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COMPARATIVE CLOSURE: ASSESSING THE BIOPHYSICAL CLOSURE CHALLENGES OF DIFFERENT MINING METHODS

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ABSTRACT

Closure issues vary depending on the mining method, which creates different biophysical challenges on the surface and in underground mining operations. On the other hand, mining methods depend on the geology of the ore deposit. Usually the method is selected based on pre-feasibility studies and there is limited opportunity to change the mining method once implemented. If the ability to close the mine, re-use the landscape and contribute to the community are to become driving factors in selecting the mining method and mine operations, then they should also be considered early in the pre-feasibility study decision making.

What if the industry could rethink the way a mining method is decided? Can the biophysical legacy issue be included as a higher impact factor in the feasibility studies? Or should we rethink the way a mining method could work, such as, for example, to reduce the high amount of waste that is removed and treated? The moving and processing of rock to extract a small percentage of valuable metal represents more than 90% of the energy and 80% of the total production costs in mining. Current mining methods can be environmentally disruptive due to the required footprint for processing and storing the waste material. Large-scale gangue movement and treatment drives operating costs and sets higher cut-off grades, which requires the mining methods to produce at an economy of scale.

Novel mining methods have been proposed to address these operational costs. Such approaches include zero-entry, invisible mining that leaves waste in place and reduces ore movement. Because these methods require the use of alternative technologies, such as robotics, leaching and cutting, they introduce a different set of biophysical issues that may affect closure and post-mining land use. So is this tradeoff worth it? There is a need to quantify the biophysical impact of different mining methods. In this paper, we present a method of analysis based on a matrix approach, which allows for a comparative assessment of biophysical risk and opportunity across different mining methods.

Keywords: Biophysical impact, mining closure, mining method