ControlSEAL Resin Sealant

Liner Plug and Squeeze

Background

The well was drilled in 1958 and used to store chemicals in a cavern 2,587 ft below surface. The 13 3/8-in. production casing had incurred ovality from 1,364 to 1,386 ft and posed a possible weak point. To strengthen the wellbore, a 10 3/4-in. liner was run inside the 13 3/8-in. casing and cemented. Subsequent pressure tests using nitrogen revealed a leak in the 13 3/8 x 10 3/4-in. annulus. This forced the well, the largest storage well at the facility, to be taken offline until the leak was properly repaired. A smaller liner run inside the 10 3/4-in. liner to bypass the leak was considered a last resort option as it would severely reduce the flow rate of the well.

ControlSEAL Resin Sealant Job

To keep from running a smaller liner, Wild Well was contacted to pump ControlSEAL™ resin sealant to repair the leak between the 10 3/4-in. liner and the 13 3/8-in. casing. Due to the low BHT and the unique well conditions, the heat from the resin reaction needed to be kept to a minimum. The resin used was designed with an extremely long set time for it to be squeezed into place over time and to reduce the temperature of the exothermic reaction. It did not use any weighting agents as it was not necessary since the wellbore fluid was fresh water. The resin reaction temperature stayed below 150°F and it remained pumpable through 36 hours. The compressive strength was 3,600 psi after 7 days and 6,100 psi after 23 days. A CIBP with cement on top was placed in the 10 3/4-in. liner with TOC at 2,341 ft. The liner was cut just above the TOC. Wild Well mixed 4 bbl of ControlSEAL and BJ Services displaced it into the well through the 2 7/8-in. workstring. The resin was mixed and pumped successfully and without any issues. After the resin was displaced to the TOC, Baker Hughes set a retrievable packer above the resin and BJ applied 3,000 psi of squeeze pressure through the 2 7/8-in. workstring. A squeeze pressure of 3,000 psi was maintained on the resin for 72 hours to push it behind the liner through the liner cut to seal the leak. After 11 days, the top of the resin was tagged 4 ft below what was expected, which indicated some of the resin was injected behind the liner. Then the resin, cement, and bridge plug were drilled out. Pressure tests with nitrogen confirmed the leak had been repaired and the well was put back to use.

WELL INFORMATION
Prev. Casing: 13 3/8 in., 72 lb, N-80
Prev. Casing Depth: 2,417 ft
Liner: 10 3/4 in. 45.5 lb, P-110
10 3/4-in. Drillable BP: 2,351 ft
TOC on CIBP: 2,341 ft
Casing Cut: 2,339 ft
Top of Resin: 2,305 ft
Workstring: 2 7/8 in. , 8.7 lb, N-80
Retrievable Squeeze Packer: 2,225 ft
EOT: 2,285 ft
Well Fluid: 8.34 ppg Fresh Water
BHT: 100°F