PROPOSING A LIQUEFACTION TRIGGERING CRITERION FOR LEACHED ORE

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ABSTRACT

The state of the practice in heap leach pads generally assess liquefaction potential assuming a steady-state seepage regime or an overly conservative hydrostatic water table from top to bottom, yet ore heaps are subjected to a chaotical hydrodynamic seepage regime which previously requires deep interpretation of: the small-and large- strain in-situ behavioral characteristics of the leached ore —e.g. shear-wave velocity (V_S), state parameter (ψ), normalized tip resistance (Q_{tn}) and the like—; the saturated and unsaturated hydraulic conductivity values —e.g. soil-water retention curve (SWCC), compressibility (m_v) and horizontal hydraulic conductivity (K_H)—; and the pore pressures in equilibrium (u_o) along the entire heap profile, to identify which layers would be effectively prone to liquefaction. This paper proposes a decoupled cross-related criterion for liquefaction triggering of leached ore, based on the soil behavior type index (I_C), state parameter (ψ), and the cyclic stress ratio (CSR), as a first-screening tool for identification of liquefaction-prone leached ore layers. This criterion attempts to cross correlate the in-situ state, the minimum saturated hydraulic conductivity to induce layer saturation, and the cyclic stress ratio profile for a fixed pair of moment magnitude (Mw) and peak ground acceleration, all into a simplified decoupled approach, and thereby comply them all together the minimum conditions for liquefaction triggering of leached ore.

Keywords: Soil liquefaction, Leached ore, SCPTu.

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