SPIDR® Gauge Injection Testing: Measure Rate and Pressure

One of the many unconventional applications for the SPIDR® gauge is as a tool for injection well tests. The SPIDR® gauge is routinely used to capture data on injectivity and injection fall-off tests on producing, storage and disposal wells. One of the key reasons for the SPIDR® gauge’s use on these tests is its ability to capture not only the pressure data during the test, but also accurate injection rate data. Any standard SPIDR® gauge can be equipped with a cable of any length to connect to most turbine meters. The SPIDR® gauge will record the pulses output by that turbine meter and convert that data to injection rate using the coefficient of the meter. Combining this data with the SPIDR® gauge pressure allows you to perform very accurate step-rate and injection fall-off tests. The plot below shows an injection fall-off test where the SPIDR® gauge was used in this way.

The blue line represents wellhead pressure, the red line is instantaneous injection rate and the green line is the cumulative injection volume. One question asked by many engineers when they first use the SPIDR® gauge to measure rate data is for an explanation for the spiky behavior of the rate data. The injection rate data supplied by most other service companies is usually a smooth line. Our data looks noisier because we are showing true instantaneous injection rate data exactly as the turbine meter reports it. This is the nature of turbine meters and this data will be more or less noisy depending on the size of your meter and the type of injection pump. Smooth plots of injection rate data are only possible when multiple points are averaged. Often this data is plotted as a running average.

The SPIDR® gauge is used in this way not only for standard injection fall-off tests that are used to analyze well completions, but also as a primary means of testing disposal and storage wells. On these wells a step-rate test with the SPIDR® gauge will allow you to determine formation parting pressure and allows you to determine your maximum injection rate. The injection fall-off test can be used to measure your skin effect and permeability.
One of the best reasons for using the SPIDR® gauge for these tests is that after you have finished pumping you can send the expensive pump truck away and monitor the pressure only using the SPIDR® gauge. This will save you the cost of renting a pump truck only to monitor pressure. In addition the pressure recorded by the SPIDR® gauge will be of higher resolution and more accurate than any typical gauge found on a pumping truck. Having this type of high quality pressure will make any analysis more accurate.

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