THE ASBESTOS INDUSTRY SINCE 1929

With Special Reference To Canada

Submitted in partial fulfillment of the requirements
for the Degree of Master of Arts

Department of Economics
McGill University

Elizabeth W. Gillies
September 2, 1941

For their help and suggestions, I wish to thank ...

Mr. R. W. Steele, President of Asbestos Corporation, Limited

Mr. H. K. Sherry, Vice-president in Charge of Operations,
Canadian Johns-Manville Company

Mr. K. B. S. Robertson

Miss Rossiter, Editor, Asbestos

TABLE OF CONTENTS

	Pages
Chapter I - Introduction The value of asbestos - origin of the word - the varieties and occurrences of asbestos - mining and milling methods - the physical properties of asbestos - the uses of the mineral.	1-8
Chapter II - Survey of the Industry until 1929 The growth of the asbestos industry in Canada - capitalization and capital control - the production of asbestos - the asbestos products industry.	9-25
Chapter III - Capital Control and Capitalization Capital control in 1929 - establishment of the Nicolet Asbestos Mines - Turner and Newall acquisition of the Bell mine in 1933 - American control - Asbestos Corporation, Limited, and the Johnson's Company - lack of centralization in Canadian-owned production - Asbestos Corporation v. Keasbey and Mattison - United States v. Asbestos Corporation - capitalization of the Asbestos Corporation - reorganization in 1932 - retirement of bonds in 1939 - stock shares and dividends - profits.	26-35
Chapter IV - Production, Prices, and Consumption Relation of asbestos consumption to the automobile and construction industries - importance of the two industries' activities in the United States to Quebec asbestos production - 1929, a prosperous year - 1930, the beginning of depression - reduction of royalties, adoption of uniform fibre classification, and the Workmen's Compensation Act in 1931 - 1932, the worst year - an upswing in 1933 and a set-back in 1934 - improved conditions in 1935 and 1936 - 1937, a prosperous year - decreased activity in 1938 - war-time regulations for asbestos in 1939 - effect of the war on 1940 operations.	36-50
Chapter V - The Soviet Bogey Growth of the Soviet asbestos output - location of the deposits - organization and production - 1929, the beginning of American imports from the U.S.S.R. - action by the Quebec operators and the Canadian government - complaint by American producers lodged with the U.W. Tariff Commission, 1932 - the 1932 embargo on Soviet asbestos - allegations from both sides - charges made before the Commission - findings of the Commission and lifting of the embargo, 1933 - American and Canadian producers little affected by Soviet importations.	51-64

Pages

Chapter VI - Production in Africa 65-82
Canada no longer a monopolist - Rhodesia's deposits - the Rhodesian and General - the Shabani mine - increase of Turner and Newall ownership - the Rhodesian industry since 1929 - the asbestos deposits of the Union of South Africa - chrysotile: in the Transvaal - crocidolite: in the Cape Province and the Transvaal - amosite: in the Transvaal - the African industry since 1929 - production advantages of Rhodesia and the Union.

Chapter VII - Other Producers 83-94
Their importance - the United States - Cyprus - Italy - Finland - Czechoslovakia - Japan - India - Brazil - Venezuela - Bolivia - Australia.

Chapter VIII - Canada's Position in World Production and Trade 95-105
Canada's decline in the world production of asbestos - importance of the Canadian export markets - nature of the Quebec production - Canada's monopoly in the American shorts market - American crude imports from Africa - Belgium as a market for Canadian asbestos - Germany - Japan - France - the United Kingdom - Canada still a leading source of supply.

Chapter IX - The Manufacture of Asbestos 106-120
Factors working against asbestos manufacture in Canada - the industry since 1929 - American manufacturers in Canada - Canadian imports - exports from Canada - an embargo on the export of raw asbestos suggested - small capitalizations in the industry - asbestos manufacture in the United States - the beginning of the industry - dominant firms - the asbestos products industry of the United Kingdom - the growth of Turner and Newall - asbestos manufacturing in the U.S.S.R. - Germany - Japan - other countries.

Chapter X - Summary and Conclusions 121-125

Appendix
Table A
(1) Annual Quebec Shipments by Grades, 1929-1939 126
(2) Quebec Production Statistics, 1929-1939 127
Table B - Principal Statistics of the Asbestos Mining Industry in Canada, 1929-1939 128
Table C - Imports of Asbestos into the United States, 1929-1939 129-134
Table D - Salient Statistics of the Asbestos Industry in the United States, 1929-1939 135
Table E - Rhodesian Asbestos Statistics 136
Table F - South African Asbestos Statistics 137

Pages

Appendix (continued)
Table G - Exports of Asbestos from Canada, 1929-1939 138-139
Table H - Principal Statistics of the Asbestos Products Industry in Canada, 1929-1939 140
Table I - Asbestos in the U.S.S.R., 1909-1938 141

Bibliography 142-146

TABLES

Table 1 - The characteristics and occurrences of asbestos 3

Table 2 - The physical properties of asbestos 7

Table 3 - Quebec production in 1940, by companies 28

Table 4 - Capitalization of the Asbestos Corporation, Limited, before and after the 1932 reorganization 33

Table 5 - Quebec classification of asbestos 42

Table 6 - World production, 1929-1937 95

Table 7 - Canadian production, imports, and exports of asbestos manufactures, 1929-1939 109

Table 8 - Asbestos manufacturing in the United States, 1929-1939 114

CHARTS

Chart 1 - Asbestos consumption, compared with automobile production, building construction, and industrial production in the United States 37

Chart 2 - Canadian, Russian, and Rhodesian crude prices 60

Chapter I

INTRODUCTION

To control the power of fire has been one of the perpetual problems of mankind. When man learned that he could make fire an instrument of service, he found also that he was unable to cope with his tool when it overran its confinements. This might still be an unfortunate truth today were it not for the discovery of a curious fibrous mineral, called asbestos, whose outstanding and most useful characteristic is incombustibility. Through the use of this strange material men have been able to diminish the destruction that fire can create and to make modern living safer, more comfortable, and more efficient.

It was not until modern times, however, that the innumerable potential uses of the mineral were realized, but today the possession of asbestos deposits or the unhampered access to foreign sources of supply has become essential to every industrial nation. The largest resources of this material are found in Canada, and consequently its production constitutes an extremely important industry for that nation.

Although the purpose of this monograph is to examine in what manner conditions during the period following 1929 and the present war have affected the production of the mineral and the manufacture of asbestos products in Canada and throughout the world, it would make for a clearer understanding of the industry's problems if certain technical details concerning the nature of asbestos were first considered.

The Greek word "asbestos" means "inextinguishable" and has the opposite meaning to incombustible, the chief characteristic of the mineral.[1]

1. O. Bowles, Asbestos -- General Information, Information Circular No. 6817, U.S. Bureau of Mines (January, 1935), pp. 2-3.

It was evidently first employed by Pliny, who possibly had in mind Plutarch's reference to the "perpetual" asbestos lamp wicks used by the Vestal Virgins. Later this name was applied to quicklime by the Greeks. Their original term for asbestos was "lithos amiantos" and meant a rock unstained, untainted, or undefiled. Another common name they used was "Karystos lithos", because a well-known source of flexible mineral fibre was located near Karystos, South Euboea, Greece.

In modern times the word asbestos has been applied in a very wide sense to a number of silicate minerals of different composition and origin, but especially to express the fibrous varieties of such minerals.[2] They can be divided into two distinct groups, serpentine or olivine and amphibole.[3] In the first group are included chrysotile, picrolite, and soapstone (talc).[4] Of these three, chrysotile is by far the most important commercially and is found in many countries, including Canada, South Africa, Southern Rhodesia, the Soviet Union, Cyprus, and the United States. In the amphibole group are found anthophyllite (commercially known as "amphibole"), tremolite, actinolite, asbestos, mountain leather or mountain cork, crocidolite, and amosite.[5] In this group, crocidolite, found in the Cape Province of the Union of South Africa and in the Transvaal, and amosite, occurring in the Transvaal, are the commercially important minerals.

The following table lists the occurrences and characteristics of the various types of "asbestos":

2. Mineral Raw Materials, Foreign Minerals Division, U.S. Bureau of Mines (New York, 1937), p. 16.

3. G. E. Howling, Asbestos (Imperial Institute, London, 1937), p. 6.

4. J. G. Ross, Chrysotile Asbestos in Canada, Department of Mines, Canada (Ottawa, 1931), pp. 10-11.

5. Ibid., p. 7.

Table 1[6]

MINERAL GROUP	VARIETY	QUALITIES	IMPORTANT DEPOSITS
Serpentine	Chrysotile	Greatest flexibility and heat resistance; less resistance to acids.	Canada U.S.S.R. S.Rhodesia U.of S.Africa
	Picrolite	Coarse and brittle.	Found with chrysotile in Canada
	Soapstone	Unaffected by moisture or chemical fumes; withstands expansion in ordinary temperatures.	Found with chrysotile in Canada
Amphibole	Actinolite	Acid-proof; less heat resistant and more brittle than chrysotile.	Canada U.S.A.
	Amosite	Long-fibred.	Transvaal
	Anthophyllite	Brittle	U.S.A. South America China
	Asbestos ("hornblende" or "amphibole")	Flexible, silky	Italy
	Crocidolite	Flexible, not very heat resistant; acid-proof.	Cape Colony Transvaal
	Mountain leather or mountain cork	Not readily separable into fibres.	
	Mountain wood	Long-fibred.	Canada
	Tremolite	Acid-proof; less heat resistant and more brittle than chrysotile.	Italy U.of S.Africa Balkan States U.S.A.

6. Compiled from Ross, Op. cit., pp. 6-17, and from Asbestos (Becker and Haag, Berlin, 1928), p. 9.

Because some varieties can be spun, carded, and woven like silk and wool by reason of their silky, elastic fibres, asbestos has been called a "mineralogical vegetable" or a "physical paradox".[7] This mineralogical vegetable occurs in three different forms: (1) as cross fibres in veins which are at right angles to the rock wall;[8] (2) as slip fibres, more or less matted together and parallel to the wall;[9] and (3) as mass fibres in bunches distributed at random throughout the rock.[10] Of the three, the cross fibre type can be freed from the rock most readily and is therefore the most valuable for commercial purposes; while slip fibre requires more milling to accomplish its separation from the rock.[11]

To obtain asbestos fibre requires first of all the removal of the rock, which is done either by some system of underground mining or by quarrying. Until recent years the latter method was used universally, since it was cheap and fairly efficient; but it was found that as the pits increased in depth, greater expense and difficulty with rock slides was experienced. Thus the great depth of the King quarry at Thetford Mines, Quebec, forced the Asbestos Corporation to adopt underground methods, and in 1932 preparation for the use of the block-caving system was begun. This method consists of tunneling beneath the portion of the ore to be mined, then undercutting the ore block and removing its foundations. Consequently, the mass of rock settles, breaking into pieces, and the material is removed and sent to the mill. In contrast to the open-quarrying method, underground mining decreases drilling

7. Ross, op. cit., p. 6.

8. "Asbestos," Agricultural and Industrial Progress in Canada, XX, 6 (June 1938), p. 90.

9. Howling, op. cit., p. 6.

10. Mineral Raw Materials, p. 16.

11. The Mineral Industries of Canada, 1933, Publication No. 738, Department of Mines, Canada (Ottawa, 1935), p. 14.

and blasting costs and avoids the necessity for removal of the overburden. Work can be carried on throughout the winter, and there is no need for the extensive drying operations of rock covered with snow and ice as in the open pit system. Nevertheless, aside from the King mine and, since 1939, the Bell mine, the quarrying method is still followed in the Quebec fields and in other asbestos-producing countries. In the U.S.S.R. and Africa there has been some underground mining, but the open pit system predominates.[12]

On the other hand, methods of separating the asbestos fibre from the rock vary more greatly among the producing countries. The longest and most valuable grades of asbestos, termed "crudes", are separated by hand, the method being called "hand-cobbing". In this way the length of the fibre can be preserved, and at the same time the harsher mechanical treatment is avoided. The shorter or "mill" grades are obtained by passing the rock through beaters and removing the fibres by screening and air separation. Crudes and the higher mill grades constitute the spinning fibres, while below spinning grade come the shingle, paper, and plaster fibres, and refuse or "shorts".[13]

The hand-cobbing method, however, is expensive, and where labour costs are high, as in Canada, the price obtained for the crude must justify the extra cost of this system of extraction. In those countries where labour can be obtained cheaply, mechanization in the separation of fibre and rock has not been so extensive as in Canada. African mines utilize large amounts of hand labour, although milling is now becoming more important; in the Soviet Union mechanical treatment of the ore is fast approaching the Canadian standard.[14]

12. Mining Newsletter Series, Department of Mines, Canada (Ottawa, May 22, 1934), pp. 1-3.

13. The Mineral Industries of Canada, 1933, p. 14;
Industrial Minerals and Rocks (American Institute of Mining and Metallurgical Engineers, New York, 1937), p. 87.

14. Howling, p. 9;
Industrial Minerals and Rocks, p. 87.

The commercial and economic value of asbestos is dependent upon the physical characteristics of the mineral, and these properties determine the use to which the variety of the product is put in asbestos manufacture. In general, however, the properties required of asbestos are length, tensile strength, fineness of fibre, infusibility, and flexibility.[15] Although chrysotile, crocidolite, and amosite are characterized by flexibility, tensile strength, and elasticity, these properties often vary in the different localities where these types are found.[16] Canadian chrysotile excels in these qualities,[17] and yet it is sometimes harsh and brittle. Amosite possesses unusually long fibres, and crocidolite is believed to be stronger than chrysotile. On the other hand, anthophyllite is brittle, but of greater flexibility than tremolite or actinolite. However, Italian tremolite is of spinning grade. The fineness of asbestos fibre is measured by the degree of separation that can be attained by the fiberizing process; and the fineness of fibre that can be achieved is almost as important in judging asbestos as are flexibility and strength. The lustre of asbestos is usually pearly or silky, but deviations in colour are found. While chrysotile is green or yellowish green, and nearly white after fiberization, amphibole ranges from grey or yellowish grey to white. Crocidolite is lavender-blue, and tremolite and anthophyllite are grey, greenish grey, or white.[18]

A necessary characteristic of asbestos is heat resistance. Anthophyllite and tremolite, having a low water content, possess the best heat resistance. On the other hand, crocidolite also has a low water content but has a very low heat resistance. Quebec chrysotile will resist a temperature of 2,000° to 3,000° F, and some chrysotile varieties exhibit

15. Ross, p. 17.

16. Bowles, Information Circular No. 6817, p. 5.

17. Ross, p. 17.

18. Bowles, Information Circular No. 6817, pp. 5-7.

no visible effects when subjected to a temperature of 5,000° F. However, chrysotile tends to lose its water of crystallization and to become brittle when it is heated to extremely high temperatures. Although used extensively for insulation, asbestos does not have a low heat conductivity; its value for this use arises from its incombustibility. In addition, its fibrous character permits it to be used for porous insulating coverings. In regard to acid resistance, chrysotile is decidedly inferior. When this quality is required in asbestos, tremolite, anthophyllite, and the amphibole varieties in general are relied upon. Those types of chrysotile, especially Arizona chrysotile, that have the lowest iron content are the most useful in electrical insulation. Most varieties in the amphibole mineral group can also be used for this purpose.[19]

The following table summarizes the properties of chrysotile, crocidolite, and amosite, the varieties of the mineral used most in the manufacture of asbestos products:

Table 2[20]

PROPERTY	CHRYSOTILE	CROCIDOLITE	AMOSITE
Fibre length (usual maximum)	1½ to 2 in.	1½ to 3 in.	7 in.
Tensile strength	High	Higher than chrysotile	Good
Flexibility	High	High	Good
Fineness of fibre	Very fine	Fine	Fine
Resistance to heat	Good, but becomes brittle	Poor; fuses to a glass	Good, but becomes brittle
Resistance to acids alkalis, and sea water	Poor	Good	Good
Electrical-insulating value	Fair to good	Good	-
Heat-insulating value	Good	Good for moderate heat	Good
Spinnability	Excellent	Fair	Fair

19. Ibid.

20. Howling, p. 8.

The uses of asbestos are so numerous and so varied that a complete list of asbestos products would run into the hundreds.[21] Although asbestos is utilized by itself in many products, it finds its chief uses in manufactures in which it is combined with other materials such as rubber, graphite, oil, metal, Portland cement, grease, and bituminous materials.[22] Considered broadly, the uses of the mineral can be divided into two classes on the basis of spinning and non-spinning fibre.[23] Wolochow divides asbestos products into five categories: textiles and textile products, building materials, heat-insulating materials, moulded products, and miscellaneous products.[24] Probably the manufactures that employ the largest amounts of the mineral are of the asbestos-cement class, such as tiles (or shingles), flat and corrugated sheets, pipes, and other similar products in whose manufacture the shorter and cheaper grades of asbestos are chiefly used.[25] The development of this branch of the industry has been so phenomenal during recent years that many materials formerly considered indispensable are now being replaced by asbestos.[26] Considering the rapidity with which asbestos-cement manufacturing is expanding, it is conceivable that the "Asbestos Age" is still in its infancy.

21. Ibid., p. 15.

22. D. Wolochow, "Asbestos and Its Utilization," The Canadian Mining and Metallurgical Bulletin, 317 (September, 1938), p. 426.

23. Bowles, Information Circular No. 6817, p. 7.

24. Wolochow, op. cit., p. 426.

25. Howling, p. 15.

26. "An Asbestos Age," Queensland Government Mining Journal, XXXII (February, 1931), p. 80.

Chapter II

SURVEY OF THE INDUSTRY UNTIL 1929[1]

Second only to that of coal in the non-metallics field is the productive value of Canada's asbestos industry. Yet despite this high ranking and the fact that there has been a fairly steady increase in demand for the mineral since production was begun in 1878, the asbestos industry in Canada is conspicuous for the vicissitudes and fluctuations in prosperity that have beset it. Admittedly the industry is in a stronger position today than it has been at various times in the past, but in order to evaluate its present and probable future standing it is necessary to summarize the earlier erratic history of asbestos.

The Growth of the Asbestos Industry in Canada

Although asbestos was known to the ancients its commercial exploitation is comparatively recent. In 1720 the mineral was discovered in the Ural Mountains, but an attempt to exploit the mineral in 1760 failed because of the very limited demand. The modern asbestos industry dates from the exploitation of the mineral in the Italian Alps by a London syndicate. Almost simultaneously, important deposits were discovered in Quebec in the Des Plantes River region. In 1862 specimens of the Canadian mineral were sent to an exhibition in London where the fibre appeared extremely short in comparison with the Italian product. Although these Canadian deposits had been traced from the Vermont boundary to beyond the Chaudière River, they were limited and attempts to work them profitably failed.

In 1879, three firms engaged in mining and manufacturing Italian asbestos were amalgamated into the "United Asbestos Company, Limited" of London. This company, now owning nearly all the Italian mines, obtained a practical monopoly of the world's asbestos trade. The difficulty in mining the mineral and the high quality of the product soon brought a price as

1. Except where otherwise stated, the material for this chapter was derived from M. M. Mendels, The Asbestos Industry of Canada, McGill University Economic Studies, No. 14, 1930.

high as $250 or $300 a ton.

Meanwhile, however, during the construction of the Quebec Central Railway in 1876, the deposits which were to mark the beginning of the Canadian asbestos industry were discovered in the serpentine hills of Thetford and Coleraine in the province of Quebec. By 1878 three quarries had been opened, and 50 tons of asbestos were produced in that year. There was little difficulty in finding a market, and production reached 300 tons in 1880, 540 in 1881, 810 in 1882, 955 in 1883, and 1,141 in 1884. This small production was disposed of at the average value of $65 per ton. Large increases in the quantities produced occurred in 1885, accompanied by a rise in prices, especially for the higher grades. The peak of production and of value was attained in 1890, when 9,860 tons were produced with a value of $1,260,240, making an average price of $127.81 per ton.

In the meantime, Canadian fibre had come into strong competition with the Italian product, and had successfully broken the Italian monopoly of the world market. With improved methods of production and preparation, the Quebec asbestos, which at first had appeared coarse and inferior to the Italian, was found to be of a high grade and more useful commercially.

The peak Canadian production of 1890 was followed by a decrease in 1891 and 1892. In the former year 9,279 tons were produced at an average price of $107.76 a ton, and in the following year, 6,082 tons at an average price of $64.20 per ton. Primarily this decrease was a result of the efforts of the producers to restore the relationship between supply and demand, which had been distorted by the increases in production of the previous years. Up until then demand and supply had been fairly parallel, and the increase in prices that had occurred could be attributed to recognition of the mineral's value for manufacturing purposes. In addition, speculators had purchased large quantities in an effort to corner the market;

and American manufacturers, assuming that the demand for asbestos would always exceed the supply, competed against each other in a rush to buy. But the speculators began to unload and broke the market, and the American manufacturers, by forming a combination, ceased to bid against each other. For the first time in the history of the industry the supply began to exceed the demand for asbestos, and a serious fall in prices resulted.

During this period of the early nineties the most prominent producers in the industry were: American Asbestos Company, Limited, Anglo-Canadian Asbestos Company, Limited, Glasgow and Montreal Asbestos Company, Limited, and United Asbestos Company, Limited, all at Black Lake; Beaver Asbestos Company, Bell's Asbestos Company, Limited, Johnson's Company, King Brothers (private), and Thetford Asbestos Company, all at Thetford; and Jeffrey Asbestos Mines (private) at Danville. Altogether there were thirteen incorporated companies and a number of private ones producing asbestos in Canada at this time, representing an investment of nearly $2,250,000 and employing about 2,000 men and boys. In five years employment had tripled and production had increased over six times. In 1889, $80 to $120 was paid for a ton of the highest quality of fibre, or "firsts", while "seconds" sold for $50 to $70 a ton, "thirds" brought $25 to $35 a ton, and "waste" was valued at $10 to $15 a ton. The great range in price for one grade of fibre resulted from the lack of a uniform system of grading; one producer's "seconds" might be very little inferior or even equal to another producer's "firsts".

This steady progress of the industry, however, was interrupted by the crisis of 1892, but the effects of the crisis proved to be more beneficial than harmful. Now the mine operators, rather than the manufacturers, carried stocks of asbestos. This resulted in an elimination of the small

producers who could operate only when they could sell their output in advance. Hence, owners who did not have the necessary capital for operations under these altered circumstances placed their properties on the market. Consequently there was a continuous purchase of the properties by foreign manufacturers, and henceforth ample capital was required in the production of asbestos.

Meanwhile, from the low of $64.20 per ton in 1892, prices recovered slightly to $86.81 in 1893. But the decline resumed in 1894 and lasted until the end of the century. Under these price conditions and with a decided decrease in demand, the only producers able to make a profit were those working on rich ground that yielded a high percentage of the crude mineral. Many operators, whose production consisted of only a small percentage of the higher grades, necessarily closed down. These conditions and the over-production that had occurred indicated that a more economical extraction was the requisite solution to the difficulties of the industry. Consequently, attempts to effect economies achieved the mechanical treatment of the lower grades in addition to the former sole method of hand-cobbing. The shorter fibres which had formerly been discarded were saved; and, as demand for this grade increased, the mines were able to operate on a far more profitable basis.

Beginning in 1899, Canada's production of asbestos again started to increase. 17,790 tons, at an average value of $26.34 per ton, were mined in that year, and from then on production almost consistently increased until a new peak of 137,000 tons, selling at an average value of $28.00 per ton, was reached in 1915. Temporary conditions can be blamed for the variations that did occur in the upward trend of production, as in 1902 and in 1909-----since asbestos is quarried under open-air conditions, unusually bad weather is likely to bring about a decrease in production.

In the late nineties, the over-production of former years was allowed to become more normal, and around 1899-1900 the relationship between the demand for and the supply of asbestos was on a more equitable basis. The mechanization that had been accomplished throughout the industry was of added value in stabilizing the production. The separation units that were installed were continuously improved and their capacity increased, while progress was made in the more complete separation of the fibre from the rock.

Throughout the period from 1899 to 1915, the average prices of asbestos displayed a remarkable stability, although on a falling level. However, such stability only masked the unhealthy condition of the industry. During this period and up until the World War the supply of asbestos exceeded the demand, and the slow but steady drop in prices was the inevitable consequence. Under such conditions, many of the mines experienced periodic intervals of shutting down and reopening. Only nine operators reported production in 1912, and in that year all mines in the Broughton district were closed. Of necessity the high cost producer in this period had to improve his methods of mining and milling and reduce costs, or withdraw from the industry. Consequently, the War impinged on the industry at the moment when it was facing insolvency. In 1914 the average price of asbestos was $29.96 per ton; in 1907 it had been $40.00. Moreover, approximately 300,000 tons of the year's production remained on hand at the mines at the end of 1914. The situation was worsened, of course, by the disorganization of the European markets and the difficulties of ocean shipment. In 1915 only eight companies were still producing, the Jacobs and British-Canadian mines ceased operating, and other companies worked only 30 to 50% of capacity. Nevertheless, the war proved to be one of the greatest stimuli

that had yet affected the industry. Once again, demand arising from the uses for asbestos in armaments and defences, exceeded supply. American demand stepped into the breach created by the loss of European markets, and Canadian production figures rose sharply. In 1920 production stood at 167,731 tons, and a ton of fibre was sold for the average price of $81.54. Such prices enabled producers to accumulate reserve funds. Moreover, there was further standardization of the product and modernization of methods. The number of producers increased from eleven to fifteen, and then to seventeen; and they were prevented from making greater returns only by the labour shortage. Although demand for fibre slackened somewhat after the armistice, following August, 1919, an upturn in the automobile and construction trades brought increased prosperity to the asbestos industry. Thus the mineral enjoyed its greatest demand and reached its highest price in the year 1920. Crude No. 1 sold for $2,000 to $3,000 a ton in the market, and even the "sands" were sold at $15 a ton.

Such a bonanza state of affairs in the industry, however, could not last. In the years following 1920, the over-production and a severe decrease in demand effected disastrous consequences. An era of intense competition and marked price-cutting was instituted, displaying the familiar pattern of attempts to sell the existing supplies at any price, whether or not sales covered the cost of production. Cooperation between operators was non-existent. Furthermore, the industry suffered not only from the competition among the Quebec producers who had large supplies to sell, but also from the large stocks of fibre dumped on the market by some American manufacturers. Owning mines in Quebec, these manufacturers worked them to capacity, and, when their manufacturing needs were fulfilled, the remainder of the fibre was dumped on the open market. Hence, the already unhealthy

situation was made worse by these stocks, since the prices at which they were sold were unimportant to the manufacturers. Despite the great facilities for mining and milling that existed throughout the industry, the production could not be adjusted to the market. Competitors refused to agree, and all suggestions of amalgamation or cooperation were rejected. What the industry needed was "cooperation, economies in production, decapitalization, the cultivation of broader markets, and the abstinence from new stock flotations." In 1923 one company went into liquidation, a testament to the unwarranted capitalization that had begun in 1910. Another company cut dividends and the rest struggled to keep their heads above water. Other factors also entered into the distressing situation. The industry was facing increasing competition from Rhodesia and South Africa; in some markets Canadian asbestos was beginning to be rejected for the Rhodesian long-fibre. An additional burden was imposed on production by the Quebec royalty tax on asbestos mining. Such a tax created one more, and somewhat unfair, difficulty for the industry.

Finally, however, the industry recognized the gains that could be brought about by amalgamation -- regulation of output and a better control of the market. Consequently, eleven Canadian-owned asbestos mining enterprises were merged in 1925 under the title of the Asbestos Corporation, Limited. This placed the control of over one-third of the Quebec output in the hands of one company. The amalgamation, for the purposes of self-preservation and not monopoly, was among all but one of the largest producers and signified the beginning of a period of relatively greater stability for the industry.

With the Asbestos Corporation leading the industry, 1925 proved

to be a brighter year. The tonnage produced reached a new peak, and, despite Rhodesian competition and the increased percentage of low-grade fibre in the Quebec production, the average price received rose. The 1926 production decreased slightly in tonnage, but rose in value. 1927 saw a further decrease in tonnage, while prices were the highest since 1920. 1928, a comparatively good year, failed to show great profits for the producers, but a more normal situation in the industry was evident.

Capitalization and Capital Control

The pioneer company in the asbestos industry in Quebec was the Johnson Asbestos Company at Thetford Mines, formed in 1886 with a registered capital $250,000 in shares of $500.00 each. It is also claimed that the Johnson Company produced the first asbestos in Megantic County, when operations were begun in 1877. The company averaged about 175 employees in the summer and 100 in the winter at their Thetford Mines property, which consisted of about 1,000 acres of mineral land in the most advantageous section of the district. Approximately 100 tons of serpentine were handled per day on a daily double shift of 20 hours, and sales amounted to over 2,000 tons in 1896.

Messrs. King Brothers, mine-owners and lumbermen, owned property which included about 18,000 acres in Thetford and Ireland townships. The ore from their quarry was especially noted for its careful cobbing and preparation, as opposed to the product of some of the other mines. In 1888, 580 tons were produced by this mine, and this was increased to 900 tons in 1896. The No. 1 product of the King quarry has always been recognized as the best Canadian fibre for length and purity and for its careful preparation.

A small property of 100 acres in this district was owned by Messrs. Ward and Ross, and later by the Thetford Asbestos Mining Company. 150 tons of excellent fibre were produced in 1886, but a little later production ceased and the mine remained closed for some time. The company was incorporated in 1889 with a capitalization of $200,000 in shares of $100.00 each. In Coleraine township the Thetford Company owned 500 acres. Although its first production was encouraging, the company closed in 1894 because of insufficient capital and poor production.

A mine, sold to the Boston Asbestos Packing Company by the Ward family, adjoined the property of the Johnson Company. Mr. John Bell bought the quarry in 1888 and shortly thereafter transferred it to a London company, with an authorized capital of £200,000 in £1 shares. Bell's Asbestos Company, as it was named, registered a production of 1,800 tons in 1889, and for the first two years of the company's history dividends were 22½%.

Not far from Thetford is Black Lake, also an important asbestos mining centre. Here in 1886 the Scottish-Canadian Asbestos Company acquired property which included the Martin quarries in Coleraine, the Frazer quarries in Broughton township, and the plant and equipment of the East Broughton Company. The latter company had been the first to attempt mechanical treatment of the ore in place of the usual hand-cobbing method. The Scottish-Canadian Company was bought in 1891 by the Glasgow and Montreal Asbestos Company and was registered in Scotland with a capitalization of £70,000. In 1896, however, the company ceased operations.

In 1889 Messrs. Frechette and Deauville sold about 75 acres to the United Asbestos Company which began production in that year. The company also operated the Frazer quarry in 1895 under lease from the Glasgow and

Montreal Asbestos Company. Adjacent to this property was that of the Anglo-Canadian Company, a private enterprise.

Near Danville and about 97 miles from Black Lake, is one of the most important asbestos mines in Quebec. It was opened in 1879 by Mr. Jeffrey, who gradually began to operate on a large scale. Finally he was forced to assign the property to trustees for the benefit of his creditors, and the quarry was closed. In 1895 it was sold to Messrs. Boas, Greenshields, and Marcuse who organized the Danville Asbestos and Slate Company.[2] It was discovered that the asbestos rock of this quarry was of an exceptionally fibrous nature and that even that part which had been classed as waste by Jeffrey could be utilized. The waste, which consists of short and unweavable asbestos, was called asbestic and became a new source of revenue in 1896. The product became important to the building trade as a plaster, and to paper manufacturing. In 1897 the Danville Company was bought out by the Asbestos and Asbestic Company, Limited.[3]

During the period from the crisis of the nineties to 1915, the industry was characterized by depressive conditions and by perpetual insolvency. In 1908, asbestos was being produced by 27 different companies. An improvement was made in 1909 when the Amalgamated Asbestos Corporation was formed to take over the assets of the following companies: the King Asbestos Mines and the Beaver Asbestos Company, at Thetford, and the British-Canadian Asbestos Company, Limited, which had acquired the American Asbestos Company the previous year. The American Asbestos Company had started up in 1903 and in 1907 had taken over the properties of the Glasgow and Montreal Asbestos Company, the United Asbestos Company, the Manhattan Asbestos Company, the Dominion Asbestos Company, Limited, and the Standard Asbestos Company at Black Lake. The Amalgamated Asbestos

2. B. Marcuse, "Asbestos -- 'Pierre a Coton'," Canadian Geographical Journal, I, 6 (October, 1930), pp. 507-508.

3. Ibid., p. 508.

Corporation was capitalized with an authorized bond issue of $15,000,000, of which $7,500,000 were issued, and stock issues of $1,875,000 of 7% cumulative preference shares and $8,125,000 common stock.

Facts regarding American capital participation in the Quebec industry prior to 1910 are difficult to obtain, but certainly a definite tendency on the part of American industry to invest in asbestos enterprises became evident at this time. Among American-owned companies in 1910 were the Belmina Consolidated Asbestos Company, which was an amalgamation of the Belmina Asbestic Company and the Asbestos Mining and Manufacturing Company, and the Beaudoin and Audette Asbestos Company, capitalized at $500,000 and holding 200 acres in Thetford. Another was the Bell Asbestos Company, an English enterprise, which had been acquired by Keasbey and Mattison of Ambler, Pennsylvania.

In 1910 the properties of the Black Lake Chrome and Asbestos Company, the Union and Southwark mines, and a controlling interest in the Imperial Asbestos Company were taken over by the Black Lake Consolidated Asbestos Company. The company's capitalization consisted of an authorized bond issue of $1,500,000 and common and preferred stock of $4,000,000. An efficient policy was adopted and operations became more profitable.

Among the older companies operating at this time was the Broughton Asbestos Fibre Company, which had been closed from 1891 to 1901 but had gradually expanded since the latter year. Also in operation were the D'Israeli Asbestos Company, the Eastern Townships Asbestos Company, the Frontenac Asbestos Mining Company, the Jacobs Asbestos Company of Thetford (recently formed), the Ling Asbestos Company, and the Robertson Asbestos Company.

That there were more companies in operation in 1919 than in 1895 testifies to the great expansion that had occurred in the asbestos industry. Unfortunately, however, the expansion had resulted in an over-capitalization

that was not warranted by the industry's profits throughout this period. The industry was simply unable to earn a reasonable profit on such capitalization. Hence, the situation was somewhat improved in 1912 when the Amalgamated Asbestos Corporation was reorganized under the name of the Asbestos Corporation of Canada, Limited. The new capitalization consisted of $4,000,000 preferred stock, $3,000,000 common stock, and $5,000,000 in bonds. This was in place of the former capitalization of $8,125,000 common stock, $1,875,000 preferred stock, and $7,500,000 bonds.

The outbreak of the World War brought additional disorganization to Canada's asbestos industry. The disappearance of overseas markets at first had disastrous effects. In 1916, the Asbestos and Asbestic Company, which operated the Jeffrey mine, went into liquidation.[4] It was then taken over by T. F. Manville, who was associated at that time with the H. W. Johns-Manville Company in the United States, and was reorganized into the Manville Asbestos Company, Limited. In 1918, the properties were transferred to the present Canadian Johns-Manville Company, Limited.

Meanwhile, the demand for asbestos had increased enormously, the American export trade more than making up for the loss of European markets. Even after the war demand continued because of the resumption of activity in the automobile and construction industries. As has been seen above, however, the years following 1920 found supplies far out-running the demand for the mineral. Thus, in 1925 a reorganization of the industry was effected by the formation of the Asbestos Corporation, Limited, which consolidated all the Canadian-owned firms except the A. F. Johnson Company. These included the Asbestos Corporation of Canada, Limited; the Maple Leaf

4. T. R. Elliott, "Fibres of Gold," Canadian Geographical Journal, XVI, 3 (March, 1938).

Asbestos Corporation, Limited; the Federal Asbestos Company; Thetford-Vimy, Limited; Consolidated Asbestos, Limited; Asbestos Mines, Limited; the Black Lake Asbestos and Chrome Company, Limited; and the Asbestos Fibre Company, Incorporated.[5] Although the final capitalization of the new corporation was only about one-half of the aggregate total of its component companies it was still top-heavy.[6]

Hence, in 1929, there existed only the Johnson Company, which is privately owned, remaining outside the consolidation of Canadian-owned firms. The other companies were American-owned and included the Quebec Asbestos Corporation, the Canadian Johns-Manville Company, Limited, and the Bell Mines, owned by Keasbey and Mattison.

The Production of Asbestos

Although asbestos occurs in many countries of the world, Canada has been able to supply approximately 70% of the total world production. She has accomplished this by means of her advantageous transportation facilities and her efficiency in production. Asbestos has been found in Canada in British Columbia and Ontario, but the commercially important deposits of chrysotile are those of the Eastern Townships in Quebec. They extend from the Vermont boundary to the Gaspe Peninsula, and this belt can be divided into three areas:

1. An area covering part of the townships of Balton, Oxford, Brompton, Melbourne, and Danville.
2. An area covering part of the townships of Hamilton, Wolfestown, Coleraine, Thetford, and Broughton, known as the Thetford-Black Lake area.
3. An area covering part of the Gaspe Peninsula.

5. "Asbestos Corporation, Limited," The Financial Post Corporation Service (Toronto, February 11, 1941), p. 2.

6. "The Asbestos Corporation, Limited," L. G. Beaubien and Company (Montreal, November 21, 1940), p. 1.

The Thetford-Black Lake area is by far the most important economically. The deposits centring around the town of Thetford Mines are probably the most significant in Canadian asbestos production. To the north are the East Broughton mines which yield only a small percentage of short fibres and no long fibres at all. Southwest of Thetford are the Danville and Asbestos deposits, which are fairly similar to those of Thetford but contain a smaller percentage of long fibres.

The chrysotile asbestos of the Thetford-Black Lake area is of the cross-fibre type and is found in veins from two to three inches wide running through the containing serpentine. The asbestos fibres are at right angles to the vein walls and do not project beyond them into the serpentine rock. Although fibres six inches long sometimes occur, the usual length is three inches. However, the amount of asbestos yielded by a ton of serpentine varies throughout Quebec and throughout the world. Rhodesian rock may average up to 15% of asbestos, while Russian and Cyprian deposits range from 5 to 10%.[7] On the other hand the Canadian deposits yield an average of 6 to 12% of asbestos per ton of rock.

Obviously, when the yield is so low, the methods of extracting the fibre must be efficient and economical in order to make the process profitable. It is the superior extractive methods of the Canadian operators that have been a primary factor in establishing the supremacy of Quebec asbestos.

The process found to be the most economical was the open-quarrying method. In recent years, however, experiments have been made with underground mining and "block-caving". For the first fifteen years after the industry's beginning the sole method of separating fibre and rock after quarrying was hand-cobbing, but this process is now used only for the longer grades. The shorter grades, which were at first discarded as waste, are

7. Mineral Raw Materials, p. 16.

sent to the mills where they undergo a mechanical crushing process. Recently the rock sand remaining after the fibres have been milled has been found valuable as a construction material, and hence is not a total loss as it was previously.

The yield per ton of rock is worth approximately $2.00 to $2.50; and this value is determined by (1) the degree of efficiency in extraction and (2) the prevailing price of asbestos. Thus, in 1927, 274,778 tons of fibre were sold at a price of $10,621,013, an average value of $38.65 per ton. But it must be remembered that this is an average value and that it conceals the fact that asbestos prices ranged from $423.65 per ton of No. 1 Crude to $21.34 per ton of the shortest grades in that year. 4,834,761 tons of rock had to be quarried to produce the 274,778 tons of fibre; hence, the yield of fibre per ton of rock was about 5.7%. In other words, 114 pounds of asbestos, worth about $2.13, were obtained from one ton of rock. This value per ton of rock quarried and milled varies from year to year, but has rather consistently increased. From 1910 until the World War, the value was approximately $1.50; under the unusual conditions of the war and of the period until 1920, it reached $4.50; and from 1920 until 1929, it ranged from $2.00 to $2.25.

The Asbestos Products Industry

Although Canada predominates in the production of asbestos, her asbestos manufacturing industry has lagged far behind. Actually it is a case of exporting the mineral and re-importing it in manufactured form. The greater percentage of the asbestos production is, of course, exported to the United States to supply the huge manufacturing industry that has

developed there. From a small beginning in the 1880's, the industry reached in 1927 the production of asbestos manufactures worth over $35,000,000. In that year there were 49 establishments, employing 6,129 workers; cost of materials totalled $19,225,000, while sales of finished products attained $36,274.000. Although the American industry has been using increasing amounts of African asbestos, obviously the United State is predominantly dependent upon the Canadian supplies. The lower transportation costs involved in obtaining the Canadian fibre and the large American ownership of the Quebec mines are the primary factors in the employment of this country's asbestos.

Asbestos manufacture in Canada, as has been stated, has run far below the level attained by the industries of the United States and the United Kingdom. In 1910 there were nine manufacturing establishments in Canada, representing a capital investment of $867,750; the gross value of the products turned out totalled $468,614. From 1910 until 1915, the industry expanded greatly although the number of establishments remained the same. Capital investment had increased to $2,434,116 and the value of the finished products had risen to $1,410,661. Unfortunately, this development was arrested by the World War, which hampered the construction and automobile industries. Since these industries absorb most of the production of the asbestos manufacturing companies, the asbestos products industry did not begin to revive until 1920. In 1922 eleven firms were in existence with a capitalization double that of 1919, but the gross value of their products was only $615,160. By 1925 conditions had improved; twelve firms with a capitalization of $2,624,260, produced $1,340,097 worth of finished goods.

In conclusion, then, the prosperity of Canada's asbestos industry prior to 1929 had been erratic at best. Efficiency in mining and milling the material had placed Canada in an advantageous position in respect to supplying world markets, but at various times other factors had outweighed that favourable element to the detriment of the industry. These were over-capitalization, over-production, and the lack of cooperation among operators. The demand and uses for asbestos had certainly warranted a healthier condition of the industry, but until the above evils that had attended the Canadian production could be corrected prosperity and stabilization would be but vague hopes.

Chapter III

CAPITAL CONTROL AND CAPITALIZATION

As was stated in the previous chapter, the Quebec asbestos industry is not entirely Canadian: capital control of the major part of our production has passed into American hands. Only two of the five companies producing asbestos in Quebec in 1929 were Canadian-owned. These were the Johnson Company, operating two quarries at Thetford Mines and Black Lake,[1] and The Asbestos Corporation, Limited, owning properties at Thetford Mines, Black Lake, Coleraine, and East Broughton.[2] Of the three American-owned corporations the largest was the Canadian Johns-Manville Company which operated a large mine and mill at Asbestos, five miles from Danville. The Bell Asbestos Mines, Incorporated, working a pit at Thetford Mines, was owned by Keasbey and Mattison of Ambler, Pennsylvania, while the Philip Carey Company of Cincinnati controlled the Quebec Asbestos Corporation, Limited, whose property was situated at East Broughton.

Late in 1929 another producer was added to the list when the Nicolet Asbestos Mines, Limited was formed, presumably by American capital, to commence operations at Norbestos, nine miles east of Danville.[3] At present the company is under the control of Asbestos and Metal Industries Corporation of Norristown, Pennsylvania.[4]

1. Annual Report of the Quebec Bureau of Mines, 1929, p. 24.
2. "Asbestos Corporation, Limited," The Financial Post Corporation Service, p. 2.
3. Annual Report of the Quebec Bureau of Mines, 1929, p. 33; Annual Report, 1930, p. 30.
4. Dunn and Bradstreet, through the courtesy of Asbestos.

The only other change in the commercial control of the Quebec asbestos industry that has occurred since 1929 was the transfer in ownership of the Bell mine in 1933. In December of that year Keasbey and Mattison's president announced that a merger had been effected with the Ambler Asbestos Shingle and Sheathing Company.[5] It was also announced that Turner and Newall of England had acquired a controlling interest in the new consolidation, giving that firm direction of the manufacturing plants and the Arizona mine of Keasbey and Mattison in the United States and the Bell mine in Canada.

Although the American capital control of the Quebec asbestos industry was weakened by the Turner and Newall acquisition of the Bell mine in 1933, Canadian ownership has remained unchanged. Furthermore, as long as the asbestos produced by Canadian Johns-Manville and the Quebec Asbestos Corporation is needed by those companies' manufacturing plants in the United States, there is little prospect of additional Canadian control in the future. How much of this American production enters the open market to compete with the Canadian-owned output is difficult to determine, but it can be assumed that by far the major portion is utilized by Johns-Manville and Philip Carey in their own factories. Consequently, the supplying of raw material to independent asbestos products manufacturers lies mainly with the two Canadian operators, but at the same time the non-ownership of manufacturing plants by the Canadian companies means that these firms do not have an assured market for their product in times of lowered business activity.

Hence, it is extremely regrettable that the 1925 merger to form the present Asbestos Corporation did not include the private firm of Johnson's Company. This would have completely centralized the Canadian

5. Annual Report of the Quebec Bureau of Mines, 1933, p. 132.

production of asbestos and would have placed Canadian management in the strongest possible competitive position. Whether any cooperation between the two companies exists at present cannot be stated, but obviously a unified control would make for a more stable condition of Canadian-owned production. This can be brought out more clearly by the following table of 1940 production figures of the Quebec operators:

Table 3 [6]

1940 Quebec Production (Groups 1-8 inclusive)

Canadian Johns-Manville	143,627.00 short tons
Asbestos Corporation	93,637.87
Johnson's Company	49,822.40
Bell	31,851.65
Quebec Asbestos Corporation	27,072.20
Total	346,011.12 short tons

Of the total output American production in 1940 accounted for 49.3%, while Asbestos Corporation and Johnson's Company contributed 27.0% and 14.3% respectively. If this Canadian output of 41.3% were under the control of one company, regulation of production and prices and the marketing of the product would be an easier matter, especially helpful in times of depressed business conditions. However, since an amalgamation does not seem probable, the best that can be hoped for is the reasonably profitable operation of the two companies and the maintenance of their export markets.

Of prime interest to Canadians, then, is the welfare of the Asbestos Corporation, Limited, the only public Canadian firm in the industry, whose course has run far from smoothly. As has been seen, previous to the formation of this company in 1925, much of the demoralization existing in the Quebec industry could be attributed to the production of

6. "Raw Asbestos Shipments, Johns-Manville and Competitive, 1940."

American-owned properties in excess of their manufacturing needs. Consequently, in order to stabilize a chaotic situation the new corporation entered into a contract in 1925 with the American operators whereby the Asbestos Corporation would provide for the marketing of that part of the producers' output which was not needed as raw material for their asbestos products.[7] The following year the Corporation began a $2,325,000 damage action against the Keasbey and Mattison Company claiming that the latter company had failed to live up to its agreement.[8] In reply the American firm pleaded that the contract was a violation of the antitrust laws of the United States.[9] This argument was more or less backed up by the United States Department of Justice when it brought suit against the Asbestos Corporation in 1928 under the antitrust laws and a clause of the 1894 Wilson Tariff Law which prohibits combinations among persons or organizations importing into the United States "when intended to operate in restraint of lawful trade or free competition.... or to increase the market price in any part of the United States of any article imported".[10] The case was heard in the District Court of New York in May, 1929, when it was decreed that the subpoena served upon one of the company's directors was invalid. Before August, 1927, the Asbestos Corporation, through an agent having a personal office and residing in New York State, had conducted business "of such character, continuity, and volume within the State as to give it corporate presence here and to subject it to service of process". After the resignation of the agent on that date, however,

7. "Canadian Asbestos and the Sherman Act" (Editorial), Engineering and Mining Journal, CXXV, 25 (June 23, 1928), p. 1001.

8. Financial Post Corporation Service, p. 2.

9. "Canadian Asbestos and the Sherman Act," p. 1001.

10. E. Staley, Raw Materials in Peace and War (New York, 1937), p. 129.

the company's business was carried on through solicitation by salesmen sent from the Toronto office and the orders were accepted in Canada. Hence, the activities of the company were not such as to give it corporate presence in New York or elsewhere in the United States, and on this basis action against the corporation was dismissed.[11]

The Asbestos Corporation's case against Keasbey and Mattison was eventually heard in May, 1931, but the trial judge died before its completion, and a final decision was not handed down until April, 1934, in Quebec. This time the claims of the Asbestos Corporation were not upheld by the court. Because the agreement between the two companies had been signed in the United States and because it would have resulted in an increase in the prices for asbestos in that country and in an attempt to monopolize a product indispensable to the United States, most of which came from Canada, the contract was subject to the Sherman and Clayton antitrust and the Wilson tariff laws. Since the Keasbey and Mattison Company would have been liable to prosecution in the United States and consequently was unable to carry out its agreement with the Asbestos Corporation, the court declared the contract between the companies null and void.[12]

Not only the troubles of litigation but also financial difficulties have characterized the history of Asbestos Corporation, Limited. The latter can be almost exclusively blamed on the firm's capital structure. The consolidation of seven companies in 1925 to form the present corporation had made that company the largest independent producer of asbestos in the world. However, the amalgamation had resulted in a great over-capitalization that left the Asbestos Corporation unable to stand up under the weight of heavy fixed charges during lean years. In 1929 the

11. Federal Antitrust Decisions, 1927-1931, Vol. II (Washington, 1934), pp. 404-407.

12. "Asbestos Corporation v. Keasbey and Mattison Company," Asbestos, XIV, 10 (April, 1933), p. 8.

company's stock capitalization consisted of $7,456,400 of 7% non-cumulative preferred, $100 par value, shares and 200,000 no par value common shares. In addition, there was a large funded debt of $3,000,000 of 6% First and Refunding Mortgage Sinking Fund Gold Bonds, due in 1941; $4,239,000 out of an authorized $10,000,000 6% General Mortgage Sinking Fund Gold Bonds, due in 1956; $3,000,000 of Asbestos Corporation of Canada 5% First Mortgage Sinking Fund Bonds, due in 1942; and $571,142 of outstanding bonds of associated companies.[13] On the preferred stock, dividends had been paid regularly until January of 1929, after which payments were discontinued; no dividends at all had been paid on the common stock since the 1925 incorporation.[14]

Not only were such heavy fixed charges a great burden to the Asbestos Corporation, but the company had also suffered from poor management. The new management which took over in May, 1929, in its report for that year, charged that it was extremely handicapped in its conduct of the business by the commitments and carelessness in mining methods of the preceding operators. Under the new control, Colonel James G. Ross was put in charge of the company's mining operations, and many improvements in facilities were initiated.[15]

Nevertheless, the lowered price of asbestos and increasing competition from African and Soviet fibre did much to augment the difficulties of the Asbestos Corporation, and on July 1, 1930 interest on the general mortgage bonds was defaulted.[16] The bondholders' protective committee, which was subsequently formed, agreed to the postponement of

13. The Financial Post Survey of Corporate Securities, 1929 (Toronto, 1929), p. 317.

14. Financial Post Survey, 1930, p. 354.

15. "Asbestos Corporation," The Canadian Mining Journal, 51 (March 21, 1930), p. 280.

16. Financial Post Survey, 1931, p. 289.

interest payments until January 1, 1932, and sinking fund payments to a year later. First and refunding mortgage bondholders also formed a committee to protect their interests, and, when interest on these bonds was defaulted in January, 1931, the holders agreed to postponement of interest payments until July 1, 1931. However, in December of 1931 the directors of the corporation were forced to appoint a committee for the consideration of a reorganization plan.[17] Rather than to attempt a liquidation of the company, this committee deemed it more expedient to attack the problems of building up an adequate working capital and of reducing the corporation's fixed charges. The plan reported by the group in February, 1932 was approved by the shareholders on April 27 and by the bondholders on May 31.

The principal features of the plan were as follows:

1. The underlying bonds (Thetford-Vimy, Maple Leaf, and Asbestos Corporation of Canada) were unchanged.

2. The preference and common stock shares, and the first and refunding mortgage and general mortgage bonds were replaced by new securities.

3. Revision of the share capital resulted in the creation of 300,000 no par value shares; new first and refunding mortgage bonds (issuable only if required for purposes of refunding underlying bonds and to provide additional working capital) and a new issue of "general mortgage 6% income bonds" were authorized. Voting rights of the shares were to be vested in five voting trustees during the life of the general mortgage 6% income bonds.[18]

4. First and refunding mortgage bondholders received new income bonds (with interest payable only if earned) on the basis of par for par, plus 1 share of capital stock for each $100 of bonds.[19]

5. General mortgage bondholders received 1 1/2 shares of capital stock for each $100 of bonds and for all interest in arrears.[20]

17. Financial Post Corporation Service, p. 3.

18. Ibid., p. 4.

19. The Canadian Annual Review of Public Affairs, 1932 (Toronto), p. 453.

20. Financial Post Corporation Service, p. 3.

6. For each 10 shares of preference stock held, 1 1/2 shares of new capital stock were received.

7. For each 50 shares of common stock held, 1 1/4 shares of new capital stock were received.

That this reorganization was drastic can be seen from the following table:

Table 4 [21]

Before Reorganization

Underlying bonds	$749,179
First mortgage bonds	$2,361,000
General mortgage bonds	$4,132,300
Preference stock	$7,456,400
	$14,698,879
Capital Stock	200,000 shares

After Reorganization

	Authorized	Issued
Underlying bonds	$749,179	$749,179
New first mortgage bonds	$1,500,000	none
New general mortgage 6% income bonds	$2,361,000	$2,361,000
	$4,610,179	$33,110,179
Capital stock, n.p.v.	300,000 shares	104,779 shares

The reorganization was followed by firm progress on the part of the company. By July 1, 1937 all income bonds had been retired and the voting trust restriction terminated.[22] Retired bonds included the 5% first mortgage bonds of the Asbestos Corporation of Canada, the Maple Leaf Asbestos Corporation 7% first mortgage bonds, the Thetford-Vimy 7% first mortgage bonds, and the Asbestos Corporation, Limited first mortgage bonds

21. Ibid.

22. "The Asbestos Corporation, Limited," L. G. Beaubien, p. 2.

and general mortgage 6% income bonds. The remaining bonds outstanding were called for redemption in 1939.[23]

In the years 1932 and 1933 the number of stock shares was increased by 23,610 in payment of bond interest. The late president of the Corporation, Colonel Robert F. Massie received a total of 7,322 shares in 1934 and 1935, issued as part payment of salary. In May of 1937, shareholders were offered one share at $75 for every eight shares held; 16,588 shares were taken up by the stockholders. In 1938, 700 shares were sold at $111 per share bringing the total shares outstanding up to 150,000. In April of 1939 the stockholders approved a stock split of four new shares for each existing share; this increased the number outstanding to 600,000 out of an authorized 1,200,000 shares of no par value common stock.[24]

Following the 1932 reorganization, no dividends were paid on the common stock until 50 cents per share was paid on March 31, 1938 and regularly (quarterly) thereafter until and including March 31, 1939. After the 1939 stock split and beginning with June 30 of that year, dividends of 15 cents per share plus extras have been paid quarterly, making a total of $1.10 and $1.25 per share in 1939 and 1940 respectively.[25]

As the foregoing indicates, great strides in improving its financial position have been made by the Asbestos Corporation since 1929. A net profit of $18,333 was made in that year, only to be followed by five successive years of deficits.[26] In 1935 a net profit of $15,415 was recorded,

23. Financial Post Corporation Service, p. 5.

24. "The Asbestos Corporation, Limited," Beaubien, p. 2.

25. Financial Post Corporation Service, p. 4.

26. Ibid., p. 7.

and net profits then steadily increased until $1,188,756 was reached in 1938. 1939 and 1940 profits decreased, however, to $929,809 and $724,854 respectively. On the basis of stock outstanding at present this represents an increase of earnings per share from $00.03 in 1935 to $1.55 and $1.21 in 1939 and 1940. However, in only three years were operating losses shown (1930, 1931, and 1932); and in 1938,operating profits, after deduction of all charges except depreciation and interest, were the highest in the history of the company.[27] Furthermore, the working capital position of the company has improved: in 1931 there was a deficiency of $384,331; by the end of 1940 working capital stood at $2,427,578, and current assets were 6.4 times current liabilities.[28]

At the present the Asbestos Corporation has no bonds, no preferred stock, no bank loans, nor any other indebtedness. Its capitalization is now in the most simple and sound form yet, a far cry from the top-heavy charges of 1929. Such lack of fixed debt and the obvious ability of the company to make operating and net profits presage well for the firm's future capability to withstand lean years. Indeed, there seems little reason to fear that the Asbestos Corporation will soon again fall into the financial difficulties that have characterized the company's history since its inception.

The gains from centralized control of Canadian-owned properties, as epitomized by the Asbestos Corporation, are beginning to be realized. Even more effective would be complete centralization through a merger with the Johnson's Company. Nevertheless, the present financial position of the public corporation and the consequent healthier condition of the Quebec industry are a vast improvement over the fluctuations of former years, and the extraction of asbestos in Canada seems to have assumed the most stabilized organization of its history.

27. "Asbestos Corporation Limited," Greenshields and Co. (Montreal, May 27, 1940), pp. 3-4.

28. Ibid., p. 4;
Financial Corporation Service, p. 6.

Chapter IV

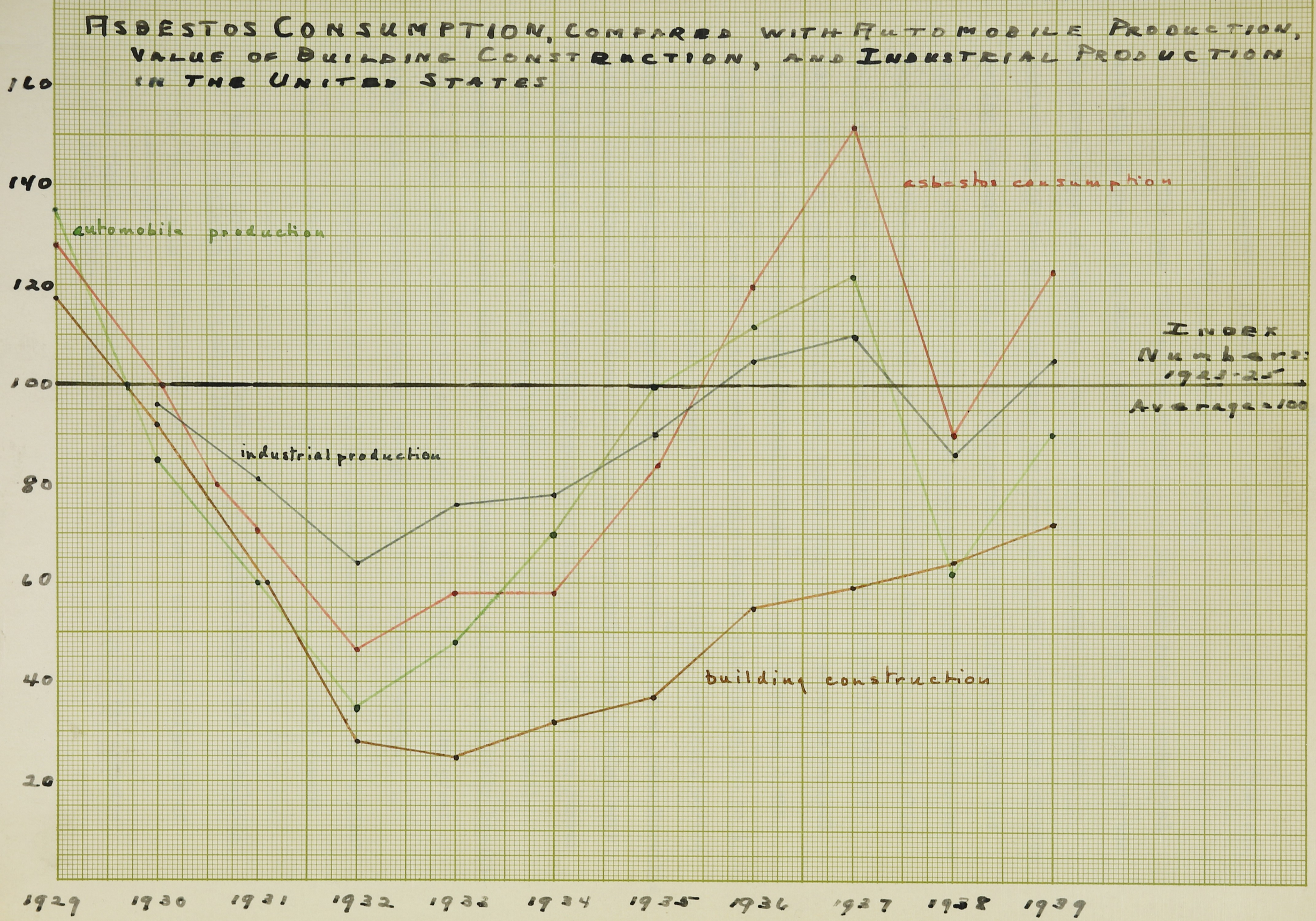
PRODUCTION, PRICES, AND CONSUMPTION [1]

To trace the activities of the automobile and construction industries since 1929 is to trace the course of asbestos production in Quebec. This relationship is explainable by the fact that the consumption of asbestos is predominantly determined by the extent of automobile manufacture and of building construction, and by the rate of industrial activity in general. (See chart on the following page.) The dependence of asbestos consumption upon these factors is evident when the uses for the mineral in those industries are considered. To modern transportation asbestos, with its resistance to wear and to friction, is indispensable as the chief component of clutch facings and brake linings. In household and factory construction and equipment its use is widespread for heat insulation, millboard, compressed sheets, and fireproof paints. Furthermore, asbestos-cement products, such as roofing, paneling, partitions, pipes, and other building materials, are being increasingly employed in construction. Steam-driven machinery, too, finds asbestos a necessary material for gaskets and packings.

With these relationships in view, it is not surprising that the activities of the two industries in the United States, Canada's largest single market for asbestos, have a profound effect upon production in Quebec. The fact that 79% by volume and 66% by value of Canada's total asbestos exports entered the United States market in 1929 emphasizes the importance of American consumption to the Quebec producers. To a great

1. Except where otherwise noted the material for this chapter has been obtained from the Annual Reports of the Quebec Bureau of Mines, 1929-1939; The Mineral Industry, Vols. XXXVIII-XLVIII; Mineral Resources of the United States, Part II — Nonmetals, 1929-1931; and Minerals Yearbook, 1931-1940.

Asbestos Consumption, Compared with Automobile Production, Value of Building Construction, and Industrial Production in the United States



(Minerals Yearbook, 1940)

extent, then, asbestos production in Canada must fall in line with the rate of industrial activity in this great market.

The year 1929 was no exception — the high rate of industrial activity in the United States and throughout the world was reflected in the Canadian output of asbestos. Not only did the year mark the fiftieth anniversary of the Quebec industry, the first shipments of Canadian asbestos having been made in 1879, but it also marked the most prosperous year the industry had enjoyed since the war and post-war periods.[2] The average value per ton of fibre shipped, $43.04, was the highest since 1921. Total shipments of 306,055 short tons were the greatest in the industry's history, while their value of $13,172,581 was second only to that recorded in 1920 when prices for asbestos were abnormally high.[3] In 1929 Crude No. 1 was selling for $550 to $750 a ton, while shingle stock was quoted at $55 to $110.

To meet the great demand for the raw material, producers worked the mines steadily night and day throughout the year.[4] Canadian Johns-Manville milled an average of 4,550 tons of ore a day, and their factory sales were the highest on record. Asbestos Corporation built a new mill at the Beaver mine to take the place of the old Consolidated mill. It was not until November and December, when a noticeable decrease in building activity brought about a fall in the demand for asbestos, that the beginning of the great industrial depression started to impinge upon the Quebec industry.

However, the effects of the trade recession became very evident in the Canadian mines after the first quarter of 1930. In April demand

2. "Monthly Correspondence - Quebec," The Canadian Mining and Metallurgical Bulletin, 207 (July, 1929), p. 814.

3. See Table A in the Appendix for annual Quebec sales and shipments of asbestos.

4. See Table B in the Appendix for principal statistics of the asbestos mining industry in Canada.

decisively lessened, and operators were forced to reduce their production greatly. Operations by the Asbestos Corporation were concentrated mainly at the King mine, the Beaver and Consolidated mines were merged and operated as a unit, and the Maple Leaf, Vimy Ridge, and East Broughton mines were closed after April. Canadian Johns-Manville and Bell worked their mines almost at capacity during the earlier part of the year, but later curtailed production by decreasing the number of working hours. Quebec Asbestos Corporation worked its East Broughton mine fairly steadily, and developed the old Montreal which it had acquired the previous year. Nicolet also began production shortly after the beginning of the year.

The decreased activity in the industry was reflected in shipments from the mines which totalled 242,113 tons, valued at $8,390, 164 — a decrease of 20.9% in volume and 36.4% in value from the previous year. The average price of asbestos per ton fell to $34.65 and was the lowest since 1925. This decrease, however, was mainly caused by the drop in price of the longer fibres; prices on the shorter grades showed little decline, chiefly because severe competition among producers had already brought about abnormally low quotations for shorts in previous years.[5] At the end of the year Crude No. 1 was priced at $350 to $400, in sharp contrast to its peak value of $750 in 1929. Crude No. 2 which had been selling at prices ranging between $450 and $575 at the beginning of 1930, reached a low of $250 by the year's end.

With construction and automobile manufacture far below normal, a decrease in the operations at the Canadian mines during 1931 was inevitable. The Asbestos Mines, British Canadian, and Beaver-Consolidated quarries of the Asbestos Corporation were closed during the year, but the Maple Leaf

5. N.R. Fisher, "Asbestos," Engineering and Mining World, II, 2 (February, 1931), p. 75.

was put into operation in August and the Vimy Ridge in September, and both were worked steadily the rest of the year. The company's King mine, however, was operated constantly, chiefly in the development of the underground mining programme which had been inaugurated in February of 1930. Canadian Johns-Manville reduced the number of its employees in May and from then on operated on a basis of only one shift a day. The Bell mine was closed during May, June, and part of July, while Johnson's Company, with its Black Lake pit closed, shut down its Thetford mine during January and June until August. The Nicolet mine at Norbestos was closed from January until the beginning of June. The company least affected by the depressed conditions prevailing throughout the industry was the Quebec Asbestos Corporation. Its East Broughton mine was operated day and night throughout the year, and the firm was easily able to employ its production of short fibres in its own manufacturing plants.

The Quebec shipments in 1931, 164,296 tons valued at $4,812,886, were the lowest in quantity since 1922, while their value was the lowest since 1915. Compared with 1930, 1931's record marked a decrease of 32% in quantity and a decrease of 45% in value. The price of Crude No. 1 ranged from $250 to $300, but by the end of the year was up to $400. Crude No. 2 was quoted at $200, while shingle stock sold for $45 to $65.

In this year the Quebec legislature attempted to ameliorate the depressed conditions in the industry by reducing the provincial duties on the annual profits from asbestos mines, making the levy equal to that on other mines. Formerly, annual profits up to $500,000 had been subject to a duty of 3% on the excess above $500,000 up to $1,000,000 to 5%, and on the excess above $1,000,000 to 8%. For the years 1931 and 1932 these

rates were reduced to 3% on profits above $10,000 and up to $1,000,000, and to 5% on the excess above $1,000,000 and up to $5,000,000. These lowered duties were later extended through 1933 and 1934.[6]

A step was also taken by the producers in 1931 to improve conditions. Since the industry's earliest days uniformity in the grading of asbestos by the various companies had been unknown, and since similar grades produced by different operators bore unlike designations efficient sales methods were impossible. Mutual distrust among producers had heretofore hampered any suggested cooperation, but the depressed economic conditions of 1930 and 1931 and the increasing competition from Africa and the U.S.S.R. in the American crude market produced a change in the attitude of Quebec operators. Consequently, a committee composed of representatives from each company and officers of the Quebec Bureau of Mines was organized to draw up a uniform designation of asbestos fibres for the entire industry. The Quebec Producers' Association was to assist the companies in controlling and standardizing their output according to the following approved classification which was put into effect on January 1, 1932:

6. Mining Royalties and Rents in the British Empire (Imperial Institute, London, 1936), pp. 59-62.

Table 5[7]

Crude Asbestos

Group 1	Crude No. 1	No machine test; crude 3/4 in. and over.
Group 2	Crude No. 2	No machine test; crude 3/8 in. to 3/4 in.
	Crude, run-of-mine	Unsorted crudes.
	Crude, sundry	Crudes other than above.

Milled Asbestos
(Based on the "Quebec Standard Testing Machine"[8])

Group 3	Spinning or textile fibre (Seven sub-grades)	Testing 0-8-6-2 and over.
Group 4	Shingle fibre (Seven sub-grades)	Testing below 0-8-6-2 and including 0-1½-9½-5.
Group 5	Paper fibre (Seven sub-grades)	Testing below 0-1½-9½-5 and including 0-0-8-8.
Group 6	Waste, stucco, or plaster (Two sub-grades)	Testing below 0-0-8-8 and including 0-0-5-11.
Group 7	Refuse and shorts (Five sub-grades)	Testing below 0-0-5-11 and including 0-0-1-15; also finer products weighing 35 lb. or less per cu. ft.
Group 8	Sand	Mill product weighing over 35 lb. and under 75 lb. per cu. ft.
Group 9	Gravel	Mill product weighing 75 lb. per cu. ft. and over.

7. Howling, op. cit., pp. 13-14.

8. Milled fibre is graded by means of a testing machine, which is used in all the Canadian mines and is gradually being adopted in other countries. The machine consists of three rectangular wooden sieves, placed one on top of another, under which is a collecting box. Sixteen ounces of the fibre to be tested are placed in the top sieve, and the machine is shaken mechanically. The fibre remaining in each sieve is then weighed, and this process determines the grade of the fibre. Thus, if there is no fibre in the top sieve, eight ounces of fibre in the second, six ounces in the third, and two ounces in the collecting box, the fibre tests 0-8-6-2, and is classified as a spinning grade. (Howling, p. 13.)

Another cooperative measure on the part of the producers was stimulated by the passage of the Quebec Workmen's Compensation Act in September of 1931. Under the new act was established a compensatory fund common to the whole industry, to which each employer contributed in proportion to his payroll. In an effort to improve their accident record and consequently to decrease expenses under the act, the Quebec operators formed a central safety committee of which Mr. Kenneth B. S. Robertson was placed in charge. The committee was to outline standard measures for the safeguarding and safety education of workmen, but the application of the rules was to be carried out by the companies individually.[9]

The increasing cooperation among Quebec producers, however, could have little effect on the downward swing of industrial activity. The value of 1932 building contracts awarded in the United States amounted to only 28% of the 1923-1925 average, while automobile manufacture was at such a low ebb that there was little demand for brake linings. Indeed, 1932 was one of the worst years in the history of the asbestos industry. Quebec shipments showed a further decline to 122,977 tons, valued at $3,039,721. Compared with 1931, this was a decrease of 25% in volume and 37% in value, while compared to 1930, the volume had declined 49% and the value 64%. The average price per ton of asbestos, $24.72, was the lowest in the industry's history.

Particularly hard hit was the market for long fibre; Crude No. 1 varied in price between $400 and $450 throughout the year and Crude No. 2 was maintained at $200. Quebec producers had consistently sold short fibres at a loss and had made up the difference by the high price of crudes, but the

9. "Marked Reduction of Accidents in the Asbestos Mines of Quebec due to Cooperation," The Canadian Mining Journal, LVI (January, 1935), p. 20.

decline in the long fibre market in 1932 forced the operators to cease cutting prices on shorts.

Although the Beaver-Consolidated, Maple Leaf, Vimy Ridge, British Canadian, and Asbestos Mines properties of the Asbestos Corporation were closed throughout 1932, the King mine was worked steadily. During the year preliminary work for the adoption of the block-caving system was inaugurated at this mine. The Bell mine and mill were operated throughout the year on a reduced scale, while the Canadian Johns-Manville quarry was shut down after May 1. Johnson's Company worked its Thetford property and the Quebec Asbestos Corporation its Montreal mine for only nine months of the year. The Nicolet mine ceased operation early in February.

The long downward trend of falling prices and reduced production and sales that had characterized the asbestos industry since the end of 1929 finally reached an end in the middle of 1933. After a slow start a rise in demand for asbestos began in June, considerably stimulated by an upturn in automobile production. Consequently, American apparent consumption of raw asbestos in 1933 increased approximately 24% over that in 1932.

Compared with 1932 shipments and sales from the Quebec mines rose 28.8% in quantity and 71.4% in value when 158,367 tons valued at $5,211,177 were shipped. The average value per ton rose from 1932's $24.72 to $32.90. Prices for raw asbestos also displayed the industry's upturn. Quoted at $400 and $450 in January, Crude No. 1 was selling for $450 in December. By that month Crude No. 2 had advanced to $225, and spinning fibre had increased from $80 to $110 in January to $90 to $155 by the end of the year.

Indicative of the industry's growing activity was the steady operation from August to November of the Vimy Ridge mine, closed since 1931, by the Asbestos Corporation. In addition the Beaver-Consolidated was worked to some extent for the recovery of crude. By the end of June a section of the

King mine was in full operation under the new system. Operations at 40% of capacity were carried on at the Bell mine until August, after which both mine and mill were worked at 60% of capacity. Closed until April, Canadian Johns-Manville's mine was in production steadily the remainder of the year. The Johnson's Company property at Thetford was shut down from February until May, but was then actively in operation the rest of 1933. The Nicolet mine was closed the whole year, while the Quebec Asbestos Corporation operated only from May to November.

A slight set-back occurred in 1934. Although automobile production in Canada and the United States increased about 45%, construction activity was unusually low. Then too, foreign exchange restrictions in Central Europe and Italy made exports to these markets more difficult. Hence, shipments from Quebec amounted to 155,980 tons with a value of $4,936,326, a decrease of 1.5% in volume and of 5.3% in value as compared with the previous year. However, prices for all grades of fibre were maintained at the 1933 levels.

As in the previous year, Asbestos Corporation worked the Vimy Ridge and Beaver Consolidated mines for short periods and the King mine actively throughout the year. Bell, Canadian Johns-Manville, and Johnson's Company (at Thetford) operated their mines steadily the whole year, while Quebec Asbestos Corporation was active for only nine months of 1934. Although the Nicolet mine was shut down, work was done at the mill on fibre purchased from other mines.

A distinct improvement in construction activity and in automobile sales in 1935 provided a needed stimulus for asbestos production in that year. An increase of 34.9% in quantity and 42.9% in value over 1934 was recorded when Quebec shipments amounted to 210,467 tons, valued at $7,054,614. The average price of asbestos rose somewhat from 1934's $31.65 to $33.52.

Crude No. 1 advanced in price to $500 per ton, while other grades remained substantially at the levels of the previous year.

Asbestos Corporation worked its King mine day and night steadily during 1935, while the Vimy Ridge was operated actively from June until December, and the Beaver-Consolidated was open for the recovery of crude. The mines of Canadian Johns-Manville, Bell and the Johnson's Company were operated at full capacity this year. The latter company also put its Black Lake quarry into production in September, for the first time since the fall of 1930. After a shut-down from January until April, the Quebec Asbestos Corporation produced at full capacity.

A notable development of 1935 was the work done by the Rahn Lake Mines Corporation, Limited on a chrysotile deposit near Matachewan in Bannockburn Township, Ontario. The occurrences seemed to be very promising, and since that time production has been taken over by the Johnson's Company.[10]

A steadily increasing demand for fibre in 1936 resulted in a decided improvement in the Quebec asbestos output. The upswing was demonstrated by a rise in the number of workmen employed by the Asbestos Corporation from 450 to 1,500 during the year. In addition to working the King mine steadily throughout 1936, the Corporation operated the Vimy Ridge mine continuously beginning in April and the Beaver-Consolidated in May. The British Canadian, which had been closed since 1931, started production in September, while the Bennet-Martin mine (at Thetford Mines), shut down since 1923, was reopened in June for the recovery of crude. The Bell mine was operated steadily, and Canadian Johns-Manville increased its production by 25%. Johnson's Company opened its Black Lake quarry in May and worked

10. Bowles, Bulletin 403, p. 34;
"Rahn Lake Asbestos Mine, "Bulletin of the Imperial Institute, XXXVIII, 3 (July-September, 1940), p. 377.

it continuously thereafter. Inactive during the winter, the Quebec Asbestos Corporation started production again in the spring.

Hence, the volume of 1936 shipments from the Quebec mines was higher than that of any previous year except 1929, and showed an increase of 43% over 1935. The sales of 301,287 tons at a value of $9,958,185 recorded an increase of 41% in value compared with the 1935 figure. However, little change in prices occurred during the year.

A remarkable gain in asbestos consumption took place in 1937, and Canadian operators worked almost at capacity to supply the demand for shorts. In fact, consumption of asbestos far-outstripped the construction and automobile industries; this may have been caused by an extensive demand for asbestos-cement goods used in the increased plant reconditioning in the earlier part of the year. Quebec shipments and sales constituted the greatest volume in the history of the industry. 410,024 tons at a value of $14,505,541 were sold, an increase over 1936 of 36% in quantity and 46% in value. With the exception of 1920 when asbestos sold for exhorbitant prices, this value was the highest yet attained by the industry. Prices for the lower grades changed little during the year, but Crude No. 1, ranging from $550 to $600 at the beginning of 1937, reached $700 and $750 in December. Crude No. 2 advanced from $200-225 to approximately $350, and spinning fibre from $90-170 to around $200.

Asbestos Corporation operated continuously its King, Beaver, and British Canadian mines during 1937. The mines of Canadian Johns-Manville and Bell were worked constantly, and both the Thetford and Black Lake properties of the Johnson Company were in production. The Quebec Asbestos Corporation was inactive during the winter months, but resumed active operation after April.

1938 proved disappointing for the asbestos industry. Automobile production was half that of 1937, and asbestos consumption fell in line with this trend despite a fair gain in building construction. Shipments of 289,793 tons with a value of $12,890,195 registered a decrease over 1937 of 29% in volume and 11% in value. However, this volume of shipments had been exceeded in only two other years (1929 and 1930). The average value per ton jumped to $44.48 from $35.38 in 1937. Prices remained substantially the same for the longer fibres but showed an increase for the short grades.

Asbestos Corporation worked actively the King, Beaver, British Canadian, and Vimy Ridge mines. Bell and Canadian Johns-Manville operated steadily, and the Johnson's Company worked its Black Lake property all year and the Thetford mine from July 1. Quebec Asbestos Corporation, inactive during the winter, resumed production in April.

The outbreak of hostilities in 1939, of course, subjected asbestos to war-time regulations by the Canadian government. Like those of other commodities, foreign shipments of fibre required an export permit, under an Order-in-Council which became effective on September 20.[11] As might be expected, uncertainty about supplies from Africa resulted in a greater demand from the United States for Canadian asbestos. Shipments from Quebec amounted to 364,454 tons, an increase of 25.7% over the previous year, and the value of the sales was the highest in the history of the industry — $15,858,492, an increase of 23% as compared with the 1938 value. Although prices were unchanged, following the outbreak of the war payments were effected in American dollars, actually a price rise of 10% for consumers in the United States.

11. Commerce Reports, U. S. Department of Commerce, 39 (September 30, 1939) p. 881.

Throughout the year the Asbestos Corporation was able to operate its King, Vimy Ridge, British-Canadian, and Beaver mines. Development work, preparatory to changing to underground methods, at the Bell mine was far advanced during the year, and a fair proportion of the company's output came from these workings. Johnson's Company operated its Black Lake pit continuously and, except for a short period, its Thetford mine. Canadian Johns-Manville, after a brief period at the beginning of the year when the quarry was worked on an average of five days a week, operated six days a week. Quebec Asbestos Corporation, except for a few weeks, carried on operations throughout 1939.

The war had surprisingly little effect upon the 1940 Canadian output. Exports to the Orient, Australia, and South America compensated fairly well for the loss of European markets. Hence, all mines were in production steadily, except the British Canadian which was closed in September. Increased demand for the shorter grades effected a rise in prices of about 10%, but prices for Crude No. 1, Crude No. 2, and spinning fibre remained the same.[12] Sales amounted to 345,531 tons, a decrease of 5% from 1939's figure.[13]

How the present war will affect future Canadian production is problematic. Indications are that the defence programme of the United States will be absorbing large amounts of Canadian fibre; asbestos has been placed on the "critical" materials list by the American government,[14] and since July 2, 1940, the export of fibre and asbestos manufacturers from the United States has required authorization in each case by a license.[15] Undoubtedly,

12. S. H. Dolbear, "Industrial Minerals," Engineering and Mining Journal, CXLII, 3 (February, 1941), p. 91.

13. Mineral Trade Notes, U.S. Bureau of Mines, Department of the Interior, XII, 4 (April 19, 1941), p. 19.

14. S. H. Dolbear, "Development and Production of Domestic Supplies of Strategic and Critical Minerals," Mining Congress Journal, XXVII, 12 (December, 1940), p. 43.

15. Engineering and Mining Journal, CXLI, 7 (July, 1940), p. 72.

American demand to a great extent will make up for the present loss of the Japanese and European markets. Current prices for asbestos will remain in effect at least until the end of 1941;[16] and one thing is certain -- they will not reach the great heights of the last war and post-war periods.[17]

16. Asbestos, XXIII, 2 (August, 1941), p. 31.

17. Current prices (August, 1941) for Canadian Asbestos are:

	Per Ton (2000 lb.) f.o.b. Mine (In U.S. Funds)
Group 1 (Crude No. 1)	$700.00 to $750.00
Group 2 (Crude No. 2, run-of-mine, and Sundry)	$150.00 to $350.00
Group 3 (Spinning or textile fibre)	$110.00 to $200.00
Group 4 (Shingle fibre)	57.00 to 85.00
Group 5 (Paper fibre)	40.00 to 49.50
Group 6 (Waste, stucco, or plaster)	30.00 to 32.00
Group 7 (Refuse or shorts)	13.00 to 28.00

Chapter V

THE SOVIET BOGEY

Previous to the Great War Canadian producers became conscious of the fact that Russian production of asbestos was expanding and that the Ural output was presenting some competition to the Quebec fibre. In 1914 the tonnages reported from Africa were as yet negligible, but Russia's production of 16% of the total world output caused concern.[1] However, the War interrupted progress in that country, and, as production sank to a very low level, the Russian threat seemed to disappear. But this happy state of affairs for the Canadian operators did not last long: when Soviet production jumped from 4,780 metric tons in 1922-1923 to 12,330 tons in 1924-1925, the Soviet Union had made a decisive bid to regain its position as the world's second producer. But an increase in output such as this from the enormous asbestos resources in the U.S.S.R. was inevitable.

The great wealth of this nation's asbestos deposits occur in several localities of the Union: in the Caucasus, where a short brittle fibre is found, in Turkestan, and in the Urals at Orenburg and in the Bazhenova-Alapaevsk-Krasnuralsk district. Some deposits at Minnsinsk on the Yenesei River in Eastern Siberia have been worked only intermittently because of unfavourable climate and poor transportation facilities, while others in the Irkutsky district at Ilchiv in the Far East are believed to possess future possibilities.[2]

At present, however, Soviet production comes entirely from the Bazhenova deposits which are centred at the town of Asbest, about

1. Mendels, op. cit., p. 55.

2. "The Russian Asbestos Resources, The Canadian Mining Journal, LII (May 15, 1931), p. 457:
W. A. Rukeyser, "Chrysotile Asbestos in the Bajenova District, U.S.S.R.," Engineering and Mining Journal, CXXXIV, 8 (August, 1933), p. 335;
Foreign Minerals Quarterly, U.S. Bureau of Mines, Department of the Interior, I, 2 -- Section 2 (June, 1938), p. 58.

thirty-five kilometres from Bazhenova, which is on the Trans-Siberian Railway, and fifty-six kilometres east of Sverdlovsk, the chief city of the Urals and an important industrial centre.[3] In this district there are four serpentine belts: an area which is south of Sverdlovsk and is non-productive; the main Bazhenova producing zone around Asbest; the Alapaevsk-Keze area which produces shorts and is north of Asbest; and, finally, the Krasnuralsk zone, west of Alapaevsk, also a producer of shorts. The Asbest district is about twenty-one kilometres long in a north-south direction, and is made up of three zones of operations. The Proletariat section, in the northern part, produces short fibres, while the October (or central) and the Ilynski (or southern) are the major producers.[4]

Before the revolution these deposits were worked almost entirely by private capital, some of the workings belonging to the Imperial family. Crude mining methods were used, and milling was only semi-mechanical. Production, however, was put under state control in 1918 and since 1921 the mines have been operated by the Uralasbest Trust;[5] the whole Soviet asbestos industry - mining, milling, manufacturing, and distribution - is under the direction of the Souzasbest at Moscow.[6] It was decided by the state authorities to exploit the deposits intensively because of their former development, their accessibility, and the adequacy of labour and power available. Production was begun on a large scale about 1923. At first, only the longest grades -- crudes, spinning fibres, and shingle stock -- were extracted and this was a result not only of the crude milling methods but also of the fact that a major portion of the output was destined for European markets, which required

3. Rukeyser, "Chrysotile Asbestos," etc., p. 335.

4. Rukeyser, "Mining Asbestos in U.S.S.R.," Engineering and Mining Journal, CXXXIV, 9 (September, 1933), p. 377.

5. Rukeyser, Working for the Soviets (New York, 1932), p. 137;
Rukeyser, "Chrysotile Asbestos," etc., p.335.
O. Bowles, Asbestos, Bulletin 403, U.S. Bureau of Mines (1937), p.41.

6. C. V. Smith, "Russia and Its Asbestos Operations," Asbestos, XIV, 10 (April, 1933), p. 3.

an unopened fibre.[7] However, the first Five-Year Plan called for the utilization of much of the fibre output within the Soviet Union in the manufacture of asbestos products, and this necessitated the production of the shorter grades and more modern milling methods, similar to the Canadian technique. Since 1931 more efficient mills have been built and some of the old ones improved with new equipment. Milling capacity at present is about 175,000 tons of fibre a year.[8] The completion in 1927 of a 34 kilometre railroad from Asbest to Bazhenova greatly stimulated the development of these ore resources. As a result Asbest has grown into a modern mining community, whose population increased from 10,000 to 20,000 in two years.[9]

The real impact of this reviving Soviet industry, however, was not felt in Canada's chief market until 1929, when 252 short tons of Ural asbestos were directly imported into the United States.[10] The following year, 4,534 tons were placed on the American market, and the cry of "dumping!" was heard far and wide from both Canadian and American operators.

The first steps to combat this situation were taken at a meeting of representatives from the Quebec mining companies in January, 1931, when it was decided that henceforth the Canadian producers should act together more harmoniously.[11] The following month the Canadian government went into action and passed an Order-in-Council forbidding the importation of coal, pulpwood and lumber, asbestos, and furs from the U.S.S.R. Said the

7. Rukeyser, "Asbestos Milling in the Urals," Engineering and Mining Journal, CXXXIV, 10 (October, 1933), p.415.

8. Howling, op. cit., p. 42;
Bowles, Bulletin 403, p. 64.

9. J. M. Bell, "Some Mineral Developments in Northern Asia," The Canadian Mining and Metallurgical Bulletin, 243 (July, 1932), p. 36.

10. See Table C in the Appendix for detailed American import statistics.

11. Canadian Annual Review of Public Affairs, 1930-31, pp. 495-496

authorities, "The Government is convinced that there is forced labour in the cutting and transport of timber and in the mining of coal; that political prisoners are exploited; that the standard of living is below any level conceived of in Canada; and that broadly speaking, all employment is in control of the Communist Government, which regulates all conditions of work and seeks to impose its will upon the whole world.[12] A retaliatory measure was shortly taken by the Soviet government whereby all Canadian imports were prohibited, as well as the use of Canadian shipping.[13]

The credit for decisive action in the matter, however, can be given to two American producers of raw asbestos: the Bear Canyon Asbestos Company (owned by Keasbey and Mattison) and the Regal Asbestos Mines, Incorporated, who were later joined by the Vermont Asbestos Corporation in 1932.[14] On December 9, 1930 these companies lodged a complaint with the United States Tariff Commission under the anti-dumping clause of the Tariff Act of 1930, and as a consequence the Commission on March 30, 1931 ordered an investigation of the charges. A date was then set for the filing of answers by the respondents, the Amtorg Trading Corporation, the Soviet trading agency, and Asbestos Limited, Incorporated of New York, an asbestos brokerage firm. Later, requests by the respondents for postponement were granted and until the investigation should be completed the Treasury Department in April forbade imports of asbestos from the U.S.S.R. into the United States except under bond.[15]

12. "Canadian Embargo on Soviet Products," Economic Review of the Soviet Union, VI, 7 (April 1, 1931), p. 155.

13. "U.S.S.R. Forbids Importation of Canadian Goods," Economic Review of the Soviet Union, VI, 9 (May 1, 1931), p. 205.

14. "Restriction of the Importation on Sales of Russian Asbestos is Lifted by U.S.A.," Asbestos, XIV, 10 (April, 1933), p. 20.

15. "Postponements in Asbestos Investigation," Engineering and Mining Journal, LII (May, 1931), p. 457.

Allegations were hurled from both sides. Wrote E. Schaaf-Regelman, president of Regal Asbestos Mines, in Asbestos in May:

"We received in 1929 from Canada 5,938 long tons of crude and in 1930 1,736 tons, while Russia brought in during 1929 only 225 tons, but their share in 1930 was over 4,000 tons.

'Therefore it is evident that Russian crude asbestos has, during the last year, largely replaced Canadian crude.

'During the middle of 1929, when the first appreciable quantities of Russian crude came to this country, American asbestos textile plants were paying $500 for Canadian Crude No. 1; they received remunerative prices for their manufactured goods and Canadian producers were satisfied, and everybody could make fair profits.

'With Russian Crude No. 1 first being offered slightly over $400, then at $350, later at $300, and now at about $200, other grades still lower with promises of once more lower prices if quantities ordered are increased, nobody knows where the bottom is, everybody cuts under everybody else's prices, and no one is making any money.

'Canadian producers finding present levels unremunerative, one after the other are closing down, and since our industries require about 200,000 to 250,000 tons of mill fibres and shorts a year, which are being produced only in Canada, grave danger threatens our whole industrial life if Canada should cease to produce these 250,000 tons of mill fibres and shorts of which there is no other source of supply.'"[16]

An article in Rock Products of August, 1931 contributed the following:

"The recent dumping of 120,000 bags or approximately 6,000 tons of crude asbestos on the United States market by the Russian government,

16. Asbestos, XII, 11 (May, 1931), pp. 16, 18.

through its agents, the Amtorg Trading Corporation, has further demoralized that industry and has caused severe curtailment in operations of the asbestos companies operating in Canada. The United States has been chiefly dependent on Canada for its supplies. Not only have large shipments to the United States been made by the U.S.S.R., but prices have been cut drastically. Formerly asbestos sold above $500 a ton, but the Russian product has been offered at $350 a ton and latest offers of Russian raws are reported at well below that figure.

"While the Asbestos Corporation of Canada has found marketing conditions difficult for some years, the situation has become acute now..... Profits after depreciation in 1929 amounted to $18,333. In 1930 operating loss was $89,068 and net loss, after charges, was $1,229,002.

"The slump in the asbestos trade began in 1929 when the first crude shipments from Russia began. Since then they have increased materially. The one Russian shipment noted above is almost on a par with monthly shipments from Canada, which in February this year (1931) were 7,120 tons. Asbestos Corporation has been forced to decrease prices to meet the competition.

"To strangle the American and Canadian asbestos industry and to supply the needed asbestos goods of the world, seems to be the ultimate aim of Russia. This will be an easy matter, as no capital investment was needed to acquire the Russian mines, having been forcibly taken from the former owners. There is no competitive or free labour market in Russia. The people are compelled to accept wages arbitrarily fixed by the government. ....."[17]

This brought a reply from A.V.Mikadze, American representative of Rudoexport (Soviet Ore Exporting Company), who said:

"The article on 'Dumping of Soviet Asbestos' which appeared in August 1, contained a number of inaccurate statements. First, as to the

17. "Dumping of Soviet Asbestos Blow to Canadian Industry," Rock Products, XXXIV, 16 (August 1, 1931), p. 46.

characterization of Soviet imports of asbestos into this country as 'dumping'. The fact is that during the first six months of 1931, 1,953 tons of asbestos were brought into this country from the U.S.S.R. for the purpose of covering contract sales. Those contracts were concluded at fair market prices, which in their relation to Canadian and Rhodesian prices were proportionately higher than in previous years.

"The slump in the asbestos trade is linked in the article with the first crude shipments from Russia which began in 1929. What are the facts in this regard? Russian asbestos has been imported regularly into this country for the last six years prior to November, 1929, Russian asbestos being shipped through Germany. In 1928 more Russian asbestos was sold in the United States than in 1929 and 1930 combined.

"The decline in the asbestos market was caused not by imaginary Soviet dumping, but by the world-wide depression, which has severely affected the two main consumers of asbestos products -- the automobile and building industries. ....

"It would naturally be expected, therefore, that these slumps in the activities of the major consumers of asbestos products would be reflected in a decrease in the production of asbestos in Canada. As a matter of fact, for the first five months of 1931 the Canadian output of raw asbestos amounted to 64,098 short tons, a decrease of 45% as compared with the output for the same period of 1929. Importations of Canadian asbestos into the U.S. for the first five months of 1931 amounted to 51,333 long tons, while Soviet imports totalled 1,953 tons. To contend, in the face of these facts, that Soviet exports, which constitute less than 4% of the Canadian shipments, have caused the fall of 45% in the Canadian output is to disregard entirely reasoned analysis.

.....

"The charge is made that Soviet asbestos importers have indulged

in price cutting. If prices for Soviet asbestos were decreased during 1930, it was done only in order to fall in line with the constantly lowered quotations on Canadian and Rhodesian asbestos. It was precisely because Soviet importers belatedly followed the lead of the others in decreasing prices that sales of Russian asbestos in 1930 fell considerably below those of previous years. While it is a fact that prices for asbestos have fallen considerably since the beginning of the depression, price of rubber, coffee, tin, lead, copper, and many other commodities which the Soviet Union does not export and some of which she is a large importer have fallen to an even greater extent....."[18]

After many delays and postponements final hearings in the case were held in September and October, 1932. Broadly speaking the American companies alleged that: (1) the U.S.S.R. had caused the closing of all but one domestic mine, through its unlimited source of supply and its reduction in prices on Soviet asbestos imported into the United States, made possible by economic conditions in the U.S.S.R., to a level below the American cost of production; (2) if not halted, this process would lead to a Soviet monopoly of the mining and sale of asbestos and the cessation of output in other producing countries; (3) the purpose of the Soviet sales was to obtain credits in gold in order to carry out the Five-Year Plan, rather than to make ordinary commercial profits; and (4) as a result of this intention, sales of Soviet asbestos were made without regard to the price received.[19]

The provisions of section 337 of the 1930 Tariff Act involved in the case are contained in the clause that states, "Unfair methods of competition and acts in the importation of articles into the United States or in their sale by the owner, importer, consignee, or agent of either,

18. "Statement on Soviet Asbestos," Rock Products, XXXIV, 22 (October 24, 1931), p. 58.

19. Russian Asbestos, U.S. Tariff Commission Report to the President, Report No. 67 -- Second Series (Washington, 1933), p. 1.

the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States or to prevent the establishment of such an industry, or to restrain or to monopolize trade and commerce in the United States, are hereby declared unlawful, and when found by the President to exist shall be dealt with, in addition to any other provisions of law,...." Consequently, regardless of the efficient and economic operation of the American asbestos industry, unfair methods of competition in importations from the Soviet Union had first of all to be proved.[20]

On the basis of the evidence presented, the Commission reached the conclusion that: (1) although the Soviet government permitted cartels within the Union and allowed its nationals to join the cartels of other countries and although the nature of the government and economic system of the U.S.S.R. placed that nation in an advantageous position to commit unfair trade practices, this did not per se constitute an unfair method of competition; (2) the question whether Soviet asbestos was produced by "convict, forced, or indentured labour" was irrelevant, since section 307 of the Tariff Act of 1930 does not forbid the import of materials produced in such a manner, if their American production is insufficient to meet domestic demand, as is the case in the American output of asbestos; (3) dumping is a form of underselling, which is not an unfair trade method if not carried on in such a way as to injure or discredit competitors or to deceive purchasers; price-cutting, also a form of underselling, of itself does not constitute an unfair method of competition; and (4) prices for Soviet asbestos after 1929 were not always less than those for similar grades from other countries. (See chart on the following page.) Further claims against importations from the U.S.S.R. which the Commission disproved included

20. Ibid., p. 3.

Canadian, Russian, and Rhodesian Crude Prices

800
700
600
500
400
300
200
100

Canadian Cr. No. 1

Russian Crude AA

Rhodesian I

Russian I

Canadian: f.o.b. mines
Russian, Rhodesian: c.i.f. N.Y.

1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940

interference inducing breach of contract, intimidation and coercion of buyers, conspiracy to restrain trade and commerce, and others.[21]

Hence, the Tariff Commission concluded that asbestos from the U.S.S.R. had not been imported in violation of the Tariff Act of 1930, and recommended the removal of the embargo.[22] The finding was formally approved by the President, and in April of 1933 the ban on Soviet asbestos was finally lifted.[23]

Was there in fact cause for this concern on the part of American and Canadian producers over the 1929-1931 importations of Soviet asbestos into the United States market? Certainly statistics do not show that American production suffered.[24] The asbestos output of the United States is exceedingly small at best in relation to American needs. Furthermore, although more chrysotile than amphibole is produced, only a small fraction of the former is of spinning grade capable of competing in the crude market. In 1929, 3,155 short tons of asbestos were sold by American producers, and this sum constituted 1.1% of the apparent American consumption of the mineral (264,873 tons) that year. Sales of American asbestos actually rose in 1930 to 4,242 tons, which amounted to 1.9% of the apparent consumption of 212,152 tons in the home market. Sales in the following year fell to 3,228 tons, but were still above the 1929 level, and these shipments of the American output reached an increased 2.3% of an apparent consumption of 137,875 tons. Surely these figures do not point to any serious loss in sales by American producers during this period of Soviet importations.

21. Ibid., pp. 3-6.

22. Ibid., p. 7.

23. Asbestos, XIV, 10 (April, 1933), pp. 20, 22.

24. See Table D in the Appendix for statistics of the American asbestos industry.

On the other hand, Canadian producers did suffer a disadvantage, but an exceedingly slight one. In 1929 American imports from the U.S.S.R. amounted to 252 short tons of crudes, while Canadian importations stood at 6,651 tons.[25] Hence, Canada supplied 39% of the total crude imports of 16,976 tons, and the U.S.S.R., less than 2%. If, however, we add to the Soviet importation 1,174 tons credited to Germany in the American import statistics, whose original source was undoubtedly the U.S.S.R., the Soviet contribution amounts to 8%. But as always, chief competition for Canada came from the Union of South Africa and Mozambique (probably an exporter of Rhodesian asbestos), who supplied 49% of the total crude imports. The following year, Canada and Africa in fact did yield to the Soviet Union in crude importations into the United States; Canada contributed 18%, the Union of South Africa, Mozambique, and the United Kingdom (also a probable exporter of African fibre) 34%, and the U.S.S.R. and Germany 46%. Nevertheless, Canada's percentage share in the volume of total American imports of asbestos was unchanged, while her percentage share of the value of total imports actually rose. In both 1929 and 1930, Canada supplied 96% of the American imports, while the value of imports from Canada rose from 74% of the total in 1929 to 77% in 1930. The Soviet imports in 1929 amounted to less than 1% in both volume and value, while in 1930 Soviet importations (including those credited to Germany) were 2% of the total imports in quantity and 10% in value. In 1931 Canada's share in the total American importations of crudes declined farther to 10%, Africa's to 25%, and the Soviet Union's (plus Germany) to 44.5%. Adding to the African total 953 tons credited to the United Kingdom, however, crude supplies from this source rose to 44.4%. But still Canada's share in the total imports of

25. See Table C in the Appendix in reference to the following section.

asbestos into the United States increased, since she contributed 95% by volume and 56% by value.

With no Soviet competition at all in 1932, Canada's crude exports to United States amounted to only 18% of the total American imports of this type of fibre, while Africa's contribution had risen to 80%. The year the ban on Asbestos from the U.S.S.R. was lifted (1933), no Soviet crudes reached the United States, according to American import statistics -- yet Canadian crudes constituted only 25% of the total crude imports, while Africa sent 73%. From 1933 through 1939 only 750 tons of Soviet Crude asbestos were recorded in American import figures, yet in only one year, 1935, did Canada's percentage share in the American imports of crudes rise to 39% to equal her 1929 figure. In 1938, when a low of 17.3% for Canada was recorded, no Soviet crude imports at all were reported.

In view of these figures it can hardly be argued that the U.S.S.R. has menaced Canada on the American crude market. As will be seen later, Canada's chief competition in the supplying of crudes to the United States still comes from Africa.

What competition there has existed from the U.S.S.R. since 1933 has been in mill fibres and shorts. But even here the inroads made by the Soviet Union have not been very great. Since that year Canada's contribution to the total American imports of asbestos by volume has varied between 85% (1936) and 94% (1933), while her share in the value of total imports has ranged between 78% (1936) and 90% (1933). The low Canadian figures in 1936, were caused not only by increased Soviet imports but also by expanding importations into the United States from Cyprus. In that year, 6,382 tons of mill fibre were recorded from the Soviet Union and 16,775 tons, whose original source was probably the U.S.S.R., from Hungary. These imports constituted 29% of the total American mill fibre imports (79,663 tons), while

Canada's share was 70%. Of total asbestos imports into the United States that year, the Soviet Union (including Hungary) supplied 9% by volume and 10% by value. Aside from 1936, however, Soviet asbestos has never exceeded 3% (1937) of the total American imports of fibre by volume or 4% (1935, 1937, and 1938) by value.

It seems reasonable to assume, then, that Canadian producers do not have much cause to fear Soviet competition on the American market. Africa still provides the major portion of crude imports into the United States, while Canada's position as the leading source of supply for American requirements of mill fibres and shorts has been little challenged by the U.S.S.R. On the other hand, one must not overlook the productive advantages possessed by the Soviet Union, which are chiefly complete state control, a cheap labour supply, and an economic system to a large extent insulated from the business fluctuations of other nations. To what degree these factors have enabled Soviet asbestos to displace Canadian fibre in other markets will be seen later. Meanwhile, the Quebec operators can take heart from the fact that a rapidly expanding asbestos products industry in the U.S.S.R. is absorbing ever-increasing amounts of that nation's production.

Chapter VI

PRODUCTION IN AFRICA

Unfortunately, the challenge to the Canadian position in the asbestos markets of the world has not come entirely from the Soviet Union. In fact, Canada's monopolistic position in the output of asbestos could almost be said to have passed to the British Empire; for, aside from those of the U.S.S.R., the world's most important deposits lie within the sphere of British political control. Most threatening to Canada is the production of Africa, which has been assuming more importance and has actually displaced this country's output in some consumption centres.

Foremost of the African producers is Southern Rhodesia, holder of third rank in the world's production of asbestos and possessor of the best spinning fibre chrysotile. Compared with other nations, Rhodesia's entrance into asbestos markets is a recent development; indeed, the growth of her industry has been phenomenal. From a scant 400 long tons in 1914, production rose to 38,066 tons in 1929.[1] This Rhodesian output consists entirely of chrysotile, and it occurs in various sections of the country, principally in the Victoria, Lomagundi, Bulawayo, and Gwelo districts, and near the Transvaal border.[2] The Bulawayo and Victoria mining districts have been predominant in Rhodesian production; in the former are located the Shabani mine in the Belingwe area and the Pangani mine in the Filabusi area, while the Victoria district includes the Gath and King mines in the Mashaba area.[3]

1. Howling, op. cit., p. 28.
2. The South and East African Year Book, 1939 (London), p. 441.
3. W.B. Timm, "Impressions of the Mineral Industry of British South Africa," The Canadian Mining Journal, LII (May 1, 1931), p. 449.

Although Rhodesia's first output was obtained from the Victoria district beginning in 1908,[4] attention was not given to the deposits in the Belingwe area, the largest production centre at present, until 1915.[5] In that year claims to the Shabani mine, held by the Rhodesian and General Corporation were staked, followed in 1916 and 1917 by those of the Birthday Nil Desperandum, Orphan's Luck, Goosha, Ad Valorem, and Sphinx mines. The Rhodesian and General at present operates the Shabani and the Birthday, (now merged with the Goosha and Orphan's Luck) mines, the latter having been purchased from Willoughby's Consolidated Company, Limited in 1924.[6] The Nil Desperandum, which now includes the Sphinx mine, in 1919 was taken over by the African Asbestos Mining Company, formed by Turner and Newall of England.[7]

The Shabani is situated about thirty miles northwest of Belingwe, the chief government station in the district, and about fifty-seven miles southwest of Fort Victoria. Until 1928, production at this mine was greatly hampered by the lack of adequate transport facilities, all fibre being conveyed by ox-wagon over poor roads for fifty-six miles to Selukwe, the terminus of a branch railway. However, these difficulties were overcome in 1928 when a sixty-five mile branch railway was completed from Shabani to Somabula, on the Southern Rhodesia Railways main line from Bulawayo to the seaport of Beira in Mozambique.[8]

4. Howling, p. 28.

5. A.G. Boyden, "Asbestos Mines of South Africa and Rhodesia," The Canadian Mining Journal, LII (April 17,1931), p. 36.

6. W.E. Skinner, The Mining Year Book, 1931 (London), p. 480.

7. F.E. Keep, "Chrysotile Asbestos Deposits of Shabani, Southern Rhodesia," The Canadian Mining Journal, LI (September 5, 1931), p. 865.

8. Ibid.

In the Mashaba district, forty-six miles east of Shabani, the Rhodesian and General has further large holdings, which include the Gath's, the King's, the Bolmain, and the Regina mines; of these the King's and Gath's have been the most consistent producers.[9] The D.S.C. and Rosey Cross mines, which are small producers, are operated by the Mashaba Rhodesian Asbestos Company, Limited in the same district.[10]

The Shabani is by far the largest Rhodesian mine and contributes approximately 75% of the total output of the country.[11] Here total recovery of fibre is estimated at about 4%, and rock having a fibre content of less than 1% is not considered profitable to work.[12] Hand-cobbing is done by native labourers, after which the fibre is sent to one of the Shabani's two mills for additional treatment. In the Mashaba district the asbestos deposits seem to be inferior to those of the Shabani in both length of fibre and fibre content of the rock. Recovery of fibre ranges from .7% to 1.2% in this district. The output from the King and King A mines, which is chiefly shingle fibre, amounts to approximately 1.5% of the country's total production.[13] The Nil Desperandum, about two miles from the Shabani, contributes 8%, while the remaining 2% is obtained from the Ethel mine (operated by the Rhodesia Chrome and Asbestos Company [14]) in the Lomagundi district, the Pangani

9. Boyden, "Asbestos Mines," etc., p. 401;
   Bowles, Bulletin 403, p. 35.

10. The Mining Year Book, 1936, p. 353.

11. The Mineral Position of the British Empire (Imperial Institute, London, 1937), p. 49.

12. Howling, p. 27.

13. The Mineral Position, etc.,p. 49.

14. The Mining Year Book, 1936, p. 498.

(apparently operated by Australian capital[15]),Croft, and Norma mines in the Filabusi area, and the Beltong mine in the Vukwe Mountains to the south of Shabani. Since there is little local demand for the shorter grades and since the Rhodesian mines are situated far from the principal consuming centres, it is profitable only to produce spinning fibre and the higher grades of mill fibre. The medium grades that are produced are disposed of in the European and Australian markets, while little fibre below spinning grade is exported to the United States.[16]

In 1929, most of the Rhodesian production passed into the hands of Turner and Newall, already owners of the Nil Desperandum mine, In that year shareholders in the Rhodesian and General Corporation were invited to exchange their shares for those of Turner and Newall on the basis of five fully-paid £ ordinary shares in Turner and Newall for every four fully-paid shares in the Rhodesian and General.[17] This gave the English manufacturing firm control over approximately 98% of the Rhodesian production.

In common with other asbestos-producing countries, Southern Rhodesia had a record year in 1929.[18] Production amounted to 42,634 short tons, the highest ever recorded, at a value of £1,186,629, exceeding £ 1,000,000

15. Asbestos, XI, 9 (March, 1930), p. 52.

16. The Mineral Position, etc., p. 49.

17. The Mining Year Book, 1931, p. 480.

18. Except where otherwise noted the material for the following section has been obtained from : The Mineral Industry, Vols. XXXVIII-XLVIII; Mineral Resources of the United States, Part II -- Nonmetals, 1929-1931; and Minerals Yearbook, 1931-1940.

for the first time.[19] The Rhodesian and General had 272 Europeans and 6,235 natives on its payroll, and for the financial year ended March 31, 1929 the company paid dividends and cash bonuses totalling 30% on its ordinary shares. 1930 brought a decrease in value and tonnage produced. Nevertheless, the average value per ton of asbestos was $138 as compared with $135.27 in 1929. Despite an accumulation of stocks and decreased activity, the Rhodesian and General was able to declare a dividend of 11¼%.

1931 and 1932 registered a distinct decline for the Rhodesian industry. Turner and Newall dividends were decreased to 5%. The King, Gath, and Regina mines were closed down throwing 50 Europeans and 2,700 natives out of work; activity was confined to the Shabani area where the higher grade of fibre was produced. In addition to a large accumulation of stocks, one of the difficulties operating against the Rhodesian industry at this time was severe competition from Canada and the Soviet Union, whose nearness to consuming centres and whose low rail and sea rates put them at a distinct advantage. When prices were high, Rhodesian producers were able to withstand the high local railway rates, but with the average price per ton of asbestos 57% of what it had been in 1930 transportation costs were a great burden. The situation was so serious and competition from the U.S.S.R. so keen, that an agreement was made in 1931 between Turner and Newall and the Soviet Union whereby European markets were apportioned between the two countries.[20] Furthermore, the fact that the Rhodesian government followed sterling currency was somewhat of an aid.[21] In 1932 operations were

19. See Table E in the Appendix for Rhodesian production figures.

20. Annual Report of the Quebec Bureau of Mines, 1931, p. 36, from: South African Mining and Engineering Journal (November 21, 1931).

21. Ibid., p. 46, from: South African Mining and Engineering Journal (January 9, 1932.)

reduced to the lowest rate at which the mines could be economically worked in an effort to adjust production to the greatly decreased demand, since returns were fast nearing the cost of production.[22] Dividends paid by Turner and Newall that year amounted to only 3 3/4%.

The agreement with the Soviet Union apparently produced favourable results, however, in 1933. A decided recovery was evident when the output of asbestos in Rhodesia increased 91.4% and its value, 182%. This was followed by another slight increase in tonnage produced the next year, but the value dropped by £153,248. Since the average value of asbestos was £184 per ton in 1933 and had dropped to £125 in 1934, it can be assumed that a larger percentage of the lower grades was being produced.

Conditions continued to improve, and the 1935 tonnage was just short of the 1929 peak, while the 1936 production exceeded that peak by 32%. Nevertheless, the value of the 1936 output was 29.5% lower than that of 1929, a definite indication that there was greater production of the lower grades in order to supply the ever-increasing demands of the European asbestos-cement products industry. Another record tonnage was produced in 1937, and marked an increase of 256% as compared with the output in 1932, while Canada had augmented her production by 233% in the same period. The tonnage produced by Southern Rhodesia in 1938 reached 58,810 tons, another all-time high, with a value exceeding the £1,000,000 mark for the first time since 1929; although 1939's production was slightly less than that of 1938, its value increased about £68,000.[23]

22. Ibid., 1932, from: South African Mining and Engineering Journal (October 22, 1932).

23. "Rhodesian Mines in 1939," The Mining Journal, CCXI, 5485 (October 5, 1940), p. 604.

Turning to Canada's other British competitor, the Union of South Africa, we find that it is the only region in the world where five different varieties of asbestos occur. These five types are chrysotile, crocidolite ("blue asbestos"), amosite, tremolite, and anthophyllite, but the latter two, whose inferior qualities greatly restrict their application in industry, are not important commercially. Tremolite has been found near Pomeroy in Zululand, in Natal, and in South West Africa,[24] and anthophyllite, known as "asbestic", has been mined in the Zoutpansberg district of the Transvaal. The latter is consumed locally only, being used for roofing slates and tiles.[25]

So far, crocidolite of sufficient commercial quantity and quality has been found only in the Cape Province and the Transvaal in South Africa and in certain parts of Western Australia.[26] Deposits of a pale blue asbestos have been discovered in Bolivia and in South Australia, and, although this fibre is inferior in quality and is of a different chemical composition, it is generally referred to as "blue asbestos" as is the African. Amosite, on the other hand, is found nowhere except in the Transvaal. Of recent years, crocidolite and amosite have been encroaching upon the position of chrysotile and its widespread use in industry, and it is for this reason that South Africa is presenting a threat to chrysotile-producing countries.

24. Mineral Raw Materials, p. 18;
Official Year Book of the Union, 1938, No. 19, Union Office of Census and Statistics, p. 1148;
The Mineral Resources of the Union of South Africa (Pretoria, 1940), p. 331.

25. The Mineral Resources, etc., p. 331.

26. Ibid., p. 325.

Crocidolite fiberizes easily, has a tensile strength greater than that of chrysotile, and has greater resistance to acids and sea water.[27] Although "blue" loses its tensile strength and its combined water at a lower temperature than does chrysotile, its greater resiliency gives it an advantage over the latter for insulating purposes at moderate temperatures.[28] Then, too, a higher proportion of the crocidolite output constitutes spinning fibre -- 13% in 1929 — and this is another point in its favour. Blue asbestos is primarily used in filter cloth, insulation packings, gaskets, joints, battery boxes, and increasingly in asbestos-cement products.[29] As a result of much study and experimentation this type of asbestos has a large market in Europe, but its use in the United States has not been nearly as extensive.[30] Amosite, on the other hand, surpasses both chrysotile and crocidolite in its length of fibre, which ranges from $1\frac{1}{2}$ to 11 inches.[31] However, it is extremely harsh and is difficult to spin and weave. In tensile strength and acid resistance it is equal to blue asbestos and fuses at a higher temperature. By itself this type is employed chiefly in the manufacture of insulation products and for asbestos sheeting and roofing materials.[32] Furthermore, it has been found possible to mix the better grades of amosite with chrysotile or even to substitute it for the latter for some purposes.[33]

27. Ibid., pp. 325, 327.

28. A.L. Hall, Asbestos in the Union of South Africa (Pretoria, 1930), p. 268.

29. The Mineral Resources, etc., p. 327.

30. Bowles, Bulletin 403, p. 37.

31. The Mineral Resources, etc., p. 328.

32. Hall, op. cit., p. 268; The Mineral Resources, etc., p. 328.

33. W. Kupferberger, "Mining Amosite Asbestos in the Pietersburg District, South Africa," Engineering and Mining World, I, 7 (July, 1930), p. 370.

Chrysotile

Except for the Sitilo mine in Natal[34] and deposits in Swaziland, the Union's chrysotile production has been confined to the Transvaal. Production was first begun around 1905 in the Carolina district about twenty-five miles east of Carolina Town; but although fibre of excellent quality has been extracted, mining operations have not been steady.[35] These deposits have been very disappointing economically, for as the depth of the workings increased great expense and a decline in output were encountered. A second deposit has been worked at the Kalkkloof mine, forty-seven miles by road from Carolina. Production consists mainly of short mill fibre of good quality; a mill was in operation in 1929, but the output has been extremely small.[36]

The chief bulwark of the Transvaal chrysotile production, however, has been the deposits, discovered in 1916, near Kaapsche Hoop in the Barberton section, some forty miles north of the Carolina occurrences, and about fifteen miles by road from Godwin River station.[37] Exploitation of this two-mile zone was not begun until 1921, and the chief producers have been the New Amianthus Mines, Limited, a subsidiary of Turner and Newall, operating in the western end, and the Munnik-Myburgh Company, acquired by the Cape Asbestos Company in 1937 [38], operating in the eastern section. Previously, the fibre from these mines had to be hauled by oxen or mules to Godwin River station, entailing heavy transportation charges, but in 1929 an aerial tramway to Elandshock was completed and from here only a short rail haul to Laurenco Margues, Mozambique, the port of shipment, is necessary.[39]

34. Annual Report of the Quebec Bureau of Mines, 1929, p. 40.

35. T.G.Trevor, "Commercial Asbestos in the Union of South Africa," The Mining Magazine, XL, 4 (April, 1929), pp. 210-211.

36. Bowles, Bulletin 403, p. 38.

37. Ibid.

38. Asbestos, XIX, 3 (September, 1937), p. 34.

39. Bowles, Bulletin 403, p. 38.

With reduced transportation costs and the high quality of its output, Barberton became an extremely important chrysotile centre in the 'thirties. In 1930 the New Amianthus mine, equipped with a modern mill, was producing approximately 1000 tons of fibre a month; of this 8% was spinning fibre and the remainder, shingle stock. At the Munnik-Myburgh production is about 200 tons a month and is increasing.[40]

Crocidolite

Cape Province

Although "Cape blue", the only type of asbestos found in the Cape Province, was first exploited as far back as 1893, it has taken many years to win the recognition in the world's markets that this variety deserves. Keen competition from the well-established chrysotile led the Cape Asbestos Company, chief producer of crocidolite, to establish its own factories in England, France, Hamburg, and Turin for the manufacturing of asbestos products from this type of fibre. Hence, a great portion of the company's output has not entered into the open market.[41]

The Cape's crocidolite deposits stretch over a distance of about 250 miles, from thirty miles south of Prieska on the Orange River, northward past Kuruman to the border of the Bechuanaland Protectorate.[42] In the southern section of the occurrences, the Cape Asbestos Company is the chief producer and in 1929 was operating thirteen mines; in the northern section, the significant operators are the Dominion Blue Asbestos Mines, Limited, a Turner and Newall subsidiary, and the Amosite and Blue Asbestos, Limited.[43]

40. Howling, p. 31.

41. Hall, p. 266.

42. The Mineral Resources, etc., p. 327.

43. Bowles, Bulletin 403, p. 37.

Because of the nature of the deposits in the southern section and by reason of the predominant position of the Cape Asbestos Company, mining has been more systematic here. In the north around Kuruman, where the seams are not as persistent and exploitation was undertaken by smaller companies, development has not been nearly as efficient. However, the establishment of the Dominion Company has led to better organization.[44]

Throughout the Cape asbestos fields, the contract method of labour is employed, whereby the management supplies tools and mining material to native workers. The native does his own prospecting, follows his own method of mining, cobs the fibre, takes it to headquarters for dressing and sorting,and is paid according to the grades per standard amount of fibre. The advantages of this system lie in the fact that fewer white men are required on the permanent staff, thus reducing charges, and that expenses decrease as production declines. However, such an unorganized system is probably disadvantageous in the long run, especially in the working of the thicker seams.[45]

Transvaal

Crocidolite is found in northeastern Transvaal, east of Chuniespoort,[46] but total production up to the end of 1935 had amounted to less than 250 tons.[47] It is inferior in quality to that of the Cape and fiberizes less easily, but improvements in milling methods are overcoming this.[48] Production increased greatly in 1938 and 1939.

44. Hall, p. 266.

45. Trevor, "Commercial Asbestos," etc., p. 213;
Hall, pp. 92-93.

46. Annual Report of the Quebec Bureau of Mines, 1929, p. 40.

47. Howling, p. 24.

48. The Mineral Resources, etc., p. 327.

Amosite

As in the case of crocidolite, great difficulty has been experienced in finding a market for amosite, obtained only in the Transvaal. Although this variety was discovered in 1907, because of its colour and its extraordinary length, it was merely a curiosity for some time.[49] A long struggle ensued before amosite gained a place in the world's markets, and even yet its application is limited. The fibre's distinctive qualities led to the adoption in 1918 of the commercial name of "amosite", the initials of the Asbestos Mines of South Africa, the company which originally exploited this variety.[50]

Amosite occurs over a distance of about sixty miles along the Olifants River between Chuniespoort, south of Pietersburg, to the Steelpoort River, north of Lydenburg.[51] The principal mines are situated near Penge in the Lydenburg district, and are the Egnep and the Amosa, operated by Egnep, Limited, a subsidiary of the Cape Asbestos Company.[52] In this district the regular mode of occurrence of the mineral has permitted systematic underground mining, and fibre lengths range from three to six inches.[53] In the Pietersburg deposits, discovered in 1927-1929,[54] smaller mines and open-pit workings predominate, and the common fibre length is one to two inches.[55] Among the mines being operated in this district are the Malips Drift, owned by Egnep, Limited, the first to be exploited here, two mines of the Chunes Asbestos Limited, and the Montana mine, owned by the Dominion Blue.[56]

49. Hall, p. 268.

50. Ibid., p. 26.

51. The Mineral Resources, etc., p. 328.

52. Kupferberger, "Mining Amosite," etc., p. 367.

53. Hall, p. 268.

54. The South and East African Year Book and Guide, 1939 (London), p. 441.

55. Hall, p. 268;
Bowles, Bulletin 403, p. 37.

56. Kupferberger, "Mining Amosite," etc., p. 367; Howling, p. 33.

The latter mine produces a very superior grade of amosite, which is marketed as "montasite" and whose flexibility and texture resemble chrysotile.[57]

Although labour is cheap, the climate reasonably good, and mining problems few, the chief difficulty in the amosite fields, as in other African producing centres, has been the lack of adequate transportation facilities.[58] The nearest mine is about thirty-five miles from Pietersburg, the present rail head, and since gasolene prices are prohibitive transport is effected by wagon.[59]

South Africa, too, whose industry showed a greater growth than that of any other country, shared in the prosperity of asbestos extraction throughout the world in 1929, when her sales reached 33,037 tons, valued at £497,393.[60] Even activity in the chrysotile fields of the Carolina district of the Transvaal was evident.[61] Demand for amosite was high and led to new developments in the Transvaal, such as those of the newly-founded South African Consolidated Asbestos Company near the Montana mine.[62] Eight mines were operating in the Pietersburg district.[63]

1930 brought a decrease of more than 40% in tonnage, as sales sank to only 19,281 tons, valued at £340,973. The greatest decline occurred in the Transvaal output. Although the demand for blue was better than that for chrysotile, the Dominion Blue suspended operations. The following year total production was 12,857 tons, as compared with 25,853 tons in 1930.

57. Howling, p. 34.

58. Trevor, "Commercial Asbestos," etc., p. 215.

59. Kupferberger, p. 369.

60. See Table F in the Appendix for Union production statistics.

61. Except where otherwise noted, the material for the following section has been obtained from: The Mineral Industry, Vols. XXXVIII-XLVIII; Mineral Resources of the United States, Part II -- Nonmetals, 1929-1931; and Minerals Yearbook, 1931-1940.

62. Asbestos, XI, 4 (October, 1929), p. 4.

63. "Pietersburg Asbestos Fields," The Mining Magazine, XLI, 1 (July, 1929), p. 26.

While chrysotile sales were maintained almost at the level of the previous year, activity in the crocidolite fields practically ceased. The net profits of the Cape Company declined from the former year's £26,210 to £13,141.[64] The South African Consolidated Company, owning amosite properties in the Pietersburg area, went into voluntary liquidation. Not only the great fall in the market demand for asbestos, but also exchange difficulties had a detrimental effect upon the export trade. It was reported, "The chief cause of the curtailment is undoubtedly the exchange problem. The asbestos market, like all others, is in a depressed condition, but it is by no means dead, and prices for crocidolite have not fallen nearly as much as with most commodities. The decrease in value of short grades is some 30%, but for the better qualities the price quoted in London is practically the same as in normal times. When, however, the 27% loss in exchange is taken into account, business can only be done at serious loss, even if the producer manages to get the 10% subsidy offered by the Government."[65] (When England went off the gold standard in September of 1931, export prices of most of the Union's primary products sold in the United Kingdom and other markets tended to remain constant in sterling and to fall in gold value. Naturally, producers in the Union, whose costs were based on full gold parity, carried on production at a loss. Consequently, the Union Government in 1931 passed the Export Subsidies Act, whereby a subsidy at the rate of 10% of export value was to be paid to the exporters of primary products from the Union.[66])

64. Annual Report of the Mineral Production of Canada, 1931 (Ottawa, 1933), p. 149.

65. Annual Report of the Quebec Bureau of Mines, 1931, p. 47, from: South African Engineering and Mining Journal (February 27, 1932).

66. N.M. Elmslie, Economic Conditions in the Union of South Africa (London, 1934), pp. 20-21.

Production in 1932 amounted to only 8,785 tons, while sales of asbestos fell to 12,070 tons, valued at only £116,401. The New Amianthus mine suspended operations, and only one mine of the Cape Asbestos Company was worked. The percentage declines in the tonnage and value of production were less than those for Rhodesia this year, and this situation was hard to explain in view of the continuing difficulties with exchange. The government subsidy did not prove sufficient to put the Union operators on an equal export basis with the producers in Rhodesia, so that the abandonment of the gold standard by the Union in December of 1932 created a more favourable situation.

The export subsidy was reduced to 7% in 1933, as the turning point was reached and production rose to 17,007 tons.[67] Amosite contributed most of the increase in production; shipments of this variety increased 122% in volume and 123% in value. Output rose again in 1934, but the market for blue asbestos was weak. Chrysotile and amosite recorded fair gains, while the Cape Asbestos Company announced a net profit of £21,877. For the next two years production increased steadily, although the output of crocidolite was slightly less in 1935 than it had been the previous year. By 1937 sales reached 28,069 tons, not far below the 1929 level. There was a great upturn in activity in the Cape, and in the Transvaal crocidolite fields the Amosite and Blue Asbestos Company completed a new mill at Pietersburg. Toward the end of the year the depletion of reserves at the New Amianthus mine caused the cessation of operations, and this was reflected in 1938's production of chrysotile which was only 5,386 tons, as compared with 15,141 tons the previous year.

The outstanding event in the Union in 1939 was the start of chrysotile production at the Havelock mine in June.[68] This mine is

67. Asbestos, XII, 9 (March, 1933), p. 37.

68. The Mining Industry of the Province of Quebec for the Year 1939, p. 32.

situated near the Transvaal border in Swaziland about twelve miles southeast of Barberton. The asbestos deposits in the district were discovered after the Great War, but serious prospecting was not done until 1928 and 1929. In the latter year, Turner and Newall paid £240,000 for 100 base metal claims in Swaziland, probably the largest amount ever paid in South Africa for a base metal prospect. When the New Amianthus mine was almost exhausted, Turner and Newall began to prepare the Havelock mine for production. Because of the mountainous country in which it is located and because a journey of 140 miles by road to Barberton would be necessary, an aerial ropeway 12½ miles long, connecting the mine with Barberton, was constructed and put into operation in October, 1938.[69] Production at Havelock was reported to have been 7,973 tons in 1939.[70]

That Canada faces strong opposition from the Africa producers, particularly Rhodesia, must be admitted. It is probably that the Union, as a producer of crocidolite and amosite, is, as yet, less of a threat for Canada than is Rhodesia in that these two varieties bring a lower price than chrysotile and are competitors to it only for a limited number of purposes. Since the depletion of the New Amianthus mine in the Transvaal, the Union's chrysotile production has been insignificant, and it is yet too early to determine the quantity and quality of the output from the Havelock mine in Swaziland.

On the other hand, Rhodesia can meet Canada on her own ground and possesses one great advantage over this country -- the high percentage that spinning fibre constitutes of the total Rhodesian output. Approximately 30% of the extraction is of this longer grade, while Canada's spinning

69. "The Havelock Asbestos Mine, Swaziland," Bulletin of the Imperial Institute, XXXVII, 3 (July-September, 1939), pp. 469-470.

70. The Mining Industry of the Province of Quebec, 1939, p. 33.

fibre amounts to only about 7.8% of her total output.[71] This means, consequently, a proportionally higher selling price for the Rhodesian operators and, in turn, a wider market range. Although there is now more production of the shorter fibres in Southern Rhodesia, the low value per ton brought by the lower grades prevents much African competition in these varieties in more distant markets. It is not likely, then, that Canada has much to fear in this direction, but decidedly Rhodesia holds the superior position in supplying world demand for crudes and spinning fibres.

There are other factors which enter into the strength of the African position. An important one of these is the cheap native labour supply which is available, in contrast to the higher Quebec wage costs. Unskilled workers in Rhodesia can be obtained for wages ranging from 5s. to 25s. a month, while more skilled labour may be paid 50s. a month.[72] Another advantage over the Canadian operator is found in the lack of climatic variations,[73] although the effects of this factor have been largely overcome in this country of recent years.

One characteristic of the African industry, however, stands out very clearly -- the great centralization of ownership. The industry is dominated by two large companies, Turner and Newall and the Cape Asbestos Company. 98% of the Rhodesian output is controlled by the former firm, and through its ownership of the New Amianthus, and now the Havelock, mines in the Transvaal and Swaziland, Turner and Newall also share in the

71. Bowles, Bulletin 403, p. 35.

72. J. Spalding, "The Asbestos Mines at Shabani, in Southern Rhodesia," Bulletin of The Institution of Mining and Metallurgy, 329 (February, 1932), p. 10.

73. South and East African Year Book and Guide, p. 441.

.chrysotile production of the Union. In addition, the company has access to crocidolite and amosite supplies by its control of the Dominion Blue Asbestos Company. On the other hand, not only does the Cape Asbestos Company have large holdings in the crocidolite fields of the Kuruman district, but it also owns chrysotile and amosite deposits through its subsidiary companies, the Munnik-Myburgh Company and Egnep, Limited. With the major portion of the African output in the hands of these two firms, the most profitable operation of the mines, regulation of production, and control of prices is thereby greatly facilitated. Furthermore, Turner and Newall have manufacturing plants in England, India, and other countries, as does the Cape Company in Italy and England. This means that in addition to supplying European and American needs, African asbestos has an assured market as a raw material for the two companies' asbestos products. A similar situation exists, of course, in Canada where the greater proportion of the output supplies American manufacturing plants. But there is no such centralization of ownership in the Quebec fields, and this is one of Canada's greatest disadvantages in her competition with Africa.

Chapter VII

OTHER PRODUCERS

The extraction of asbestos is not limited to Canada, the Soviet Union, and Africa by any means, for there are many other countries actively exploiting their deposits at the present time. While Canada has little to fear from these smaller operators, their production does bear some consideration for several reasons. First, there is always a certain amount of actual competition in the exports of those countries which use little or none of their fibre in domestic industries. Cyprus furnishes an excellent example. Finland also can be placed in this category, although her production consists of an anthophyllite much inferior to the chrysotile extracted in Cyprus. Second, some important consumers and importers of asbestos, such as the United States, Italy, Australia and Japan, also have limited occurrences of their own. Although it is true that these resources cannot possibly supply all their asbestos needs, in times of emergency the deposits would be exploited to the utmost in order to replace foreign imports as much as possible, as Italy is undoubtedly doing in the present war. Likewise, Japan is actively working the quarries in Manchuria at present, while Germany is probably filling much of her demand for asbestos from Finland and Czechoslovakia. Third, there are those countries whose small asbestos output is capable of supplying a small local manufacturing industry, which is supplemented by imports of foreign asbestos products. China belongs in this class, and in the future perhaps India and several South American countries. India already has an asbestos products industry, but most of her raw material is supplied from foreign sources. Although as yet little manufacturing has been done in South America and although asbestos products are imported in considerable quantities, the possibility of domestic development in both the extractive and industrial fields cannot be overlooked.

United States

The largest consumer of asbestos in the world is the United States, yet that country produces only a small fraction of its needs. The first production was obtained in 1880, when 150 tons of anthophyllite were quarried in Georgia, South Carolina, Maryland, and New York.[1] By 1882 an output of 1,200 tons was recorded, but from 1885 until 1890 production was greatly curtailed because of imports from Canada. From the latter date until 1894, there was a small output from the western states. Several localities in both East and West provided anthophyllite from 1895 until 1901. At present this variety of asbestos is intermittently exploited to a limited extent in Maryland, Montana, and Washington.[2] The Maryland fibre is especially useful for acid filtration, the Montana asbestos for insulating material, and the Washington product for acoustical plaster and roofing compositions.[3]

Chrysotile was first discovered in Vermont in 1900, and in 1903 in Arizona. There was no important production until 1905, and by 1911 and 1912 Vermont was the chief producer. Following these years output was relatively unimportant until 1929.[4] The chrysotile found in Arizona is of excellent quality, but high mining costs and location far from the industrial centres have worked against extensive exploitation. Mills have been erected but there is production only when demand is great and prices are

1. O. Bowles, Growth and Development of the Nonmetallic Mineral Industries, Information Circular No. 6687, U.S. Bureau of Mines (February, 1933), p. 26.
2. Mineral Raw Materials, p. 18.
3. Howling, op. cit., pp. 67-70.
4. Bowles, I.C. 6687, p. 28.

high.[5] On the other hand, the Vermont chrysotile is inferior to that of Arizona and consists of the short and medium grades only, which are used for paper, paint, boiler coverings, and asbestos-cement goods.[6]

In 1929 the American extractive industry experienced a great upward spurt; the sales of 3,155 tons of asbestos were the highest since 1912. There was a great deal of activity in Arizona: shipments were made by the Johns-Manville mine, the Regal Asbestos Mines, two other smaller companies, and the newly-opened Bear Canyon mine owned by Keasbey and Mattison. However, since that date the Vermont Asbestos Mines (owned by the Ruberoid Company of New York), the only producer in that state, has been in constant operation while no output from the Arizona mines was reported from 1934 until 1937. Except for slight set-backs in 1931 and 1938, production in the United States has expanded consistently. In 1939 sales reached an all-time high of 15,459 tons, but even this increased output amounted to only 6.0% of the American apparent consumption that year.[7]

Europe

Cyprus

The history of asbestos production on the island of Cyprus goes back as far as Phoenician times, while the Greeks and Romans are believed to have utilized Cyprian fibre in making winding sheets for cremations.[8] This fibre, however, was probably of the amphibole variety, while the mineral

5. Industrial Minerals and Rocks (New York, 1937), p. 81.
6. Howling, p. 67.
7. See Table D in the Appendix.
8. M. Whitworth, "Cyprus and Its Asbestos Industry", The Mining Magazine, XXXIX, 3 (September, 1928), p. 143.

produced in modern times is a short-fibre chrysotile.[9] Operations are carried out on the slopes of Mount Troodos, near Amiandos, and transportation from the mines to the port of Limassol is effected by an aerial tramway, completed in 1925.[10] This arrangement reduced costs from approximately 20 or 25 shillings per ton to 6s. 9d. a ton. Other factors which contribute to the relatively low cost of production in Cyprus are the favourable location on the mountain slopes, which makes for easy disposal of waste rock, and the cheap labour supply available.[11] Most of the workers are Greek, and sometimes whole families receive work at wages of approximately 3 shillings a day for men and 2 shillings for women. Because of the climate, however, work is done only in the summer months from March until December.[12]

Milling operations are carried on in efficient plants, and the fibres are separated into three grades -- standard, shorts, and fines. The standard corresponds to Canadian shingle stock, and comprises about three-fourths of the output. The entire production, especially suitable for asbestos-cement products, is exported.[14]

Modern extraction in Cyprus began in 1904, and since then has always been under the control of a single company.[15] An Austrian firm was

9. Howling, p. 47.
10. Bowles, Bulletin 403, p. 43.
11. Mineral Raw Materials, p. 16.
12. Whitworth, "Cyprus", etc., p. 144.
13. Commercial Intelligence Journal, XLVII, 1497 (October 8, 1932), p. 581.
14. Howling, p. 48.
15. Commercial Intelligence Journal, LV, 1702 (September 12, 1936), p. 512.

the pioneer and carried on operations up to and during the Great War, when it was sold to the Cyprus Anonyme Asbestos Company, an island syndicate.[16] The latter was purchased for £150,000 in 1921 by the newly-formed Cyprus Asbestos Company, Limited, a British firm.[17]

Under the direction of this company, as exports increased from 6,331 long tons to 13,976 tons, the industry experienced a great expansion between 1926 and 1929. However, exports began to decrease after that date, and financial difficulties forced the Cyprus Asbestos into reorganization in 1931 as the Cyprus and General Asbestos Company, Limited. The low point in exportations was reached in 1932 when only 1,600 tons were exported. Consequently, in 1933 the Government reduced the royalty payable on asbestos exports to a nominal rate, and later extended the reduction through 1936. This helped to bring about a revival, and Cyprus asbestos was able to compete more effectively with other countries. Beginning in 1933 a marked increase in shipments to the United States was noticeable.[19] Nevertheless, in spite of the 1931 reorganization and the growing exports, the Cyprus and General found it necessary to dissolve in 1936. It was then taken over by the Tunnel Asbestos Cement Company, Limited, formed by the Tunnel Portland Cement Company, Limited, of England,[20] Conditions under the new company have improved, the firm reporting an average daily employment of 1,622 in 1937, as

16. Whitworth, pp. 143,144.

17. The Mining Year Book, 1931, p. 47.

18. "The Economic Resources of Cyprus", Bulletin of the Imperial Institute, XXXIII,3 (October, 1935), p. 349.

19. The Mineral Position of the British Empire, pp. 133.

20. Howling, p. 48.

compared with 262 in 1931.[21] An asbestos-cement products plant has been built by the company in West Thurrock, England.[22]

Italy

Italy, "cradle of the asbestos industry", who has been mining and manufacturing the mineral on a commercial scale since the middle of the nineteenth century, was the chief source of supply for Europe and America before the Canadian discoveries. But soon the Quebec asbestos displaced the Italian product on the world's markets, and production since then has been relatively insignificant.

The variety first produced in Italy was tremolite, possessing a pure white colour and soft, long fibres. However, this type has proved to be very poor spinning fibre, but because of its great resistance to heat and to acids it has a limited application as covering for gas stoves and for acid filters. Tremolite is quarried in the Aosta and Susa valleys in the Piedmont and in the Val Tellina regions east of Lake Como, but output at present is scant.[24] After the Great War exploitation of chrysotile deposits at the Balangero mine in the Lanzo Valley, about twenty kilometres north of Turin, was begun.[25] Modern milling equipment was introduced in 1928. The product is a very short fibre, useful principally in the manufacture of mill board and asbestos-cement goods.[26]

21. "The Economic Resources of Cyprus", etc. p. 349;
Mineral Trade Notes, U.S. Bureau of Mines, VIII, 2 (February 29, 1930) p.12

22. Howling, p. 49.

23. Commercial Intelligence Journal, L, 1580 (May 12, 1934), p. 794;
Bowles, Bulletin 403, p. 43.

24. Industrial and Engineering Chemistry -- News Edition, X, 11 (June 10, 1932), p. 18;
Bowles, Bulletin 403, p. 43.

25. Howling, p. 62.

26. Bowles, Bulletin 403, p. 43.

Output rose from 2,000 tons in 1925 to 5,000 tons in 1928, after which it declined considerably. A small amount of the Italian fibre is exported to England, France, Belgium, Australia, Brazil, and the United States.[27] Hence, Italy is both an exporter and an importer of asbestos. There is always a domestic demand for crude and spinning fibres, of which Italy produces little; raw asbestos, formerly subject to a duty of 15% ad valorem, was put on the duty-free list in 1933.[28] Since 1936 licences issued by the Minister of Finance have been required for importations.[29]

Finland

Deposits of anthophyllite of inferior quality at Paakkila, north of Lake Saima, in Finland, known as far back as ancient times, have been mined since 1900 when the first producing company was formed. But competition with the Russian asbestos and unfavourable transportation facilities forced the company to dissolve in 1911. Meanwhile, the canalizing of the Juojaervi River provided a means of direct shipment, and when the war caused a shortage of the mineral in central Europe a newly-formed company resumed operations.[30] A mill was erected for extraction of the fibre, and in 1922 a plant for the manufacture of tiles and boards was established by the firm in Helsinki; in 1929 an additional factory was built.[31] Finland has been a regular exporter since 1919, principally to Germany, and exports reached as high as 2,680 metric tons in 1937.[32]

27. Commercial Intelligence Journal, etc., (May 12, 1934), p. 794.

28. Ibid., XLII, 1377 (June 21, 1930), p. 961.
Ibid., L, 1563 (January 13, 1934), p. 65.

29. Mineral Trade Notes, Special Supplement No. 6 (March 20, 1937),p. 19.

30. Asbestos (Becker and Haag), p. 41.

31. Asbestos, XI, 12 (June, 1930), p. 4.

32. Foreign Minerals Quarterly, II, 1 (January, 1939), p. 24.

Czechoslovakia

Of recent years Czechoslavakia has become increasingly important as a producer of chrysotile of a rather poor quality.[33] The sole source of supply is the Dobsina mine, on the Sojo River in Slovakia, where about 200 workers are normally employed. Production approximates 2,000 tons annually, some of which is exported while the remainder is used locally for the manufacture of asbestos-cement shingles and in insulation compounds.[34]

Asia

China

Chrysotile asbestos is found in many provinces of China, principally in Chihli, Shensi, Szechuan, Honan, Shantung, Yunnan, and in some districts of Inner Mongolia.[35] On the whole the quality of the fibre is low, the longest fibre being that from Szechuan.[36] However, the most important deposits are those in the Laiyuan district in Chili province near Yenmeitung, where mining has been carried on since 1914. Of the three companies which operated originally, only the Chungta Company is producing at the present time. From 200 to 300 workers are normally employed at the mine during the working period of three to five months a year. The fibre is carried by pack-horse 106 kilometres to Yihsien and by train from there to Tientsin, where it is sold to an asbestos products factory.[37] Production of raw asbestos amounted to 180, 100, and 150 tons in 1932, 1933, and 1934 respectively.[38]

33. Howling, p. 58.

34. Mineral Trade Notes, X, 1 (January 20, 1940), p. 10.

35. B.P. Torgasheff, The Mineral Industry of the Far East (Shanghai, 1930), p. 295.

36. Commercial Intelligence Journal, LV, 1701 (September 5, 1936), p. 47.

37. Geological Bulletin, National Geological Survey of China, no. 25 (March, 1935), pp. 39, 41.

38. Commercial Intelligence Journal, etc., (September 5, 1936), p. 479.

Manchoukuo

For about thirty years a Japanese firm, the Nippon Asbestos Company, has mined chrysotile near Chinchow in Manchoukuo, and the product is used in the manufacture of asbestos products at the company's factories in Tokyo and Osaka. Production averages only about 65 metric tons per year, although as many as 300 tons were obtained a year during the Great War.[39]

Japan

There is a slight production of asbestos in Japan, which is chiefly used to supply government plants. The deposits occur in the provinces of Hizen, Kii, Higo, and Iwaki, and on the island of Kyushu. Official production figures are not published, but output is estimated by the Imperial Institute at about 1,000 tons per year.[40]

India

The occurrence and output of asbestos has been reported from many districts of India, but it is not probable that the country will ever be an important producer. Most of India's output has come from the Hassan district in Mysore State and has consisted principally of anthophyllite, with small amounts of chrysotile.[41] Between 1906 and 1929, when production ceased, 3,467 tons were obtained from this district.[42] Near Bramanapalle in the Cuddapah section of Madras, however, chrysotile of excellent quality has

39. The Mineral Industry, 1929, p. 51.

40. Torgasheff, op. cit. p. 297;
Howling, p. 772.

41. Mineral Trade Notes, XII, 3 (March 20, 1941), p. 18.

42. J.C. Brown, India's Mineral Wealth (London, 1936), p. 261.

been produced by the Mysore Asbestos Mines, Limited from 1924 to 1934, amounting to 205 tons.[43] Indian output of asbestos was 102 and 70 tons in 1937 and 1938.[44]

South America

Brazil

Brazil has become a producer in a small way of a low-grade asbestos, and it is believed that approximately tons were obtained in 1938. The fibre is of an extremely low quality, but is used locally in the manufacture of cement, roofing tiles, cardboard, Bakelite, and as a filler for insulation purposes. The use of domestic supplies in decreasing imports and limiting them to the higher spinning grades.[45]

Venezuela

In Venezuela a very promising occurrence of chrysotile exists at La Montanita, south of the town of Tinaquillo in the State of Cojedes. Exploitation was begun in 1933, and a mill was erected in 1935. However, operations were discontinued in 1936 because of lack of funds.[46] It is reported that Turner and Newall have an interest in deposits in this country.

Bolivia

Some occurrences of asbestos in the Department of Cochambamba in Bolivia were developed in 1907, but transportation difficulties soon caused the discontinuance of operations. But recently, improved transport facilities

43. Ibid., p. 361.
Howling, p. 50.

44. Mineral Trade Notes, etc., (March 20, 1941), p. 18.

45. Ibid., VIII, 5 (May 20, 1939), p. 23.

46. Howling, pp. 70-71;
Mineral Trade Notes, VIII, 2 (February 20, 1939), p. 13.

have encouraged some activity, and the export of 60 or 70 metric tons to Japan in 1940 was reported. In the same area deposits of crocidolite have aroused interest, inasmuch as blue asbestos of commercial value has hitherto been found only in Africa and Australia.[47]

Australia

Asbestos has been produced in every state except Victoria in Australia, but as yet the output has not been very large. The greatest production occurred in 1921 when 2,364 tons were extracted, and to the end of 1929 Australia's output amounted to 15,000 tons.[48] In South Australia some of the chrysotile occurring around Cowell in the Eyre Peninsula has been used for the local manufacture of electrical equipment, while erocidolite near Robertstown has been used for insulating purposes.[49] In Western Australia good quality chrysotile is produced on a small scale in the West Pilbara area of the State; it is claimed that the percentage of fibre contained in the rock in this district is very high and that the fibre has great strength and fineness. The Australian and General Asbestos Company was formed in 1928 to work deposits near Sherlock in this State.[50] Several mills have been erected at Lionel and Soanesville, and spinning fibre amounting to about 170 tons a year is shipped to Sydney, London, and New York. Some is also consumed locally for the manufacture of asbestos-cement goods.[51] It is believed that erocidolite occurring in the

47. Mineral Trade Notes, XII, 1 (January 20, 1941), p. 13.

48. "Asbestos in Australia," Queensland Government Mining Journal, XXXI (December, 1931), p. 470.

49. Mining Review, 56 (June 30, 1932), pp. 62-63.

50. "Asbestos in Australia," etc., p. 357.

51. Asbestos (Becker and Haag), p. 42;
Howling, p. 55.

Hamersley Range and worked by a local company has great potential importance. An option has been given to the Asbestos, Molybdenum, and Tungsten Company of London for further development of the deposits.[52]

From 1918 to 1922 when the imported supply of asbestos was curtailed, chrysotile was produced near Barraba in New South Wales, but the economic possibilities of development of this and other minor deposits in that state seem slight.[53] In the Beaconsfield area of Tasmania, chrysotile was extracted as far back as 1899, but operations were suspended in 1901.[54] Production was resumed, however, during the Great War, and the fibre was sent to Sydney for use in asbestos-cement products. Activity was resumed in 1933 by the Tasmanian Asbestos Mining Company, and fibre was shipped to Melbourne.[55]

Although it is not likely that Canada will ever face any serious competition from these smaller producers, certainly they are capable of assuming a degree of importance in times of emergency. Then, too, there is always the possibility that such deposits may afterwards be kept in operation, either because high prices for asbestos prevail, as during the period following the last war, or in order to supply a domestic manufacturing industry. At present China and Brazil maintain high import duties on the raw material to protect their extractive and manufacturing industries,[56] while it has been suggested that India make use of her own deposits of short fibres in manufacture rather than import products made from these grades.[57] Undoubtedly there will be an increasing output in the future from these numerous smaller operators.

52. The Mining Magazine, XLII, 1 (January, 1940), p. 32.

53. Howling, pp. 52-53.

54. Ibid., p. 55.

55. "Tasmanian Asbestos," The Mining Magazine, XLVIII, 4 (April, 1933),

56. Commercial Intelligence Journal, LV, 1701 (September 5, 1936), p. 480; Ibid., LV, 1710 (November 7, 1936), p. 880.

57. Brown, op. cit., p. 262.

Chapter VIII

CANADA'S POSITION IN WORLD PRODUCTION AND TRADE

As has been shown, it must be admitted that long ago Canada lost her place as a monopolist in asbestos production; for the past twenty years this country has faced increasing output from her sister nations, Southern Rhodesia and the Union of South Africa, and from the U.S.S.R. A survey of world production since 1929, based on figures published by the Imperial Institute, discloses that even since that date Canada has lost ground.

Table 6[1]

Year	Total World Production	Percentage Production to Total			
		Canada	U.S.S.R.	Southern Rhodesia	Union of S. Africa
1929	423,712 long tons	69.5%	9.0%	8.9%	6.7%
1930	375,803	66.7	14.1	8.9	6.1
1931	245,149	57.7	25.9	8.7	4.6
1932	203,723	55.4	28.8	6.9	3.8
1933	279,059	52.7	26.1	9.6	5.4
1934	301,978	47.4	30.4	9.5	5.3
1935	368,901	51.6	25.4	10.3	4.9
1936	503,667	53.9	24.4	9.9	4.3
1937	608,241	60.0	20.2	8.3	4.2

But these figures are not as alarming as appear at first sight: new uses for asbestos and the mineral's constantly growing consumption should be able to take care of all the asbestos Canada can produce. Nevertheless, the question is no longer who should be favoured with Canadian exports, but how to place Quebec asbestos in the most advantageous position for a keenly competitive race in the principal consumption centres. Since approximately 95% of Quebec's production of the mineral is exported, it follows that the prosperity of the industry depends almost exclusively

1. The Mineral Industry of the British Empire and Foreign Countries, Statistical Summaries, 1929-1938, Imperial Institute.

upon the maintenance of Canada's export trade. If exportations to her principal markets can be preserved, the loss of the nation's position in world production is not necessarily detrimental to the raw industry. At the same time it has been pointed out that the American capacity to consume the Quebec production exerts a decisive control over the Canadian output of raw asbestos for the reason that the United States is our largest importer of the mineral. Hence, Canada's ability to overcome foreign competition and to maintain her exports to that market is of the utmost importance to the productive industry. If she cannot do this, the loss must be made up elsewhere.

Before analyzing the Canadian position in the American market, the character of the Quebec production should be borne in mind. By far the largest percentage of the output consists of milled fibres and shorts, while the amount of crude produced constitutes scarcely 2% of the total. Since shorts and the lower grades of mill fibre do not bring a high price in the market their shipping radius is thereby greatly reduced. That is, proximity of the consumption centre for shorts and mill fibre is absolutely essential to the profitable production of these grades. On the other hand, the fact that crudes sell for $200 to $750 per ton means that this grade of fibre is able to compete more successfully in distant markets than can the shorter fibres. Hence, the Canadian producer finds himself at a greater advantage when selling in a market close to the centre of production.

For many years, Canada had enjoyed almost a complete monopoly as a source of supply for the American demand for milled fibres and shorts, and during the period since 1929 her position as chief exporter of these grades to the United States has changed little.[2] From 1929

2. See Table C in the Appendix.

until 1932 American import statistics list Canada as practically the sole source of supply for shorts and mill fibres, with only occasional small tonnages reported from Italy, Germany (of Soviet origin), and the United Kingdom (of African origin). But in 1933 a redistribution of supply sources for the American market in these grades appeared. Imports of shorts from Canada in 1932 and 1933 were approximately equal, 63,606 and 63,999 short tons respectively, but imports from other sources increased from 672 to 4,055 tons in 1933. This tonnage was credited to the U.S.S.R., Germany, Italy, the United Kingdom, and to Malta, Gozo, and Cyrus, and the remainder to Canada. As in previous years Canada was the only source of milled fibre in 1934, but her share in the total imports of shorts, 70,007 tons, decreased to 93%; Cyrus and the U.S.S.R. were the other principal exporters, supplying 2,463 and 1,938 tons respectively. Another notable development that year was the rise of the Soviet Union to second place as a source of supply of total American imports and of Cyprus to third place. Cyprus contributed short fibres only, while imports from the U.S.S.R. included both crude and shorts.

The following year, 1935, Canada's exports of mill fibres to the United States increased to 54,484 tons, compared with 41,960 tons in 1934, but the U.S.S.R. challenged Quebec by supplying 4,604 tons, or 7.3% of the total mill fibre imports. That year this country's percentage share in the imports of shorts also declined, although our tonnage increased from 1934's 70,007 tons to 94,204 tons. Imports of 4,628 tons, or 4.6% of the total shorts importations, from Cyprus and small amounts from Italy, the Soviet Union, and Finland accounted for the relatively smaller Canadian supplies.

But in 1936, American imports of mill fibres from the U.S.S.R. (and Hungary) jumped to 23,157 tons, or 29% of the total mill fibre imports,

while importations from Canada were 2,000 tons less than those of the previous year, and the Canadian percentage contribution dropped to 79%. On the other hand, short fibre imports from this country rose to 150,538 tons, with Cyprus and Italy supplying 4,386 (2.8%) and 1,044 tons respectively. It was this year that the Soviet industry made its greatest bid for a place in the American market: of the total American imports of asbestos, the U.S.S.R. (and Hungary) supplied 9% by volume and 10% by value. Imports from Canada amounted to only 85% by quantity of total imports, and this constituted the lowest percentage to be recorded for this country during the period 1929-1939.

In 1937 imports into the United States from the U.S.S.R. decreased: most of the Soviet asbestos appearing on the American market consisted of milled fibres of which 7,978 tons, or 7% of the total mill fibre supplies, were imported, while Canada provided the remainder, or 95,788 tons. Imports of shorts from Canada also rose over those for 1936, but increased tonnages from Cyprus and the U.S.S.R., who contributed 4.2% and 1% respectively, decreased the Canadian percentage share from 96% in 1936 to 94% in 1937.

Because of an industrial recession the following year, American imports of asbestos fell in 1938, Quebec mines providing 90% (51,141 tons) of the total mill fibres and 98% (113,570 tons) of the total shorts. Soviet supplies of the milled grade had increased over 1937 relative to imports from Canada, but only 6 tons of shorts were attributed to Cyprus this year and most of the remainder to Italy and Finland. 1939 registered an increase in American imports, and Canada's share in the mill fibre market rose to 96%, or 75,511 tons, the remainder coming from the U.S.S.R. Although imports of Canadian shorts also increased, the Quebec percentage share of the total importations of shorts declined slightly to 96%, representing 147,261 tons. Supplies of the short fibres from Cyprus recovered to 3,940

tons, or 2.5%.

To sum up, in the face of increased African and Soviet production Canada has been able to maintain her position as the principal source of supply for American requirements of milled fibres and shorts to a marked degree. Prior to 1933 importations into the United States from sources other than the Quebec mines were negligible; only very small tonnages were recorded from Italy, Germany, and the United Kingdom. In 1933 and the years following, however, the Quebec producers experienced competition from the Soviet Union on the American market for milled fibres. But except for 1936 when large imports from the U.S.S.R. decreased Canada's share to 70% of the total American mill fibre imports, Canada consistently supplied over 90%. On the other hand, beginning in 1933, the American imports of short fibres displayed a greater diversity in sources of supply. Not only the U.S.S.R., but also Cyprus, Italy, and Finland were credited with considerable amounts; indeed, in this market Cyprus appeared as a greater threat than did the Soviet Union. Since 1933, then, Canada's percentage contribution to total American imports of shorts has not exceeded 98% (1938), but it has never fallen below 93% (1934). In view of these facts it does not seem likely that the trend of American consumption of the shorter grades before the outbreak of the war in 1939 was gravitating seriously toward sources of supply other than Canada. There are two reasons for this. First, it must be remembered that a large part of the Quebec exports to the United States consists of output by American producers in Canada for use in their own manufacturing plants in the United States. Second, the independent Canadian producers, because of proximity to the consumption centre and consequent lower freight rates, have an advantage over foreign operators in supplying the short grades to those American manufacturers who do not have their own

sources of raw material. Another factor beneficial to Canadian asbestos should be noted here -- the growing use of moulded brake linings, which employ the shorter fibres, in preference to the woven type, which utilizes crudes and the spinning grades. In 1935, moulded linings constituted 39% of the total American footage produced and in 1937, the proportion rose to 56%.[3]

On the other hand, the outlook for Canadian crudes is not nearly as bright. In 1927 Quebec crudes amounted to 44% by volume of the total American imports of the longer fibres, and in 1928 Canadian supplies accounted for 41% of the total.[4] In 1929 the United States imported 39.1% of its crudes from Quebec, 49.6% from Africa, and 8.4% from the U.S.S.R. Following that date the Canadian share fell, reached 10.8% in 1931, and then rose slowly to a high point of 39.2% in 1935. Subsequently, the Quebec contribution again decreased until it amounted to 17.3% in 1938, and in turn rose to 20% in 1939. As has been pointed out, loss of ground by Canada in the American crude market has been less caused by Soviet competition than by increased imports from Africa. The U.S.S.R. has supplied substantial quantities during the period under review only in 1929, 1930, 1931, and 1934, when her percentage share in total American crude imports was 8.4%, 46%, 44.5%, and 18% respectively. In other years, Soviet crudes amounted to negligible tonnages. Even in 1932, when the American embargo on asbestos from the U.S.S.R. was in force, this country supplied only 17.8% of the total crude imports, while Africa was credited with 80.4%. Hence, Africa has definitely replaced Canada as the principal source of supply for the American needs of crude fibres. The African share of total

3. Minerals Yearbook, 1939, p. 1313.

4. Mineral Resources of the United States, Part II -- Nonmetals, 1929, p. 202.

crude imports in 1929 was 49.6%, and although it fell to 34% in the following year, it reached 80.4% in 1932. Since then African supplies have never contributed less than 50.6% (1934), while a high of 82.1% was reached in 1938. However, these figures are somewhat subject to modification: American import statistics do not separately designate importations of crocidolite, which is, of course, for most purposes not competitive with Quebec chrysotile. Furthermore, although all imports from Africa are classified as "crudes", in reality much of the fibre is a high-grade milled fibre and is not strictly comparable to Canadian crude. Nevertheless, it can be stated that the United States has become more and more dependent upon Africa for supplies of the longer fibres during recent years, and it does not seem likely that Quebec can regain her former predominant position. If a greater proportion of the Canadian production consisted of crudes, this country would be better able to supply the expanding American demand to the exclusion of other producers.

During the period under review, the United States has, of course, consistently held first place as an importer of Canadian asbestos. On the other hand, a noticeable redistribution in this country's other markets has occurred during the same period.

In 1929, 1930, and 1931 exports to Belgium took second place after those to the United States, when 14,291 tons, 10,836 tons, and 7,831 tons respectively were sent to the former country.[5] The next year Belgium fell to seventh place and only 1,080 tons were exported, but she recovered to fourth position in 1933 when 5,964 tons were shipped. However, during these years Canada had still been the principal source of supply for Belgium's asbestos needs. In 1934, however, the U.S.S.R. was the principal exporter

5. See Table G in the Appendix for annual exports of asbestos from Canada.

to Belgium, and in 1934, Africa.[6] In 1936 Canadian exports to this market rose to 9,664 tons, reached 18,752 tons in 1937, and amounted to 10,958 tons in 1938. Canada had regained her lead and was supplying over half of the Belgian imports these years. In 1937 and 1938, Africa and the Soviet Union were in second and third place respectively, but in the latter year imports from the U.S.S.R. had greatly decreased.[7]

After Belgium, Germany was the next largest market for Canadian fibre in 1929.[8] Canada shipped 13,996 tons this year, or 64.5% of the total German imports. The following year, however, competition from Africa (principally Southern Rhodesia) and the U.S.S.R. became much more apparent. Canadian exports decreased to 6,588 tons and constituted only 46.3% of the German supplies. On the other hand, imports into this marketcfrom Africa and the U.S.S.R. increased. 1931 and 1932 registered further decreases for Canadian exports, the Quebec share amounting to 51.6% and 45.9% respectively. In the latter year, imports from the U.S.S.R. exceeded the 1931 Soviet shipments to Germany, and for the first time the Soviet Union displaced Africa as the second most important source of supply. Exports to Germany from Canada in 1933 increased to 6,238 tons, approximating the 1931 level, but this amount constituted only 40% of the rising total German imports.

As the result of a trade agreement with the U.S.S.R., German imports of Soviet asbestos increased enormously in 1934 and 1935, relegating Canada and Africa to second and third positions. However, Canada's exports somewhat increased over the 1933 figure and provided the second source of

6. Howling, op. cit., p. 57.

7. Commercial Intelligence Journal, IX, 1847 (June 24, 1939), p. 1008.

8. The percentages relating to German imports are based on statistics as given in Howling, p. 60.

supply.[9] After the agreement lapsed, the U.S.S.R. fell to second place in 1936 as Quebec supplies once more resumed first place, rising sharply from 1935's shipments of 6,531 tons to 16,358 tons. Exports to Germany expanded greatly in 1937 and 1938 and amounted to more than 20,000 tons both years. German imports of Quebec asbestos constituted 63% of the total in 1937 and 69% in 1938. Africa was far behind in second place, and no shipments at all were recorded from the Soviet Union.[10] Hence, Canada was the principal exporter of asbestos to Germany from 1929 through 1933, but encountered increasing competition from Africa and the U.S.S.R. from 1930 onward. In 1934 and 1935 Soviet supplies filled a major portion of the German needs, while following 1936 Quebec shipments to this market exceeded the 1929 level and competition from Africa was very weak.

Fourth place among Canada's markets in 1929 was held by Japan to whom 10,557 tons of asbestos were shipped. Importations from Canada were estimated to be approximately 80% of the Japanese total.[11] Unlike Germany and Belgium, Japan has consistently drawn upon the Quebec mines in order to provide for an ever-increasing demand within the country. In 1931 and 1932, 74.4% and 70.1% respectively of Japanese supplies were credited to Canada (and the United States); in the latter year there was a noticeable increase in the imports from the Soviet Union.[12] Furthermore, in 1932 Japan assumed the position of the second largest export market for Canadian asbestos and retained this rank until 1938, when she yielded to Germany. In 1934 Canadian shipments to Japan suddenly increased to 18,489 tons, compared with 9,530 tons the previous year; in 1937 they stood at 34,951 tons,

9. Commercial Intelligence Journal, LV, 1696 (August 1, 1936), p. 216.

10. Foreign Minerals Quarterly, I, 2, Section 1 (April, 1938), p. 10; Ibid., II, 2 (April, 1939), p. 11

11. Commercial Intelligence Journal, XLIV, 1421 (April 25, 1931), p. 610

12. Ibid., XLIX, 1541 (August 12, 1933), p. 262.

and in 1938 at 29,051 tons. In the latter year these exports accounted for 84.6% of the Japanese total supplies,[13] indicating that this country had made appreciable gains in overcoming the competition from the U.S.S.R. which had existed in the early thirties and that from Africa which had begun in 1935.[14]

France was in fifth place at the beginning of our period, and received that year 6,583 tons from Canada. Although France has been only the sixth ranking market since 1935, she has been a steady importer of Quebec asbestos; shipments to this nation have exhibited fewer fluctuations than have those to some other buyers. The low point of exports occurred in 1932 when 2,360 tons were sent, while the highest shipments, 9,376 tons, were made in 1938. On the other hand, Canada is not the chief source of supply for France, but ranks second to Africa, according to Imperial Institute statistics for 1933-1935.[15]

The United Kingdom, the sixth ranking buyer of Quebec asbestos in 1929, proved to be a very disappointing market that year. In 1927 Canada had been the principal supplier of asbestos to Great Britain, and her share had amounted to 40.5% of the total British imports.[16] The following year this country gave way to Southern Rhodesia as the chief source of supply, and contributed only 23.9% of the United Kingdom's purchases.[17] Furthermore, by 1929 our exports amounted to only 5,843 tons, or 19,3% of the total British imports, and we were far behind Rhodesia.[18] Shipments increased

13. Ibid., LXII, 1899 (June 22, 1940), p. 984.

14. Ibid., LV, 1705 (October 3, 1936), p. 657.

15. Howling, p. 59.

16. Annual Report of the Quebec Bureau of Mines, 1929, p. 24.

17. Ibid.

18. The percentages are based on statistics published annually in Asbestos.

slightly the next year, only to fall to a scant 2,816 tons in 1931. During the period under review, 1931 was Canada's weakest year in relation to her other competitors in the United Kingdom market; Quebec asbestos constituted only 13.6% of the total imports. However, beginning with 1932 Canada's position improved considerably in the British market as the Quebec share of the imports rose to 16.0% and to 27.1% in 1933. From 1933 until the end of 1936, imports into the United Kingdom from this country averaged approximately 8,400 tons, or about 23% of total importations. But 1937 and 1938 brought an even more gratifying improvement: 1937's exports rose abruptly to 20,450 tons and constituted 33.6% of English purchases. Furthermore, Canada was actually able to recapture first place from Southern Rhodesia in 1938 by shipping 24,932 tons, which amounted to 41.6% of the total imports.

In conclusion, it can be said that Canada has definitely not suffered materially from African and Soviet competition in more recent years. Her supremacy in the Japanese market has scarcely been questioned, while German purchases, except for the two years in which the agreement with the Soviet Union was in force, were expanding constantly until the outbreak of the present war. Belgium has been a little disappointing, but the recent British imports more than made up for that deficiency. But, most important of all, Quebec still holds its accustomed grip on the American market and promises to continue its domination. Maintenance of this market is essential, and, encouragingly enough, future prospects in this direction are extremely bright.

Chapter IX

THE MANUFACTURE OF ASBESTOS

With Canada still holding first place in the production of asbestos it would be natural to expect that the nation possesses a domestic asbestos products industry of considerable size. But such is not the case, for Canada's predominance ends with her position in the extractive industry. Instead, Canada is the leading exporter of the mineral, her exports constituting approximately 95% of the Quebec production. It is obvious, then, that the Canadian manufacture of asbestos products is extremely insignificant in comparison with the domestic production of the raw material. Indeed, Canadian asbestos is exported for use in foreign manufacturing industries and is subsequently reimported in the form of finished goods to meet the demands of the domestic market for asbestos products.

Several factors have contributed to the creation of this situation, and chief among them is the size and proximity of the manufacturing industry in the United States. With an American output worth $63,793,752 at her doors, Canada is unable even to fill the needs of her own market from domestic production against such competition. However, for the Canadian manufacturers to compete against the wide range of asbestos products offered by the United States is almost as unnecessary as it is impossible; for a second limitation upon the Canadian industry is the smallness of the domestic market for asbestos products. As has been pointed out, the mineral does not have a market that exists independently, but a market whose size is determined by the asbestos consumption of the capital goods industries. Hence, until industrial production in general has expanded to a much greater extent in Canada, the output of domestic products will necessarily be restricted. A third factor which influences the domestic industry is the ownership of

Quebec mines by American and English manufacturing firms. In 1940 only 41% of the asbestos output represented production by the Canadian companies, Asbestos Corporation, Limited and the Johnson's Company. The remaining 59% was credited to the Bell mine, owned by Turner and Newall,and to the American firms of Canadian Johns-Manville, Quebec Asbestos Corporation, and Nicolet Asbestos Mines. Thus, even if most of the Quebec raw asbestos output could be utilized in domestic manufacture, the major portion of the production would not be available.

Nevertheless, while the asbestos products industry has exhibited no phenomenal growth during recent years, it is of fair importance to the Canadian economy. In 1929 the value of manufactures produced reached $2,286,638, an increase of 12% over the 1928 figure and a 37% increase over the 1927 production.[1] Twelve companies, capitalized at $2,949,712, were in operation that year. The greatest value in the history of the industry was attained the next year, when the products sold amounted to $2,301,924, a figure which has not been equaled since. That year eleven firms were engaged in asbestos manufacturing, capitalized at $2,316,645. Following 1930, a progressive decrease in the value of products manufactured occurred until a low point of $757,626 was recorded in 1933; at a decreased capitalization of $1,777,975, eleven companies were in production. A gradual increase in productive value then took place, and in 1937 thirteen companies accounted for an output worth $1,896,677. In 1939, the last year for which figures are available, fourteen companies, capitalized at $2,003,516, produced asbestos products valued at $1,783,993. According to the 1939 statistics, the principal manufactures in order of their value were brake linings, boiler and pipe coverings, clutch facings, packings, paper, and gaskets.

1. See Table H in the Appendix for statistics of the asbestos manufacturing industry in Canada.

Quebec is not only the centre for raw asbestos production, but also for the manufacture of the mineral. In 1930 approximately 79% of the total asbestos products output was credited to firms in Quebec;[2] and in 1939 there were seven plants in Quebec, six in Ontario, and one in Nova Scotia.[3] Although it is difficult to obtain precise information on the value of output by the various companies, it is probable that the largest manufacturer in Canada is the Canadian Johns-Manville Company Limited, whose factory is located at its source of raw material at Asbestos, Quebec. This company began manufacturing operations in 1924, and at present produces a wide range of products especially for the needs of Canadian industry. Among them are paper, shingles, insulating materials, brake linings, textiles, packings, rock wool products, and roofing.[4] Another important manufacturer is the Philip Carey Company, owner of the Quebec Asbestos Corporation, whose factory at Lennoxville, Quebec was built in 1934. American capital is well represented in the Canadian asbestos manufacturing industry also, but probably not in the same proportion as in the production of the raw material.[5] Of the fourteen firms listed by the Dominion Bureau of Statistics for 1939, at least four were American-owned: Canadian Johns-Manville, Philip Carey Company, the Canadian Raybestos Company Limited (Peterboro, Ontario), and the Garlock Packing Company (Hamilton, Ontario).

As mentioned above, Canada finds it necessary to import a considerable proportion of asbestos manufactures; during the period 1929-1939

2. F.W. Field, Economic Conditions in Canada, Department of Overseas Trade (London, 1932), p. 196.

3. The Asbestos Industry in Canada, 1939, Dominion Bureau of Statistics (Ottawa, 1940), p. 8.

4. R.C. Rowe, "Mining and Milling Operations of The Canadian Johns-Manville Company, Limited," The Canadian Mining Journal, LX (April, 1939), p. 205.

5. The Canadian Mining Journal, LVI (April, 1935), p. 164.

imports amounted to 54% of the total domestic production. The following table gives a comparison of the value of the Canadian production, imports, and exports from 1929 through 1939:

Table 7[6]

Year	Gross Selling Value of Canadian Products at Works	Imports	Exports
1929	$2,286,638	$1,013,436	$113,952
1930	2,301,924	873,850	199,783
1931	1,308,183	617,819	111,241
1932	1,067,801	474,097	75,517
1933	757,626	454,108	73,044
1934	910,983	690,785	140,826
1935	1,130,282	712,297	175,452
1936	1,293,909	888,787	175,038
1937	1,896,677	1,149,057	330,061
1938	1,551,118	911,551	206,372
1939	1,783,993	1,072,443	479,415

The United States is the chief source of supply for imports, while the United Kingdom is far behind in second place. Under the terms of the reciprocal trade agreement between Canada and the United States in 1935, the Canadian duty of 25% ad valorem on "asbestos, except crude and all manufactures, n.o.p," was reduced to 22½% ad valorem.[7] An agreement between the two countries, signed in 1938, further reduced the Canadian tariff to 20% ad valorem.[8] In 1938 an agreement between the United Kingdom and the United States provided American duty reductions, applicable to Canada,

6. Manufactures of the Non-Metallic Minerals in Canada, 1928-1937; Annual Report on the Mineral Production of Canada, 1938; The Asbestos Industry in Canada, 1939.

7. Asbestos, XVII, 4 (October, 1935), p. 10.

8. Ibid., XX, 6 (December, 1938), p. 13.

on British asbestos manufactures. The American 40% ad valorem duty on asbestos textile manufactures was decreased to 20%, and the 25% on "moulded, pressed or formed articles, in part of asbestos, etc."(Par. 1501 b) to 20%.[9]

As indicated by the above table, of recent years Canada's export trade in asbestos products has shown some expansion; 1938's exports recorded an increase of 145% over those for 1930. For the years 1936, 1937, and 1938 the three largest markets for Canadian exports were the United Kingdom, Australia, and Brazil. In addition to Newfoundland, not inconsiderable is the South American market, including Argentina, Mexico, Peru, Colombia, and Chili.[10]

At various times it has been suggested that an embargo on the Canadian export of raw asbestos could be the means of expanding the domestic manufacturing industry. However, this plan must be rejected as entirely impracticable. If Canada were the only source of supply for the world's asbestos needs an embargo would undoubtedly accomplish the desired result, but as long as Canada is merely the leading producer of the mineral the effects of such action can only be detrimental. In the event of a Canadian embargo, the United States, our principal market, could at little loss obtain her supplies from South Africa or the U.S.S.R., as some of Canada's other markets are doing. Consequently, this nation would be left with a surplus production which she could not possible use domestically. At one time an embargo might have been effective, but since the expansion of the productive industries in South Africa and the Soviet Union the possibility of its successful operation has been cancelled.

9. Commercial Intelligence Journal, LIX, 1817 (November 26, 1938), p. 925.
10. Manufactures of the Non-Metallic Minerals in Canada, 1936-1937; Annual Report on the Mineral Production of Canada, 1938.

What can be done about the industry is problematical. Even the tariff on asbestos products has not prevented imports from the United States. Furthermore, the domestic manufacturer can do little to influence the three factors mentioned at the beginning of this chapter. The question seems to narrow down to the lack of a dominating firm or firms, contrary to the situation in the United Kingdom and to a less extent in the United States. It can be pointed out that of the twelve firms listed as manufacturing asbestos products in Canada in 1929, only six were still in existence in 1939. Three were the American-owned Canadian Johns-Manville, Canadian Raybestos, and Garlock Packing, while the others were the Atlas Asbestos Co. (Montreal), C. Wild and Co. (Toronto) and Guilfords Limited (Halifax). Beldam Asbestos Packing Limited (Toronto) and Asbestos Corporation (St. Lambert) have been listed by the Bureau since 1932, Asten-Hill Limited (Valleyfield, P.Q.) and Philip Carey since 1935, and the Hamilton Engine Packing (Hamilton) since 1937. The remaining companies were listed for the first time in 1939. A survey of the Bureau's directories of asbestos products firms indicates, then, that since 1929 the industry has been characterized by many new incorporations and by an almost equal number of liquidations. The directories cannot be taken too literally as a picture of the industry, however, since some of the firms not listed at present may still be in existence but may have merely dropped asbestos products from their line of manufactures; likewise, recently listed firms may have lately added asbestos articles to their other products. Nevertheless, a certain lack of stability undoubtedly exists in the Canadian industry, and until this is overcome little expansion is likely. Larger capitalizations and manufacture on a greater scale by individual companies would produce better results.

Turning to the United States it is found that Canada's production of asbestos has provided the major portion of the raw material for a $63,793,752 asbestos products industry, the largest in the world. To meet

the American demand for such manufactures the industry annually consumes approximately three-fourths of the world's asbestos output. Yet this industry is of comparatively recent origin. About fifty-five years ago the manufacture of textiles made from asbestos was begun in the United States. Fireproof garments and theatre curtains were the chief products, but not until the coming of the automobile did the asbestos products industry begin its great expansion. Brake linings were made first in England in 1896, and apparently 1906 was the beginning of this branch in the United States. From then until 1924, when the use of the four-wheel internal brake stimulated the development of an asbestos moulded brake lining, woven linings found an ever increasing market. Today the moulded type has a wider usage than the woven. In 1871 appeared the first asbestos packing, made of Italian fibre and cotton, and at about the same time a packing of anthophyllite and cotton wicking was made; but it was not until after 1880, that the utilization of Canadian fibre and other improvements produced a packing more similar to that in use today. Asbestos paper had been known as far back as 1700, and asbestos boards were used as book covers in Italy in the middle of the last century. Paper from the mineral was not, however, made in America until 1878 at Waltham, Massachusetts. Its value and that of the heavier, thicker millboard for use in heat insulation and fireproofing were quickly recognized, and at present these products are a very important branch of the industry. The use of asbestos for heat insulation was initiated in 1866, when the mineral was mixed with silicate of soda, while asbestos cement, which has a 15% fibre content, was used as a boiler covering around 1870. In 1885 canvas-covered sectional magnesia pipe covering first appeared, and later air-cell covering. The present widespread use of asbestos-cement products is a comparatively recent development. The manufacture of asbestos-cement roofing by the

"Eternit" or laminated process, was begun around 1900 in America, and in 1903 Dr. Mattison of Ambler, Pennsylvania, developed asbestos-cement shingles. Pipes of this material were first manufactured by the Eternit process in 1913 in Italy, and their American production began in 1929.[11]

Today the American capital goods industries provide a huge and ever-increasing home market for this wide variety of asbestos products. So great are the demands upon the asbestos manufactures industry that in 1937 the plants engaged in such production numbered seventy-three; if firms manufacturing steam packings, pipe and boiler covering and gaskets, in which little asbestos is used, are included the number of establishments reached one hundred and ninety-eight. The value of their output amounted to $63,793,752 and $96,347,570 respectively.[12] The large consuption of asbestos products in the United States can be seen from the table below which indicates that exports by the industry amount to a very small proportion of the total production:

11. Bowles, Bulletin 403, pp. 8-9

12. Biennial Census of Manufactures -- Part 1 -- 1937, Bureau of the Census, U.S. Department of Commerce (Washington, 1939), p. 833.

Table 8 [13]

Year	Apparent Consumption of Raw Asbestos (short tons)	Number of Establishments	Asbestos Products Manufactures ($)	Asbestos Products Exports ($)
1929	264,873	67	$56,164,036	$4,649,599
1930	212,152			4,193,510
1931	137,875	67	35,174,002	2,606,166
1932	98,606			1,608,880
1933	122,861	58	25,254,604	1,743,140
1934	123,752			2,142,514
1935	174,655	72	38,162,587	2,261,929
1936	250,922			2,479,273
1937	316,263	73	63,793,752	3,047,078
1938	187,150			2,533,916
1939	255,547	79	60,774,252	3,354,919

As might be expected, the largest manufacturers are those who own mines in Canada: the Johns-Manville Corporation, Keasbey and Mattison Company, and the Philip Carey Company. Johns-Manville and Keasbey and Mattison also have a domestic supply of asbestos in Arizona; the former operates a mine under the name of Johns-Manville Products Corporation, while Keasbey and Mattison control the Bear Canyon Asbestos Company.[14] The industry's largest company is, of course, Johns-Manville, which began as "H. W. Johns" in 1858, and was merged with the Manville Covering Company in 1901.[15] Over one thousand individual products are manufactured by the company, including products in

13. Minerals Yearbook, 1934-1940;
Biennial Census of Manufactures, 1931 and Part I, 1937;
Census of Manufactures: 1939 (Preliminary Report).

14. Minerals Yearbook, 1932-33.

15. Asbestos, XI, 12 (June, 1930), p. 20.

which mineral wool and diatomite are used.[16] The corporation's chief competitors are Keasbey and Mattison and Philip Carey, although about half the production of the latter consists of roofing, and asphalt products are more emphasized than those of asbestos.[17] Another prominent firm, which specializes in brake linings, is Raybestos-Manhattan, Incorporated of Bridgeport, Connecticut, which attained its present size as the result of a merger of the Raybestos Company, the Manhattan Rubber Manufacturing Company, and the United States Asbestos Company in 1929.[18] An additional asbestos products firm with its own source of raw fibre is the Ruberoid Company of New York, which purchased the Vermont Asbestos Corporation in 1936 and operates its mine under the name of Vermont Asbestos Mines.[19]

In contrast to the Canadian industry, integration of control from raw material to finished product characterizes the American companies prominent in the asbestos manufacturing field. Yet such an advantageous form of organization could serve no useful purpose without the existence of the large home market, which is the backbone of the American industry.

Similarly and to an even greater extent manufacturing in the United Kingdom, the world's largest exporter of asbestos products, is well centralized: in fact, the industry can largely be put into terms of Turner and Newall of Rochdale. In 1930 the various plants controlled by this firm accounted for 80% of the total United Kingdom output and for 78.6% of the paid-in capital of the nation's industry.[20] Like the prominent American firms,

16. O. Bowles, "Non-Metallics Acquire Greater Stability," Chemical and Metallurgical Engineering, XXXVII, 1 (January, 1930), p. 40

17. "Management by Morgan," Fortune, IX, 3 (March, 1934),p. 132.

18. Asbestos, X, 12 (June, 1929), p. 28.

19. Ibid., XVII, 8 (October, 1932), p. 16.

20. "The Asbestos Manufacturing Industry in the United Kingdom," Asbestos, XIV, 4 (October, 1932), p. 16.

the company is a vertical combination and can adequately supply its varied manufacturing interests throughout the world with raw material from its own mines in Africa, Canada, and the United States.

The present company took form as a private concern in 1920 through the amalgamation of the following firms: Newall's Insulation Company, founded in 1907, the Washington Chemical Company, founded in 1840; and Turner Brothers' Asbestos Company, founded in 1871. When the firm became a public company in 1925 its paid-up capital amounted to £2,567,204;[21] it now stands at £6,773,357 (£5,329,088 ordinary stock and £1,444,269 preferred).[22] Since its beginnings the company has consistently increased its holdings both of mines in Africa and of other manufacturing firms. Turner and Newall became the foremost producer of asbestos products in the world when the company in 1928 amalgamated with Bell's United Asbestos Company, a large English manufacturing firm and former owner of the Bell mine in Canada.[23] As a result of this combination the company was able to promote a large international cartel composed of the principal asbestos-cement manufacturers in Czechoslovakia, Belgium, France, Holland, Austria, Italy, Hungary, Spain, Switzerland, and Germany. The objects of the cartel were to be, "The exchange of technical knowledge, establishment in Switzerland of an institute of research, foundation of new factories in neutral countries, organization of the export business, standardization of quality and minimizing unnecessary variety in the product, and mutual assistance in securing the necessary raw materials on the best terms."[24]

21. "The Stock Exchange and Turner and Newall," The Economist, CXXIII, 4841 (June 6, 1936), p. 558.

22. The Stock Exchange Official Year Book, 1940 (London), p. 1947.

23. Asbestos, X, 12 (June, 1929), p. 25.

24. "International Asbestos-Cement Products Cartel," Chemistry and Industry, XLVIII, 51 (December 20, 1929), pp. 1232-1233.

In January, 1930, an important addition to the Turner and Newall raw asbestos resources was made when the company acquired the whole of the issued share capital of the Rhodesian and General Asbestos Corporation, on the basis of five £1 ordinary shares of Turner and Newall for four £1 shares of the Rhodesian and General.[25] This gave the English firm further control in Southern Rhodesia of the Shabani and Birthday mines in the Belingwe district and the King and Gath's in the Victoria area. At the company's annual meeting in 1930, Mr. Samuel Turner in reference to the African acquisition said, "Consequent upon immensely increased mineral resources now owned by the mining unit companies of Turner and Newall, Limited, all of which are managed by their respective boards in Africa, the manufacturing unit companies are now assured for an indefinite period of ample supplies of first class raw material, and will thus be enabled to carry on the manufacture and marketing of their products without recurring periods of anxiety and uncertainty which have during the past discouraged development."[26] Turner and Newall activities were extended to Canada and the United States in 1934 when a controlling stock interest in Keasbey and Mattison of Ambler, Pennsylvania, was acquired, giving the English firm direction over the Bell mine in Quebec and the Keasbey and Mattison mine in Arizona. In addition, the Ambler company was to undertake the sale of the brake lining and friction products made by the Ferodo and Asbestos, Incorporated, a Turner and Newall plant in New Brunswick, New Jersey. By 1936 the balance of the shares in Keasbey and Mattison had been taken over by the English company.[27]

25. "The Asbestos Fusion," The Chemical Age, XXI, 543 (November 23, 1929), p. 467.

26. "Steady Progress of the Turner and Newall Asbestos Merger," The Canadian Mining Journal, LII (February 20, 1931), p. 205.

27. "Company Meetings -- Turner and Newall," The Economist, CXX, 4769 (January 19, 1935), p. 146.

Turner and Newall, which does not trade in its own name, has in this manner consistently attempted to hold 100% of the stock in its subsidiary companies.[28] This policy of unified control has enabled the firm to extend its manufacturing activities to France, Germany, India, and South Africa, and to place the United Kingdom in first position as exporter of asbestos products.

On the basis of raw asbestos tonnage consumed, however, the manufacturing industry of the U.S.S.R. has now overtaken the United Kingdon industry. It is difficult to determine how greatly developed the asbestos products output in the Soviet Union really is, but certainly that country is assuming an increasingly important position in the industry. The relative decrease in exports from the Union's expanded raw fibre production attests to this.[29] Before the World War a great variety of asbestos goods was manufactured in Riga at the Tringolnik works and in St. Petersburg, while in Briansk and Baku shingles and asbestos-cement goods were produced. The standard of these products was fairly high, and domestic requirements were adequately filled. However, the war and the revolution seriously interrupted the progress that was being made, and it was not until 1921 that rehabilitation of the industry was begun. From 1921 until 1924 the Urals were the centre of the asbestos products industry, and around 1925 work was resumed in Leningrad. Both a lack of production of raw asbestos and of efficient equipment contributed to the industry's slow development at this time. That recent expansion has been exceedingly rapid is indicated by the fact that the productive value of asbestos manufactures increased from 4.7 million roubles in 1928 to 20.4 in 1932.[30] The completion of the Rubber and Asbestos Combine plant in 1933 or

28. The Economist, CXXIII, 4841 (June 6, 1936), p. 558.

29. See Table I in the Appendix for production and exports of Soviet asbestos.

30. P.J. Talalay, "Russia's Asbestos Industry," The India-Rubber Journal, LXXXVI, 18A (November 1, 1933), p. 36.

1934 at Yaroslavl has probably increased the Union's production greatly;[31] it is estimated that the factory is capable of turning out about 35,000 tons of asbestos products annually.[32] The U.S.S.R. actually became an exporter of asbestos manufactures in 1934, when sheeting and other asbestos goods were sent to Holland, Sweden, and Great Britain.[33]

The other principal manufacturers of asbestos products are Germany and Japan. Imports of raw fibre by the former nation are not far behind those of the United Kingdon.[34] Roofing materials, paper, asbestos-cement products, pipe and boiler coverings, and insulation goods of all kinds are the principal manufactures. In 1936, 2,299 workers were employed in 51 factories.[35] Since Germany produces no asbestos of her own she must depend entirely upon foreign sources of supply. Hence, the mineral was one of the first materials to be made subject to exchange restrictions, when imports were placed under the regulation of the Rubber Trade Control Board in 1934. Indicative of the value placed on asbestos was the fact that barter was allowed on a 1:1 ratio in the case of Canada and other "non-clearing" countries.[36]

Japan now rivals Germany in the manufacture of asbestos products, importing about 20,000 long tons of raw fibre annually.[37] In the past Japan depended upon foreign countries for such products as packings, boards, brake and clutch lining, and roofing materials, but the local manufacture of these

31. Economic Review of the Soviet Union, VII, 11 (June 1, 1932), p. 254.

32. Industrial and Engineering Chemistry -- News Edition, XI, 3 (February 10, 1933), p. 35.

33. Asbestos, XVII, 4 (October, 1935), p. 31.

34. Howling, op. Cit., p. 59.

35. Commercial Intelligence Journal, LV, 1696 (August, 1936), p. 213.

36. Ibid., p. 214;
Asbestos, XVI, 8 (February, 1935), p. 18.

37. Howling, p. 72.

products and their low prices have considerably replaced imports.[38] At present large quantities of slates, Eternit pipes, packings, and millboard are made for local consumption, and in 1937 the total value of production amounted to 12,080,000 yen, as compared with 9,587,000 yen in 1936. Japan also exports part of her production to North China and Manchoukuo. Following the outbreak of war with China, demand for asbestos increased enormously and government authorities were forced to exercise control over imports. Consumers now place their orders with the Japanese Asbestos Importers' Association, made up of eight importing companies, and these orders are filed with the Commerce and Industry authorities. When permission for importation is granted the Association allots the quantity allowed to manufacturing firms in proportion to the size of their output in previous years. Raw asbestos needed for military use, however, can be directly imported without reference to the Association. In conjunction with this import control, the Japanese government is exploiting the Manchurian deposits to the utmost.[39]

Other thriving asbestos products industries are being maintained in Italy, Australia, and India. Prior to the outbreak of the present war the manufacture of asbestos goods had reached large proportions in Belgium, France, Czechoslovakia, and the Netherlands. Certainly the war has interrupted in some countries a branch of industry that was progressing at a rapid rate throughout the world, and which nations will later prove to have derived beneficial results from the conflict cannot be ascertained. It does seem probable, however, that the smaller industries in Canada, India, and Australia, to whose borders the war has not spread as yet, have an opportunity to expand their production under the stimulus of war supplies manufacture.

38. Commercial Intelligence Journal, LV, 1705 (October 3, 1936), p. 657.

39. Ibid., LXII, 1899 (June 22, 1940), pp. 984-985.

Chapter X

Summary and Conclusions

In summary, Canada is the ranking producer of a mineral which has become essential to modern industry — a material which cannot be made synthetically and for which there are few substitutes. All attempts to make an effective synthetic fibre have so far failed,[1] and only in heat insulation are glass wool and mineral wool threatening the use of asbestos.[2] Already indispensable, the mineral is being used in new ways constantly, and with present consumption at such a high level, the importance of asbestos extraction to Canada is unquestioned. Yet despite the fact that the mineral's value has been recognized almost since the beginning of production in this country, the Quebec industry has experienced many fluctuations and upheavals during its history.

Although asbestos was first produced on a commercial scale in Italy, the opening up of the rich Canadian deposits in 1878 soon placed the Quebec fibre in a superior position in the world's markets. High prices and a large demand for the mineral progressively increased mining operations in Canada until over-production and a decided drop in prices occurred in the early nineties. As a consequence, smaller operators were forced to withdraw, improved

1. A German inventor claimed in 1932 that he had been able to make a low-cost synthetic material comparable to chrysotile, but evidently there has been no subsequent success in its production on a commercial scale. (Bowles, Bulletin 403, p. 5; Mineral Trade Notes VI, 4 (April 20, 1938,) p. 16.)

2. A brake lining of aluminum or steel wool and synthetic rubber is reported to be in use in Germany at present, while General Motors in the United States has patented a lining made of glass fibre and synthetic resin. If these types prove to be effective, the use of asbestos for brake linings might possibly be seriously decreased. (P.M. Tyler and O. Bowles, Nonmetallic Industries in 1939, Information Circular No. 7106, U.S. Bureau of Mines (February, 1940), p. 6; Mineral Trade Notes, X, 4 (April 20, 1940), p. 20.)

methods of mining and milling operations were adopted, and the industry was placed on a more stable basis. Nevertheless, there followed a period of low prices which might have put the Canadian production of asbestos in a precarious position had not the Great War brought an expanded demand for fibre. But with the post-war economic depression, demand greatly decreased and prices fell precipitously from their 1920 heights, when Crude No. 1 sold for as much as $3,000 a ton. The low level of business activity during this period brought to light the factors which had been working against prosperity in the industry since its inception -- over-expansion, over-capitalization, and lack of cooperation. Furthermore, competition from the African fibre was becoming increasingly evident at this time. In a move to concentrate Canadian-owned production, then, the Asbestos Corporation was formed in 1925, embodying eleven firms at a greatly reduced capitalization.

Hence, 1929 found the industry in a far healthier condition than at any time during the past. Canadian capital control was represented by the two firms, Asbestos Corporation, Limited and the Johnson's Company, while the other mine operators were American owners of asbestos products plants in the United States. For the first time production had reached a degree of centralization, and asbestos extraction in Quebec was able to assume a more stable aspect. Shipments from Canadian mines were the highest in the history of the industry and their sales value second only to that of 1920. It was unfortunate, then, that the economic depression of the early thirties for a time dashed the hopes of a new and increased prosperity for the industry. Production sank to very low levels, and by 1932 an average value of $24.72 per ton of asbestos was the lowest that had ever prevailed. One thing became evident, however, and that was the

fact that the 1925 decapitalization of the Asbestos Corporation had not gone far enough. This resulted in a drastic, but beneficial, reorganization which made possible subsequent great strides in improving the financial position of the firm. With the revival of business activity in 1933, the Quebec industry began to regain a measure of its vigour; by 1937 shipments from the mines had established an all-time record in tonnage, with a value just slightly under that of 1920. Shipments since that date have not come up to this peak, but the 1939 sales value was the greatest ever attained -- more than five times the value in 1932.

Since Canada's early rise to supremacy, a redistribution in the world production of asbestos has evolved. Around 1910 exploitation of the Russian deposits began to alarm the Quebec operators; when the Great War and the revolution curtailed production from that source, the African output began to encroach upon Canada's position. When the U.S.S.R. re-entered world asbestos markets in the late twenties, a three-cornered race commenced. Not only are the Soviet Union and Africa now challenging this country, but there is also an increasing output from such smaller producers as Cyprus, the United States, Finland, and others. However, if Canada can maintain her export markets, especially that of the United States, production from other countries need not cause much concern. Fortunately, Quebec fibre has held its own exceedingly well since 1929. Its principal markets -- the United States, Germany, and Japan -- have continued to depend chiefly upon Canada for their supplies; even the United Kingdom has become a larger purchaser in recent years. Of course, what changes will occur in the international trade in asbestos after the present war cannot be stated, just as one cannot for a certainty project into the future the export tendencies that were observable before the outbreak of hostilities.

Nevertheless, even the permanent loss of some of the markets for Quebec asbestos would not be too disastrous if Canada can continue as the chief source of supply to the United States. Although it is not likely that the Quebec fibre can ever again fill the American demand for crudes to the exclusion of African imports, this country will undoubtedly remain as the principal source of the shorter grades.

In the manufacture of asbestos products, on the other hand, Canada has not been nearly so successful. This country has seen her raw asbestos production exported to supply the large manufacturing industries of other nations. The growth of the American industry has to a great extent discouraged a similar development here; but even the existing Canadian production must be supplemented by imports from the United States. An embargo on the export of raw asbestos, which might possibly stimulate the output of asbestos products in this country, would only prove harmful to the primary industry. Expansion of asbestos manufacture, and a consequent wider range of products, will have to await larger capitalizations in the industry and a greater activity in the capital goods industries throughout Canada.

However, the situation of the raw industry is much brighter. Although Canada's share in world production has declined perceptibly since the early days and although there is less integration of control from mine to factory than exists in the Soviet Union and Africa, there are other elements that overweigh such disadvantages. These are proximity to the market of the United States, American and English ownership of Quebec mines, and increasing uses for short fibre. Furthermore, the immensely improved financial condition of the Asbestos Corporation, the largest independent producer in the world, places that company in its strongest position yet to

supply manufacturers who lack their own resources of raw material. The era of over-capitalization is ended; more cooperation among operators, as evidenced by the adoption of a uniform classification and other measure, exists; efficient mining and milling methods have been effectively developed; and retention of the American market seems assured. There remain two steps that can yet be taken to fortify the Quebec asbestos industry -- an amalgamation of the Asbestos Corporation and the Johnson's Company to centralize completely Canadian ownership and an increase in prices for the lower grades, which constitute the major portion of Canada's output, to make for more remunerative returns.

APPENDIX

TABLE A

(1) Annual Quebec Shipments by Grades, 1929-1939

Year	Crude No. 1 (short tons)	Crude No. 2 (short tons)	Other Crude (short tons)	Spinning Fibre (short tons)	Shingle Fibre (short tons)	Millboard and paper Fibre (short tons)	Fillers Floats & Other Short Fibres (short tons)	Total Asbestos Shipped (short tons)	Asbestic (short tons)
1929	802	2,625	931	17,545	34,177	91,157	158,818	306,055	18,976
1930	720	1,440	161	10,411	19,909	79,738	129,734	242,113	40,309

Year	Crudes	Fibre	Shorts	Total Asbestos Shipped	Sand Gravel & Stone
1931	206	543	---	8,560	15,988	39,867	6,309	92,823	164,296	7,209
1932	144	313	14	6,004	6,626	32,694	3,984	73,199	122,977	3,473
1933		1,306		82,605		74,456			158,367	6,445
1934		1,663		77,465		76,852			155,980	4,672
1935		2,278		102,270		105,919			210,467	3,025
1936		3,440		133,288		164,550			301,287	3,103
1937		3,845		200,246		205,933			410,024	3,980
1938		2,911		163,097		123,785			289,793	3,279
1939		3,122		193,973		167,359			364,454	3,897

(From Annual Reports of the Quebec Bureau of Mines)

TABLE A

(2) Quebec Production Statistics, 1929 - 1939

Year	Fibre Shipped (Tons)	Total	Average Value per Ton	Fibre Produced (Tons)	Asbestos Content per Ton of Rock Mined (lb.)	Average Value of Asbestos Content of Rock Mined per Ton	Rock Mined (Tons)
1929	306,055	$13,172,581	$43.04	309,746	99.76	$2.21	6,208,970
1930	242,113	8,390,164	34.65	244,114	99.61	1.90	4,901,206
1931	164,297	4,812,886	29.29	154,872	136.20	1.99	2,274,048
1932	122,977[1]	3,039,721	24.72	119,968	129.38	1.60	1,145,340
1933	158,367[2]	5,211,177	32.90	151,842	145.38	2.39	1,566,919
1934	155,980	4,936,326	31.65	173,604	149.60	2.45	2,320,750
1935	210,467	7,054,614	33.52	213,285	149.56	2.42	2,852,118
1936	301,287	9,958,183	33.05	311,205	132.65	2.11	4,692,004
1937	410,024	14,505,541	35.38	402,477	124.26	2.14	6,477,805
1938	289,793	12,890,195	44.48	321,223	110.45	2.48	5,816,368
1939	364,454	15,858,492	43.51	335,525	100.90	2.24	6,650,416

(From Annual Reports of the Quebec Bureau of Mines)

Calculated on 1,854,434 tons, i.e., 1,145,340 tons of rock mined and 709,094 tons of tailings retreated.

Calculated on 2,088,849 tons, i.e., 1,566,919 tons of rock mined and 521,930 tons of tailings retreated.

TABLE B

Principal Statistics of the Asbestos Mining Industry in Canada, 1929-1939

Year	No. of Firms	Capital Employed	No. of Employees	Salaries and Wages	Cost of Fuel and Electricity (1)	Net Value of Sales
1929	7	$33,248,957	3,391	$4,410,535	$1,335,610	$13,172,581
1930	7	35,097,872	2,770	3,474,215	1,330,737	8,390,163
1931	7	40,164,005	1,675	1,836,115	849,047	4,812,886
1932	7	30,081,362	1,409	1,156,315	827,303	3,039,721
1933	7	21,109,967	1,629	1,279,093	771,327	5,211,177
1934	7	21,816,350	1,855	1,608,812	855,556	4,946,326
1935	8	16,805,583	2,072	1,904,053	2,058,451	4,996,163
1936	10	18,877,326	2,647	2,642,924	2,399,475	7,558,708
1937	10	21,249,676	3,842	4,232,507	4,076,235	10,432,857
1938	8	22,008,771	3,711	4,024,363	3,387,725	9,704,934
1939	8	22,489,233	3,784	4,347,064	3,463,513	12,390,629

(1) Beginning with 1935 includes cost of process supplies.

(From Annual Reports on the Mineral Production of Canada and The Asbestos Industry in Canada, 1939.)

TABLE C

Imports of Asbestos into the United States, 1929-1939

	1929		1930	
(1)	Short Tons	Value	Short Tons	Value
CRUDE				
Canada	6,651	$1,545,892	1,945	$536,301
Africa:				
Union of S.A.	3,680	585,240	1,907	297,749
Mozambique	4,524	1,578,514	1,303	432,525
U.S.S.R.	252	111,290	4,534	660,559
United Kingdom	225	65,341	410	113,684
Italy	122	31,212	48	8,752
Germany	1,174	361,446	390	83,897
Belgium	348	55,125		
British India			1	55
France			1	267
Total	16,976	$4,334,060	10,539	$2,133,789
MILL FIBRE				
Canada	95,383	$4,575,438	69,012	$3,119,894
Italy	1	45		
United Kingdom	1	96		
Total	95,384	$4,575,579	69,012	$3,119,894
STUCCO and REFUSE				
Canada	150,034	$2,242,211	129,111	$1,810,588
Italy	33	1,167		
United Kingdom			17	469
Germany			2	84
Total	150,067	$2,243,378	129,130	$1,811,141
TOTAL				
Canada	252,067	$8,363,541	200,068	$5,466,783
Africa:				
Union of S.A.	3,680	585,240	1,907	297,749
Mozambique	4,524	1,578,514	1,303	432,525
U.S.S.R.	252	111,290	4,534	660,559
United Kingdom	226	65,437	427	114,153
Italy	156	32,424	48	8,752
Germany	1,174	361,446	392	83,981
Belgium	348	55,125		
British India			1	55
France			1	267
TOTAL IMPORTS	262,427	$11,153,017	208,681	$7,064,824

(1) Crude includes blue fibre.

Imports into the United States (continued)

	1931		1932	
	Short Tons	Value	Short Tons	Value
CRUDE				
Canada	552	$130,262	305	$60,298
Africa:				
Union of S.A.	823	94,110	212	23,890
Portugese E.	514	95,239		
Other			1,114	93,884
U.S.S.R.	2,188	104,271		
United Kingdom	953	166,465	1	399
Italy	19	9,855	18	8,365
Germany	108	10,633	(1)	399
China	1	280		
Total	5,158	$611,115	1,650	$30,826
MILL FIBRE				
Canada	46,788	$1,993,484	30,759	$1,225,501
Germany	2	67		
Italy			67	1,262
TOTAL	46,790	$1,993,551	30,826	$1,226,763
STUCCO and REFUSE				
Canada	82,767	$1,108,936	63,606	$827,744
U.S.S.R.	1,619	35,423		
Italy	27	315	629	7,719
United Kingdom			43	1,108
Total	84,413	$1,144,674	64,278	$836,571
TOTAL				
Canada	130,107	$3,232,682	94,670	$2,113,543
Africa				
Union of S.A.	823	94,110	212	23,890
Portugese E.	514	95,239		
Other			1,114	93,884
U.S.S.R.	3,807	139,694		
United Kingdom	953	166,465	44	1,507
Italy	46	10,170	714	17,346
Germany	110	10,700	(1)	30
China	1	280		
TOTAL IMPORTS	136,361	$3,749,340	96,754	$2,250,200

(1) Less than one ton.

Imports into the United States (continued)

	1933		1934	
	Short Tons	Value	Short Tons	Value
CRUDE				
Canada	804	$167,795	1,993	$218,649
Africa:				
Union of S.A.	233	20,173	595	62,667
Other	2,091	214,384	1,199	135,812
U.S.S.R.			657	26,434
United Kingdom	1		22	5,016
Italy	17	8,929	16	9,775
Germany	6	669		
Total	3,152	$412,537	3,582	$458,353
MILL FIBRE				
Canada	48,112	$2,170,151	41,960	$1,807,512
U.S.S.R.	176	17,339		
	48,288	$2,187,490	41,960	$1,807,512
STUCCO and REFUSE				
Canada	63,999	$854,647	70,007	$1,000,402
U.S.S.R.	795	39,439	1,938	63,005
United Kingdom	11	339		
Malta, Gozo, Cyprus	2,274	37,395	2,463	43,611
Germany	36	1,064		
Italy	939	7,764	246	1,774
Finland			38	1,920
Egypt			100	1,417
Total	68,054	$940,648	74,792	$1,112,129
TOTAL				
Canada	112,915	$3,192,593	113,060	$3,026,563
Africa:				
Union of S.A.	233	20,173	595	62,667
Other	2,091	214,384	1,199	135,812
U.S.S.R.	971	56,778	2,595	89,439
United Kingdom	12	926	22	5,016
Italy	956	16,693	262	11,549
Germany	42	1,733		
Malta, Gozo, Cyprus	2,274	37,395	2,463	43,611
Finland			38	1,920
Egypt			100	1,417
TOTAL IMPORTS	119,494	$3,540,675	120,334	$3,377,994

Imports into the United States (continued)

	1935		1936	
	Short Tons	Value	Short Tons	Value
CRUDE				
Canada	1,548	$301,352	2,281	$432,004
Africa:				
Union of S.A.	945	121,577	2,080	$246,171
Other	1,183	172,654	3,266	412,138
U.S.S.R.	18	7,351	35	5,972
United Kingdom	202	23,451	220	39,236
Italy	22	11,464	30	22,030
Morocco	22	2,131		
Total	3,940	$639,980	7,912	$1,157,551
MILL FIBRE				
Canada	58,484	$2,713,895	56,484	$2,972,137
U.S.S.R.	4,614	206,347	6,382	300,300
Hungary			16,775	516,713
Finland			22	840
United Kingdom			(1)	65
Total	63,098	$2,920,242	79,663	$3,790,055
STUCCO and REFUSE				
Canada	94,204	$1,470,865	150,538	$2,469,910
Malta, Gozo, Cyprus	4,628	87,844	4,386	91,706
Italy	523	5,202	1,044	14,187
U.S.S.R.	181	834		
Finland	11	446	59	1,528
Total	99,547	$1,565,191	156,027	$2,577,331
TOTAL				
Canada	154,236	$4,486,112	209,303	$5,874,051
Africa:				
Union of S.A.	945	121,577	2,080	246,171
Other	1,183	172,654	3,266	412,138
U.S.S.R.	4,813	214,532	6,417	306,272
United Kingdom	202	23,451	220	39,301
Italy	545	16,666	1,074	36,217
Malta, Gozo, Cyprus	4,628	87,844	4,386	91,706
Finland	11	446	81	2,368
Morocco	22	2,131		
Hungary			16,775	516,713
TOTAL IMPORTS	166,585	$5,125,413	243,602	$7,524,937

(1) Less than one ton.

Imports into the United States (continued)

	1937		1938	
	Short Tons	Value	Short Tons	Value
CRUDE				
Canada	2,620	$556,034	1,360	$321,424
Africa:				
Union of S.A.	4,247	490,335	3,677	456,073
Other	7,099	794,256	2,745	310,147
U.S.S.R.	39	8,464	1	479
United Kingdom	290	54,636	22	5,205
Italy	31	22,332	18	12,477
Australia			21	6,006
Total	14,326	$1,926,057	7,844	$1,111,811
MILL FIBRE				
Canada	95,788	$4,775,513	51,141	$2,701,494
U.S.S.R.	7,978	363,804	5,201	258,593
Total	103,766	$5,139,317	56,342	$2,960,087
SHORT FIBRES				
Canada	177,602	$2,984,299	113,570	$2,043,844
Malta, Gozo, Cyprus	8,129	310,058	6	294
U.S.S.R.	2,196	85,392	63	1,525
Italy	958	19,775	1,551	38,488
Finland	88	3,568	89	3,564
France	122	1,735		
United Kingdom			22	847 7
Austria			3	142
Total	189,096	$3,404,834	115,304	$2,088,704
TOTAL				
Canada	276,010	$8,315,846	166,071	$5,066,762
Africa:				
Union of S.A.	4,248	490,362	3,677	456,073
Other	7,099	794,256	2,745	310,147
U.S.S.R.	10,213	457,660	5,265	260,597
United Kingdom	290	54,636	44	6,052
Italy	989	42,087	1,569	50,965
Malta, Gozo, Cyprus	8,129	310,058	6	294
Finland	88	3,568	89	3,564
France	122	1,735		
Australia			21	6,006
Austria			3	142
TOTAL IMPORTS	307,188	$10,470,208	179,490	$6,160,602

Imports into the United States (continued)

1939

	Short Tons	Value
CRUDE		
Canada	3,068	$547,425
Africa:		
Union of S.A.	6,359	656,543
Other	4,836	593,596
United Kingdom	298	40,580
Italy	31	23,167
Australia	53	11,000
Total	14,645	$1,872,311
MILL FIBRE		
Canada	73,511	$4,378,887
U.S.S.R.	2,611	109,516
Total	76,122	$4,488,403
SHORT FIBRES		
Canada	147,261	$2,650,886
Malta, Gozo, Cyprus	3,940	69,426
Italy	536	12,133
Finland	46	1,324
U.S.S.R.	(1)	5
Venezuela	11	50
	151,794	$2,733,824
TOTAL		
Canada	223,840	$7,577,198
Africa:		
Union of S.A.	6,359	656,543
Other	4,836	593,596
U.S.S.R.	2,611	109,521
United Kingdom	298	40,580
Malta, Gozo, Cyprus	3,940	69,426
Italy	567	35,300
Finland	46	1,324
Australia	53	11,000
Venezuela	11	50
TOTAL IMPORTS	242,561	$9,094,538

(From The Mineral Industry, Vols. 44-48)

TABLE D

Salient Statistics of the Asbestos Industry in the United States, 1929-1939

	DOMESTIC ASBESTOS			IMPORTS	
	Production	Sales			
	Tons	Tons	Value	Tons	Value
1929		3,155	$351,004	262,427	$11,153,017
1930		4,242	289,284	208,681	7,064,824
1931		3,228	118,967	136,361	3,749,340
1932		3,559	105,292	96,754	2,250,200
1933	5,017	4,745	130,677	119,494	3,540,675
1934	6,544	5,087	158,347	120,334	3,377,994
1935	9,415	8,920	292,927	166,585	5,125,413
1936	10,924	11,064	314,161	243,602	7,524,937
1937	13,896	12,079	344,644	307,188	10,470,208
1938	12,901	10,440	247,264	179,490	6,160,602
1939	15,136	15,459	512,788	242,561	9,094,538

(From Mineral Resources of the United States, Part II -- Non-Metals and Minerals Yearbook.)

TABLE E

Rhodesian Asbestos Statistics

	PRODUCTION		EXPORTS
	Short Tons	Value	Short Tons
1929	42,634	£1,186,627	45,646
1930	37,765	1,070,847	37,765
1931	24,042	386,494	27,997
1932	15,765	197,092	13,865
1933	30,181	555,993	30,246
1934	32,214	402,745	32,180
1935	42,517	646,657	45,289
1936	56,346	836,468	51,203
1937	57,014	840,026	64,453
1938	58,811	1,020,921	58,610
1939	58,313	1,088,782	------

(From The Mineral Industry, Vols. 42 and 48, and Year Book and Guide of the Rhodesias and Nyasaland, 1938-39.)

TABLE F

South African Asbestos Statistics, 1929-1939.

YEAR	SALES					TOTAL EXPORTS PROD.	
(short tons)	Transvaal	Cape	Natal	Total	Value	(Short tons)	(short tons)
1929			23	33,037	£497,393		
Chrysotile	17,724						
Crocidolite		6,030					
Amosite	9,260						
1930				19,281	£340,975	25,853	12,047
Chrysotile	10,519						
Crocidolite		5,481					
Amosite	3,281						
1931				15,676	£246,583	12,857	15,049
Chrysotile	9,938						
Crocidolite		3,651					
Amosite	2,087						
1932				12,070	£116,401	8,785	11,522
Chrysotile	7,715						
Crocidolite		2,964					
Amosite	1,391						
1933				15,887	£197,120	17,007	16,022
Chrysotile	9,572						
Crocidolite		3,225					
Amosite	3,090						
1934				17,594	£203,033	18,089	17,433
Chrysotile	11,025						
Crocidolite	1	2,811					
Amosite	3,757						
1935				22,802	£226,881	20,421	23,702
Chrysotile	15,641						
Crocidolite	75	2,402					
Amosite	4,684						
1936				25,237	£337,229	24,429	24,709
Chrysotile	16,149						
Crocidolite	216	4,048					
Amosite	4,824						
1937				28,069	£430,761	28,633	27,848
Chrysotile	15,141						
Crocidolite	654	4,786					
Amosite	7,488						
1938				23,176	£416,401	23,149	21,819
Chrysotile	5,386		187				
Crocidolite	2,326	6,484					
Amosite	8,793						
1939				22,033	£509,278	21,959	22,612
Chrysotile	1,586		79				
Crocidolite	2,909	6,143					
Amosite	11,316						

(From The Mineral Industry, Vols. 44-48, and Annual Reports of the Quebec Bureau of Mines, 1929-1939.)

TABLE G

Exports of Asbestos from Canada, 1929 - 1939

DESTINATION	1929	1930	1931	1932
Crude and Fibre				
Total tons	143,725	131,238	70,903	42,661
Total value	$10,127,208	$6,441,939	$6,441,939	$2,115,140
United Kingdom	3,508	3,528	1,801	1,420
	$350,410	$288,531	$140,024	$85,567
United States	91,876	66,857	46,002	27,392
	$6,033,946	$3,723,462	$2,171,000	$1,274,646
Belgium	14,291	10,836	7,831	1,080
	$987,896	$769,002	$533,737	$49,707
Germany	11,329	4,278	4,714	1,969
	$1,189,580	$410,083	$399,584	$117,148
Japan	10,557	8,605	4,539	6,683
	$567,800	$476,199	$227,803	$338,576
France	6,583	5,545	3,327	2,360
	$504,539	$389,890	$244,380	$150,911
Short Fibre, Shorts, and Waste				
Total Tons	148,305	131,238	88,535	69,769
Total Value	$2,507,474	$2,011,318	$1,245,326	$986,095
United Kingdom	2,335	3,104	1,015	1,151
	$55,850	$75,539	$22,492	$25,830
United States	140,588	121,605	83,082	65,618
	$2,320,084	$1,791,306	$1,130,159	$901,927
Germany	2,667	2,310	1,568	733
	$66,625	$51,115	$34,717	13,934
Grand Total	292,030	235,500	159,438	112,430
	$12,634,682	$8,453,257	$5,174,643	$3,101,235

DESTINATION	1933	1934	1935	1936
Crude and Fibre				
Total Tons	78,701	83,267	100,186	136,547
Total Value	$3,998,377	$4,029,191	$5,300,176	$7,391,517
United Kingdom	4,633	4,618	4,584	6,817
	$303,492	$316,468	$299,569	$405,712
United States	48,469	44,541	61,059	77,691
	$2,324,246	$1,996,915	$3,079,366	$4,052,187
Belgium	5,051	3,548	4,814	8,058
	$275,046	$191,519	$270,606	$455,828
Germany	4,572	5,435	4,913	12,811
	$306,713	$441,188	$438,062	$987,125
Japan	9,530	18,489	15,597	21,200
	$422,252	$679,723	$628,597	$856,167
France	2,620	3,969	3,781	6,986
	$167,832	$243,416	$254,142	$473,406

Exports of Asbestos from Canada (Continued)

(continued)

	1933	1934	1935	1936
Short Fibre, Shorts, and Waste				
Total Tons	70,296	74,977	100,025	157,678
Total Value	$991,417	$1,100,305	$1,585,481	$2,567,343
United Kingdom	2,816	2,080	3,595	4,566
	$54,979	$44,620	$75,516	$84,711
United States	63,744	68,171	92,810	146,081
	$869,994	$964,429	$1,440,995	$2,350,527
Germany	1,666	2,497	1,438	3,547
	$32,222	$50,787	$28,805	$71,365
Grand Total				
	148,997	158,244	200,211	294,225
	$4,989,794	$5,129,496	$6,885,657	$9,958

DESTINATION	1937	1938	1939
Crude and Fibre			
Total Tons	196,511	165,744	186,238
Total Value	$10,972,852	$10,872,435	$12,463,177
United Kingdom	14,003	19,996	22,610
	$919,350	$1,271,974	$1,392,063
United States	98,916	54,323	77,460
	$5,347,488	$3,125,401	$4,994,227
Belgium	15,743	10,567	14,041
	$926,061	$684,535	$946,949
Germany	17,699	25,980	5,573
	$1,361,571	$2,582,351	$614,855
Japan	33,934	27,089	30,649
	$1,544,561	$1,334,821	$2,070,903
France	9,376	8,590	13,033
	$614,979	$579,730	$927,517
Short Fibre, Shorts, and Waste			
Total Tons	194,530	123,143	159,780
Total Value	$3,242,457	$2,237,751	$2,902,111
United Kingdom	6,357	4,936	7,559
	$119,605	$103,453	$155,549
United States	176,708	112,544	147,599
	$2,913,183	$2,063,429	$2,651,896
Germany	5,205	3,071	1,163
	$95,718	$75,035	$25,214
Japan	1,017	348	11
	$21,487	$9,208	$2,784
Grand Total	391,041	288,887	346,018
	$14,215,309	$13,110,186	$15,365,283

(From Manufactures of the Non-Metallic Minerals in Canada, Annual Reports on the Mineral Production of Canada, and Asbestos.)

TABLE H

Principal Statistics of the Asbestos Products Industry in Canada, 1929-1939

	1929	1930	1931	1932
Number of plants	12	11	13	13
Capital employed	$2,949,712	$$2,316,645	$1,112,141	$2,682,882
Av. no. of employees	351	306	240	279
Salaries and wages	$359,433	$401,490	$302,638	$280,953
Cost of fuel electricity at works	$80,902	$77,082	$5 7,339	$67,732
Cost of materials at works at works	$1,348,460	$1,327,025	$729,771	$559,673
Gross selling value of products at works	$2,286,638	$2,301,924	$1,308,183	$1,067,801

	1933	1934	1935	1936
Number of plants	11	11	13	13
Capital employed	$1,777,975	$1,391,873	$1,703,301	$1,955,676
Av. no. of employees	222	228	327	372
Salaries and wages	$208,580	$233,379	$323,854	$376,574
Cost of fuel and elecricity at works	$55,031	$46,488	$66,793	$79,290
Cost of materials at works	$331,062	$387,074	$518,994	$622,530
Gross selling value of products at works	$757,626	$910,983	$1,130,282	$1,293,909

	1937	1938	1939
Number of plants	13	13	14
Capital employed	$2,003,659,	$1,701,202	$2,003,516
Av. no. of employees	451	403	415
Salaries and wages	$464,882	$433,964	$497,324
Cost of fuel and electricity at works	$91,252	$107,436	$99,711
Cost of materials at works	$812,639	$614,207	$724,424
Gross selling value of products at works	$1,896,677	$1,531,118	$1,783,993

(From The Asbestos Industry in Canada, 1939.)

TABLE I

Asbestos in the U.S.S.R., 1909-1938

	Production	Exports	Ratio of Exports to Production
(metric tons)			
1909-13 (annual average)	16,840	11,203	66.5%
1922-23	4,780	2,442	51.1
1922-23	4,780	2,442	51.1
1924-25	12,330	5,936	48.1
1926-27	21,156	9,927	46.7
1927-28	26,410	11,164	42.3
1929	39,177	12,603	32.2
1930	54,382	15,749	29.0
1931	65,546	13,239	20.2
1932	60,160	16,551	27.4
1933	74,000	21,458	30.1
1934	92,167	15,079	16.4
1935	92,200	25,510	28.7
1936	95,500	26,155	27.4
1937	125,117	27,299	21.8
1938	-------	14,434	-----

(From The Mineral Industry, Vols. 44 and 48)

BIBLIOGRAPHY

GENERAL

Asbestos. Berlin, Becker and Haag, 1928.

Howling, G. E. Asbestos. London, Imperial Institute, 1937.

Industrial Minerals and Rocks. New York, American Institute of Mining and Metallurgical Engineers, 1937.

The Mineral Industry of the British Empire and Foreign Countries. Statistical Summaries. London, Imperial Institute. 1929-1939.

The Mineral Position of the British Empire. London, Imperial Institute, 1937.

Mining Royalties and Rents in the British Empire. London, Imperial Institute, 1936.

The Mining Year Book. London, W.E. Skinner and "Financial Times." Vols. for 1931 and 1936.

Roush, G.A., ed. The Mineral Industry. New York, Mc-Graw Hill. Vols. XXXVIII-XLVIII.

Staley, E. Raw Materials in Peace and War. New York, Council on Foreign Relations, 1937.

The Stock Exchange Official Year Book -- 1940. London, T. Skinner

CANADA

Asbestos Corporation, Limited. Montreal, Greenshields and Co., 1940.

Asbestos Corporation, Limited. Toronto, The Financial Post Corporation Service, 1941.

The Asbestos Corporation Limited. Montreal, L.G. Beaubien and Company, 1940.

The Canadian Annual Review of Public Affairs. Toronto, Canadian Review Company. Vols. for 1930-31 and 1932.

The Financial Post Survey of Corporate Securities. Toronto, Maclean. Vols. 1929-1931.

Mendels, M.M. The Asbestos Industry of Canada. Montreal, McGill University Economic Studies, No. 14.

Raw Asbestos Shipments, Johns-Manville and Competitive, 1940.

OTHER COUNTRIES

Brown, G.G., ed. The South and East African Year Book and Guide. London, 1939.

Brown, J.C. India's Mineral Wealth. Oxford University Press, 1936.

Hon, T.F. "Notes on the Asbestos Deposits of Laiyuan District, Hopei Province." Geological Bulletin of the National Geological Survey of China, No. 25. (March, 1935).

Rukeyser, W.A. Working for the Soviets. New York, Covici-Friede, 1932.

Torgasheff, B.P. The Mineral Industry of the Far East. Shanghai, Chali Company, 1930.

GOVERNMENT PUBLICATIONS

Canada

Annual Report of the Quebec Bureau of Mines. Vols. 1929-1939.

Annual Report on the Mineral Production of Canada. Ottawa, Dominion Bureau of Statistics, Department of Trade and Commerce. Vols. 1929-1938.

The Asbestos Industry in Canada, 1939. Ottawa, Dominion Bureau of Statistics, 1940.

Manufactures of the Non-Metallic Minerals in Canada. Ottawa, Dominion Bureau of Statistics. Vol. 1928-1929 to Vol. 1936 - 1937.

The Mineral Industries of Canada, 1933. No. 738. Ottawa, Department of Mines, 1934.

Mining Newsletter Series. No. 11/16. Ottawa, Department of Mines, 1934.

Ross, J.G. Chrysotile Asbestos in Canada. Ottawa, Department of Mines, 1931.

United Kingdom

Elmslie, N. Economic Conditions in the Union of South Africa - September, 1933. London, Department of Overseas Trade, 1934.

Field, F.W. Economic Conditions in Canada - 1931. London, Department of Overseas Trade, 1932.

United States

Biennial Census of Manufactures, 1931. Washington, Bureau of the Census, U.S. Department of Commerce, 1935.

Biennial Census of Manufactures, Part 2, 1937. Washington, Bureau of the Census, U.S. Department of Commerce, 1939.

Bowles, O. Asbestos. Bulletin 403. Washington, U.S. Bureau of Mines, 1937.

--------- Asbestos -- General Information. Information Circular No. 6817. Washington, U.S. Bureau of Mines, 1935.

Bowles, O. and Justice, C.W. Growth and Development of the Nonmetallic Mineral Industries. Information Circular No. 6687. Washington, U.S. Bureau of Mines, Department of Commerce, 1933.

Mineral Raw Materials. New York (Mc-Graw Hill), Foreign Minerals Division, U.S. Bureau of Mines, 1937.

Mineral Resources of the United States -- Part II -- Nonmetals. Washington, Bureau of Mines, U.S. Department of Commerce. Vols. 1929-1931.

Minerals Yearbook, 1932-1933. Washington, Bureau of Mines, U.S. Department of Commerce, 1933.

Minerals Yearbook. Washington, Bureau of Mines, U.S. Department of Interior. Vols. 1934-1940.

Census of Manufactures: 1939. Preliminary Report. Washington Bureau of the Census, U.S. Department of Commerce, 1940.

Federal Antitrust Decisions, 1927-1931. Washington, 1934. Vol. II.

Russian Asbestos. U.S. Tariff Commission Report to the President, Report No. 67 -- Second Series. Washington, 1933.

Tyler, T.M. and Bowles, O. Nonmetallic Industries in 1939. Information Circular No. 7106. Washington, Bureau of Mines, U.S. Department of Interior, 1940.

Union of South Africa

Hall, A. L. Asbestos in the Union of South Africa. Memoir No. 12. Pretoria, Geological Survey, Department of Mines and Industries, 1930.

The Mineral Resources of the Union of South Africa. Pretoria, Department of Mines, 1940.

Official Year Book of the Union and of Basutoland, Bechuanaland Protectorate, and Swaziland. No. 19. Union Office of Census and Statistics, 1938.

Government Periodicals

Commerce Reports. Washington, Bureau of Foreign and Domestic Commerce, U.S. Department of Commerce.

Commercial Intelligence Journal. Ottawa, Department of Trade and Commerce.

Foreign Minerals Quarterly. Washington, Bureau of Mines, U.S. Department of Interior.

Mineral Trade Notes. Washington, Bureau of Mines, U.S. Department of Interior.

Queensland Government Mining Journal. Brisbane, Australia.

Mining Review. Adelaide, South Australia, Department of Mines.

PERIODICALS

Canada

Agricultural and Industrial Progress in Canada. Montreal, C.P.R. Department of Immigration and Colonization.

Canadian Geographical Journal Ottawa and Montreal, Canadian Geographical Society.

The Canadian Mining and Metallurgical Bulletin. Montreal, Canadian Institute of Mining and Metallurgy.

The Canadian Mining Journal. Gardenvale, Quebec.

United Kingdom

Bulletin of the Imperial Institute. London.

Bulletin of the Institution of Mining and Metallurgy. London.

The Chemical Age. London, Benn Brothers, Limited.

Chemistry and Industry. London, Society of Chemical Industry.

The Economist. London.

The India-Rubber Journal. London.

The Mining Journal. London.

The Mining Magazine. London, Mining Publications, Limited.

United States

Asbestos. Philadelphia.

Chemical and Metallurgical Engineering. New York, Mc-Graw Hill.

Economic Review of the Soviet Union. New York, Amtorg Trading Corporation.

Engineering and Mining Journal. New York, Mc-Graw Hill.

Engineering and Mining World. New York, Mc-Graw Hill.

Fortune. New York.

Industrial and Engineering Chemistry -- News Edition. Washington, American Chemical Society.

Mining and Metallurgy. New York, American Institute of Mining and Metallurgical Engineers.

Mining Congress Journal. Washington.

Rock Products. Chicago