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INVESTIGATION OF A BRITISH MARKET FOR CANADIAN NON-METALLIC MINERALS.

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The following notes on factors governing the market in Great Britain for certain non-metallic minerals produced in Canada comprise information gathered in September 1922 in the course of a survey of the British trade, as represented by some of the more important consumers, brokers and importers of such materials. It should be understood that the general condition of trade as mentioned in the introductory paragraph is that obtaining during the last quarter of 1922; this condition, it is to be hoped, will gradually change for the better.

Introductory.

The moment at which the above-survey was made proved to be an unfortunate one for attempting to arouse interest with the British trade in Canadian minerals, owing to the general industrial depression and the political uncertainty. Trade in general in Great Britain is in a very depressed condition, and recovery from the post-war slump in many industries has been slow and hampered by the coal and engineering strikes. The present unstable exchange, also, is having a very prejudicial effect upon industrial activity. In addition to the fluctuating exchange curtailing buying of raw materials by rendering manufacturers disinclined to lay in stocks, the more favourable exchange with many European countries having resources of the minerals required naturally makes it to the British importer's advantage to buy from such countries, rather than from Canada. The depreciation of the franc, for instance, makes it to the British importer's interest to obtain his graphite from Madagascar, a French possession, and the same holds good of mica, of which mineral Madagascar has recently been shown to possess important deposits. The relatively low production costs in countries supplied with black labour, such as the various French and British colonial possessions, still further works to the disadvantage of Canada in competing for the British market.

The result of the enquiries instituted goes to show that Great Britain at the present time is not buying at all heavily of non-metallic minerals; that manufacturers in some cases are carrying considerable stocks both of minerals and of manufactured goods; and that mineral brokers, in consequence, are not greatly interested in Canada as an

immediate source of non-metallic minerals. The Atlantic freight, also, (at present about $6 per ton from Eastern ports), plus the rail charges from point of production to the Atlantic seaboard, constitute a serious obstacle to trade relations. In the case of feldspar, for example, these combined freight costs practically equal the cif selling price of feldspar in Great Britain today.

In order to assist Canadian producers who may be desirous of seeking an outlet for their mine products in Great Britain when general trade conditions shall improve, the Mines Branch has compiled lists of the more important British consumers, dealers and brokers in many of the more important minerals—particularly the non-metallics. Copies of these lists may be secured on application to the Director, Mines Branch, Department of Mines, Ottawa.

Barytes. British barytes producers are already feeling the effect of German competition, the German barytes being a better crude and also more carefully ground and prepared for the trade than the English. It is regarded as certain that, when conditions permit of a greater certainty of delivery from Germany, German barytes will supplant domestic or any other barytes in the English market. In September 1922, German barytes, prime white, water floated, 99 per cent $BaSO_4$, was quoted at $18 per ton cif United Kingdom.

The principal use of barytes in England is in the paint trade.

Bentonite. Bentonite is a colloidal clay found in certain parts of Western Canada, and in Wyoming and Dakota in the United States. Its extremely fine state of sub-division, and its peculiar property of swelling to several times its mass and forming a mineral jelly upon the addition of water, indicate that it may prove to be of considerable importance in industry. Suggested uses for the material are in the loading of paper, textiles and other fabrics, in rubber, paints, sizing of yarns, and the dye industry. Successful commercial use has already been made of bentonite in the United States for de-inking old newsprint and to increase the retention of china clay in the manufacture of paper. It has also been employed in a small way in coloured crayons, and as a component of adhesive pastes.

In 1921, the Mines Branch negotiated the shipment to the Imperial authorities in London of five tons of Alberta bentonite, to be distributed to various industries for experimental purposes. A survey was made of these industries in order to ascertain what progress, if any, had been made in the research work on the material. It was found that practically all attempts to develop a use for the bentonite had failed, and little interest was expressed in its possibilities. This is due, in part, to the expense of freeing the crude clay of the percentage of relatively coarse grit usually present. If ordinary settling in water is practised, the gelatinous nature of the water-saturated clay renders drying of the cleaned product difficult and costly. This obstacle will doubtless be overcome eventually—possibly by employing some medium other than water

for washing the clay. The progress already made with bentonite in the United States gives ground for believing that further research will result in the successful utilization of the material in various lines of industry.

Corundum. Brokers report that considerable quantities of corundum are now coming on the market from Madagascar and Rhodesia; these importations supplement the main supply, which is derived from India. The Madagascar corundum is in the form of loose crystals of various sizes, and is probably won from soft, weathered rock, thus dispensing with expensive mining and crushing. The Rhodesian corundum is stated to be surface float, and is rather different in character to the Madagascar. Rhodesian corundum is quoted at $45 to $54 per long ton cif United Kingdom, and Madagascar crystals at $45 per long ton.

Diatomaceous Earth. Dealings in this material are largely confined to one firm, the Kieselguhr Supply Company, 1 Great Winchester Street, London E.C.2, who draw their supplies from many sources.

A large percentage of the diatomaceous earth used in Great Britain goes into insulating bricks and pipe-coverings. A quantity is also employed for filtering purposes in the sugar industry, in the refining of oils, fats and glycerine and as a filler in rubber. The annual consumption of diatomaceous earth (or kieselguhr, as it is commonly termed in the trade) for all purposes in the United Kingdom, is given as 6,000 long tons, and that of the world as 36,000 tons.

For insulating purposes, an earth of low specific gravity is demanded, colour being immaterial within limits. German kieselguhr which is considered the best on the market, averages 13-14 pounds per cubic foot. The rubber trade stipulates for a white, iron-free earth.

The price of diatomaceous earth is dependent largely on the structure and shape of the diatoms, since these characters control the specific gravity and the consequent absorptive and insulating power. Diatoms vary widely in the above respects, hundreds of forms being known; and a knowledge of diatom structure is therefore requisite to enable the value of an earth to be gauged with the help of the microscope.

German kieselguhr undergoes a washing process to remove grit, and is water-floated to ensure a uniform product. Air-dried earth is considered superior to kiln-dried. Far closer attention would appear to be paid in Europe to the cleaning and grading of diatomaceous earth than has been the case among Canadian producers.

Feldspar. A special effort was made to ascertain the factors governing the feldspar situation, since Canadian producers of crude feldspar have been endeavouring for some years past to enter the British market. This market has been supplied for years past virtually entirely from Scandinavian sources. Little authoritative information has been

available regarding the possibilities of the British market for feldspar, and Canadian producers have, therefore, been working rather in the dark when making an effort to establish trade connections with Great Britain.

A temporary shortage of feldspar was experienced in Great Britain toward the close of 1920, and during the early months of 1921 high prices ruled for both crude and ground spar. This situation being brought to the attention of Canadian producers, serious efforts were made to negotiate sales of Canadian feldspar to the British trade. These efforts, however, proved practically fruitless, since the shortage was of brief duration, and prices soon fell to a much lower level.

It was with a view to securing authoritative information on the present market possibilities that a visit was made to the Potteries district, in order to interview the chief pottery firms and potters' supplies houses. Dealings in feldspar in Great Britain are mostly conducted through potters' supplies firms, though limited sales are also effected through general mineral brokers, a number of whom were also interviewed and their views secured. The result of this investigation may be summarized briefly as follows:

The market for feldspar in England is not large, the annual consumption by all trades, including the metalware-enamelling industry, probably not exceeding five thousand tons. This is considered to be an outside figure, and the actual consumption in the last two years is thought to be considerably under this amount. Cornwall stone practically takes the place of feldspar in the English pottery trade, and for various reasons is preferred by English potters. Being of domestic origin and available in large quantities, it is, of course, much cheaper than feldspar. The feldspar used by the English pottery trade goes chiefly into brick glazes and vitreous floor tile bodies, very little being employed in white ware bodies. In this respect, English practice is the reverse of American practice.

The British market for feldspar is supplied practically entirely by Scandinavia, though there is a small production of domestic spar, some of which may also find its way to the pottery trade. The Scandinavian deposits are situated close to tide-water and can be worked cheaply. Small vessels that carry coals to Scandinavian ports load up with feldspar at the mines along the fjords and carry it to Runcorn (the head of Mersey navigation) where they discharge into barges. These bring the spar by canal to the Potteries and in this way, freight charges are reduced to a very low figure. The quality of No. 1 Canadian and No. 1 Scandinavian feldspar is about equal, and provided that Canadian spar could be laid down in England as cheaply as the Scandinavian, the trade would no doubt be willing to use it.

To meet Scandinavian competition at the present time, Canadian feldspar would have to be laid down at Runcorn at probably about $13 per long ton. Since the Atlantic freight is now in the neighbourhood of $6, this means that the spar would have to be put

aboard Montreal or other port for $7 per long ton, a figure which can hardly be approached by any of the inland producers.

The feldspar deposits of Norway and Sweden are regarded as capable of supplying virtually the entire European market, both immediate and prospective. Cheap water power, also, enables the spar to be ground economically at point of origin, and considerable quantities of Swedish-ground feldspar are imported into Great Britain. While expressing themselves as completely satisfied with the quality of Canadian spar, most of the firms interviewed were of opinion that its cost laid down at the Potteries could hardly permit of any competition with Scandinavian spar.

Owing to the relatively small consumption of feldspar in England, users buy in small lots only, and there is consequently little chance for ship-load consignments (2,000-3,000 ton lots) being contracted for by the potters' supplies firms. The small vessels bringing spar from Scandinavia can proceed as far as Runcorn, which is a canal-head, and discharge direct into barges. Large ocean steamers, on the other hand, cannot do this but must discharge at a Mersey port, whence the spar would have to be shipped by rail to the Potteries or else railed to Runcorn, and there placed in barges, both measures entailing a considerable expense over the entirely water-borne Scandinavian spar. The potters' supplies houses, which grind for the trade, contract for delivery according to demand and do not carry the large stocks that the American grinders do, with their much larger market. Since there are a number of such firms, each one grinds annually a relatively small amount of spar, possibly only a few hundred tons.

One prominent firm's books showed pre-war (1911) cif Runcorn deliveries of best, crude Scandinavian spar at 20 to 25 shillings per long ton, equivalent, at pre-war exchange, to $4.35 to $5.44 per short ton. While it may well be that these low levels will hardly be reached again, present quotations are very much below the prices obtaining during the shortage in 1920.

It may, perhaps, be added that during the past two years, a number of mineral brokers not connected directly with the feldspar trade, as well as officials of the Imperial Mineral Resources Bureau and of the Canadian Trade Commission, have been actively looking into the feldspar situation, and that the results of these investigations, as communicated to the Mines Branch, correspond closely with those of the writer's own survey.

The question has been raised whether perhaps ground feldspar cannot be shipped profitably to Great Britain. This point has been considered and was taken up with the trade. In view, however, of the great importance attached by the pottery firms to the assurance of quality in feldspar, and the satisfaction hitherto

afforded by the present source of supply, it may well be doubted whether the question of importing ground Canadian spar would be entertained at all favourably. A shipment of off-grade feldspar may cost a potter a great deal of money in spoiled goods, and he naturally prefers to be dependent on a local source of supply, from which he can obtain prompt redress in case of complaint. The potters and potters' supplies houses have been associated so long in the feldspar business that it would undoubtedly be a difficult matter to attempt competition.

Garnet. The garnet coming on the British market is chiefly crude lump, which is preferred by the users to sized, ground garnet. This is due, probably, to the fact that the quality of a consignment is more readily apparent from an inspection of lump than of pulverized garnet; that garnet concentrates made from a garnet schist usually contain a percentage of other heavy minerals; and that the manufacturer can grind lump to his varying requirements without being obliged to stock up with a large range of sizes. Hitherto, Canadian garnet has been offered only in sized grades, representing the concentrates made by milling garnet schist. Such concentrates have been offered to the British trade at a cif price of approximately $100 per short ton. As against this, crude lump garnet is selling at $25-$30 per long ton cif United Kingdom, with demand light and apparently no dearth of supply. There appears little hope therefore, that Canadian milled garnet can find a market in the United Kingdom at the price demanded.

It may be noted that the suitability of garnet for the abrasive trade depends very largely on the hardness of the mineral and on how it breaks—whether the fragments possess sharp, chisel edges or are of irregular form and exert little cutting power. All garnet is by no means alike in the above respects, and steps should always be taken to ascertain the quality of the material yielded by any newly-discovered deposit before its development is undertaken. Some garnets break down readily on light crushing into very small fragments, practically powder, and it is not practicable, therefore, to make from such material the full range of sizes required by the trade.

Graphite. The British market for graphite previous to 1910 was supplied mainly from Ceylon, which island furnished a very superior grade of plumbago, or crystalline graphite, that was considered essential for crucible purposes. During the past decade, however, increasing quantities of flake graphite have been secured from Madagascar, a French possession, and this grade of graphite has now largely supplanted the Ceylon in the English crucible trade. In fact, one of the most prominent English crucible firms is understood to have considerable capital invested in the Madagascar field, and to be using Madagascar flake almost entirely. If the latter statement be correct, it effectually disposes of the contention of American crucible makers that a good crucible cannot be made without Ceylon plumbago.

The graphite market in all countries has been in such a depressed state during 1921 and 1922, owing to the immense over-production in all the producing countries during the last year of the war and the accumulation of large stocks, that it is difficult at the present time to gain a correct index of the situation. The English crucible trade, which probably accounts for the great bulk of the graphite imported, is reported as stocked up with both crucibles and graphite. Consequently present sales are almost negligible, and prices low. Best Madagascar flake is now offered at about 3 cents per pound, with few takers.

The general opinion is that Madagascar will continue to dominate the graphite market for years to come, and will ultimately supply the world's requirements for crucible graphite. Less and less Ceylon graphite is being used, as Madagascar flake can be supplied much more cheaply and has been found to answer crucible requirements.

None of the firms questioned could offer any immediate encouragement for Canadian graphite in the European market, either for crucible, lubricant or other purposes. The consumption of graphite in Great Britain for purposes other than crucibles and stove polish would appear to be very limited, graphite lubricants and foundry facings being reported as relatively little used. Madagascar graphite can, of course, be employed for these purposes perfectly satisfactorily.

Mica. An important development that may ultimately result in affecting the Canadian mica-mining industry is the discovery within the last two years of important amber mica deposits in Madagascar. The deposits (about which little authentic information seems to be available) are said to be very large. Considerable quantities of Madagascar phlogopite have been coming on the English market, the mica being of very superior quality and the sheets of large size. Little in the way of smaller grades has reached the market, shipments consisting uniformly of knife-trimmed sheets measuring 2 x 4 inches and up. Madagascar mica is hardly distinguishable from the best Canadian phlogopite.

The low cost of mining in Madagascar, due to native labour and to the fact that the rock is stated to be weathered to a considerable depth, should enable even narrow veins to be worked profitably, and may result in Madagascar proving a serious competitor in the mica market, more particularly for the larger and higher-priced grades. So far, there has apparently been little attempt to export the smaller sizes or splittings, Canadian sales for these grades being reported as good during the last quarter of 1922.

Discoveries of excellent mica, both muscovite and phlogopite, have been made in recent years in many parts of the world, including Rhodesia, East Africa, Mexico, Brazil and Cochin India, and considerable quantities of well-graded mica from these sources have been coming on the English market.

With respect to ground mica, it appears that ground amber mica does not find a ready sale in England, the principal user of ground mica being the wall paper trade, which demands a very high grade, silvery-white product. This is obtained from an American source, and is prepared by a somewhat elaborate process, involving wet-grinding. The product commands a high price, and is selling at $170 per long ton cif United Kingdom. Some of the English wall-paper firms are understood to have installed their own grinding plants to grind muscovite scrap obtained from domestic sources. The resultant product is not as good as the American, and goes into the cheaper grades of paper. One of the principal markets for ground mica on this side of the Atlantic is the prepared roofing trade, but relatively little of this material is made or used in Europe.

Talc. Relatively little talc is used by the paper trade in Great Britain, its place being taken almost entirely by china clay, which is obtained from Cornwall and is much cheaper than talc. The talcum powder trade is a very limited one, relatively little being made or used. The paint trade also uses very little talc.

Most of the talc imported into Great Britain is of French, Italian or Indian origin, the raw material being essentially steatite, and grinding to a powder possessing good colour and high slip. Some Norwegian talc, also, is used. The Indian steatite is imported in block form, and is used for lava purposes—gas burners and the like. Lava is also prepared from high grade powdered talc, which is pressed into block form (so-called 'synthetic lava'). Some very good powdered talc of Spanish origin has also lately appeared on the English market. Canadian talc, from the Madoc district, has been imported in small amounts.

The total consumption of talc in Great Britain is small. Little or no block or slab soapstone would appear to be used. Samples of the grade of talc required by the English market would indicate that the Madoc talc is inferior in slip, and that from the Eastern Townships in colour, to the Italian and French talcs now imported. Brokers state that the supply of talc from Italy, France and Norway is more than adequate to satisfy British trade requirements. Norwegian talc, suitable for the rubber and paint trades, sells at $27 per long ton cif United Kingdom, while the best Italian talc fetches as high as $63 per ton.