

Petrology and geochemistry of scandium in New Caledonian Ni-Co laterites

Y. TEITLER^{1*}, M. CATHELINEAU¹, M. ULRICH², J.P. AMBROS³, M. MUNOZ⁴

¹Laboratoire GéoRessources, rue Jacques Callot, BP 70239, 54506 Vandoeuvre-lès-Nancy Cedex, France

²EOST, 1 rue Blessig, 67084 Strasbourg Cedex, France

³CEREGE, Technopôle de l'Arbois-Méditerranée, BP80, 13545 Aix en Provence cedex 4

⁴Géosciences Montpellier, place Eugène Bataillon, 34095 Montpellier cedex 05, France

*yoram.teitler@univ-lorraine.fr

The growing demand for scandium (Sc), essential for several modern industrial applications, thrives the mining industry to develop alternative Sc sources. In such context, significant Sc concentrations (~100 ppm) were recently reported in several Ni-Co lateritic oxide ores developed after mafic-ultramafic rocks. This contribution examines the distribution of Sc and other critical metals in Ni-Co laterites from New Caledonia, the fifth largest Ni producer worldwide. Representative lateritic profiles were selected based on the protolith type and include dunite, harzburgite and lherzolite protoliths, wherein the Sc content, determined by the relative proportion of olivine and pyroxene, ranges from <5 ppm in dunite to >10 ppm in lherzolite.

In Ni-Co laterites, dissolution and leaching of primary Mg-rich silicates leads to the residual enrichment of iron as ferric oxides/oxyhydroxides in the upper horizons. Downward remobilisation and trapping of Ni and Co lead to their local enrichment to economic concentrations, with maximum grades reached in the coarse saprolite and in the transition laterite, respectively. In contrast, maximum Sc enrichment occurs in the yellow laterite, where Sc-bearing goethite reaches about ten times the Sc content of the parent rock. Consequently, harzburgite- and lherzolite-derived yellow laterites yield maximum Sc concentrations up to 100 ppm, together with moderate Ni and Co concentrations. There, Sc is a potentially valuable by-product that could be successfully co-extracted during hydrometallurgical processing.

In addition to peridotite-hosted laterites, hornblende-rich amphibolites yield elevated Sc up to 130 ppm. Lateritisation of amphibolites leads to the formation of a mixture of Al-goethite, gibbsite and kaolinite with Sc concentrations >200 ppm. There, Al-goethite is the main Sc carrier with up to 700 ppm Sc. Therefore, despite their relatively limited volumes, amphibolitic laterites may also represent attractive targets for Sc in New Caledonia.