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Apatite, magnetite-ilmenite mineralization hosted in gabbro intrusive body, implication to East Africa zone

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The Bikilal layered gabbro-complex is composed of zones/layers of olivine/ pyroxene gabbro and hornblende gabbro. Within the hornblende gabbro, repeated lens-like thin and elongated bodies of hornblendite are found intimately associated with massive and disseminated ilmenite-magnetite bodies, in places with apatite. Petrological examination of the hornblende gabbro shows 50-55% hornblende, 40-45% plagioclase, 5-7% opaque minerals/ilmenite + magnetite/, and 5-15% apatite and that of hornblendite shows 75% hornblende, 10-15% apatite, 10-15% ilmenite and rare sulphides, and traces of Uranium. Regardless of the type of lithological units, two main zones of phosphate mineralization, the upper and lower zones, were identified and delineated entirely based on phosphate (P_2O_5) assay values of chip, channel and, core samples.

The strike length of the upper zone is 1600 m. There are two main layers of phosphate mineralization in the upper zone; the average thickness of each layer is 30 m and 40 m respectively. The strike length of the lower zone is 3000 m having a thickness of 60 m-200 m. The mineable reserve of Soji-Bikilal phosphate deposit is estimated to be 181 million tons, at a grade of 3.5% P_2O_5 . Preliminary beneficiation trial reveals commercial grade concentrate, at which the overall weight recovery, is in the range of 3-5%. Similar Gabbro intrusions occur in Western Ethiopia and in East Africa which should be assessed for phosphate potential to develop the fertilizer potential of the East Africa Region. The most abundant phosphate deposits in East and Southeast Africa region are related to igneous rocks. These deposits can be broadly divided into four categories. Carbonatite-related deposits are the most important category but apatite may also be found in association with basic intrusions, syenitic intrusions, and pegmatite bodies.

As a part of the Bikilal layered gabbro-complex (Western Ethiopia), the Soji-Bikilal apatite-bearing zones in the hornblende gabbro and hornblendite are considered to be promising as igneous phosphate resources. A project was initiated to locate and assess local phosphate resources in Ethiopia.

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