

IRON ORE DEPOSITS, BATHURST MINES, NEW BRUNSWICK*

By G. A. Young.

The iron ore deposits of Bathurst Mines occur in three main bodies or groups of bodies, the longer axes of which, at the surface run about north and south. These deposits occur within a limited area on the northern bank of Nipisiguit river and in the vicinity of Austin brook a south-easterly flowing tributary of the main river. One of the groups of iron ore bodies known as No. 2 deposit, outcrops on the northeast side of Austin brook valley and extends northward for at least 1,200 feet (360 m.). Another ore body, known as No. 1 deposit, outcrops on the southwest side of Austin brook valley about 900 feet (275 m.) west of No. 2 deposit and extends southerly for several thousand feet. The third group of ore bodies known as No. 3 deposit, lies nearly due north of No. 1 body at a distance of about 800 yards (730 m.).

In the immediate neighborhood of the ore bodies all the rocks are of igneous origin and belong to three main types, namely, quartz-free porphyry, quartz porphyry and diabase. The rocks in the district are largely covered by drift and therefore the relationship existing between the different rock varieties has not been established, but it is assumed that the quartz-free porphyry and the quartz porphyry are closely related in origin and age, and that the diabase occurs in dike or sill-like bodies cutting the porphyries.

The quartz-free porphyry outcrops in the eastern and southwestern portion of the area; the quartz porphyry forms the central portion of the area; and the diabase occurs in the western portion. No. 2 deposit lies within and just along the boundary between the area of quartz-free porphyry on the east and the central zone of quartz porphyry; No. 1 and No. 3 deposits occur along the western margin of the zone of quartz porphyry near the area occupied jointly by diabase and quartz-free porphyry.

The ore has generally a prominent slaty cleavage, is fine grained, and is composed largely of finely granular magnetite with a variable amount of hematite. Slight variations in grain are visible along regularly alternating bands. The banding varies in degree from microscopic to very broadly developed, being indicated where coarse by the occurrence of various impurities distributed along bands. The ore has a general black colour, tinged greyish from the presence of minute grains of quartz and feldspar which in some bands are finely and uniformly disseminated, while in other cases they occur in lines, narrow streaks and lenticular areas. Considerable pyrite is present and tends to occur in large and small, elongated, lenticular aggregates. Quartz is relatively abundant occurring in veins and stringers. A large number of analyses indicate that the iron content of the ore ranges from 39.6 per cent. to 58.7 per cent.; sulphur from 0.009 per cent. to 0.27 per cent.; and, phosphorus from 0.385 per cent. to 1.222 per cent.

Examined in thin sections under the microscope, the ore is seen to be composed of minute, rapidly alternating bands of nearly pure iron ore, or of iron ore with considerable finely granular quartz and feldspar; and other bands of nearly pure quartz, with varying proportions of feldspar, iron ore, etc.

In the case of No. 2 body, a portion of its southern end, and of the east and west walls is visible. The

greatest width of the body where stripped, is a little over 40 feet (12 m.). The containing walls are sharply defined, and the body appears to dip to the west at angles varying between 60° and 80°. The ore is banded and some quartz is present in comparatively large, irregular veins. Little or no pyrite is to be seen except immediately along the walls.

On the hanging wall side, at a distance of about 150 feet (45 m.) from the ore, ordinary schistose quartz porphyry crowded with phenocrysts of quartz and feldspar is visible. At exposures intermediate between this and the ore body, the rock gradually assumes a more schistose habit. On the foot-wall side an analogous set of phenomena is visible, but the rock there appears to be a quartz-free porphyry.

The southern termination of the ore body has been laid bare. The mass of ore ends in a number of angular, finger-like projections extending a few feet into the country rock and associated with considerable quartz.

In the case of No. 1 deposit, the foot-wall is exposed for a short distance. The rock, probably a much altered, schistose quartz porphyry, is very heavily charged with pyrite. It has a pronounced schistose parting along which occur seams and veins of quartz. The boundary of the ore body is remarkably sharp. The ore seems to end abruptly along the plane corresponding to that of the slaty parting and banding in the ore and of the schistose parting in the wall rocks.

The ore bodies have the form of abruptly terminating beds or bands, with, in each case, a fairly constant thickness. The walls where seen, are always sharply defined and dip westward at angles varying from 45° to nearly 90°. In the case of No. 1 deposit the ore body at its outcrop at the northern end has a thickness of 105 ft. (32 m.). In a drill hole which intersected the body at a vertical depth of 410 feet (125 m.), the ore body had a thickness of 65 feet (19.8 m.). As indicated by the results obtained from a magnetometric survey, the ore body has a length of about 2,000 feet (610 m.).

It is believed, for the following reasons, that the ore bodies have formed through the partial replacement of schistose quartz porphyry by iron ore, along sharply defined zones.

The prominent banding of the ore, sometimes on a coarse scale, sometimes microscopic in its fineness, is, when seen in thin sections under the microscope, very regular, and gives the impression of being an original structure, not a secondary one imparted in some way to the ore after its formation.

The parallelism of the banding of the ore (seemingly an original structure) and its attendant slaty cleavage, with the walls of the ore bodies and with the planes of schistosity in the neighboring rocks, forcibly suggests that the ore has replaced a schistose rock, and has partly preserved the original schistose structure.

The finely granular quartz present throughout the ore, as well as the less abundant granular feldspar, may readily be regarded as representing original constituents of the replaced, schistose rock, possibly sheared quartz porphyry. That the original rock was schistose is supported by the fact that in all cases where observa-

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