Asbestos

By Charles L. Readling [1]

U.S. production (shipments) of asbestos increased 4 percent to establish a record high in output, surpassing the previous high set in 1966. However, overall demand for asbestos in 1969 declined slightly primarily as a result of tight money conditions, and the resulting high interest rates restricted the availability of mortgage funds for home building. Imports decreased 6 percent from those of 1968.

Canada, the largest asbestos producer, increased output (shipments) 4 percent over that of 1968.

Legislation and Government Programs.—The Tax Reform Act of 1969, signed by the President on December 30, 1969, reduced domestic asbestos depletion rates from 23 percent to 22 percent effective with taxable years beginning after October 9, 1969. The General Services Administration (GSA) in 1969 disposed of 2,294 short tons of amosite, 2,663 tons of crocidolite, and 336 tons of chrysotile from Government inventories.

DOMESTIC PRODUCTION

Asbestos production in the United States in 1969 increased 4 percent in volume and 2 percent in value. Production was from four States: 60 percent from California; with Vermont second in rank; followed by Arizona and North Carolina.

[1] Mineral specialist, Bureau of Mines, Minneapolis, Minn.

Table 1.—Salient asbestos statistics

	1965	1966	1967	1968	1969
United States:					
Production (sales)—short tons	118,275	125,928	123,189	120,690	125,936
Value—thousands	$10,162	$11,056	$11,102	$10,406	$10,648
Exports and reexports (unmanufactured) short tons	43,126	46,996	47,718	41,236	36,173
Value—thousands	$5,294	$5,763	$6,025	$4,679	$4,979
Exports and reexports of asbestos products (value)—thousands	$19,139	$21,963	$23,767	$24,527	$28,183
Imports for consumption (unmanufactured)—short tons	719,559	726,459	645,112	737,909	694,558
Value—thousands	$70,457	$73,100	$65,743	$72,930	$76,422
Consumption, apparent [1]—short tons	794,708	805,391	720,583	817,363	784,321
World: Production—do	3,101,994	3,275,262	3,207,259	3,290,370	NA

NA Not available.
[1] Measured by quantity produced, plus imports, minus exports.

Table 2.—Stockpile objective and Government inventories as of December 31, 1969

(Short tons)

Mineral	Stockpile objective	Inventories			
		National	Supplemental	Defense Production Act	Total
Amosite	40,000	11,705	51,983	---	63,688
Chrysotile	13,700	6,224	7,576	908	14,708
Subspecification	------	152	2,692	908	3,752
Crocidolite	------	1,565	44,034	---	45,599

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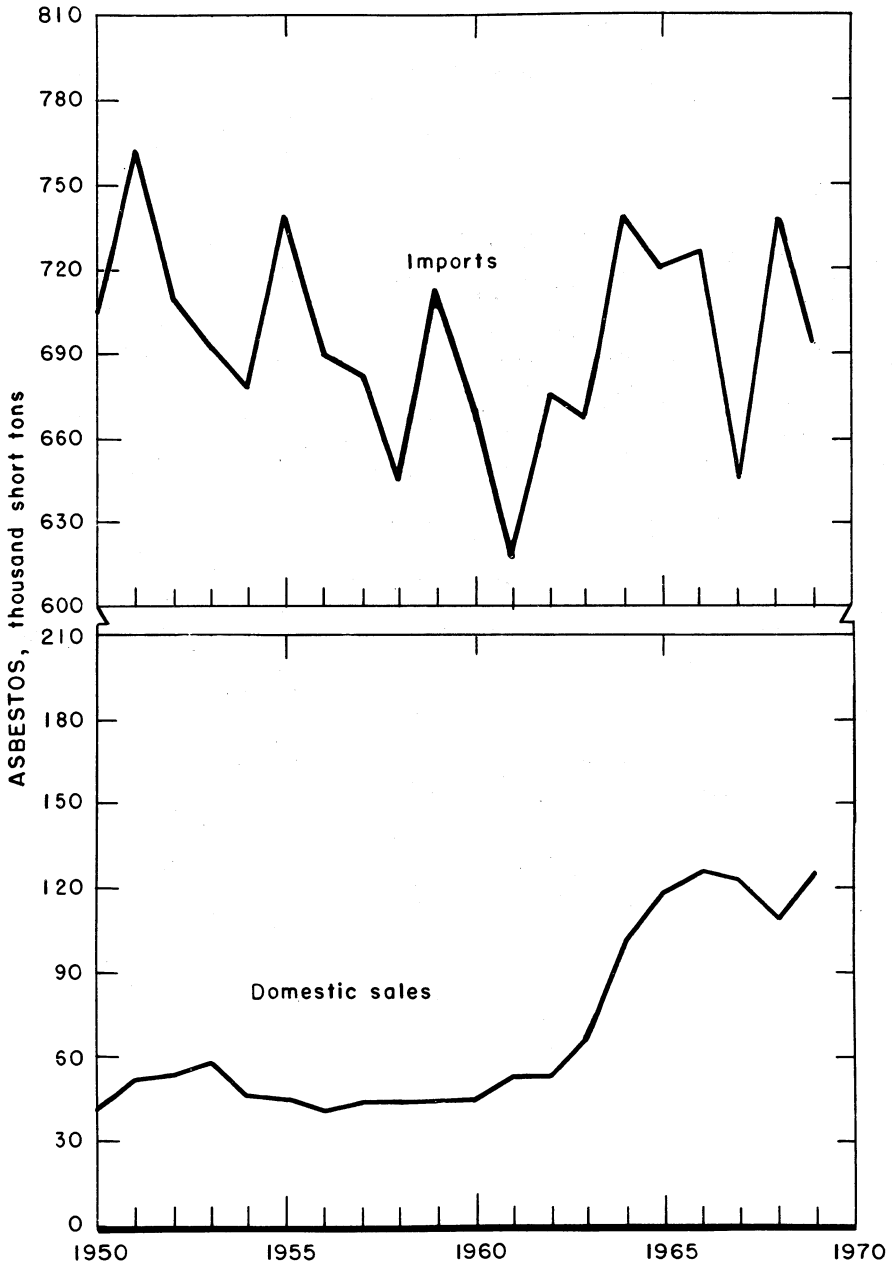


Figure 1.—United States production (sales) and imports of asbestos.

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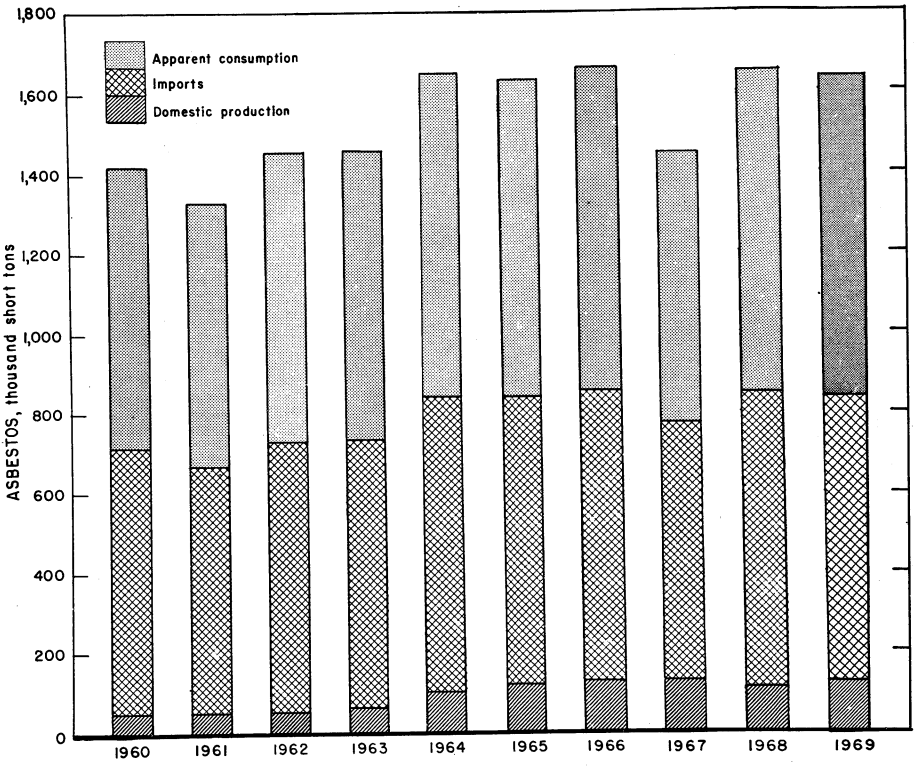


Figure 2.—Domestic supply and consumption of asbestos.

Production in California increased only slightly from 75,592 tons in 1968 to 75,828 tons in 1969; value decreased $183,000. Both quantity and value of output in Vermont rose 9 percent. Production in Arizona increased almost 30 percent. North Carolina reversed a downward trend to gain 18 percent over 1968 production. Nearly all the U.S. production was short fiber, which supplied 16 percent of domestic requirements. Asbestos producers in the U.S. are listed in the following tabulation:

State and company	County	Name of mine	Type of asbestos
Arizona:			
Asbestos Manufacturing Co	Gila	Phillips	Chrysotile.
Jaquays Mining Corp	----do	Chrysotile	Do.
Metate Asbestos Corp	----do	Lucky Seven	Do.
California:			
Atlas Asbestos Corp	Fresno	Santa Cruz	Do.
Coalinga Asbestos Co	----do	Coalinga	Do.
Pacific Asbestos Corp	Calaveras	Pacific Asbestos	Do.
Union Carbide Corp	San Benito	Joe No. 5	Do.
North Carolina:			
Powhatan Mining Co	Yancey	Burnsville	Anthophyllite.
Vermont:			
GAF	Orleans	Lowell	Chrysotile.

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CONSUMPTION AND USES

Direct and indirect uses for asbestos number about 3,000, but most of the consumption is in a few applications. An estimated 70 percent of the world's production of all types of fiber was used in asbestos cement-building materials and asbestos cement pipe.[2] The second largest use was in the floor tile industry, with U.S. consumption estimated at about 200,000 tons. Other significant uses were in the manufacture of brake linings, gaskets, clutch facings, plastics, roofing compounds, electrical and heat insulations, and textiles.

A slowdown in the building and construction industries during 1969 was reflected in a 4-percent drop in apparent consumption from the 1968 level. Chrysotile asbestos accounted for over 96 percent of the total amount consumed in the United States in 1969. Amosite accounted for slightly over 2 percent, and crocidolite accounted for less than 2 percent.

[2] Industrial Minerals (London). No. 28, January 1970, p. 12.

PRICES [3]

Effective January 1, 1969, quoted prices for Vermont, Quebec, and British Columbia asbestos were increased from 4 percent to 12 percent across grades. The increases reportedly were needed to offset higher costs of materials, labor, and equipment. Prices were not published for California chrysotile and North Carolina anthophyllite asbestos.

Quotations for Canadian (Quebec) chrysotile, f.o.b. mine, were as follows, as of January 1, 1969:

Grade	Description	Per short ton
Group No. 1	Crude	Can$1,480
Group No. 2	do	800
Group No. 3	Spinning fiber	385–630
Group No. 4	Shingle fiber	212–360
Group No. 5	Paper fiber	152–180
Group No. 6	Waste, stucco or plaster	110
Group No. 7	Refuse or shorts	50– 92

Prices for British Columbia, Canada, chrysotile asbestos, f.o.b. Vancouver, were as follows, as of January 1, 1969:

Grade	Description	Per short ton
AAA	Nonferrous spinning fiber	Can$845
AA	do	673
A	do	508
AC	Asbestos cement fiber	363
AK	Shingle fiber	249
CP	do	234
AS	do	217
CT	do	211
AX	do	193
CY	do	136
AY	do	136

Prices for Arizona chrysotile asbestos have remained unchanged since August 1, 1968. Quotations, f.o.b. Globe were as follows:

Grade	Description	Per short ton
Group No. 1	Crude	$1,410–1,650
Group No. 2	do	700– 950
AAA		800
Group No. 3	Nonferrous filtering and spinning	425– 700
Group No. 4	Nonferrous plastic and filtering	400– 500
Group No. 5	Plastic and filtering	385– 425
Group No. 6	Refuse or shorts	250
Group No. 7	do	65– 90

As of January 1, 1969, Vermont chrysotile asbestos, f.o.b. Morrisville, was priced as follows:

Grade	Description	Per short ton
Group No. 3	Spinning and filtering	$356–382
Group No. 4	Shingle fiber	195–331
Group No. 5	Paper fiber	141–165
Group No. 6	Waste, stucco or plaster fiber	102
Group No. 7	Shorts and floats	47– 85

Market quotations were unavailable for African asbestos because sales were negotiated privately. The Cape Asbestos group produces nine grades of crocidolite (blue) asbestos and 17 grades of amosite. The following values were calculated from U.S. Department of Commerce import data:

Imports	Per short ton	
	1968	1969
Amosite: South Africa, Republic of	$149	$153
Chrysotile:		
Rhodesia, Southern	184	---
South Africa, Republic of	194	192
Crocidolite: South Africa, Republic of	193	189

[3] Asbestos. V. 51, No. 6, December 1969, p. 56.

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FOREIGN TRADE

U.S. exports of manufactured asbestos products in 1969 increased 15 percent in value over those in 1968. Shipments were made to more than 90 countries. Canada accounted for 35 percent of the total value; West Germany, 7 percent; and Venezuela, Australia, and the United Kingdom each accounted for 4 percent. Canada received 74 percent of reexports of asbestos products; Chile and the United Kingdom accounted for 11 percent each, and Mexico accounted for the remainder. Though imports for consumption of asbestos in 1969 declined almost 6 percent in quantity from the 1968 level, value increased almost $3.5 million. Imports of amosite from the Republic of South Africa in 1969 were almost 29 percent less than the previous year; crocidolite from the same source declined 24 percent. Imports of low-iron spinning length chrysotile from British Columbia increased to 6,192 tons from 6,086 tons in 1968, and imports of all grades from this source increased from 20,943 tons to 28,831 tons during the same period.

Table 3.—U.S. exports and reexports of asbestos and asbestos products

Product	1968		1969	
	Quantity	Value (thousands)	Quantity	Value (thousands)
EXPORTS				
Unmanufactured:				
Crude and spinning fibers---short tons	872	$193	1,419	$314
Nonspinning fibers---do	17,066	2,308	14,407	2,274
Waste and refuse---do	23,279	2,176	18,696	2,038
Total---do	41,217	4,677	34,522	4,626
Products:				
Gaskets and packing---do	2,415	5,895	2,519	6,917
Brake linings---do	4,374	5,724	4,519	6,804
Clutch facings, including linings---number	3,436,934	2,318	3,749,035	2,966
Textiles and yarn---short tons	3,450	1,802	4,402	2,420
Shingles and clapboard---do	10,651	1,944	8,606	1,599
Articles of asbestos cement---do	5,896	1,628	5,120	1,779
Manufactures, n.e.c.	NA	5,193	NA	5,673
Total	------	24,504	------	28,158
REEXPORTS				
Unmanufactured:				
Crude and spinning fibers---short tons	------	------	589	122
Nonspinning fibers---do	19	2	1,062	231
Total---do	19	2	1,651	353
Products:				
Gaskets and packing---do	3	1	3	4
Brake linings---do	(1)	1	------	------
Clutch facings, including linings---number	------	------	2,281	2
Shingles and clapboard---short tons	47	9	72	14
Articles of asbestos cement---do	42	3	------	------
Manufactures, n.e.c.	NA	9	NA	5
Total	------	23	------	25

NA Not available.
[1] Less than ½ unit.

No asbestos was received from Southern Rhodesia in 1969, having been embargoed by Presidential order dated January 5, 1967. The small quantities received through 1968 probably were entered from bonded warehouses or shipped from stocks in other countries which were exported from Southern Rhodesia prior to December 1966.

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Table 4.—U.S. imports for consumption of asbestos (unmanufactured), by classes and countries

Year and country	Crude (including blue fiber)		Textile fiber		All other		Total	
	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)
1968								
Bolivia	1	$2	------	------	3	$3	4	$5
Canada	57	32	15,318	$5,869	674,008	59,450	689,383	65,351
Cyprus	16	3	------	------	------	------	16	3
Finland	578	32	110	6	3,774	219	4,462	257
France	------	------	------	------	30	4	30	4
Italy	2	1	------	------	3	3	5	4
Mozambique	150	20	------	------	742	165	892	185
Panama	------	------	------	------	54	3	54	3
Portugal	------	------	------	------	24	2	24	2
Rhodesia, Southern	85	16	------	------	2,734	504	2,819	520
South Africa, Republic of	37,249	6,260	5	1	1,233	274	38,487	6,535
Southern Africa, n.e.c.	80	16	------	------	------	------	80	16
Yugoslavia	------	------	1,653	45	------	------	1,653	45
Total	38,218	6,382	17,086	5,921	682,605	60,627	737,909	72,930
1969								
Angola	------	------	------	------	62	5	62	5
Canada	2,851	393	15,974	5,928	636,606	64,438	655,431	70,759
Finland	1,277	61	------	------	4,958	280	6,235	341
France	30	4	------	------	------	------	30	4
Italy	1	(1)	------	------	1	2	2	2
Malta and Gozo	------	------	------	------	1	2	1	2
Mozambique	55	8	------	------	217	18	272	26
Portugal	20	1	------	------	395	35	415	36
South Africa, Republic of	28,026	4,774	------	------	1,664	321	29,690	5,095
Southern Africa, n.e.c.	245	48	------	------	------	------	245	48
United Kingdom	31	5	------	------	265	11	296	16
Yugoslavia	280	9	------	------	1,599	79	1,879	88
Total	32,816	5,303	15,974	5,928	645,768	65,191	694,558	76,422

[1] Less than ½ unit.

Table 5.—U.S. imports for consumption of asbestos from specified countries, by grades

(Short tons)

Grade	1968			1969	
	Canada	Southern Rhodesia	Republic of South Africa	Canada	Republic of South Africa
Chrysotile					
Crudes	57	85	2,817	2,851	2,850
Spinning fibers	15,318	-----	5	15,974	-----
All other	674,008	2,734	1,233	636,606	1,664
Crocidolite (blue)	-------	-----	13,965	-------	10,558
Amosite	-------	-----	20,467	-------	14,618
Total	689,383	2,819	38,487	655,431	29,690

WORLD REVIEW

Australia.—Australian asbestos output has been less than 1,000 tons annually since the cessation of crocidolite production at Wittenoom, Western Australia at the end of 1966. However, Pacific Asbestos Ltd., plans a mining and milling operation at the company's property near Barraba, New South Wales to produce 65,000 tons of short-fiber chrysotile annually.[4] Mining was to be by open pit methods.

[4] Industrial Minerals. No. 28, January 1970, p. 29.

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Table 6.—World production of asbestos, by countries

(Short tons)

Country [1]	1967	1968	1969 [p]
North America:			
Canada (sales)	1,452,104	1,509,697	1,576,874
United States (sold or used by producers)	123,189	120,690	125,936
South America:			
Argentina	551	381	NA
Brazil [2]	[r] 2,487	4,806	NA
Europe:			
Bulgaria	[r] 1,653	[e] 1,653	[e] 1,653
Finland [3]	11,601	14,484	[e] 15,432
France	165	---	---
Italy	111,402	114,020	[e] 111,333
Portugal	57	112	[e] 55
U.S.S.R. [e]	847,676	881,848	1,102,310
Yugoslavia	9,944	11,456	12,634
Africa:			
Kenya	56	---	NA
Mozambique	559	132	NA
Rhodesia, Southern	[e] 107,255	[e] 94,799	NA
South Africa, Republic of	268,482	260,530	[e] 281,089
Swaziland	40,154	42,946	NA
United Arab Republic	2,135	2,868	NA
Asia:			
China, mainland [e]	165,000	165,000	176,000
Cyprus	[r] 21,782	21,293	21,385
India	[r] 7,732	9,992	[e] 11,023
Japan	27,037	24,251	[e] 12,677
Korea, South	2,388	3,650	NA
Philippines	64	35	49
Taiwan	631	1,323	3,396
Turkey	2,421	3,509	[e] 3,748
Oceania: Australia	734	895	[e] 816
Total [4]	[r] 3,207,259	3,290,370	NA

[e] Estimate. [p] Preliminary. [r] Revised. NA Not available.
[1] Negligible quantities also produced in Bolivia, Czechoslovakia, Eritrea, Malagasy, North Korea, and Rumania.
[2] Bahia and Goias only for 1967, Goias only for 1968.
[3] Includes asbestos flour.
[4] Total is of listed figures only.

Table 7.—Canada: Shipments [1] of asbestos, by grades

(Short tons)

Grade	1965	1966	1967	1968	1969
Quebec, milled group:					
3 (spinning) [2]	21,356	28,716	25,391	32,248	29,291
4 (shingle)	322,772	371,837	336,568	335,807	326,146
5 (paper)	168,759	190,278	185,450	193,446	204,208
6 (stucco)	208,682	229,426	244,021	255,648	242,126
7 (refuse)	506,497	512,030	490,087	542,124	539,413
8 (sand)	6,088	8,706	7,149	3,037	2,023
Newfoundland, Ontario, and British Columbia	153,401	138,288	154,345	147,389	233,669
Total	1,387,555	1,479,281	1,443,011	1,509,699	1,576,876

[1] Includes tonnage for own use.
[2] Includes crude No. 1, No. 2, and other.

Source: Dominion Bureau of Statistics.

Canada.—Production as measured by sales increased 4 percent to 1,576,874 tons in 1969.

At Thetford Mines, Quebec, Asbestos Corporation Ltd. continued development of the Penhale orebody on the company's Vimy Ridge property. Shaft sinking, begun in 1968, reached a depth of 600 feet by the end of 1969. At the King-Beaver mine, a new ore preparation and storage plant was completed in December at a cost of Can$2.5 million. The company also announced that ore reserves at yearend were as follows:[5]

[5] Asbestos Corporation Ltd. Annual Report. Montreal, 1969, p. 3.

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Mine	Thousand short tons
King-Beaver Mine	41,662
British Canadian Mine	63,645
Normandie Mine	9,906
Asbestos Hill	18,738
Other Properties	10,611
Total	144,562

Drilling by Abitibi Asbestos Mining Ltd. on property in Maizerets Township in Quebec has indicated an estimated 102.8 million tons of ore containing medium length chrysotile fiber. Survey work, bulk sampling tests, and feasibility studies were still in progress at yearend, but an annual output of 75,000 tons of fiber is envisaged.[6]

Cassiar Asbestos Corp. Ltd. announced plans to expand mill capacity at its Cassiar, British Columbia, mine from 75,000 tons of fiber annually to 100,000 tons. Total cost for the one-third increase in capacity was estimated at Can$4.3 million; completion was scheduled for December 1970.[7]

At the Canadian Johns-Manville Co. Ltd. Jeffrey open pit mine at Asbestos, Quebec, capacity is being expanded from 600,000 to 700,000 tons of fiber annually with completion scheduled next year. The company also increased output at its Reeves mine in Ontario. Underground exploration of an asbestos prospect located in Garrison Township, about 25 miles east of Matheson, northern Ontario, also was conducted by the company.[8]

Greece.—A tentative agreement between Cerro Corporation of New York and Hellenic Asbestos, S.A., an operating company of Hellenic Industrial Development Bank (HIDB), was announced for development of the latter's asbestos mines at Zidani Kozanis. If further studies indicate economic feasibility, the mines would be put into production through establishment of a 40,000-ton-per-year capacity fiber plant. Total cost of the project was placed at $15 million, of which Cerro Corp. was to contribute $5.8 million, the balance made available by HIDB. Exploration, studies, and equipping of an existing small pilot plant for asbestos processing were to be completed in 1970.[9]

Mexico.—A deposit of an estimated 1.2 million tons of recoverable chrysotile asbestos fiber was discovered near Ciudad Victoria, Tamaulipas. A new company to be known as Cia. Nacional de Asbestos has been established to develop the orebody. The Federal government was to have a 51-percent share in the company, and private interests will own the remaining 49 percent. A 300-ton-per-day plant was scheduled to begin operation in early 1971. Mexico currently has no domestic production of asbestos, and imports—primarily from Canada and the United States—average about 30,000 short tons annually. However, completion of the Cia. Nacional de Asbestos project would result in Mexico's first production of short fiber chrysotile asbestos and could reduce imports by one-third.[10]

Another deposit of asbestos-bearing rock was discovered during routine exploration by Freemex S.A., a wholly owned subsidiary of Freeport Sulphur Co., and Cía. Metalúrgica Peñoles. The deposit reportedly ranges in thickness from 93 to 385 feet and contains substantial tonnages of commercial material.[11]

South Africa, Republic of.—The Republic of South Africa again ranked third among the asbestos-producing countries of the world, with an estimated output of 281,000 short tons. Cape Province crocidolite comprised approximately 50 percent of the output; amosite, one-third; chrysotile, about 15 percent; the remainder, Transvaal Blue from the Northern Transvaal.

Construction of the Msauli Asbestos Ltd. milling plant near Barberton, Eastern Transvaal, was completed the latter part of the year. The $6 million complex will increase production capacity to 50,000 tons of fiber annually, 75 percent of which will be exported via the port of Lourenço Marques. The new mill can treat approximately 1,000 tons per day on a two-shift basis. Crude ore is obtained from the largest chrysotile mine in South Africa. An article describing the operation was published.[12] Late in the year, Valley Asbestos (Pty.) Ltd. located a deposit of anthophyllite in the Northern Transvaal, and was

[6] Industrial Minerals (London). No. 28, January 1970, p. 21.
[7] Cassiar Asbestos Corporation Ltd. Annual Report. Toronto, 1969, p. 12.
[8] Mining Journal (London). V. 274, No. 7014, Jan. 23, 1970, p. 73.
[9] U.S. Embassy, Athens. State Department Airgram A–55, Feb. 11, 1970.
[10] Mining Magazine (London). V. 121, No. 6, December 1969, p. 495.
[11] Industrial Minerals (London). No. 26, September 1969, p. 52.
[12] Mining and Minerals Engineering. Asbestos in South Africa. V. 5, No. 2, February 1969, pp. 45–49.

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conducting drilling operations there at year-end.[13]

Swaziland.—Although 1969 data are not available, production continued from the Havelock mine, Swaziland's sole producer. London Rhodesian Mining & Land Co. Ltd. (Lonrho) conducted exploration on an asbestos property at Emlembe, adjacent to Turner & Newall's Havelock mine.[14]

U.S.S.R.—The U.S.S.R. continued to be one of the world's leading asbestos suppliers with an estimated output of 1.1 million short tons, 25 percent more than in 1968. The No. 6 plant at the Urals asbestos complex was completed.[15] The plant, which has a rated annual capacity of 12 million tons, will process low-grade material produced mainly as a by-product of other operations capable of utilizing only higher-grade ore.

Exports in 1968 totaled 334,660 tons, an increase of 6 percent over the 314,380 tons reported for the previous year. Principal markets were Eastern Europe, France, Germany (East and West), and Japan. The bulk of the Soviet production, however, was retained for domestic use in manufacturing a variety of asbestos products.

Over 85 percent of the total Soviet reserves are in the Urals and Kazakhstan, and the remainder mostly in Eastern Siberia.

TECHNOLOGY

Technological advances in 1969 related mainly to development of new asbestos products and uses. A new aluminized asbestos cloth having an extremely high reflectivity and good wear properties became available for the production of fire resistant clothing. The use of asbestos in building products and plastics continued to expand. Research-based development of asbestos products was discussed.[16]

Medical research on the effects of asbestos on human health continued in 1969. The outcome of current endeavors to solve the problems of air, water, and soil pollution will have great impact on workers in the mining, manufacturing, and construction industries as well as the general public. Dust control and respiratory equipment from many companies were described.[17]

Two types of containers designed to provide dust-free mixing of asbestos insulating cement were submitted to Insulation Industry Hygiene Research Program (IIHRP), and field testing of them started in September. Both containers are waterproof plastic bags in which the materials will be packaged at the factory. Both provide means for introducing water into the bag and mixing the cement to the desired consistency before opening the bag. The bags differ mainly in the manner in which water is introduced. They will be tested to determine optimum bag size and worker acceptability.[18]

A first-year grant of $53,818 was made by the U.S. Department of Health, Education and Welfare to Dr. Ross W. Smith, associate professor of metallurgy, Mackay School of Mines, University of Nevada, for a study of the aqueous surface chemistry of asbestos minerals.[19] The significance of the study is its possible use in medical research on the known hazards of various species of asbestos on human health. The Mackay study was to continue through August 1972.

[13] U.S. Embassy, Johannesburg. State Department Airgram A–186, Dec. 9, 1969.
[14] Asbestos. V. 51, No. 6, December 1969, p. 24.
[15] Mining Journal (London). V. 274, No. 7011, Jan. 2, 1970, p. 11.
[16] The South African Mining and Engineering Journal. V. 81, No. 4013, Pt. 1, Jan. 2, 1970, pp. 9–10, 13–15.
[17] Asbestos. V. 51, No. 6, December 1969, pp. 14, 16, 18.
[18] Asbestos. V. 51, No. 4, October 1969, p. 16.
[19] Skillings' Mining Review. V. 58, No. 50, Dec. 13, 1969, p. 28.

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