

and the exploration was concentrated upon the Townships of Falconbridge and MacLennan where the contact was largely concealed by glacial covering, but where, so far as known, the norite had the same mineralogical characteristics at the immediate base as the norite found during the course of the other explorations. In addition to the drilling, and while it was in progress, studies of many portions of the norite contact were made in the field wherever it was exposed to view.

As a result of this work and of a consideration of all the large field relationships as shown on the maps of the Sudbury District, the following general condition had been becoming apparent: The quantity of sulphides which may be expected to occur at the contact of the nickel-bearing intrusive is roughly proportional to the volume of the adjacent norite. The surface expanse of the nickel-bearing intrusive and its thickness as shown by the dip at the contact both go to show what the volume of the tributary nickel-bearing intrusive may be.

The one great expanse of nickel-bearing intrusive in the district which, so far as known, did not have a commensurate body of sulphides accompanying it, lay in the eastern part of the district in the Township of Falconbridge. The nickel-bearing intrusive in this vicinity has a much greater width than in the Townships of Wisner, Bowell and Levack on the north, or Trill on the west. The norite has a great width in the Townships of Denison and Blezard, but the accompanying orebodies had already been discovered; i.e., Crean Hill mine and Blezard mine. Hence, it was decided to concentrate on the contact in the Township of Falconbridge, even though it was covered by 150 to 200 ft. of gravel and boulders.

In this connection, it may be noted that in regions where the offsets are highly mineralized, the adjacent basic margin does not yield orebodies, i.e., in the region of the Worthington and Mond mines, the marginal contact of the main intrusive is quite generally exposed and no orebodies have been found along it. In the region of the Frood mine, which is found on an offset, the margin proper does not yield orebodies, indicating that the metallic content which was a portion of the magma in these vicinities, when found in one place does not occur in quantity in another portion of the "horizontal cross-section" or plan now exposed by the erosion surface. This relationship is, of course, rough, discernible only in broad outlines, but is sound evidence for the conduct of exploration, safer than speculation arising from more detailed features of any one hand specimen or any one orebody. General evidence of this kind is more likely to be a safe guide for the projection of work in unknown areas, since the reasoning proceeds from the nature of the intrusive process as a whole, not from any one phase which may be dominated by local conditions.

While the discovery of ore in Falconbridge Township as a result of assuming a relation between the volume of norite and the volume of sulphides may be only a coincidence, nevertheless, the outcome is a strong indication that some such close relationship actually does exist.

Another factor which has been emphasized by this exploration is the intimate association of the ore with the norite. In Falconbridge Township, it usually occurs at the immediate contact, the hanging-wall being entirely norite and the footwall entirely quartzite. Where the ore is actually within the quartzite (or

greenstone) it is never more than 20 or 25 ft from the base of the norite. Moreover, the drill core often shows that the gangue within the ore is norite, while the rock above and below may be quartzite or greenstone.

This is well illustrated in Hole 308, a cross-section of which is shown. Below the main body of ore, the drill passed through 161½ ft. of barren quartzite only to enter again a 2½ ft. stringer of rich ore containing small included particles of norite. The association of the norite with this last shoot of ore is extremely suggestive, and points strongly to the fact that they both came from the same source and were closely contemporaneous.

Summary.

By way of summary, a possible succession of events which produced the Sudbury ores is outlined below:

A laccolithic mass of molten rock was intruded along a plane of unconformity beneath the Animikie sediments. Through some process of differentiation, the nature of which is uncertain, this mass separated and consolidated into two distinct but intergrading types, micropegmatite and norite. The sulphides were carried downward with the norite. As the norite consolidated, these sulphides remained in solution and were concentrated in association with an acid component of the magma. This segregation or "extract" made its way to the base of the norite under the influence of complex chemical and physical forces. At the very last stage in the consolidation of the norite, the sulphides were precipitated from the "extract" along the contact, and at the same time, the acid component solidified into granite. The presence of water, sulphur, and possibly other mineralizers in the magma, gave this extract somewhat the character of a solution, enabling it to replace the wall rock to some extent. But it was still so intimately related to the magma that it was unable to carry the sulphides any great distance into the foot-wall, unless also accompanied by the molten norite.

With this point of view, it is merely a question of emphasis whether these ores are considered to be of magmatic or hydrothermal origin. The point we have tried to make clear is that the dominant factor controlling the deposition of the Sudbury ores is magmatic segregation in situ. Hot solutions may have been active, but only served to influence the local character and position of the ores.

THE ROSS ENGINEERING COMPANY.

The Ross Engineering Company, makers of Ross box pumps for sands and slimes, automatic drop-bar grizzly feeders and ore screening equipment and automatic dump ore car system, have opened an office at 908 Eastern Townships Bank Bldg., Montreal.

Mr. Wm. Ross, general manager of the company, is well known in many mining districts. He is a graduate of the Aberdeen Technical College, Aberdeen, Scotland. After graduating he went with Messrs. Babcock & Wilcox, Limited, where he remained for a year. He was also for a year with Messrs. Box Hall Iron Works, London, England. During the next four years he was in South Africa as chief designer of the City Deep Gold Mines, Johannesburg. From there he came to Canada five years ago. During his first year here he was mechanical engineer of mines for the Canadian Copper Co., Copper Cliff. For the next three years he was mechanical engineer for the Dome Mines, South Porcupine, and during the last year he was chief engineer for Messrs. Fraser & Chalmers.