

Evaluation of the presence and spatial distribution of critical raw materials in Los Buitres and San José tailing impoundments, Punta del Cobre district, Atacama, Chile.

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El Buitre and San José are two different tailings impoundments operated by Pucobre since 1997 and are located 20 km south from Copiapó, Atacama Region, Chile.

Although the extraction of Cu from El Buitre and San José could be economically feasible, there is not much information about the presence of other critical raw materials and the minerals hosting them. In addition, a detail mineralogical and chemical 3D distribution of the tailing impoundment is also missing. Therefore, the present research was designed to: 1) elucidate the presence of raw critical materials (apart from Cu) and 2) study the spatial distribution of the elements and minerals in the impoundment.

To achieve these goals, 22 and 16 boreholes with depths around 25 m each were drilled in the Los Buitres and San José tailing impoundments, respectively. A more detailed surficial sampling was performed using a manual auger, drilling eight 4 m deep boreholes in each deposit. The samples were mineralogically characterized using petrographic microscope, XRD, SEM and QEMSCAN analyses. For geochemical studies, samples were analysed by XRF and LIBS techniques. Also, an aqua regia digestion of the samples was made to determine major and trace elements by ICP-MS and ICP-OES.

At the moment, with the available XRF data, elements like Al, Si, P, S, K, Ca, Ti, Mn, Fe, Cu, Zn, As, Rb, Sr, Y and Zr have been identified at different depths.