Evolution of the Hydraulic Conductivity of Reclamation Covers over Sodic/Saline Mining Overburden

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Abstract: The evolution of the field saturated hydraulic conductivity of four covers located on a reclaimed saline-sodic shale overburden from oil sands mining is presented. Three covers consisted of a surface layer of peat/glacial topsoil over a mineral, soil, and one cover was a single layer of mixed peat and mineral soil. Measurements of the field saturated hydraulic conductivity of the cover and shale materials were made with a Guelph permeameter between 2000 and 2004. The hydraulic conductivity of the cover materials in the multilayered covers increased by one to two orders of magnitude over the first few monitoring seasons. The hydraulic conductivity of the single-layer cover system, which was placed three years before the multilayered covers, marginally increased from 2000 to 2002 and then remained relatively unchanged. The hydraulic conductivity of the shale underlying all four covers increased approximately one order of magnitude. Soil temperature measurements indicated that one freeze/thaw cycle occurred each year within all cover soils and the surficial overburden. This suggests that freeze/thaw effects were the cause of the observed increases in hydraulic conductivity, as previously observed by other researchers working on compacted clays. DOI: 10.1061/(ASCE)GT.1943-5606.0000523. © 2011 American Society of Civil Engineers.

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