Geology of the Gull Lake North ASP Tertiary Flood, Upper Shaunavon Formation, Southwest Saskatchewan

Sid Leggett[1]

The middle Jurassic Upper Shaunavon Formation in the Gull Lake area is composed of a series of up to six shallowing-upward sequences going from shale to shallow-marine carbonate and fine-grained sandstone. The Gull Lake North Pool consists of two different reservoirs: 1) a large tidal channel and 2) several small tidal bars stratigraphically above the channel. The channel is the main reservoir for the pool and is the primary target for the tertiary flood. Within the channel, sandstones have retained most of their primary porosity and are the best reservoir. Diagenesis of the carbonates within the reservoir has reduced most of the porosity to non-effective levels.

Migration of oil into the area is driven by a north-south trending hydrodynamic low that occurs along the west side of the reservoir. However gas associated with the oil moved structurally updip to the northeast leaving the reservoir with low GOR oil in the updip part of the channel and a sizeable water leg in the downdip part.

The Gull Lake Pool met several key criteria for an alkali/surfactant/polymer tertiary flooding – size, lack of a gas cap, very little clay, an intermediate API crude and a thick, high-quality reservoir with no apparent permeability barriers. The only negative aspect of the Gull Lake Pool is the presence of a water leg which will dilute any injected fluids that come in contact with it.

[1] Husky Energy Inc.

Sid Leggett is a development geologist who specializes in the optimization of existing fields and secondary and tertiary recovery. Most of his 30 years of industry experience in Western Canada have been spent working for several mid-sized and large exploration companies. Currently he is a senior staff geologist working for Husky Energy. In this capacity, he provides geological support in the management of Husky's extensive Shaunavon oil fields in southwest Saskatchewan. Sid has a M.Sc. in Geology from the University of Manitoba and a B.Sc. (Hons) degree from Brock University.