



Technical Memorandum Field Application

Subject: Water Base Mud

Location: Lone Star

An operator was involved in procedures to permanently P/A a well when the existing 8 5/8" surface casing and production string parted at a depth of 234'. Loss of returns occurred immediately. Attempts to regain circulation through the use of a variety of loss circulation agents were unsuccessful. A string of 4 1/2" casing was run into the hole to a point just above the parted area in an attempt to regain communication with the bottom section of the 8 5/8" casing string. It was then noticed that the well had started flowing 8.7 ppg saltwater at a rate of 1/2 bbl/min. When the 4 1/2' casing was shut-in, migration of some of this saltwater appeared at the surface around the location through channels made in the upper geological structure. Additional attempts to seal off the thief zone through use of standard loss circulation agents, coupled with various innovative engineering concepts, still proved unsuccessful in gaining the downhole pressure integrity necessary to successfully kill and plug the well.

A pill consisting of 25 ppb Liquid Casing® and 20 ppb O.M. Seal® was used. The base fluid for this operation was comprised of the water existing 8.7 ppg saltwater and concentrations of 25 ppb attapulgit (saltwater gel), and 1.2 ppb Drispac. Experience in numerous applications of Liquid Casing and O.M. Seal has enabled the formulation of



certain criteria that the base fluid must have in order to maximize and control the degree of the pills' success. With this in mind, the attapulgite was added for the colloidal suspension not inherent with raw saltwater.

The Drispac was added to lend some control over the A.P.I. fluid loss.

The base fluid was pumped to a ribbon blender unit where the Liquid Casing and O.M. Seal were mixed. After being thoroughly combined, the pill was pumped down the hole at a rate of 3 bbl/min, twice the rate of the flow. This was done in an effort to get ahead of the saltwater flow rate. When the pill reached the zone, there was an increase of 400 psi on the pump and 50 psi on the shut-in casing side. This casing pressure bled off after the pumping ceased, but the pump side pressure held at around 50 psi. After bleeding the pump off, a 45 bbl pill of 12.5 ppg kill mud was sent down hole in an effort to kill the flow. After pressures were bled off on both sides, it was observed that the well had been killed. The next step was to set a cement plug. It was noticed that there was no increase in pump pressure as the cement was being displaced. It was then decided to abort this operation and observe the well overnight before the next step could be taken.

This precautionary approach proved very prudent because overnight the well began flowing again. The kill mud has aggravated the seal that the Liquid Casing and O.M. Seal had made. With nothing to hold the kill mud, the heavy fluid was lost and the flow commenced again.



It was decided to repeat the procedures of the previous day with the exception of the kill mud. In other words, try to seal off the thief zone, gain some down hole integrity, then follow with the cement plug. A new 50 bbl batch of 25 ppb of Liquid Casing and 20 ppb of O.M. Seal was mixed and pumped at a rate of $\frac{1}{2}$ bbl/min. Pressure increases of up to 400 psi were noticed as the pill hit the thief zone. Since integrity has been established, the cement plug was pumped on the tail of the previous pill. The plug was spotted with no problems. Pressures were bled off and the well was once again killed.

After observing the well for 24 hours with no incident, a string of tubing was run into the hole in an effort to find the cement plug. The plug was located and dressed-off. It was determined that the lower section of the 8 5/8" casing and the production tubing was plugged off. The job was satisfactorily completed.