

## Better results with Diagnostic Injection Fracture Tests

DIFTs are a practical way to improve frac results. Porter Underwood will illustrate their application using case histories from local fields.

Key parameters that are often missing when evaluating a formation for hydraulic fracturing include effective permeability, reservoir pressure, fracture closure stress, type of fracture growth, and near-wellbore phenomena. By injecting relatively small volumes of fluid - around 1000 gal - at fracture extension pressure and monitoring the pressure decline, these parameters can be determined.

Each pay stringer can be evaluated separately to tailor the fracture treatment and to forecast the production response. Perforated intervals are isolated and a low volume of thin fluid compatible to the formation (lease water, 2% KCL water, lease crude, etc) is pumped with the pressure decline recorded following shut-in. For low-pressure well applications, bottom hole memory gauges are used. The fracture closure stress is determined and a pre-frac closure and after-frac closure analysis determines the effective permeability and reservoir pressure. Direct measurement of near-wellbore pressure effects, such as non-linear flow and tortuosity, are made, as well as fracture growth characteristics, such as height recession and natural fracture leak-off, which play a big role in fracture treatment success.

### Four Leak-off Types

