	NA	NA	NA	53,800 ^e	56,000
1906	1,538	54,000 ^e	NA	NA	NA	NA	NA	55,900 ^e	64,700
1907	592	55,000 ^e	NA	NA	NA	NA	NA	55,600 ^e	66,300
1908	849	46,200 ^e	NA	NA	NA	NA	NA	47,100 ^e	14,100
1909	2,799	44,400 ^e	NA	NA	NA	NA	NA	47,200 ^e	73,600
1910	3,350	48,270	48,079	NA	NA	NA	NA	46,400	84,700
1911	6,898	58,038	57,861	NA	NA	NA	NA	58,700	114,000
1912	3,994	64,900	64,797	NA	NA	NA	NA	68,900	117,000
1913	905	88,100	87,953	NA	NA	NA	NA	89,100	145,000
1914	1,026	65,200	65,119	NA	NA	NA	NA	66,300	106,000
1915	1,424	84,900	84,881	NA	NA	NA	NA	86,500	117,000
1916	1,217	105,000	104,306	102	NA	NA	NA	107,000	142,000
1917	1,385	122,000	119,318	1,624	NA	NA	NA	123,000	141,000
1918	825	125,000	122,300	759	NA	NA	NA	125,000	144,000
1919	955	123,000	121,256	816	NA	NA	NA	123,000	181,000
1920	1,356	152,000	147,615	2,025	NA	NA	NA	153,000	193,000
1921	754	65,700	64,784	457	NA	NA	NA	66,000	91,100
1922	61	136,000	133,897	373	NA	NA	NA	135,000	136,000
1923	206	193,000	188,929	254	NA	NA	NA	192,000	201,000
1924	272	166,000	163,340	943	NA	NA	NA	165,000	198,000
1925	1,141	209,000	204,968	382	NA	NA	NA	209,000	312,000
1926	1,232	234,000	229,054	2,182	NA	NA	NA	234,000	329,000
1927	2,704	203,000	195,753	3,156	NA	NA	NA	205,000	342,000
1928	2,031	209,000	200,796	2,920	NA	NA	NA	210,000	354,000
1929	2,862	238,000	228,672	3,338	NA	NA	NA	240,000	400,000
1930	3,848	189,000	181,499	1,730	NA	NA	NA	192,000	339,000
1931	2,928	123,705	118,031	747	NA	NA	1,555	125,000	235,000
1932	3,229	87,774	85,883	192	NA	NA	1,549	89,500	186,000
1933	4,305	108,447	102,435	211	NA	NA	1,250	112,000	249,000
1934	4,615	109,165	102,566	540	NA	NA	1,514	112,000	271,000
1935	8,092	151,124	139,921	857	NA	NA	771	158,000	337,000
1936	10,037	220,992	205,095	1,887	NA	NA	3,397	228,000	460,000
1937	10,958	278,677	250,392	3,854	NA	NA	2,725	287,000	556,000
1938	9,471	162,831	150,657	3,336	NA	NA	2,522	170,000	413,000
1939	14,024	220,048	203,064	5,769	NA	NA	2,243	232,000	425,000
1940	18,198	223,724	204,893	7,940	NA	NA	4,059	238,000	428,000
1941	22,127	380,289	353,250	19,456	NA	NA	4,396	398,000	528,000
1942	14,044	380,330	350,737	18,396	NA	NA	702	394,000	509,000
1943	5,456	399,393	349,861	21,781	NA	NA	333	405,000	575,000
1944	6,048	347,497	320,461	17,414	NA	NA	431	353,000	546,000
1945	11,091	339,609	322,775	12,017	NA	NA	7,756	343,000	573,000
1946	12,769	413,371	401,042	5,737	NA	NA	9,989	416,000	680,000
1947	21,804	539,630	507,370	18,175	NA	NA	2,431	559,000	816,000
1948	33,649	587,748	546,322	17,109	NA	NA	8,371	613,000	930,000
1949	39,360	462,090	427,088	20,611	NA	NA	18,185	483,000	884,000
1950	38,496	639,981	615,703	13,523	NA	NA	18,951	660,000	1,290,000
1951	46,852	691,160	659,315	21,394	NA	NA	14,992	723,000	1,420,000
1952	48,865	643,602	606,817	24,405	NA	NA	9,729	683,000	1,420,000
1953	49,402	627,995	591,591	23,977	NA	NA	2,791	675,000	1,420,000
1954	43,201	615,425	580,855	24,857	NA	NA	1,718	657,000	1,510,000

See footnotes at end of table.

TABLE 2--Continued
SALIENT U.S. STATISTICS AND WORLD PRODUCTION
(Metric tons)

	Domestic sales or use	Asbestos imports	Imports from Canada	Imports from South Africa	Crocidolite imports	Amosite imports	Asbestos exports	Apparent consumption ¹	World production
1955	40,431	671,701	634,202	26,036	NA	NA	2,528	709,000	1,770,000
1956	37,478	625,877	574,925	28,982	16,641	10,372	2,676	660,000	1,810,000
1957	39,601	619,364	568,034	32,152	16,166	12,879	2,624	656,000	1,890,000
1958	39,897	584,528	531,088	36,652	17,862	15,417	2,745	622,000	1,860,000
1959	41,240	646,866	593,776	35,124	16,335	15,072	4,047	684,000	2,050,000
1960	41,026	607,357	559,553	37,008	13,516	17,764	5,012	643,000	2,210,000
1961	47,912	559,742	517,144	32,123	14,062	13,588	3,446	604,000	2,510,000
1962	48,253	613,215	565,912	31,445	8,701	18,347	3,575	659,000	2,410,000
1963	60,234	605,873	561,314	33,524	9,903	19,907	9,112	657,000	2,510,000
1964	91,709	670,738	605,068	45,841	22,551	21,711	24,627	738,000	2,770,000
1965	107,297	652,774	596,973	37,134	19,201	15,460	39,123	721,000	2,810,000
1966	114,240	659,033	593,398	56,763	24,489	21,713	42,634	731,000	2,970,000
1967	111,755	585,236	546,110	27,773	13,532	11,392	43,289	654,000	2,910,000
1968	109,488	669,421	625,398	34,915	12,669	18,567	37,409	741,000	3,010,000
1969	114,247	630,093	594,598	26,934	9,578	13,261	32,816	712,000	3,270,000
1970	113,683	589,128	556,386	24,247	8,923	12,937	42,261	665,000	3,490,000
1971	118,734	618,126	588,439	22,690	6,308	13,227	48,696	699,000	3,580,000
1972	119,443	667,249	647,635	14,864	4,875	6,464	53,183	747,000	3,780,000
1973	136,111	718,920	693,674	22,738	11,387	7,114	60,275	803,000	4,190,000
1974	98,966	695,053	670,511	21,468	10,253	7,274	55,994	768,000	4,160,000
1975	89,498	488,521	456,809	16,308	10,496	3,533	33,061	552,000	5,090,000
1976	104,873	596,737	560,237	18,229	9,232	1,428	42,564	659,000	4,770,000
1977	92,256	550,693	516,085	20,397	10,921	529	34,896	610,000	4,790,000
1978	93,097	570,020	543,233	24,908	16,865	1,170	41,783	619,000	4,690,000
1979	93,354	513,084	495,914	16,328	13,827	461	43,291	564,000	4,760,000
1980	80,079	327,296	315,540	10,261	7,597	364	48,671	356,000	4,670,000
1981	75,618	337,618	318,367	17,112	7,376	680	64,419	349,000	4,350,000
1982	63,515	241,737	229,079	11,390	7,904	389	58,771	247,000	4,560,000
1983	69,906	196,387	184,303	11,754	6,177	609	54,634	217,000	4,430,000
1984	57,422	209,963	195,651	13,912	5,656	715	39,919	226,000	4,310,000
1985	57,457	142,431	131,119	10,985	4,794	121	45,656	162,000	4,250,000
1986	51,437	108,352	103,517	4,455	1,988	--	47,281	120,000	4,030,000
1987	50,600	93,763	90,224	3,246	1,113	--	60,084	84,000	4,240,000
1988	18,233	85,326	79,690	4,288	1,252	--	31,544	71,000	4,310,000
1989	17,427	55,306	53,572	1,040	593	--	27,004	55,000	4,290,000
1990	W	41,348	40,380	835	835	--	27,965	41,000	4,010,000
1991	20,061	34,765	34,480	209	282	--	25,636	35,000	3,490,000
1992	15,573	31,602	30,870	104	472	--	24,860	33,000	3,270,000
1993	13,704	30,840	30,709	--	18	--	27,643	32,000	2,780,000
1994	10,100	25,800	25,700	--	--	--	17,500	27,000	2,250,000
1995	9,000	21,900	21,800	--	192 ²	--	14,600	22,000	2,180,000
1996	9,550	21,600	21,400	15	197 ²	--	15,400	21,700	2,120,000
1997	6,890	20,900	20,700	14	238 ²	--	20,300	21,000	2,150,000
1998	5,760	15,800	15,700	10	228 ²	--	18,100	15,800	1,820,000
1999	7,190	15,800	14,300	293	--	--	21,700	15,800	1,770,000
2000	5,260	14,600	14,500	53	67 ²	--	18,800	14,600	2,070,000
Total	3,280,000	29,500,000	27,400,000	1,120,000	365,000	282,000	1,540,000	31,500,000	173,000,000

⁶Estimated. NA Not available. W Withheld to avoid revealing company proprietary data. -- Zero.

¹Production plus imports minus exports minus changes to Government and industry stocks.

²U.S. Census Bureau reported number. Crocidolite imports estimated to be less than 5 tons.

Sources: U.S. Bureau of Mines and U.S. Geological Survey Minerals Yearbook chapter on asbestos, 1900 to 2001.

TABLE 3
U.S. END USES FOR ASBESTOS, 1965 to 2000
(Thousand metric tons)

	Asbestos cement pipe	Asbestos cement sheet	Coatings and compounds	Flooring products	Friction products	Electrical insulation	Thermal insulation	Packing and gaskets	Paper products	Plastics	Roofing products	Textiles	Other ¹	Unknown ²	Total ³
1965 ^e	137	50	(4)	181	64	22	(5)	22	15	(4)	72	15	144	--	721
1966 ^e	139	51	(4)	183	65	22	(5)	22	14	(4)	73	15	147	--	730
1967 ^e	122	46	(4)	162	59	20	(5)	20	13	(4)	64	13	132	--	650
1968 ^e	141	52	(4)	185	67	23	(5)	23	15	(4)	74	15	148	--	741
1969 ^e	135	50	(4)	178	64	22	(5)	22	14	(4)	72	14	140	--	711
1970 ^e	126	46	(4)	167	60	20	(5)	20	14	(4)	66	14	133	--	666
1971 ^e	131	48	(4)	173	62	21	(5)	21	14	(4)	69	13	137	--	689
1972	140	52	(4)	183	66	22	(5)	22	15	(4)	73	14	147	--	733
1973	151	58	(4)	198	72	23	(5)	24	16	(4)	79	16	158	--	795
1974	202	86	(4)	139	73	13	(5)	26	57	(4)	69	18	85	--	768
1975	139	40	(4)	123	60	6	(5)	15	60	(4)	42	5	62	--	552
1976	127	21	(4)	104	58	8	(5)	18	28	(4)	231	6	59	--	659
1977	115	27	36	150	57	17	4	28	7	8	70	10	143	--	672
1978	106	25	33	138	53	15	4	25	7	7	64	9	133	--	619
1979	96	22	30	125	48	14	3	23	6	7	58	8	121	--	561
1980	42	23	11	70	52	6	3	12	1	2	24	2	111	--	359
1981	42	20	13	67	51	6	1	19	2	1	16	2	109	--	349
1982	38	11	25	49	53	--	1	14	2	--	7	1	46	--	247
1983	26	10	23	45	48	--	1	12	2	1	6	1	42	--	217
1984	37	12	22	46	48	(6)	2	13	2	1	7	2	33	--	226
1985	28	7	23	7	34	(6)	(6)	6	17	(6)	26	1	5	7	162
1986	20	5	17	5	26	(6)	(6)	5	13	(6)	20	(6)	4	4	120
1987	11	4	3	--	21	(6)	--	10	5	1	23	1	2	4	84
1988	12	4	4	(6)	15	(6)	(6)	10	1	(6)	20	(6)	(6)	5	71
1989	8	3	4	--	12	--	--	4	1	1	18	(6)	1	4	55
1990	5	2	2	--	9	--	--	3	(6)	(6)	13	--	1	7	41
1991	4	2	1	--	10	--	--	3	(6)	(6)	15	--	1	1	35
1992	2	(6)	1	--	10	--	--	3	(6)	(6)	16	--	1	(6)	33
1993	1	--	1	--	10	--	--	3	(6)	(6)	16	--	1	(6)	32
1994	--	--	(6)	--	9	--	--	3	(6)	(6)	13	--	1	(6)	27
1995	--	--	(6)	--	7	--	--	3	(6)	(6)	11	--	1	(6)	22
1996	--	--	(6)	--	7	--	--	3	(6)	(6)	11	--	1	(6)	22
1997	--	--	(6)	--	6	--	--	4	(6)	(6)	10	--	1	(6)	21
1998	--	--	(6)	--	3	--	--	2	1	(6)	9	--	1	--	16
1999	--	--	(6)	--	2	--	--	3	--	(6)	10	--	1	--	16
2000	--	--	(6)	--	2	--	(6)	3	--	(6)	9	--	1	--	15
Total ⁷	2,280	776	248	2,680	1,360	279	19	467	339	29	1,480	193	2,250	32	12,400

^eEstimated. Numbers in parentheses--footnotes. -- Zero.

¹"Other" includes known end uses not falling into specified end-use categories.

²Undetermined end uses.

³May not add to total due to independent rounding.

⁴Included with "Other."

⁵Included with "Electrical insulation."

⁶Less than 1/2 unit.

⁷Data are rounded to no more than three significant digits; may not add to totals shown.

Sources: U.S. Bureau of Mines and U.S. Geological Survey Minerals Yearbook chapter on asbestos, 1900 to 2001 and U.S. Bureau of Mines Mineral Facts & Problems 1965, 1970, 1975, and 1980.

TABLE 4
WORLD ASBESTOS PRODUCTION, ALL TYPES¹
(Metric tons)

	United States	Australia	Brazil	Canada	China	FSU ²	Greece	Italy	South Africa	Swaziland	Zimbabwe	Other	World production ²
1900	956	--	--	26,436	NA	NA	--	NA	158	--	NA	3,937	31,487
1901	678	--	--	36,484	NA	NA	--	NA	90	--	NA	4,517	41,769
1902	912	--	--	36,665	NA	NA	--	NA	41	--	NA	4,506	42,124
1903	805	--	--	37,809	NA	5,248	--	NA	277	--	NA	16	44,155
1904	1,343	--	--	43,967	NA	7,479	--	NA	373	--	NA	186	53,348
1905	2,820	--	--	61,927	NA	7,244	--	NA	455	--	NA	22	72,468
1906	1,538	--	--	74,557	NA	7,997	--	NA	474	--	NA	1,223	85,789
1907	592	--	--	82,033	NA	8,837	--	NA	548	--	NA	1,683	93,693
1908	849	--	--	82,348	NA	10,827	--	NA	1,149	--	NA	1,647	96,820
1909	2,799	--	--	79,197	NA	13,294	--	NA	1,519	--	NA	405	97,214
1910	3,350	--	--	92,728	NA	11,070	--	NA	1,346	--	NA	611	109,105
1911	6,898	--	--	115,588	NA	15,487	--	167	1,149	--	NA	1,191	140,479
1912	3,994	--	--	119,077	NA	16,455	--	169	2,115	--	NA	6,574	148,383
1913	905	--	--	124,239	NA	17,494	--	175	873	--	263	93	144,042
1914	1,026	--	--	87,580	NA	15,691	--	171	1,079	--	442	11	106,000
1915	1,424	--	--	100,826	NA	9,779	--	163	1,940	--	1,823	1,045	117,000
1916	1,217	37	--	121,053	NA	8,192	--	82	4,224	--	5,586	4,875	145,229
1917	1,385	280	--	122,925	378	--	--	85	5,643	--	8,675	1,909	141,000
1918	825	2900	--	128,331	243	NA	--	60	3,333	--	7,778	3,430	144,000
1919	955	106	--	124,070	69	NA	--	98	3,567	--	8,889	2,647	140,295
1920	1,356	839	--	162,038	5	1,478	--	165	6,452	--	17,076	4,430	193,000
1921	754	1201	--	61,083	169	2,604	--	420	4,647	--	17,716	3,707	91,100
1922	61	754	--	109,128	197	3,215	--	540	3,982	--	12,926	5,951	136,000
1923	206	331	--	164,014	128	4,780	--	1,538	7,614	--	18,474	4,246	201,000
1924	272	79	--	150,768	127	8,456	--	2,160	6,569	--	23,715	5,933	198,000
1925	1,141	51	--	248,136	213	12,330	--	2,105	9,224	--	31,161	7,690	312,000
1926	1,232	112	--	253,469	NA	18,334	--	2,900	12,789	--	30,249	10,027	329,000
1927	2,704	11	--	249,273	241	21,156	--	3,840	20,106	--	30,097	14,583	342,000
1928	2,031	12	--	247,690	NA	26,492	NA	4,950	21,821	--	36,251	14,765	354,000
1929	2,862	260	--	277,647	277	29,520	NA	2,847	29,971	--	38,677	17,913	399,714
1930	3,848	144	--	219,641	315	54,083	2	851	17,491	--	34,260	7,572	338,063
1931	2,928	130	--	149,047	264	64,674	10	632	14,221	--	21,810	5,849	259,435
1932	3,229	132	112	111,562	250	59,800	9	1,284	10,950	5	14,303	3,895	205,399
1933	4,305	283	99	143,667	239	71,700	14	3,267	14,412	NA	27,381	8,991	274,075
1934	4,615	157	NA	141,502	290	92,200	30	2,252	15,960	NA	29,224	13,140	299,213
1935	8,092	179	NA	190,931	70	95,500	2	4,320	20,600	NA	38,644	13,871	372,030
1936	10,037	243	NA	273,322	69	125,117	1	6,113	22,894	NA	51,116	18,291	506,960
1937	10,958	168	NA	371,967	NA	125,000	2	6,393	25,975	NA	51,722	20,925	612,942
1938	9,471	176	120	262,894	700	86,000	85	6,860	21,025	NA	53,352	14,839	455,346
1939	14,024	325	45	330,642	18,015	95,000 °	2	6,765	20,003	7,233	52,900	18,388	563,017
1940	18,198	498	500	313,504	20,015	102,000 °	NA	8,271	24,850	18,873	50,809	17,098	573,728
1941	22,127	256	13	433,492	20,515	95,000 °	NA	10,766	25,655	19,166	40,037	9,786	676,557
1942	14,044	334	NA	398,669	20,615	95,000 °	NA	11,695	31,351	23,219	50,623	11,298	656,514

See footnotes at end of table.

TABLE 4--Continued
WORLD ASBESTOS PRODUCTION, ALL TYPES
(Metric tons)

	United States	Australia	Brazil	Canada	China	FSU ²	Greece	Italy	South Africa	Swaziland	Zimbabwe	Other	World production
1943	5,456	699	NA	423,831	20,000	100,000 °	NA	8,459	32,347	17,179	52,749	72,979	733,000
1944	6,048	3022	NA	380,349	NA	110,000 °	NA	7,238	31,372	29,628	52,882	94,483	712,000
1945	11,091	4071	2,723	423,559	NA	120,000 °	NA	5,222	25,597	21,243	51,068	91,497	752,000
1946	12,769	629	1,214	506,371	NA	140,000 °	4	8,814	25,597	29,155	50,686	115,390	890,000
1947	21,804	1399	2,631	600,391	NA	160,000 °	40	10,719	27,344	25,360	49,073	162,638	1,060,000
1948	33,649	1,348	1,499	650,239	NA	180,000 °	9	13,044	41,490	29,421	62,502	193,147	1,205,000
1949	39,360	1,671	1,415	521,543	NA	191,000	9	15,877	64,335	30,814	72,246	38,401	975,000
1950	38,496	1,811	844	794,100	NA	217,725	30	21,433	79,301	29,635	64,888	46,289	1,292,740
1951	46,852	2865	1,321	882,871	NA	217,725	34	22,612	97,403	31,719	70,456	53,291	1,424,282
1952	48,865	4,546	1,305	843,083	NA	217,725	24	23,938	121,417	31,542	76,961	50,351	1,415,210
1953	49,402	5,567	1,231	826,651	NA	272,156	1	20,397	86,017	27,309	79,597	56,985	1,419,746
1954	43,201	4,789	2,555	838,345	13,608	340,195	2	23,784	99,020	27,344	72,542	54,405	1,515,000
1955	40,431	5,437	2,834	965,066	20,865	408,234	3	32,101	108,421	29,586	95,491	65,980	1,769,012
1956	37,478	8,808	3,392	920,112	10,886	453,593	5	35,785	123,849	27,102	107,932	85,165	1,805,300
1957	39,601	13,308	2,408	948,994	29,937	453,593	8	36,615	142,858	27,875	119,863	85,195	1,886,947
1958	39,897	14,125	3,462	839,447	58,967	498,952	--	38,555	159,342	22,916	115,319	87,409	1,864,267
1959	41,240	16,216	3,357	952,934	81,647	544,311	--	47,662	165,475	22,504	108,591	82,520	2,050,240
1960	41,026	14,164	3,538	1,014,647	81,647	598,743	--	54,914	159,540	29,054	121,529	108,895	2,213,533
1961	47,912	15,192	3,084	1,064,759	90,719	798,324	--	56,975	176,687	27,934	146,613	99,899	2,512,905
1962	48,253	16,707	4,445	1,102,969	90,719	644,102	--	55,211	200,762	29,783	128,999	103,335	2,408,578
1963	60,234	12,133	1,306	1,157,143	99,790	684,925	67	57,167	186,648	30,255	129,053	98,860	2,505,449
1964	91,709	12,288	1,297	1,288,069	117,934	734,821	63	68,556	195,582	36,162	139,210	94,330	2,767,733
1965	107,297	10,493	1,092	1,259,366	127,006	745,000	--	71,928	218,407	37,089	159,802	87,097	2,814,085
1966	114,240	12,217	1,651	1,350,850	136,078	755,000	--	82,325	250,925	32,788	160,003	87,411	2,971,271
1967	111,755	666	2,256	1,317,328	149,686	769,000	--	101,062	243,563	36,427	97,302	81,201	2,909,580
1968	109,488	812	4,360	1,369,578	154,222	816,467	--	103,437	236,350	38,960	86,184	88,550	3,007,596
1969	114,247	838	12,701	1,430,520	158,758	961,617	--	112,526	258,174	39,079	79,832	97,619	3,265,073
1970	113,683	739	16,329	1,507,420	172,365	1,065,943	--	118,536	287,416	33,057	79,832	99,219	3,493,800
1971	118,734	756	19,958	1,482,867	158,758	1,152,126	--	119,568	319,296	35,484	79,834	98,074	3,584,698
1972	119,443	16,838	32,883	1,530,469	199,581	1,220,165	--	131,272	320,628	33,400	79,834	109,553	3,777,227
1973	136,111	43,529	44,868	1,690,065	208,653	1,279,132	--	150,256	332,650	36,900	163,293	143,572	4,185,499
1974	98,966	30,863	61,871	1,643,790	149,686	1,360,779	--	148,099	333,272	37,917	163,293	159,344	4,157,016
1975	89,498	47,922	73,978	1,055,668	149,686	1,896,018	--	146,995	354,710	41,219	163,293	167,692	4,138,756
1976	104,873	60,642	92,703	1,536,091	150,000	1,850,000	NA	164,788	369,840	41,847	281,000	175,929	4,767,071
1977	92,256	50,601	92,773	1,517,360	200,000	1,900,000	NA	149,327	380,164	38,046	273,194	150,331	4,793,451
1978	93,097	62,744	122,815	1,421,808	250,000	1,945,000	NA	135,402	257,325	36,957	248,861	181,952	4,693,217
1979	93,354	79,721	138,457	1,492,719	140,000	2,020,000	NA	143,931	249,187	34,294	259,891	186,189	4,758,022
1980	80,079	92,418	169,173	1,323,000	131,700	2,070,000	NA	157,794	276,734	32,833	250,949	177,038	4,669,300
1981	75,618	45,494	138,417	1,121,845	106,000	2,105,000	457	137,086	235,943	35,264	247,600	146,236	4,349,466
1982	63,515	18,587	145,998	834,249	110,000	2,700,000	17,016	116,410	211,860	30,145	197,682	132,620	4,559,495
1983	69,906	3,909	158,885	857,504	160,000	2,500,000	31,811	139,054	221,111	26,287	153,221	111,088	4,428,867
1984	57,422	--	134,788	836,654	135,000	2,500,000	45,376	147,272	167,389	25,832	165,385	96,724	4,311,842
1985	57,457	--	165,446	750,190	150,000	2,500,000	46,811	136,006	164,247	25,130	173,580	80,121	4,248,988

See footnotes at end of table.

TABLE 4--Continued
WORLD ASBESTOS PRODUCTION, ALL TYPES
(Metric tons)

	United States	Australia	Brazil	Canada	China	FSU ²	Greece	Italy	South Africa	Swaziland	Zimbabwe	Other	World production
1986	51,437	--	204,460	662,381	150,712	2,400,000	51,355	115,208	138,862	24,475	163,984	66,490	4,029,364
1987	50,600	--	212,807	664,546	144,673	2,554,600	60,134	118,352	135,074	25,925	193,295	77,116	4,237,122
1988	18,233	--	227,653	710,357	150,000	2,600,000	71,114	94,549	145,678	22,804	186,581	84,020	4,310,989
1989	17,427	--	206,195	732,192	181,000	2,600,000	73,300	44,348	156,594	27,291	187,006	65,011	4,290,364
1990	W	--	205,000	725,000	221,000	2,400,000	66,000	3,860	146,000	35,900	161,000	50,495	4,014,255
1991	20,061	--	237,000	639,000	200,000	2,000,000	4,730	15,000	148,525	13,900	142,000	67,735	3,487,951
1992	15,573	--	170,000	590,641	240,000	1,900,000	30,000	--	133,268	32,301	150,158	9,549	3,271,490
1993	13,704	--	185,000	522,967	240,000	1,130,000	56,945	--	103,994	33,860	156,881	331,844	2,775,195
1994	10,100	--	192,050	531,000	303,000	830,000	55,502	--	92,130	26,720	151,905	57,593	2,250,000
1995	9,000	--	170,000	515,587	263,000	808,400	76,003	--	88,642	28,570	169,256	51,542	2,180,000
1996	9,550	--	170,000	506,000	293,000	743,700	80,213	--	57,120	26,014	165,494	48,909	2,100,000
1997	6,890	--	170,000	455,000	288,000	892,000	63,294	--	49,986	25,888	144,959	53,983	2,150,000
1998	5,760	--	170,000	309,000	314,000	755,400	50,000	--	27,195	27,693	123,295	37,657	1,820,000
1999	7,190	--	170,000	337,366	247,000	814,300	--	--	18,836	22,912	115,000	37,396	1,770,000
2000	5,260	--	170,000	320,000	370,000	983,200	--	--	18,782	11,000	145,000	46,758	2,070,000
Total	3,280,000	751,000	4,540,000	60,500,000	7,700,000	67,100,000	881,000	3,860,000	9,920,000	1,800,000	8,690,000	5,980,000	174,000,000

^eEstimated data. NA Not available. W Withheld to avoid disclosing company proprietary data. -- Zero.

¹Some data are rounded to no more than three significant digits, may not add to total shown.

²Former Soviet Union

Sources: U.S. Bureau of Mines and U.S. Geological Survey Minerals Yearbook chapter on asbestos, 1900 to 2001.

TABLE 5
ESTIMATED CONSUMPTION, BY CONTINENT¹
(Metric tons)

	1920	1930	1940	1950	1960	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999	2000
Europe	40,900	128,000	230,000	507,000	1,170,000	1,800,000	2,700,000	2,810,000	2,940,000	2,580,000	928,000	835,000	939,000	479,000	456,000	341,000
Africa	3,530	14,800	1,420	9,600	28,600	90,300	96,100	73,900	112,000	63,100	62,600	99,400	69,900	70,800	106,000	20,500
North America	152,000	234,000	253,000	707,000	703,000	808,000	617,000	554,000	249,000	151,000	53,200	53,000	67,200	38,000	28,600	35,800
South America	1,160	340	1,080	11,700	38,100	99,200	162,000	267,000	200,000	206,000	236,000	214,000	231,000	222,000	187,000	207,000
Asia	6,810	11,600	38,300	25,400	222,000	669,000	702,000	1,060,000	835,000	975,000	1,260,000	1,200,000	1,250,000	816,000	873,000	871,000
Oceania	841	83	15,600	22,100	48,700	77,600	85,700	71,400	13,500	1,710	1,490	1,370	1,560	1,470	1,320	1,250
Total	205,000	389,000	540,000	1,280,000	2,210,000	3,540,000	4,360,000	4,840,000	4,350,000	3,980,000	2,540,000	2,410,000	2,560,000	1,630,000	1,650,000	1,480,000

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: Calculated from data in Appendix A.

TABLE 6
CHANGES IN ESTIMATED CONSUMPTION, BY DECADE¹
(Metric tons)

	1920	1930	1940	1950	1960	1970	1980	1990	2000
World consumption	205,000	389,000	540,000	1,283,000	2,213,000	3,544,000	4,836,000	3,980,000	1,480,000

CHANGES IN ESTIMATED CONSUMPTION, BY CONTINENT, BY DECADE¹

		(Metric tons)							
World	NA	184,000	151,000	743,000	930,000	1,330,000	1,290,000	-855,000	-2,500,000
Europe	NA	86,800	102,000	277,000	665,000	627,000	1,010,000	-222,000	-2,240,000
Africa	NA	11,200	-13,300	8,180	19,000	61,700	-16,500	-10,800	-42,600
North America	NA	82,500	18,900	454,000	-4,020	106,000	-255,000	-403,000	-115,000
South America	NA	-823	739	10,600	26,400	61,100	168,000	-61,200	575
Asia	NA	4,770	26,700	-12,900	197,000	447,000	394,000	-88,300	-104,000
Oceania	NA	-758	15,500	6,450	26,600	28,900	-6,130	-69,700	-460

MAJOR CHANGES IN CONSUMPTION BETWEEN DECADES, BY COUNTRY, DECREASING ORDER^{1,2}

	(Metric tons)							
Europe	FSU +36,700	UK +71,800	FRG +80,000	FSU +317,000	FSU +227,000	FSU +789,000	FSU +681,000	Yugoslavia -33,700
	BLEU +18,800	FSU +32,800	FSU +65,300	UK +55,400	France +69,000	FRG +191,000	UK -77,800	Italy -62,300
	Germany +7,060	France +19,100	BLEU +21,500	FRG +52,400	Spain +62,300	Italy +48,200	Italy -118,000	France -63,600
	Cyprus +6,730	BLEU -19,100	France +19,800	Italy +48,500	Italy +59,000	UK -56,400	FRG -351,000	Poland -65,600
	Spain +5,480				Poland +49,100			FSU -1,680,000
Africa	RSA +13,800	RSA -27,100	Algeria +1,550	Egypt +5,950	RSA +48,400	Zambia -15,600	RSA +78,800	RSA +17,400
			Congo +1,340	Algeria +4,640	Nigeria +34,400	RSA -98,000	Nigeria -12,000	Tunisia -7,180
				RSA -21,300	Zambia +15,600		Saudi Arabia -50,600	Algeria -16,500
North America	Canada +61,300	U.S. +44,600	U.S. +423,000	U.S. -16,700	Canada +50,000	U.S. -309,000	Mexico -39,700	Mexico -12,400
	U.S. +40,700	Canada -26,300			Mexico +27,000	Mexico +39,000	U.S. -326,300	U.S. -31,300
								Canada -80,800
South America			Brazil +8,720	Brazil +17,600	Argentina +21,100	Brazil +157,000	Argentina -14,500	Brazil +18,500
							Brazil -32,000	
Asia	Japan +6,230	Japan +15,500	India +5,610	China +81,200	Japan +227,000	Japan +79,400	Indonesia +57,900	China +224,000
		Korea +5,590	Japan -14,400	Japan +80,200	China +91,400	China +68,300	Iran +48,900	Korea -47,100
		India +5,520		India +12,500	Korea +36,000	Saudi Arabia +52,200	China -55,300	Iran -70,200
					India +26,100	India +47,100	Japan -106,000	Japan -194,000
Oceania		Australia +14,700	Australia +3,360	Australia +25,700	Australia +25,100		Australia -64,800	

NA Not available. BLEU Belgium-Luxembourg; FRG West Germany; FSU Former Soviet Union; RSA South Africa; UK United Kingdom.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Part of the change in consumption in major asbestos-producing countries such as Canada, FSU, and RSA includes asbestos that has been added to or removed from company stocks in addition to that used in manufacturing.

Source: Calculated from data in Appendix A.

Appendix A

World Asbestos Production, Trade, and Consumption from 1920 to 2000

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1920
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	941	--	941	NA
Cyprus	925	--	910	15	NA
Czechoslovakia	--	517	1	516	NA
Denmark	--	133	--	133	NA
Finland	--	24	--	24	NA
France	445	--	--	445	NA
Germany	28	6,828	209	6,647	NA
Italy	166	3,966	294	3,838	NA
Netherlands	--	1,270	111	1,159	NA
Norway	--	381	--	381	NA
Poland	--	241	--	241	NA
Romania	--	14	--	14	NA
Soviet Union ³	1,629	--	--	1,629	NA
Spain	--	1,137	--	1,137	NA
Sweden	--	425	88	336	NA
Switzerland	--	2,265	15	2,249	NA
United Kingdom	--	21,291	92	21,199	NA
Total (Europe)	3,193	39,433	1,721	40,905	40,905
Africa					
Egypt	--	297	--	297	NA
Madagascar	1	--	--	1	NA
South Africa	6,244	--	7,567	-1,323	NA
Zimbabwe (S. Rhodesia)	17,075	--	13,845	3,230	NA
Total (Africa)	23,320	297	21,412	2,205	3,528
North America					
Canada	153,712	--	173,536	-19,824	NA
U.S.	1,495	150,829	558	151,766	NA
Total (North America)	155,206	150,829	174,094	131,942	151,766
South America					
Argentina	--	708	--	708	NA
Brazil	1	205	1	205	NA
Chile	--	252	2	250	NA
Total (South America)	1	1,165	3	1,163	1,163
Asia					
China	5	--	5	--	NA
India	1,847	--	--	1,847	NA
Japan	--	4,965	--	4,965	NA
Total (Asia)	1,852	4,965	5	6,812	6,812
Oceania					
Australia	839	--	--	839	NA
New Zealand	2	--	--	2	NA
Total (Oceania)	841	--	--	841	841
Grand total (World)	184,413	196,689	197,235	183,868	205,015

NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Imperial Institute, Statistical Summary 1920-22: Her Majesty's Stationery Office, London, 1923, p. 23-26.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1930
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	5,111	116	4,996	NA
Belgium-Luxembourg	--	19,050	241	18,809	NA
Cyprus	7,372	4,855	5,485	6,742	NA
Czechoslovakia	--	--	268	-268	NA
Denmark	--	1,029	--	1,029	NA
Finland	1,078	344	--	1,422	NA
Germany	--	14,107	398	13,709	NA
Italy	721	6,576	355	6,942	NA
Latvia	--	108	--	108	NA
Lithuania	--	74	--	74	NA
Netherlands	--	252	231	21	NA
Norway	--	1,453	--	1,453	NA
Poland	--	1,235	--	1,235	NA
Portugal	--	59	--	59	NA
Romania	--	68	--	68	NA
Soviet Union ³	54,080	--	15,748	38,332	NA
Spain	--	6,652	30	6,621	NA
Sweden	--	1,062	1	1,061	NA
Switzerland	--	813	8	805	NA
United Kingdom	--	23,938	721	23,217	NA
Yugoslavia	--	1,045	--	1,045	NA
Total (Europe)	63,251	87,832	23,603	127,481	127,749
Africa					
Mozambique	16	--	--	16	NA
South Africa	23,452	--	10,928	12,524	NA
Zimbabwe (S. Rhodesia)	34,260	--	32,048	2,212	NA
Total (Africa)	57,728	--	42,976	14,752	14,752
North America					
Canada	255,066	--	213,632	41,433	NA
Mexico	--	390	--	390	NA
Panama	--	25	--	25	NA
U.S.	3,849	189,304	699	192,454	NA
Total (North America)	258,914	189,720	214,331	234,303	234,303
South America					
Brazil	--	136	--	136	NA
Chile	--	127	--	127	NA
Colombia	--	77	--	77	NA
Total (South America)	--	340	--	340	340
Asia					
China	315	--	--	315	NA
India	34	--	--	34	NA
Iraq	--	34	--	34	NA
Japan	1,016	10,177	NA	11,193	NA
Indonesia (Netherlands East Indies)	--	6	--	6	NA
Total (Asia)	1,364	10,217	--	11,581	11,581
Oceania					
Australia	83	NA	--	83	NA
Total (Oceania)	83	NA	--	83	83
Grand total (World)	381,341	288,109	280,910	388,541	388,809

NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Imperial Institute, Statistical Summary 1929-31: Her Majesty's Stationery Office, London, 1931, p. 34-40.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1940
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	508	5	503	NA
Belgium-Luxembourg	--	254	508	-254	NA
Bulgaria	--	5	--	5	NA
Cyprus	7,967	--	8,637	-670	NA
Czechoslovakia	NA	5,081	508	4,572	NA
Denmark	--	512	--	512	NA
Estonia	--	102	--	102	NA
Finland	5,338	51	1,563	3,826	NA
France	5,081	14,050	--	19,130	NA
Germany	--	11,555	374	11,181	NA
Greece	20	71	--	91	NA
Hungary	--	508	NA	508	NA
Iceland	--	15	--	15	NA
Italy	8,269	5,748	546	13,471	NA
Latvia	--	102	--	102	NA
Lithuania	--	51	--	51	NA
Netherlands	--	1,040	--	1,040	NA
Norway	--	155	--	155	NA
Poland	--	1,016	20	996	NA
Portugal	102	501	20	582	NA
Romania	--	61	--	61	NA
Soviet Union ³	101,610	--	30,483	71,127	NA
Spain	--	1,793	5	1,788	NA
Sweden	--	2,880	2	2,878	NA
Switzerland	--	2,086	9	2,077	NA
United Kingdom	--	95,392	384	95,008	NA
Yugoslavia	--	102	20	81	NA
Total (Europe)	128,386	143,639	43,085	228,941	229,865
Africa					
Algeria	--	5	--	5	NA
Egypt	--	120	--	120	NA
Morocco	203	--	--	203	NA
South Africa	24,851	--	39,448	-14,597	NA
Swaziland	18,874	--	17,782	1,092	NA
Zimbabwe (S. Rhodesia)	50,812	--	52,520	-1,708	NA
Total (Africa)	94,740	125	109,750	-14,885	1,421
North America					
Canada	320,514	--	305,351	15,162	NA
Costa Rica	--	20	--	20	NA
Mexico	--	947	--	947	NA
U.S.	17,396	223,735	4,059	237,071	NA
Total (North America)	337,909	224,702	309,411	253,201	253,201
South America					
Argentina	150	--	--	150	NA
Bolivia	70	70	70	70	NA
Brazil	508	51	--	559	NA
Colombia	--	79	--	79	NA
Uruguay	--	192	--	192	NA
Venezuela	20	28	20	28	NA
Total (South America)	749	421	90	1,079	1,079
Asia					
China	102	39	--	140	NA
India	297	5,257	--	5,554	NA
Japan	1,524	25,403	254	26,673	NA
Korea, Republic of	508	5,081	--	5,589	NA
Indonesia (Netherlands East Indies)	--	287	--	287	NA
Turkey	88	--	--	88	NA
Total (Asia)	2,519	36,065	254	38,330	38,330

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1940--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Oceania					
Australia	497	14,324	NA	14,821	NA
New Zealand	3	795	3	795	NA
Total (Oceania)	500	15,119	3	15,615	15,615
Grand total (World)	564,803	420,071	462,593	522,282	539,511

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Imperial Institute, Statistical Summary 1938-44: Her Majesty's Stationery Office, London, 1945, p. 30-36.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1950

(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	3,496	21	3,475	NA
Belgium-Luxembourg	--	21,856	636	21,220	NA
Czechoslovakia	NA	15,242	--	15,242	NA
Cyprus	14,990	--	15,720	-731	NA
Denmark	--	9,986	--	9,986	NA
Finland	10,949	988	2,300	9,637	NA
France	7,456	33,560	2,095	38,921	NA
Germany, East	--	13,858	15	13,842	NA
Germany, West	--	80,000	--	80,000	NA
Greece	30	178	--	208	NA
Hungary	--	5,081	--	5,081	NA
Iceland	--	31	--	31	NA
Italy	21,434	6,265	2,886	24,813	NA
Netherlands	--	6,935	8	6,927	NA
Norway	--	2,676	--	2,676	NA
Poland	--	5,081	--	5,081	NA
Portugal	257	2,323	169	2,411	NA
Soviet Union ³	217,746	NA	81,288	136,458	NA
Spain	42	4,384	2	4,424	NA
Sweden	--	10,246	244	10,002	NA
Switzerland	--	4,298	92	4,206	NA
United Kingdom	--	111,261	3,655	107,606	NA
Yugoslavia	958	3,956	35	4,879	NA
Total (Europe)	273,862	341,701	109,167	506,396	507,127
Africa					
Algeria	--	1,552	--	1,552	NA
Angola	--	49	--	49	NA
Congo (Kinshasa)	--	1,344	--	1,344	NA
Egypt	260	868	44	1,084	NA
Kenya	229	--	NA	229	NA
Madagascar	--	--	1	-1	NA
Morocco	511	475	156	829	NA
Mozambique	--	276	--	276	NA
South Africa	79,305	--	92,155	-12,851	NA
Swaziland	29,637	--	25,403	4,234	NA
Zimbabwe (S. Rhodesia)	64,891	--	66,935	-2,043	NA
Total (Africa)	174,832	4,563	184,693	-5,298	9,597
North America					
Canada	794,140	--	752,983	41,157	NA
Mexico	--	5,429	--	5,429	NA
U.S.	37,522	639,755	17,148	660,129	NA
Total (North America)	831,662	645,184	770,131	706,715	706,715
South America					
Argentina	NA	--	--	NA	NA
Bolivia	166	--	166	--	NA
Brazil	844	8,435	--	9,279	NA
Chile	172	234	--	405	NA
Colombia	--	NA	--	NA	NA
Suriname (Dutch Guiana)	--	NA	--	NA	NA
Ecuador	--	NA	--	NA	NA
Peru	--	811	--	811	NA
Venezuela	190	999	20	1,169	NA
Total (South America)	1,372	10,478	186	11,664	11,664

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1950--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Asia					
China	102	--	--	<i>102</i>	NA
Taiwan (Formosa)	<i>218</i>	<i>102</i>	--	<i>320</i>	NA
India	211	10,957	8	11,160	NA
Indonesia	--	39	--	39	NA
Iraq	--	23	--	23	NA
Japan	5,665	6,690	110	12,245	NA
Korea, South	610	--	--	610	NA
Philippines	--	657	--	657	NA
Turkey	245	10	28	227	NA
Total (Asia)	7,051	18,478	146	25,383	25,383
Oceania					
Australia	1,643	16,824	285	18,182	NA
New Zealand	42	3,846	--	3,888	NA
Total (Oceania)	1,685	20,670	285	22,070	22,070
Grand total (World)	1,290,463	1,041,073	1,064,608	1,266,929	1,282,555

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Colonial Geological Surveys, Statistical Summary of the Mineral Industry 1949-54: Her Majesty's Stationery Office, London, 1956, p. 31-37.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1960
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	12,767	63	12,764	NA
Belgium-Luxembourg	--	53,990	297	53,694	NA
Bulgaria	1,118	--	--	1,118	NA
Cyprus	21,153	--	15,575	5,578	NA
Czechoslovakia	--	27,422	--	27,422	NA
Denmark	--	17,440	26	17,414	NA
Finland	9,556	4,446	5,551	8,452	NA
France	25,583	68,592	10,790	83,385	NA
Germany, East	--	35,000	--	35,000	NA
Germany, West	--	132,634	226	132,408	NA
Greece	--	48	--	48	NA
Hungary	--	9,804	--	9,804	NA
Iceland	--	37	--	37	NA
Italy	51,123	29,607	7,409	73,322	NA
Netherlands	--	21,725	36	21,690	NA
Norway	--	6,918	--	6,918	NA
Poland	--	15,245	--	15,245	NA
Portugal	131	2,346	35	2,443	NA
Soviet Union ³	599,499	--	146,115	453,384	NA
Spain	4	14,453	--	14,457	NA
Sweden	--	17,107	28	17,079	NA
Switzerland	--	8,695	--	8,695	NA
United Kingdom	--	170,893	7,874	163,019	NA
Yugoslavia	5,416	8,727	5,217	8,926	NA
Total (Europe)	713,644	657,896	199,240	1,172,300	1,172,300
Africa					
Algeria	--	6,189	--	6,189	NA
Angola	--	819	--	819	NA
Botswana (Bechuanaland)	1,163	--	--	1,163	NA
Egypt	450	6,583	--	7,033	NA
Kenya	106	--	29	76	NA
Morocco	--	2,676	--	2,676	NA
Mozambique	20	720	80	660	NA
South Africa	159,551	NA	193,696	-34,145	NA
Swaziland	29,055	--	25,403	3,653	NA
Tunisia	--	2	--	2	NA
Uganda	--	830	--	830	NA
Zimbabwe (S. Rhodesia)	121,537	--	116,060	5,477	NA
Total (Africa)	311,883	17,820	335,268	-5,565	28,580
North America					
Canada	1,014,699	NA	969,372	45,327	NA
El Salvador	--	227	--	227	NA
Guatemala	--	226	--	226	NA
Jamaica	--	35	--	35	NA
Mexico	--	13,421	--	13,421	NA
U.S.	41,028	607,388	4,955	643,462	NA
Total (North America)	1,055,727	621,295	974,326	702,696	702,696
South America					
Bolivia	170	--	170	--	NA
Brazil	13,237	13,670	--	26,906	NA
Colombia	--	6,836	--	6,836	NA
Peru	--	1,813	--	1,813	NA
Venezuela	3,932	2,277	3,661	2,548	NA
Total (South America)	17,339	24,596	3,831	38,104	38,104

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1960--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Asia					
Burma	--	468	--	468	NA
China	81,288	--	--	81,288	NA
Formosa (Taiwan)	440	1,047	--	1,487	NA
Hong Kong	--	22	--	22	NA
India	1,711	21,967	26	23,652	NA
Indonesia	--	588	--	588	NA
Iran	--	1,246	--	1,246	NA
Iraq	--	450	--	450	NA
Israel	--	6,615	--	6,615	NA
Japan	15,461	77,059	37	92,483	NA
Korea, Republic of	631	--	--	631	NA
Lebanon	--	2,258	--	2,258	NA
Malaysia	--	2,868	--	2,868	NA
Philippines	33	1,236	--	1,268	NA
Thailand	--	6,433	--	6,433	NA
Turkey	216	470	5	682	NA
Total (Asia)	99,780	122,728	68	222,440	222,440
Oceania					
Australia	14,164	37,198	7,529	43,834	NA
New Zealand	289	4,585	--	4,873	NA
Total (Oceania)	14,453	41,783	7,529	48,707	48,707
Grand total (World)	2,212,825	1,486,118	1,520,263	2,178,681	2,212,826

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Natural Environment Research Council Statistical Summary of the Mineral Industry 1960-65: Her Majesty's Stationery Office, London, 1967, p. 33-41

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1970
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	34,155	29	34,126	NA
Belgium-Luxembourg	--	54,839	953	53,886	NA
Bulgaria	3,046	--	--	3,046	NA
Cyprus	28,708	--	24,133	4,575	NA
Czechoslovakia	NA	39,017	--	39,017	NA
Denmark	--	28,633	6	28,627	NA
Finland	13,626	7,744	9,335	12,035	NA
France	710	151,848	201	152,357	NA
Germany, East	--	52,015	--	52,015	NA
Germany, West	--	175,612	924	174,688	NA
Greece	--	17,811	NA	17,811	NA
Hungary	--	15,236	--	15,236	NA
Iceland	--	1,028	--	1,028	NA
Italy	118,618	62,402	48,662	132,358	NA
Netherlands	--	20,063	275	19,788	NA
Norway	--	7,982	--	7,982	NA
Poland	--	64,385	--	64,385	NA
Portugal	202	6,509	180	6,531	NA
Soviet Union ³	1,065,889	--	385,300	680,589	NA
Spain	--	77,677	875	76,802	NA
Sweden	--	18,830	184	18,646	NA
Switzerland	--	17,721	66	17,655	NA
United Kingdom	--	154,636	4,741	149,895	NA
Yugoslavia	12,105	28,552	4,666	35,991	NA
Total (Europe)	1,242,904	1,036,695	480,530	1,799,069	1,799,069
Africa					
Algeria	--	2,285	--	2,285	NA
Angola	--	1,076	--	1,076	NA
Egypt	449	6,609	--	7,058	NA
Kenya	--	206	--	206	NA
Libya	--	540	--	540	NA
Morocco	--	3,551	--	3,551	NA
Mozambique	228	753	316	665	NA
Nigeria	--	34,443	--	34,443	NA
Senegal	--	799	--	799	NA
South Africa	287,431	17,191	290,381	14,241	NA
Swaziland	33,059	--	32,515	544	NA
Tunisia	--	1,766	--	1,766	NA
Uganda	--	2,468	--	2,468	NA
Zambia	--	15,607	--	15,607	NA
Zimbabwe (S. Rhodesia)	81,288	--	76,208	5,080	NA
Total (Africa)	402,455	87,294	399,420	90,329	90,329
North America					
Canada	1,507,497	5,292	1,417,415	95,374	NA
Costa Rica	--	736	--	736	NA
El Salvador	--	963	--	963	NA
Guatemala	--	457	--	457	NA
Jamaica	--	1,910	--	1,910	NA
Mexico	--	40,460	--	40,460	NA
Nicaragua	--	316	--	316	NA
Panama	--	146	--	146	NA
U.S.	113,688	589,127	34,686	668,129	NA
Total (North America)	1,621,186	639,407	1,452,101	808,492	808,492

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1970--Continued

(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America					
Argentina	35	21,106	--	21,141	NA
Bolivia	--	508	--	508	NA
Brazil (fiber)	16,329	23,413	2,032	37,710	NA
Chile	--	8,800	--	8,800	NA
Colombia	--	16,763	--	16,763	NA
Netherlands Antilles	--	335	--	335	NA
Peru	--	1,828	--	1,828	NA
Uruguay	--	1,996	--	1,996	NA
Venezuela	--	10,161	--	10,161	NA
Total (South America)	16,363	84,910	2,032	99,241	99,241
Asia					
Burma	--	1,465	--	1,465	NA
China	172,737	--	--	172,737	NA
Hong Kong	--	90	--	90	NA
India	10,056	39,766	30	49,792	NA
Iran	--	11,197	--	11,197	NA
Iraq	--	2,000	--	2,000	NA
Israel	--	7,589	--	7,589	NA
Japan	21,389	298,253	169	319,473	NA
Korea, Republic of	1,372	35,292	--	36,664	NA
Lebanon	--	6,418	--	6,418	NA
Malaysia	--	14,321	--	14,321	NA
Philippines	1,213	3,303	--	4,516	NA
Singapore	--	3,150	--	3,150	NA
Taiwan	2,842	6,589	151	9,280	NA
Thailand	--	21,272	--	21,272	NA
Turkey	1,685	7,546	--	9,231	NA
Total (Asia)	211,294	458,251	350	669,195	669,195
Oceania					
Australia	740	68,605	443	68,902	NA
New Zealand	--	8,662	--	8,662	NA
Total (Oceania)	740	77,267	443	77,564	77,564
Grand total (World)	3,494,941	2,383,824	2,334,876	3,543,889	3,543,889

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Natural Environment Research Council Statistical Summary of the Mineral Industry 1967-71: Her Majesty's Stationery Office, London, 1967, p. 34-39

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1975
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	34,343	183	34,160	NA
Belgium-Luxembourg	--	60,549	1,721	58,828	NA
Bulgaria	--	28,812	--	28,812	NA
Canary Islands	--	288	--	288	NA
Cyprus	31,602	--	28,378	3,224	NA
Czechoslovakia	--	43,494	--	43,494	NA
Denmark	--	24,388	112	24,276	NA
Finland	2,791	10,132	3,512	9,411	NA
France	--	138,637	2,050	136,587	NA
Germany, East	--	65,725	--	65,725	NA
Germany, West	--	386,188	73,770	312,418	NA
Greece	--	13,306	--	13,306	NA
Hungary	--	32,604	--	32,604	NA
Iceland	--	7	--	7	NA
Ireland	--	6,848	--	6,848	NA
Italy	146,984	66,273	81,073	132,184	NA
Netherlands	--	35,852	189	35,663	NA
Norway	--	5,629	--	5,629	NA
Poland	--	94,412	--	94,412	NA
Portugal	--	5,778	--	5,778	NA
Romania	--	41,299	--	41,299	NA
Soviet Union ³	1,900,000	--	613,303	1,286,697	NA
Spain	--	94,114	--	94,114	NA
Sweden	--	15,529	173	15,356	NA
Switzerland	--	17,262	82	17,180	NA
United Kingdom	--	139,185	1,698	137,487	NA
Yugoslavia	12,336	52,138	3,170	61,304	NA
Total (Europe)	2,093,713	1,412,792	809,414	2,697,091	2,697,091
Africa					
Algeria	--	4,582	--	4,582	NA
Congo (Kinshasa)	--	672	--	672	NA
Egypt	479	5,477	--	5,956	NA
Ghana	--	13,188	--	13,188	NA
Kuwait	--	5,666	--	5,666	NA
Kenya	--	743	--	743	NA
Libya	--	1,335	--	1,335	NA
Morocco	--	7,160	--	7,160	NA
Mozambique	--	740	1,148	-408	NA
Nigeria	--	29,024	--	29,024	NA
Senegal	--	1,132	--	1,132	NA
South Africa	354,710	28,560	368,000	15,270	NA
Swaziland	37,601	--	41,219	-3,618	NA
Syria	--	3,391	--	3,391	NA
Tunisia	--	1,619	--	1,619	NA
Uganda	--	28	--	28	NA
United Arab Emirates (Dubai)	--	2,000	--	2,000	NA
Zambia	--	2,765	--	2,765	NA
Zimbabwe	261,542	--	260,000	1,542	NA
Total (Africa)	654,332	108,082	670,367	92,047	96,073
North America					
Canada	1,055,667	5,166	1,085,610	-24,777	NA
Costa Rica	--	2,974	--	2,974	NA
El Salvador	--	3,866	--	3,866	NA
Guatemala	--	1,808	--	1,808	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1975--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
North America--Continued					
Jamaica	--	1,307	--	1,307	NA
Mexico	--	60,395	--	60,395	NA
Nicaragua	--	1,207	--	1,207	NA
Panama	--	83	--	83	NA
U.S.	89,497	488,567	33,064	545,000	NA
Total (North America)	1,145,164	565,373	1,118,674	591,863	616,640
South America					
Argentina	1,130	15,548	--	16,678	NA
Bolivia	--	750	--	750	NA
Brazil	73,978	29,800	--	103,778	NA
Chile	--	2,000	--	2,000	NA
Colombia	--	15,000	--	15,000	NA
Ecuador	--	3,000	--	3,000	NA
Peru	--	3,500	--	3,500	NA
Uruguay	--	1,927	--	1,927	NA
Venezuela	--	15,548	--	15,548	NA
Total (South America)	75,108	87,073	--	162,181	162,181
Asia					
China	150,000	--	--	150,000	NA
Hong Kong	--	907	705	202	NA
India	20,312	41,514	--	61,826	NA
Indonesia	--	4,845	--	4,845	NA
Iran	--	24,814	--	24,814	NA
Iraq	--	1,482	--	1,482	NA
Israel	--	856	--	856	NA
Japan	4,612	253,097	2,158	255,551	NA
Korea, Republic of	4,345	56,960	--	61,305	NA
Malaysia	--	19,932	--	19,932	NA
North Korea	--	3,300	--	3,300	NA
Pakistan	--	7,000	--	7,000	NA
Philippines	--	1,899	--	1,899	NA
Saudi Arabia	--	10,405	--	10,405	NA
Singapore	--	10,341	1,670	8,671	NA
Sri Lanka	--	789	--	789	NA
Taiwan	1,737	13,363	--	15,100	NA
Thailand	--	42,521	--	42,521	NA
Turkey	15,496	16,357	--	31,853	NA
Total (Asia)	196,502	510,382	4,533	702,351	702,351
Oceania					
Australia	47,922	49,794	24,524	73,192	NA
New Zealand	--	12,484	--	12,484	NA
Total (Oceania)	47,922	62,278	24,524	85,676	85,676
Grand total (World)	4,212,741	2,745,980	2,627,512	4,331,209	4,360,012

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Natural Environment Research Council Statistical Summary of the Mineral Industry 1975-79: Her Majesty's Stationery Office, London, 1981, p. 19-22

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1980

(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Albania	--	2,400	--	2,400	NA
Austria	--	20,241	--	20,241	NA
Belgium-Luxembourg	--	47,880	57	47,823	NA
Bulgaria	650	500	--	1,150	NA
Canary Islands	--	131	--	131	NA
Cyprus	35,535	--	30,446	5,089	NA
Czechoslovakia	617	46,197	--	46,814	NA
Denmark	--	13,713	48	13,665	NA
Finland	--	5,040	--	5,040	NA
France	--	127,123	1,574	125,549	NA
Germany, East	--	74,400	--	74,400	NA
Germany, West	--	392,978	27,333	365,645	NA
Greece	--	14,180	--	14,180	NA
Hungary	--	48,402	5,300	43,102	NA
Iceland	--	5	--	5	NA
Ireland	--	8,413	--	8,413	NA
Italy	157,794	86,550	63,815	180,529	NA
Netherlands	--	19,042	36	19,006	NA
Norway	--	103	--	103	NA
Poland	--	83,272	--	83,272	NA
Portugal	--	19,953	--	19,953	NA
Romania	--	4,900	--	4,900	NA
Soviet Union ³	2,070,000	--	600,000	1,470,000	NA
Spain	--	66,944	--	66,944	NA
Sweden	--	1,195	14	1,181	NA
Switzerland	--	21,029	43	20,986	NA
United Kingdom	--	94,640	1,114	93,526	NA
Yugoslavia	10,468	60,023	2,506	67,985	NA
Total (Europe)	2,275,064	1,259,254	732,286	2,802,032	2,806,108
Africa					
Algeria	--	21,305	--	21,305	NA
Burundi	--	125	--	125	NA
Congo (Kinshasa)	--	118	--	118	NA
Egypt	316	4,387	--	4,703	NA
Kenya	--	1,403	--	1,403	NA
Kuwait	--	2,084	--	2,084	NA
Libya	--	307	--	307	NA
Morocco	--	6,770	--	6,770	NA
Mozambique	800	1,082	--	1,882	NA
Nigeria	--	22,000	--	22,000	NA
Senegal	--	1,177	--	1,177	NA
South Africa	277,734	19,518	381,000	-83,748	NA
Swaziland	32,833	--	31,435	1,398	NA
Tunisia	--	5,838	--	5,838	NA
Uganda	--	132	--	132	NA
United Arab Emirates (Dubai)	--	4,631	--	4,631	NA
Zimbabwe	250,949	--	274,258	-23,309	NA
Total (Africa)	562,632	90,877	686,693	-33,184	73,873
North America					
Canada	1,323,053	1,156	1,217,840	106,369	NA
Costa Rica	--	1,318	--	1,318	NA
El Salvador	--	3,324	--	3,324	NA
Guatemala	--	1,825	--	1,825	NA
Honduras	--	2,102	--	2,102	NA
Jamaica	--	4	--	4	NA
Mexico	--	79,014	--	79,014	NA

See footnotes at end of table

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1980--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
North America--Continued					
Nicaragua	--	848	--	848	NA
Panama	--	283	--	283	NA
U.S.	80,079	327,295	48,666	358,708	NA
Total (North America)	1,403,132	417,169	1,266,506	553,795	553,795
South America					
Argentina	1,261	20,149	--	21,410	NA
Brazil	170,403	24,799	--	195,202	NA
Colombia	--	27,057	--	27,057	NA
Ecuador	--	7,138	--	7,138	NA
Peru	--	4,870	--	4,870	NA
Uruguay	--	2,427	--	2,427	NA
Venezuela	--	9,111	--	9,111	NA
Total (South America)	171,664	95,551	--	267,215	267,215
Asia					
Burma	--	1,825	--	1,825	NA
China	250,000	--	9,000	241,000	NA
Hong Kong	--	8,776	8,492	284	NA
India	33,716	63,176	--	96,892	NA
Indonesia	--	23,047	--	23,047	NA
Iran	--	23,392	--	23,392	NA
Israel	--	3,050	--	3,050	NA
Japan	3,897	395,408	428	398,877	NA
Korea, Republic of	9,854	36,787	--	46,641	NA
Malaysia	--	32,242	--	32,242	NA
Pakistan	--	10,679	--	10,679	NA
Philippines	--	4,467	--	4,467	NA
Saudi Arabia	--	52,225	--	52,225	NA
Singapore	--	16,661	10,461	6,200	NA
Sri Lanka	--	6,188	--	6,188	NA
Syria	--	4,076	--	4,076	NA
Taiwan	683	31,247	--	31,930	NA
Thailand	--	58,756	--	58,756	NA
Turkey	8,882	16,671	--	25,553	NA
Total (Asia)	307,032	788,673	28,381	1,067,324	1,063,248
Oceania					
Australia	92,418	25,239	51,172	66,485	NA
New Zealand	--	4,952	--	4,952	NA
Total (Oceania)	92,418	30,191	51,172	71,437	71,437
Grand total (World)	4,811,942	2,681,715	2,765,038	4,728,619	4,835,676

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: Natural Environment Research Council, World Mineral Statistics 1978-82: Her Majesty's Stationery Office, London, 1984, p. 21-24.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1985
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Albania	--	1,500	--	1,500	NA
Austria	--	21,595	--	21,595	NA
Belgium-Luxembourg	--	25,138	254	24,884	NA
Bulgaria	400	35,472	--	35,872	NA
Cyprus	16,360	462	16,948	-126	NA
Czechoslovakia	--	46,783	--	46,783	NA
Denmark	--	10,362	--	10,362	NA
Finland	--	2,479	--	2,479	NA
France	--	63,873	979	62,894	NA
Germany, East	--	54,600	--	54,600	NA
Germany, West	--	63,172	3,064	60,108	NA
Greece	46,811	4,653	29,387	22,077	NA
Hungary	--	33,596	--	33,596	NA
Ireland	--	5,243	--	5,243	NA
Italy	136,006	47,952	66,244	117,714	NA
Netherlands	--	5,625	50	5,575	NA
Poland	--	81,690	--	81,690	NA
Portugal	--	9,932	--	9,932	NA
Romania	--	4,700	--	4,700	NA
Soviet Union ²	2,500,000	--	309,800	2,190,200	NA
Spain	--	38,022	189	37,833	NA
Sweden	--	1,042	--	1,042	NA
Switzerland	--	5,058	--	5,058	NA
United Kingdom	--	37,639	308	37,331	NA
Yugoslavia	6,918	54,373	2,018	59,273	NA
Total (Europe)	2,706,495	654,961	429,241	2,932,215	2,938,269
Africa					
Algeria	--	31,752	--	31,752	NA
Burundi	--	422	--	422	NA
Congo (Kinshasa)	--	200	--	200	NA
Egypt	229	13,090	--	13,319	NA
Ghana	--	1,760	--	1,760	NA
Kenya	--	766	--	766	NA
Morocco	--	1,110	--	1,110	NA
Mozambique	55	3	--	58	NA
Nigeria	--	10,778	--	10,778	NA
Senegal	--	708	--	708	NA
South Africa	194,905	11,528	175,929	30,504	NA
Swaziland	25,130	--	24,791	339	NA
Tunisia	--	5,852	--	5,852	NA
Zimbabwe	173,500	--	158,633	14,867	NA
Total (Africa)	393,819	77,969	359,353	112,435	112,435
North America					
Canada	750,190	374	721,560	29,004	NA
Cuba	--	1,658	--	1,658	NA
Dominican Republic	--	641	--	641	NA
El Salvador	--	1,769	--	1,769	NA
Guatemala	--	1,101	--	1,101	NA
Honduras	--	1,902	--	1,902	NA
Mexico	--	54,868	--	54,868	NA
Nicaragua	--	3,676	--	3,676	NA
Panama	--	225	--	225	NA
U.S.	57,457	142,429	45,656	154,230	NA
Total (North America)	807,647	208,643	767,216	249,074	249,074

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1985--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America					
Argentina	1,244	5,864	--	7,108	NA
Brazil	165,446	2,591	23,248	144,789	NA
Chile	--	8,387	--	8,387	NA
Colombia	12,435	14,185	--	26,620	NA
Ecuador	--	5,031	--	5,031	NA
Peru	--	3,242	--	3,242	NA
Uruguay	--	596	--	596	NA
Venezuela	--	4,669	--	4,669	NA
Total (South America)	179,125	44,565	23,248	200,442	200,442
Asia					
Burma	--	1,348	--	1,348	NA
China	150,000	1,700	1,700	150,000	NA
India	29,450	78,075	--	107,525	NA
Indonesia	25,000	8,149	--	33,149	NA
Iran	--	20,451	--	20,451	NA
Israel	--	3,621	--	3,621	NA
Japan	2,971	261,648	292	264,327	NA
Korea, Republic of	4,703	57,143	--	61,846	NA
Malaysia	--	19,064	--	19,064	NA
Pakistan	--	2,028	--	2,028	NA
Philippines	--	1,190	--	1,190	NA
Saudi Arabia	--	4,547	985	3,562	NA
Singapore	--	6,078	7,117	-1,039	NA
Sri Lanka	--	8,590	--	8,590	NA
Syria	--	5,928	--	5,928	NA
Taiwan	625	24,519	--	25,144	NA
Thailand	--	71,516	--	71,516	NA
Turkey	29,039	25,544	--	54,583	NA
United Arab Emirates (Dubai)	--	6,624	--	6,624	NA
Total (Asia)	241,788	607,763	10,094	839,457	834,568
Oceania					
Australia	--	12,194	--	12,194	NA
New Zealand	--	1,304	--	1,304	NA
Total (Oceania)	--	13,498	--	13,498	13,498
Grand total (World)	4,328,874	1,607,399	1,589,152	4,347,121	4,348,286

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1985-89: Her Majesty's Stationery Office, London, 1991, p. 26-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1990
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Austria	--	6,167	675	5,492	NA
Belgium-Luxembourg	--	26,514	310	26,204	NA
Bulgaria	500	--	--	500	NA
Czechoslovakia	--	32,776	--	32,776	NA
Denmark	--	800	--	800	NA
France	--	63,672	101	63,571	NA
Germany	--	15,692	608	15,084	NA
Greece	65,993	2,299	56,963	11,329	NA
Hungary	--	33,375	5,784	27,591	NA
Ireland	--	5,533	--	5,533	NA
Italy	3,862	63,438	4,893	62,407	NA
Netherlands	--	6,252	--	6,252	NA
Poland	--	65,621	--	65,621	NA
Portugal	--	12,284	--	12,284	NA
Romania	--	3,000	--	3,000	NA
Soviet Union ³	2,400,000	--	248,200	2,151,800	NA
Spain	--	39,609	127	39,482	NA
Sweden	--	595	--	595	NA
Switzerland	--	1,341	--	1,341	NA
United Kingdom	--	16,022	291	15,731	NA
Yugoslavia	6,578	28,323	--	34,901	NA
Total (Europe)	2,476,933	423,313	317,952	2,582,294	2,583,842
Africa					
Algeria	--	17,382	--	17,382	NA
Burundi	--	68	--	68	NA
Egypt	367	--	--	367	NA
Kuwait	--	1,140	--	1,140	NA
Morocco	--	7,157	--	7,157	NA
Nigeria	--	10,000	--	10,000	NA
Senegal	--	646	--	646	NA
South Africa	161,494	12,354	178,750	-4,902	NA
Swaziland	35,938	--	19,292	16,646	NA
Tunisia	--	7,179	--	7,179	NA
Zambia	--	2,472	--	2,472	NA
Zimbabwe	160,500	--	172,206	-11,706	NA
Total (Africa)	358,299	58,398	370,248	46,449	63,057
North America					
Canada	724,620	879	649,485	76,014	NA
Cuba	--	1,500	--	1,500	NA
El Salvador	--	904	--	904	NA
Honduras	--	416	--	416	NA
Mexico	--	39,316	--	39,316	NA
Panama	--	352	--	352	NA
U.S.	20,000	41,331	28,875	32,456	NA
Total (North America)	744,620	84,698	678,360	150,958	150,958
South America					
Argentina	275	6,588	--	6,863	NA
Bolivia	--	1,297	--	1,297	NA
Brazil	205,220	11,160	53,142	163,238	NA
Chile	--	7,749	--	7,749	NA
Colombia (fiber)	8,000	13,437	--	21,437	NA
Ecuador	--	1,151	--	1,151	NA
Peru	--	1,060	--	1,060	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1990--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Uruguay	--	1,794	--	1,794	NA
Venezuela	--	1,418	--	1,418	NA
Total (South America)	213,495	45,654	53,142	206,007	206,007
Asia					
China	191,800	1,083	7,135	185,748	NA
India	26,053	93,165	254	118,964	NA
Indonesia	--	28,599	--	28,599	NA
Iran	2,800	69,446	--	72,246	NA
Israel	--	2,955	--	2,955	NA
Japan	5,184	287,659	142	292,701	NA
Korea, Republic of	1,534	74,549	--	76,083	NA
Malaysia	--	22,000	--	22,000	NA
Pakistan	--	4,525	--	4,525	NA
Philippines	--	1,869	--	1,869	NA
Saudi Arabia	--	2,005	422	1,583	NA
Singapore	--	4,741	2,181	2,560	NA
Sri Lanka	--	7,002	--	7,002	NA
Syria	--	1,548	--	1,548	NA
Taiwan	--	15,165	--	15,165	NA
Thailand	--	116,652	--	116,652	NA
Turkey	--	26,259	--	26,259	NA
Total (Asia)	227,371	759,222	10,134	976,459	974,911
Oceania					
Australia	--	1,706	--	1,706	NA
Total (Oceania)	--	1,706	--	1,706	1,706
Grand total (World)	4,020,718	1,372,991	1,429,836	3,963,873	3,980,481

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

³ Production and exports include Russia and Kazakhstan.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1990-94: Her Majesty's Stationery Office, London, 1995, p. 24-27.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1995
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Albania	--	1,000	--	1,000	NA
Belarus	--	20,000	2,000	18,000	NA
Belgium-Luxembourg	--	10,462	94	10,368	NA
Bulgaria	100	--	--	100	NA
Croatia	--	3,045	--	3,045	NA
Czech Republic	--	4,500	100	4,400	NA
Denmark	--	345	--	345	NA
Estonia	--	7,976	9,037	-1,061	NA
France	--	48,205	224	47,981	NA
Germany	--	98	--	98	NA
Greece	75,003	272	67,991	7,284	NA
Hungary	--	3,356	--	3,356	NA
Ireland	--	6,355	--	6,355	NA
Italy	--	126	22	104	NA
Kazakhstan	160,829	--	115,400	45,429	NA
Kyrgyzstan	--	11,445	793	10,652	NA
Latvia	--	2,228	--	2,228	NA
Lithuania	--	5,600	5,173	427	NA
Macedonia	--	2,800	--	2,800	NA
Moldova	--	2,800	--	2,800	NA
Poland	--	31,315	948	30,367	NA
Portugal	--	9,163	--	9,163	NA
Romania	--	27,425	--	27,425	NA
Slovakia	--	2,300	100	2,200	NA
Slovenia	--	4,900	--	4,900	NA
Russia	685,000	41,400	76,820	649,580	NA
Spain	--	26,852	142	26,710	NA
Sweden	--	298	--	298	NA
United Kingdom	--	10,157	14	10,143	NA
Yugoslavia (former)	497	--	--	497	NA
Total (Europe)	921,429	284,423	278,858	926,994	928,055
Africa					
Algeria	--	10,000	--	10,000	NA
Egypt	392	7,600	--	7,992	NA
Morocco	--	5,023	--	5,023	NA
Nigeria	--	15,000	--	15,000	NA
Senegal	--	300	--	300	NA
South Africa	88,642	7,891	92,100	4,433	NA
Swaziland	28,574	--	19,000	9,574	NA
Tunisia	--	7,297	--	7,297	NA
Zambia	--	3,000	--	3,000	NA
Zimbabwe	169,487	1,500	174,558	-3,571	NA
Total (Africa)	287,095	57,611	285,658	59,048	62,619
North America					
Canada	524,392	297	509,575	15,114	NA
Cuba	--	3,000	--	3,000	NA
El Salvador	--	398	--	398	NA
Mexico	--	19,154	--	19,154	NA
Panama	--	844	--	844	NA
U.S.	9,290	21,941	16,556	14,675	NA
Total (North America)	533,682	45,634	526,131	53,185	53,185
South America					
Argentina	300	5,788	--	6,088	NA
Bolivia	--	1,575	--	1,575	NA
Brazil	210,352	43,524	71,747	182,129	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1995--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Chile	--	11,666	--	11,666	NA
Colombia (fiber)	3,000	19,925	--	22,925	NA
Ecuador	--	805	--	805	NA
Peru	--	4,947	--	4,947	NA
Uruguay	--	903	--	903	NA
Venezuela	--	5,012	--	5,012	NA
Total (South America)	213,652	94,145	71,747	236,050	236,050
Asia					
China	447,000	68,300	3,465	511,835	NA
India	23,844	91,909	14	115,739	NA
Indonesia	--	50,231	--	50,231	NA
Iran	--	54,933	--	54,933	NA
Israel	--	2,200	--	2,200	NA
Japan	2,399	191,475	74	193,800	NA
Korea, Republic of	--	88,722	--	88,722	NA
Malaysia	--	28,200	--	28,200	NA
Oman	--	181	--	181	NA
Philippines	--	2,904	--	2,904	NA
Saudi Arabia	--	306	8,400	-8,094	NA
Singapore	--	475	--	475	NA
Sri Lanka	--	35	--	35	NA
Syria	--	1,222	--	1,222	NA
Taiwan	--	5,582	--	5,582	NA
Thailand	--	181,692	--	181,692	NA
Turkey	--	25,471	--	25,471	NA
United Arab Emirates	--	6,000	--	6,000	NA
Total (Asia)	473,243	799,838	11,953	1,261,128	1,261,128
Oceania					
Australia	--	1,488	--	1,488	NA
Total (Oceania)	--	1,488	--	1,488	1,488
Grand total (World)	2,429,101	1,283,139	1,174,347	2,537,893	2,542,525

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1995-99: Her Majesty's Stationery Office, 2001, London, p. 26-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1996

(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Albania	--	9	--	9	NA
Belarus	--	20,000	3,000	17,000	NA
Belgium-Luxembourg	--	5,681	11	5,670	NA
Bulgaria	400	--	--	400	NA
Croatia	--	2,363	--	2,363	NA
Czech Republic	--	1,400	27,100	-25,700	NA
Denmark	--	225	--	225	NA
Estonia	--	800	300	500	NA
France	--	20,576	14,053	6,523	NA
Germany	--	119	--	119	NA
Greece	80,213	252	74,043	6,422	NA
Hungary	--	5,249	--	5,249	NA
Ireland	--	4,638	--	4,638	NA
Italy	--	127	51	76	NA
Kazakhstan	134,484	--	139,100	-4,616	NA
Kyrgyzstan	--	12,542	--	12,542	NA
Latvia	--	1,212	--	1,212	NA
Lithuania	--	6,343	4,656	1,687	NA
Macedonia	--	2,999	--	2,999	NA
Moldova	--	1,537	--	1,537	NA
Poland	--	15,700	200	15,500	NA
Portugal	--	6,442	--	6,442	NA
Romania	--	39,130	--	39,130	NA
Russia	629,863	31,366	33,411	627,818	NA
Slovakia	36,000	3,322	201	39,121	NA
Slovenia	--	5,000	--	5,000	NA
Spain	--	27,030	625	26,405	NA
Sweden	--	158	--	158	NA
United Kingdom	--	7,099	967	6,132	NA
Yugoslavia (former)	509	--	--	509	NA
Total (Europe)	881,469	221,319	297,718	805,070	835,386
Africa					
Algeria	--	7,102	--	7,102	NA
Egypt	552	29,849	--	30,401	NA
Morocco	--	5,643	--	5,643	NA
Nigeria	--	15,841	--	15,841	NA
Senegal	--	300	--	300	NA
South Africa	61,800	9,133	60,829	10,104	NA
Swaziland	26,014	--	20,000	6,014	NA
Tunisia	--	6,081	--	6,081	NA
Zambia	--	3,000	--	3,000	NA
Zimbabwe	165,494	1,500	152,091	14,903	NA
Total (Africa)	253,860	78,449	232,920	99,389	99,389
North America					
Canada	475,130	353	504,069	-28,586	NA
Cuba	--	7,100	--	7,100	NA
El Salvador	--	398	--	398	NA
Mexico	--	29,097	--	29,097	NA
Panama	--	650	--	650	NA
U.S.	9,550	30,449	24,231	15,768	NA
Total (North America)	484,680	68,047	528,300	24,427	53,013
South America					
Argentina	446	5,791	--	6,237	NA
Bolivia	--	1,567	--	1,567	NA
Brazil	213,213	31,765	78,294	166,684	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1996--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Chile	--	9,349	--	9,349	NA
Colombia (fiber)	2,000	20,548	--	22,548	NA
Ecuador	--	1,278	--	1,278	NA
Peru	--	4,098	--	4,098	NA
Uruguay	--	895	--	895	NA
Venezuela	--	1,561	--	1,561	NA
Total (South America)	215,659	76,852	78,294	214,217	214,217
Asia					
China	440,500	77,959	9,392	509,067	NA
Dubai	--	6,100	--	6,100	NA
India	27,180	84,378	275	111,283	NA
Indonesia	--	48,331	--	48,331	NA
Iran	2,127	--	--	2,127	NA
Israel	--	1,500	--	1,500	NA
Japan	2,269	177,869	133	180,005	NA
Korea, Republic of	--	77,145	--	77,145	NA
Malaysia	--	19,600	--	19,600	NA
Oman	--	2,061	--	2,061	NA
Pakistan	--	5,500	--	5,500	NA
Philippines	--	1,770	--	1,770	NA
Saudi Arabia	--	500	11,530	-11,030	NA
Singapore	--	429	--	429	NA
Sri Lanka	--	4,818	--	4,818	NA
Syria	--	2,672	--	2,672	NA
Taiwan	--	6,164	--	6,164	NA
Thailand	--	190,205	--	190,205	NA
Turkey	--	26,863	--	26,863	NA
United Arab Emirates	--	6,000	--	6,000	NA
Total (Asia)	472,076	739,864	21,330	1,190,610	1,201,640
Oceania					
Australia	--	1,366	--	1,366	NA
Total (Oceania)	--	1,366	--	1,366	1,366
Grand total (World)	2,307,744	1,185,897	1,158,562	2,335,079	2,405,011

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1995-99: Her Majesty's Stationery Office, 2001, London, p. 27-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1997
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Belarus	--	20,000	3,000	17,000	NA
Belgium-Luxembourg	--	2,366	263	2,103	NA
Bulgaria	300	--	--	300	NA
Croatia	--	3,033	--	3,033	NA
Czech Republic	--	1,315	--	1,315	NA
Denmark	--	125	--	125	NA
Estonia	--	800	4	796	NA
France	--	55	164	-109	NA
Germany	--	143	--	143	NA
Greece	63,294	239	51,720	11,813	NA
Hungary	--	5,759	--	5,759	NA
Ireland	--	2,468	--	2,468	NA
Italy	--	--	42	-42	NA
Kazakhstan	181,818	--	60,429	121,389	NA
Kyrgyzstan	--	22,200	--	22,200	NA
Latvia	--	1,828	--	1,828	NA
Lithuania	--	10,819	7,113	3,706	NA
Macedonia	--	1,998	--	1,998	NA
Moldova	--	3,189	--	3,189	NA
Poland	--	23,000	300	22,700	NA
Portugal	--	7,324	--	7,324	NA
Romania	--	6,807	--	6,807	NA
Russia	723,973	17,128	98,832	644,188	NA
Slovakia	30,000	1,215	328	30,887	NA
Slovenia	--	1,800	--	1,800	NA
Spain	--	21,192	19	21,173	NA
United Kingdom	--	4,320	16	4,304	NA
Yugoslavia (former)	765	1,365	--	2,130	NA
Total (Europe)	1,000,150	160,488	222,230	938,408	938,559
Africa					
Algeria	--	9,997	--	9,997	NA
Egypt	776	10,100	--	10,876	NA
Morocco	--	4,376	--	4,376	NA
Nigeria	--	7,799	--	7,799	NA
Senegal	--	300	--	300	NA
South Africa	49,986	9,571	38,209	21,348	NA
Swaziland	25,888	--	20,000	5,888	NA
Tunisia	--	3,573	--	3,573	NA
Zambia	--	3,000	--	3,000	NA
Zimbabwe	144,959	1,000	143,169	2,790	NA
Total (Africa)	221,609	49,716	201,378	69,947	69,947
North America					
Canada	454,991	128	430,288	24,831	NA
Cuba	--	6,600	--	6,600	NA
El Salvador	--	999	--	999	NA
Mexico	--	28,886	--	28,886	NA
Panama	--	1,171	--	1,171	NA
U.S.	6,890	20,922	23,061	4,751	NA
Total (North America)	461,881	58,706	453,349	67,238	67,238
South America					
Argentina	301	6,549	--	6,850	NA
Bolivia	--	1,818	--	1,818	NA
Brazil	208,447	38,941	63,165	184,223	NA
Chile	--	9,198	--	9,198	NA
Colombia (fiber)	3,000	16,650	--	19,650	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1997--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Ecuador	--	1,348	--	1,348	NA
Peru	--	4,078	--	4,078	NA
Uruguay	--	1,511	--	1,511	NA
Venezuela	--	2,214	--	2,214	NA
Total (South America)	211,748	82,307	63,165	230,890	230,890
Asia					
China	437,000	103,265	13,553	526,712	NA
India	25,537	83,356	282	108,611	NA
Indonesia	--	41,845	--	41,845	NA
Iran	10,373	75,587	--	85,960	NA
Japan	2,254	176,021	160	178,115	NA
Korea, Republic of	--	44,985	--	44,985	NA
Malaysia	--	21,700	--	21,700	NA
Oman	--	1,331	--	1,331	NA
Pakistan	--	3,789	--	3,789	NA
Philippines	--	2,206	--	2,206	NA
Saudi Arabia	--	--	6,440	-6,440	NA
Singapore	--	243	--	243	NA
Sri Lanka	--	18	--	18	NA
Syria	--	3,068	--	3,068	NA
Taiwan	--	5,773	--	5,773	NA
Thailand	--	177,124	--	177,124	NA
Turkey	--	33,725	--	33,725	NA
United Arab Emirates	--	13,660	--	13,660	NA
Total (Asia)	475,164	787,696	20,435	1,242,425	1,248,865
Oceania					
Australia	--	1,556	--	1,556	NA
Total (Oceania)	--	1,556	--	1,556	1,556
Grand total (World)	2,370,552	1,140,469	960,557	2,550,464	2,557,055

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1995-99: Her Majesty's Stationery Office, 2001, London, p. 27-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1998
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Belarus	--	21,518	3,604	17,914	NA
Belgium-Luxembourg	--	2	685	-683	NA
Bulgaria	672	--	--	672	NA
Croatia	--	2,746	--	2,746	NA
Czech Republic	--	1,684	51	1,633	NA
Estonia	--	253	--	253	NA
France	--	979	--	979	NA
Germany	--	191	--	191	NA
Greece	35,068	244	35,185	127	NA
Hungary	--	7,452	--	7,452	NA
Ireland	--	891	--	891	NA
Italy	--	192	7	185	NA
Kazakhstan	155,400	116	123,906	31,610	NA
Kyrgyzstan	--	18,800	69	18,731	NA
Latvia	--	1,385	--	1,385	NA
Lithuania	--	5,877	2,982	2,895	NA
Moldova	--	357	--	357	NA
Poland	--	9,700	300	9,400	NA
Portugal	--	6,302	--	6,302	NA
Romania	--	18,705	--	18,705	NA
Russia	601,859	30,157	241,681	390,335	NA
Slovakia	19,000	--	--	19,000	NA
Slovenia	--	1,716	--	1,716	NA
Spain	--	21,349	15	21,334	NA
United Kingdom	--	1,840	45	1,795	NA
Yugoslavia (former)	1,457	1,427	--	2,884	NA
Total (Europe)	813,456	153,883	408,530	558,809	479,492
Africa					
Algeria	--	8,017	--	8,017	NA
Egypt	147	7,850	--	7,997	NA
Morocco	--	4,500	--	4,500	NA
Nigeria	--	12,515	--	12,515	NA
South Africa	27,752	7,013	24,875	9,890	NA
Swaziland	27,693	--	19,000	8,693	NA
Tunisia	--	4,907	--	4,907	NA
Zambia	--	3,000	--	3,000	NA
Zimbabwe	123,295	1,000	113,008	11,287	NA
Total (Africa)	178,887	48,802	156,883	70,806	70,806
North America					
Canada	302,000	138	319,430	-17,292	NA
Cuba	--	4,400	--	4,400	NA
El Salvador	--	1,266	--	1,266	NA
Mexico	--	29,102	--	29,102	NA
Panama	--	600	--	600	NA
U.S.	5,760	15,823	18,896	2,687	NA
Total (North America)	307,760	51,329	338,326	20,763	38,055
South America					
Argentina	309	4,847	--	5,156	NA
Bolivia	--	1,664	--	1,664	NA
Brazil	198,332	39,597	51,239	186,690	NA
Chile	--	5,125	--	5,125	NA
Colombia	--	14,554	--	14,554	NA
Ecuador	--	2,253	--	2,253	NA
Peru	--	2,994	--	2,994	NA
Uruguay	--	1,432	--	1,432	NA
Venezuela	--	1,782	--	1,782	NA
Total (South America)	198,641	74,248	51,239	221,650	221,650

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1998--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Asia					
China	314,000	71,694	18,591	367,103	NA
India	20,111	106,249	348	126,012	NA
Indonesia	--	21,079	--	21,079	NA
Iran	--	40,505	--	40,505	NA
Japan	1,389	120,813	32	122,170	NA
Korea, Republic of	--	29,619	--	29,619	NA
Malaysia	--	8,400	--	8,400	NA
Oman	--	1,231	--	1,231	NA
Pakistan	--	4,583	--	4,583	NA
Philippines	--	1,500	--	1,500	NA
Saudi Arabia	--	--	8,607	-8,607	NA
Singapore	--	18	--	18	NA
Sri Lanka	--	1,744	--	1,744	NA
Syria	--	1,488	--	1,488	NA
Taiwan	--	5,682	--	5,682	NA
Thailand	--	60,093	--	60,093	NA
Turkey	--	22,674	--	22,674	NA
United Arab Emirates	--	10,291	--	10,291	NA
Total (Asia)	335,500	507,663	27,578	815,585	815,585
Oceania					
Australia	--	1,471	--	1,471	NA
Total (Oceania)	--	1,471	--	1,471	1,471
Grand total (World)	1,834,244	837,396	982,556	1,689,084	1,627,059

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1995-99: Her Majesty's Stationery Office, 2001, London, p. 27-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1999
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Azerbaijan	--	2,976	--	2,976	NA
Belarus	--	25,639	4,334	21,305	NA
Belgium-Luxembourg	--	25	1	24	NA
Bulgaria	354	--	--	354	NA
Croatia	--	1,704	--	1,704	NA
Czech Republic	--	1,441	1	1,440	NA
Estonia	--	833	578	255	NA
France	--	15	--	15	NA
Germany	--	214	--	214	NA
Greece	32,000	72	28,360	3,712	NA
Hungary	--	1,486	--	1,486	NA
Ireland	--	8	--	8	NA
Italy	--	305	--	305	NA
Kazakhstan	139,300	537	107,428	32,409	NA
Kyrgyzstan	--	18,900	13	18,887	NA
Latvia	--	1,042	--	1,042	NA
Lithuania	--	4,102	3,967	135	NA
Moldova	--	300	--	300	NA
Portugal	--	8,949	--	8,949	NA
Romania	--	13,986	--	13,986	NA
Russia	683,174	23,853	261,138	445,889	NA
Slovenia	--	1,487	--	1,487	NA
Spain	--	17,847	5	17,842	NA
United Kingdom	--	789	49	740	NA
Yugoslavia (former)	361	592	--	953	NA
Total (Europe)	855,189	127,102	405,874	576,417	456,417
Africa					
Algeria	--	4,673	--	4,673	NA
Egypt	--	3,347	--	3,347	NA
Morocco	--	4,000	--	4,000	NA
Nigeria	--	79,108	--	79,108	NA
Senegal	--	1,542	--	1,542	NA
South Africa	18,707	10,262	20,174	8,795	NA
Swaziland	22,912	--	22,620	292	NA
Tunisia	--	1,700	--	1,700	NA
Zambia	--	2,500	--	2,500	NA
Zimbabwe	87,972	186	126,068	-37,910	NA
Total (Africa)	129,591	107,318	168,862	68,047	105,957
North America					
Canada	311,000	203	332,406	-21,203	NA
Cuba	--	3,000	--	3,000	NA
El Salvador	--	1,688	--	1,688	NA
Mexico	--	22,755	--	22,755	NA
Panama	--	140	--	140	NA
U.S.	7,190	15,808	21,997	1,001	NA
Total (North America)	318,190	43,594	354,403	7,381	28,584
South America					
Argentina	300	2,634	--	2,934	NA
Bolivia	--	1,212	--	1,212	NA
Brazil	188,386	24,049	49,419	163,016	NA
Chile	--	NA	--	NA	NA
Colombia	--	11,569	--	11,569	NA
Ecuador	--	4,044	--	4,044	NA
Peru	--	1,188	--	1,188	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 1999--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Uruguay	--	1,187	--	1,187	NA
Venezuela	--	1,991	--	1,991	NA
Total (South America)	188,686	47,874	49,419	187,141	187,141
Asia					
China	329,000	69,391	10,720	387,671	NA
India	18,304	112,936	--	131,240	NA
Indonesia	--	20,000	--	20,000	NA
Iran	--	20,000	--	20,000	NA
Japan	1,052	117,143	20	118,175	NA
Korea, Republic of	--	32,519	--	32,519	NA
Malaysia	--	17,980	--	17,980	NA
Oman	--	3,636	--	3,636	NA
Pakistan	--	3,624	--	3,624	NA
Philippines	--	2,882	--	2,882	NA
Saudi Arabia	--	--	17,970	-17,970	NA
Singapore	--	91	--	91	NA
Sri Lanka	--	10,903	--	10,903	NA
Taiwan	--	6,572	--	6,572	NA
Thailand	--	100,423	--	100,423	NA
Turkey	--	15,494	--	15,494	NA
United Arab Emirates	--	1,500	--	1,500	NA
Total (Asia)	348,356	535,094	28,710	854,740	872,710
Oceania					
Australia	--	1,316	--	1,316	NA
Total (Oceania)	--	1,316	--	1,316	1,316
Grand total (World)	1,840,012	862,298	1,007,268	1,695,042	1,652,125

Italics--Estimated data. NA Not available. -- Zero.

¹ Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

² Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1995-99: Her Majesty's Stationery Office, 2001, London, p. 27-29.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 2000

(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
Europe					
Azerbaijan	--	8,252	--	8,252	NA
Belarus	--	25,301	65	25,236	NA
Belgium-Luxembourg	--	98	--	98	NA
Bulgaria	350	--	--	350	NA
Croatia	--	2,586	--	2,586	NA
Czech Republic	--	1,402	--	1,402	NA
Estonia	--	180	--	180	NA
France	--	16	46	-30	NA
Germany	--	189	--	189	NA
Greece	--	501	8,946	-8,445	NA
Hungary	--	3,558	--	3,558	NA
Ireland	--	1,007	--	1,007	NA
Italy	--	87	--	87	NA
Kazakhstan	178,400	--	174,000	4,400	NA
Kyrgyzstan	--	17,307	--	17,307	NA
Latvia	--	857	--	857	NA
Lithuania	--	1,356	643	713	NA
Moldova	--	5	--	5	NA
Poland	--	19	14	5	NA
Portugal	--	4,710	--	4,710	NA
Romania	--	10,244	--	10,244	NA
Russia	752,000	27,259	332,417	446,842	NA
Slovenia	--	893	--	893	NA
Spain	--	15,568	126	15,442	NA
United Kingdom	--	246	2	244	NA
Yugoslavia (former)	563	607	--	1,170	NA
Total (Europe)	931,313	122,248	516,259	537,302	340,777
Africa					
Algeria	--	900	--	900	NA
Egypt	--	NA	--	NA	NA
Morocco	--	NA	--	NA	NA
Nigeria	--	NA	--	NA	NA
Ghana	--	648	--	648	NA
Senegal	--	1,784	--	1,784	NA
South Africa	18,910	10,217	16,627	12,500	NA
Swaziland	12,690	--	10,000	2,690	NA
Tunisia	--	NA	--	NA	NA
Zimbabwe	151,954	--	140,000	11,954	NA
Zambia	--	NA	--	NA	NA
Total (Africa)	183,554	13,549	166,627	30,476	20,476
North America					
Canada	320,000	125	315,326	4,799	NA
El Salvador	--	1,678	--	1,678	NA
Mexico	--	26,880	--	26,880	NA
Panama	--	1,280	--	1,280	NA
U.S.	5,260	14,637	18,765	1,132	NA
Total (North America)	325,260	44,600	334,091	35,769	35,769
South America					
Argentina	254	2,079	--	2,333	NA
Bolivia	--	982	--	982	NA
Brazil	209,332	35,491	63,134	181,689	NA
Chile	--	1,460	--	1,460	NA
Colombia	--	12,189	--	12,189	NA
Ecuador	--	4,393	--	4,393	NA
Peru	--	NA	--	NA	NA

See footnotes at end of table.

ASBESTOS PRODUCTION, TRADE, AND CONSUMPTION IN 2000--Continued
(Metric tons)

Country	Production	Imports	Exports	Apparent consumption ¹	Estimated consumption ²
South America--Continued					
Uruguay	--	809	--	809	NA
Venezuela	--	2,727	--	2,727	NA
Total (South America)	209,586	60,130	63,134	206,582	206,582
Asia					
China	350,000	72,004	11,814	410,190	NA
India	14,516	<i>110,000</i>	--	<i>124,516</i>	NA
Indonesia	--	54,891	--	54,891	NA
Iran	2,000	--	--	2,000	NA
Japan	--	98,595	--	98,595	NA
Korea, Republic of	--	28,972	--	28,972	NA
Malaysia	--	NA	--	NA	NA
Philippines	--	NA	--	NA	NA
Oman	--	2,347	--	2,347	NA
Pakistan	--	4,160	--	4,160	NA
Saudi Arabia	--	--	9,733	-9,733	NA
Singapore	--	4	--	4	NA
Sri Lanka	--	NA	--	NA	NA
Taiwan	--	5,421	--	5,421	NA
Thailand	--	120,563	--	120,563	NA
Turkey	--	19,455	--	19,455	NA
Total (Asia)	366,516	516,412	21,547	861,381	871,114
Oceania					
Australia	--	1,246	--	1,246	NA
Total (Oceania)	--	1,246	--	1,246	1,246
Grand total (World)	2,016,229	758,185	1,101,658	1,672,756	1,475,964

Italics--Estimated data. NA Not available. -- Zero.

¹Apparent consumption calculated as production plus imports minus exports, not adjusted to account for changes in Government and industry stocks.

²Estimated consumption excludes negative apparent consumption data and estimated additions to stockpiles for individual countries.

Source for production, import, and export data: British Geological Survey, World Mineral Statistics 1996-2000: Her Majesty's Stationery Office, 2002, London, p. 25-28.