MATHEMATICAL MODELING OF HEAT TRANSFER

IN MULTILATERAL WELL

FINAL REPORT

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and the original work contained herein have not been undertake or done by unspecified sources or persons.

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ABSTRACT

Intelligent well is a rapidly evolving technology which are gradually being used in the completion of horizontal, multilateral, and multi-branching wells. Some sort of the technology had been used in intelligent well completion in order to continuously and permanently monitor downhole temperature and pressure profiles. Distributed sensor (DTS) technology is one of the sensor uses as a downhole measurement to supply real-time temperature profile in order to identify fluid entries and quantify the flow rates profile.

To realize the value of intelligent wells, the efficient and accurate interpretation of the raw data being acquired is needed. Interpreted temperature profile will help to determine the inflow profile of the various phases produced, and thus contribute to determining well performance. Therefore, from the accurate prediction on temperature profile, it will significantly help the Petroleum Engineer to understand the behavior of inflow profile inside the wellbore and come out with proper facilities design for maximizing the production.

Therefore, for this study, the focus is on predicting temperature profile on the build section of multilateral wells. The study will be focus on calculating liquid temperature in the build section at specified depth. Due to the temperature difference between geothermal and liquid temperature, heat transfer occurs. At the build section, well angle which relative to the temperature profile need to take into account because the changed angle on the build section considerably contribute to the pattern of heat transfer inside the multilateral wells.

In order to calculate the liquid temperature, extended Ramey's method has been used to determine the changes of liquid temperature along the build section. Well information such as the inclination angle, flow rate, geothermal gradient, overall heat transfer and also time function are several parameters needed while using the method. Prediction on liquid temperature was observed from two condition, high production rate and low production rate. Finally, calculated liquid temperatures are drawn into temperature profile to show the relationship between the changes of inclination angle of build section along with the changes of temperature in the wellbore under high and low rate production.

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