# Asbestos

By R. A. Clifton[1]

U.S. apparent consumption of asbestos failed to decline in 1984 for the first time since 1978. U.S. apparent consumption rose 4% over that in 1983 but was just 28% below the alltime high of 1973. Shipments from domestic mines, all chrysotile, decreased 18%, and imports for consumption increased 7%.

**Domestic Data Coverage.**—Domestic production data for asbestos are developed by the Bureau of Mines by means of a voluntary industry survey. Of the three canvassed operations to which a survey request was made, all responded, representing 100% of the total production data shown in table 1.

**Table 1.—Salient asbestos statistics**

| | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|
| United States: | | | | | |
| Production (sales) metric tons | 80,079 | 75,618 | 63,515 | 69,906 | 57,422 |
| Value thousands | $30,599 | $30,685 | $24,917 | $27,866 | $24,238 |
| Exports and reexports (unmanufactured) | | | | | |
| metric tons | 48,671 | 64,419 | 58,771 | 54,634 | 39,919 |
| Value thousands | $21,067 | $21,508 | $19,713 | $19,683 | $18,346 |
| Exports and reexports of asbestos products (value) | | | | | |
| do | $141,653 | $145,130 | $127,867 | $129,582 | $163,347 |
| Imports for consumption (unmanufactured) | | | | | |
| metric tons | 327,296 | 337,618 | 241,737 | 196,387 | 209,963 |
| Value thousands | $91,809 | $103,893 | $64,925 | $57,956 | $64,749 |
| Consumption metric tons | 358,700 | 348,800 | 246,500 | 217,000 | 226,000 |
| World: Production do | r4,699,306 | r4,348,387 | 4,115,413 | p4,275,604 | e4,338,297 |

eEstimated. pPreliminary. rRevised.

**Legislation and Government Programs.**—The Emergency Temporary Standard (ETS) for exposure to asbestos published by the Occupational Safety and Health Administration (OSHA) in November 1983 was terminated by the Fifth Circuit Court of Appeals. On March 7, 1984, the court issued a ruling that invalidated the ETS because the record did not indicate that the risk was as serious as OSHA had defined it.

By yearend, the Environmental Protection Agency (EPA) proposal of July 27, 1983, to ban asbestos in some products immediately and in all products eventually, had not been published.

By notice in the Federal Register of April 10, 1984, OSHA published its proposal to revise the standard for occupational exposure to asbestos. In addition, OSHA's 1975 proposal was formally withdrawn and replaced by this action. The regulatory text of the proposal (1) specifies two alternative permissible exposure limits (PEL), 0.2 fiber per cubic centimeter and 0.5 fiber per cubic centimeter, (2) requires an employee information and training program, and (3) requires warning signs to be displayed at each location where a revised PEL may be exceeded. OSHA plans to adopt a new PEL that reflects evidence that will be produced in the record concerning health risk and technical and economic feasibility and that may be higher or lower than the limits proposed. Hearings on the proposal were held during 1984.

A trade newsletter stated that recent findings of a study of the 44 nonfuel materials in the National Defense Stockpile indi-



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cated that 8 need immediate quality assessment because of their critical role in national defense.[2] One of these is chrysotile asbestos.

**Environmental Impact.**—As part of a review requested by OSHA, the U.S. Department of the Interior strongly suggested that the American Society for Testing and Materials' asbestos definition be adopted as the federal definition.[3] The compromise definition, which was expected to be useful to both the environmental and minerals communities, is as follows:

*Asbestos.*—A term applied to six naturally occurring minerals exploited commercially for their desirable physical properties, which are in part derived from their asbestiform habit. The six minerals are the serpentine mineral chrysotile and the amphibole minerals grunerite asbestos (also referred to as amosite), riebeckite asbestos (also referred to as crocidolite), anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. Individual mineral particles, however processed and regardless of their mineral name, are not demonstrated to be asbestos if the length-to-width ratio is less than 20 to 1.

Figures compiled by the Rand Institute on 3,400 completed asbestos disease litigation cases showed that the total cost of the average case was $95,000, of which only $35,000 was paid to the plaintiff. A solution being tried was to set up a separate fund to settle the asbestos claims outside of the courtroom. The fund, called the Asbestos Claims Facility, would be run by a newly created, nonprofit organization.[4] The defendants would provide the funding, although the specific contributions of the various industrial companies and insurance companies involved had not been decided by yearend.

The necessity of removing asbestos from millions of buildings where it had been installed, mainly as insulation, was examined.[5] The study indicated that the National Academy of Sciences under contract to EPA concluded that the typical amount of asbestos dust in the home, including homes containing no asbestos construction materials, is about 400 fibers per cubic meter. Studies in the United Kingdom had shown that, in buildings containing damaged asbestos-based materials, the density of fibers was no higher. The lifetime public risk from asbestos-linked cancer was stated in the report to be about 9 per million—nearly 900 times smaller than the risk of death by accidents in the home.

**Table 2.—Stockpile goals and Government inventories for asbestos as of December 31**

(Metric tons)

| | Stockpile goals | Total inventories | | |
|---|---|---|---|---|
| | | 1982 | 1983 | 1984 |
| Amosite | 15,422 | 38,587 | 38,591 | 30,855 |
| Chrysotile | 2,722 | 9,034 | 9,753 | 9,754 |
| Crocidolite | -- | 754 | 754 | 33 |
| Total | 18,144 | 48,375 | 49,098 | 40,642 |

## DOMESTIC PRODUCTION

Mines in the United States shipped about 18% less asbestos than in 1983, and the value decreased 13%. Only two States produced asbestos; California was the leader, followed by Vermont.

Calaveras Asbestos Corp. was California's and the Nation's leading producer, from its Copperopolis Mine. The other California producer, the Santa Rita Mine on the Joaquin Ridge near Coalinga, in San Benito County, was owned and operated by Union Carbide Corp. through its newly named Calidria Corp. This mine was the second largest U.S. producer. The third U.S. producer was the Vermont Asbestos Group's Lowell Mine in Orleans County, VT.

Employment in U.S. asbestos mines and mills remained at somewhat less than 400 persons.

The Vermont Asbestos Group's mine was struck in October 1983, and the miners were out until February 1, 1984.

The Alaska asbestos project was again reviewed.[6] The Slate Creek chrysotile asbestos deposits are known to contain indicated reserves of about 60 million metric tons with an average fiber content of more than 5%. The fiber is strong and fast filtering


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and is considered to be ideal for use in asbestos-cement products. The Cache deposit, the largest of the Slate Creek deposits, would be the first scheduled for development. Because of domestic environmental problems, development of these Alaskan deposits remained on hold during 1984 despite the potential of supplying the Pacific Rim with excellent quality asbestos.

**Table 3.—Asbestos producers in 1984**

| State and company | County | Mine | Type of asbestos |
|---|---|---|---|
| California: | | | |
| Calaveras Asbestos Corp | Calaveras | Copperopolis | Chrysotile. |
| Calidria Corp | San Benito | Santa Rita | Do. |
| Vermont: Vermont Asbestos Group | Orleans | Lowell | Do. |

## CONSUMPTION AND USES

Total U.S. asbestos consumption increased 4%; of this, 97% was chrysotile and 3% was crocidolite. Small amounts of amosite were reported used. Spinning grades 1, 2, and 3 represented 1% of the total chrysotile imported. Grade 7 remained the most used, 70%, followed by grades 4 at 11%, 5 at 10%, and 6 at 8%.

**Table 4.—U.S. asbestos consumption, by end use, grade, and type**

(Thousand metric tons)

| End use | Chrysotile | | | | | | | Crocidolite | Amosite | Total asbestos |
|---|---|---|---|---|---|---|---|---|---|---|
| | Grades 1 and 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 | Grade 7 | Total | | | |
| 1983 total | 0.4 | 2.2 | 17.0 | 13.9 | 17.4 | 159.3 | 210.2 | 6.2 | 0.6 | 217.0 |
| 1984: | | | | | | | | | | |
| Asbestos-cement pipe | -- | -- | 22.4 | 7.4 | 1.5 | -- | 31.3 | 5.7 | -- | 37.0 |
| Asbestos-cement sheet | -- | -- | .3 | 1.2 | 8.0 | 2.6 | 12.1 | -- | -- | 12.1 |
| Coatings and compounds | -- | -- | -- | -- | -- | 21.6 | 21.6 | -- | -- | 21.6 |
| Flooring products | -- | -- | -- | -- | -- | 46.4 | 46.4 | -- | -- | 46.4 |
| Friction products | -- | -- | 1.0 | 7.3 | 6.2 | 33.9 | 48.4 | -- | -- | 48.4 |
| Insulation: | | | | | | | | | | |
| Thermal | -- | -- | .1 | -- | -- | .4 | .5 | -- | .1 | .6 |
| Electrical | -- | -- | -- | 1.5 | .5 | .2 | 2.2 | -- | -- | 2.2 |
| Packing and gaskets | -- | -- | .4 | .5 | .7 | 11.6 | 13.2 | -- | -- | 13.2 |
| Paper | -- | -- | -- | .1 | -- | 1.6 | 1.7 | -- | -- | 1.7 |
| Plastics | -- | -- | -- | .5 | -- | .6 | 1.1 | -- | -- | 1.1 |
| Proofing products | -- | -- | -- | 3.0 | -- | 4.1 | 7.1 | -- | -- | 7.1 |
| Textiles | -- | 1.5 | -- | -- | -- | -- | 1.5 | -- | -- | 1.5 |
| Other | .1 | .5 | .9 | .2 | .5 | 30.6 | 32.8 | -- | .3 | 33.1 |
| Total | .1 | 2.0 | 25.1 | 21.7 | 17.4 | 153.6 | 219.9 | 5.7 | .4 | 226.0 |

## PRICES

Depressed markets and high producer inventories of the last few years have caused final negotiated asbestos prices to be lower than listed prices. A realistic set of unit values can be calculated using import data. These averaged data represented most of the domestic market. The unit value of exported asbestos, $460 per ton, represented a 28% increase.


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**Table 5.—Customs unit values of imported asbestos**

(Dollars per metric ton)

| | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|
| Canada: | | | | | |
| Chrysotile: | | | | | |
| Cement | 251 | 272 | 234 | 257 | 284 |
| Crude | 158 | -- | 380 | 199 | 1,084 |
| Spinning | 843 | 927 | 917 | 932 | 699 |
| Other | 296 | 373 | 334 | 384 | 431 |
| South Africa, Republic of: | | | | | |
| Amosite | 1,611 | 728 | 771 | 840 | 869 |
| Crocidolite | 686 | 676 | 646 | 629 | 705 |

## FOREIGN TRADE

There was a 27% increase in the total value of asbestos fibers and asbestos products exported from the United States; of this, the fiber portion remained at 13%. Exports of brake linings and disk brake pads increased 47% in value and accounted for 63% of the value of all asbestos products exported in 1984. Canada remained the largest recipient of U.S. exports accounting for 62% of the value, followed by Japan, 7%; Mexico, 6%; Saudi Arabia, 3%; and Venezuela, 3%.

Canada provided 93% of the asbestos fiber imported into the United States, and the Republic of South Africa provided 7%. Several countries provided minor amounts. Chrysotile continued to dominate the imported types with 97% of the total. The value of imported asbestos fiber increased 12%.

**Table 6.—Countries importing U.S. asbestos fibers and products**

(Thousand dollars)

| Country | 1983 | | | 1984 | | |
|---|---|---|---|---|---|---|
| | Unmanufactured fibers | Manufactured products | Total[1] | Unmanufactured fibers | Manufactured products | Total |
| Australia | 19 | 2,107 | 2,126 | 55 | 2,457 | 2,512 |
| Brazil | 221 | 1,432 | 1,653 | 215 | 3,683 | 3,898 |
| Canada | 1,539 | 73,739 | 75,278 | 889 | 112,012 | 112,901 |
| Germany, Federal Republic of | 985 | 2,367 | 3,352 | 1,023 | 2,540 | 3,563 |
| Japan | 3,787 | 8,036 | 11,823 | 3,279 | 9,062 | 12,341 |
| Korea, Republic of | 550 | 781 | 1,331 | 479 | 1,259 | 1,738 |
| Kuwait | -- | 1,380 | 1,380 | 31 | 857 | 888 |
| Mexico | 4,649 | 3,565 | 8,214 | 6,997 | 4,649 | 11,646 |
| Saudi Arabia | 13 | 10,339 | 10,352 | 4 | 4,904 | 4,908 |
| Thailand | 2,599 | 189 | 2,788 | 1,916 | 179 | 2,095 |
| Turkey | 497 | 913 | 1,410 | 13 | 350 | 363 |
| United Kingdom | 204 | 2,116 | 2,320 | 192 | 619 | 811 |
| Venezuela | 329 | 1,773 | 2,102 | 571 | 3,975 | 4,546 |
| Other | 4,005 | 19,846 | 23,851 | 2,557 | 16,144 | 18,701 |
| Total[1] | 19,398 | 128,584 | 147,981 | 18,221 | 162,690 | 180,911 |

[1]Data may not add to totals shown because of independent rounding.


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## Table 7.—U.S. exports and reexports of asbestos and asbestos products

| Products | | 1982 | | 1983 | | 1984 | |
|---|---|---|---|---|---|---|---|
| | | Quantity | Value (thousands) | Quantity | Value (thousands) | Quantity | Value (thousands) |
| **EXPORTS** | | | | | | | |
| Unmanufactured: | | | | | | | |
| Crudes, fibers, stucco | metric tons | 42,342 | $14,752 | 40,476 | $14,879 | 26,381 | $14,106 |
| Sand and refuse | do | 16,183 | 4,791 | 13,760 | 4,519 | 13,398 | 4,115 |
| Total | do | 58,525 | 19,543 | 54,236 | 19,398 | 39,779 | 18,221 |
| Manufactured: | | | | | | | |
| Asbestos fibers | do | 2,538 | 8,119 | 1,537 | 5,198 | 958 | 5,067 |
| Brake linings and disk brake pads | do | NA | 42,852 | NA | 70,456 | NA | 103,303 |
| Clutch facings and linings | number | NA | 16,879 | NA | 20,285 | NA | 23,206 |
| Gaskets | metric tons | 358 | 3,020 | 337 | 2,196 | 275 | 1,815 |
| Insulation | do | NA | 6,799 | NA | 3,270 | NA | 5,720 |
| Packing and seals | do | 1,311 | 15,309 | 1,015 | 10,174 | 1,150 | 9,063 |
| Shingles and clapboard | do | 4,011 | 3,235 | 3,082 | 1,935 | 2,098 | 1,615 |
| Other articles of asbestos | do | 17,639 | 13,444 | 4,953 | 5,593 | 1,759 | 2,595 |
| Other articles, n.s.p.f | do | NA | 17,047 | NA | 9,477 | NA | 10,306 |
| Total | | XX | 126,704 | XX | 128,584 | XX | 162,690 |
| **REEXPORTS** | | | | | | | |
| Unmanufactured: | | | | | | | |
| Crudes and fibers | do | 246 | 170 | 333 | 271 | 140 | 125 |
| Sand and refuse | do | XX | XX | 65 | 14 | -- | -- |
| Total | do | 246 | 170 | 398 | 285 | 140 | 125 |
| Manufactured: | | | | | | | |
| Asbestos fibers | do | 66 | 203 | 3 | 7 | 1 | 5 |
| Brake linings and disk brake pads | do | NA | 539 | NA | 318 | NA | 47 |
| Clutch facings and linings | number | NA | 309 | NA | 167 | NA | 194 |
| Gaskets | metric tons | r(1) | 1 | (1) | 117 | 46 | 136 |
| Insulation | do | -- | -- | NA | 10 | (1) | 10 |
| Packing and seals | do | 5 | 22 | 1 | 10 | (1) | 1 |
| Other articles of asbestos | do | 27 | 80 | 59 | 203 | NA | 264 |
| Other articles, n.s.p.f | do | NA | 9 | NA | 166 | -- | -- |
| Total | | XX | 1,163 | XX | 998 | XX | 657 |

rRevised. NA Not available. XX Not applicable.
[1]Less than 1/2 unit.

## Table 8.—U.S. imports for consumption of asbestos fibers, by type, origin, and value

| Type | Canada | | South Africa, Republic of | | Other | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Quantity (metric tons) | Value (thousands) | Quantity (metric tons) | Value (thousands) | Quantity (metric tons) | Value (thousands) | Quantity (metric tons) | Value (thousands) |
| 1982 | 229,079 | $56,714 | 11,390 | $7,199 | 1,268 | $1,012 | 241,737 | $64,925 |
| 1983: | | | | | | | | |
| Amosite | -- | -- | 609 | 512 | -- | -- | 609 | 512 |
| Chrysotile: | | | | | | | | |
| Crude | 4 | 1 | 313 | 220 | 89 | 138 | 406 | 359 |
| Spinning fibers | 1,840 | 1,714 | 190 | 123 | 161 | 225 | 2,191 | 2,062 |
| All other | 182,459 | 48,018 | 4,465 | 2,998 | 80 | 120 | 187,004 | 51,136 |
| Crocidolite (blue) | -- | -- | 6,177 | 3,887 | -- | -- | 6,177 | 3,887 |
| Total | 184,303 | 49,733 | 11,754 | 7,740 | 330 | 483 | 196,387 | 57,956 |
| 1984: | | | | | | | | |
| Amosite | -- | -- | 715 | 621 | -- | -- | 715 | 621 |
| Chrysotile: | | | | | | | | |
| Crude | 85 | 92 | -- | -- | -- | -- | 85 | 92 |
| Spinning fibers | 2,041 | 1,369 | -- | -- | 93 | 123 | 2,134 | 1,492 |
| All other | 193,525 | 54,806 | 7,541 | 3,423 | 307 | 326 | 201,373 | 58,555 |
| Crocidolite (blue) | -- | -- | 5,656 | 3,989 | -- | -- | 5,656 | 3,989 |
| Total | 195,651 | 56,267 | 13,912 | 8,033 | 400 | 449 | 209,963 | 64,749 |


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## WORLD REVIEW

World production of asbestos increased slightly for the second consecutive year. Canadian asbestos exports accounted for 65% of total world exports. Of total world asbestos deliveries, about 38% was made to North America including 30% to the United States, 22% to Asia, 20% to Europe, 11% to Central and South America, 8% to Africa and the Middle East, and 1% to Oceania.

As of mid-1983, producer inventories in Canada and most of the market economy countries were at a record high, even though all producers had adjusted production downward. It was estimated that 200,000 tons of asbestos fiber was stockpiled in Canada alone. The major reduction in mine production continued to give rise to shortened work periods, layoffs, and, in many instances, prolonged shutdowns of mining and processing operations. Furthermore, prices of most fiber grades had not increased during the last 3 years.[7]

World chrysotile production capacity was apparently increasing while demand was decreasing. Many countries were competing with Canada for a share of the export markets. In addition to the established producers such as Australia, Italy, the Republic of South Africa, the U.S.S.R., and Zimbabwe, Brazil, Colombia, and Greece had recently entered the world market.

Developing countries of Africa, Asia, Latin America, and the Middle East essentially constitute the only markets offering potential for growth, given their needs for asbestos products in construction and irrigation. Most of these countries are faced with a scarcity of hard currencies along with the shrinking of financing resources.

**Australia.**—Woodsreef Mines Ltd. announced plans to reopen its mine at Barraba early in 1985 if financing can be arranged. Using their wet process for fiber recovery, the company proposes to process the 25 million tons of dry process tailings left from previous mining for an expected 12-year operational life. An additional 12 million tons of unmined ore is amenable to the wet process. The company claims that the wet process almost doubles the yield of fiber obtained from ore compared to dry processing, and yields comparable to initial dry plant yields can be recovered from the tailings.

The wet process virtually eliminates all environmental problems and produces a well-opened fiber suitable for use in asbestos-cement without further treatment. The main product line will be a grade 5R equivalent, although limited quantities of grade 6D equivalent may be available. The fiber will probably be marketed in a pelletized form. Successful end-use trials on a commercial scale have already been conducted in asbestos-cement plants in Australia, Malaysia, Thailand, and the United States.

**Brazil.**—S.A. Mineração de Amianto (SAMA) holds about 96% of Brazil's asbestos reserves at Minacu, Goiás. In 1983, SAMA produced 150,000 tons of asbestos fiber and exported 14,000 tons. Measured, indicated, and inferred reserves total 5 million tons, with an average ore grade of 6.76%.

**Canada.**—Asbestos, which ranked third among all minerals in value of production in Quebec Province during 1984, continued to suffer reductions in production. In 1983, 745 million tons was produced with a value of C$321 million compared with 695 million tons in 1984 valued at C$301 million.[8] In volume, asbestos shipments dropped by 45% from those of 1979, and producers now have production capacity that far exceeds demand.

Brinco Mining Ltd. has increased the expected life of its Cassiar asbestos operations in British Columbia severalfold following the completion of a deep drill hole, which was collared 750 feet southeast of the 15-million-ton McDame deposit. This deep hole at least doubled the previously established reserves for the McDame deposit as a conservative estimate. Although the grade of the deposit is similar to the main Cassiar ore body, the unit value of the ore was expected to be higher because of the quality of the asbestos fiber.[9]

In another action, Brinco announced the sale of its 60.13% equity interest in Abitibi Asbestos Mining Co. in Maizerete Township, Quebec, to Dydar Resources Ltd., a private firm.

The Société Nationale de l'Amiante (SNA), an asbestos firm owned by the Quebec government, was active in two major areas with its asbestos properties. Asbestos Corp. Ltd. temporarily suspended operations at its Thetford plant effective December 1, 1984, because of a high inventory, 40,000 tons, caused by poor sales in 1984 and because of predicted weak markets in 1984.[10] A merger of their two operating mines in the Eastern Townships was under study.


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**China.**—A delegation from China, while visiting in Canada, gave some information about their asbestos industry. Their production was not definitely known because there were many small local mines and records were poor. Mines were in 16 or 17 Provinces, and about 30 were owned by local communes, not by the state. The larger mines employed a total of 2,000 to 3,000 workers. According to the State Bureau of Building Materials, production was about 140,000 tons in 1982. Reserves are large, about 50 million tons. Product utilization has not been very wide.

**Cyprus.**—Production of asbestos in Cyprus came exclusively from one mine located in the serpentinite deposit of the Troodos Massif. The mine, at Amiandos, was owned and operated by Cyprus Asbestos Mines Ltd. Production was halved over a 3-year period to approximately 17,000 tons in 1983, inline with decreasing sales, which amounted to about 15,000 tons. Most of that production was exported.

Cyprus Asbestos produced two grades of asbestos, 3S and HSH, but because of declining quality, it is now developing two new grades in their place. During the summer of 1984, a pilot plant was set up to produce grades 4T and equivalent 4Z together with a small quantity of grade 7. The company planned to commence commercial production of its new grades in 1985 aiming at markets in the Middle and Far East. The majority of the company's production was destined for export with only about 1,000 tons per year supplied to the domestic market for the manufacture of asbestos cement pipes.[11]

**United Kingdom.**—The Health and Safety Executive of the United Kingdom put new control limits on asbestos exposure in 1984. The control limit for crocidolite remained at 0.2 fiber per cubic centimeter, and the limit for amosite was lowered from 0.5 to 0.2 fiber per cubic centimeter. The chrysotile control limit was halved to 0.5 fiber per cubic centimeter.

**Yugoslavia.**—A new asbestos tile and paper factory started trial operations in Stragari.[12] The factory was to export over one-half of its overall output to hard currency markets. Annual production of the factory was to be as follows: asbestos concentrate, 40,000 tons; asbestos paper, 22 million square meters; and asbestos tile, 9,000 tons.

**Table 9.—Asbestos: World production, by country[1]**

(Metric tons)

| Country[2] | 1980 | 1981 | 1982 | 1983[p] | 1984[e] |
|---|---|---|---|---|---|
| Argentina | 1,261 | 1,280 | 1,218 | 1,240 | 1,250 |
| Australia | 92,418 | [r]45,494 | 18,587 | [e]20,000 | 10,000 |
| Brazil | 169,173 | 138,420 | 145,998 | 158,885 | 160,000 |
| Bulgaria | 700 | 400 | 600 | 700 | 600 |
| Canada (shipments) | 1,323,053 | 1,122,000 | 834,000 | 858,000 | 922,000 |
| China[e] | 131,700 | 106,000 | 110,000 | [r]160,000 | 160,000 |
| Colombia[e] | NA | 5,400 | 5,400 | 5,400 | 9,000 |
| Cyprus | 34,535 | 24,440 | 18,952 | 17,288 | 16,000 |
| Egypt | 316 | 325 | 424 | 245 | 325 |
| Greece | -- | -- | [e]100,000 | [e]100,000 | 110,000 |
| India | 31,253 | 24,515 | 26,761 | 24,873 | 25,000 |
| Indonesia[e] | -- | 5,000 | 25,000 | 25,000 | 25,000 |
| Italy | 157,794 | 137,086 | 116,410 | 139,054 | 140,000 |
| Japan | 3,897 | 3,950 | 4,135 | [e]4,000 | 4,000 |
| Korea, Republic of | 9,854 | 14,084 | 15,933 | 12,506 | 15,000 |
| Mozambique | 800 | 800 | 800 | 800 | 800 |
| Philippines | 6 | -- | -- | -- | -- |
| South Africa, Republic of | 277,734 | 235,943 | 211,860 | 221,111 | 170,000 |
| Swaziland (exports) | 32,833 | 35,264 | 26,413 | 31,275 | 30,000 |
| Taiwan | 683 | 2,317 | 2,392 | 7,819 | 2,500 |
| Turkey | 18,162 | 3,860 | 958 | [e]4,000 | 4,000 |
| U.S.S.R.[e] | 2,070,000 | 2,105,000 | 2,180,000 | 2,250,000 | 2,300,000 |
| United States (sold or used by producers) | 80,079 | 75,618 | 63,515 | 69,906 | [3]57,422 |
| Yugoslavia | 12,106 | 13,591 | 11,657 | 10,502 | 10,400 |
| Zimbabwe | 250,949 | 247,600 | 194,400 | 153,000 | 165,000 |
| Total | [r]4,699,306 | [r]4,348,387 | 4,115,413 | 4,275,604 | 4,338,297 |

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Apr. 23, 1985.

[2]In addition to the countries listed, Afghanistan, Czechoslovakia, North Korea, and Romania also produced asbestos, but output is not officially reported, and available general information is inadequate for the formulation of reliable estimates of output levels.

[3]Reported figure.


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## TECHNOLOGY

Higher methanol-to-gasoline yields were made possible with an asbestos-based catalyst as a result of research being carried out at Concordia University in Montreal, Canada. By crystallizing zeolite ZSM-5, a catalyst, on asbestos fibers, a mixed catalyst was made that selectively converts methanol to products with higher olefin-to-paraffin ratios than does ZSM-5 alone. In tests, olefin production was raised from 10% to 15%, using ZSM-5 alone, to almost 60%, while paraffin generation was cut from 45% to less than 5%. The concentration of aromatic liquids produced was about the same, 40%, with both catalysts. The catalyst is made by soaking asbestos fibers in dilute sulfuric acid, which partially leaches out magnesium and other metal impurities. The fibers are then hydrothermally reacted with sodium aluminate and tetrapropyl ammonium hydroxide to form submicrometer-size, spherical nodules of ZSM-5 on the fibers.[13]

A safe and inexpensive method of removing preformed asbestos insulation from ship pipes, fittings, and boilers was developed and successfully tested by Southwest Research Institute. The process uses a 1-to-5 solution of ethylene glycol and water to reduce the friability of the asbestos as well as the consequent fiber level in the air. Workers saturate the asbestos with the solution, allow it to soak into the insulation for 2 to 3 days, and then remove the insulation. Tests showed asbestos fiber concentrations to be well within permissible levels.[14]

Preparatory work was reportedly done by some paint companies to use attapulgite in place of asbestos. Although asbestos was still used in paints for a number of purposes, attapulgite was already getting considerable use as a replacement for asbestos in texture paint.[15]

Research on substitutes for asbestos has recently intensified.[16] Approaches were novel materials such as pulped polyolefins and a synthetic glass made from slate-mining wastes; new combinations of existing asbestos substitutes aimed at boosting their performance; and modifications of the chemical and physical nature of asbestos fibers to make them less injurious to living tissue.

Over the years, about 30 materials were advanced as substitutes for asbestos. These include glass fiber, cotton, ceramic fibers, carbon fibers, phenolic and aramid fibers, clay, mica, and diatomaceous earth. Many had already found their way into the market, either alone or combined in different proportions to achieve desired properties. Not one of these materials or groups of materials, however, is entirely satisfactory for all of the many asbestos outlets that include cement, brake linings, wallboard, and fireproof fabrics. Moreover, many of the substitutes have limitations, such as inadequate heat resistance, low strength, chemical instability, and cost.

Pulped polyolefin, introduced 3 years ago under the tradename Pulpex, was being investigated as an asbestos substitute in such applications as reinforcement for cement, felts for flooring tiles, and filters in the beverage industry. Chemically, Pulpex consists of tiny fibers of high-density polyethylene or polypropylene. Physically, it has a fleecy, white appearance that in bulk form and under a microscope strongly resembles asbestos fibers. Although the product has been used in cement piping in Europe, it has been more difficult to market in the United States because of a tremendous reluctance to change from asbestos despite its well-known health hazards. The area where pulped polyolefins already had marked success was in replacing the asbestos in felt that underlies vinyl floor tiles. However, they are about 10 times more costly than the cheaper grades of asbestos.

Far more experimental than the Pulpex work is a project under way at the University of California at Los Angeles. The program, sponsored by the Bureau of Mines, seeks to turn the wastes from marble and slate processing into a glassy fiber that shows promise for replacing asbestos in cement.

The search for asbestos replacements also involves the combination of well-known substitute materials in novel blends. Nowhere is this practice more common than in friction materials, including linings for brakes and clutches. In this application, there is no single drop-in substitute for asbestos.

Although complete replacement of asbestos is the goal of most research on substitutes, some attempts are being made to modify asbestos itself to make it less harmful. One such program is in progress in Canada at SNA. The process involves treating asbestos fibers with dry vapors of phosphorus compounds in an inert atmosphere.


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Among the compounds used are phosphorus oxychloride and phosphorus pentachloride. The asbestos treated in this fashion has 0.5% to 5% by weight of phosphate groups chemically bound to the fibers. According to the company, such fibers do far less damage to living tissue than do ordinary asbestos fibers, although it is not known why.

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[1]Physical scientist, Division of Industrial Minerals.

[2]Energy and Minerals Resources. Minerals Newswire. V. 12, No. 18, May 7, 1984, p. 143.

[3]Ross, M., R. A. Kuntze, and R. A. Clifton. A Definition for Asbestos. Definitions for Asbestos and Other Health-Related Silicates, ed. by Benjamin Levadie. American Society for Testing and Materials, ASTM STP 834, 1984, pp. 139-147.

[4]Chemical Week. An Out of Court Fund for Asbestos Claims. V. 134, No. 17, Apr. 25, 1984, pp. 18-19.

[5]The Economist (London). Is the Anti-Asbestos Lobby Moving Too Quickly, Too Late? V. 292, No. 7359, Sept. 15, 1984, p. 65.

[6]Mullins, W. J., and J. F. McQuat. The Alaska Asbestos Project (Part 1)—Project Review. Ind. Miner. (London), No. 199, Apr. 1984, p. 40.

[7]Dupere, J. Asbestos Industry at the Crossroads: Current Position and Outlook. Min. Eng., v. 36, No. 7, 1984, pp. 727-730.

[8]The Northern Miner. Quebec Increases Value of Annual Mineral Output. V. 70, No. 42, Dec. 27, 1984, p. 20.

[9]———. Brinco Hole Doubles McDame Reserves. V. 70, No. 27, Sept. 13, 1984, p. 1.

[10]Industrial Minerals (London). Asbestos Corp. Shutdown. No. 207, Dec. 1984, p. 9.

[11]Griffiths, J. The Industrial Minerals of Cyprus. Ind. Miner. (London), No. 207, Dec. 1984, pp. 21-35.

[12]Industrial Minerals (London). Company News and Mineral Notes. No. 205, Oct. 1984, p. 70.

[13]Chemical Engineering. Chementator. V. 91, No. 9, Apr. 30, 1984, p. 17.

[14]Chemical Week. A New Process To Remove Asbestos. V. 134, No. 14, Apr. 14, 1984, p. 34.

[15]American Paint and Coatings Journal. Miscellaneous Materials. V. 69, No. 2, July 30, 1984, p. 22.

[16]Chemical Week. The Urgent Search for Asbestos Substitutes. V. 135, No. 2, July 11, 1984, pp. 54-55.


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