ASBESTOS

By Robert L. Virta

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Asbestos is a generic name for six fibrous minerals that have been used primarily for roofing products, brakes, and gaskets in recent years. The six types of asbestos are actinolite asbestos, amosite, anthophyllite asbestos, chrysotile, crocidolite, and tremolite asbestos. Several properties that make asbestos so versatile 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

U.S. Senate Bill 2641, introduced on June 18, proposed a ban on the manufacture and use of asbestos-containing products after January 2005. The Bill also proposed to establish a public education program on asbestos and asbestos-contaminated vermiculite, expand research on asbestos-related diseases, and establish a mesothelioma treatment program. The Bill was referred to the Committee on Environment and Public Works for consideration (Congressional Record, 2002a§[1]).

Senate Bill 3136, submitted October 17, would establish a trust fund for medical benefit payments to current and former residents in Libby, MT, and former employees of the Libby vermiculite mining operation who suffer from asbestos-related disease. The Bill also was referred to the Committee on Environment and Public Works (Congressional Record, 2002b§).

U.S. House of Representatives Bill 1586, introduced on April 3, would require evidence of physical impairment caused by exposure to asbestos to bring or maintain civil action against a company or companies. The Bill would begin the statute of limitation period for filing asbestos-related civil action at the discovery date of impairment rather than the time of exposure due to the long latency period for asbestos-related diseases, limit liability as proportional to a company's percentage of responsibility, and set limits for noneconomic loss awards. The Bill also would restrict filing of civil actions to the plaintiff's domicile State or the State in which exposure occurred, limit the consolidation of claims for trial, and eliminate punitive damage awards. The Bill was referred to the House Committee on the Judiciary. Two similar bills, Senate Bill 413 and House of Representatives Bill 1737 were introduced into committee in 2003 (Hitt, 2002; Congressional Record, 2003§).

The U.S. Environmental Protection Agency (EPA) continued its work on asbestos in Libby, MT. The work involved analyzing dust and soil for asbestos content, improving analytical methodology for asbestos determinations in samples, particularly in soils and vermiculite attic insulation, conducting medical examinations of former vermiculite miners and millers and residents of Libby, MT, and developing strategies for evaluating the potential health risk posed by exposure to the Libby vermiculite at exfoliation plants throughout the United States. Reports on these activities are available through the Web site for EPA Region 8 (U.S. Environmental Protection Agency, 2003§). The agency also approved the expansion of cleanup activities in Libby including the removal of asbestos-containing soil in yards, school grounds and parks, and targeted removal of asbestos-containing vermiculite insulation from Libby homes and businesses (U.S. Environmental Protection Agency, 2002a§). EPA also added Libby to its national priorities list, meaning the area became eligible for Federal funds for extensive, long-term cleanup under the Superfund program (U.S. Environmental Protection Agency, 2002b§).

The Mine Safety and Health Administration (MSHA) held public meetings during the year to permit public comment on its proposal to reduce the 8-hour time-weighted average permissible exposure level from 2 fibers per cubic centimeter (f/cc) to 0.1 f/cc. Consideration also was being given to the use of more sensitive analytical equipment and addressing the issue of contamination of the home environment with asbestos on workers' clothing (U.S. Department of Labor, 2002). MSHA was still evaluating the ruling at yearend, but records of testimony submitted during the meetings were available on the MSHA Web site (U.S. Department of Labor, undated§).

The National Institute for Occupational Safety and Health issued a report discussing its research agenda on protecting workers' families from exposure to hazardous materials through "take home" contamination or workplace visitation. The publication covers asbestos and other hazardous materials (National Institute for Occupational Safety and Health, 2002§).

Production

KCAC Inc. in San Benito County, CA, the last domestic producer of asbestos, closed its mine and mill in 2002. The company had mined a highly sheared serpentinite containing matted, short-fiber chrysotile and unfractured serpentinite (also called a mass-fiber deposit). Domestic production (sales) declined to 2,720 t valued at $1.38 million from 5,260 t valued at $3.7 million in 2001 (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 estimated to be 6,850 t, a decrease from 13,100 t in 2001. Asbestos was used in

[1]References that include a section mark (§) are found in the Internet References Cited section.

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roofing products (50% of domestic consumption), coatings and compounds (32%), gaskets (8%), friction products (4%), electrical and thermal insulation (4%), and the remaining uses (2%) (table 2). Most of the asbestos reported by industry under "coatings and compounds" probably was used in roofing applications. Roofing products probably compose about 80% of U.S. consumption, and coatings and compounds not used in roofing applications compose about 3% of the U.S. consumption. Declines in consumption occurred in every product category.

With regard to U.S. asbestos consumption, Canadian asbestos producers reported that 9,660 t was shipped to the United States in 2002, while the U.S. Census Bureau reported that 6,630 t of asbestos was imported from Canada. This discrepancy could not be resolved with available data by publication time, and end use data presented in table 2 were based on the total import tonnage reported by the U.S. Census Bureau.

Chrysotile was the only type of asbestos used in the United States. Of the chrysotile used in 2002, 91% was grade 7, followed by grades 4, 5, 6, and 3, in decreasing order of use.

Prices

The average unit value of domestically produced asbestos decreased to $507 per metric ton from $703 per ton in 2001. The average free alongside ship (f.a.s.) unit value of asbestos exports and reexports was $308 per ton, an increase from $225 per ton in 2001. The average U.S. customs unit value for imported crude chrysotile decreased to $123 per ton in 2002 from $145 per ton in 2001. The average unit value for imports of spinning-grade (grade 3) chrysotile increased to $7,560 per ton from $1,580 per ton in 2001. This increase occurred because of a few small-tonnage and high-value shipments of chrysotile, principally from non-Canadian sources. The unit value of the other grades of chrysotile increased to $198 per ton from $195 per ton in 2001 (table 6).

The United States customs unit values for the crude and spinning grades of chrysotile fiber from Canada were $122 and $479 per ton, respectively (tables 3 and 6). Imports of "Other, chrysotile" from Canada were valued at $208 per ton (tables 3 and 6).

Prices for Canadian chrysotile were $144 per ton to $300 per ton for group 7, $293 per ton to $420 per ton for group 6, $472 per ton to $655 per ton for group 5, $710 per ton to $995 for group 4, and $1,030 per ton to $1,244 per ton for group 3. Prices for South African chrysotile were $200 per ton to $290 per ton for group 7, $300 per ton to $350 per ton for group 6, and $360 per ton to $440 per ton for group 5 (Industrial Minerals, 2002). 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 f.a.s. value of exported asbestos fibers and products containing asbestos or asbestos substitutes decreased to $209 million in 2002 from $302 million in 2001. Japan and Mexico were the leading importers of asbestos fiber from the United States. Canada was the leading importer of United States products manufactured using asbestos or asbestos substitutes, followed by Mexico, Germany, Saudi Arabia, Japan, and the United Kingdom (table 4). These six countries accounted for 77% of the value of manufactured asbestos products exported from the United States in 2002.

Exports and reexports of brake linings, disk pads, and mounted brake linings accounted for 84% of the value of all manufactured asbestos products (table 5). Products in these categories composed 96% of the value of goods manufactured using asbestos and asbestos substitutes that were exported to Germany, 92% of that exported to the United Kingdom, 82% of that exported to Canada, 82% of that exported to Mexico, 70% of that exported to Saudi Arabia, and 27% of that exported to Japan. The export categories for brakes, disk pads, and mounted brake linings also contained products manufactured using asbestos substitutes.

In 2002, approximately 6,550 t of asbestos was exported, according to the U.S. Census Bureau. The exports included asbestos crudes, fiber, sand, refuse, and stucco. Exports of domestic origin were 2,720 t. Reexports of Canadian fiber accounted for the bulk of the remaining exports, although some manufactured products and nonasbestos mineral exports may have been included in the 6,550 t.

In 2002, Canada supplied 97% of the asbestos imported by the United States. Imports also were reported from South Africa (176 t), and Zimbabwe (46 t) (table 6). Transshipments probably occurred through Germany (1 t). Only chrysotile was imported into the United States in 2002.

The United States also imported $182 million worth of products containing asbestos or asbestos substitutes. This included approximately 44,600 t of asbestos- and cellulose-fiber cement products (A/C) valued at $20.8 million, including panels, pipe, and tile. The bulk of the A/C products was imported in the form of flat sheets and panels (88%), followed by miscellaneous A/C products (8%), corrugated sheet (2%), and pipe (2%).

World Review

World production of asbestos was estimated to be 2.13 Mt in 2002, a decrease from 2.16 Mt in 2001. Russia continued to be the leading producer of asbestos, followed by China, Kazakhstan, Canada, Brazil, and Zimbabwe. These countries accounted for 95% of the world production (table 7).

Mazarin Inc. resolved a labor dispute with employees of Lake Asbestos of Canada and LAB Chrysotile mining companies. The agreement ended a 5-month lockout that began in July 2002 (Mazarin Inc., 2002).

Jeffrey Mine Inc. temporarily closed its mine in October when it filed for bankruptcy protection. The company cited declining worldwide prices for asbestos as the reason for the action. The company opened the mine for limited production in December to fill special orders for asbestos. It will continue to operate on a limited scale while under bankruptcy protection (Gazette Montreal, 2002; Natural Resources Quebec, 2003§).

Several countries have taken action to fully or partially ban asbestos. Legislation was passed in Uruguay to ban the fabrication and import of asbestos products and in New Zealand to ban the import of raw asbestos (International Ban Asbestos Secretariat, 2002§).

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Outlook

Domestic use probably will continue to slowly decline for the next few years. Friction products, gaskets, and roofing products will continue to be the only significant domestic markets of asbestos. Efforts to ban the use of asbestos are likely to continue worldwide. However, chrysotile asbestos producers and consumers are working to counteract these initiatives.

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TABLE 1
SALIENT ASBESTOS STATISTICS[1]

		1998	1999	2000	2001	2002
United States:						
Production (sales)	metric tons	5,760	7,190	5,260	5,260	2,720
Exports and reexports:[2]						
Unmanufactured, value	thousands	$6,410	$7,960	$7,220	$4,890	$2,020
Asbestos products, value	do.	$194,000	$237,000	$288,000	$298,000	$207,000
Imports for consumption, unmanufactured:						
Quantity	metric tons	15,800	15,800	14,600	13,100	6,850
Value[3]	thousands	$3,240	$3,150	$2,510	$2,640	$1,770
Consumption, apparent[4]	metric tons	15,800	15,800	14,600	13,100	6,850
World, production	do.	1,980,000 r	1,850,000 r	2,110,000 r	2,160,000 r	2,130,000 e

eEstimated. rRevised.

[1]Data are rounded to no more than three significant digits.

[2]Free alongside ship 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
2001	3	75	221	383	12,500	13,100
2002:						
Coatings and compounds	--	383	131	--	1,710	2,220
Friction products	--	--	--	17	271	288
Gaskets	--	7	--	7	501	515
Insulation:						
Electrical	--	51	--	--	--	51
Thermal	--	--	--	--	242	242
Paper	--	--	--	--	47	47
Roofing products	--	--	--	--	3,420	3,420
Other	6	21	--	--	33	60
Total	6	462	131	24	6,230	6,850

-- 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.

TABLE 3
CUSTOMS UNIT VALUE OF
IMPORTED ASBESTOS

(Dollars per metric ton)

	2001	2002
Canada, chrysotile:		
Crude	145	122
Spinning	104	479
Other	149	208

Source: U.S. Census Bureau.

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TABLE 4

VALUE OF U.S. EXPORTS AND REEXPORTS OF ASBESTOS FIBERS AND PRODUCTS[1, 2]

(Thousand dollars)

Country	2001			2002		
	Unmanufactured fiber[3]	Manufactured products[4]	Total	Unmanufactured fiber[3]	Manufactured products[4]	Total
Australia	--	1,200	1,200	38	1,790	1,830
Brazil	54	2,200	2,250	47	539	586
Canada	22	106,000	106,000	--	101,000	101,000
Germany	--	74,200	74,200	--	15,400	15,400
Japan	1,630	6,550	8,180	994	3,820	4,820
Korea, Republic of	102	1,480	1,580	127	902	1,030
Kuwait	--	401	401	--	758	758
Mexico	2,960	44,400	47,300	748	29,300	30,000
Saudi Arabia	--	2,650	2,650	--	6,280	6,280
Thailand	3	62	65	--	94	94
Turkey	--	58	58	--	12	12
United Kingdom	--	2,870	2,870	--	4,000	4,000
Venezuela	--	1,960	1,960	--	695	695
Other	120	53,500	53,600	65	42,000	42,100
Total	4,890	298,000	302,000	2,020	207,000	209,000

-- Zero.

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

[2]Free alongside ship value.

[3]Includes exports of crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials.

[4]Includes products manufactured using asbestos, cellulose fiber, and other asbestos substitutes.

Source: U.S. Census Bureau.

TABLE 5

U.S. EXPORTS AND REEXPORTS OF ASBESTOS AND ASBESTOS PRODUCTS[1]

	2001		2002	
	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Unmanufactured, asbestos[3]	21,700	$4,890	6,550	$2,020
Manufactured:				
Asbestos fibers	NA	6,030	--	--
Brake linings and disk brake pads[4]	NA	245,000	NA	174,000
Clutch facings and linings[5]	NA	9,470	NA	9,420
Clothing, cord, fabric, yarn	NA	7,690	NA	2,420
Gaskets, packing and seals	NA	2,210	NA	1,890
Panel, sheet, tile, tube[6]	NA	14,100	NA	14,900
Paper and millboard	NA	1,150	NA	2,160
Other articles[7]	NA	11,900	NA	1,850
Total	NA	298,000	NA	207,000

NA Not available. -- Zero.

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

[2]Free alongside ship 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: U.S. Census Bureau.

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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)
2001:								
Chrysotile:								
Crude	2,300	$333	--	--	--	--	2,300	$333
Spinning fibers	42	4	71	$157	65	$121	178	282
All other	7,810	1,160	112	225	91	174	8,010	1,560
Other (unspecified asbestos type)	2,540	441	--	--	104	24	2,640	465
Total	12,700	1,940	183	382	260	319	13,100	2,640
2002:								
Chrysotile:								
Crude	1,550	190	--	--	--	--	1,550	190
Spinning fibers	63	30	176	340	46	106	63	476
All other	4,670	970	--	--	--	--	4,890	970
Other (unspecified asbestos type)	339	130	--	--	1	2	340	132
Total	6,630	1,320	176	340	47	108	6,850	1,770

-- Zero.

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

[2]U.S. customs declared value.

Source: U.S. Census Bureau.

TABLE 7

ASBESTOS: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	1998	1999	2000	2001	2002[e]
Argentina	309	259	254	250 [e]	250
Brazil	198,332 [r]	188,386 [r]	209,332 [r]	209,300 [r]	209,300 [4]
Bulgaria[e]	300	350	350	350	300
Canada	309,000	337,000	307,000 [r]	272,000 [r]	272,000 [p]
China[e]	314,000	247,000	320,000 [r]	360,000	360,000
Colombia, crude ore	128,446	61,125	59,249	96,140	62,785 [4]
Egypt[e]	700	1,000	2,000	2,000	2,000
Greece[e]	50,000	--	-- [4]	--	--
India[e]	18,751 [4]	20,000	21,000	21,000	19,000
Iran[e]	2,258 [4]	2,000	2,000	2,000 [r]	1,500
Japan[e]	18,000	18,000	18,000	18,000	18,000
Kazakhstan	155,400	139,300	233,200	271,300 [r]	291,100 [4]
Russia[e]	600,000	675,000	750,000	750,000	750,000
Serbia and Montenegro	633	361	563	194 [r]	200
South Africa	27,195	18,836	18,782	13,393 [r]	10,000
Swaziland	27,693	22,912	12,690 [r]	-- [r]	--
United States (sold or used by producers)	5,760	7,190	5,260	5,260	2,720 [4]
Zimbabwe	123,295	115,000	152,000 [r]	136,327 [r]	130,000
Total	1,980,000 [r]	1,850,000 [r]	2,110,000 [r]	2,160,000 [r]	2,130,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Marketable fiber production. Table includes data available through April 8, 2003.

[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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