

Mini-Frac' DFIT Doubles for Initial Test... Mini-frac' or Diagnostic Fracture Injection Tests (DFIT) help double your testing efficiency if pressure recorders are installed on bottom. First, a successful DFIT helps estimate hydraulic fracture closure pressure and reservoir flow properties—valuable information for stimulation programs. Second, the pressure fall-off can be analyzed to comply with AER Initial Pressure Oil or Gas requirements.

Keep Test Simple & Quick

Program pressure recorders for rapid data sampling (1 sec). Leak-off Test (LOT) for ≈ 60 min to confirm wellbore integrity. Acid spearhead if necessary. Start mini-frac' at 0.5–1.0 m³/minute, establish breakdown, hold injection rate constant, maximum 5–10 m³ of Newtonian fluid (N₂, oil, water). Hard shut-down, close all wellhead valves. Wait ≈ 60 min before rigging out pump.

Minimum Shut-in 8 h

Required for the transient gauge PAS file (TRG.pas) flagged as test purpose "Initial." If the final pressure passes the Board's 2 kPa Rule (pressure changing < 2 kPa/h/6 h) then you are done. If not pressure transient analysis (PTA) will be required to provide the extrapolated p^* to satisfy Initial Pressure requirements for new Oil or Gas wells.

Shut-in Time vs. p^*

As operational logistics allow, longer shut-in times are better. However, the pressure fall-off does not have to pass the 2 kPa Rule, nor does the well have to be shut-in > 14 days. The AER will accept PAS files flagged as analyzed, with input extrapolated pressure (p^*). Micro-permeability systems probably will never reveal pseudo-radial flow.

Step-Rate Tests

Changing injection rate, either step-up or step-down, is not recommended as the critical closure pressure signature can be masked by the rate change.

Static Gradient Survey

A final reverse static gradient survey should be conducted, when recovering subsurface pressure recorders, to end the mini-frac' fall-off test.

G-Function Analysis

Estimate closure stress, pore pressure, leak-off, and possibly a permeability for use in fracture stimulation design.

Pressure Transient Analysis

What isn't specifically clear in AER D40 is that pressure transient analysis (PTA) is acceptable for estimating both Initial Pressure Oil and Initial Pressure Gas conditions (p^*). Analytically the DFIT is similar to a closed chamber drill stem test (DST) where an impulse (opening valve) generates a pressure response. This also corresponds to the positive impulse generated by under-balanced perforating, both resulting in a pressure build-up. The mini-frac' is opposite: a negative impulse causing the pressure to fall-off.