

## **Placing the Risk of Thermal Mobilization into Perspective**

**Jon W. Fennell<sup>1</sup>**

<sup>1</sup>Integrated Sustainability Consultants Ltd., Calgary, Alberta, Canada

### **Abstract**

The oil sands deposits of northern Alberta are significant in size and volume. Of the 170 billion barrels of currently recoverable oil, more than 95% is too deeply buried to economically recover it via surface mining techniques. As such, the industry has responded with in situ technologies such as SAGD (steam assisted gravity drainage) and CSS (cyclic steam stimulation) - both employing the injection of high temperature steam into the target formations via steel wells. In the late 1990s, it was discovered that heat from these production casings was being transferred to shallow aquifers and raising local groundwater temperatures to comparatively high values (greater than 40°C). Investigations at two separate projects confirmed the presence of anomalous groundwater quality conditions down gradient of operating production pads (i.e., elevated arsenic concentrations).