THE USE OF MINE-DEVELOPMENT MODELS TO SUPPORT MINE CLOSURE AND RECLAMATION PLANNING

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Abstract: Geochemical characterization and the development of compositional models for waste-rock and spent leach piles and tailing impoundments are an integral part of mine closure and reclamation planning. A compositional model is a three-dimensional graphical representation of a waste facility that shows the distribution of the different types of mined or milled materials comprising it. As part of closure plans, regulatory authorities typically require the characterization of potential sources of dissolved contaminants. Geologic resource and mineable reserve (mine-development or block) models may be used, in conjunction with mine development records, to create compositional models of waste-rock and leach piles and tailing impoundments. The procedure involves: (1) the collection and analysis of samples that represent the geochemical variability of the different rocks that occur in the mine that are also components of the mine waste; (2) classification and grouping of the different rock types based on their potential to release contaminants (e.g., ABA, leachable metals); and (3) evaluation of historical records concerning the volume and disposition of mined materials. This approach significantly reduces the efforts and costs associated with traditional characterization (e.g., drilling and sampling on grids) of the waste facilities. The block models of the mine and compositional models of the waste facilities may also be used to: (1) develop more effective rock handling plans; (2) support the creation of hydrogeochemical models used to predict long-term environmental impacts to groundwater and surface water; and (3) support evaluations of cost-effective closure and reclamation alternatives (e.g., cover designs and revegetation).

Addtional Key Words: geochemical characterization, mine closure plans, block models.

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