The Halliburton FracInsightSM service is an unbiased, repeatable interpretation workflow that leverages the best available horizontal well data to select perforation clusters and frac stage locations. It is designed to create a more consistent fracturing operation by eliminating the fracturing of nonproductive rock, reducing inconsistent breakdown and treating pressures, and minimizing screenout or “go-to-flush” early instances.

The FracInsightSM service provides a “Production Index” and “Frac Index” that are combined to optimize stage and cluster placement. The Production Index uses individually weighted criteria such as facies quality, effective porosity, and brittleness to quantify the differences in reservoir character. The Frac Index uses weighted criteria such as closure stress, natural fracture index, and cement bond index to highlight areas of differing mechanical properties or mechanical risk.

Two different custom frac staging designs are generated based on the client’s preferred input criteria. These two designs are compared with a conventional geometric spaced design or an external design supplied by the client in order to analyze net stress and treating pressure differences between clusters in individual stages. One of the custom designs is also typically optimized for the absolute best rock and least pressure differential between clusters.

This solution offering is designed to support all levels of available horizontal well formation evaluation. It has long been recognized that while LWD gamma ray steering in source rock reservoirs may be cost-effective, it actually offers little to no reliable information regarding the actual rock properties the well path is intersecting. The geosteering professional may or may not be within the ideal target window, depending on lateral variability, localized formation dip changes, and microfaulting of the reservoir itself.
Without any other information than an LWD gamma ray, the workflow can make use of Sperry Drilling’s StrataSteer® 3D software by performing a post-drill stratigraphic correlation. This is done by projecting formation properties derived from a ShaleXpertSM interpretation from the closest offset well along the horizontal wellbore. While this scenario ignores the concept of laterally changing rock properties, it offers the best chance to model reasonable rock properties based on actual wellbore placement with zero risk and minimal expense. This simplest version of the workflow should be applied only when the local stratigraphic structure is well defined. This application is ideal for subsequent development wells in a pad drilling application.

Ideally, the actual interpretation should be performed using LWD or horizontal openhole wireline logs. However, these solutions are expensive and add risk within a development drilling program. A no-risk solution exists with the use of the Advanced Sample AnalysisSM service from drill cuttings to identify changing total organic carbon (TOC), mineralogy, and stress regimes along the well. A low-risk cased-hole FracCombo service, consisting of the pulsed-neutron Reservoir Monitoring (RMT™i) and UltraSlimSM Borehole Sonic Array Tool services, can be pumped down or tractor conveyed after casing is set to identify the same properties along with effective porosity and a bond log. Both of these services are viable cost-effective options to provide quality staging inputs for the FracInsightSM service.

If absolute precision in measuring differential anisotropic stress is required for a critical horizontal well, an openhole LWD XBAT™ Azimuthal Sonic tool can be run as a last wiper trip. This method also requires some form of bulk density measurement, which can be obtained using the through-casing FracComboSM service after the rig has moved. This solution also helps minimize risks by leveraging openhole and cased-hole operations.

For more information, contact your Halliburton representative.