MDT/RFT Pressure Testing: Reservoir Interpretation, Supercharging Evaluation, and Data Processing

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ABSTRACT:

Successful MDT/RFT testing, to a large degree, depends on the quality of the reservoir and the condition of the wellbore. Information from a four arm caliper and CMR log, allows the selection of testing points that are most likely to give valid interpretable pressures and formation fluid samples. In addition, data filtering, error estimation, pressure transient analysis, and operation planning, can be used to place realistic limits on the expectations from test results.

Classification of individual MDT/RFT tests into **A**, **B**, **C**, and **D** four quality codes, identifies tests affected by supercharging and packer leakage, the main sources of erroneous pressure data. Using only the **A** and **B** quality tests from the same tool run reduces pressure uncertainty to the extent that the reservoir fluid contents and reservoir quality can be identified with a high degree of confidence.

Supercharging is a dynamic condition which extends the hydrostatic pressure of mud in the wellbore beyond the filter-cake into the reservoir. This effect is most noticeable in reservoirs which have low permeability and /or a poor filter cake. No practical procedures are available to correct supercharged pressures, however, the use of A and B quality tests, which are least affected by supercharging, dramatically minimize the problem. Alternatively, MDT dual packer testing has the potential to reduce the number of low permeability tests that show the effect of supercharging in the recorded pressure data and therefore greatly improve the testing success. The dual packer test serves as a miniDST and has the potential to investigate beyond the invaded radius about the wellbore, and record normal formation pressures.

Operational considerations are important Allowing the pressure buildup to stabilize, where possible, minimizes formation pressure error. Acquiring the pressure data in sequence in one direction (preferably downwards) minimizes errors and maximizes the efficiency of data collection, particularly when the strain gauge is used. Determining the stabilization time for the gauge sets the minimum buildup time for each test and is an approximate measure of the reliability of the gauge. A comparison of the pressure drawdown to the stability of the late time buildup pressure data for the **A** quality tests, should be done for each test as it measures the integrity of the donut packer. An understanding of the uncertainty in the stable reservoir pressure gradient allows the operator to estimate key factors: the number of good quality pressure points that has to be obtained, and the length of interval tested to differentiate between reservoir liquids of various densities (e.g., 14 *API* oil vs. fresh water).

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