Click to view Posters

Joslyn Creek SAGD: Geologic Considerations Related to a Surface Steam Release Incident, Athabasca Oil Sands Area, Northeastern Alberta, Canada*

Frances J. Hein[1] and Brent Fairgrieve[1]

Search and Discovery Article #80148 (2011)
Posted April 30, 2011

*Adapted from a poster presentation at AAPG Annual Convention and Exhibition, Houston, Texas, April 10-13, 2011

[1]Energy Resources Conservation Board, Calgary, AB, Canada (fran.hein@ercb.ca)

Abstract

On May 18, 2006, a surface steam release incident occurred at the Joslyn Creek in-situ steam assisted gravity drainage (SAGD) operation in the Athabasca oil sands of northeastern Alberta. The surface steam release lasted several minutes and caused significant surficial disturbance on the ground (which has since been remediated), with the volume of displaced material ejected on surface estimated to be between 1400 and 1700 cubic meters.

In addition to operating and engineering factors, a comprehensive multidisciplinary investigation into the event identified the following geologic factors that may have contributed to the release:

1) Thin overburden (29-47 m), which is sandy and silty, and locally fractured. In cases of excessive down-hole pressures, this overburden above the confining steam-chamber seal cannot be relied upon to act as a caprock, if the confining steam-chamber seal is breached;
2) Occurrence of upper thief zones above the Athabasca oil sands deposit substantiated by the presence of gas and bitumen within the overlying Quaternary (glacial) succession;
3) Presence of glacial channel fills which locally remove any or all overburden including any potential caprock seal; and,
4) Structural influences related to karsting and/or regional tectonics which may reduce the confining ability of the seal above the exploited interval.

The experience of the Joslyn Creek SAGD surface steam release incident shows that all engineering and geologic factors have to be integrated when assessing sites for potential in-situ thermal recovery of bitumen. Results of the present investigation point to the need to have detailed site-specific characterization and modeling of both the overburden and under-burden to properly understand the present stress

regime of the area being steamed; so appropriate operating pressures can be determined prior to steaming. Given ongoing caprock integrity concerns associated with the hydrofracing in the subsurface to initiate production, these findings may have relevance to other shallow in-situ thermal and non-thermal operations, including in-situ bitumen/extra-heavy oil deposits and unconventional commodities such as oil shale, shale gas, and tight oil development.