APPLICATION OF THE TERRESIM© MODEL FOR WATER-BALANCE ANALYSIS[1]

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Abstract: The U.S. EPA computer code HELP is commonly and widely used to predict and model infiltration into mine waste disposal areas. However, within the framework of long-term reclamation designs that seek to use vegetative cover components, HELP fails to recognize and account for plant dynamics over time. These dynamics strongly influence long-term environmental performance, including the sites water balance. The Terrestrial Ecosystem Simulation Model (TerreSIM©) is a mechanistic model developed as an innovative approach for analyzing infiltration through various cover systems, at any location. The model is a tool to project the effect of plant dynamics on a site water balance over time. The model has been used at various mine sites around the world to assess not only the short-term water balance, but also the long-term changes as a consequence of plant community evolution. Using on-the-ground data and site-specific examples, the limitations of HELP are highlighted relative to results from TerreSIM. TerreSIM can be extended to more accurately mimic the long-term infiltration characteristics of actively reclaimed mine waste disposal facilities. Further, TerreSIM is capable of modeling the infiltration characteristics of reclaimed mine waste surfaces seasonally as well as for time intervals spanning many years. This discerning capability is consistent with the regulatory demands of reclaimed facilities that must comply with time-averaged surface water discharge concentration requirements for constituents of concern. Relative to ground water impact simulations, TerreSIM's robust simulation of infiltration provides an increased level of accuracy with respect to potential ground water discharges and associated impacts on water quality. This paper will present an overview the TerreSIM model and will use specific data from a series of reclaimed mine waste facilities to illustrate the heightened utility available when considering and accounting for a dynamic vegetative reclamation strategy.

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