# ASBESTOS

By Oliver Bowles and F. M. Barsigian

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## SUMMARY


Sales of domestic asbestos in 1942—15,481 short tons—were 37 percent less than those in 1941. The decline was confined to the chrysotile variety, sales of which were smaller both in Vermont and Arizona. The value of total sales was 31 percent lower. Sales of the amphibole variety were slightly higher in both quantity and value than in 1941. Most of the United States production is of the shorter grades of chrysotile. During 1942 domestic production furnished less than 4 percent of domestic requirements.

As in the past, Canada supplied most of the United States needs of unmanufactured asbestos. Canadian chrysotile is of excellent quality and is suitable for most asbestos products, although a few specialties require asbestos from other sources. African chrysotile, which is imported in substantial quantities, is an important supplement to Canadian fibers of spinning grade. India and Soviet Russia are other sources of chrysotile for general use.

Asbestos combines noninflammability with a fibrous structure that makes it the unique source of unburnable fabrics. Because of this peculiar combination of properties it is an irreplaceable material for certain important military uses, although for some common uses substitution is possible. The most important application in the former category is for brake linings and clutch facings on automobile transport equipment. No satisfactory substitute has been found for these uses. As all types of automotive transport must have brakes and clutch facings, it is apparent that the military needs are extensive and of primary importance. Fortunately, any strong, flexible chrysotile of spinnable length is satisfactory for such use, and the extensive asbestos-producing industry of Canada can supply large quantities of satisfactory material. The demands for spinning fibers in this field are relieved to some extent by the substitution of molded for woven brake bands. The molded bands employ shorter grades of fiber, but they can be used only on certain types of brakes. Other important asbestos products are gaskets and packings around steam and com-




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pressed-air machinery. These products are also of great military importance because they are used on warships, by the merchant marine, and in even larger quantities at power plants and innumerable munition factories.

Still another important field of usefulness for asbestos is heat insulation. Asbestos is a popular insulating medium; but other materials are substituted for it to some extent, and further substitution in the general insulation field is possible. There are, however, certain types of insulation for which special grades of asbestos are essential if weight is to be conserved and efficiency maintained.

The most widespread occurrences of asbestos in the United States are those of the amphibole type—anthophyllite and tremolite. Hundreds of deposits are known, but production never exceeds a few hundred tons a year because the uses are quite limited. Its resistance to acids renders tremolite useful for making chemical filters; the amphibole varieties are employed also in arc welding and in making insulation products, but the uses are so restricted and relatively so unimportant that they are not classed as critical.

Chrysotile asbestos is the principal variety of commerce and occupies an important place in the war program. The principal world production centers are Quebec (Canada), Rhodesia, Union of South Africa, Swaziland, and Soviet Russia. The Canadian mines and mills supply most of the United States needs, and the quality of the product is satisfactory for most of the important uses. African chrysotile is superior for electric-insulation products that must be low in iron and therefore is regarded as essential to the military program.

Amosite, a variety of asbestos mined only in Africa, consists of long, strong fibers that are superior for making lightweight insulation to be used around steam machinery on warships. Amosite also is preferred for making 85-percent magnesia pipe covering and a block insulation of similar type that contains no magnesia. This variety is therefore regarded as essential to the highest naval efficiency. In June 1942 the War Production Board promulgated Conservation Order M–79 restricting the use of amosite in 85-percent magnesia to certain military applications.

Crocidolite or blue asbestos is regarded as essential because it is superior to other varieties in making asbestos-cement pressure pipes, chemical filters, and acid-resistant packings. Long blue fiber is used also in making gas masks. Blue asbestos is mined chiefly in Africa, but small quantities are obtained in Australia.

Beginning January 1943, fiber obtainable from the two leading producing companies in Africa was purchased on United States Government account by the Metals Reserve Co. and allocated to the various asbestos-products manufacturers. This plan offered certain advantages in control of shipping routes, stimulation of production, and allocation according to the most urgent needs.

Throughout 1942 the Bureau of Mines conducted a monthly canvass for the War Production Board, covering receipts, stocks, and consumption. Stocks of critical grades of African fibers in the hands of consumers at the end of 1942 were adequate for 6 to 8 months' use at the average rate of consumption during the year.

Salient statistics on asbestos for 1941 and 1942 are summarized in the following table.

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*Salient statistics of the asbestos industry in the United States, 1941–42*

| | 1941 | | 1942 | |
|---|---|---|---|---|
| | Short tons | Value | Short tons | Value |
| Domestic asbestos— | | | | |
| Produced: | | | | |
| Chrysotile | 20,144 | (1) | 13,109 | (1) |
| Amphibole | 2,252 | (1) | 2,208 | (1) |
| Total produced | 22,396 | (1) | 15,317 | (1) |
| Sold or used by producers: | | | | |
| Chrysotile | 22,439 | $707,589 | 13,373 | $480,245 |
| Amphibole | 1,952 | 18,164 | 2,108 | 18,612 |
| Total sold or used by producers | 24,391 | 725,753 | 15,481 | 498,857 |
| Imports (unmanufactured) | 419,196 | 17,909,077 | 419,414 | 21,235,266 |
| Exports (unmanufactured) | 4,846 | 325,825 | 774 | 134,083 |
| Apparent consumption [2] | [3] 438,741 | [3] 18,309,005 | 434,121 | 21,600,040 |
| Exports of asbestos products | (1) | 4,835,194 | (1) | 5,114,496 |

[1] Figures not available.
[2] Quantity sold or used by producers, plus imports, minus exports.
[3] Revised figures.

The following table shows domestic production of asbestos during recent years according to varieties.

*Asbestos sold or used by producers in the United States, 1938–42, by varieties*

| Year | Chrysotile | | Amphibole | | Total | |
|---|---|---|---|---|---|---|
| | Short tons | Value | Short tons | Value | Short tons | Value |
| 1938 | (1) | (1) | (1) | (1) | 10,440 | $247,264 |
| 1939 | 15,043 | $503,097 | 416 | $9,691 | 15,459 | 512,788 |
| 1940 | 18,672 | 664,520 | 1,288 | 9,988 | 20,060 | 674,508 |
| 1941 | 22,439 | 707,589 | 1,952 | 18,164 | 24,391 | 725,753 |
| 1942 | 13,373 | 480,245 | 2,108 | 18,612 | 15,481 | 498,857 |

[1] Bureau of Mines not at liberty to publish figures separately for chrysotile and amphibole.

## DOMESTIC INDUSTRY

### REVIEW BY STATES

*Arizona.*—Production of asbestos in Arizona was less than half as great in 1942 as in 1941, according to reports of producers submitted to the Bureau of Mines. Sales, which were about two-thirds those in 1941, were made by the following companies: Arizona Chrysotile Asbestos Co., Arthur Enders, Guy G. Phillips, and Pine Top Asbestos Mines, all of Globe, Ariz.; E. E. Prochnow, Winslow, Ariz.; Fiber & Metal Products Co., Downey, Calif.; Gladding, McBean & Co., 2901 Los Feliz Boulevard, Los Angeles, Calif.; and Johns-Manville Products Corporation, 22 East Fortieth Street, New York, N. Y.

The Johns-Manville Products Corporation completed its new mill at Chrysotile, Ariz., but the output in 1942 was quite limited. When it attains normal operation the mill will afford a means of grading and classifying Arizona asbestos more accurately than has been possible in the past.


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Pine Top Asbestos Mines began development of a property in the San Carlos Indian Reservation in May 1942, and shipments of fiber were made later in the year. Plans are under way for systematic development of the property and for erection of a mill.

*California.*—Kohler & Chase, 26 O'Farrell St., San Francisco, produced short-fiber chrysotile from its property near Monticello, Napa County. This was the only asbestos-mining activity noted in California during 1942.

*Georgia.*—The only activity reported from Georgia was that of the Powhatan Mining Co., which continued operation of its amphibole asbestos property near Dillard, Rabun County.

*North Carolina.*—Sales of North Carolina amphibole asbestos, only variety mined in the State, were 20 percent greater in 1942 than in 1941. W. T. Hippey and the Powhatan Mining Co. continued to operate their mines in the Micaville area of Yancey County. The Industrial Minerals Corporation (Asheville) began production from a new property near Newdale, Yancey County, early in 1942 and marketed substantial quantities before the end of the year. According to report, the asbestos-bearing rock mass is at least 200 feet wide and 400 feet long. It gives promise of production on a larger scale than is possible at most amphibole deposits.

*Oregon.*—A small quantity of tremolite asbestos was produced from a property owned by Mrs. Flora Winsenberg (Azalea, Oreg.) near Rogue River, Jackson County.

*Vermont.*—The Vermont Asbestos Mines Division of the Ruberoid Co. (500 Fifth Ave., New York, N. Y.), largest producer of asbestos in the United States, continued to operate its open-pit mine and well-equipped mill near Eden, Lamoille County. Shingle stock and molded brake-lining fiber are important products, but several shorter grades are produced in large quantities. The volume of output was somewhat lower than in 1941.

## TRENDS IN CONSUMPTION

Trends in the asbestos-products industries during recent years are indicated in the following table.

*Raw asbestos consumed in the United States and asbestos products manufactured in and exported from the United States, 1937–42*

| Year | Raw asbestos—apparent consumption (short tons) | Asbestos products— | | Year | Raw asbestos—apparent consumption (short tons) | Asbestos products— | |
|---|---|---|---|---|---|---|---|
| | | Manufactured [1] | Exported [2] | | | Manufactured [1] | Exported [2] |
| 1937 | 316,263 | $96,347,570 | $3,047,078 | 1940 | 262,199 | (4) | $3,473,248 |
| 1938 | 187,150 | (4) | 2,533,916 | 1941 | [3] 438,741 | (4) | 4,835,194 |
| 1939 | 255,547 | 97,944,735 | 3,354,920 | 1942 | 434,121 | (4) | 5,114,496 |

[1] Figures of Bureau of the Census (collected biennially for odd years) include value of certain gaskets, packing, and similar products in which little asbestos was employed.
[2] Compiled from records of the Department of Commerce.
[3] Revised figures.
[4] Data not available.

Under normal conditions the consumption of asbestos is governed to quite an extent by the number of automobiles manufactured, be-


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cause all kinds of automotive transport equipment require asbestos brake bands and clutch facings. During 1942 the manufacture of automobiles was virtually suspended and therefore ceased to be a market indicator. Activity in building construction also influences asbestos sales, because asbestos heat-insulation and fireproofing materials as well as asbestos-cement building materials (such as shingles, siding, and wallboard) are used extensively. Private building declined greatly in 1942, but military construction (including defense housing) was very active and was responsible for large sales of asbestos products. Industrial activity, which maintained a very high level, involved extensive power-plant construction. Large quantities of packings, gaskets, boiler lagging, and pipe covering were consumed in these plants and in multitudes of munition factories. Asbestos is an essential raw material for ship construction, and the rapid expansion of the Navy and Merchant Marine accounted for a large proportion of the sales of high-grade fibers during 1942. Figure 1 shows the relationship of asbestos consumption to building construction and industrial activity for a period of years. It is evident that asbestos consumption is related more closely to industrial activity than to building construction.

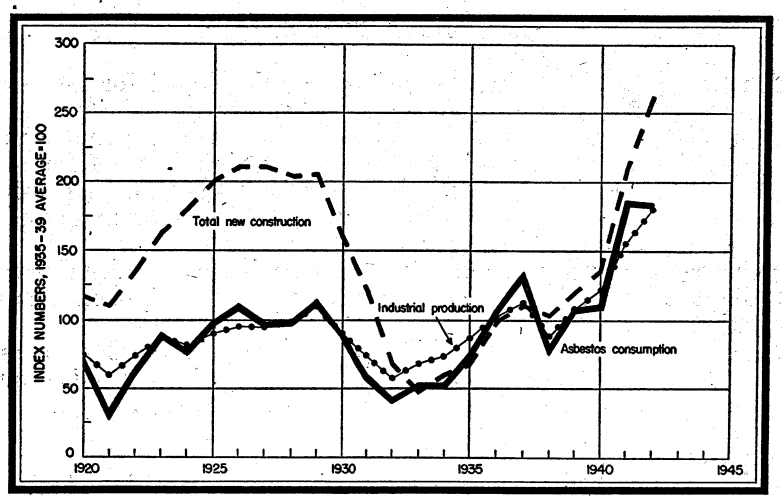



FIGURE 1.—Consumption of asbestos compared with total new construction and industrial production, 1920–42. Units are reduced to percentages of the 1935–39 average. Statistics on the value of construction from the Bureau of Foreign and Domestic Commerce and on industrial production from the Federal Reserve Board.

## MARKET CONDITIONS

Over-all market demands for asbestos, which surpassed in 1941 all previous records, declined slightly in 1942. Needs in the automobile industry were confined largely to replacements, but loss of market in this field was compensated by the growing demands of the war program. Civilian uses of the more critical grades were restricted to insure adequate supplies for war needs. The demand for spinning fibers was very strong and threatened to outstrip the supply during the latter part of the year.


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### PRICES

Prices for asbestos are quoted upon a short-ton basis from Metal and Mineral Markets, published by the McGraw-Hill Publishing Co., Inc., New York City. Canadian prices are f. o. b. Quebec mines, tax and bags included; Vermont prices are f. o. b. mines, Hyde Park, Vt.

Prices of all Canadian fibers remained at the levels of 1941, as quoted in Minerals Yearbook for that year, until April 1942, when all grades except Crude No. 1 were advanced as follows and remained constant thereafter: Crude No. 1, $650–$750; Crude No. 2 and sundry crudes, $165–$385; spinning fibers, $124–$233; magnesia, and compressed sheet fibers, $124–$146.50; shingle stock, $62.50–$85; paper stock, $44–$49; cement stock, $28.50–$33; floats, $19.50–$21; and shorts, $14.50–$26.50. Canadian prices are in United States dollars.

African and Russian fibers were not quoted during 1942.

In April 1942 prices of all grades of Vermont fibers were advanced substantially from 1941 figures. Quotations from April to the end of the year were as follows: Shingle stock, $62.50–$65.50; paper stock, $44–$53; waste, $33; shorts, $14.50–$28.50; and floats, $19.50.

### NEW DEVELOPMENTS

A new type of block insulation has been developed for uses similar to those of 85-percent magnesia. It consists of amosite asbestos with a binder but contains no magnesia—an advantage under present conditions, when there is an abnormally high demand for magnesia to be used in making refractories and metallic magnesium. The new product compares favorably with 85-percent magnesia in thermal conductivity, shrinkage, and strength.

Venezuela's new asbestos mill near Tinaquillo was under construction in 1942 but owing to difficulties in securing equipment was not completed.

Blue asbestos is now mined in a small way in the Hammersley Ranges of Western Australia. Hand-cobbed fiber is of excellent quality, commanding about $300 a ton at American ports. Supplies from this source are not great because the deposits are in very rough country where transportation facilities are inadequate.

It is reported that Germany is obtaining small quantities of asbestos in Norway. The small pre-war output of Finland, Italy, and Czechoslovakia would be entirely inadequate for German war needs. No data are available on the increased output from the small known sources of asbestos in Central Europe or the extent of reserve stocks held by Germany, and only meager information is at hand on substitute materials.

An asbestos-graphite lightweight molded product has been developed recently and sold under the trade name "seybolite." It is highly resistant to moisture, acids, alkalies, and fire. Suggested uses include molded seamless conduits, chemical containers, and fireproof panels for ships, trucks, and airplanes.

A new lightweight asbestos fabric sold under the trade name "asbeston" is taking the place of critical metals in aircraft fittings, such as carburetor-intake attachments, heater-hose nozzles, and defrosters.


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## FOREIGN TRADE [1]

The following table shows imports of unmanufactured asbestos into the United States in 1941 and 1942. The volume of imports in 1942 was virtually unchanged from 1941. Imports from Africa were only slightly lower than in 1941 even though ship sinkings caused several serious losses. As most of the African fibers are of strategic grades, it is highly desirable to maintain imports at undiminished levels. Canadian imports fell a little below those of 1941, but the value of imports was more than 3 million dollars higher, due chiefly to advance in prices; larger purchases of the better grades of fibers probably accounted for some of the increase.

*Asbestos (unmanufactured) imported for consumption in the United States, 1941–42, by countries and classes*

| Country | Crude (including blue fiber) | | Mill fibers | | Short fibers [1] | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Short tons | Value | Short tons | Value | Short tons | Value | Short tons | Value |
| 1941 | | | | | | | | |
| Africa: | | | | | | | | |
| Union of South Africa | 21,447 | $2,075,360 | | | | | 21,447 | $2,075,360 |
| "Other British" | 8,234 | 1,273,203 | | | | | 8,234 | 1,273,203 |
| Australia | 62 | 12,769 | | | | | 62 | 12,769 |
| Bolivia | 22 | 2,504 | | | | | 22 | 2,504 |
| Brazil | | | | | 4 | $142 | 4 | 142 |
| Canada | 3,362 | 889,291 | 163,631 | $9,401,893 | 222,398 | 4,240,759 | 389,391 | 14,531,943 |
| India, British | 35 | 12,646 | | | | | 35 | 12,646 |
| United Kingdom | 1 | 510 | | | | | 1 | 510 |
| | 33,163 | 4,266,283 | 163,631 | 9,401,893 | 222,402 | 4,240,901 | 419,196 | 17,909,077 |
| 1942 | | | | | | | | |
| Africa: | | | | | | | | |
| Union of South Africa | 20,424 | 1,940,143 | | | | | 20,424 | 1,940,143 |
| "Other British" | 8,665 | 1,386,782 | | | | | 8,665 | 1,386,782 |
| Australia | 35 | 6,879 | | | | | 35 | 6,879 |
| Bolivia | 16 | 2,093 | | | | | 16 | 2,093 |
| Canada | 2,959 | 1,146,778 | 165,088 | 11,407,510 | 218,600 | 5,063,349 | 386,647 | 17,617,637 |
| India and Dependencies (British India) | 17 | 9,255 | | | | | 17 | 9,255 |
| U. S. S. R. | 673 | 56,552 | 2,937 | 215,925 | | | 3,610 | 272,477 |
| | 32,789 | 4,548,482 | 168,025 | 11,623,435 | 218,600 | 5,063,349 | 419,414 | 21,235,266 |

[1] Asbestos, n. e. s., containing not over 15 percent foreign matter.

The following table shows imports and exports of unmanufactured asbestos for the 5-year period 1938–42.

*Asbestos (unmanufactured) imported for consumption in and exported from the United States, 1938–42*

| Year | Imports | | Exports | |
|---|---|---|---|---|
| | Short tons | Value | Short tons | Value |
| 1938 | 179,490 | $6,160,602 | 2,780 | $288,617 |
| 1939 | 242,561 | 9,094,538 | 2,473 | 218,830 |
| 1940 | 246,613 | 10,034,433 | 4,474 | 449,105 |
| 1941 | 419,196 | 17,909,077 | 4,846 | 325,825 |
| 1942 | 419,414 | 21,235,266 | 774 | 134,083 |

[1] Figures on imports and exports compiled by M. B. Price, of the Bureau of Mines, from records of the Department of Commerce.


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The following table shows exports of asbestos products in 1941 and 1942.

*Manufactured asbestos products exported from the United States, 1941–42, by kinds*

| Product | 1941 | | 1942 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| Brake lining: | | | | |
| Molded and semimolded, short tons | (1) | $1,150,386 | 1,810 | $1,706,624 |
| Not molded, linear feet | 1,277,562 | 285,192 | 749,449 | 283,900 |
| Clutch facing, number | 1,006,371 | 364,420 | 1,431,512 | 558,190 |
| Paper, millboard, and roll board, short tons | 1,540 | 212,157 | 679 | 102,660 |
| Pipe covering and cement, do | 1,187 | 136,501 | 1,063 | 135,158 |
| Textiles, yarn, and packing, do | 1,556 | 1,356,793 | 1,017 | 1,154,241 |
| Asbestos roofing, squares | 82,149 | 334,246 | 97,668 | 169,331 |
| Other asbestos manufactures, except roofing, short tons | 4,431 | 679,466 | 3,000 | 778,547 |
| Magnesia and manufactures, do | 2,155 | 316,033 | 1,305 | 225,845 |
| | | 4,835,194 | | 5,114,496 |

[1] Quantity not recorded.

## WORLD PRODUCTION

The following table shows production of asbestos throughout the world, by countries, from 1937 to 1942, insofar as figures are available.

*World production of asbestos, 1937–42, by countries, in metric tons* [1]

[Compiled by B. B. Waldbauer]

| Country [1] | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 |
|---|---|---|---|---|---|---|
| Argentina | | | 110 | 150 | 84 | (2) |
| Australia: | | | | | | |
| South Australia | 123 | 49 | 46 | 119 | 152 | (2) |
| Tasmania | 2 | 4 | | | (2) | (2) |
| Western Australia | 43 | 123 | 279 | 364 | (2) | (2) |
| Bolivia | 21 | 21 | [3] 2 | [3] 71 | [3] 211 | [3] 58 |
| Brazil | | 120 | 45 | 500 | [3] 13 | (2) |
| Canada [4] | 371,967 | 262,894 | 330,642 | 313,504 | 433,492 | 398,669 |
| China | (2) | (2) | (2) | 100 | (2) | (2) |
| Chosen | 70 | (2) | (2) | (2) | (2) | (2) |
| Cyprus (exports) | 11,892 | 5,668 | 9,970 | 9,652 | (2) | (2) |
| Finland [5] | 7,260 | (2) | (2) | (2) | (2) | (2) |
| France | 250 | (2) | (2) | (2) | (2) | (2) |
| Greece | 2 | 85 | (2) | (2) | (2) | (2) |
| India, British | 102 | 90 | 266 | [6] 1 | [6] 32 | [6] 15 |
| Indochina | 5 | | (2) | (2) | (2) | (2) |
| Italy | 6,393 | 6,860 | (2) | (2) | (2) | (2) |
| Japan (approximate) | 1,000 | 1,000 | 1,000 | 1,000 | (2) | (2) |
| Kenya Colony | | 5 | (2) | (2) | (2) | (2) |
| New Zealand | (2) | (2) | (2) | | 54 | (2) |
| Southern Rhodesia | 51,722 | 53,352 | 52,900 | [7] 22,127 | (2) | (2) |
| Swaziland | | | 7,233 | 18,873 | (2) | (2) |
| Turkey | 157 | 668 | 88 | (2) | (2) | (2) |
| Uganda | | 53 | (2) | (2) | (2) | (2) |
| Union of South Africa | 25,975 | 21,025 | 20,003 | 24,849 | [8] 25,400 | [8] 31,000 |
| U. S. S. R. | 125,000 | 86,000 | (2) | (2) | (2) | (2) |
| United States (sold or used by producers) | 10,958 | 9,471 | 14,024 | 18,198 | 22,127 | 14,044 |
| Venezuela | (2) | (2) | (2) | 20 | (2) | (2) |

[1] In addition to countries listed, asbestos is produced in Bulgaria, Czechoslovakia, and Madagascar.
[2] Data not available.
[3] Exports.
[4] Exclusive of sand, gravel, and stone (waste rock only), production of which is reported as follows: 1937, 3,611 tons; 1938, 2,975 tons; 1939, 3,535 tons; 1940–42, data not available.
[5] Includes asbestos flour.
[6] Imports into United States.
[7] January to May, inclusive.
[8] Preliminary.


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## CANADA

Canadian mines and mills were operating virtually at capacity during 1942. Supplies of mill fibers were ample for United States requirements, but a possible shortage of No. 2 crude was threatened during the latter part of the year. It is claimed that the percentage of crude fibers recovered in the Quebec mines is declining, and the cause of the decline is attributed to the method of mining. Several of the larger mines now employ the block-caving method, which involves undermining great masses of asbestos-bearing rock and removing the broken stone from tunnels underneath the rock mass. The block of stone is shattered under the stress of forces set up as it settles unevenly; and as the fiber veins are planes of weakness, shatter cracks tend to follow the veins, breaking them up in such a manner that much of the fiber—formerly hand-cobbed as crudes—is mixed with the rock and recovered later as mill fiber. The United States is so dependent on Canada for its high-grade fibers that all such trends must be followed closely.

The following figures have been released by the Department of Mines, Province of Quebec, for strictly confidential use.

*Sales of asbestos in Canada, 1941–42, by grades*

| | 1941 | | | 1942 | | |
|---|---|---|---|---|---|---|
| | Short tons | Value | | Short tons | Value | |
| | | Total | Average per ton | | Total | Average per ton |
| Grade: | | | | | | |
| Crudes | 2,845 | $980,217 | $344.54 | 2,890 | $1,233,184 | $426.71 |
| Fibers | 223,767 | 14,812,871 | 66.20 | 199,829 | 15,339,128 | 76.76 |
| Shorts | 251,234 | 5,675,752 | 22.59 | 236,741 | 6,090,971 | 25.73 |
| | 477,846 | 21,468,840 | 44.93 | 439,460 | 22,663,283 | 51.57 |
| Rock mined | 7,712,367 | | | 8,233,516 | | |
| Rock milled | 6,366,670 | | | 6,795,459 | | |

## AFRICA

*Southern Rhodesia.*—The Shabani mine has been an important producer for many years and is probably producing at near maximum capacity. Other smaller mines add to the supply. Because of war restrictions, no figures of output have been released since May 1940.

*Union of South Africa.*—The Union of South Africa is unique in that it produces five kinds of asbestos—chrysotile, crocidolite, amosite, anthophyllite, and tremolite. The last two varieties are produced in small amounts, for local use only. Some years ago there was a large production of chrysotile from the Amianthus and Munnik Myburgh mines in the Kaapsche Hoop district of eastern Transvaal. The mines are now virtually worked out, but the loss from these sources is more than compensated by production from the recently developed Havelock mine in Swaziland, which has an annual output exceeding 24,000 tons of high-grade fiber.

Although exports of amosite and blue asbestos were considerably higher in 1942 than in 1941, stocks at the mills were maintained at normal levels. Added equipment has increased mill capacity.


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The best blue fiber (crocidolite) occurs in the Prieska and Kuruman districts of Cape Province, where the largest production is centered. A small output is obtained in the Pietersburg district of Transvaal. The workings are shallow, and the product is less desirable than the Cape blue.

The following table shows production during recent years. Production in 1942 exceeded all previous records.

*Asbestos produced in the Union of South Africa, 1938–42, by sources*

| Year | Short tons | | | | Total value [1] |
|---|---|---|---|---|---|
| | Transvaal | Cape Province | Natal | Total | |
| 1938 | 16,505 | 6,484 | [2] 187 | [2] 23,176 | £416,401 |
| 1939 | 15,827 | 6,144 | 79 | 22,050 | 517,535 |
| 1940 | 21,011 | 6,381 | [3] | [3] 27,392 | 492,125 |
| 1941 | [4] 18,028 | [4] 5,408 | [3] | [5] 28,000 | [6] |
| 1942 | [7] 20,440 | [7] 5,281 | [3] | [5] 34,000 | [6] |

[1] Value of local sales plus value of exports.
[2] Small production in Natal in December 1936 and in 1937 included in 1938 figures.
[3] Data for Natal not available.
[4] January to October, inclusive.
[5] Preliminary.
[6] Data not available.
[7] January to September, inclusive.

The following table shows the tonnage of each variety produced from 1938 to 1942, insofar as data are available.

*Asbestos produced in the Union of South Africa, 1938–42, by varieties and sources, in short tons*

| Variety and source | 1938 [1] | 1939 [2] | 1940 [2] | 1941 | 1942 |
|---|---|---|---|---|---|
| Amosite (Transvaal) | 8,793 | 11,299 | 17,767 | [3] 15,886 | [4] 18,675 |
| Chrysotile (Transvaal) | [5] 5,573 | [5] 612 | 646 | [3] 1,408 | [4] 1,469 |
| Blue (Transvaal) | 2,326 | 3,983 | 2,520 | [3] 675 | [4] 231 |
| Blue (Cape) | 6,484 | 6,144 | 6,381 | [3] 5,408 | [4] 5,281 |
| Anthophyllite (Transvaal) | ---------- | 12 | 78 | [3] 59 | [4] 65 |
| | 23,176 | 22,050 | 27,392 | [6] 28,000 | [6] 34,000 |

[1] Data from Union of South Africa, Department of Mines, Monthly Reports.
[2] Data from Union of South Africa, Department of Mines, Quarterly Reports.
[3] January to October, inclusive.
[4] January to September, inclusive.
[5] Includes 187 tons in 1938 and 79 tons in 1939 produced in Natal.
[6] Preliminary.

## SOVIET RUSSIA

Nearly all the Russian asbestos produced originates in the Bajenova district of the Urals, where there are both mines and mills. No production statistics are available since 1938, when an output of 86,000 metric tons was reported. Under the third Five-Year-Plan, an expansion of production capacity to 220,000 metric tons a year was contemplated. Such an objective was expected to be attained in 1942. The bulk of the output would, as heretofore, be used in domestic asbestos-products plants. Among world producers the Soviet Union stands next to Canada on a tonnage basis, but, like Canada, a large share of the output consists of the shorter grades.


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Canada's shorter grades find ready market in nearby United States, but in Soviet Russia the short fibers are consumed by large domestic asbestos-products manufacturing industries. The Russian industry probably has expanded greatly to provide brake bands and clutch facings for the Union's growing automotive transport system and to furnish gaskets, packings, and heat insulation for its numerous immense munition factories. Russian reserves are estimated at 18,000,000 tons of fiber.

### OTHER COUNTRIES

In addition to the blue asbestos in Western Australia, mentioned under New Developments, other deposits have been discovered on the Australian Continent. A deposit of asbestos—probably chrysotile as it occurs in serpentine rock—has been found on the western shore of Macquarie Harbor about 18 miles from Strahan, Tasmania. The occurrences are conveniently situated for transport, being 4 miles from the Gordon River, which is navigable. Preliminary prospecting and testing have been conducted over an area of 300 acres.

Extensive occurrences of high-grade asbestos are reported on South Island, New Zealand, but are too inaccessible for development at present. Presumably, the necessary fiber will be obtained from Australian mines. One asbestos-cement-products plant is operated in New Zealand, and a second plant is contemplated because of a shortage of roofing and other building materials.

Considerable interest has centered recently on asbestos occurrences in Latin America. Reference has been made under New Developments to a large deposit of chrysotile in Venezuela. A deposit of blue asbestos has been known for many years in Bolivia and has been worked in a small way at intervals, but the quality is inferior to that of African blue. Small tonnages of asbestos are produced in Argentina for local use.

According to recent reports an asbestos-cement-products industry will soon be established in the State of Minas Gerais, Brazil. The factory presumably will be located at an asbestos mine that is about to be developed, but information regarding a more exact location is not yet available. A sample of the asbestos submitted to the Bureau of Mines appeared to consist of strong, flexible fibers of tremolite, but they were positively identified by the Geological Survey as anthophyllite. The occurrence of this variety of asbestos in fibers comparable in strength with chrysotile or high-grade tremolite is very unusual. Asbestos-cement board will be one of the chief products of the new factory; and, although anthophyllite found in the United States is unsuitable for such use, the Brazilian product seems to have suitable qualities. The entire output of the mine probably will be used in the local plant.

Samples of chrysotile of good strength and flexibility were received by the Bureau of Mines in 1942 from a deposit reported to be in the Department of Junin, Peru, on the eastern slope of the Andes.

During 1942 the Bureau of Mines received samples of fair-quality chrysotile asbestos from deposits in Mexico, somewhere in the vicinity of the Laredo-Mexico City highway. The asbestos-bearing rock is said to be an outcrop of serpentine 10 kilometers long and 1.5 kilometers wide, in which more than 20 fiber veins occur. Some of the samples

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examined by the Bureau of Mines consisted of cross-fiber veins of spinning fiber comparable in quality with Canadian asbestos, except that they were stained and discolored. This condition probably was due to surface alteration.

Chrysotile asbestos was discovered in Turkey in 1934. According to Turkish authorities, the deposit is between Karakose and Kogizman in the vilayet of Agri. Because of remoteness and technical difficulties, it has not been developed. Short-fiber asbestos suitable only for asbestos-cement products and insulation is produced in small quantities in the Eskisehir region. It is reported that small shipments were made to Germany and Hungary in 1942.

A small output of asbestos was reported from the Macheria deposit, Algeria, in 1942. No information is available on the variety or quality of the fiber.

Cyprus normally produces several thousand tons of short-fiber chrysotile a year, and as there is virtually no local market the entire output is exported. Shipping conditions were quite difficult in the Mediterranean Sea during 1942, and presumably the Cyprus industry has been relatively inactive. As no new data have been obtained, the table that appeared in Minerals Yearbook, 1941, has not been repeated in this chapter.


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