

Characterization of Mudstone Interbeds in McMurray SAGD Reservoirs, Athabasca Area, Northeast Alberta

Y. Greg Hu*

Petro-Canada Oil and Gas, 150 – 6th Ave. S.W. Calgary, AB T2P 3E3
ghu@petro-canada.ca

ABSTRACT

Interbeds of sand and mud (often called Inclined Heterolithic Stratification, or IHS) exist in virtually every McMurray oil sands deposit. They may even be the dominant component in some oil sands successions. Their sedimentary characteristics and distribution in a SAGD reservoir are important factors that determine SAGD performance and strategies of positioning horizontal well pairs. Therefore, characterization of IHS in a SAGD reservoir is a very important and valuable exercise to evaluate SAGD performance.

To improve 3-D modeling studies on SAGD performance, mudstone interbeds are studied using several different approaches: variable resolution volume of shale (Vsh) qualification; mud interbed “types” classification; vertical permeability (Kv) quantification of individual mudstone interbeds, using flow simulation techniques from core-based micro-models; core CT-scan image analyses; and the study of connectivity between the sand beds that are separated by mudstone.

These studies confirm that mudstone interbeds in IHS can be very sandy and they can be discontinuous because of bioturbation, dewatering and/or erosion. In addition, some “mudstone interbeds” are actually mud-filled burrows that penetrated into sands from the top surface of the sands. All of these characteristics indicate that mudstone interbeds in IHS are expected to be permeable to variable degrees during SAGD operations. This is especially true for those mudstone interbeds associated with sand-dominated IHS.