Water / Gas Injector Testing from Surface Measurements

Measuring surface injection pressures and rates are routine applications for Halliburton. Water injector wells can be for produced water disposal or water flooding for secondary recovery and pressure maintenance programs. Gas injectors wells can be utilized for acid gas injection (disposal), for pressure maintenance, and for tertiary recovery efforts (i.e. CO\(_2\), N\(_2\), O\(_2\) & Steam).

Testing applications usually fall into several categories:
1. Step-rate testing to determine fracture gradients
2. Injection fall-off to determine completion and reservoir properties.
3. Monitoring injection pressures vs. injection rate
4. Interference / communication monitoring between injectors and producers
5. Modeling injection pressures on pilot projects or conversions of producers to injectors.

Transient tests for skin effects can be of the injection fall-off variety where a steady injection rate has been maintained for some period of time and the well shut-in with the pressure allowed to fall-off. Alternatively, a two-rate flow test may be performed (with significant differences in the injection rates) in order to determine skin and permeability.

Using surface measurements is a fairly straightforward application as you have a column of liquid of a known density and length from which to calculate the hydrostatic head in the wellbore. The only critically important point to remember for using surface measurements on water injection testing is that the well must maintain positive pressure at the surface during a fall-off test. In other words, the well must not go on a vacuum. If the well goes on vacuum we would recommend performing a 2-rate injection test.

High resolution and high sampling frequency SPIDR® surface pressure gauges can be used to capture pressure and injection rates for a variety of applications. The use of SPIDR® surface gauges for pressure transient tests on secondary and tertiary recovery wells is an effective NO RISK, LOW COST substitute for running wire and pressure gauges downhole. For steam injection testing there are limited and expensive downhole options for gathering pressure and rate information because of the elevated temperatures involved.

Halliburton maintains a fleet of SPIDR® gauges available for immediate delivery to your location via overnight FedEx or same day Hotshot service.

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