

From: Morten Haug Emilsen
Sent: Thu May 13 20:01:47 2010
To: Corser, Kent
Subject: Status Dynamic Modeling
Importance: Normal

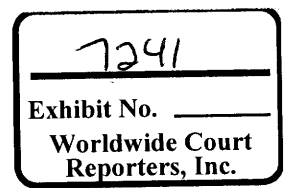
Kent,

The status for the dynamic modeling is as follows:

1. PVT calculations have been performed and presented (May 6th) based on the received PVTsim fluid database.
2. Two draft simulation models have been build, one assuming flow through the shoe and the other assuming flow on the outside annulus. Both models are based on 86 ft, 300 mD, 12.6 ppg sand and with the initially estimated 85 bbl gain.
3. Initial simulation runs, based on best guess input parameters, have been simulated and results have been presented, May 6th and May 11th. The trends and behavior predicted by the simulator are in agreement with the observations. Based on these first pass simulations there are a couple of findings:
 - a) An oil kick will keep its density while migrating through the 14 ppg mud in the wellbore, read no expansion. Gas will start flashing out of solution once the pressure drops below approximately 6000 psi. (Bubble point is 6500 psi at 237 °F and 6000 psi at 165 °F)
 - b) With a fully open reservoir (86 feet net pay reservoir exposure), the Inflow Performance Relation (IPR) is high and indicates a very prolific reservoir.
 - c) There is a discrepancy between the shut-in pressures (1200 and 1400 psi) and the reported gains according to the simulations. Based on the simulations, a larger amount of hydrocarbons is required inside the casing, while a lower amount of hydrocarbons is required in the annulus to reproduce the shut-in pressures.
 - d) The pressure build-up curves indicate that a smaller fraction of the reservoir is initially flowing
 - e) The decrease in pressure from 17:09 to 17:25 (from 1248 psi to 1204 psi) cannot be explained
 - f) Whether it is flowing inside or outside cannot yet be determined based on the initial simulations

Recommendations and plans for further work:

1. Validate input data and implement accordingly
2. Run sensitivities wrt. kick sizes, net reservoir exposure and pressure
3. Run sensitivities wrt. restrictions down hole. I've already started to isolate points in time where I can find proper build-up curves that will help to get a good estimate of the initial reservoir exposure.
4. Refine model (grid cells, dimensions etc.)
5. Reporting (in progress)



As earlier stated, the first pass results are based on an 80-20% principle. Now I will spend more time on details and special points in time in order to get a better overview of what was going on. With respect to timing, it is challenging to estimate as the progress will be depending on the findings of the rest of the group. Findings that are directly challenging the model inputs. It is time consuming to run 6 hours real time and this is required to estimate what was going on up to the explosion. The starting point for the simulations are right before the Form-A-Set spacer is pumped.

I still do believe that the dynamic modeling can be helpful during the efforts of determining the cause and events leading to the incident as well as determining the most likely flow path.

Day off:

Saturday is fine. Alternatively Sunday, I'm flexible.

Regards,
Morten