Asbestos

By D. O. Kennedy[1] and Annie L. Marks[2]

WORLD output of asbestos increased in 1955 to 1.75 million tons after 4 years of nearly identical production of 1.5 million tons. Greater output in Canada was responsible for most of the 1955 world increase. Within the United States, production declined for the second consecutive year and amounted to less than 3 percent of the world output. Imports and consumption in the United States rose to nearly the record high of 1951. Imports of low-iron chrysotile of spinning grade from Southern Rhodesia declined to less than 60 percent of the 1954 imports, but imports of low-iron chrysotile from British Columbia continued to increase and have almost entirely replaced Southern Rhodesia fibers in the low-iron field. Imports of Canadian spinning-grade fibers increased 14 percent compared with 1954.

Prices of Canadian chrysotile were advanced in December 1955, but other prices remained unchanged from 1954.

TABLE 1.—Salient statistics of the asbestos industry in the United States, 1946–50 (average) and 1951–55

	1946–50 (average)	1951	1952	1953	1954	1955
Domestic asbestos:						
Produced short tons	32,216	51,730	53,888	57,950	45,813	44,752
Sold or used do	32,205	51,645	53,864	54,456	47,621	44,580
Value	$1,753,810	$3,912,500	$4,713,032	$4,857,359	$4,697,962	$4,487,428
Imports (unmanufactured) short tons	582,642	761,873	709,469	692,245	678,390	740,423
Value	$33,558,043	$58,521,046	$61,604,601	$59,753,583	[1]$55,856,606	[1]$60,957,578
Exports (unmanufactured)[2] short tons	12,816	16,526	10,724	3,076	1,894	2,787
Value	$2,374,601	$3,662,270	$2,670,970	$592,222	$291,157	$267,776
Apparent consumption short tons	602,075	796,992	752,609	743,625	724,117	782,216
Exports of asbestos products [2 3]	$9,291,608	$14,321,278	$13,028,857	$10,627,293	$11,484,735	$12,858,504

[1] Owing to changes in tabulating procedures by the U. S. Department of Commerce, data known not to be strictly comparable to earlier years.
[2] Includes material that has been imported and subsequently exported without change.
[3] 1945 figures include value of "Magnesia and manufactures."

DOMESTIC PRODUCTION

During 1955, production of chrysotile increased 41 percent in Arizona owing chiefly to increased sales of short fibers. Production in Vermont decreased nearly 5 percent compared with 1954. The

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small production and sale of low-grade chrysotile fibers in California and increased Arizona production almost offset declining Vermont output; the result was a decrease of only 1 percent in domestic production of chrysotile asbestos. Output of amphibole asbestos, suspended in Georgia and greatly reduced in North Carolina, was nearly 90 percent less than in 1954. So few companies outside of Arizona produced amphibole and chrysotile that separate statistics for each type and production by States cannot be published.

Of 13 companies in Arizona, 6 produced and sold less than 10 tons each during 1955. Greatly expanded shipments of short fibers resulted in a 40-percent increase in the total quantity of asbestos shipped; the total sales value was 3 percent less than the 1954 shipments. The following firms and individuals produced chrysotile in the Globe district of Arizona during 1955: American Asbestos Cement Corp., American Fiber Corp., Arizona Asbestos Mining Co., Crown Asbestos Mines, Inc., Barry De Rose, Jaquays Mining Corp., Kyle Asbestos Mines of Arizona, Metate Asbestos Corp., Arthur Enders, Phillips Asbestos Mines, Via Development Co., Clarence Via, and Western Chemical Co.

At the end of 1954, bids for leasing a 200-acre asbestos-mining property on the Fort Apache Indian Reservation in Arizona were invited.[3] Jack L. Neal and associates acquired the Bear Canyon asbestos property on the San Carlos Indian Reservation in Arizona under a 10-year leasing agreement.[4]

The Materials Branch, Emergency Procurement Service, General Services Administration, continued to purchase domestic low-iron chrysotile at its depot in Globe, Ariz. Reports of purchases of crudes Nos. 1, 2, and 3 showed that 87 percent of the total production of these grades was sold to the Government. The Government was paying $1,500 a ton for crude No. 1, $900 a ton for crude No. 2, and $400 a ton for crude No. 3. The program was scheduled to run until October 1, 1957, or until 1,500 tons of crudes Nos. 1 and 2 combined had been purchased.

The Tabor Mining Co. produced a small quantity of short chrysotile from the Phoenix mine, Napa County, Calif. Tremolite was produced in Placer County by W. Zimdars and J. Delmue from the Noon Day mine in the Iowa Hill district. Amphibole asbestos was produced by Huntley Industrial Minerals, Inc., in the Ubehebe district of Inyo County, and by the Calasbestos Corp., from the Katherine C mine in the Santa Rosa district of Riverside County.

A new discovery of amphibole asbestos near the Zenia area in Trinity County, Calif., was announced.[5]

The Powhatan Mining Co., Baltimore, Md., continued to produce amphibole asbestos from the Kilpatrick mine in Transylvania County, N. C.

The Vermont Asbestos Mines Division of Ruberoid Co. remained the chief producer of asbestos in the United States. Production from the Vermont quarry was less in 1955 than in 1954.

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[3] Mining Congress Journal, Lease Apache Asbestos Land: Vol. 41, No. 3, March 1955, p. 77.
[4] Mining World, vol. 17, No. 9, August 1955, p. 100.
[5] California Mining Journal, Trinity County: Vol. 25, No. 1, September 1955, p. 20.

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The Asbestos Corp., Ltd., took an option to purchase 27 claims on Ibex Mountains near Hyder, Alaska. High-grade chrysotile asbestos was found on these claims.[6] This area lies southwest of the Cassiar mine, which is producing low-iron chrysotile asbestos of strategic importance.

CONSUMPTION

Chrysotile asbestos represented 96 percent of the total consumption of asbestos in the United States in 1955, and the increase of 8 percent in the consumption of chrysotile in 1955 compared with 1954 was reflected in the same increase in all types of asbestos.

TABLE 2.—Apparent consumption of raw asbestos in the United States, 1946–50 (average) and 1951–55

Year	Short tons	Value	Year	Short tons	Value
1946–50 (average)	602,075	$32,937,252	1953	743,625	$64,018,720
1951	796,992	58,771,276	1954	724,117	60,263,411
1952	752,609	63,646,663	1955	782,216	65,177,230

Consumption of spinning grades of chrysotile increased 11 percent and that of short fibers increased 8 percent. Consumption of amosite declined 20 percent owing to a shortage in supply from the Union of South Africa.

Consumption of crocidolite (blue asbestos) increased 29 percent. As asbestos was employed extensively in building construction and in many industries, trends in asbestos consumption, industrial production, and volume of new construction are compared graphically in figure 1.

PRICES

Canadian Johns-Manville Co., Ltd., announced increases in prices for all grades of asbestos, effective December 15, 1955. This rise, about 10 percent for all long-fiber grades and about 5 percent for all short fibers, was the first adjustment in Canadian prices since January 1952.[7] These increases were not reflected in trade-journal quotations until over a month later and did not appear as 1955 price changes. Trade-journal quotations follow:

	Price per ton
Crude No. 1	US$1,100–US$1,500
Crude No. 2	500– 1,000
No. 3—Spinning fiber	300– 525
No. 4—Shingle fiber	150– 200
No. 5—Paper fiber	100– 140
No. 6—Plaster fiber	77
No. 7—Shorts	35– 70

[6] Western Mining and Industrial News, Alaska Asbestos Properties to Be Mined Near Hyder: Vol. 23, No. 5, May 1955, p. 4.
[7] Northern Miner, Johns-Manville Raises Prices for Asbestos: Vol. 41, No. 40, Dec. 15, 1955, p. 11.

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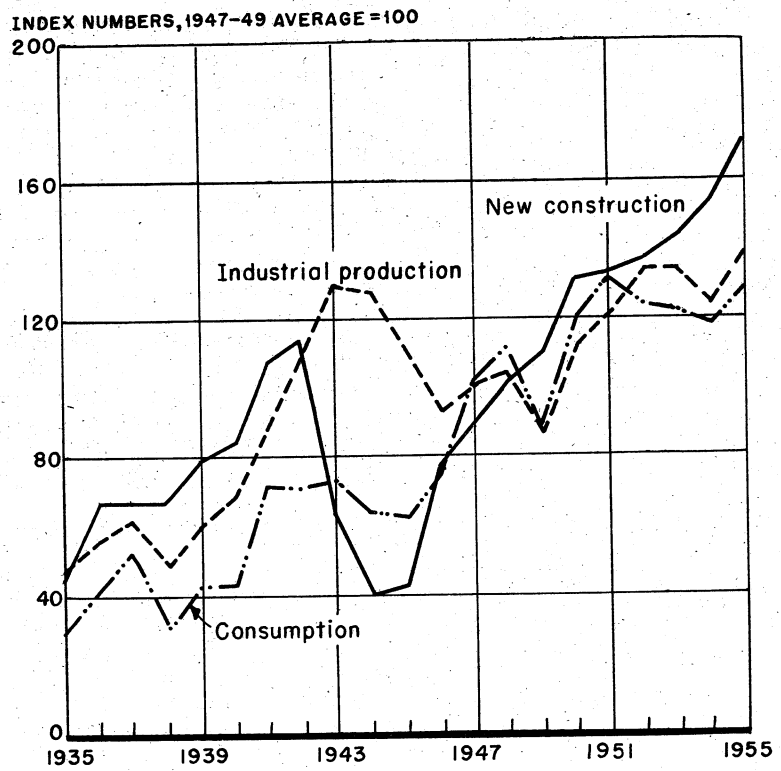


FIGURE 1.—Consumption of asbestos compared with total new construction and industrial production, 1935–55. Statistics on value of construction from Bureau of Foreign and Domestic Commerce and on industrial production from Federal Reserve Board.

The Arizona quotations were unchanged during 1955 and were as follows:

	Per ton f. o. b. Globe, Ariz.
No. 1 crude	$1,500–$1,750
No. 2 crude	900– 1,050
No. 3 crude	400– 450
Filter fiber	250– 450

African asbestos was sold by negotiation with individual purchasers. There were no market quotations. Department of Commerce reports show the following average figures for imports in 1954 and 1955, per short ton:

	1954	*1955*
Amosite: South Africa	$132.73	$125.38
Crocidolite:		
Bolivia	450.21	-------
Australia	316.83	229.00
South Africa	209.61	206.06

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FOREIGN TRADE [8]

Imports.—During 1955 less than 6 percent of the asbestos consumed in the United States was produced in domestic mines. Nearly half the world production of asbestos was imported to meet United States requirements, an increase of nearly 10 percent in 1955. Imports of amosite dropped about 20 percent, and shortages in this type of asbestos began to develop in some industries. As in 1954, 94 percent of the 1955 imports originated in Canada; nearly 4 percent came from the Union of South Africa, Southern British Africa, and British East Africa; a little over 1 percent came from Southern Rhodesia. The value of the imports from these three areas represented 87, 8, and 3 percent, respectively, of the total value of all imports of asbestos into the United States in 1955.

TABLE 3.—Asbestos (unmanufactured) imported for consumption in the United States, 1946–50 (average) and 1951–53 (totals) and 1954–55, by countries and classes

[U. S. Department of Commerce]

	Crude (including blue fiber)		Mill fibers		Short fibers		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1946–50 (average)	30,998	$4,921,338	159,601	$15,646,889	392,043	$12,989,816	582,642	$33,558,043
1951	35,289	6,618,140	[1] 225,284	[1] 28,844,485	501,300	23,058,421	761,873	58,521,046
1952	38,636	8,048,835	212,684	31,292,506	458,149	22,263,260	709,469	61,604,601
1953	39,201	9,052,007	170,692	27,521,438	482,352	23,180,138	692,245	59,753,583
1954								
North America: Canada	1,107	338,268	148,026	24,242,023	491,149	23,549,156	640,282	48,129,447
South America:								
Bolivia	166	74,736					166	74,736
Venezuela			47	7,943			47	7,943
Total	166	74,736	47	7,943			213	82,679
Europe:								
Finland					168	9,759	168	9,759
Germany, West	4	6,000	2	275			6	6,275
Italy			1	1,340	1	2,498	2	3,838
Malta, Gozo and Cyprus					120	3,166	120	3,166
U. S. S. R.			292	32,442			292	32,442
United Kingdom	[2] 28	[2] 9,985	119	39,216	2	1,891	149	51,092
Total	32	15,985	414	73,273	291	17,314	737	106,572
Africa:								
British East Africa	(3)	(3)			53	5,394	[4] 53	[4] 5,394
Federation of Rhodesia and Nyasaland [5]	6,699	1,832,596	156	94,626	364	199,824	7,219	2,127,046
Southern British Africa	[4] 1,105	[4] 241,308	125	31,688			[4] 1,230	[4] 272,996
Union of South Africa	[4] 27,096	[4] 4,601,514	194	107,400	110	25,607	[4] 27,400	[4] 4,734,521
Total	34,900	6,675,418	475	233,714	527	230,825	35,902	7,139,957
Oceania: Australia	1,256	397,951					1,256	397,951
Grand total	37,461	[6] 7,502,358	148,962	[6] 24,556,953	491,967	[6] 23,797,295	678,390	[6] 55,856,606

See footnotes at end of table.

[8] Figures on imports and exports compiled by Mae B. Price and Elsie D. Page, Division of Foreign Activities, Bureau of Mines, from records of the U. S. Department of Commerce.

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TABLE 3.—Asbestos (unmanufactured) imported for consumption in the United States, 1946–50 (average) 1951–53 (totals) and 1954–55, by countries and classes—Continued

[U. S. Department of Commerce]

	Crude (including blue fiber)		Mill fibers		Short fibers		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1955								
North America: Canada	873	$471,279	167,191	$27,388,074	531,023	$25,215,464	699,087	$53,074,817
South America: Venezuela			1	435			1	435
Europe:								
France					7	589	7	589
Germany, West			2	278			2	278
Italy			8	9,310			8	9,310
Portugal	4	538					4	538
United Kingdom	1	336	72	20,642	9	9,627	82	30,605
Yugoslavia	558	23,276	6	575			564	23,851
Total	563	24,150	88	30,805	16	10,216	667	65,171
Africa:								
British East Africa					12	1,358	12	1,358
Federation of Rhodesia and Nyasaland [5]	8,168	1,999,787	237	73,041	15	4,312	8,420	2,077,140
Southern British Africa	189	42,458					189	42,458
Union of South Africa	27,507	4,745,152	635	105,172	557	79,168	28,699	4,929,492
Total	35,864	6,787,397	872	178,213	584	84,838	37,320	7,050,448
Oceania: Australia	3,348	766,707					3,348	766,707
Grand total	40,648	8,049,533	168,152	[6] 27,597,527	531,623	[6] 25,310,518	740,423	[6] 60,957,578

[1] Includes 11 tons ($1,632) classified by the U. S. Department of Commerce as "amosite, crude"; reclassified by Federal Bureau of Mines as "mill fibers."
[2] Data includes less than 1 ton, valued at $501 in 1954, believed to have originated in the Union of South Africa or Australia, and processed in the United Kingdom.
[3] Revised to none.
[4] Revised figure.
[5] Believed to be all from Southern Rhodesia.
[6] Owing to changes in tabulating procedures by the U. S. Department of Commerce data known not to be comparable to years before 1954.

TABLE 4.—Asbestos (chrysotile) imported for consumption in the United States from Canada, by grades, 1946–50 (average) and 1951–55, in short tons

[U. S. Department of Commerce]

Grades	1946–50 (average)	1951	1952	1953	1954	1955
Crude No. 1	251	126	144	168	82	65
Crude No. 2	268	226	332	207	181	164
Other crudes	341	384	79	467	844	644
Spinning and textile fiber	19,093	22,463	24,112	19,417	18,319	21,339
Shingle fiber	73,437	104,419	98,577	86,540	72,242	83,898
Paper fiber	65,184	97,888	87,644	63,139	57,465	61,954
Short fiber	392,035	501,264	458,012	482,179	491,149	531,023
Total	550,609	726,770	668,900	652,117	640,282	699,087

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As the longer spinning-grade fibers of chrysotile were of strategic interest, tables 4 and 5 were prepared to show the imports of chrysotile from Canada and Southern Rhodesia by grades. Although not shown separately in table 4, imports of low-iron chrysotile from British Columbia increased from 2,323 tons in 1954 to 5,742 tons in 1955. Imports from Southern Rhodesia increased about 17 percent in 1955 compared with 1954 owing to larger shipments of short fibers. Imports of the strategic spinning grades (low-iron) continued to decline.

TABLE 5.—Asbestos (chrysotile) imported for consumption in the United States from Southern Rhodesia [1] by grades, 1946–50 (average) and 1951–55, in short tons

[U. S. Department of Commerce]

Grades	1946–50 (average)	1951	1952	1953	1954	1955
Crude No. 1	1,375	678	462	1,039	181	105
Crude No. 2	3,049	1,239	1,363	814	275	162
Other crude	[2] 4,575	5,783	8,296	7,304	6,243	7,901
Spinning and textile fiber	151	25	177	730	156	76
Shingle fiber	45	----------	245	103	----------	161
Short fiber	6	----------	----------	----------	364	15
Total	9,201	7,725	10,543	9,990	7,219	8,420

[1] Effective July 1, 1954, reported by the U. S. Department of Commerce as Federation of Rhodesia and Nyasaland. Believed to be all from Southern Rhodesia.
[2] Includes small amounts credited by U. S. Department of Commerce to Mozambique.

Imports from the Union of South Africa increased again in 1955. Imports of crocidolite (blue asbestos) more than doubled since 1952, but imports of amosite decreased to about 59 percent of the 1952 figure.

TABLE 6.—Imports of amosite, crocidolite, and chrysotile into the United States from Union of South Africa, 1951–55, in short tons

[U. S. Department of Commerce]

	1951	1952	1953	1954	1955
Amosite	[1] 15,131	[2] 18,323	15,261	14,634	11,745
Crocidolite	[3] 5,473	6,885	7,781	10,911	14,591
Chrysotile	2,979	1,694	3,388	1,855	2,363
Total	23,583	26,902	26,430	27,400	28,699

[1] Includes 100 tons credited by U. S. Department of Commerce to French West Africa; 512 tons credited to Mozambique and 140 tons credited to Southern Rhodesia.
[2] Includes 105 tons credited to Mozambique.
[3] Includes 6 tons blue (crocidolite) crudes credited to United Kingdom.

Exports.—Exports of raw asbestos increased nearly 50 percent in 1955 compared with 1954 but represented less than 6 percent of our domestic production and were insignificant compared with imports.

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TABLE 7.—Asbestos and asbestos products exported from the United States, 1946–50 (average) and 1951–55

[U. S. Department of Commerce]

Year	Unmanufactured asbestos				Asbestos products	
	Domestic [1]		Foreign [2]		Domestic [1]	Foreign [2]
	Short tons	Value	Short tons	Value	Value	Value
1946–50 (average)	11,236	$2,028,514	1,580	$348,667	$9,277,936	$13,672
1951	14,298	3,216,810	2,228	445,460	14,320,389	889
1952	10,265	2,550,065	459	120,905	13,027,739	1,118
1953	2,780	540,273	296	51,949	10,615,832	11,461
1954	1,847	275,778	47	15,379	11,475,082	9,653
1955	2,161	236,336	626	31,440	12,820,917	37,587

[1] Material of domestic origin, or foreign material that has been milled, blended or otherwise processed in the United States.
[2] Material that has been imported and subsequently exported without change.

TABLE 8.—Asbestos and asbestos products exported from the United States, 1954–55, by kinds

[U. S. Department of Commerce]

Product		1954		1955	
		Quantity	Value	Quantity	Value
Unmanufactured asbestos:					
Crude and spinning fibers	short tons	286	$58,726	240	$48,858
Nonspinning fibers	do	438	100,227	287	42,817
Waste and refuse	do	1,123	116,825	1,634	144,661
Total unmanufactured	do	1,847	275,778	2,161	236,336
Asbestos products:					
Brake lining and blocks:					
Molded, semimolded and woven		(1)	4,620,416	(1)	4,995,315
Clutch facing and lining	number	1,138,760	879,450	1,182,728	927,597
Construction materials	short tons	15,056	2,521,652	16,395	3,055,227
Pipe covering and cement	do	2,094	635,224	3,040	806,976
Textiles, yarn, and packing	do	1,387	2,434,904	1,210	2,605,656
Manufactures, n.e.c.		(2)	383,436	(2)	430,146
Total products			11,475,082		12,820,917

[1] Owing to changes in classification, values have been summarized; quantities not shown.
[2] Quantity not recorded.

TECHNOLOGY

Two technical publications on asbestos were issued in 1955. The first, by Oliver Bowles, was a comprehensive report covering all phases of asbestos production and use. This report utilized the vast reservoir of information available from many studies pertaining to the technique and equipment of mining and milling, new applications, economic problems, international trade, reserves, and various other aspects of this unique mineral. These data were supplemented by conferences with numerous authorities on the production and utilization of asbestos and visits to asbestos mines and deposits in the United States and foreign countries.[9] The second publication, by W. E. Sinclair, was a textbook with a great deal of information on mining and milling methods in South Africa.[10]

[9] Bowles, Oliver, The Asbestos Industry: Bureau of Mines, Bull. 552, 1955, 122 pp.
[10] Sinclair, W. E., Asbestos, Its Origin, Production, and Utilization: Mining Publications, Ltd., London, 1955, 365 pp.

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Asbestos mining in Arizona was studied by the Stanford Research Institute of Stanford, Calif.,[11] and by the Bureau of Mines.[12] Recommendations made by the Stanford Research Institute to the San Carlos Apache Tribe Council included the following:

The leasing of land for mineral exploitation should be simplified to revive and create interest in mineral development.

As a result of a 7-year detailed study of asbestos occurrences at Thetford Mines, Quebec, a report was compiled describing the probable origin of the asbestos veins.[13]

New developments in block-caving methods used in the Quebec asbestos mines were described.[14]

The use of ball mills in the Johnson's Asbestos Co. mill at Black Lake, Quebec—an innovation in asbestos-milling processes—was described in several publications.[15]

Several patents were granted covering new types of apparatus to improve fiberization of asbestos in treatment plants.[16] A process was patented for recovering treated asbestos fibers from waste gasket material containing asbestos and metal.[17]

The so-called harsh and semiharsh asbestos fibers have certain definite advantages over those that are soft, silky, or slimy in wet-process manufacture of such products as asbestos-cement pipe. Research, conducted for several years, has shown that the soft fibers may be changed to any degree of harshness desired by a flash-heating process. The changes appear to be accomplished by the removal of part of the molecular water.[18]

Several processes for better utilization of asbestos fibers were described in patents granted during 1955.[19]

WORLD REVIEW

World production in 1955, about 15 percent larger than in 1954, showed a sizable increase for the first time in 5 years.

NORTH AMERICA

Canada.—Sales of asbestos in Canada increased nearly 15 percent in 1955 compared with 1954, both in quantity and value. Sales of fibers reached a new high of nearly 400,000 tons—13 percent above the previous high of 350,000 tons in 1952.

[11] Western Mining Industrial News, Asbestos Mining Principal Mineral Resource on Apache Reservation: Vol. 23, No. 5, May 1955, pp. 13–14.
[12] Stewart, Lincoln A., Chrysotile Asbestos Deposits of Arizona: Bureau of Mines Inf. Circ. 7706, 1955, 124 pp.
[13] Riordon, P. H., The Genesis of Asbestos in Ultrabasic Rocks: Econ. Geol., vol. 50, No. 1, January-February 1955, pp. 67–81.
[14] Antonides, Lloyd E., Asbestos Mines Improve Caving Schemes: Eng. and Min. Jour., vol. 157, No. 1, January 1956, pp. 100–103, 110.
[15] Hardinge Highlights, Asbestos and Johnson's Company: April 1955, 4 pp.
Mining World, New Asbestos Milling Methods Pioneered by Johnson Company: Vol. 17, No. 9, August 1955, pp. 48–53.
Herod, Buren C., Johnson's Asbestos Opens New Mill, Mine at Black Lake, Que.: Pit and Quarry, vol. 48, No. 10, April 1956, pp. 138–142.
[16] Donovan, J. J., and Donovan, R. A., Ore-Fiberizing Machine: U. S. Patent 2,700,511, Jan. 25, 1955.
Donovan J. J., and Donovan, R. A., Vertical Axis Rotary-Beater Mill for Treatment of Fibrous Materials: U. S. Patent 2,700,512, Jan 25, 1955.
Birdseye, C., Progressive Explosion Process of Defibration: U. S. Patent 2,711,369, June 21, 1955.
[17] Lillie, S. M., and Toman, J. C., Process of Recovering Treated Fibrous Material: U. S. Patent 2,702,162, Feb. 15, 1955.
[18] Badollet, M. S., and Streib, W. C., Heat Treatment of Chrysotile Asbestos Fibers: Canadian Min. and Met. Bull., vol. 48, No. 514, February 1955, pp. 65–69.
[19] Spooner, L. W., Aluminum Phosphate Bonded Asbestos Insulating Material: U. S. Patent 2,702,068, Feb. 15, 1955.
Bump, C. K., Process of Bonding Asbestos Fibers With a Titanium Polymer and Article Produced Thereby: U. S. Patent 2,710,268, June 7, 1955.
Steck, R. F., Production of Friction Materials: U. S. Patent 2,702,770, Feb. 22, 1955.

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TABLE 9.—World production of asbestos by countries,[1] 1946–50 (average) and 1951–55, in short tons [2]

[Compiled by Helen L. Hunt]

Country [1]	1946–50 (average)	1951	1952	1953	1954	1955
North America:						
Canada (sales) [3]	677,404	973,198	929,339	911,226	924,116	1,092,384
United States (sold or used by producers)	32,205	51,645	53,864	54,456	47,621	44,580
Total	709,609	1,024,843	983,203	965,682	971,737	1,136,964
South America:						
Argentina	289	(4)	(4)	(4)	(4)	198
Bolivia (exports)	140	348	513	810	33	
Brazil	1,677	1,456	1,439	1,357	2,816	[5] 1,250
Chile	294	(4)	(4)	(4)	(4)	(4)
Venezuela	194	287	434	185	743	1,757
Total	2,594	[5] 2,500	[5] 2,800	[5] 2,800	[5] 4,000	[5] 3,400
Europe:						
Finland [6]	9,785	13,062	11,464	12,047	7,853	18,674
France	2,506	7,814	8,338	11,419	11,795	10,913
Greece	20	37	28	1	6	
Italy	15,584	24,925	26,387	22,484	25,955	33,266
Portugal	137	344	185	105	30	56
Spain	25	45	33		176	(4)
U. S. S. R. [5]	176,400	240,000	240,000	240,000	240,000	240,000
Yugoslavia	[7] 862	1,679	2,762	4,131	3,598	4,305
Total [1 5]	210,000	290,000	290,000	290,000	295,000	310,000
Asia:						
Cyprus	10,271	18,938	18,250	15,966	17,146	17,143
India	202	580	765	637	435	[5] 440
Iran			3	55		
Japan	5,330	6,478	3,370	4,495	6,916	6,950
Korea, Republic of	(4)	(4)	(4)	(4)	233	2,048
Taiwan (Formosa)	282	39	26		163	405
Turkey	220	88			50	259
Total [1 5]	18,000	28,000	25,000	27,000	33,000	38,000
Africa:						
Bechuanaland		41	528	548	729	1,426
Egypt	679	1,375	66	220		
French Morocco	567	666	635	600	597	631
Kenya	485	418	390	166	224	152
Madagascar	1	19	3	8		
Mozambique					193	301
Rhodesia and Nyasaland, Federation of: Southern Rhodesia	65,970	77,663	84,834	87,739	79,962	105,261
Swaziland	31,832	34,964	34,769	30,103	30,142	32,613
Union of South Africa	50,887	107,368	133,839	94,817	109,151	119,699
Total	150,421	222,514	255,064	214,201	220,998	260,083
Oceania:						
Australia	1,475	2,865	4,546	5,566	5,279	5,993
New Zealand	9	911	764			
Total	1,484	3,776	5,310	5,566	5,279	5,993
World total (estimate) [1]	1,090,000	1,570,000	1,560,000	1,505,000	1,530,000	1,755,000

[1] In addition to countries listed, asbestos is produced in China, Czechoslovakia, and North Korea. Estimates by author of chapter are included in the total.
[2] This table incorporates a number of revisions of data published in previous Asbestos chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[3] Exclusive of sand, gravel and stone (waste rock only), production of which is reported as follows: 1946–50 (average) 28,682 tons; 1951, 33,762 tons; 1952, 39,664 tons; 1953, 21,118 tons; 1954, 26,429 tons; 1955, 28,582 tons.
[4] Data not available; estimate by author of chapter included in total.
[5] Estimate.
[6] Includes asbestos flour.
[7] Average for 1947–50.

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TABLE 10.—Sales of asbestos in Canada, 1954–55, by grades

[Dominion Bureau of Statistics]

	1954			1955		
	Short tons	Value		Short tons	Value	
		Total	Average per ton		Total	Average per ton
Grade:						
Crudes	725	Can$645, 608	Can$890. 49	724	Can$610, 830	Can$843. 69
Fibers	326, 653	56, 724, 585	173. 65	395, 096	66, 813, 234	169. 11
Shorts	596, 738	29, 039, 019	48. 66	667, 982	32, 217, 034	48. 23
Total	924, 116	86, 409, 212	93. 50	1, 063, 802	99, 641, 098	93. 67
Rock mined	14, 793, 760			17, 696, 357		
Rock milled	11, 394, 571			12, 427, 002		

Optimism about the future of Canadian asbestos was indicated in reports showing increased ore reserves, greater production at the mines of Asbestos Corp. in Quebec,[20] shaft sinking at the Munro mine of the Johns-Manville Corp., Ltd., in Ontario,[21] and preliminary plans for opening new ore bodies in the Matheson area.[22] A record production of 592,000 tons was reported from the world's largest asbestos mine, the Jeffery mine of the Johns-Manville Corp., Ltd., at Asbestos, Quebec.

Lake Asbestos of Quebec, Ltd., began dredging operations at Black Lake, Quebec. Over 25 million yards of mud, sand, gravel, and boulder clay will be removed from the lake in preparation for open-pit mining of a large ore body.[23]

The block-caving method at the Jeffery mine [24] and the open pit at the Munro mine [25] of Johns-Manville Corp., Ltd., were described in a publication.

Many companies explored for new asbestos deposits. Canadian Johns-Manville Corp., Ltd., announced its interest in new asbestos "finds" anywhere in western Canada or the western United States. Continental Asbestos Mines, Ltd., a new firm in control of the property and mill of Continental Asbestos Co., considered a geomagnetic survey and diamond-drilling program of the property.[26] Derogan Asbestos Corp. used a second diamond drill to explore its property in Melborne Township, Quebec. One hole drilled showed fiber to a depth of 450 feet. Eastern Asbestos Co. explored by drifting and core sampling an asbestos deposit in Portland West Township, about 24 miles north of Buckingham, Quebec. The asbestos occurs in crossfiber veins in dolomite and is similar in origin and character to the Arizona fiber.[27] Golden Age mines carried out bulk sampling and

[20] Northern Miner, Asbestos Corp. Had Record Year-Sales Profits, Ore Reserves Up: Vol. 41, No. 49, Mar. 1, 1956, pp. 17, 25.
[21] Northern Miner, Johns-Manville Sinking Shaft at Munro Mine: Vol. 41, No. 27, Sept. 29, 1955, pp. 1, 15.
[22] Northern Miner, Johns-Manville Considers Opening Second Orebody: Vol. 41, No. 34, Nov. 17, 1955, p. 2.
[23] Canadian Mining and Metallurgical Bulletin, Asbestos: Vol. 48, No. 519, July 1955, p. 456.
Engineering and Mining Journal, Canada Moves a Lake to Mine Asbestos: Vol. 157, No. 1, January 1956, pp. 91–93.
[24] Briggs, Marion L., World's Largest Asbestos Block-Caving Method: Rock Products, vol. 58, No. 5, May 1955, pp. 58–61.
[25] Pit and Quarry, Johns-Manville's Munro Mine—First Asbestos Development in Ontario's "Golden Area": Vol. 48, No. 3, September 1955, pp. 74–76, 78.
[26] Northern Miner, New Owners Develop Continental Asbestos: Vol. 41, No. 35, Nov. 24, 1955, p. 23.
[27] Canadian Mining Journal, Eastern Asbestos Co.: Vol. 76, No. 1, January 1955, p. 118.

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mill testing of the eastern portion of its property in the Eastern Township area of Quebec. An average recovery of 1.76-percent fiber was reported.[28] New Lafayette Asbestos Co., Ltd., announced plans to drive an adit to open up and sample an asbestos deposit found by diamond drilling on its property in Dorchester County, Eastern Townships district, Quebec. Estimates were over 10-million tons of 4-percent-asbestos ore had been found by diamond drilling. Exploration by Quebec Asbestos Corp. uncovered a large new deposit a few miles from its old operation near East Broughton, Quebec. The work of developing the deposit and erecting a new mill was begun in 1955. The mill will be operated as Carey Canadian Mines, Ltd., a subsidiary of Philip Cary Manufacturing Co. of Cincinnati, Ohio.[29] Chibougamau Asbestos, Ltd., announced plans to develop its properties under option in the Chibougamau district of Quebec.

Mining at the Cassiar mine in northern British Columbia continued to progress satisfactorily. The company completed its first full year of production in September with a net profit of nearly $700,000. The principal construction during the year was erection of an aerial tramway begun in 1954.[30] Shipments of 15,031 short tons of fibers were reported for the year 1955, and increased production was forecast for the coming year. Construction continued on a 300-mile road from Cassiar to Stewart, British Columbia, as part of the highway program of the Provincial Government.[31]

The discovery of a large deposit of asbestos has been reported by Advocate Mines on the Burlington Peninsula on the northeastern coast of Newfoundland. Airborne geophysical surveys, followed by drilling, have indicated an ore body 2,500 feet long and 300 feet wide.

Caposite Insulations, Ltd., was formed by Cape Asbestos Co., Ltd., for manufacture of asbestos thermal-insulation materials in Canada using amosite from the South African mines. A plant was begun near Sarnia, Ontario, on the shore of Lake Huron.[32]

EUROPE

Finland.—Anthophyllite asbestos was mined at Paakkila and Maljasalmi by underground and open-pit methods. The Suomen Mineraali Oy (company) owned the mines and used the output to produce asbestos board, insulation compounds, some yarn and packings, and asbestos-cement board. A deposit of chrysotile asbestos was found in Finnish Lapland by Suomen Mineraali Oy in 1955.[33]

AFRICA

Rhodesia and Nyasaland, Federation of.—In 1955 asbestos production in Southern Rhodesia increased 32 percent in quantity and 19 percent in value over 1954 and became the principal Southern Rhodesia mining industry, surpassing gold mining by nearly £500,000.

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[28] Northern Miner, Golden Age Reports on Asbestos Work: Vol. 41, No. 29, Oct. 13, 1955, p. 5.
[29] Northern Miner, Another Big New Asbestos Mill Slated for Eastern Townships: Vol. 40, No. 49, Feb. 24, 1955, pp. 1, 5.
[30] Northern Miner, Cassiar Asbestos Makes All Profit in Six Months: Vol. 41, No. 40, Dec. 29, 1955, p. 3.
[31] United States Embassy, Montreal, Canada, State Department Dispatch 195, May 18, 1956, pp. 5–6.
[32] South African Mining and Engineering Journal, Asbestos Firm to Manufacture in Canada: Vol. 66, No. 3275, Nov. 19, 1955, p. 439.
[33] Bureau of Mines, Mineral Trade Notes: Vol. 42, No. 3, March 1956, p. 18.

Many small mines, unable to increase the grade of ore by selective mining, were forced out of production by steadily increasing working costs.[34]

Expansion plans were announced at Wynne's mine near Filabusi[35] and the Ethel mine near Salisbury, with expectations of increased mechanization as a means of meeting rising costs.

TABLE 11.—Asbestos produced in Southern Rhodesia, 1951–55

Year	Short tons	Value	Year	Short tons	Value
1951	77,663	£5,452,108	1954	79,962	£5,922,724
1952	84,834	6,651,975	1955	105,261	7,051,831
1953	87,739	6,542,731			

Union of South Africa.—Production of amosite and crocidolite (blue asbestos) was about 10 percent greater in the Union of South Africa during 1955 than in 1954. Demands for these products increased, and exports were nearly 20 percent greater than in 1954. Production of amosite increased, but the quantity allotted to the United States decreased in spite of an increasing demand.

The adjustments and consolidation effected by the asbestos industry in the Union of South Africa in 1954 were reflected by limited expansions and considerable standardization, which had favorable effects on the production during 1955.[36]

TABLE 12.—Asbestos produced in the Union of South Africa, 1951–55, by varieties and sources, in short tons

Variety and source	1951	1952	1953	1954	1955
Amosite (Transvaal)	54,053	63,280	38,258	45,922	50,137
Chrysotile (Transvaal)	19,509	24,970	18,840	19,373	20,535
Blue (Transvaal)	15,581	20,294	16,824	15,610	13,964
Blue (Cape)	18,078	24,441	20,883	28,136	34,878
Anthophyllite (Transvaal)	147	854	12	110	185
Total	107,368	133,839	94,817	109,151	119,699

TABLE 13.—Asbestos produced in and exported from the Union of South Africa, 1951–55

Year	Production (short tons)			Exports	
	Transvaal	Cape Province	Total	Short tons	Value
1951	89,290	18,078	107,368	89,735	£5,056,143
1952	109,398	24,441	133,839	106,576	6,899,086
1953	73,934	20,883	94,817	71,791	4,158,476
1954	81,015	28,136	109,151	94,322	5,453,116
1955	84,821	34,878	119,699	114,056	6,697,352

[34] Rhodesian Mining Review: A Steady Progress and a Healthy Future: Vol. 21, No. 7, July 1956, p. 37
[35] Mining, Expansion Programme at Wynne's Mine: Vol. 20, No. 13, December 1955, p. 27.
[36] Asbestos, South African Asbestos Market Review for 1955: Vol. 37, No. 8, February 1956, p. 14.

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OCEANIA

Australia.—Production of crocidolite (blue asbestos) at Wittenoom increased during 1955, but production costs remained too high for competition with African asbestos. Both the Australian and the Western Australian Governments subsidized the mining of crocidolite in 1955.[37] A review of the obstacles overcome and still facing the Australian industry was published.[38]

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[37] Mining World and Engineering Record (London), Asbestos in Australia: Vol. 170, No. 4445, June 9, 1956, p. 280.
[38] Mining Magazine (London), Australia Asbestos: Vol. 92, No. 4, April 1955, pp. 247–249.

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