

2005 Project Study for the Development of Generic Site Assessment Criteria for Salinity Below the Root Zone – Salt Transport Sensitivity Analysis

Anthony Knafla, Equilibrium Environmental Inc.
GL901551

This report details the methodology and results of a sensitivity analysis conducted by Equilibrium Environmental Inc. (Equilibrium) in support of the salt transport modeling portion of the Petroleum Technology Alliance Canada (PTAC) "Project Study for the Development of Generic Site Assessment Criteria for Salinity below the Root Zone". Saline water can be released to the environment as a result of oil and gas production activities and operation of road salt storage facilities. The infiltration of saline water into soil may have negative effects on plant growth, shallow groundwater quality, and soil hydraulic conductivity. Alberta Environment's site assessment criteria for soil salinity currently exist for the 0

to 1.5 m soil depth interval (topsoil and shallow subsoil). This depth interval is commonly referred to as the root zone. The PTAC project study was conceived with the ultimate goal of deriving generic site assessment criteria for salinity at depths below the root zone.

In order to reach this goal, a sensitivity analysis was conducted to better understand factors that influence salt transport in soil within and below the root zone. Those factors that are the most influential for determining salt transport will also be key determinants in the development of deep subsoil criteria. Salt transport modeling within the vadose (unsaturated) zone and shallow saturated zone was performed using public-domain computer software specifically designed for this purpose (e.g., HYDRUS and LEACHM).

Eleven model input factors were identified that were considered relevant to salt transport and water balance in shallow soil. Model input factors were varied between high and low boundary values. These boundary values are considered representative of typical conditions for Alberta. Values that would occur outside of these ranges can be evaluated as special cases during the generic criteria matrix development process. The high and low boundary value was alternately varied based on the run design discussed in the Methodology section of the Main Report.

2003 ERAC_Models to Predict Salt Impacts

2005 EQM_SALINITY BELOW THE ROOT ZONE Sensitivity
Analysis Report