Reservoir Engineering Aspects of Liquid Loading
Breakout session
Facilitator: Efrén Muñoz
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Feb-21st/2012
Topics

1. Workflow for remedial jobs. Combination of Decline Curve and Nodal Analyses.
2. No signs of aquifer support in a flowing material balance analysis.
3. What to do with a well where production suddenly decreases very quickly?
1. Workflow for remedial jobs. Combination of Decline Curve and Nodal Analyses

1. Check previous production history including:
   - Gas rate changes
   - Wellhead pressure changes
   - Remedial jobs and results
   - Check offset well with similar completions (how do they look?)
1. Workflow for remedial jobs. Combination of Decline Curve and Nodal Analyses (cont)

2. Cumulative production review:
   - Initial EUR number
   - Actual EUR
   - Estimate recovery factor (RF = EUR/OGIP)
   - Compare RF with offset wells and establish realistic remaining reserves

The well has seen this rate
1. Workflow for remedial jobs. Combination of Decline Curve and Nodal Analyses (cont)

- Run a down hole pressure gauge to verify Pr and generate a nodal analysis
- Recommended sensitivities:
  - Skin
  - Tubing ID
  - Possibility to reposition the tubing, change tubing tail (TT in Snap)

NOTE: be open to combine potential solutions i.e. smaller tubing with a capstring to inject foam.
2. No signs of aquifer support in a flowing material balance analysis

- Difficult to give an opinion without seeing actual data, but check:
  - Offset wells, Qw?
  - Electric logs, do they show the GWC?
  - Run a PLT and see where the water is coming from
  - If the source is the deeper-most layer, the solution might be a plug or a squeeze to isolate the water source

- Additional comments:
  - WHFP and rate represent an extended draw-down period, try to model it in a Pressure Transient Analysis package and put a fault (finite length fault) with some conductivity assigned to the fault and run different cases to match actual data
3. What to do with a well where production suddenly decreases very quickly?

• Again, difficult to give an opinion without any actual production data, but based on the comments it is possible to recommend:
  – Run a bar to check obstructions in the tubing
  – Check pressures prior to the production rate reduction, is it water being produced now?

• Additional comments: This is a gas well with high productivity.
  – Looks like a mechanical problem, more than a reservoir problem. Reservoir effects normally are smooth and take some time.
Attendees

- Les Reid – Baker Hughes
- Samir Hamdan – Baker Hughes
- Eric Klatt – BP
- Cody Hopkins – BP
- Andrew Whiteneck – CHK
- Aaron Dunlap – BP
- Jeramy Gaskins – BP
- Allen Anderson – BP
- Brad Reed - EOG

- Brad Olson – COP
- David Slack – COP
- Ben Jenkins – Ultra Petroleum
- Ferhat Yavuz – EBN
- Kyle Bowzer - EOG