

traction (joints) and by regional deformation before the waters could have been introduced. On the other hand, the present water level is comparatively near the surface in this district, and, as the region is one that suffered great erosion in glacial times, the present surface may long have stood below ground-water level. It is not proved that meteoric waters are not a competent cause to produce these effects and at least a share in the cause may probably be attributed to them.

In the deepest workings yet made, which are a little more than 200 ft. deep, there is no apparent change in the quantity or quality of the product, and no desposit of serious importance has yet been exhausted. The principal deposits are found in the most basic parts of the peridotite (dunite); that is, near the base of sills or toward the central parts of stocks. Owing to glacial erosion having been more effective on the north side of the stocks several deposits are found near the north edge of the peridotite core of the principal stock.

Slip-Fiber Deposits—Slip-fiber or parallel-fiber asbestos is a fibrous phase of serpentine in which the fibers are arranged parallel to adjacent cleavage faces in the rock. In places the rock is almost entirely in a fibrous condition and the name "mass-fiber" is sometimes used for such occurrences. It is probable that this class of asbestos has been derived from pyroxene.

Where slip fiber is abundant the proportion of asbestos in the rock is much higher than in the case of the cross-fiber occurrences. But much of the slip fiber is short and the proportion that is recoverable and useful, though higher, is not so greatly different from that obtained from the cross-fiber mines. Only a little "crude" asbestos is obtained from deposits of this class.

Mining and Dressing.

Mining.—The distribution of the asbestos is such that all the rock within the area mined must be handled. Except in one mine where underground work is quite extensively carried on in winter or for development purposes, the mining, or rather quarrying, is all open-cast work. The ground is cut down in benches, generally 6 to 12 ft. high, which are carried across the floor of the pit so as to afford sufficient working face. Several of the pits have reached a depth of 200 ft. from the original surface and are from 600 to 1,200 ft. or even more in length.

Handling.—Hoisting is done by means of cable derricks with boxes carrying about a ton each. In one case a tramway enters the pit through an inclined tunnel and the rock is hauled out in cars drawn by a cable. Hauling on the surface is done by small locomotives with side-dumping cars of 4 or 5 tons capacity.

Dressing.—The separation of fiber from the rock commonly begins in the pit. Rock containing "crude"—that is, veins $\frac{3}{4}$ -in. or more in width and of good quality—is sent to the cobbing sheds for hand separ-

ation, and asbestos that is liberated by the breaking of the rock in the pit is collected in hand boxes; dead rock is taken to the waste dump, and the remainder, usually 35 to 60 per cent. of all the rock handled, goes to the ore bins, or directly to the mill for mechanical concentration.

The milling practice varies somewhat in different mills, but is very similar in all. It consists essentially of coarse crushing, drying, and alternate finer crushings and screenings. At each screening, the asbestos then liberated is drawn off through overhead pipes by suction fans and collected in settling tanks. When thoroughly screened from dust and classified according to length of fiber by means of a rotary screen, the different grades pass to their respective storage bins, or in some mills are mechanically bagged.

In the coarse crushing, jaw crushers are used. Gyrotories and frequently rolls are used for the finer crushing. When rolls are used special appliances are needed for teasing out the fiber, which becomes compressed into matted sheets by the rolls. The final crushing of the rock is effected by a specially designed "cyclone." This consists of two "beaters" or fans of chilled iron, in shape like the screw propeller of a boat and weighing upward of 100 lb., which revolve at a speed of 2,000 rev. per minute, or more, in a closed chamber. From the rock fragments thus driven together the smallest particles of asbestos are released and collected as before.

Suction fans for the removal of dust from the cyclone, the classifier, and sometimes from the mill, are important accessories to the equipment. Magnets are usually placed over the shaking screens to eliminate particles of iron ore. The average recovery of cross fiber seems to vary at different properties between 3 and 8 per cent. of the rock treated; slip fiber, perhaps 2 or 3 per cent. higher.

Product.—The fiber recovered in the mill is classified into three or more grades, the crude asbestos usually into two grades. The adoption of a standard classification has been discussed, but owing to local differences in the character of the fiber, as well as other causes, no standardization has yet been effected. Each mine follows its own grading and there is a lack of uniformity in the products of different mines. An arbitrary classification that has been adopted by the Department of Mines of the Province of Quebec is as follows:

Crude Asbestos, Hand Cobbed.

No. 1—Value \$200 per ton or more.

No. 2—Value less than \$200 per ton.

Mill Stock, Mechanically Separated.

No. 1—Value \$45 per ton or more.

No. 2—Value \$20 to \$45 per ton.

No. 3—Value less than \$20 per ton.

The production of 1912 was as follows, according to the classification given above:

Quantity of Rock Mined 1,870,608 Tons.			Shipments			Stock on Hand	
Qualities	No. of Men Employed	Wages Paid	Tons.	Value	Av. per Ton.	Tons.	Value
Crude No. 1.....			1,914	\$510,785	\$263.16	867	\$221,215
Crude No. 2.....			3,766	379,445	100.76	2,867	310,596
Mill Sk. No. 1.....			3,682	237,203	64.42	2,370	137,106
Mill Sk. No. 2.....			32,682	1,018,960	31.17	8,234	301,774
Mill Sk. No. 3.....			69,097	912,691	13.21	6,838	131,206
Totals.	2,910	\$1,377,444	111,175	3,059,084	27.52	24,176	1,102,206