Traceable non-radioactive proppant helps reduce stimulation uncertainties

Propped fracture height data in near-field study enhances frac model calibrations.

Pinedale field, Wyoming

The challenge

Tremendous downhole variances make it difficult to determine the effectiveness of propped hydraulic fracture stimulation treatments and eventual reservoir drainage. Consequently, the operator required a more precise evaluation of hydraulic fracturing geometry to reduce the analytical uncertainties and help calibrate frac models to improve the completion design of multi-stage wells.

The solution

CARBONRT® inert tracer technology was incorporated as part of the operator's integrated near-field diagnostics study that included Distributed Temperature Sensing (DTS) and Distributed Acoustics Sensing (DAS) monitoring. While fiber-optic DTS and DAS techniques monitor fluid location, CARBONRT is unique in that it also measures propped fracture height, thus providing analysis of non-stimulated and under-stimulated frac stages. Further, CARBONRT eliminates the environmental concerns associated with radioactive tracers. As part of the year-long study, integrated frac diagnostics were conducted in 83 stages of five wells.

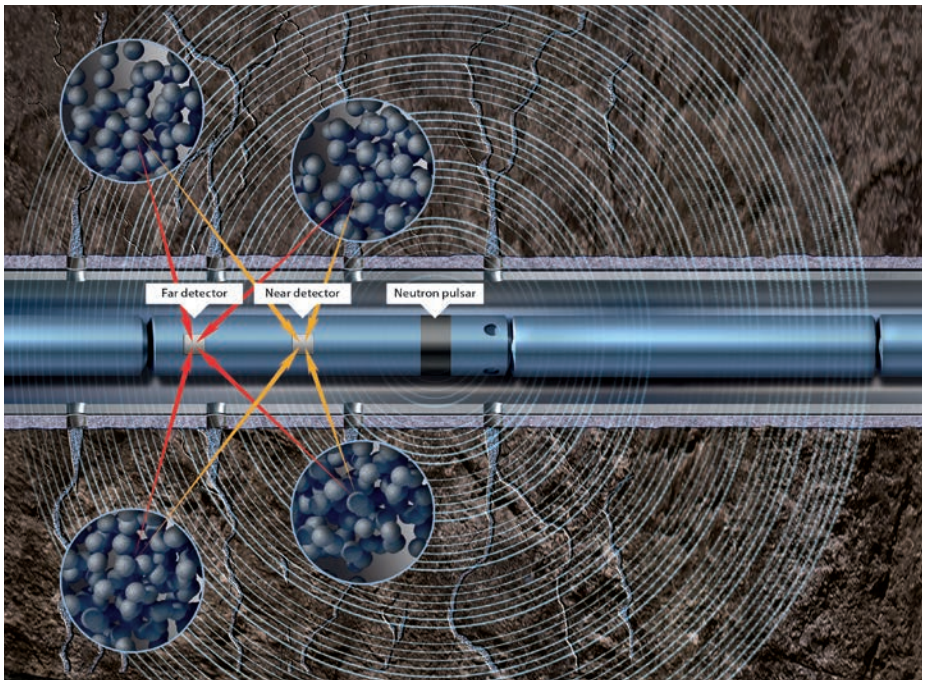


Figure 1: CARBONRT inert tracer technology enables precise fracture evaluation to be performed efficiently and safely throughout the life of the well.

Well Data

Location: Pinedale field, West-Central, Wyoming, USA

Well Type: Tight gas

Proppant: CARBONRT inert traceable technology

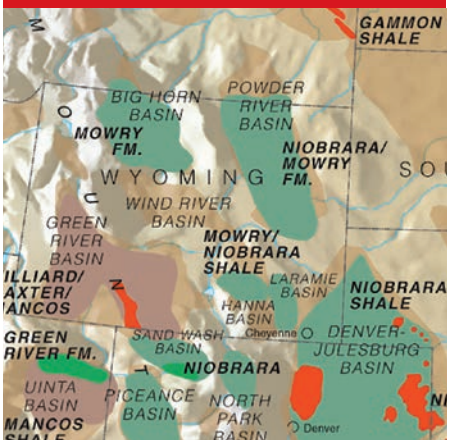
Pay zone length: 5,500-6,020 ft

Well design: 20 to 25-stage vertical well, grouped sands

Pore pressure: Just above hydrostatic to overpressured

Permeability: 2 mD to 8 mD

Porosity: 4% to 12%



CARBO

Production. Enhanced.

The results

By pinpointing proppant location and subsequent propped fracture height, the CARBONRT proppant revealed that 53% of the stages evaluated were shorter than predicted and only 63% of the available net sands had been effectively stimulated. Further, unlike DTS and DAS technologies, CARBONRT effectively predicted where production would originate by using only propped coverage. The DTS and DAS, meanwhile, provided conflicting results that did not correlate with the production curves, as clearly illustrated on Stage 8 of the second interval in Figure 2. CARBONRT provided distinctive and valuable insight for use in calibrating frac models and designing future stimulation and completion strategies for the field. Along with helping maximize estimated ultimate recovery (EUR), this capacity likewise will help avoid re-fracs and other costly mitigation techniques.

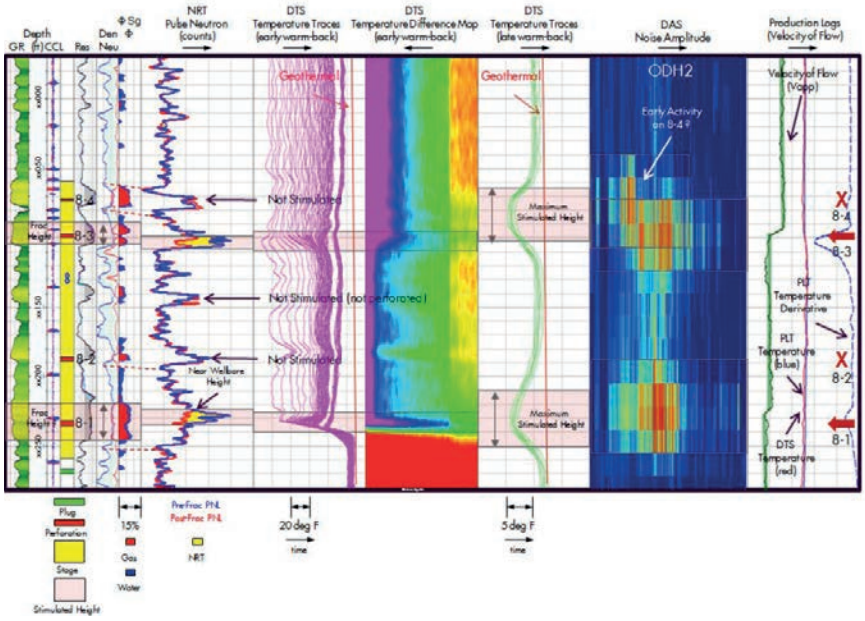


Figure 2: Integrated HFC diagnostic results (Stage 8-2011), SPE Paper #168603

For more information contact:

Pragnya Maruwada
Pragnya.Maruwada@carboceramics.com

Talk to CARBO to find out how we can help you enhance your production.

carboceramics.com

CARBO
Production. Enhanced.