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Mineralogy and Critical Metal Department of Fe-Ni-Co Laterite Ores from Sebuk Island, SE Kalimantan, Indonesia

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Laterite deposits in Indonesia are a major source of Ni and Co. Here, we present new geological data on the Sebuk laterite deposit (Island of Sebuk, SE Kalimantan, Indonesia), with a JORC-compliant resource of ~390 Mt at 42.5 wt.% Fe, 0.9 wt.% Ni, and 0.15 wt.% Co. The laterites are mostly limonitic, oxide-dominated Fe-Ni-Co(\pm Sc)-rich horizons, which formed by weathering of Jurassic-Cretaceous ophiolitic units. Although the deposit is under production since 2006 (primarily for Fe), there is little mineralogical and geochemical data available, which would allow optimizing beneficiation and recovery of Ni, Co, and Sc.

Typical laterite profiles at Sebuk consist of 1) weathered bedrock composed of serpentinized dunites and harzburgites overlain by 2) a 0.2- to 7-m-thick saprolite zone, 3) a 2- to 8.5-m-thick yellow limonite zone, and 4) a 1- to 3.5-m-thick red-limonite zone.

Preliminary X-ray fluorescence (XRF), X-ray diffraction (XRD), and mineral liberation analysis (MLA) data show a decrease in Mg and Si and an increase in Fe moving upwards through the laterite profile, corresponding to a transition from silicate- to oxide-rich mineralogy. Oxides and (oxy)-hydroxides comprise goethite, maghemite, hematite, magnetite, chromium spinel, gibbsite/bayerite, and various Mn-minerals, whereas silicates consist of serpentine, chlorite, talc, quartz, pyroxene, olivine, clay minerals, and “garnierite”-like minerals. Ni is hosted by various minerals, which include goethite, Mn-oxides, serpentine, and garnierite, whereas Co is mainly hosted by Mn-oxides and garnierite. It is still unclear in which minerals Sc is primarily hosted.

Mineral chemical analyses (EPMA) are planned to further understand critical metal variability and distribution within the host minerals and throughout the deposits. The first results will be presented here. Our ultimate goal is to characterize and quantify the distribution of Ni, Co, and Sc in order to develop more efficient beneficiation processes.