Managing thermal mobilization effects in the oil sands areas of Alberta

Steve Wallace & Susan Satterthwaite
Alberta Environment and Parks, Edmonton, Alberta, Canada
Brent Welsh
Alberta Energy Regulator, Edmonton, Alberta, Canada

ABSTRACT
Alberta's oil sands deposits are one of the largest reserves of hydrocarbons in the world. The majority of these reserves are located in northern and east-central Alberta. The bulk of these reserves are too deep to be accessible from surface mining and therefore are extracted using thermal in-situ practices such as steam-assisted gravity drainage (SAGD) and cycle steam stimulation (CSS). During these production processes, high temperature steam is injected into the reserves to reduce viscosity and facilitate production. In areas where there is a high density of thermal in-situ wellbores, some heat is lost to the overburden through conductive heating. Due to the elevated groundwater temperatures created by the heat transferred from thermal wellbores, a number of inorganic and organic constituents from the surrounding sediments have the ability to dissolve into the surrounding aquifers. In addition to impacting the surrounding aquifers, these mobilized constituents have the potential to migrate downgradient of thermal operations to adjacent aquifers and/or sensitive receptors. Thermal mobilization of these constituents has been observed and documented at some of the existing operations. To address this, Alberta regulators have put into place a unique risk-based management approach for assessing effects to groundwater pathways and receptors with potential to be impacted by the conductive heat loss created by the these extraction processes. Phased monitoring coupled with modelling within management areas will be used to assess the effects and the attenuation of elevated inorganic and organic concentrations to manage risk at the local level.