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# The Chromite Deposits of the Bacuri Mafic- Ultramafic Layered Complex, Guyana Shield, Amapa State, Brazil

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## Abstract

The chromite deposits of the Bacuri mafic-ultramafic layered complex consist of 8.8 Mt of ore grading 34 percent $Cr_2O_3$ and represent the second largest reserves of chromite in Brazil. The complex is a major strati- form complex overprinted by ductile deformation and associated regional amphibolite-facies metamorphism of the Transamazonian cycle (about 2.0 Ga), intrusive into gneiss-migmatite terranes of the Guyana Shield.

The Bacuri mafic-ultramafic complex consists of a lower mafic zone (>500 m thick), an ultramafic zone (30-120 m thick) and an upper mafic zone (>300 m thick). The chromitite layers are restricted to the ultra- mafic zone. This zone consists of interlayered serpentinite (olivine cumulate) and chromitite (chromite cumu- late). Most of the chromite is concentrated in a thick chromitite layer, known as the main chromitite, located at the base of the ultramafic zone in direct contact with the underlying lower mafic zone. The thickness of the main chromitite is highly variable owing to deformation and ranges from 3 to 30 m (average of 12 m). Several thinner layers of massive chromitite are located above the main chromitite within the ultramafic zone.

Chromitites are generally massive and contain more than 60 vol percent of cumulus chromite. The chromite is mainly euhedral and fine-grained, ranging from 0.1 to 3 mm in diameter. The matrix of massive chromitite consists mainly of metamorphic silicates (serpentine, chlorite, and tremolite), except for the B1 orebody where large igneous orthopyroxene oikocrysts are preserved. Chromite grains in massive chromitite have a homoge- neous core and an alteration rim. Microprobe traverses through chromite grains of massive chromitite indicate that the alteration rim is enriched in Cr and $Fe^{2+}$ and depleted in Al and Mg.

The composition of chromite from massive chromitite changes significantly with stratigraphic height. The consistent stratigraphic variation is well indicated by progressive upward decrease in the $Mg/(Mg + Fe^{2+})$ ratio as well as the progressive upward increase in the Cr/(Cr + Al) ratio, the $Fe^{3+}/(Fe^{3+} + Al + Cr)$ ratio, and $TiO_2$ content. The significant $TiO_2$ and $Fe^{3+}$ enrichments in chromite of the uppermost massive chromitites are typ- ical of stratiform chromite deposits such as the Bush veld Complex. Olivine shows an equivalent trend of com- positional variation characterized by an upward decrease in Fo and Ni content. The cryptic variation of chromite and olivine indicates extensive fractionation within the ultramafic zone. Reversals in the Fo content of olivine and in both $Mg/(Mg + Fe^{2+})$ ratio and $TiO_2$ content of chromite suggest that successive replenish- ments of the magma chamber with more primitive magma occurred during the formation of the ultramafic zone.