

# **Hydrochemical Characterization of Produced Formation Water, and Shallow Aquifers at the Kenmore and Bodalla South Oil Fields, Queensland, Australia**

Secombe, Katherine, Mansour Edraki, Thomas Baumgart, and David Mulligan, The University of Queensland, Brisbane, Australia

In a few petroleum and coal seam gas fields of Australia, large volumes of saline produced formation waters which potentially contain inorganic salts, trace metals and organic compounds have been traditionally released into unlined impoundments, or evaporation ponds. A better understanding of the geochemical properties and the environmental impacts of these waters, as they interact with neighbouring soils and ground waters, is the key to the rehabilitation of the ponds and the surroundings. The aim of this study is to (1) accurately characterize the produced formation water and local ground waters at two study sites, Kenmore and Bodalla South oil fields in southwest Queensland, (2) delineate those geochemical properties that are helpful in investigating fate, transport and attenuation of the contaminants; and (3) investigate the extent of the contribution of produced water to the salinity of the lands surrounding the ponds.

Produced water at the outlet is warm (~60°C) alkaline with pH values ranging from 8.12 to 9.82 and salinities ranging up to 5000 mg/L TDS. The produced water at both sites is Na-HCO<sub>3</sub> type waters, whereas sampled waters from the monitoring wells are Na-Cl type. The pond waters do not appear to have caused the accumulation of salts, which is in accord with the local soils showing signs of dry land salinization exacerbated by land clearing. However, local seepage from the ponds was detected by some trace elements and hydrocarbons, supported by geochemical modelling and oxygen isotopes. The seepage in fact remobilises the natural salts already present in the soil.