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RENEWED EXPERIMENTAL HYDRAULIC FRACTURING TECHNIQUE FOR HARD ROCK IN-SITU RECOVERY ENHANCEMENT

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ABSTRACT

Even though the economic feasibility to continue large scale conventional mining operations is still well in place, there has been decades of time during which the mining industry has not observed revolutionary technical advancements. Given the current world economical situations, it can be foreseen that the industry will be reaching a turning point where it must refer to techniques equivalent in production while featuring smaller environmental impacts and lower costs. In-situ recovery (ISR) as a candidate for such resolution, offers an alternative for conventional mining that features a smaller footprint. The production of ISR is dependent on permeability, which can be resolved by artificial stimulation (e.g., hydraulic fracturing, blasting).

Previously in experimental research on hydraulic fracturing hard rock, the suitability of a deposit for ISR has been discussed, yet conclusions regarding injection flow rate, injection borehole size, and rock mechanical properties' influence when stress is high, remains to be determined. In this work, based on previous experimental research of hydraulic fracturing on hard rocks, further sensitivity analysis of the governing fracturing factors will be reviewed and presented. Similar to previous study, the hydraulically induced fracture geometry, strain data, injection pressure curve and X-ray computed tomography will be compared according to the conditions applied. As a direct output from hydraulic fracturing stimulation, analysis regarding fracture and lixiviant's mineral extraction interaction will also be included. With addition to already extensive number of experiments combining increased range of applied conditions, and experimental data analysis will yield a subjective point of view to evaluate hydraulic fracturing to stimulate ISR under realistic engineering background conditions.

Keywords: In-situ recovery; Hydraulic fracturing.