Asbestos

By Paul W. Icke [1]

The demand for asbestos increased in 1968 primarily as a result of a rise in construction activity and automobile production. Despite the increased demand in these two important sectors, U.S. production (shipments) of asbestos declined 2 percent. However, a 14-percent increase in imports covered rising U.S. requirements. Canada, the largest producer, increased output (sales) by 10 percent over that of 1967.

Legislation and Government Programs.—The General Services Administration (GSA) in 1968 disposed of 1,250 short tons of amosite, 189 tons of crocidolite, and 1,242 tons of domestic chrysotile from government inventories.

[1] Physical scientist, Division of Mineral Studies.

Table 1.—Salient asbestos statistics

	1964	1965	1966	1967	1968
United States:					
Production (sales)—short tons	101,092	118,275	125,928	123,189	120,690
Value—thousands	$8,143	$10,162	$11,056	$11,102	$10,406
Exports and reexports (unmanufactured) short tons	27,147	43,126	46,996	47,718	41,236
Value—thousands	$3,199	$5,294	$5,763	$6,025	$4,679
Exports and reexports of asbestos products (value)—thousands	$16,288	$19,139	$21,963	$23,767	$24,527
Imports for consumption (unmanufactured) short tons	739,361	719,559	726,459	645,112	737,909
Value—thousands	$72,973	$70,457	$73,100	$65,743	$72,930
Consumption, apparent [1]—short tons	813,306	794,708	805,391	720,583	817,363
World: Production—do	3,050,900	3,101,994	3,275,262	3,094,784	NA

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

Table 2.—Stockpile objective and Government inventories as of December 31, 1968

(Short tons)

Mineral	Stockpile objective	Inventories			
		National	Supplemental	Defense Production Act	Total
Amosite	40,000	11,705	53,606	--------	65,311
Chrysotile	13,700	6,080	4,383	--------	10,463
Subspecification	--------	152	3,193	1,536	4,881
Crocidolite	--------	1,565	46,507	--------	48,072

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DOMESTIC PRODUCTION

Asbestos production in the United States in 1968 declined 2 percent in volume and 6 percent in value. Production in California decreased from 77,091 tons in 1967 to 75,592 tons in 1968, and the value dropped by $587,000. Output in Arizona increased 34 percent, while production in Vermont decreased almost 5 percent. North Carolina, the smallest producer, continued its downward trend with a decrease of 20 percent from the previous year's production.

Practically all U.S. production was short fiber, which supplied approximately 14 percent of domestic requirements. U.S. producers 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 Minerals Corp	Fresno	Santa Cruz	Do.
Coalinga Asbestos Co	do	Coalinga	Do.
Pacific Asbestos Corp [1]	Calaveras	Pacific Asbestos	Do.
Union Carbide Corp	San Benito	Joe No. 5	Do.
North Carolina:			
Powhatan Mining Co	Yancey	Burnsville	Anthophyllite.
Vermont:			
General Aniline & Film Corp. (The Ruberoid Division).	Orleans	Lowell	Chrysotile.

[1] Acquired by H. K. Porter Co. Inc. during 1968.

The U.S. Geological Survey discovered a chrysotile asbestos deposit in the Yukon-Tanana Upland near Eagle, Alaska. It is located some 55 miles northwest of the Cassair Clinton mine in Yukon Territory, Canada.[2]

CONSUMPTION AND USES

The commercial utility of asbestos was originally based on the heat resistance characteristics of the fibrous mineral for use in packings. Its current utility is based more on its ability as a reinforcing binder in such products as portland cement, rubber, and plastics. The asbestos cement industry was the largest consumer, requiring an estimated 50 percent of the world's asbestos production. The second largest use was in the floor tile industry, with an estimated U.S. consumption of 200,000 tons. Other important uses were in the manufacture of brake linings, millboard products, gaskets, clutch facings, electrical and heat insulations, and textiles. Chrysotile asbestos accounted for 96 percent of the total amount consumed in the United States in 1968, crocidolite accounted for slightly less than 2 percent, and amosite accounted for slightly over 2 percent.

[2] Foster, H. L. Asbestos Occurrence in the Eagle C–4 Quadrangle, Alaska. U.S. Geol. Survey Circ. 611, 1969, 7 pp.

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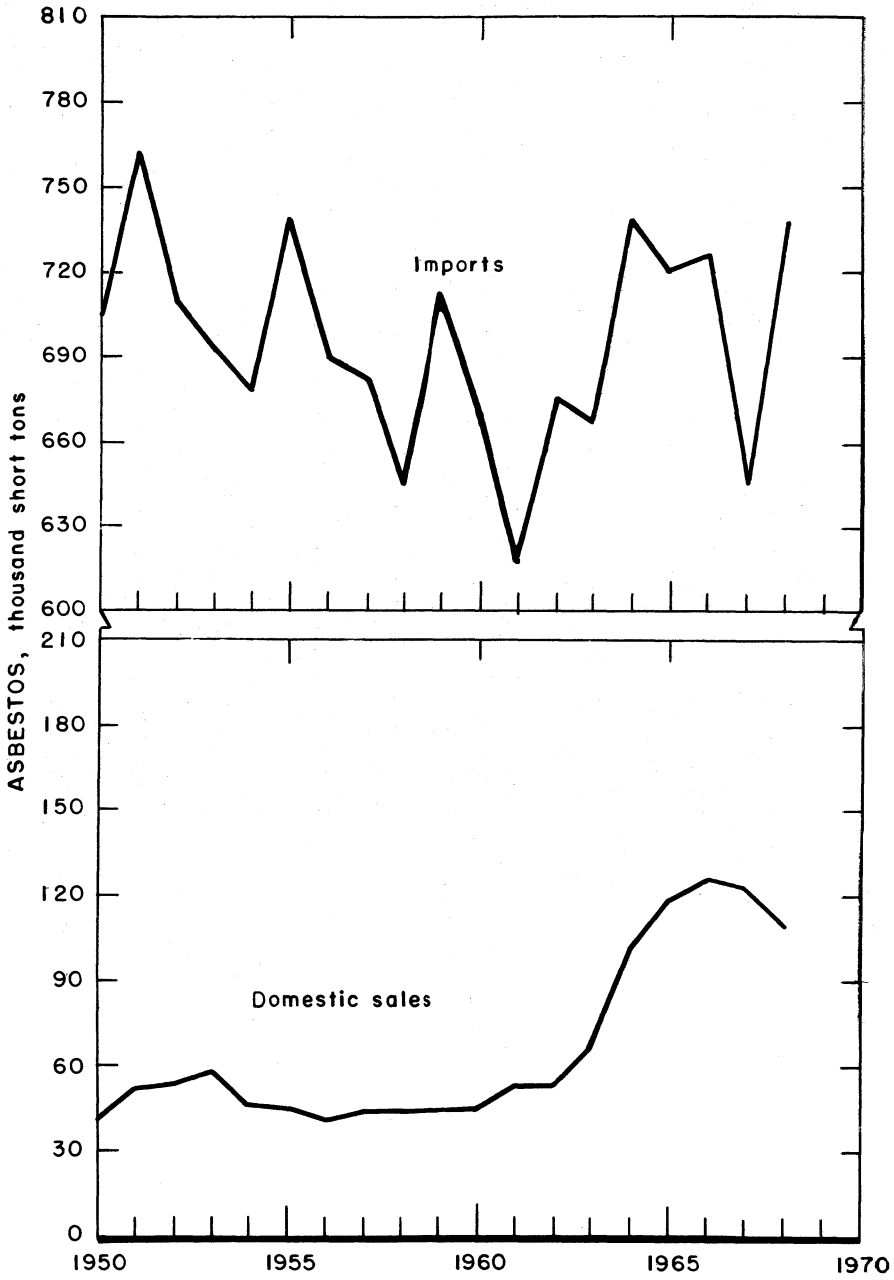


Figure 1.—United States production (sales) and imports of asbestos.

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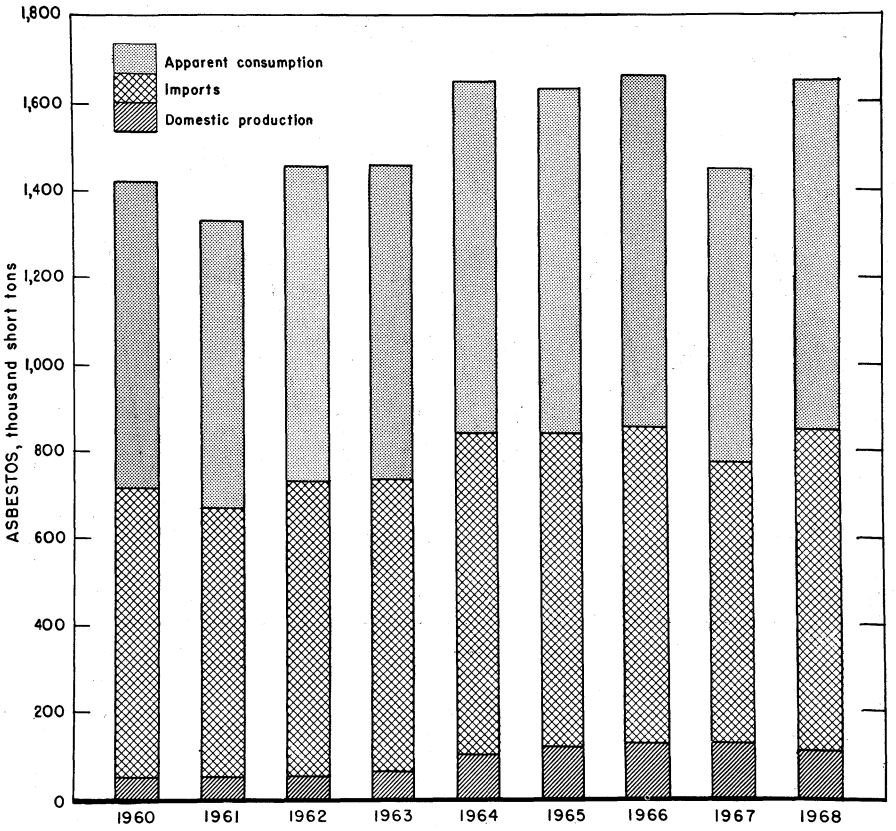


Figure 2.—Domestic supply and consumption of asbestos.

PRICES [3]

Prices for Vermont, Arizona, and Quebec asbestos increased in mid-1968 from 2 to 5 percent on the high-volume grades. No increase was posted, however, for British Columbia asbestos. Prices for California chrysotile and North Carolina anthophyllite were not published.

[3] Asbestos. V. 50, No. 5, November 1968, p. 50.

Quotations for Canadian (Quebec) chrysolite f.o.b. mine, were as follows:

Grade	Description	Per short ton	
		Mar. 31, 1968	Apr. 1, 1968
Group No. 1	Crude	Can$1,410	Can$1,410
Group No. 2	----do	760	760
Group No. 3	Spinning fiber	360–588	367–600
Group No. 4	Shingle fiber	198–335	201–341
Group No. 5	Paper fiber	140–165	143–169
Group No. 6	Waste, stucco	101	104
Group No. 7	Refuse or shorts	47– 85	45– 87

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Prices for British Columbia, Canada, chrysolite asbestos, f.o.b. Vancouver, were as follows, as of January 1, 1968:

Grade	Description	Per short ton
AAA	Nonferrous spinning fiber	Can$810
AA	----do	643
A	----do	484
AC	Asbestos cement fiber	345
AK	Shingle fiber	241
CP	----do	220
AS	----do	200
CT	----do	195
AX	----do	177
CY	----do	126
AY	----do	126

Prices for Arizona chrysotile asbestos were increased on August 1, 1968, the first price increase since July 10, 1964. Quotations, f.o.b. Globe, were listed as follows:

Grade	Description	Per short ton	
		July 31, 1968	Aug. 1, 1968
Group No. 1	Crude	$1410–1650	$1410–1650
Group No. 2	----do	610– 900	700– 950
AAA		800	800
Group No. 3	Nonferrous filtering and spinning	425– 750	425– 700
Group No. 4	Nonferrous plastic and filtering	385– 500	400– 500
Group No. 5	Plastic and filtering	250– 400	385– 425
Group No. 6	Refuse or shorts	----------	250
Group No. 7	----do	58– 90	65– 90

Prices for Vermont chrysotile asbestos, f.o.b. Morrisville, were as follows:

Grade	Description	Per short ton	
		July 31, 1968	Aug. 1, 1968
Group No. 3	Spinning and filtering	$319–342	$319–342
Group No. 4	Shingle fiber	183–296	186–296
Group No. 5	Paper fiber	129–153	132–156
Group No. 6	Waste, stucco or plaster fiber	93	96
Group No. 7	Shorts and floats	40.50– 75	44.50– 80
Group No. 8	Shorts	----------	26.50

Market quotations were unavailable for African and Australian asbestos because sales were negotiated privately. The following values were calculated from U.S. Department of Commerce import data:

Imports	Per short ton	
	1967	1968
Amosite: South Africa, Republic of	$152	$149
Chrysotile:		
Rhodesia, Southern	160	184
South Africa, Republic of	187	194
Crocidolite: South Africa, Republic of	191	193

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FOREIGN TRADE

U.S. exports of manufactured asbestos products in 1968 increased 3 percent over those in 1967. Canada, West Germany, and Venezuela accounted for 36, 9, and 4 percent, respectively. Of reexports, Canada and the United Kingdom received 74 and 26 percent, respectively.

In 1968 total imports for consumption of asbestos were 14 percent greater than those in 1967. Imports of amosite from the Republic of South Africa increased 63 percent, while crocidolite from the same source decreased 6 percent. Low-iron, spinning-length, chrysotile imports from British Columbia decreased to 6,086 tons from 6,252 tons in 1967, and imports of all grades from this source decreased 14 percent.

Although embargoed by Presidential order, dated Jan. 5, 1967, declining quantities of asbestos continued to be received from Southern Rhodesia. This material probably was entered from bonded warehouses or shipped from stocks in other countries which were exported from Southern Rhodesia prior to December 1966.

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

Product	1967		1968	
	Quantity	Value (thousands)	Quantity	Value (thousands)
EXPORTS				
Unmanufactured:				
Crude and spinning fibers---short tons	860	$238	872	$193
Nonspinning fibers---do	26,603	4,021	17,066	2,308
Waste and refuse---do	19,893	1,692	23,279	2,176
Total---do	47,356	5,951	41,217	4,677
Products:				
Gaskets and packing---do	2,326	5,253	2,415	5,895
Brake linings---do	4,249	5,819	4,374	5,724
Clutch facings, including linings---number	2,765,868	2,328	3,436,934	2,318
Textiles and yarn---short tons	2,215	1,790	3,450	1,802
Shingles and clapboard---do	10,729	1,996	10,651	1,944
Articles of asbestos cement---do	11,020	2,159	5,896	1,628
Manufactures, n.e.c	NA	4,358	NA	5,193
Total		23,703		24,504
REEXPORTS				
Unmanufactured:				
Crude and spinning fibers---short tons	256	52		
Nonspinning fibers---do	106	22	19	2
Total---do	362	74	19	2
Products:				
Gaskets and packing---do			3	1
Brake linings---do	(1)	1	(1)	1
Clutch facings, including linings---number	6,800	5		
Shingles and clapboard---short tons	85	16	47	9
Articles of asbestos cement---do			42	3
Manufactures, n.e.c	NA	42	NA	9
Total		64		23

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

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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)
1967								
Bolivia	------	------	------	------	3	$3	3	$3
Canada	6,966	$1,246	15,063	$5,745	579,953	52,174	601,982	59,165
Finland	662	26	------	------	2,585	166	3,247	192
France	15	2	------	------	------	------	15	2
Italy	1	1	------	------	6	7	7	8
Mozambique	250	32	------	------	------	------	250	32
Portugal	------	------	------	------	59	6	59	6
Rhodesia, Southern	420	68	75	26	4,956	775	5,451	869
South Africa, Republic of	29,318	5,081	17	3	1,280	255	30,615	5,339
Yugoslavia	------	------	827	30	2,656	97	3,483	127
Total	37,632	6,456	15,982	5,804	591,498	53,483	645,112	65,743
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

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

(Short tons)

Grade	1967			1968		
	Canada	Southern Rhodesia	Republic of South Africa	Canada	Southern Rhodesia	Republic of South Africa
Chrysotile:						
Crudes	6,966	420	1,843	57	85	2,817
Spinning and textile	15,063	75	17	15,318	------	5
All other	579,953	4,956	1,280	674,008	2,734	1,233
Crocidolite (blue)	------	------	14,917	------	------	13,965
Amosite	------	------	12,558	------	------	20,467
Total	601,982	5,451	30,615	689,383	2,819	38,487

WORLD REVIEW

Australia.—Production of chrysotile asbestos in 1968 was 895 tons, up 22 percent from the 734 tons of 1967. Imports in 1967 included 39,752 tons of chrysotile, almost wholly from Canada, and 10,345 tons of amosite, 96 percent from Republic of South Africa. Total imports equaled 52,584 tons.

Canada.—Production as measured by sales rebounded from the setback in 1967, increasing 10 percent to 1,596,011 tons in 1968. Exports increased 9 percent to 1,459,650, with a rise in value of almost 12 percent to Can$192,895,000.

The Asbestos Corporation Ltd. began sinking a 1,645-foot exploration shaft into the Penhale ore body on the company's Vimy Ridge property, 5 miles southwest of Thetford Mines, Quebec. This $2.5 million project is to confirm drill-indicated reserves in a program due for completion in

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late 1971.[4] A drift will also be driven laterally into the ore body at the 1,120-foot level. If results warrant it, the shaft and the drift will be incorporated into a new underground mine, estimated to cost an additional $5.25 million to bring into production. If the plans are realized, the mine will be the largest underground asbestos mine in the world, with a production capacity of 8,200 tons per day.

[4] Mining in Canada (Winnipeg). January 1969, p. 35.

Table 6.—World production of asbestos, by countries

(Short tons)

Country [1]	1964	1965	1966	1967	1968 [p]
North America:					
Canada (sales)	1,419,851	1,388,212	[r] 1,489,055	1,452,104	1,596,011
United States (sold or used by producers)	101,092	118,275	125,928	123,189	120,690
South America:					
Argentina	542	243	53	[p] 201	NA
Brazil [2]	[e] 1,430	1,204	1,820	1,393	NA
Europe:					
Bulgaria	1,433	1,433	[e] 1,430	[e] 1,984	[e] 1,984
Finland [3]	11,611	13,307	13,250	11,601	[e] 13,228
France	24,289	11,179	331	165	----
Italy	[r] 75,570	[r] 79,287	[r] 90,748	111,402	[e] 116,845
Portugal	----	53	11	57	[e] 28
U.S.S.R.	810,000	[r e] 821,221	[r e] 832,244	[e] 847,676	881,848
Yugoslavia	9,280	10,585	8,411	9,944	[e] 11,023
Africa:					
Botswana	2,161	888	----	----	----
Kenya	204	136	73	56	NA
Mozambique	----	[r] 88	535	559	NA
Rhodesia, Southern	153,450	176,149	[e] 176,370	NA	NA
South Africa, Republic of	215,592	240,752	276,597	268,482	260,530
Swaziland	39,862	40,884	36,142	40,154	42,946
United Arab Republic	1,739	3,225	[4] 2,057	NA	NA
Asia:					
China, mainland [e]	130,000	140,000	150,000	165,000	165,000
Cyprus	13,755	17,622	24,449	19,447	[e] 23,038
India	3,710	5,264	7,646	8,095	NA
Japan	17,979	16,451	21,428	27,037	[e] 27,558
Korea, South	1,402	1,710	687	2,388	3,650
Philippines	586	----	551	64	NA
Taiwan	526	883	721	631	1,323
Turkey	1,291	1,376	[r] 1,258	2,421	3,183
Oceania: Australia	13,545	11,567	13,467	734	895
Total [5]	[r] 3,050,900	[r] 3,101,994	[r] 3,275,262	[r] 3,094,784	NA

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

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

(Short tons)

Grade	1964	1965	1966	1967	1968
Quebec, milled group:					
3 (spinning) [2]	31,594	21,356	28,716	25,391	32,248
4 (shingle)	319,629	322,772	371,837	336,568	335,807
5 (paper)	188,672	168,759	190,278	185,450	193,446
6 (stucco)	232,382	208,682	229,426	244,021	255,648
7 (refuse)	507,003	506,497	512,030	490,087	542,124
8 (sand)	5,602	6,088	8,706	7,149	3,037
Newfoundland, Ontario, and British Columbia	135,887	153,401	138,288	154,345	147,389
Total [3]	1,420,769	1,387,555	1,479,281	1,443,011	1,509,699

[1] Includes tonnage for own use.
[2] Includes crude No. 1, 2, and other.
[3] Data may not add to totals shown because of independent rounding.
Source: Dominion Bureau of Statistics.

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The highly mechanized operation would use rubber-tired, diesel-powered, load-haul-dump vehicles to take ore to an underground crusher. A load-haul-dump unit is now on trial at one of the company's existing underground mines.[5]

The Asbestos Corporation Ltd. announced that construction has commenced at the King-Beaver mine on a new ore preparation plant costing $2.5 million.[6] This new facility, scheduled for operation by September 1, 1969, will process all King-Beaver's open-pit ore. Concurrently, a new underground crushing station at the King-Beaver No. 3 shaft was being built to handle all the ore from underground operations and is expected to be completed in May 1969. This will consolidate the two separate underground operations, and all ore will be hoisted through No. 3 shaft.

The corporation also announced that reserves at yearend were as follows:[7]

	Thousand short tons
King-Beaver mine	44,655
British Canadian mine	68,285
Normandie mine	11,622
Asbestos Hill	18,738
Other properties	10,611
Total	153,911

During 1968 Hedman Mines Ltd. continued construction on its new mill near Matheson, Ontario.[8] The mill will have an ore-crushing capacity of 600 tons per day and an initial fiberizing capacity of 300 tons per day. Stripping operations begun in 1967 have exposed enough ore in the initial pit to last 4 years. Meanwhile, the company continued pilot plant tests in which fiber output was up to 500 tons per month.

During 1968 the Cassiar Asbestos Corporation Ltd.'s Clinton mine in the Yukon Territory commenced operation. Shipments for the year totaled 53,749 tons, with the United States, the United Kingdom, and Australia as the principal recipients.

Greece.—The Hellenic Industrial Development Bank (HIDB) planned to reopen the asbestos mine at Zidani Kozanis in northeastern Greece, where recent prospecting has shown the existence of 15 million tons of chrysotile-bearing ore.[9] HIDB plans an open-pit mine and mill at Kozani with the capacity to produce 600,000 tons of ore annually. The target for production of finished fiber has been set at 25,000 tons.

Italy.—Italy's only asbestos producer, the Balangero mine near Turin, has been expanded and modernized at a cost of 400 million lire.[10] The mine, operated by Societá Amiantifera di Balangero of Milan, is now fully mechanized; excavation of the serpentine ore and primary crushing are done in a mobile plant capable of handling 500 short tons per hour. Throughput of ore could be as high as 2.2 million tons and it will enable Amiantifera di Balangero, which markets short fiber chrysotile asbestos, to maintain output at about 100,000 tons of fiber per year. The company, a successor to Anonima Cave di San Vittore set up in 1918, is capitalized at 600 million lire and is associated with Eternit SpA, a major manufacturer of asbestos cement products. About one-third of the production in recent years has been exported. Reserves of ore at the open-pit mine, which employs 280, are estimated to be 70 million tons.

South Africa, Republic of.—Asbestos production totaled 260,530 tons, a decrease of 7,952 tons, or 3 percent from that of 1967. Amosite production rose 2 percent, chrysotile rose about 16 percent, and crocidolite dropped 10 percent. Exports totaled 262,158 tons valued at 28,727,376 rands.

Swaziland.—Chrysotile asbestos production from the Havelock mine, Swaziland's sole producer, increased 7 percent over that of 1967. The King of Swaziland granted prospecting rights to the London-Rhodesian Mining and Land Co. Ltd. in an area adjacent to the Havelock property, which may lead to the opening of a second mine.[11]

U.S.S.R.—Total production of six grades of asbestos in 1968 was estimated at 881,848 short tons. Asbestos exports rose from 283,070 tons in 1966 to 314,380 in 1967. Data released by the All-Union Building

[5] Work cited in footnote 4.
[6] Asbestos Corporation Ltd. Annual Report. Montreal, 1968, p. 3.
[7] Work cited in footnote 6.
[8] Mining Journal (London). V. 270, No. 6925, May 10, 1968, p. 383.
[9] Industrial Minerals (London). No. 14, November 1968, p. 31.
[10] Industrial Minerals (London). No. 8, May 1968, p. 24.
[11] Mining & Engineering Journal (Johannesburg). V. 79, No. 3952, Pt. 2, Nov. 1, 1968, p. 1031.

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Material Institute indicated that about 50 percent of the mine waste was used in aggregates, and the rest was relegated to dumps.

In 1967 and 1968 East European countries increased their imports from Canada which prompted the Soviet journal Foreign Trade to charge the Canadian industry with price manipulation and with the granting of confidential discounts on the listed prices in signing long-term contracts.[12]

TECHNOLOGY

Technological advances in 1968 related more to new products and applications than to developments in mining and milling. Union Carbide Corp. developed a process for shearing asbestos to obtain a high degree of fiber separation.[13] The product is then pelletized to provide an improved material for use in drilling muds.

Improved characteristics of thermoplastics resulted from the use of asbestos additives.[14] It was reported that such additions increase strength, rigidity, gloss and heat stability of various plastic products.

Medical research on the effects of asbestos on human health continued during 1968.

In October, the Nation's first cooperative effort by labor, industry, science, and Government to conduct a health research program for industrial workers was inaugurated at Mount Sinai School of Medicine, City University of New York.[15] Dr. Irving J. Selikoff, Director of Mount Sinai's Environmental Sciences Laboratory, will direct the new activity, known as the Insulation Industry Hygiene Research Program. This research, budgeted at $362,500 for the first year, was financed jointly by Johns-Manville and the International Association of Heat and Frost Insulators and Asbestos Workers. Its primary purpose is to develop improved methods of minimizing exposure of insulation workers to dust and fumes encountered in their work. The Bureau of Occupational Safety and Health, U.S. Public Health Service, will provide consultation and technical assistance.

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[12] Mining Journal (London). V. 270, No. 6948, Oct. 18, 1968, p. 295.

[13] Kennedy, John L. Preshearing, Pelletizing Improves Asbestos Fibers for Drilling Mud. Oil and Gas J., v. 66, No. 44, Oct. 28, 1968, pp. 102–103.

[14] Product Engineering. V. 39, No. 22, Oct. 21, 1968, p. 120.
Steel. V. 162, No. 13, Mar. 25, 1968, p. 138n.

[15] Johns-Manville Corporation. Annual Report. New York, 1968, p. 5.

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