Analysis and Design of Evapotranspirative Cover for Hazardous Waste Landfill

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Abstract: A site-specific unsaturated flow investigation was undertaken for the design of an evapotranspirative (ET) cover system at the Operating Industries, Inc. (OII) Superfund landfill in southern California. This cover system constitutes the first ET cover approved by the US Environmental Protection Agency for construction at a Superfund site. Percolation control in an ET cover system relies on the storage of moisture within the cover soils during the rainy season and on the subsequent release of the stored moisture by evapotranspiration during the dry season. The site-specific sensitivity evaluation shows that percolation response to design parameters such as rooting depth, cover thickness, and saturated hydraulic conductivity is highly nonlinear. This facilitated selection of the design parameters in the final cover. The analyses also provide insight into the effect of irrigation, increased natural precipitation, and initial moisture content of the cover soils. Unsaturated flow analyses performed for closure design at the OII site show that an ET cover is feasible for a wide range of conditions. Equivalence demonstration procedures using site-specific weather conditions and soil-specific hydraulic properties were developed to evaluate compliance of the proposed alternative cover with the prescriptive system. A laboratory testing program, implemented to determine the hydraulic characteristics of candidate borrow soils, indicated that placement conditions do not affect significantly the moisture retention properties of the compacted soils.