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DEPARTMENT OF MINES, OTTAWA, CANADA.

Mineral Resources of Canada.

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Preliminary Statement.

A NEW SOURCE OF SOAPSTONE IN ONTARIO.

H. S. SPENCE, M.E.

What shows promise of proving an important and valuable source of soapstone has lately been investigated by the Mines Branch of the Department of Mines, Ottawa. Mr H. S. Spence, who is at present engaged in preparing a report on the talc and soapstone resources of Canada, for publication by the Mines Branch, examined the deposit in question last October. Mr Spence's report reads, in part, as follows:-

Location.

An interesting and extensive deposit of so-called soapstone occurs one mile west of Wabigoon station, on the main line of the Canadian Pacific railway, near Dryden, Ontario. The occurrence is close to Wabigoon lake, in the township of Zealand, and is distant only 500 yards from the railroad. It is well situated for working, the outcrops being on the top of a low ridge, thus affording good drainage for quarry operations. The mining location is numbered HW133, and the deposit is owned by Mr. E. Pidgeon, Wabigoon, Ontario.

Development.

Outside of a small amount of stripping, no development work has as yet been conducted on the property. There is very little overburden, however, and the outcrops are sufficient to show the existence of a large body of soapstone.

Description of Stone.

The stone may be termed soapstone; though, beyond being soft enough to be cut readily with an ordinary saw, it possesses few of the outward characteristics of what is usually classed as soapstone. It yields a greenish-grey powder that possesses little slip, and the stone is not greasy to the touch, as is talc.

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Tests of Stone.

The following tests of samples of stone from the northern band were conducted in the Mines Branch laboratory.

Crushing strength. Three tests of crushing strength, made on 2" cubes, showed:

- (1) 12,140 pounds per sq.in.
- (2) 10,269 "
- (3) 10,755 "

Transverse strength. Two tests were made to determine the transverse strength. The test pieces measured one inch in thickness by two inches wide; the supports were four inches apart. The modulus of rupture was determined as:

- (1) 1827 pounds per sq.in.
- (2) 1920 "

Corrosion. A sample of the stone, exposed to ordinary room temperature for three months, was weighed and then dried for two weeks at 105°C. On re-weighing, there was no loss in weight, indicating no absorbed moisture. The sample was then immersed in concentrated hydrochloric acid and boiled for 48 hours. After thorough washing, by boiling in water for several days, the sample was dried at 105°C. and weighed. The loss in weight was found to be 9.74 per cent. On immersion in the acid, slight effervescence was noticed, indicating the presence of a carbonate. The sample after treatment showed only slight local pitting. A sample of the alberene stone, subjected to the same treatment, effervesced violently when placed in the acid, and afterwards exhibited extensive pitting; the loss of weight in this case was 17.95 per cent, or almost twice that of the Wabigoon stone. Analysis, also, shows the presence in the alberene stone of almost twice as much carbon dioxide as in the Wabigoon stone.

Absorption. A sample of the stone was dried at 70°C. for 24 hours, weighed and immersed in cold, distilled water for three days. After air-drying for a short time, the sample was weighed and was found to have gained only 0.12 per cent.

Fusion temperature. Two samples were treated for their fusion temperature, which was determined in both cases as 1400°C. A sample of alberene stone, tested at the same time, went down at 1350°C.

It should be noted that all of the above tests and analyses of the Wabigoon stone were conducted on material taken from within a few inches of the surface of the deposit. This material, as shown by the broken test pieces, is traversed by numerous flaws and cracks showing rusty surfaces, and is likely to be considerably inferior in all respects to fresh, unweathered stone.

The stone is very similar in appearance and in composition (as shown by analysis) to the so-called "alberene stone", that is quarried on a large scale in Nelson and Albermarle counties, Virginia, and which is commonly classed as a soapstone. Alberene stone finds expensive employment in slab form for switchboard panels, laboratory table tops and laboratory equipment generally, laundry tubs, etc.; in the form of bricks, blocks and plates, it is used for lining furnaces, and for griddles, fireless cooker stones, foot warmers, etc.

The Wabigoon stone is a dark, greenish-grey rock, composed largely of talc, with some chlorite and dolomite. It is soft enough to be scratched with the nail. The rock is fine - to medium-grained, the largest constituents being dolomite crystals that occur as phenocrysts up to 1/8" diameter. There is no approach to schistose structure, the grain being quite uniform and the rock massive and homogeneous in every respect.

Analyses.

The following analyses were made in the Mines Branch laboratory of the stone composing the northern band, and of the 18 inch band of soft soapstone bordering it. An analysis of a sample of Virginia alberene stone is shown for comparison. The analyses show that the Wabigoon stone contains considerably less carbonates than the alberene stone.

	<u>1.</u>	<u>2.</u>	<u>3.</u>
Silica	41.94	51.44	37.10
Ferrous oxide	7.71	7.24	6.58
Ferric oxide	2.05	3.68	4.57
Alumina	7.57	4.79	4.53
Lime	3.42	None	4.20
Magnesia	25.39	26.43	27.37
Carbon dioxide	5.09	0.11	10.45
Water above 105°C.	6.71	6.56	5.46
Total:	99.88	100.25	100.26

1. Wabigoon stone, representative material of northern band.
2. Wabigoon stone, 18 inch band of soapstone bordering northern band.
3. Virginia alberene stone.

Description of Deposit. Two well defined bands of soapstone occur, separated by about 100 feet of hard grit rock, the nature of which has not been determined. The trend of the band is NW, and the apparent dip is approximately vertical. The stone is well exposed on the summit and west slope of a low ridge that crosses a small peninsula extending from the north shore of Wabigoon lake. The northern band has a proved length of over 500 feet, with a width of 35 feet. The extent of the southern band has not been determined, but from the visible outcrops, it is probably considerably the larger of the two bodies. There is very little overburden on the deposit and only a light stand of second growth timber.

The northern band has been stripped for a short distance of the light cover of soil that lies against its southern contact, but no openings have been made upon it. No work whatever has been done on the southern band. The northern band consists of about 35 feet of medium-grained stone, bordered along each contact by 18 inches of fine-grained, compact, soft soapstone. This soapstone is of good quality, is much more greasy to the touch than the stone of the main body, and consists largely of talc. Its occurrence is confined to the narrow bands along the contacts, and there is accordingly relatively little of it.

Small veinlets and pocketty aggregates of green, foliated talc occur locally in the mass of the main soapstone bands, but such material would not appear to be present in any quantity.

Possible Uses.

The use that suggests itself most strongly for the stone of this deposit is for bricks for lining the smelting furnaces of sulphate pulp (kraft) mills. These furnaces require a refractory material that is structurally strong and that does not spall or crack under the heat to which it is subjected. There are more than a dozen sulphate pulp mills in Canada, and the aggregate amount of soapstone bricks used is considerable. All of these bricks are imported from the United States. If the Wabigoon stone proves suitable under actual working conditions for the above purpose, the cost of soapstone to domestic pulp mills should be materially lessened.

A further suggested use for this stone is for bake oven bricks. Soapstone bricks are superior to ordinary fire brick for bake ovens on account of their greater heat retention, but their use is limited owing to the difficulty of procuring soapstone and its high cost.

Wabigoon stone might also be suitable for fireless cooker stones, foot warmers, griddles, etc.

Conclusions.

This deposit is the most promising, from an economic standpoint, of any of the soapstone occurrences seen in Canada. There is undoubtedly a large tonnage of stone available; the deposit lies within a few hundred yards of the railroad; and the location could not be bettered for a quarry site.