

3D Distribution of Elements and Recycling of Tailings in Hongqiling Nickel Mine, Northeast China

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Introduction and Methods

As the second largest copper-nickel sulfide deposits in China, The Hongqiling nickel mine remains large amounts of ore tailings. The mineralogy, chemical composition, and distribution of elements in the impounded tailings are of great significance to the future utilization and reclamation of the tailings ponds. In total, 468 tailings samples from 29 drill cores were collected from the tailings pond. All samples were analyzed to determine their chemical composition, and an experimental research on beneficiation flowsheet for recovering nickel from tailings was conducted.

Discussion of Results

Based on the 3D model of the drill cores, the 3D distributions of selected major and trace elements shows Cu, Ni, Se, S and TFe₂O₃ are enriched in the dam area of the tailings pond, while SiO₂, Na₂O and MgO are enriched in the beach area (Fig.1). The results indicated that elements distribution may be mainly controlled by gravitational separation during the tailings discharge and deposit.

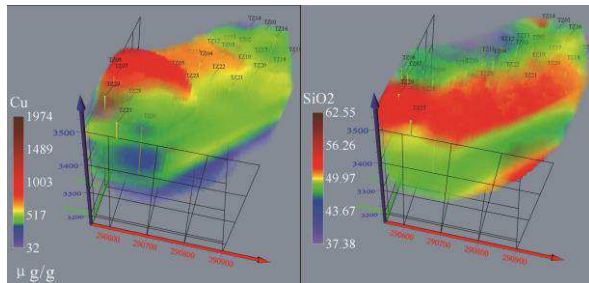


Figure 1: 3D distribution of Cu (left) and SiO₂ (right) in the tailings pond of Hongqiling nickel mine.

According to the preliminary result of mineral beneficiation test, the flotation - (sulfuric) acid Leaching flowsheet works best, a nickel concentrate of 3.16% Ni was obtained with the recovery of 82.61% from the feed of 0.28% Ni. Roughly, the recoverable amount of Ni in the tailings pond is estimated at 47,144 tons.