FILE NAME: Kennecott (KENN)

DATE: 1962

DOC#: KENN008

DOCUMENT DESCRIPTION: Minerals Yearbook [US Dept of Interior] - Excerpts

MINERALS YEARBOOK

1962

Volume I of Three Volumes

METALS AND MINERALS
(Except Fuels)

Prepared by the staff of the
BUREAU OF MINES
DIVISION OF MINERALS
Charles W. Merrill, Chief

UNITED STATES DEPARTMENT OF THE INTERIOR • Stewart L. Udall, Secretary

BUREAU OF MINES • Marling J. Ankeny, Director

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1963

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price $4.75

FOREWORD

MINERALS YEARBOOK, 1962, published in three volumes, provides a record of performance of the Nation's mineral industries during the year, with enough background information to interpret the year's developments.

The three-volume issues of the Yearbook follow this pattern:

Volume I includes chapters on metal and nonmetal mineral commodities except mineral fuels. In addition, it contains a chapter reviewing these mineral industries, a statistical summary, and chapters on mining and metallurgical technology, employment and injuries, and technologic trends. The former "Minor Metals" and "Minor Nonmetals" chapters have been combined in one chapter on "Minor Metals and Minerals."

Volume II includes chapters on each mineral fuel and a helium, an employment and injuries presentation, and a mineral-fuels review chapter that summarizes development in the fuel industries.

Volume III contains chapters covering each of the 50 States, plus a chapter on island possessions in the Pacific Ocean, the Commonwealth of Puerto Rico and island possessions in the Caribbean Sea, including the Canal Zone. Volume III also has a statistical summary chapter, identical with that in Volume I, and a chapter on employment and injuries.

Figures in the Minerals Yearbook are based largely upon information supplied by mineral producers, processors, and users, and acknowledgment is made of this indispensable cooperation given by industry. Information obtained from individuals through confidential surveys has been grouped to provide statistical aggregates. Data on individual producers are presented only if available from published or other nonconfidential sources, or when permission of the individuals concerned has been granted.

MARLING J. ANKENY, *Director.*

ACKNOWLEDGMENTS

The Bureau of Mines has been assisted in collecting mine-production data and the supporting information appearing in this volume of the MINERALS YEARBOOK by the following cooperating organizations:

Alabama: Geological Survey of Alabama.
Alaska: Department of Natural Resources.
Arizona: Arizona Bureau of Mines.
Arkansas: Geological and Conservation Commission; Arkansas Oil and Gas Commission; Department of Revenue.
California: Division of Mines and Geology.
Delaware: Delaware Geological Survey.
Florida: Florida Geological Survey.
Georgia: Geological Survey of Georgia.
Hawaii: Department of Land and Natural Resources.
Idaho: Bureau of Mines and Geology.
Illinois: State Geological Survey Division.
Indiana: Geological Survey, Department of Conservation.
Iowa: Iowa Geological Survey.
Kansas: Conservation Division, State Corporation Commission and State Geological Survey of Kansas.
Kentucky: Kentucky Geological Survey.
Louisiana: Louisiana Geological Survey and Louisiana Department of Conservation.
Maine: Geological Survey of Maine.
Maryland: Department of Geology, Mines, and Water Resources.
Michigan: Geological Survey Division, Department of Conservation.
Mississippi: Mississippi Geological Survey, Mississippi State Oil and Gas Board, and Oil and Gas Service Tax Division, Mississippi State Tax Commission.
Missouri: Division of Geological Survey and Water Resources, Department of Business and Administration.
Montana: Montana Bureau of Mines and Geology.
Nevada: Nevada Bureau of Mines.
New Hampshire: Department of Resources and Economic Development.
New Jersey: Bureau of Geology and Topography.
New York: New York State Science Service.
North Carolina: Geological Survey of North Carolina.
North Dakota: North Dakota Geological Survey.
Oklahoma: Oklahoma Geological Survey and Oil and Gas Conservation Department; Oklahoma Corporation Commission, Gross Production Division; Oklahoma Tax Commission.
Oregon: State Department of Geology and Mineral Industries.
Pennsylvania: Bureau of Topographic and Geological Survey.
Puerto Rico: Mineralogy and Geology Section, Economic Development Administration, Commonwealth of Puerto Rico.
South Carolina: Geological Survey of South Carolina.
South Dakota: State Geological Survey.
Tennessee: Department of Conservation and Commerce.
Texas: Bureau of Economic Geology, The University of Texas; Oil and Gas Division, Railroad Commission of Texas; Oil and Gas Division, State Comptroller of Public Accounts.
Utah: Utah Geological and Mineralogical Survey.
Virginia: Division of Mineral Resources.
Washington: Division of Mines and Geology, Department of Conservation and Development.

West Virginia: West Virginia Geological and Economic Survey.
Wisconsin: Wisconsin Geological Survey.
Wyoming: The Geological Survey of Wyoming.

Except for the four review chapters, this volume was prepared by the staff of the Division of Minerals. All manuscripts were reviewed to insure statistical consistency among the tables, figures, and text, between this volume and volume III, and between this volume and those for former years, by a staff supervised by Kathleen J. D'Amico, who was assisted by Julia Muscal, Helen L. Gealy, Helen E. Tice, Mary E. Daugherty, Nellie W. Fahrney, Robert E. Anderson, and Joseph Spann.

The assembly and preparation of data for world production tables were supervised by Berenice B. Mitchell, Division of Foreign Activities.

Minerals Yearbook compilations are based largely on facts provided by the mineral industries. Acknowledgment is made of the willing contribution by both companies and individuals of these essential data.

CHARLES W. MERRILL,
Chief, Division of Minerals.

CONTENTS

	Page
Foreword, by Marling J. Ankeny	III
Acknowledgments, by Charles W. Merrill	V
Review of the mineral industries (metals and nonmetals except fuels), by Kung-Lee Wang	1
Review of metallurgical technology, by Rollien R. Wells	65
Review of mining technology, by Paul T. Allsman and James E. Hill	79
Technologic trends in the mineral industries, by Donald R. Irving	93
Statistical summary of mineral production, by Kathleen J. D'Amico	137
Employment and injuries in the metal and nonmetal industries, by Forrest T. Moyer	187
Abrasive materials, by James D. Cooper and Gertrude E. Tucker	197
Aluminum, by Kenneth B. Higbie, Clarke I. Wampler, and Mary E. Trought	213
Antimony, by Richard N. Spencer and Edith E. den Hartog	243
Arsenic, by F. L. Wideman and Gertrude N. Greenspoon	253
Asbestos, by J. M. West and Victoria R. Schreck	259
Barite, by Milford L. Skow and Victoria R. Schreck	273
Bauxite, by Kenneth B. Higbie, Arden C. Sullivan, and Mary E. Trought	289
Beryllium, by Donald E. Eilertsen	311
Bismuth, by Richard N. Spencer and Edith E. den Hartog	321
Boron, by Henry E. Stipp and Victoria R. Schreck	327
Bromine, by Henry E. Stipp and Victoria R. Schreck	345
Cadmium, by A. D. McMahon and Esther B. Miller	353
Calcium and calcium compounds, by C. Meade Patterson	363
Cement, by J. M. West and Ardell H. Lindquist	371
Chromium, by Andrew S. Prokopovitsh and Hilda V. Heidrich	411
Clays, by Taber de Polo and Betty Ann Brett	427
Cobalt, by Joseph H. Bilbrey, Jr., and Violet M. Clarke	457
Columbium and tantalum, by F. W. Wessel and Robert A. Whitman	469
Copper, by F. L. Wideman, Gertrude N. Greenspoon, and Wilma F. Washington	483
Diatomite, by John W. Hartwell and Victoria R. Schreck	531
Feldspar, nepheline syenite, and aplite, by Taber de Polo and Gertrude E. Tucker	537
Ferroalloys, by Frank L. Fisher, Gertrude C. Schwab, and Hilda V. Heidrich	547
Fluorspar and cryolite, by William V. Kuster	561
Gem stones, by John W. Hartwell and Betty Ann Brett	585
Gold, by J. P. Ryan and Ethel M. Tucker	599
Graphite, by Harold J. Drake and Betty Ann Brett	623
Gypsum, by William V. Kuster and Jewel B. Mallory	633
Iodine, by Henry E. Stipp and Victoria R. Schreck	649
Iron ore, by R. W. Holliday and Helen E. Lewis	655
Iron and steel, by Joseph H. Bilbrey, Jr., and Gail Knight	687
Iron and steel scrap, by James E. Larkin	717
Iron oxide pigments, by John W. Hartwell and Betty Ann Brett	743
Kyanite and related minerals, by James D. Cooper and Gertrude E. Tucker	749
Lead, by Richard N. Spencer, Edith E. den Hartog, and Mary E. Graves	753
Lime, by C. Meade Patterson and Rose L. Ballard	789
Lithium, by Arnold M. Lansche and Victoria R. Schreck	819
Magnesium, by H. B. Comstock and Jeannette I. Baker	825
Magnesium compounds, by H. B. Comstock and Jeannette I. Baker	835
Manganese, by Gilbert L. DeHuff and Teresa Fratta	847

	Page
Mercury, by John E. Shelton and Gertrude N. Greenspoon	873
Mica, by Milford L. Skow and Gertrude E. Tucker	889
Molybdenum, by Horace T. Reno and Mary J. Burke	911
Nickel, by Joseph H. Bilbrey, Jr., and Ethel R. Long	923
Nitrogen, by Richard W. Lewis and Betty Ann Brett	939
Perlite, by John W. Hartwell and Victoria R. Schreck	955
Phosphate rock, by Richard W. Lewis and Gertrude E. Tucker	961
Platinum-group metals, by J. P. Ryan and Ethel M. Tucker	981
Potash, by Richard W. Lewis and Gertrude E. Tucker	999
Pumice, by John W. Hartwell	1013
Quartz crystal, electronic-grade, by Benjamin Petkof and Gertrude E. Tucker	1021
Rare-earth minerals and metals, by John G. Parker	1025
Salt, by Robert T. MacMillan	1035
Sand and gravel, by Perry G. Cotter and Jewel B. Mallory	1049
Silicon, by Frank L. Fisher, Gertrude C. Schwab, and Hilda V. Heidrich	1077
Silver, by J. P. Ryan and Ethel M. Tucker	1089
Slag: iron-blast-furnace, by Perry G. Cotter	1111
Sodium and sodium compounds, by Robert T. MacMillan and Victoria R. Schreck	1119
Stone, by Perry G. Cotter and Nan C. Jensen	1129
Strontium, by Arnold M. Lansche and Victoria R. Schreck	1159
Sulfur and pyrites, by Clarence O. Babcock and Betty I. Stanley	1163
Talc, soapstone, and pyrophyllite, by Harold J. Drake and Betty Ann Brett	1189
Thorium, by John G. Parker	1199
Tin, by John E. Shelton and John B. Umhau	1205
Titanium, by John W. Stamper	1231
Tungsten, by Andrew S. Prokopovitsh and Mary J. Burke	1251
Uranium, by John G. Parker and Ethel M. Tucker	1265
Vanadium, by Richard F. Stevens, Jr., and Huguette A. Lizotte	1287
Vermiculite, by John W. Hartwell and Nan C. Jensen	1297
Water, by Robert T. MacMillan	1303
Zinc, by A. D. McMahon, Esther B. Miller, and Dora A. Rice	1309
Zirconium and hafnium, by F. W. Wessel and John W. Stamper	1351
Minor metals and minerals, by Staff, Division of Minerals	1359
Index	1381

Asbestos

By J. M. West [1] and Victoria R. Schreck [2]

ALTHOUGH the United States consumed 24 percent of the world output of asbestos fiber, it supplied only 7 percent of its own requirements. The Nation ranked seventh among world producers and contributed 2 percent of the total output.

LEGISLATION AND GOVERNMENT PROGRAMS

A revised national stockpile purchase specification, P–4–R3, was issued on January 23, 1962, by the Office of Emergency Planning for Government procurement of amosite asbestos. The new specification superseded the one dated August 4, 1959.

Deliveries of Arizona No. 2 chrysotile for the stockpile were completed by one of three contracting operators. The Government continued to acquire amosite and crocidolite asbestos for stockpiling under barter agreements through the U.S. Department of Agriculture.

TABLE 1.—Salient asbestos statistics

	1953–57 (average)	1958	1959	1960	1961	1962
United States:						
Production (sales)—short tons	46,822	43,979	45,459	45,223	52,814	53,190
Value—thousands	$4,740	$5,127	$4,391	$4,231	$4,347	$4,677
Imports for consumption (unmanufactured)—short tons	696,740	644,331	713,047	669,496	[r] 616,529	676,027
Value—thousands	$59,722	$58,314	$65,006	$63,345	$59,942	$64,150
Exports (unmanufactured) [1]—short tons	2,720	3,026	4,461	5,525	3,799	2,949
Value—thousands	$375	$424	$793	$857	$759	$598
Exports of asbestos products (value) [1]—thousands	$12,875	$13,233	$12,921	$13,703	$13,825	$14,274
Consumption, apparent [2]—short tons	740,342	685,284	754,045	709,194	[r] 665,544	726,268
World: Production—do	1,850,000	2,055,000	2,270,000	2,440,000	2,770,000	3,055,000

[r] Revised figure.
[1] Includes reexports.
[2] Measured by quantity produced, plus imports, minus exports.

DOMESTIC PRODUCTION

Asbestos production in the United States increased 1 percent in quantity and 8 percent in value compared with 1961. Most of the rise in value came from California and Vermont sales, although

[1] Commodity specialist, Division of Minerals.
[2] Statistical assistant, Division of Minerals.

Asbestos magazine published Arizona asbestos prices, f.o.b. Globe, as follows:

Grade:	Per short ton 1961	Mar. 10, 1962
No. 1 soft	$1,650 to $1,800	$1,475 to $1,650
No. 2 soft	800 to 1,000	800 to 1,000
Group 3—Filtering and spinning	375 to 450	425 to 450
Group 4—Plastic and filtering	225 to 250	385 to 400
Group 5—Plastic and filtering	190 to 225	225 to 375
Group 7—Refuse and shorts	58 to 90	58 to 90

Market quotations were not available for African, Australian, and South American asbestos because sales were negotiated privately. The following average values were calculated from U.S. Department of Commerce import data:

Imports:	Per short ton 1961	1962
Amosite	$163	$164
Crocidolite:		
Bolivia	182	---
Australia	209	201
South Africa, Republic of	202	221

FOREIGN TRADE[4]

Imports of amosite and chrysotile increased 36 and 9 percent, respectively, and crocidolite decreased 4 percent, resulting in an overall increase of 9 percent in total asbestos imports in 1962.

Low-iron chrysotile imports of spinning-length fibers from British Columbia decreased from 5,374 tons in 1961 to 5,077 tons. Ninety-seven percent of all chrysotile imported was short fiber of less than spinning length.

The Republic of South Africa supplied crocidolite and chrysotile and was the only source of amosite. Imports from Australia consisted solely of crocidolite. The total of crocidolite imports from these two countries was 17,127 tons. An additional ton was imported from Bolivia. Finland supplied anthophyllite, and only chrysotile was imported from other countries.

Exports of unmanufactured asbestos decreased from 3,572 tons in 1961 to 2,824 tons.

Imports included 7,633 tons of amosite and 8,270 tons of crocidolite acquired for the Government's supplemental stockpile.

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

TABLE 2.—U.S. imports for consumption of asbestos (unmanufactured), by classes and countries [1]

Year and country	Crude (including blue fiber)		Textile fiber [2]		All other		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1961:								
North America: Canada	437	$60,097	16,903	$6,163,364	552,713	$44,713,557	570,053	$50,937,018
South America: Bolivia	50	9,090					50	9,090
Europe:								
Finland					[r] 165	14,500	[r] 165	14,500
Italy [3]	[r] 3	[r] 6,120			110	16,530	113	22,650
Portugal [3]	8	645					8	645
Yugoslavia	5,194	173,260					5,194	173,260
Africa:								
Rhodesia and Nyasaland, Federation of [4]	[r] 2,469	[r] 616,424			[r] 753	[r] 132,559	[r] 3,222	[r] 748,983
Union of South Africa [5]	[r] 33,335	[r] 6,182,426	18	5,349	[r] 2,057	[r] 365,388	[r] 35,410	[r] 6,553,163
Oceania: Australia	2,314	482,764					2,314	482,764
Total	[r] 43,810	[r] 7,530,826	16,921	6,168,713	[r] 555,798	[r] 45,242,534	[r] 616,529	58,942,073
1962:								
North America: Canada	232	55,411	14,816	5,875,484	608,757	49,003,906	623,805	54,934,801
South America: Bolivia [4]	1	300					1	300
Europe:								
Finland					440	18,150	440	18,150
Italy [3]	9	10,585			28	5,123	37	15,708
Portugal [3]					23	2,374	23	2,374
Yugoslavia	3,444	119,614			11	542	3,455	120,156
Africa:								
Rhodesia and Nyasaland, Federation of [3]	4,171	859,177			1,908	366,056	6,079	1,225,233
South Africa, Republic of [5] [6]	30,250	5,514,426			4,412	803,274	34,662	6,317,700
Oceania: Australia	7,525	1,515,323					7,525	1,515,323
Total	45,632	8,074,836	14,816	5,875,484	615,579	50,199,425	676,027	64,149,745

[1] In Minerals Yearbook 1961, page 285, table 2, the 1960 total of short fibers should read 472,164 short tons instead of 5,472,164 short tons.
[2] Data reported by the Bureau of the Census have been adjusted by the Bureau of Mines.
[r] Revised figure.
[4] All believed to be from Southern Rhodesia.
[5] Reported by the Bureau of the Census as Chile.
[6] Effective Jan. 1, 1962; formerly Union of South Africa.

Source: Bureau of the Census.

TABLE 3.—U.S. imports for consumption of asbestos, from specified countries, by grades

(Short tons)

Grade	1961			1962		
	Canada	Southern Rhodesia [1]	Union of South Africa [2]	Canada	Southern Rhodesia [1]	Republic of South Africa [2] [3]
Chrysotile:						
Crudes	437	[4] 2,469	2,856	232	4,171	413
Spinning or textile	16,903	----------	18	14,816	----------	----------
All other	552,713	[4] 753	2,057	608,757	1,908	4,412
Crocidolite (blue)	----------	----------	[4] 15,501	----------	----------	9,602
Amosite	----------	----------	14,978	(5)	----------	20,235
Total	570,053	[4] 3,222	[4] 35,410	623,805	6,079	34,662

[1] Reported by the Bureau of the Census as Federation of Rhodesia and Nyasaland. Believed to be from Southern Rhodesia. Excludes data adjusted by the Bureau of Mines.
[2] Includes data adjusted by the Bureau of Mines.
[3] Effective Jan. 1, 1962; formerly Union of South Africa.
[4] Revised figure.
[5] Excludes data adjusted by the Bureau of Mines.

TABLE 4.—U.S. exports [1] and reexports [2] of asbestos and asbestos products

Product	1961		1962	
	Quantity	Value	Quantity	Value
Exports:				
Unmanufactured:				
Crude and spinning fibers, short tons	1,064	$281,444	655	$162,130
Nonspinning fibers, do	1,094	256,261	968	204,797
Waste and refuse, do	1,424	170,755	1,201	211,456
Total unmanufactured, do	3,572	708,460	2,824	578,383
Products:				
Brake lining and blocks—molded, semimolded, and woven	(3)	4,192,908	(3)	4,645,844
Clutch facing and lining, number	1,452,435	1,149,299	2,277,461	1,561,659
Construction materials, n.e.c., short tons	11,300	2,980,726	9,064	2,343,404
Pipe covering and cement, do	2,627	1,485,640	2,890	1,242,752
Textiles, yarn, and packing, do	1,288	3,106,542	1,453	3,311,355
Manufactures, n.e.c.	(4)	889,625	(4)	1,164,908
Total products	----------	13,804,740	----------	14,269,922
Reexports:				
Unmanufactured:				
Crude and spinning fibers, short tons	108	24,175	95	14,193
Nonspinning fibers, do	106	26,003	----------	----------
Waste and refuse, do	13	594	[5] 30	5,437
Total Unmanufactured, do	227	50,772	125	19,630
Products:				
Brake lining and blocks—molded, semimolded, and woven	(3)	1,580	(3)	1,905
Construction materials, n.e.c., short tons	63	18,353	7	1,756
Textiles, yarn, and packing, do	1	228	----------	----------
Total products	----------	20,161	----------	3,661

[1] Materials 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 later exported without change.
[3] Values have been summarized; quantities not shown.
[4] Quantity not recorded.
[5] Adjusted by Bureau of Mines.

Source: Bureau of the Census.

WORLD REVIEW [5]

NORTH AMERICA

Canada.—Asbestos shipments in 1962 set a record of more than 1.2 million tons. More than 95 percent of 1961 shipments were exported.[6] Employment at Canadian asbestos mines and mills in 1961 totaled 6,875 workers.

Canadian Johns-Manville Co., Ltd., operated the Jeffrey mine, Asbestos, Quebec, close to capacity during 1962. The return of the mine to open-pit operation was essentially completed. An inclined skipway was installed for removing waste from the pit. Explorations for asbestos were conducted by the company between Amos and Barraute in northwestern Quebec. The company managed development operations at the Advocate Mines, Ltd. property, Baie Verte, northern Newfoundland, where stripping of waste continued in preparation for production to start in mid-1963. Output was expected to exceed 40,000 tons of fiber annually, mainly group 4 for use in asbestos-cement products.

Asbestos Corporation Ltd. exchanged shares equivalent to a 10-percent interest with Eternit S.A. of Belgium. A long-term contract for purchase of asbestos from the Canadian company was included in the agreement. Ore reserves at the end of 1962 were, in million tons: King-Beaver, 12.4; British Canadian, 46.9; Normandie, 20.3; and others, 14.2. A total of 4.6 million tons of ore was milled, and 10.9 million tons of barren rock excavated. More than 1 million tons of overlying waste was stripped from the ore body at the Normandie mine. A pilot plant for producing finely ground asbestos filler was installed at the mine.

An option was taken by Asbestos Corporation Ltd. on the Murray Mining Corp. Ltd., Asbestos Hill property, south of Deception Bay in the Ungava area, northern Quebec. Exploration and plans for development continued.

Production by Lake Asbestos of Quebec Ltd., a subsidiary of American Smelting and Refining Company, totaled 100,612 tons, compared with 95,042 tons in 1961. Ore reserves were increased at the company's Black Lake, Quebec, mine by continued development work on the open pit.

Several exploration holes were drilled by Bornite Copper Corp. on its prospect in Cleveland Township, near Asbestos, Quebec. A deposit 1,000 feet or more long and 140 feet wide was indicated. Assays were from 6.4 to 9.7 percent fiber and floats, mainly classified as shorts. A magnetometer survey was completed over the northeast part of the deposit.

National Gypsum Co. initiated an expansion program to increase capacity at its Thetford Mines, Quebec, property.

[5] Values in this section are U.S. dollars based on the average rate of exchange by the Federal Reserve Board unless otherwise specified.

[6] Dominion Bureau of Statistics, Industry and Merchandising Division (Ottawa, Canada). The Asbestos Industry, 1961. Annual Rept. No. 26–205, October 1962, 10 pp.

TABLE 5.—World production of asbestos by countries [1 2]

(Short tons)

Country [1]	1953–57 (average)	1958	1959	1960	1961	1962
North America:						
Canada (sales) [3]	991,896	925,331	1,050,429	1,118,458	1,173,695	1,223,509
United States (sold or used by producers)	46,322	43,979	45,459	45,223	52,814	53,190
Total	1,038,218	969,310	1,095,888	1,163,679	1,226,509	1,276,699
South America:						
Argentina	429	285	320	e 330	e 330	e 330
Bolivia (exports)	205		168	66	57	56
Brazil	2,738	3,816	12,325	14,590	e 18,700	e 18,750
Venezuela	3,223	9,152	5,095	4,333	650	
Total	6,595	13,253	17,908	19,319	e 19,750	e 19,150
Europe:						
Austria				215	564	503
Bulgaria	1,146	1,100	1,100	1,200	1,200	e 1,100
Finland [4]	11,587	7,932	9,579	10,534	10,339	10,869
France	13,641	20,742	23,360	28,662	30,746	27,558
Italy	33,059	42,500	49,778	56,672	62,816	61,233
Portugal	58	98	40	144	21	
Spain	35		19	4	11	
U.S.S.R [e]	425,000	550,000	600,000	660,000	880,000	1,100,000
Yugoslavia	4,465	5,960	4,748	5,970	6,709	7,401
Total [e]	490,000	630,000	690,000	765,000	990,000	1,210,000
Asia:						
China [e]	22,000	65,000	90,000	90,000	90,000	90,000
Cyprus	15,379	16,494	14,424	23,316	16,207	19,993
India	1,221	1,302	1,464	1,886	1,618	1,705
Japan	8,290	11,187	13,633	17,042	18,799	15,550
Korea, Republic of	90	22	88	740	341	1,333
Philippines			56	36	83	1,037
Taiwan	190	47	150	485	44	525
Turkey	208	839	411	236	496	709
Total [e]	47,000	95,000	120,000	135,000	128,000	130,000
Africa:						
Bechuanaland	1,185	2,265	1,410	1,282	1,924	2,375
Kenya	164	120	43	117	151	e 150
Morocco	467					
Mozambique	170	198	37	22	162	110
Rhodesia and Nyasaland, Federation of: Southern Rhodesia	104,811	127,116	119,699	133,963	161,610	142,196
South Africa, Republic of	123,532	175,644	182,405	175,867	194,834	221,302
Swaziland	30,692	25,261	24,806	32,027	30,792	32,830
United Arab Republic (Egypt)	49	485	502	496	254	e 250
Total	261,070	331,088	328,902	343,774	389,727	399,213
Oceania:						
Australia	8,244	15,570	17,875	15,613	16,746	18,392
New Zealand	154	454	640	319	373	e 375
Total	8,398	16,024	18,515	15,932	17,119	18,767
World total (estimate) [1 2]	1,850,000	2,055,000	2,270,000	2,440,000	2,770,000	3,055,000

[1] Asbestos also is produced in Czechoslovakia, Eritrea, North Korea, and Rumania. No estimates for these countries are included in the total, as production is believed to be negligible.

[2] This table incorporates some revisions. Data do not add to totals shown because of 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: 1953–57 (average) 27,042 tons; 1958, 18,449 tons; 1959, 29,532 tons; 1960, 51,624 tons; 1961, 41,696 tons; 1962, data not available.

[e] Estimate.

[4] Includes asbestos flour.

Compiled by Helen L. Hunt, Division of Foreign Activities.

TABLE 6.—Canada: Sales of asbestos by grades

Grade	1961			1962		
	Short tons	Value		Short tons	Value	
		Total (thousands)	Average per ton		Total (thousands)	Average per ton
Crude No. 1, 2, and other	163	$132	$810			
Milled group:						
3	29,296	10,619	362			
4	339,082	56,874	168	[1] 1,223,509	(2)	(2)
5	179,852	20,359	113			
6	193,467	14,461	75			
7	423,116	15,916	38			
8	8,719	164	19			
Total, all grades	1,173,695	118,525	101	[1] 1,223,509	(2)	(2)
Waste rock	41,896	35	1	(2)	(2)	(2)

[1] Breakdown by grades not available.
[2] Data not available.

Source: Dominion Bureau of Statistics

At Roberge Lake, northwestern Quebec, McAdam Mining Corp. drilled a 500-foot hole to explore a magnetic anomaly northeast of the main asbestos zone. The main zone was reported to contain 15 million tons of ore averaging about $5 per ton in fiber value. A third zone was indicated by a magnetometer survey. Central Asbestos Mines conducted magnetometer surveys of claims in the Thetford Mines area and Coleraine Township, Quebec. Recoveries from bulk tests in the pilot plant at the Hedman Mines Ltd. property in Warden and Munro Townships, 25 miles northeast of Matheson, Ontario, averaged about $25.50 per ton in value. Reserves available through open-pit mining to a depth of 300 feet were estimated at 8.5 million tons. Design of a large mill was nearly completed.

The main shaft at the Munro mine of Canadian Johns-Manville Co., Ltd., was deepened 300 feet below the 637-foot level in preparation for a second production level. Work continued on the westward extension of the 637-foot level. Two grades of fiber were produced.

Operations at the Cassiar Asbestos Corp. Ltd. mine in British Columbia continued through the winter months. During 1962 720,000 tons of ore was mined and 2,358,000 tons of waste rock stripped. Ore milled totaled 535,000 tons, consisting of 295,000 tons of concentrate from the rock-rejection circuit and 240,000 tons of mine-run ore. Plans were made to move the crushing plant to a lower level and to install a larger crusher. Recovery of AK and AX grades was to be improved. Ore reserves were sufficient for 30 years of production at the current rate. The parent company, Conwest Exploration Co., Ltd., leased waterfront property in North Vancouver, British Columbia, and planned a $1 million improvement in dock facilities. An option on an asbestos prospect southeast of Atlin on the Taku River, British Columbia, was dropped.

SOUTH AMERICA

Brazil.—The mine of Mineracão de Amianto, S.A., at Djalma Dutra (Pocões), Bahia, continued production. Sales of chrysotile to Bra-

zilian ports totaled 1,279 tons in 1962. A pilot plant reportedly was constructed for processing fiber from newly discovered deposits in Batalha, Alagoes.

EUROPE

Greece.—Developmental work was continued on an extensive deposit of asbestos at Kozani by Kenbestos Corp., a subsidiary of Kennecott Copper Corp. A plant to produce asbestos-cement products was planned.

Ireland.—Exploratory drilling of a deposit near Sligo on the northwest coast was planned by Northern Canada Mines, Ltd.

United Kingdom.—A $3 million asbestos-cement-products plant, the largest in Europe, was opened at Widnes in northwest England.

Yugoslavia.—An established plant, Antisa Vucicic Salonite, began producing large-diameter asbestos-cement pipe partly for export. An asbestos-yarn plant began operating at Poloce on the Adriatic. Means for improving the mining and processing of asbestos were studied by an American, Dr. Arthur B. Cummins, under an International Cooperative Administration contract.

ASIA

Cyprus.—All production was exported, except for a few hundred tons that was used annually for domestic manufacture of asbestos-cement sheeting. Reserves at the Cyprus Asbestos Mines, Ltd., deposit below the summit of Mount Olympus near Amiandos were large, but the fiber content was generally less than 1 percent.

India.—Imports of asbestos totaled 21,679 tons valued at $4,935,000 in 1961, compared with 24,315 tons valued at $5,670,000 in 1960. Domestic asbestos was a suitable substitute for imported fiber in the manufacture asbestos-cement pipe in a process developed by Central Fuel Research Institute.[7]

Viet-Nam.—Plans were announced by Eternit Vietnam for an asbestos-cement plant at Saigon having an annual capacity of 10,000 tons.

AFRICA

Bechuanaland.—Exports totaled 1,852 tons valued at $450,527 in 1961. An aerial magnetometer survey was conducted, mainly over southern portions of the territory, in search of asbestos and other minerals.

Mozambique.—Long-fiber tremolite was produced from the Mavita mine of Sociedade Mineira de Mavita, Lda., south of Vila Manica near the Rhodesian border, and exported to several countries including the United States for asbestos-cement manufacture.

Rhodesia and Nyasaland, Federation of.—Crude asbestos exports, mostly from Turner and Newall, Ltd., mines at Shabani and Mashaba, totaled 133,516 tons valued at $23,637,000 in 1961. The tonnages were distributed as follows, in percent: United Kingdom, 57; Czechoslovakia, 8; Poland, 2; United States, 1; and other countries, 32. As-

[7] Journal of Mines, Metals and Fuels (Calcutta, India). Asbestos Cement Pipes From Indian Asbestos. V. 10, No. 9, September 1962, pp. 29, 31.