ASBESTOS

By Robert L. Virta

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The U.S. Court of Appeals for the Fifth Circuit overturned the Environmental Protection Agency (EPA) ruling that would have phased out most uses of asbestos by 1997. The court indicated the EPA did not sufficiently evaluate the health risks posed by substitutes or adequately assess the costs and benefits of less burdensome options to a total ban. Domestic asbestos production increased slightly from that of 1990, but consumption decreased 16%, from 41,348 to 34,765 tons. Asbestos was consumed domestically for roofing products, 44%; friction products, 28%; asbestos-cement pipe, 11%; packing and gaskets, 8%; and other, 9%.

DOMESTIC DATA COVERAGE

Domestic production data for asbestos are developed by the U.S. Bureau of Mines by means of a voluntary industry survey. Of the two canvassed operations to which a survey request was sent, both responded, representing 100% of the total production data shown in table 1. *(See table 1.)*

ANNUAL REVIEW

Legislation and Government Programs

The U.S. Court of Appeals for the Fifth Circuit overturned EPA's 1989 ruling that would have phased out most uses of asbestos by 1997. The court indicated that EPA did not adequately evaluate the health risks posed by asbestos substitutes or adequately assess the costs and benefits of alternatives to a total ban on the use of asbestos. EPA can ban asbestos-containing products that were not manufactured or imported prior to July 12, 1989, under the court decision.[1] EPA did not appeal the decision to the U.S. Supreme Court.

EPA issued a final rule on January 30 amending national primary and secondary drinking water regulations. The maximum contaminant and maximum contaminant level goals for asbestos were both set at 7 million fibers (longer than 10 micrometers) per liter. The standard becomes effective in July 1992.[2]

The Mine Safety and Health Administration continued reviewing its proposed revisions to existing standards for air quality and chemical substances, including the lowering of permissible exposure levels to asbestos from 2.0 fibers per cubic centimeter to 0.2 fibers per cubic centimeter.[3]

The Occupational Safety and Health Administration (OSHA) issued a final rule on June 8, 1992, removing the nonasbestiform varieties of actinolite, anthophyllite, and tremolite from the scope of its asbestos standard. The nonasbestiform varieties will be regulated according to limits set for "particulates not otherwise regulated."[4]

Strategic Considerations

A wide variety of asbestos-containing civilian products also have military applications. Examples include friction materials (brakes and clutches), electrical and thermal insulations, packings and gaskets, asbestos-reinforced plastics, etc., for use on military vehicles, ships, rockets, missiles, and in military construction. During World War II and the Korean War, strict controls were placed on the export of asbestos because the United States was dependent on foreign sources for about 90% of its requirements of all grades of asbestos. The United States was totally dependent on foreign sources for low-iron, spinning-grade chrysotile. Since that time, equipment components have been redesigned, new products have been introduced, and substitutes for asbestos are being used more frequently. Because of the trend toward lower asbestos consumption, the Department of Defense has authorized the disposal of 6,155 tons of chrysotile, 30,844 tons of amosite, and 33 tons of crocidolite from the National Defense Stockpile.

Issues

The safe use of asbestos is one of the major concerns of the asbestos industry. In response to these concerns, representatives from several countries established the International Fibre Safety Group. The purpose of the organization is to promote the safe and controlled use of asbestos and other industrial fibers and the adoption of International Labor Organization recommendations. Representatives from Belgium, Brazil, Canada, France, Thailand, the United States, the former Soviet Union, and Zimbabwe were founding members of the organization.[5]

A major concern among the public is the health risk posed by asbestos-containing materials in buildings. The Health Effects Institute-Asbestos Research, cosponsored by EPA, conducted a study of asbestos in

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 1 of 8
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commercial and public buildings. The panel reported that it is unlikely that indoor asbestos concentrations would be greater than outdoor concentrations when asbestos-containing materials were in good condition. It also concluded that other pollutants posed a greater lifetime risk and that arbitrary removal of asbestos-containing material is unwarranted in well-maintained buildings.[6] Similarly, the American Medical Association's Council of Scientific Affairs recommended the use of better management, containment, and disposal methods to prevent asbestos-related injury and disease.[7]

Production

Asbestos was produced in the United States by two companies, KCAC Inc., San Benito County, CA, and Vermont Asbestos Group Inc. (VAG), Orleans County, VT. Domestic production was limited to chrysotile, one of six commercial varieties of asbestos. KCAC operated a mine in a highly sheared serpentinite composed of matted, short-fiber chrysotile and unfractured serpentinite (also referred to as a mass fiber deposit). The ore was stripped, and wet processing was used to beneficiate the fiber. VAG operated an open pit mine in a serpentinite-containing cross-fiber veins of chrysotile. Dry milling was used to process the fiber. While the California company produced only short fiber chrysotile, the Vermont company produced a wide range of chrysotile grades.

Domestic production increased slightly from that of 1990. While domestic markets for asbestos continued to weaken, foreign markets remained strong.

Consumption and Uses

Asbestos was used in a wide variety of products because of its high tensile strength, chemical and thermal stability, high flexibility, low electrical conductivity, and large surface area. Products made from asbestos were more heat resistant (and often incombustible), more resistant to chemical attack (particularly for alkalis), stronger (asbestos acted as a physical reinforcer), and less conductive (asbestos had a low dielectric constant). In addition, they were more viscose (asbestos stiffened compounds and coatings), faster setting (asbestos hastened water drainage in asbestos-cement pipe production), and more cost efficient than many nonasbestos products.

U.S. consumption of asbestos decreased 16% in 1991. Approximately 83% of the asbestos consumed domestically was chrysotile, 1% was crocidolite, and 16% was an unspecified fiber type, most likely chrysotile. Approximately 79% of the chrysotile consumed in the United States was grade 7, followed by grades 4, 6, 5, and 3. *(See table 2.)*

The construction industry is the major consumer of asbestos fiber in the form of asbestos cement pipe, asbestos cement sheet, coatings, compounds, packings, and roofing products. These end uses accounted for 70% of the asbestos consumed in the United States.

Consumption has declined dramatically from 800,962 tons in 1973 to 34,765 tons in 1991. Two factors have been responsible for the decrease. First, many U.S. markets are maturing so the demand for asbestos-containing materials has declined. Second, the controversy surrounding the health risks posed by asbestos have prompted many manufacturers to stop producing asbestos-containing products. Manufacturers gradually have been replacing asbestos with substitute materials, redesigning old products to eliminate the need for asbestos, or designing new products that require neither asbestos nor asbestos substitutes. Economic, manufacturing, performance, and/or technical difficulties were considered before asbestos was replaced by a substitute material or product.

Examples of materials substituted for asbestos include aramid fiber, calcium silicate, carbon fiber, cellulose fiber, ceramic fiber, fibrous glass, graphite flake and fiber, steel fibers, and wollastonite. Examples of alternative products include aluminum, vinyl, and wood siding; aluminum and fiberglass sheet; asphalt coatings; ductile iron pipe; polyvinylchloride pipe; prestressed and reinforced concrete pipe, and semimetallic brakes.

Markets and Prices

The average unit value of domestically produced asbestos increased slightly from that of 1991. Unit values for imported asbestos ranged from $154 per ton to $1,927 per ton and averaged $256 per ton. Unit values for exported asbestos ranged from $169 per ton to $2,350 per ton and averaged $290 per ton. Approximate equivalents, in dollars per metric ton, of price ranges quoted in Industrial Minerals (London), December 1991, for Canadian chrysotile, f.o.b. mine, were $1,320 to $2,125 for Group 3, $918 to $1,275 for Group 4, $604 to $714 for Group 5, $442 for Group 6, and $136 to $264 for Group 7. *(See table 3.)*

Foreign Trade

The total value of asbestos fibers and asbestos products exported and reexported from the United States was $123,439,041. This is a slight decrease from that of 1990. Exports and reexports of brake linings and disk pads accounted for 75% of the value of all manufactured asbestos products. Canada remained the largest importer of unmanufactured fibers and manufactured products, followed by Japan, Mexico, the United Kingdom, and the Federal Republic of Germany.

Canada provided 99% of the asbestos imported into the United States, and the Republic of South Africa provided less than 1%. Zimbabwe supplied the remaining amount. Approximately 99% of the asbestos fiber imports was chrysotile. *(See tables 4, 5, and 6.)*

World Review

World production of asbestos, which has been fairly stable for many years, decreased again in 1991. Since 1982, production has dropped from 3,910,592 tons to 3,489,529 tons in 1991. Most of the decline occurred in the past 3 years when opposition to the use of asbestos

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 2 of 8
Published by AsbestosClaims.Law
asbestosclaims.law/library/11028/2

intensified. Consumption in more mature North American and European markets has declined. Sales in other countries continued to grow because of the need for asbestos-base construction materials.

Canada continued to be the largest market economy producer of asbestos, followed by Brazil, Zimbabwe, and the Republic of South Africa. The U.S.S.R. was the world's largest producer of asbestos. Canada and the U.S.S.R. accounted for 77% of the world production. Canada continued to be the largest exporter of asbestos. *(See table 7.)*

Greece.—The Northern Greece Asbestos Mines Co. in Kozani closed owing to financial difficulties. The work force at the mine was reduced from 380 to 250 employees, and the company was refinanced with Government backing. The operation may be leased to private interests in the future.[8]

South Africa, Republic of.—Msaulii Asbes Beperk, which has experienced a drop in profits in recent years, began studying the feasibility of recovering asbestos fiber from its tailings dump. The recovery would require the construction of a new mill plant.[9]

Swaziland.—The Swaziland Government and Consolidated Mining Corp. of the Republic of South Africa have taken control of the Havelock asbestos mine. Ownership is 15% and 85%, respectively. The mine is expected to have an operating life of 8 years, at a production rate of 2,500 tons per month.[10]

OUTLOOK

Domestic consumption will continue to decrease although the decrease should not be as great as in recent years. The overturning of the EPA phaseout of asbestos is not likely to result in a reversal of this trend. Foreign markets for asbestos fiber should remain strong because of the demand for proven, low-cost construction materials.

[1]Asbestos Information Association News & Notes. The U.S. Court of Appeals for the Fifth Circuit Overturns EPA's Ban Rule on Asbestos. Oct. 25, 1991, pp. 1-4.

[2]Federal Register. Environmental Protection Agency. National Primary Drinking Water Regulations, Final Rule. V. 56, No. 20, Jan. 30, 1991, pp. 3526-3597.

[3]———. Mine Safety and Health Administration. Air Quality, Chemical Substances, and Respiratory Protection Standards. V. 56, No. 39, Feb. 27, 1991, pp. 8168-8171.

[4]———. Occupational Safety and Health Administration. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite. V. 57, No. 110, June 8, 1992, pp. 24310-24331.

[5]Asbestos Information Association News & Notes. New International Fibre Safety Group Officially Launched in Moscow. June 28, 1991, pp. 1-2.

[6]———. Prestigious Panel Issues Long-Awaited Study on Asbestos in Public Buildings. Sept. 30, 1991, p. 1-2.

[7]Engineering News Record. Learning To Live With Asbestos. V. 227, No. 7, Aug. 19, 1991, p. 7.

[8]Mining Journal. Greece: Asbestos Mine Prop. V. 317, No. 8134, Aug. 9, 1991, p. 99.

[9]Industrial Minerals. Mining Problems Hit Msauli Asbes Beperk. No. 285, June 1991, p. 21.

[10]———. Havelock Asbestos Reprieved. No. 286, July 1991, p. 10.

OTHER SOURCES OF INFORMATION

Bureau of Mines Publications

Asbestos. Ch. in Mineral Commodity Profile, July 1979.
Asbestos. Ch. in Mineral Commodity Summaries, annual.
Asbestos. Ch. in Mineral Facts & Problems, 1985.
Asbestos. Ch. in Mineral Industry Surveys, annual.
Asbestos. Ch. in Minerals Yearbook, annual.

Other Sources

Asbestos Information Association/NA.
The Asbestos Institute.
Company annual reports.
Engineering and Mining Journal, monthly.
Industrial Minerals (London), monthly.
Mining Engineering, monthly.
Mining Journal, monthly.

TABLE 1
SALIENT ASBESTOS STATISTICS

	1987	1988	1989	1990	1991
United States:					
Production (sales):					
Quantity	50,600	18,233	17,427	W	W
Value[1]	$17,198	W	W	W	W
Exports and reexports (unmanufactured):					
Quantity	60,084	31,544	27,004	27,965	25,636
Value	$16,149	$8,468	$7,690	$7,964	$7,424
Exports and reexports of asbestos products:					
Value	$180,602	$194,858	$153,081	$120,328	$116,015
Imports for consumption (unmanufactured):					
Quantity	93,763	85,326	55,306	41,348	34,765
Value	$22,022	$21,528	$14,031	$10,773	$8,900
Consumption, apparent[2]	84,279	71,354	e55,306	e41,348	34,765
World: Production	r4,237,122	r4,318,457	r4,237,659	• 3,819,018	• 3,489,529

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data.
[1]F.o.b. mine.
[2]Production, plus imports, minus exports, plus adjustments in Government and industry stocks.
[3]Does not include U.S. production.

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

(Thousand metric tons)

End use	Chrysotile[1]						Cro-cido-lite	Other[3]	Total asbes-tos[4]
	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Total[2]			
1990 total	0.1	3.6	2.1	2.4	26.0	34.3	0.8	6.2	35.1
1991:									
Asbestos-cement pipe	—	2.4	.4	.6	—	3.4	.3	—	3.7
Asbestos-cement sheet	—	—	—	.9	.7	1.6	—	—	1.6
Coatings and compounds	(5)	—	—	—	.8	.8	—	—	.8
Friction products	(5)	(5)	.8	.4	8.3	9.5	—	—	9.5
Packing and gaskets	—	(5)	.6	.2	2.0	2.9	—	—	2.8
Paper	—	—	—	—	(5)	(5)	—	—	(5)
Plastics	(5)	(5)	(5)	—	—	(5)	—	—	(5)
Roofing products	—	(5)	—	(5)	15.1	15.1	—	—	15.1
Other	(5)	.4	(5)	—	.2	.6	—	—	.6
Total[2]	(5)	2.7	1.8	2.1	27.0	33.8	.3	.5	34.0

[1]Estimated distribution based upon data provided by the Asbestos Institute, Montreal, Canada, and the U.S. Bureau of Mines asbestos producer survey.
[2]Data may not add to totals shown because of independent rounding.
[3]Source: Bureau of the Census. "Other" category contains unspecified fiber type and end use.
[4]Does not include "Other" category in total.
[5]Less than 1/10 unit.

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 4 of 8
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asbestosclaims.law/library/11028/4

TABLE 3
CUSTOMS UNIT VALUES OF IMPORTED ASBESTOS

(Dollars per metric ton)

	1987	1988	1989	1990	1991
Canada:					
Chrysotile:					
Crude	610	635	167	782	776
Spinning	598	756	387	291	372
Other	218	227	227	259	265
South Africa, Republic of:					
Amosite	—	—	3,728	—	—
Crocidolite	572	609	631	651	582

Source: Bureau of the Census.

TABLE 4
COUNTRIES IMPORTING U.S. ASBESTOS FIBERS AND PRODUCTS

(Thousand dollars)

Country	1990			1991		
	Unmanufactured fiber	Manufactured products	Total[1]	Unmanufactured fiber	Manufactured products	Total[1]
Australia	12	1,851	1,863	10	1,083	1,093
Brazil	534	4,171	4,705	433	2,914	3,348
Canada	472	58,458	58,930	366	50,833	51,199
Germany, Federal Republic of	63	5,479	5,542	58	3,363	3,421
Japan	4,119	10,938	15,057	3,758	11,395	15,154
Korea, Republic of	107	1,477	1,584	386	2,513	2,899
Kuwait	—	189	189	—	51	51
Mexico	529	5,822	6,350	1,259	7,652	8,910
Saudia Arabia	14	1,047	1,061	10	3,278	3,289
Thailand	81	280	360	58	261	320
Turkey	—	92	92	—	64	64
United Kingdom	134	6,517	6,650	21	4,829	4,850
Venezuela	13	712	725	—	259	259
Other	1,888	23,295	25,185	1,064	27,520	28,524
Total[1]	7,964	120,328	128,292	7,424	116,015	123,439

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

Source: Bureau of the Census.

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 5 of 8
Published by AsbestosClaims.Law
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TABLE 5

U.S. EXPORTS AND REEXPORTS OF ASBESTOS AND ASBESTOS PRODUCTS

Products		Quantity	Value (thousands)
1990:			
Unmanufactured:			
Asbestos[1]	tons	27,965	$7,964
Manufactured:			
Asbestos fibers	do.	81	684
Brake linings and disk brake pads[2]		NA	93,125
Clutch facings and linings[3]	tons	NA	7,242
Clothing, cord, fabric, and yarn		NA	1,376
Gaskets, packing and seals	tons	NA	4,565
Panel, sheet, title, and tube[4]	do.	NA	4,109
Paper and millboard		NA	885
Other articles[5]		NA	8,341
Total[6]		XX	120,328
1991:			
Unmanufactured:			
Asbestos[1]	tons	25,636	7,424
Manufactured:			
Asbestos fibers	do.	NA	772
Brake linings and disk brake pads[2]		NA	86,980
Clutch facings and linings[3]	tons	NA	6,637
Clothing, cord, fabric, and yarn		NA	724
Gaskets, packing and seals	tons	NA	6,841
Panel, sheet, title, and tube[4]	do.	NA	4,651
Paper and millboard		NA	1,155
Other articles[5]		NA	8,254
Total[6]		XX	116,015

NA Not available. XX Not applicable.
[1]Includes crudes, fibers, stucco, sand, refuse.
[2]Includes asbestos and cellulose fiber brakes and similar materials.
[3]Includes clutches and other friction materials, excluding brakes and brake pads.
[4]Includes asbestos-cement and cellulose fiber cement products.
[5]Includes asbestos and cellulose fiber products.
[6]Data may not add to totals shown because of independent rounding.

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 6 of 8
Published by AsbestosClaims.Law
asbestosclaims.law/library/11028/6

TABLE 6

U.S. IMPORTS FOR CONSUMPTION OF ASBESTOS FIBERS, BY TYPE, ORIGIN, AND VALUE

Type	Canada		South Africa, Republic of		Other		Total[1]	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metic tons)	Value (thousands)
1989	53,572	$12,961	1,040	$628	694	$442	55,306	$14,031
1990:								
Chrysotile:								
Crude	188	137	—	—	17	23	205	160
Spinning fibers	840	185	—	—	58	77	898	261
All other	33,164	8,542	—	—	58	77	33,222	8,619
Crocidolite (blue)	—	—	835	544	—	—	835	544
Other (unspecified asbestos type)	6,188	1,188	—	—	—	—	6,188	1,188
Total[1]	40,380	10,052	835	544	133	177	41,348	10,772
1991:								
Chrysotile:								
Crude	176	137	—	—	—	—	176	137
Spinning fibers	683	193	—	—	53	81	736	274
All other	27,872	7,356	—	—	23	37	27,895	7,393
Crocidolite (blue)	73	12	209	152	—	—	282	164
Other (unspecified asbestos type)	5,676	932	—	—	—	—	5,676	932
Total	34,480	8,630	209	152	76	118	34,765	8,900

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

Source: Bureau of the Census.

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 7 of 8
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TABLE 7
ASBESTOS: WORLD PRODUCTION, BY COUNTRY[1]

(Metric tons)

Country[2]	1987	1988	1989	1990	1991[e]
Argentina	332	2,328	225	[e]300	250
Brazil	212,807	227,653	206,195	[e]210,000	210,000
Bulgaria	400	[r]300	[r e]300	[r e]300	300
Canada (shipments)	664,546	710,357	701,227	[r]685,627	[3]686,867
China	144,673	157,478	[e]160,000	[e]160,000	150,000
Colombia[e 4]	6,600	7,600	7,900	8,000	8,000
Cyprus	18,070	14,585	—	—	—
Egypt	209	166	312	[r]369	350
Greece	60,134	[r]71,114	72,500	[r e]65,600	60,000
India	29,110	31,123	36,502	[r]25,958	30,000
Iran[e]	[r]2,900	3,400	[r]3,300	[r]3,300	3,300
Italy	118,352	94,549	[r]44,348	[r]3,862	3,500
Japan	[r]5,207	[r e]5,000	[r e]5,000	[r e]5,000	5,000
Korea, Republic of	2,518	2,428	2,361	[r]1,534	1,500
South Africa, Republic of	135,074	145,678	[r]156,594	[r]145,791	[3]148,962
Swaziland	25,925	22,804	27,291	[r]35,938	15,000
Turkey	806	[e]50	—	—	—
U.S.S.R.[e]	[3]2,554,600	2,600,000	2,600,000	2,400,000	2,000,000
United States (sold or used by producers)	50,600	18,233	17,427	W	W
Yugoslavia	10,964	17,030	[r]9,111	[r]6,578	5,500
Zimbabwe	193,295	186,581	187,066	[r]60,861	161,000
Total	[r]4,237,122	[r]4,318,457	[r]4,237,659	[r]3,819,018	3,489,529

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; excluded from "Total."

[1]Marketable fiber production. Table includes data available through Apr. 16, 1991.

[2]In addition to the countries listed, Afghanistan, Czechoslovakia, North Korea, and Romania also produce 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.

[4]Estimated fiber production based on reported crude production, in metric tons, of: 1987—132,723; 1988—152,896; 1989—158,149; 1990—160,000 (estimated); 1991—160,000 (estimated).

Minerals Yearbook: Asbestos Chapters, 1991
ACL Doc 11028 · Page 8 of 8
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asbestosclaims.law/library/11028/8