to the one analysed. Robertson stated that the hydromagnesite forms hummocks in a low, swampy depression, "which are constantly rising higher and higher and now form mounds 5 to 8 feet above the swamp level." He concluded that carbonated swamp waters obtained magnesium carbonate from underlying soft magnesium rock and that the process of deposition was such as to cause the material to "grow up" from below.

Young points out that there is no evidence of magnesium bedrock directly underlying the Atlin deposits, that there may be 200 feet of unconsolidated drift between them and bedrock. He believes the earths were deposited in ponds by concentration due to evaporation, by the loss of carbon dioxide, or through some other cause. He combats the spring hypothesis vigorously, although stating that the ponds presumably receive their water by underground ways.

The writer believes that in Atlin as in the Cariboo-Clinton areas, the hydromagnesites were carried to their present sites in solution by underground waters and were not transported either mechanically or in solution by waters flowing over the surface. Precipitation occurred in ponds or on dry land according to the surface conditions existing at the place of emergence of the waters.

COMMERCIAL EXPLOITATION.

No attempt has yet been made to develop these deposits of the Cariboo-Clinton areas. The information upon tonnage given below is based for the most part on the examination of borings made with an auger by the writer in 1919. The outlines of the areas in practically all cases were measured with a steel tape. K. A. Clark of the Mines Branch determined the apparent specific gravity of the material in its natural state as 1·22. This makes the weight of a cubic yard of the hydromagnesite as it lies in the ground, including voids, 2,050 pounds. This factor was employed in calculating tonnage instead of the true specific gravity of hydromagnesite. The results of the borings made in 1919 necessitate a revision of the tonnage as estimated in 1918.[1] The final estimates of the amounts of hydromagnesite of possible commercial value are: at Clinton, 3,000 tons; Meadow lake, 114,000 tons; Watson lake, 23,000 tons; Riske creek, 13,500 tons. These estimates apply only to the upper white layer of hydromagnesite which in all cases is low in lime but varies considerably in the percentage of siliceous impurities (Table II). Austrian magnesites with total impurities ranging from 5 to about 12 per cent have been extensively used in the dead-burned form for refractory purposes and, lately, Quebec deposits high in lime have been used after treatment for the same purpose, so that it is difficult to set limits to the percentage of impurities that would condemn a hydromagnesite for commercial purposes. It is believed that the white hydromagnesite layer, and in places the top of the granulated, will prove to be of commercial value. All of the deposits are soft enough to be excavated by steam shovel, although it may be difficult to do so without including the lower more impure layers.

The Clinton and Watson Lake deposits lie from 1 to 2 miles from the railway, Meadow lake is 16 miles distant by road over easy grades, and Riske creek 35 miles over very steep grades. Clinton, Watson, and

[1]Reinecke, L., "Undeveloped mineral resources of the Clinton district," Trans. Can. Min. Inst., vol. XXII 1919, and Bull., Can. Min. Inst., Sept., 1919, p. 942.