

## **The Mysteries of Cold Production**

### **Abstract**

Heavy oil producers in western Canada have practised cold production since the early 1980s. Improvements in exploitation methods and strategies have been field-driven from the outset. Field experience has demonstrated that the aggressive production of sand generally leads to significant increases in oil production rates. Cold production has become the recovery technology of choice for most heavy oil fields in the Lloydminster block.

Unlike most enhanced oil recovery (EOR) processes, cold production was practised successfully in the field before its behaviour in the reservoir was understood in any detail. Since 1991 the Alberta Research Council has been studying the fundamental mechanisms of cold production through an integrated program of laboratory experiments, theoretical developments, numerical simulations, and field studies. These reveal a complex interdependent web of mechanisms involving the failure and transport of sand, and the non-equilibrium behaviour of “foamy oil” – transient bubbles of evolved gas in the oil. These mechanisms combine to produce a growing network of high-permeability channels of failed sand (wormholes), whose dynamic nature in turn helps to support those mechanisms. Such an improbable, self-sustaining process could only have evolved in the field.

The prerequisite conditions, the small-scale mechanisms and the large-scale behaviour of cold production will be illustrated with examples from field studies and numerical simulations.

### **Biography**

Ron Sawatzky is a senior research scientist with the Alberta Research Council in Edmonton, with nearly 20 years of experience working in research and development for heavy oil recovery processes. For the past 16 years he has served as a team leader for the cold production research group at ARC.