POLITICAL AND COMMERCIAL GEOLOGY

AND THE

WORLD'S MINERAL RESOURCES

A SERIES OF STUDIES BY SPECIALISTS

J. E. SPURR, EDITOR

FIRST EDITION
SECOND IMPRESSION

Royalties received from the sale of this book will be assigned to an institution of learning to finance further studies along the lines followed in the volume.

McGRAW-HILL BOOK COMPANY, INC.
NEW YORK: 370 SEVENTH AVENUE
LONDON: 6 & 8 BOUVERIE ST., E. C. 4
1920

Political and Commercial Geology and the World's Mineral Resources: Chapter X... Published by AsbestosClaims.Law
ACL Doc 21259 · Page 1 of 9 asbestosclaims.law/library/21259/1

POLITICAL AND COMMERCIAL GEOLOGY

AND THE

WORLD'S MINERAL RESOURCES

Published by AsbestosClaims.Law
asbestosclaims.law/library/21259/2

CHAPTER XXIV

ASBESTOS

By Oliver Bowles

USES OF ASBESTOS

Asbestos is useful because of its incombustibility, insulating qualities, and fibrous structure. High-grade asbestos is spun or woven into ropes and fabrics, the fabrics being used for many purposes, such as safety curtains, mats, mattresses, upholstering, firemen's suits and gloves, Of late years much high-grade asbestos has been used for friction facings in brakes and for packings. Low-grade asbestos is used for a great many purposes, which may be classed in three groups—building, insulating, and miscellaneous.

For building purposes asbestos is employed in many ways. A mixture of asbestos and cement is used to make fireproof shingles or slates. Asbestos is also used with Portland cement to make a protective surface on metal sheathing; asbestos paper is used for weather and sound proofing and also for fire-protection purposes. It is used widely for plaster, which not only is fireproof but also improves the acoustic properties of auditoriums, churches, etc. Asbestos is also used for floor tiling and in the manufacture of paints. Asbestos lumber and millboard are employed for many structural purposes.

Asbestos cement, a mixture of asbestos fiber and clay, is much used as a covering for boilers and steam pipes to prevent heat radiation. Other coverings are made from a mixture of asbestos and magnesia. Varieties of asbestos having a low iron content are useful for electrical insulating purposes.

Some of the many miscellaneous uses of asbestos are for fire brick, acid filters, lead-fume collectors, stove mats, cooking-utensil linings, etc.

The most essential of the above uses are those in which the long-fiber asbestos is employed. For fireproof ropes and fabrics nothing can take its place. Its use in friction facings for brakes is essential in all motor vehicles.

The uses for which low-grade asbestos is employed may be regarded as less essential and might be eliminated in case of necessity, though such elimination would no doubt involve many serious difficulties. Fire risk would thereby be increased and many boilers and heating plants would be rendered less efficient and more wasteful, though these difficulties could be overcome to some degree by the use of substitutes.

Substitutes.—Slag wool or mineral wool is a fireproof material and a good non-conductor of heat and sound. It is also highly porous, and hence it is useful as an absorbent. It can, therefore, be used to some extent as a substitute for asbestos for heat insulation and fireproofing. However, as it is brittle and cannot be woven as readily as asbestos, it is not to be regarded as a satisfactory substitute for the higher grades. Talc may be employed in the manufacture of fireproof and corrosive-proof paints, and also as a lining for furnaces and fireplaces. Infusorial earth is used to some extent as a substitute for asbestos for insulating and fireproofing. But it is important to note that none of the substitutes mentioned above can replace the high-grade spinning fiber.

CHANGES IN PRACTICE

As has been indicated, there is a probability of the demand for asbestos increasing. The wide use of motor-transport equipment demands a large amount of high-grade fiber for brake linings, while the increasing use of steam equipment, and electrical equipment and appliances, demands more and more material, both for electrical and heat-insulating purposes. Although substitutes may be employed for the lower grades, no substitutes are known for the spinning grades of asbestos, which are now in strongest demand. Consequently there are no changes in practice that will reduce the demand for asbestos.

GEOLOGICAL DISTRIBUTION

Asbestos originates for the most part from rocks consisting largely of olivine, such as peridotites or dunites, or from rocks consisting largely of pyroxene. Hence it is only in altered rocks of this nature that asbestos of the common types is to be expected. Two distinct types of alteration are common: Alteration of the olivine or pyroxene to serpentine, with development of chrysotile in places; and alteration of olivine or pyroxene to amphibole with development of anthophyllite (a variety of amphibole) and related forms. Both types of alteration are well represented in the great North American belt of asbestos-bearing peridotites that extends from central Alabama along the Piedmont Plateau to the Gaspé Peninsula of Quebec, a distance of more than 1,600 miles. In the northern part of the belt, in Vermont and Quebec, the alteration has been to serpentine with chrysotile asbestos in places, while in the southern part the alteration has been largely to amphibolite with development of anthophyllite asbestos and talc.

Chrysotile asbestos (Quebec type), as represented in most deposits, is formed by serpentinization, with subsequent prismatic crystallization in cracks, the veins thus formed representing a recrystallization along the

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920)
Published by AsbestosClaims.Law
ACL Doc 21259 · Page 3 of 9
asbestosclaims.law/library/21259/3

walls and thus being replacement veins rather than fissure veins. Contact metamorphism evidently plays an important part in the process, for in most regions intrusive dikes are associated with the deposits and evidently had a definite influence on the development of the commercial product. As serpentinization is a deep-seated process, chrysotile deposits may occur at considerable depth.

Anthophyllite asbestos (Georgia type) results from alteration of peridotites or pyroxenites to amphibole, giving the fibrous anthophyllite and related forms. This type of asbestos does not occur in veins but constitutes the major part of the rock mass.

While the modes of alteration noted above account for most of the asbestos deposits known, there are two important exceptions—the crocidolite, or blue asbestos, of South Africa, and the chrysotile deposits of Arizona, both of which occur in sedimentary rocks. Crocidolite is interbedded in jasper and ironstone, and the Arizona chrysotile has resulted from the alteration of cherty limestone influenced to some extent by the action of diabase intrusions.

As pointed out in the discussion of uses, for various select purposes anthophyllite cannot be employed as a substitute for chrysotile of spinning grade. As the uses of anthophyllite are thus restricted, and as the supply seems to be ample for many years to come, the problem of supply centers about the deposits of high-grade chrysotile.

Deposits of serpentinized basic rocks are by no means rare, and even the development of a fibrous structure is common, but in all chrysotile-bearing deposits only a small part of the serpentine is fibrous, and of the fibrous part only a small percentage can be utilized as high-grade asbestos. The value of deposits of most ores depends largely on the percentage of metal and of impurities present, and little attention need be given to the physical character of an ore. The value of asbestos, however, depends not only on purity of composition, but on very definite physical properties, such as length of fiber, flexibility, and tensile strength. Such properties result from a combination of favorable conditions of crystallization, conditions that are at present little understood.

A large body of serpentinized basic rock bears, therefore, no certain promise of an asbestos supply, though it may offer encouragement for prospecting. High-grade fiber is evidently formed under a peculiar combination of geologic conditions which involve the presence of certain primary rock types, their alteration to secondary minerals and recrystallization of these in veins, such recrystallization being induced by a combination of metamorphic agencies. Although it is quite probable, therefore, that new fields will be discovered, there is no probability of an abundant supply.

An important point to be considered in connection with future supplies is that for most uses of asbestos there is little or no scrap recovery;

that which is once used is for the most part gone beyond recall. It is wise, therefore, to maintain a conservative view of the asbestos reserve, for although there is evidence of a supply in the Canadian deposits and elsewhere to last for many years, the probability is that deposits of high-grade material are neither numerous nor extensive.

The total production and estimated reserves of spinning asbestos in the important producing countries are shown in Figure 13.

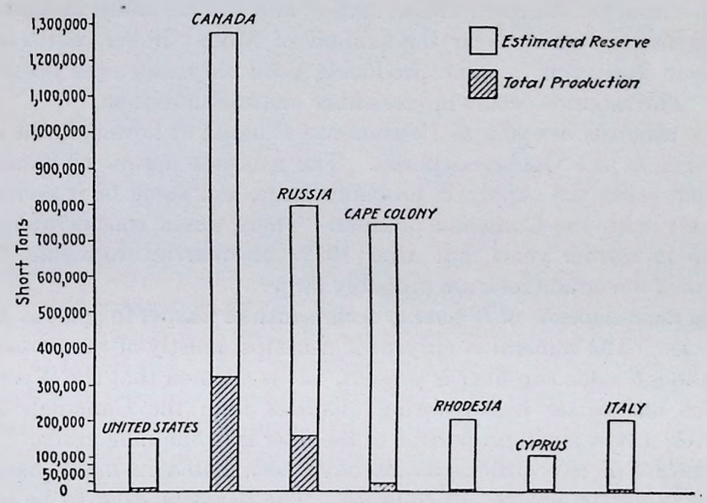


FIG. 13.—Total production and estimated reserves of spinning asbestos.

GEOGRAPHICAL DISTRIBUTION

United States.—Asbestos in the United States is of two types, chrysotile and anthophyllite. The chrysotile variety occurs in Arizona, Vermont, Wyoming, and California, and the anthophyllite in Georgia, Virginia, Maryland, Massachusetts, Connecticut, Rhode Island, and Idaho.

Chrysotile Asbestos.—The asbestos deposits of *Arizona* are unusual in being cross-fiber chrysotile veins in cherty limestone, and thus quite distinct in origin from the Quebec deposits. The asbestos-bearing beds are thin and some of them are almost inaccessible.

Asbestos was first discovered in Arizona at two points in the Grand Canyon of the Colorado, west of the mouth of the Little Colorado River. The mineral occurs in a single bed, 12 to 14 inches thick, the veins being parallel with the bedding. In some places the veins are 4 inches thick, but usually they do not exceed 2½ inches. The visible supply, therefore, is not great, and as the district is difficult of access production has been slight. Asbestos also occurs in Ash Creek Canyon near Globe. Production began in 1914, and has increased considerably since. The

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920)
ACL Doc 21259 · Page 4 of 9
Published by AsbestosClaims.Law
asbestosclaims.law/library/21259/4

asbestos carries only 0.5 per cent. iron oxide, while Canadian asbestos runs 2.2 per cent. to 2.6 per cent. iron oxide. The Arizona material is, therefore, superior to Canadian asbestos for electrical insulation. It is estimated that under favorable conditions the region can supply 1,000 tons annually for many years to come, but that the output will never be large as compared with that of Canada. In 1914 an asbestos deposit similar to those of Ash Creek was reported near Young postoffice. It is 80 miles from the nearest railroad station and will probably be inaccessible for many years. Near the summit of Mount Baker, north of the Roosevelt Reservoir, a mine producing good chrysotile was opened in 1917. The asbestos occurs in cross-fiber veins in limestone.

The asbestos deposits of *Vermont* are situated at Lowell, in the same formation as the Quebec deposits. The asbestos occurs in numerous irregular veins, the supply is probably large, and some of it compares favorably with the Canadian product. There was a considerable production in former years, but after 1912 the quarries were idle. The reserves of low-grade rock are probably large.

The main deposits of *Wyoming* occur south of Casper in igneous Archean rocks. The mineral is chrysotile asbestos, mostly of the cross-fiber type, though some slip-fiber is present. It is claimed that the Wyoming asbestos has better heat-resisting qualities than the Canadian fiber. However, a very small proportion of the fiber is of spinning grade.

Deposits of chrysotile asbestos have been noted in many parts of *California*, scattered over 13 counties. The deposits seem to be small, and thus far the production has not exceeded a few tons a year. A small production is recorded for 1917 from Nevada and Inyo counties. There was an increased output in 1918, the total being 229 tons. Some No. 1 spinning fiber was obtained in Nevada County.

Anthophyllite Asbestos.—The anthophyllite asbestos deposits in *Georgia* yield the largest production of any state in the Union. The material is not of spinning grade and is practically all used for fireproofing and insulating. There is a considerable demand for such material, however, and the industry is established on a firm basis. A notable feature of the Georgia deposits is that approximately 95 per cent. of the rock quarried is fibrous anthophyllite of commercial quality, whereas in Quebec only about 6½ per cent. of the material quarried can be utilized.

Anthophyllite asbestos deposits occur in *Virginia* near Bedford. The material is low-grade and the amount is probably small. A little is consumed in the manufacture of "tenax," a preparation used by dentists. Amphibole slip-fiber asbestos has lately been mined on a small scale in *Maryland*, near Pylesville. It is used for filters. Several years ago a small production was recorded from Dalton, *Massachusetts*, and New Hartford, *Connecticut*.

Anthophyllite asbestos occurs in *Idaho*, near Kamiah. It is not of spinning grade, is of low tensile strength, and is inferior to all but the lowest grades of chrysotile. The deposit is evidently large, but the production is almost negligible.

Canada and Newfoundland.—The most important asbestos-producing deposits of the world are those of the province of *Quebec*, Canada, chiefly in the region of Thetford and Broughton. Asbestos occurs in serpentine of Cambrian age, the area in which the important mines are found extending from southern Vermont to Gaspé, in the Province of Quebec. The serpentine lies in three prominent belts. The Danville-Eastman-Vermont serpentine belt is about 62 miles long. The scattered outcrops probably are connected beneath the heavy drift deposits and forest growth. Prospects have been worked in six places, but the production attained is small. The belt is an uncertain quantity, that gives fair promise of a large future supply.

The Thetford-Black Lake area is the important area of Quebec and now the most productive asbestos district of the world. In 1917 there were 17 active mines in the district. In 1918 the quantity of rock mined was 2,445,745 tons, and the total asbestos production was 159,225 tons, valued at $9,053,945. The Broughton and the central and eastern Thetford areas are mainly slip-fiber asbestos. The West Thetford, South Ireland, and North Coleraine Township deposits constitute the vein-fiber belt which yields the high-grade spinning asbestos that has a world-wide reputation.

Serpentine rocks bearing chrysotile asbestos are reported near Port au Port, in *Newfoundland*, probably representing a continuation of the Quebec belt. The possibility of commercial development is uncertain.

Mexico, Central and South America.—Asbestos deposits have been reported in *Brazil*, but aside from this no commercial deposits have been noted in South America.

There is no record of asbestos deposits in Mexico or in Central America.

Europe.—The absestos deposits of *Russia* probably rank next to those of Canada. The principal mines are 57 miles north of Ekaterinburg, in the Ural Mountains. The quarries can be worked only from May to November in each year. Transportation is over the Perm Railroad, and the output is exported via Riga. The fiber is of the same type as the Canadian, a chrysotile asbestos, chiefly of the cross-fiber type. The richest ore yields 42 to 55 pounds of asbestos per cubic yard. Production has also been reported by the South Urals Asbestos Co., operating in the Orsk district, in Orenburg. Russian asbestos is said to be harsher than Canadian and less suitable for spinning, but a great deal of high-grade fiber has been produced and Russia is likely to be an important future source of asbestos.

The asbestos of *Italy* is of the anthophyllite variety. There are three main districts: the Susa Valley deposits, near the French border,

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920) Published by AsbestosClaims.Law
ACL Doc 21259 · Page 5 of 9 asbestosclaims.law/library/21259/5

which lie 6,000 to 10,000 feet above sea level and are, therefore, not readily available; the Aosta Valley deposits, of wide extent, with long-fibered, strong, and soapy product; and the deposits in Lombardy, also of great extent. Italian asbestos may be used to some extent as a substitute for Canadian fiber, or to mix with it, but the supply of high-grade fiber is not great, and it is more difficult and expensive to work than the Canadian material. The United Asbestos Co., of London, England, is the largest producer.

Large deposits of asbestos are known on the island of *Cyprus*. The material is derived from serpentine and is of the amphibole anthophyllite type. Much of it is short-fibered but some of it can be used to mix with Canadian fiber.

Good spinning asbestos has been noted in central *Finland* but production up to the present time is almost negligible.

Asbestos deposits have been noted in *England, Scotland, Ireland, France, Portugal, Spain, Switzerland, Germany, Norway, Greece,* and *Turkey,* but all the above deposits are said to consist of coarse and brittle material of little commercial value. A large deposit of good asbestos is reported in the island of *Corsica.*

Asia.—Deposits are known in various districts of *India.* Asbestos is also reported in *Afghanistan.* Indian asbestos is of inferior tensile strength, and the lack of development renders it an uncertain resource.

The United States Geological Survey reported in 1912 that three asbestos mines were in operation 45 miles northeast of Antung, *China.* The product, which was shipped into Manchuria, is of the amphibole (anthophyllite) type and quite brittle. Chrysotile asbestos of good quality is reported south of Lake Baikal, in *Mongolia.* It has never been mined, and on account of its remoteness is not likely to be developed. Deposits yielding a small output are reported from several other provinces.

Asbestos deposits occur in several localities in *Japan.* The output is of inferior quality and is mixed with imported material for asbestos packing. The Japan Asbestos Co., of Osaka, is the chief manufacturer of asbestos products.

Deposits have been opened at Minusinck, on the Yenesei River, in *Siberia,* but production is reported for the year 1905 only. Transportation is difficult.

Africa.—The asbestos of *Cape Colony* is crocidolite, or blue asbestos; it is of the amphibole type and will not bear high temperature, probably on account of its iron content, but is longer, stronger, finer, and more elastic than chrysotile. On account of its low fusibility it is useful in electric welding. The mineral occurs in three important districts and outcrops at numerous points from the Orange River north to Bechuanaland. Government engineers report it to be the largest asbestos-

bearing area in the world. The principal deposits are at Koejas, where the Cape Asbestos Co., Ltd., produced in 1916 about two-thirds of the total amount of asbestos mined in South Africa. Blue asbestos is gaining favor in foreign markets, and this fact, in connection with the great extent of the deposits, indicates that these deposits constitute an important factor in world supply.

Large and probably extensive deposits of chrysotile asbestos of the finest quality occur in the *Transvaal.* Three companies have recently operated in this district. Production, which began about 1914, in which year 30 tons were reported, had increased to a total of 407 tons in 1916.

A new and important development is the mining of a long-fibered amphibole asbestos known as "amosite."

A small output of asbestos from *Natal* has been reported for several years; however, the fiber is not high grade and an increase of production is not likely.

Important deposits occur in southern *Rhodesia.* The Southern Rhodesia Geological Survey reports that there is in sight several years' supply for an output of 200 tons per month without going deeper than 60 feet. The "probable ore" supply is very great. It has been stated that the Rhodesian fiber is the only class of chrysotile asbestos that can compete successfully with the best grade of Canadian fiber.

Australasia.—A chrysotile-bearing serpentine belt covers a considerable area in *Queensland.* A deposit occurs near Rockwell, *South Australia.* The Australia Asbestos Manufacturing Co. has produced a small amount of material similar to Italian asbestos. A small amount of chrysotile has also been found. A deposit of chrysotile prospected in *New South Wales* is claimed to have the longest asbestos fiber in the world. No production has been reported. In the Pilbarra district, *West Australia,* there is chrysotile asbestos of spinning grade which is said to be superior to either the Russian or Italian product. Some years ago a mine was worked to considerable depth by the Pilbarra Asbestos Co., of London, England, but in recent years the production has been almost negligible. In *New Zealand* chrysotile asbestos of spinning grade occurs in Nelson Province. The Australasian Asbestos Co., of Sydney, has recently prospected the serpentine belt of *Tasmania,* which contains both chrysotile and anthophyllite asbestos.

DEVELOPMENTS AND CHANGES IN DISTRIBUTION OF MINES

The United States leads all nations in the manufacture of asbestos products, and the large supply of asbestos in Quebec is readily available. There is, therefore, little prospect of any radical change in the geographical distribution of American asbestos mines. As there is always a possibility of such changes, however, it is well to consider the controlling factors.

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920)
ACL Doc 21259 · Page 6 of 9
Published by AsbestosClaims.Law
asbestosclaims.law/library/21259/6

As to the future of the Quebec deposits, the present source of supply, little definite information is available. The fact that serpentinization is a deep-seated process has led Canadian geologists to conclude that commercial fiber may be formed to the full depth of the original peridotite rock. For all practical purposes, however, the depth of the deposit is limited to the depth at which asbestos can be extracted profitably. One mine is now working at a depth of 300 feet and drill holes sunk 400 feet farther indicate a thickness of at least 700 feet of good fiber-bearing rock. Cirkel has stated that in one of the Black Lake quarries there is 44,377,500 tons of asbestos rock in sight above the railway tracks, ready for immediate exploitation. A deduction of 50 per cent. for waste rock would leave 22,000,000 tons of mill rock available, or enough to supply for 22 years a plant capable of producing 4,000 tons a day. As this includes only the visible ore it may be inferred that the reserve is very great. Cirkel estimates the total acreage of productive vein fiber as 12,420, of which 1,100 acres is under development at the present time. A geologist who spent two summers studying the geology of the region states that second-grade fiber is very abundant and that the high-grade deposits are not more than 25 per cent. exhausted. There is, therefore, no prospect for many years of any change in the geographical distribution of working mines through the exhaustion of present deposits.

During 1916 and 1917 the production of high-grade fiber in the United States grew steadily, but is still far from meeting domestic demands, as the total United States output in 1917 was only one-eightieth of the amount imported. The most important development has been in the high-grade chrysotile districts of Arizona, but these new deposits do not give promise of an abundant supply, and it is unlikely that they will constitute a dominating factor in American production.

Legislation may have a profound effect on the development of deposits. A high export duty placed on raw asbestos by a country now producing it in large quantities would have the effect of encouraging prospecting in other countries and the development of deposits that might supply substitute material. In this connection it is interesting to note that the Board of Trade of the eastern townships of Quebec proposed measures to protect the export of raw asbestos, in order to force the manufacture of asbestos products in Canada. The Canadian Mining Institute Bulletin (August, 1916) pointed out the dangers of such action, for other countries would immediately search for asbestos deposits elsewhere, and as good asbestos occurs in Russia, South Africa, Cyprus, and other localities, substitutes for Canadian material could probably be found. It is evident, therefore, that Canada does not control the supply, but that so long as Canadian fiber is available at reasonable prices there is no strong incentive for the development of new deposits.

In the Old World the situation is less stable than in America. European countries import considerable material from Canada, and the balance of their requirements is filled from various sources, chiefly from Russia, Cyprus, Italy, South Africa, and Australia. High-grade asbestos deposits exist in various countries and are for the most part developed to a small extent. The factors determining changes in production are somewhat different from those outlined for America. The lack of a strong central government greatly hampers production in any country. Thus under recent conditions in Russia the output fell from nearly 20,000 tons in 1913 to about 9,000 in 1916. Stabilized conditions and more efficient governments would tend to increase the output of several eastern countries. The most important factor contributing to the slow development of the Old World deposits is poor transportation. Russian asbestos for the English market has to pay transportation costs of $25 to $30 per ton. The important crocidolite deposits of South Africa are likewise hampered by poor transportation. Not only are the roads poor, but the most important deposits of Koegas are 18 miles from a traveled road, and other deposits are about 100 miles from roads. This drawback is offset to some extent by cheap labor.

The present political upheaval in Europe, involving the formation of new states and new forms of government, may have a pronounced effect on the development of asbestos deposits, but until progressive governments are established and vast improvements made in transportation, no great increase in production is possible.

POLITICAL AND COMMERCIAL CONTROL

A large share of the asbestos deposits of the world, being situated in British colonial possessions, are under the political control of Great Britain. The deposits of Cyprus are at present under British political control, but this may not be permanent. Before the war, Cyprus was nominally Turkish, though administered by Great Britain; in 1914, Great Britain formally annexed the island. Cyprus was offered to Greece in return for her assistance in the war, but the offer was not accepted.

From information available it is evident that the governments of Russia and Italy have in the past imposed no serious restrictions on the development of their asbestos properties through either domestic or foreign capital.

Below is set forth the commercial control of the asbestos deposits of the world, by countries, in the following order: United States, Canada, Russia, South Africa, Italy, Cyprus, and Australia.

In the Globe district of Arizona, in the *United States*, spinning asbestos is produced by the Johns-Manville Co., working the Snell & Fisk property, and by the American Ores & Asbestos Co. The Sierra Asbestos Co., near Nevada City, California, produced spinning fiber in 1918. As far as

Published by AsbestosClaims.Law
asbestosclaims.law/library/21259/7

is known all the companies operating in the United States are American owned.

The asbestos mining industry in *Canada* is confined to the eastern townships of the Province of Quebec. The largest company is the Asbestos Corporation of Canada, Ltd., with head office in Montreal. This company operates the Kings and Beaver mines, at Thetford Mines, the British Canadian mine, at Black Lake, and the Frazer mine, at East Broughton. The company is controlled by English, Canadian, and United States capital. The Bell Asbestos Mines Co., the Asbestos & Asbestic Corporation, and the Manville Asbestos Co. are wholly or largely owned in the United States. The remaining companies are mostly controlled by English or Canadian capital, though United States interests are represented in some of them. Evidently, therefore, the ownership of the companies is divided between English, Canadian and United States capital, with British interests probably predominating.

The most important of the Ekaterinburg mines in *Russia* are the Voznesensky and Zoc-Anonsky, near Bazhenof. About one-third of the total output of the Urals came from these mines in 1916. It is reported that prior to the war a German syndicate controlled several Russian mines which produced in all more than 80 per cent. of the entire Russian output. Germany and Austria were the chief buyers of Russian asbestos before the war.

In *South Africa* the crocidolite of Cape Colony is mined largely by the Cape Asbestos Co., a British firm with mines at Koegas and Westerberg, and having factories in England, Turin, and Hamburg. A sister company in France, Compagnie Française de l'Amiante du Cap, handled in 1916 about two-thirds of the total South African production and was the chief manufacturer of blue asbestos products. In the Transvaal, asbestos is mined by three companies, The Transvaal Asbestos Syndicate, now absorbed by the Consolidated Gold Fields; the South African Minerals Option Syndicate, a subsidiary of the Bechuanaland Exploration Co., and the Anglo-Swiss Asbestos Co. British capital predominates. The Rhodesia Asbestos Co., Ltd., was the chief Rhodesian producer until recently, but in 1917 the Rhodesia and General Asbestos Corporation was organized with a capital of £400,000 to take over the operating mines. The commercial control is, therefore, British.

The chief producer in *Italy* is the United Asbestos Co., of London, England.

Prior to the war the *Cyprus* deposits were worked by the Cyprian Mining Co., an Austrian corporation. As mining concessions are obtained from the British government by lease on a royalty basis, it is probable that the lease has now been cancelled.

The deposits in *Australasia* are practically all controlled by English or Australian capital.

Mines that have no milling equipment can produce crude fiber which may be treated at manufacturing plants. The various grades of mill fiber may be produced only where mills are located at or near the mines. As the utilization of all grades can be accomplished only with the assistance of mills, such mills are necessary for efficient mining. Consequently, with other factors equal, mines with near-by mills have a distinct commercial advantage over mines that produce crude fiber only. Although mills are not essential factors in the asbestos-mining industry, they exert a secondary influence in commercial control through the increase in mining efficiency that they render possible. For deposits remote from centers of manufacture, mills are of little advantage, as fiber below spinning grade will not bear heavy transportation charges. Most of the United States and Canadian mines have mills for treatment of rock bearing short fiber. Several of the Russian mines are similarly equipped, but in other parts of the world little or no milling is done.

A number of important manufacturers of asbestos products in the United States are owners of or have intimate trade agreements with large Canadian asbestos mines, and also with some of the domestic mines. Hence as regards commercial control the United States is practically assured of a supply of raw material.

POSITION OF LEADING COMMERCIAL NATIONS

Although the *United States* is the largest manufacturer of asbestos products in the world, in 1917 less than 1 per cent. of the raw material was mined in this country. The country is, therefore, largely dependent on foreign sources of supply. The abundant deposits of Quebec, Canada, are conveniently near, and so long as the present amicable relations with Canada continue, an ample supply seems to be assured. In 1916 the United States used 86 per cent. of the Canadian output. During 1916 and 1917 there was marked activity in developing the high-grade chrysotile deposits of Arizona. While there is as yet no evidence of an abundant supply, the material is an important supplementary source of supply because of its quality.

While no commercial asbestos is mined in the British Isles, British colonial possessions hold control of about 88 per cent. of the annual asbestos output of the world and approximately 70 per cent. of the world's reserves. Thus, although the supply within the *British Empire* is ample, the home requirements of the nation can be met only under favorable shipping conditions, as all necessary material must be transported several thousand miles.

Russia is the second largest producer of asbestos in the world, and seemingly has large reserves. As little manufacturing is done in the country, practically the entire output is exported. Being independent

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920) Published by AsbestosClaims.Law
ACL Doc 21259 · Page 8 of 9 asbestosclaims.law/library/21259/8

as regards her own needs for raw asbestos, Russia requires only the maintenance of an active foreign market to assure a permanent industry.

No commercial asbestos deposits are known to exist in *Germany*. Prior to the war asbestos was imported chiefly from Russia and Canada. The chief Russian mines are said to have been controlled by German capital.

Italy has large deposits of amphibole (anthophyllite) asbestos, some of which is of spinning grade, but as production has always been small and has, except for minor fluctuations, been stationary for the past 18 years, it is unlikely that the deposits can supply domestic requirements of high-grade fiber. A small amount has been exported for filter use, for which Italian asbestos is well adapted. As the chief mine is operated by a British company, considerable Italian asbestos is shipped to England.

No asbestos deposits are worked in *France*. Supplies are obtained from Russia, Canada, and South Africa. France is the leading nation in the manufacture of blue asbestos products.

Several deposits of asbestos occur in *Japan*, but all are of inferior quality. The material mined is mixed with imported fiber for the manufacture of asbestos packing.

SUMMARY

Asbestos is a unique mineral for the reason that it combines incombustibility and insulating qualities with a fibrous structure that makes possible its manufacture into fabrics, felts, and similar wares. The spinning grades of asbestos are most in demand and the problem of supply hinges largely on the deposits of high-grade chrysotile. Such material is used for the manufacture of ropes, safety curtains, mats, packings and friction facings in brakes. The lower grades are used for making fireproof shingles and other building materials, for insulating, and for fire brick, acid filters, etc. Although some substitutes may be found for the lower grades, no substitutes are known for spinning fiber.

Asbestos occurs in three main types, chrysotile, crocidolite, and anthophyllite; the first and second provide most of the spinning fiber, and the third is almost all of non-spinning quality. The most important deposit of chrysotile asbestos is in Quebec, Canada, but large deposits are worked in Russia and Rhodesia. Crocidolite is mined only in Cape Colony, South Africa. Large deposits of anthophyllite occur in the United States, Italy, and Cyprus.

The United States is by far the largest manufacturer of asbestos products in the world, but produces only a small fraction of the necessary raw material; it is practically assured of an ample supply of this because the largest deposits in the world are in the adjacent Province of Quebec, Canada. The Arizona deposits provide an excellent grade of fiber and constitute a promising supplementary source of supply, though the estimated reserves are not great. The British Empire holds a dominating position, controlling about 88 per cent. of the annual asbestos production of the world and approximately 70 per cent. of the estimated reserves. Canada is far in the lead of all countries, supplying about 85 per cent. of the world's output. Russia was, before the revolution, second to Canada as a producer; because of the cost of transportation the chief output is spinning fiber. South Africa has large reserves of good fiber, but the output is handicapped by poor transportation.

Exhaustion of the chief sources of supply is not likely for many years, nor is there immediate prospect of any material shift in the centers of production, though with improved transportation a shift to South Africa is posssible. The demand for high-grade asbestos will probably increase at a steady rate.

All the asbestos quarries in the United States seem to be American owned. The Canadian deposits are controlled by Canadian, English, and American capital, British interests probably being predominant. British companies evidently hold exclusive control of the present output in South Africa, Australasia, and Italy. Before the war the Russian output was largely controlled by a German syndicate, and the Cyprus output by an Austrian company.

Political and Commercial Geology and the World's Mineral Resources: Chapter XXIV, Asbestos (1920)
ACL Doc 21259 · Page 9 of 9
Published by AsbestosClaims.Law
asbestosclaims.law/library/21259/9