ASBESTOS

By Robert L. Virta

Asbestos is a generic name given to six fibrous minerals that have been used widely in commercial products. The six types of asbestos are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. The most widely used variety is chrysotile. The 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.

Legislation and Government Programs

An appeals court reviewed the Occupational Safety and Health Administration's 1994 construction and shipyard asbestos standard and ruled that the portion of the standard dealing with asphalt roof coatings and sealants was invalid. The court cited insufficient evidence of exposure risk as its reason for overturning the section (Asbestos Information Association, 1997).

A variety of asbestos-containing civilian products such as brakes, clutches, packings, and asphalt roofing products are used by the military on vehicles, ships, missiles, and in construction. Strategic-grade asbestos is not required in the manufacture of these products and classified applications which use strategic-grade asbestos are believed to be minimal. The Department of Defense authorized the disposal of 8,814 metric tons of strategic- and nonstrategic-grade chrysotile; 30,849 tons of amosite; and 33 tons of crocidolite from the National Defense Stockpile.

Production

KCAC Inc., San Benito County, CA, was the only company mining asbestos in the United States in 1997. The company mines a highly sheared serpentinite composed of matted, short fiber chrysotile, and unfractured serpentinite (also called a mass fiber deposit). Domestic production (sales) decreased to 6,890 tons. *(See 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 declined 3% to 21,000 tons in 1997. The three leading domestic markets were friction products, gaskets, and roofing products with 29%, 17%, and 48% of the asbestos market, respectively.

More than 99% of the asbestos consumed domestically was chrysotile. The remainder was crocidolite. Ninety-four percent of the chrysotile consumed in the United States was grade 7, followed by grades 5, 6, 4, and 3. *(See table 2.)* Markets for crocidolite were limited and consumption was estimated to be less than 5 tons despite reported imports of 238 tons.

Prices

The average unit value of domestically produced asbestos increased from that of 1996. Unit values for all varieties of imported asbestos ranged from $133 per ton to $2,292 per ton and averaged $222 per ton. Unit values for all varieties of exported asbestos ranged from $173 per ton to $4,883 per ton and averaged $281 per ton.

The customs unit value for imported chrysotile ranged from $133 per ton to $2,292 per ton. The average unit value for imported crude chrysotile decreased from $1,717 per ton in 1996 to $165 per ton in 1997 because no high-value crude chrysotile was imported from Zimbabwe in 1997. The average unit values for exports of spinning grade chrysotile and other chrysotile types were $182 per ton and $226 per ton, respectively.

For imports, the highest values were associated with imports of long-fiber chrysotile from Zimbabwe. High-value exports probably are associated with reexports of some grades of Canadian and possibly Zimbabwean chrysotile. The average unit value for imported crocidolite was reported to be $303 per ton. *(See table 3.)*

Approximate equivalents, in dollars per metric ton, of prices for Canadian chrysotile, f.o.b. mine, ranged between $147 per ton and $1,262 per ton, depending on the grade. Chrysotile from South Africa ranged from $200 per ton to $440 per ton. Crocidolite from South Africa ranged from $640 per ton to $920 per ton (Industrial Minerals, 1997c). 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 value of asbestos fibers and asbestos products exported and reexported increased 21% in 1997. Japan was the largest importer of unmanufactured asbestos fiber. Canada was the largest importer of unmanufactured fibers and manufactured products from the United States, followed by Mexico and Japan. *(See table 4.)* Significant increases in export value were observed for the brake linings and disk brake pad (increased export value to Canada); clothing, cord, fabric, and yarn (increased export value to Canada and Mexico); and gasket, packing, and seal categories (increased export value to multiple countries). Exports and reexports of brake linings and disk pads accounted for 84% of the value of all manufactured asbestos products. *(See table 5.)*

Approximately 15,400 tons of asbestos was exported in 1997 according to the Bureau of the Census. The exports included asbestos crudes, fiber, stucco, sand, and refuse. Exports of domestic origin were estimated to be less than 7,000 tons in 1997.

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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 15,400 tons.

Canada supplied nearly all of the asbestos imported by the United States. Most of this asbestos fiber was chrysotile. *(See table 6.)* Approximately 238 tons of asbestos imports was reported as crocidolite in 1997. Most of the imports reported as crocidolite, however, probably were chrysotile based on the fact that the current U.S. market for crocidolite is estimated to be less than 5 tons and Canada (listed as the source of the crocidolite) does not produce crocidolite. Any crocidolite received from Canada was mined in South Africa and transshipped through Canadian ports.

The United States also imported approximately 42,100 tons of asbestos- and cellulose-fiber cement products, including panels, pipe, and tile. This is a decrease from 68,000 tons in 1996. The bulk of these imports was in the form of flat sheets and panels (86%), followed by pipe (6%), corrugated sheet (3%), and other (5%). Mexico, Australia, Belgium, Canada, and Costa Rica were the major sources of imported asbestos- and cellulose-fiber cement products.

World Review

World production of asbestos was estimated to be 2.07 million tons. Russia continued to be the largest producer of asbestos, followed by Canada, China, Brazil, Zimbabwe, and Kazakstan. These countries accounted for 89% of the world production. *(See table 7.)* LAB Chrysotile closed its British Canadian asbestos mine near Black Lake, Quebec, and announced plans to expand its Lac d'Amiante du Quebec chrysotile mine. The expansion will extend the life of the mine by 10 years (Industrial Minerals, 1997b). Mineral Resources Corp. (MRC) reached an agreement with Greenfields Coal Co. Ltd. to obtain full ownership of B.C. Chrysotile Corp. MRC previously controlled 80% of the B.C. Chrysotile shares (Mineral Resources Corp., Mineral Resources Corporation acquires full ownership of B.C. Chrysotile Corp., accessed December 26, 1997, at URL http://biz.yahoo.com/bw/971224/mineral_ resources_1.html). Noranda Inc. approved funding for construction of a 58,000-ton-per-year magnesium plant in Asbestos, Quebec. The plant will extract magnesium from asbestos tailings present near the site and should be operational in 2000 (North American Minerals News, 1997). South Africa's last remaining crocidolite mine, which is owned by Griqualand Exploration and Finance Co., closed in early 1997 (Republic of South Africa Department of Minerals and Energy, 1997). The United Kingdom announced plans to ban the use of asbestos. While crocidolite and amosite use already were banned, it was legal to import chrysotile fiber or products containing chrysotile such as brake linings and roof tiles. No date has been set for imposition of the ban (Industrial Minerals, 1997a).

Outlook

Domestic asbestos consumption will continue to decrease in response to opposition to its use in consumer goods and building products. The decrease should be on the order of 2% to 4% per year, considerably less than the 10% to 30% decreases typical of the 1980's. World demand also is expected to decline because of the health and environmental issues and more recently, the economic conditions in the former Soviet Union and Southeast Asia, which have hampered production in the former and consumption in the latter.

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

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TABLE 1
SALIENT ASBESTOS STATISTICS 1/

(Metric tons unless otherwise specified)

		1993	1994	1995	1996	1997
United States:						
Production (sales):						
Quantity		13,700	10,100	9,290	9,550	6,890
Value 2/	thousands	$5,960	$5,120	W	W	W
Exports and reexports 3/ (unmanufactured):						
Value	thousands	$8,440	$6,550	$6,010	$5,310	$5,690
Exports and reexports of asbestos products:						
Value	thousands	$141,000	$177,000	$180,000	$163,000	$197,000
Imports for consumption 4/ (unmanufactured):						
Quantity		30,800	25,800	21,900	21,600	20,900
Value	thousands	$6,960	$5,390	$4,810	$4,880	$4,660
Consumption, apparent 5/		31,600	26,800	22,000	21,700	21,000
World: Production		2,520,000 r/	2,350,000 r/	2,300,000 r/	2,180,000 r/	2,070,000 e/

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to three significant digits.
2/ F.o.b. mine.
3/ F.a.s. value; includes exports of crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials.
4/ U.S. Customs declared value.
5/ 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
1996	89	145	657	310	20,300	21,500	197	21,700
1997:								
Coatings and compounds	--	--	--	--	157	157	--	157
Friction products	--	--	359	232	5,420	6,010	--	6,010
Gaskets	--	1	322	83	3,240	3,640	--	3,640
Paper	--	--	--	--	212	212	--	212
Plastics	61	1	--	--	--	61	--	61
Roofing products	--	2	--	--	10,100	10,100	--	10,100
Other	7	75	204	--	262	548	238	786
Total	68	78	884	314	19,400	20,800	238	21,000

1/ Data are rounded to 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)

	1996	1997
Canada:		
Chrysotile:		
Crude	352	165
Spinning	277	182
Other	204	202
South Africa: Crocidolite 1/	186	303

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	1996			1997		
	Unmanufactured fiber 3/	Manufactured products 4/	Total	Unmanufactured fiber 3/	Manufactured products 4/	Total
Australia	25	2,100	2,130	52	1,670	1,720
Brazil	589	1,250	1,840	156	719	875
Canada	102	93,500	93,600	22	125,000	125,000
Germany	--	2,130	2,130	--	3,270	3,270
Japan	3,300	6,130	9,430	2,660	6,030	8,690
Korea, Republic of	116	1,290	1,400	158	1,210	1,370
Kuwait	--	395	395	--	334	334
Mexico	707	14,300	15,000	2,060	21,900	24,000
Saudi Arabia	--	1,180	1,180	--	1,160	1,160
Thailand	11	362	373	9	381	390
Turkey	--	504	504	--	212	212
United Kingdom	9	3,780	3,790	--	5,600	5,600
Venezuela	--	1,660	1,660	--	1,970	1,970
Other	454	34,200	34,700	570	27,300	27,900
Total	5,310	163,000	168,000	5,690	197,000	203,000

1/ Data are rounded to 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/

	1996		1997	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
Unmanufactured, asbestos 3/	15,400	$5,310	20,300	$5,690
Manufactured:				
Asbestos fibers	NA	905	NA	1,040
Brake linings and disk brake pads 4/	NA	130,000	NA	165,000
Clutch facings and linings 5/	NA	11,600	NA	11,800
Clothing, cord, fabric, yarn	NA	710	NA	1,920
Gaskets, packing and seals	NA	3,140	NA	3,590
Panel, sheet, tile, tube 6/	NA	6,840	NA	6,430
Paper and millboard	NA	2,620	NA	1,030
Other articles 7/	NA	7,120	NA	6,050
Total	XX	163,000	XX	197,000

NA Not available. XX Not applicable.
1/ Data are rounded to 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/ 2/

Type	Canada		South Africa		Other		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1996:								
Chrysotile:								
Crude	9	$3	--	--	97	$179	106	$182
Spinning fibers	266	74	--	--	--	--	266	74
All other	20,100	4,110	--	--	192	330	20,300	4,440
Crocidolite (blue) 3/	197	37	--	--	--	--	197	37
Other (unspecified asbestos type)	817	144	--	--	4	2	821	146
Total	21,400	4,370	--	--	293	511	21,600	4,880
1997:								
Chrysotile:								
Crude	1,590	263	--	--	--	--	1,590	263
Spinning fibers	80	15	--	--	--	--	80	15
All other	18,100	3,630	14	$32	249	491	18,300	4,150
Crocidolite (blue) 3/	238	72	--	--	--	--	238	72
Other (unspecified asbestos type)	692	159	--	--	--	--	692	159
Total	20,700	4,140	14	32	249	491	20,900	4,660

1/ Data are rounded to 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/	1993	1994	1995	1996	1997 e/
Argentina	309	260 r/	300 r/ e/	446 r/	400
Bosnia and Herzegovina e/	500	300	--	--	--
Brazil	185,000	192,050	170,000	170,000 e/	170,000
Bulgaria e/	500	500	100 r/	400 r/	1,000 4/
Canada	522,967	531,000	515,587	521,000 e/	447,000 p/
China e/	240,000	303,000	263,000	250,000	245,000
Egypt e/	436 4/	400	400	400	400
Greece	56,945 r/	55,502 r/	76,003 r/	80,213 r/	80,000
India	44,080	29,824	25,065 r/	23,215 r/	25,000
Iran e/	4,500	4,500	4,500	4,500	4,500
Japan e/	24,900	21,000	20,000	20,000	20,000
Kazakstan	130,000 r/ e/	130,000 r/ e/	128,400 r/	128,700 r/	125,000
Russia e/	1,000,000	800,000	800,000	720,000	700,000
Serbia and Montenegro	314	498	497 r/	450 r/	300
South Africa	103,994	92,130	88,642	57,120 r/	60,000
Swaziland	33,860	26,720	28,570	26,041 r/	25,888 4/
United States (sold or used by producers)	13,700	10,100	9,290	9,550	6,890 4/
Zimbabwe	156,881	151,905	169,256	165,494 r/	160,000
Total	2,520,000 r/	2,350,000 r/	2,300,000 r/	2,180,000 r/	2,070,000

e/ Estimated. p/ Preliminary. 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 8, 1998.
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.

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