2000 Project

Title: DWS Well Selection and Production Optimization Method for Maximum Performance

Objective: There is a need for systematic approach to implementation of DWS technology in a specific oilfield. Operators should know if DWS is a suitable solution, how to select wells for re-completion, how to operate and evaluate DWS wells. Objective of this project is to perform study and develop technical criteria and analytical tools for deployment and operation of DWS wells to maximize advantage of DWS over conventional technology in reservoirs with water coning problems.

Tasks:
1. Criteria and Method for DWS Well Selection
   Perform sensitivity analysis of reservoir properties and well parameters to identify controlling factors; Formulate screening criteria for selection of the best well candidates for DWS installations; Develop software for computation Performance Parameter representing advantage of DWS over conventional completion; Formulate selection procedure for a reservoir candidates; Formulate selection method for well candidates.

2. DWS Well Evaluation Method: Develop a transient pressure testing method and software for evaluation well hydraulic integrity
   Modify the pressure transient method to evaluate formation permeability damage; Formulate a mathematical model of multi-rate testing of DWS wells; Introduce productivity index and wellbore flowing pressure to inflow performance mapping; Solve problem of well stabilization prediction; Develop testing procedure and analysis method for DWS well productivity testing; Demonstrate the method with simulated examples.

3. DWS Well Production Optimization Schedules
   Introduce well performance limits to Inflow Performance Chart; Formulate mathematical optimization model for daily performance of DWS well in terms of maximum production/return rates; Formulate mathematical optimization model for time-related well production schedule and maximum NPV; Write a software for designing the optimized production program for DWS wells to maximize recovery of oil or NPV; Solve example applications.

4. Feasibility of Water Control in Horizontal Wells Using DWS Completions
   Review the methods for water cresting and pressure drawdown distribution in horizontal wells - literature study; Develop water cresting study tool using commercial numerical simulator; Determine a design method for maximum length of the reach section for horizontal wells with water cresting problems; Modify the simulation tool for modeling horizontal wells with dual completions; Study productivity increase for horizontal wells with tail-pipe water sink; Study productivity increase for bi-lateral horizontal wells with water sink completions.
5. **Physical Demonstration of DWS Technology**
   Install a data collection/monitoring system in the physical pie-shaped model; Develop procedures for model pre-packing, operating and cleaning; Test the model up-scaling procedure using a homogeneous sand pack; Conduct a video-taped experiment 1: Prediction of DWS Well Performance from Physical Model; Conduct a video-taped experiment 2: Recovery Performance of Wells with Water Coning and permeability Stratification

**Deliverables:**
1. A summary report providing the theory, criteria and method for DWS Well Selection and evaluation.
2. A summary report providing the theory, experimental results, data from analytical studies and methodologies for well evaluation, testing, and production optimization.
3. Software for optimized production program for a DWS well;
4. Data from computer simulation studies and a numerical method for estimation of the feasibility of water control in horizontal wells using DWS completions
5. Two videotapes and written training materials summarizing the visual demonstration experiments