

# **Thermal Simulation and Visualization in Petrel**

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## **Canada (Heavy oil deposits)**

Standing at 2.5 trillion barrels, Canada has the largest portion of the world's ultraheavyoil and bitumen resources<sup>1</sup>. While the shallow reserves are extracted from pit mines, the deeper reserves can only be extracted through wells. The high oil viscosity prohibits cold production from these wells and hence steam flooding is required to heat the oil to reduce its viscosity. Production is through Steam Assisted Gravity Drainage (SAGD) and Cyclic Steam Simulation (CSS). The optimal location of well placement defines the propagation of steam within the reservoir and the resulting flow of crude towards the producers.

## **Petrel and ECLIPSE**

Seismic surveys, core and well logs helps identify the presence, thickness and areal extent of the reservoir and seals. Petrel geological modeling allows us to create a model of the reservoir based on the data available and the knowledge of the geology whereas ECLIPSE simulator computes the flow behavior within the reservoir throughout the chosen production cycle.

Combining the visualization power of Petrel with ECLIPSE simulation creates an opportunity to visualize the fluid flow behavior in such reservoirs unmatched by any other visualization tool. Flow Streamlines add another dimension to the visualization allowing to monitor the behavior of steam and crude during the production cycle. Field performance can be investigated under various development scenarios; when matched with the visualization power, helps us in optimal well placements.

Infill wells, recompletions, water flooding, steam drive and horizontal well drilling can be examined and their effects on the reservoir can be visualized, improving recovery while reducing costs<sup>2</sup>. The modeling approach will lead to significant time savings and will act as a reservoir management tool for future field development.

## References

<sup>1</sup> Canadian Petroleum Communications Foundation, [http://www.ocf.ab.ca/quick\\_answers/default.asp](http://www.ocf.ab.ca/quick_answers/default.asp)

<sup>2</sup> L. Marquez et al., 2003, Application of Large Thermal Sector Models in a Field Performance Optimization Study of a Mature, Heavy Oil Field, SPE Annual Technical Conference and Exhibition, 5-8 October, Denver, Colorado