

KABANGA NICKEL – THE ROLE OF HYDROMETALLURGY IN UNLOCKING A WORLD-CLASS ASSET FOR LOW-EMISSIONS GREEN METALS PRODUCTION

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ABSTRACT

There is a compelling outlook for nickel demand and responsibly sourced "green metals". Kabanga Nickel is one of the world's largest and highest-grade undeveloped nickel sulphide deposits that for years has remained undeveloped under a conventional concentrate offtake strategy with smelters. Lifezone through its Tanzanian Joint Venture company Tembo Nickel is now developing the Kabanga Nickel project under a new strategy of in-country processing of concentrate to refined Class 1 nickel, cobalt and copper metals using its hydrometallurgy technology suite. Kabanga Nickel also enjoys Government of Tanzania support as 16% shareholder in Tembo Nickel. Vertical integration provides the ability for the country to capture full benefit of its sovereign natural resources. The overall strategy has been further endorsed by leading strategic partner BHP whose investment in Lifezone and Kabanga Nickel validates the economics and enhances project execution.

A substantial body of work was completed previously on the Kabanga Nickel project, with \$293 million spent by prior owners on drilling and feasibility studies, including six flotation pilot plant runs and almost 600 km of drilling. Kabanga Nickel has augmented this by undertaking additional drilling and metallurgical testwork, as well as substantive work on the ground in Tanzania.

Kabanga concentrate shall be transported some 320 km by road to the refinery site at Kahama, utilising some of the pre-existing infrastructure and permitting of the Buzwagi gold mine, which ceased operations mid-2021 due to ore depletion and is currently undergoing rehabilitation. The hydrometallurgical flowsheet for Kabanga concentrate includes total pressure oxidation, recovery of copper by solvent extraction and electrowinning, iron removal, and recovery of nickel and cobalt into a mixed hydroxide precipitate for leaching and refining by solvent extraction and electrowinning. All residues are backhauled to the Kabanga minesite for use as underground pastefill. The binding properties of the gypsum allow for part replacement of cement as pastefill binder and the siliceous residue has also been activated by the leaching process. By this means, residue, tailings and slag stockpiles are eliminated at the Kahama refinery site. Moreover, the desulphurised residues allow for a greater proportion of tailings to be stored underground, reducing the size of the surface tailings storage facility.

The role of hydrometallurgy in unlocking this world-class asset spans several key layers within the project. Economics are enhanced, via high metals recoveries, low capital and operating costs, elimination of the carbon footprint of bulk shipping, near elimination of concentrate transportation costs and reduction in pastefill cement consumption. Environmental benefits include the elimination of sulphur dioxide emissions, by conversion of sulphides to gypsum binder for underground pastefill. Carbon emissions are substantially reduced compared to industry baseline as published by the Nickel Institute. Social and community benefits are significant, with the creation of a metals refining hub at Kahama, resulting in job and skills creation, training and education as well as secondary business opportunities.

Kahama refinery has the potential to become a multi-metals processing facility that could expand into refractory gold, nickel, cobalt, copper, platinum group metals and rare earths, from the broader region – effectively becoming a major East African metals refining hub.

Keywords: Nickel, cobalt, copper, hydrometallurgy, pressure oxidation, solvent extraction, electrowinning, Tanzania