

# THE NEED FOR TWO-DIMENSIONAL COUPLED SOIL-ATMOSPHERE NUMERICAL MODELING FOR MINE WASTE COVER SYSTEM DESIGN<sup>1</sup>

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**Abstract.** A significant percentage of the surface area associated with decommissioning and reclaiming mining wastes possesses sloping surface conditions. The design of engineered cover systems for the underlying waste has typically focused on a simplistic one-dimensional (1D) approach. However, the hydraulic performance of these cover systems are significantly influenced by the sloping surface conditions; and as such a more rigorous and defensible approach is required.

This paper will present cover system designs for different climate regimes (from arid to humid), and with different design objectives (oxygen ingress control, net percolation control, surface water management) using a simplistic 1D approach and a rigorous 2D approach. The design results will be summarized to demonstrate that depending on climate conditions a cover system design developed using a simplistic 1D approach can underestimate or overestimate performance as compared to the more representative and rigorous 2D approach.

Finally, a case study will be presented to demonstrate the need to move from a simplistic 1D approach to a more rigorous and defensible 2D coupled soil-atmosphere approach for predicting the long-term performance of a full-scale cover system for a sloping surface.

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