ASBESTOS

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Asbestos is a generic name given to six fibrous minerals that have been used in commercial products. The six types of asbestos are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. Several properties that make asbestos so versatile and cost effective are high tensile strength, chemical and thermal stability, high flexibility, low electrical conductivity, and large surface area. Nearly all of the asbestos produced worldwide is chrysotile.

Legislation and Government Programs

The Environmental Protection Agency issued an updated draft toxicological profile of asbestos under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (U.S. Environmental Protection Agency, 1999).

A variety of asbestos-containing products, such as brakes, gaskets, and asphalt roofing products, are used by the military on vehicles, ships, and missiles and in construction. Strategic-grade asbestos is not required in the manufacture of these products, and classified applications in which strategic-grade asbestos is used are believed to be extremely limited. The U.S. Department of Defense authorized the disposal of 197 metric tons (t) of strategic- and nonstrategic-grade chrysotile, which is the remainder of the chrysotile in the National Defense Stockpile. The amosite and crocidolite in the stockpile will not be sold but have been authorized for disposal.

Production

KCAC Inc., San Benito County, CA, was the only company mining asbestos in the United States in 1999. The company mined a highly sheared serpentinite comprising matted, short-fiber chrysotile and unfractured serpentinite (also called a mass-fiber deposit). Domestic production (sales) increased 25% to 7,190 t in 1999 (table 1). Domestic production data for asbestos were collected by means of a voluntary survey of the one domestic mining operation, representing 100% of the sales data shown in table 1.

Consumption

U.S. consumption of asbestos was 15,800 t, essentially unchanged from that of 1998. The three leading domestic markets were roofing products, gaskets, and friction products, with 61%, 19%, and 13%, respectively, of the asbestos market. Only chrysotile was used in manufacturing in the United States; 94% was grade 7, followed by grades 5, 6, 4, and 3, in decreasing order of consumption (table 2).

Prices

The average unit value of domestically produced asbestos decreased from that of 1998. The average unit value for imported crude chrysotile increased slightly to $149 per metric ton in 1999. The average unit value for imports of spinning-grade chrysotile was $1,300 per ton, a twelvefold increase from that of 1998. Low-tonnage, high-value imports from Azerbaijan and South Africa caused the increase in the unit value. Without these high-value shipments, the average unit value for spinning-grade chrysotile was $110 per ton, or 3% higher than in 1998. The unit value of "Chrysotile, other" decreased 20% to $166 per ton in 1999 because fewer high-value shipments from South Africa and Zimbabwe were included under this category than in 1998 (table 3). Imports of chrysotile from Azerbaijan, South Africa, and Zimbabwe had the highest unit values. The average unit value of chrysotile imported from Azerbaijan was $1,190 per ton; from South Africa, $1,550 per ton; and from Zimbabwe, $1,950 per ton. Average unit values of imports from Brazil, Mexico, the Republic of Korea, and Venezuela ranged from $102 per ton to $1,100 per ton.

Prices ranged from $147 per ton to $1,262 per ton for Canadian chrysotile and $200 per ton to $440 per ton for South African chrysotile, depending on the grade (Industrial Minerals, 1999). Quoted prices should be used only as a guideline because actual prices depend on the terms of the contract between seller and buyer.

Foreign Trade

The export value of asbestos fibers and products containing asbestos or asbestos substitutes increased by 22% to $245 million in 1999 from $201 million in 1998. Exports of friction products (brake linings, pads, mounted brake linings, and clutch facings) accounted for over 80% of this increase.

Mexico and Japan were the leading importers of asbestos fiber from the United States. Canada was the leading importer of U.S. products manufactured using asbestos or asbestos substitutes, followed by Mexico, Germany, Japan, and the United Kingdom (table 4). These five countries accounted for 84% of the value of asbestos products exported from the United States.

Exports and reexports of brake linings, disk pads, and mounted brake linings accounted for 81% of the value of all manufactured asbestos products (table 5). Products in these categories composed 94% of the value of goods manufactured using asbestos and asbestos substitutes that were exported to

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Canada. These products also accounted for 95% of the export values to Mexico, 96% to Germany, and 87% to Japan.

In 1999, approximately 21,700 t of asbestos was exported, according to the Bureau of the Census. The exports included asbestos crudes, fiber, sand, refuse, and stucco. Exports of domestic origin were estimated to be approximately 7,000 t. Reexports of Canadian fiber probably accounted for the bulk of the remaining exports, although some manufactured products and nonasbestos mineral exports may have been included in the 21,700 t.

In 1999, Canada supplied 91% of the asbestos imported by the United States. Imports also were reported from Azerbaijan (42 t), Brazil (20 t), the Republic of Korea (5 t), Mexico (10 t), South Africa (293 t), Venezuela (1,020 t), Zimbabwe (80 t) (table 6). Imports from the Republic of Korea, Mexico, and Venezuela probably were transshipments because none of these countries are known to mine asbestos.

The United States also imported $149 million of the products under asbestos product classifications. This includes approximately 60,100 t valued at $26.7 million of asbestos- and cellulose-fiber cement products (A/C), including panels, pipe, and tile. The bulk of the A/C product imports was in the form of flat sheets and panels (93%), followed by corrugated sheet (4%), pipe (1%), and other (2%).

World Review

World production of asbestos was estimated to be 1.93 million metric tons. Russia continued to be the leading producer of asbestos, followed by Canada, China, Brazil, Zimbabwe, and Kazakhstan. These countries accounted for 92% of the world production (table 7).

A 1997 ban on asbestos use by France, which was challenged by the Canadian Government, continued to be reviewed by the World Trade Organization (WTO). The Canadian Government is awaiting the outcome of the WTO review before considering a challenge to an asbestos ban issued in July by the 15-nation European Commission (EC). The EC ban eliminates the use of chrysotile in cement products, seals, gaskets, and other specialized uses by 2005. The only exemption from the ban will be chrysotile diaphragms used by the chlorine industry. However, the EC will undertake a further review of any relevant new scientific data on the health risks of chrysotile asbestos and its substitutes before January 1, 2003. The EC had previously banned the use of other types of asbestos (Yahoo!Finance, July 27, 1999, EU Commission confirms ban on white asbestos, press release, accessed July 29, 1999, at URL http://biz.yahoo. com/rf/990727/lc.html).

Canada.—Noranda Inc. continued construction on its $491.5 million magnesium facility in Asbestos, Quebec. The company will extract magnesium metal from asbestos mine tailings using the Magnola Process. Noranda expects to begin production in 2000, with production anticipated at 63,000 metric tons per year (t/yr) (Heinzl, 1999).

Minroc Mines Inc., which owns a chrysotile mine and mill in British Columbia, changed its name to Cassiar Mines and Metals Inc. and initiated production of chrysotile fiber from stockpiles and tailings at its Cassiar site (Cassiar Mines and Metals Inc., 2000). The company also entered into an agreement with Aluminum of Korea Ltd., a Hyundai Group company, to develop a magnesium plant at the Cassiar site, using stockpiled serpentinite as the source material for the magnesium. Initial proposals called for a 68,000 t/yr to 90,700 t/yr magnesium production capacity, with production projected to begin in 2003. Prior to this, the company will conduct a $25-million feasibility study (Cassiar Mines and Metals Inc., 1999).

J.M. Asbestos Inc. continued its underground development in Asbestos, Quebec. The underground mine, which will replace its open pit operation, is scheduled to begin operation in 2000 (Mining Journal, 1999a).

United Kingdom.—The Health and Safety Commission announced a ban on imports and use of chrysotile and products that contain chrysotile, effective November 24, 1999. The ban permits the use of chrysotile in applications for which there are no suitable asbestos substitutes, allows research, development, or analysis on chrysotile, and permits products in service prior to the ban to be used through the end of their service life. The United Kingdom had previously banned the use of amosite and crocidolite in the 1980's (Mining Journal, 1999b).

Outlook

Domestic markets for asbestos probably will remain unchanged or decline only slightly over the next few years. Friction products, gaskets, and roofing products will continue to be the only significant domestic markets for the foreseeable future in the United States. World markets for asbestos should improve slightly with the easing of the economic slowdown in Southeast Asia.

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[1]Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1
SALIENT ASBESTOS STATISTICS 1/

(Metric tons, unless otherwise specified)

		1995	1996	1997	1998	1999
United States:						
Production (sales)		9,290	9,550	6,890	5,760	7,190
Exports and reexports: 2/						
Unmanufactured, value	thousands	$6,010	$5,310	$5,690	$6,410	$7,960
Asbestos products, value	do.	$180,000	$163,000	$197,000	$194,000	$237,000
Imports for consumption, unmanufactured:						
Quantity		21,900	21,600	20,900	15,800	15,800
Value 3/	thousands	$4,810	$4,880	$4,660	$3,240	$3,150
Consumption, apparent 4/		22,000	21,700	21,000	15,800	15,800
World: Production		2,180,000	2,100,000 r/	2,110,000 r/	1,820,000 r/	1,930,000 e/

e/ Estimated. r/ Revised.
1/ Data are rounded to no more than three significant digits.
2/ F.a.s. value; includes exports of crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials.
3/ U.S. Customs declared value.
4/ Production, plus imports, minus producer exports of asbestos fiber, plus adjustments in Government and industry stocks.

TABLE 2
U.S. ASBESTOS CONSUMPTION BY END USE, GRADE, AND TYPE 1/ 2/

(Metric tons)

	Chrysotile							
End use	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Total	Crocidolite 3/	Total asbestos
1998	78	120	720	237	14,400	15,600	228	15,800
1999:								
Coatings and compounds	--	--	--	--	226	226	--	226
Friction products	--	--	221	162	1,740	2,120	--	2,120
Gaskets	--	--	146	43	2,900	3,080	--	3,080
Plastics	32	1	--	--	--	33	--	33
Roofing products	--	--	--	--	9,700	9,700	--	9,700
Other	27	72	283	--	267	648	--	648
Total	59	73	649	205	14,800	15,800	--	15,800

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Estimated distribution based upon data provided by the Asbestos Institute, Montreal, Canada, and the U.S. Geological Survey asbestos producer survey.
3/ May include imports of chrysotile. Estimated consumption of crocidolite was less than 5 tons.

TABLE 3
CUSTOMS UNIT VALUE OF IMPORTED ASBESTOS

(Dollars per metric ton)

	1998	1999
Canada:		
Chrysotile:		
Crude	147	149
Spinning	107	1,300
Other	207	166
South Africa: Crocidolite 1/	247	--

-- Zero.
1/ May include imports of chrysotile.

Source: Bureau of the Census.

TABLE 4
U.S. EXPORTS AND REEXPORTS OF ASBESTOS FIBERS AND PRODUCTS 1/ 2/

(Thousand dollars)

Country	1998			1999		
	Unmanufactured fiber 3/	Manufactured products 4/	Total	Unmanufactured fiber 3/	Manufactured products 4/	Total
Australia	55	1,540	1,590	64	1,960	2,020
Brazil	44	915	959	55	465	520
Canada	15	106,000	106,000	4	117,000	117,000
Germany	--	4,740	4,740	24	11,600	11,700
Japan	2,200	5,710	7,910	2,280	6,240	8,510
Korea, Republic of	76	577	653	127	1,520	1,650
Kuwait	--	625	625	3	398	401
Mexico	3,770	33,000	36,800	5,070	60,100	65,200
Saudi Arabia	--	3,780	3,780	--	1,680	1,680
Thailand	--	33	33	108	12	120
Turkey	--	4	4	--	7	7
United Kingdom	--	5,600	5,600	4	4,810	4,820
Venezuela	--	2,600	2,600	--	2,770	2,770
Other	243	28,600	28,900	222	29,100	29,300
Total	6,410	194,000	201,000	7,960	237,000	245,000

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ F.a.s. value.
3/ Includes exports of crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials.
4/ Also includes products manufactured using asbestos substitutes.

Source: Bureau of the Census.

TABLE 5
U.S. EXPORTS AND REEXPORTS OF ASBESTOS AND ASBESTOS PRODUCTS 1/

	1998		1999	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
Unmanufactured: Asbestos 3/	18,100	$6,410	21,700	$7,960
Manufactured:				
Asbestos fibers	NA	1,320	NA	2,310
Brake linings and disk brake pads 4/	NA	165,000	NA	192,000
Clutch facings and linings 5/	NA	12,900	NA	22,200
Clothing, cord, fabric, yarn	NA	1,610	NA	1,270
Gaskets, packing and seals	NA	2,540	NA	2,650
Panel, sheet, tile, tube 6/	NA	4,790	NA	9,790
Paper and millboard	NA	718	NA	1,410
Other articles 7/	NA	5,070	NA	5,800
Total	NA	194,000	NA	237,000

NA Not available.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ F.a.s. value.
3/ Includes crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials.
4/ Includes asbestos and cellulose fiber brakes and similar materials.
5/ Includes clutches and other friction materials, excluding brakes and brake pads.
6/ Includes asbestos cement and cellulose fiber cement products.
7/ Includes asbestos and cellulose fiber products.

Source: Bureau of the Census.

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TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF ASBESTOS FIBERS, BY TYPE, ORIGIN, AND VALUE 1/

Type	Canada		South Africa		Other		Total	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
1998:								
Chrysotile:								
Crude	2,980	$438	--	--	--	--	2,980	$438
Spinning fibers	112	12	--	--	--	--	112	12
All other	11,300	2,080	10	$33	109	$255	11,500	2,370
Crocidolite (blue) 3/	228	56	--	--	--	--	228	56
Other (unspecified asbestos type)	1,050	366	--	--	--	--	1,050	366
Total	15,700	2,950	10	33	109	255	15,800	3,240
1999:								
Chrysotile:								
Crude	2,350	350	--	--	--	--	2,350	350
Spinning fibers	65	7	284	421	42	82	391	510
All other	11,200	1,670	9	32	80	156	11,200	1,860
Other (unspecified asbestos type)	769	303	--	--	1,060	130	1,820	434
Total	14,300	2,330	293	453	1,180	368	15,800	3,150

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ U.S. Customs declared value.
3/ Reported by the Bureau of the Census. Its source suggests the imports labeled as crocidolite probably were a combination of chrysotile imports and transshipments of crocidolite through Canada.

Source: Bureau of the Census.

TABLE 7
ASBESTOS: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1995	1996	1997	1998	1999 e/
Argentina e/	300	446 4/	400	380 r/	350
Brazil e/	170,000 4/	170,000	170,000	170,000	170,000
Bulgaria	100	400	300	300 e/	350
Canada	515,587	506,000 r/	455,000 r/	309,000 r/	337,366 5/
China e/	263,000	293,000	288,000 r/	314,000 r/	300,000
Egypt	427	1,836	2,000 e/	2,000 e/	2,000
Greece	76,003	80,213	80,000 e/	70,000 e/	60,000
India	25,065	23,215	25,051 r/	18,751 r/	20,000
Iran e/	4,500	4,500	4,500	4,500	4,500
Japan e/	20,000	18,000	18,000	18,000	18,000
Kazakhstan	128,400	128,700	125,000 e/	125,000 e/	125,000
Russia e/	680,000	615,000	710,000	600,000 r/	700,000
Serbia and Montenegro	497	509	360	550 e/	150
South Africa	88,642	57,120	49,986	27,195 r/	20,100 6/
Swaziland	28,570	26,014 r/	25,888	27,693 r/	28,000
United States (sold or used by producers)	9,290	9,550	6,890	5,760	7,190 4/
Zimbabwe	169,256	165,494	144,959 r/	123,295 r/	135,000
Total	2,180,000	2,100,000 r/	2,110,000 r/	1,820,000 r/	1,930,000

e/ Estimated. r/ Revised.
1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.
2/ Marketable fiber production. Table includes data available through April 6, 2000.
3/ In addition to the countries listed, Afghanistan, North Korea, Romania, and Slovakia also produce asbestos, but output is not officially reported, and available general information is inadequate for the formulation of reliable estimates of output levels.
4/ Reported figure.
5/ Preliminary reported number.
6/ Based on 11 months of data.