

Safely charting the course for emerging play development: Middle East

CARBONRT inert tracer technology validates diversion effectiveness, provides keen insight for future unconventional completions.

Middle East

The challenge

The thick and organic-rich marine carbonate shale sequence underlying a Middle East Basin is emerging as a highly prospective multi-stage unconventional target. To maximize reservoir contact and effectively develop the resource, the operator relies on multi-stage hydraulically fractured completion designs. Diversion techniques are used to effectively propagate fractures from each cluster by sequentially plugging off perforations from previously stimulated areas and direct the treatment to untreated zones.

Verifying the success of the diversion operation, particularly with respect to individual perforation and stage efficiency, requires precise knowledge of near-wellbore proppant placement, which typically would be accomplished with radioactive tracers. However, due to local restrictions on radioactive tracers, the client required a non-hazardous alternative method to verify proppant placement and the success of the diversion operation.

The solution

To determine the diversion effectiveness without the HSE repercussions of radioactive tracers, the operator selected CARBONRT inert tracer technology. Pumped as part of the frac pump schedule, CARBONRT is engineered with a high neutron capture cross-section compound that is clearly detectable with standard neutron logging tools.

In this case the inert tracer, incorporated within CARBOHSP high-density sintered bauxite proppant, would be detected by comparing the response of a Pulsed Neutron Capture (PNC) tool before and after the proppant has been placed. In addition, CARBONRT is the enabling technology for the exclusive FRACTUREVISION proppant-delivered fracture evaluation service, which would be used to develop a near-wellbore connectivity index and provide a qualitative measurement of contact between the wellbore and formation. The project would represent the first FRACTUREVISION evaluation performed in conjunction with CARBONRT in a logged multi-stage horizontal well located internationally.

Well Data

Location: Middle East

Operator: Middle East operator

Well type: Shale and tight gas/ horizontal dual-casing string

Reservoir: Carbonate marine shale

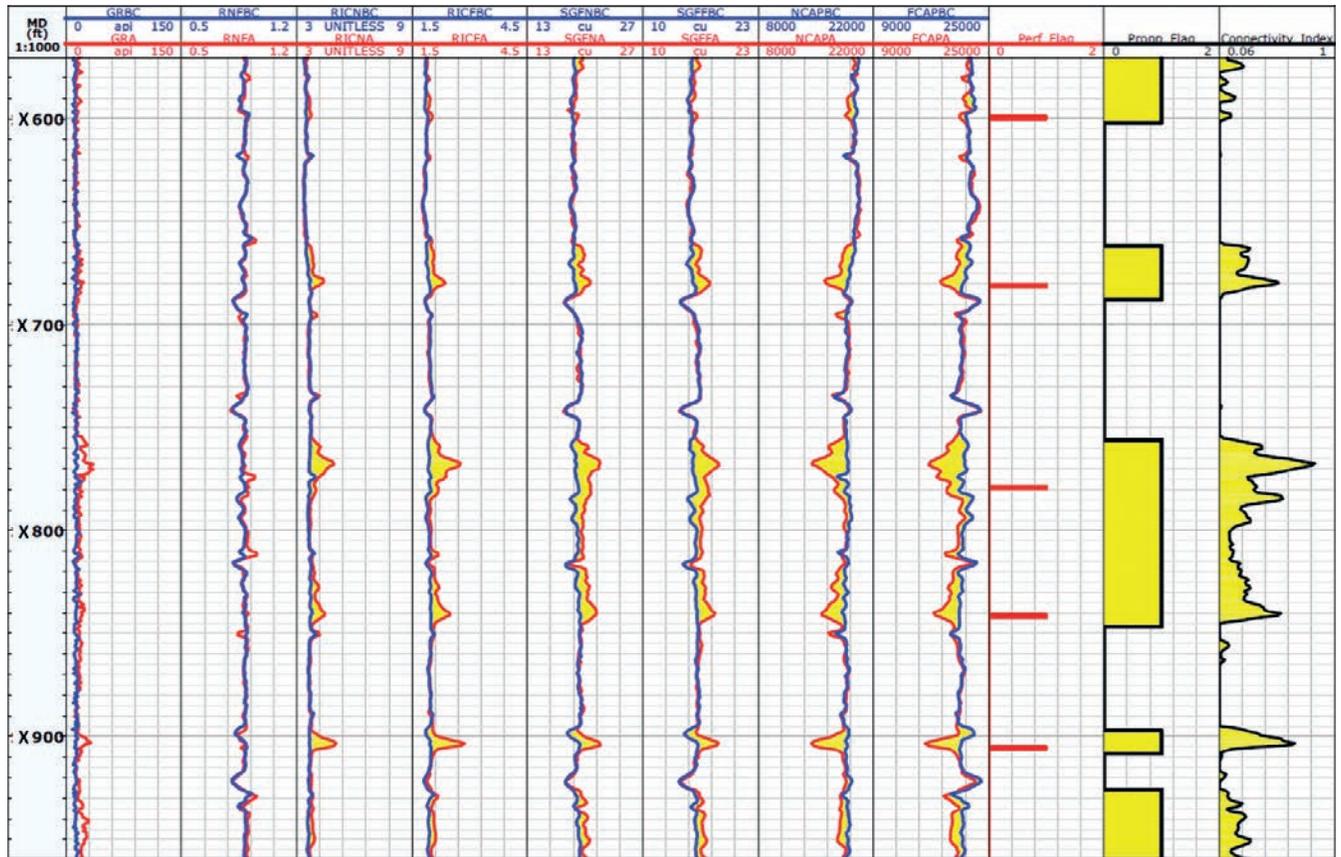
Detection/evaluation tools: Pulsed neutron capture (PNC), FRACTUREVISION fracture evaluation service

Proppant: CARBOHSP 30/50 with CARBONRT



The results

The proppant detection and stimulation evaluation strategy met all of the client’s objectives, with signals clearly observed in all stages without the HSE issues associated with radioactive tracers. The overall success of the diversion technique in effectively stimulating the targeted perforations was reflected in close alignment of the perforation and proppant flags (signals). Moreover, the FRACTUREVISION-derived connectivity index was proportional to the volume of CARBONRT proppant within the near-wellbore region. The results of this data analysis will prove invaluable in evaluating perforation and cluster efficiencies to optimize future completion designs in this emerging unconventional play.



The proppant flags (shaded in yellow) indicate CARBONRT signals, with the second column to the far right indicating the fracture integrity and stimulation efficiency. The far right column illustrates the exceptional wellbore connectivity for each perforation.

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/carbonrt

