

SPARTAN™ Plug and Perf System

Significantly Improves Efficiency in P&A Operations

The Industry Challenge

A challenge for operators worldwide when plugging and abandoning (P&A) wells, both exploration and wells at the end of a lifetime, is oil based mud in the annulus between two casing strings.

In order to cut and pull the wellhead, the oil based mud between the casings must be circulated out, and a cement plug has to be set as an environmental barrier.

Traditionally this was solved by cutting and pulling the casing; for example, cut the 9-5/8" casing from the 13-3/8" casing shoe, then set the bridge plug and cement inside the 13-3/8" casing. In some cases, casing milling was required to set the environmental plug.

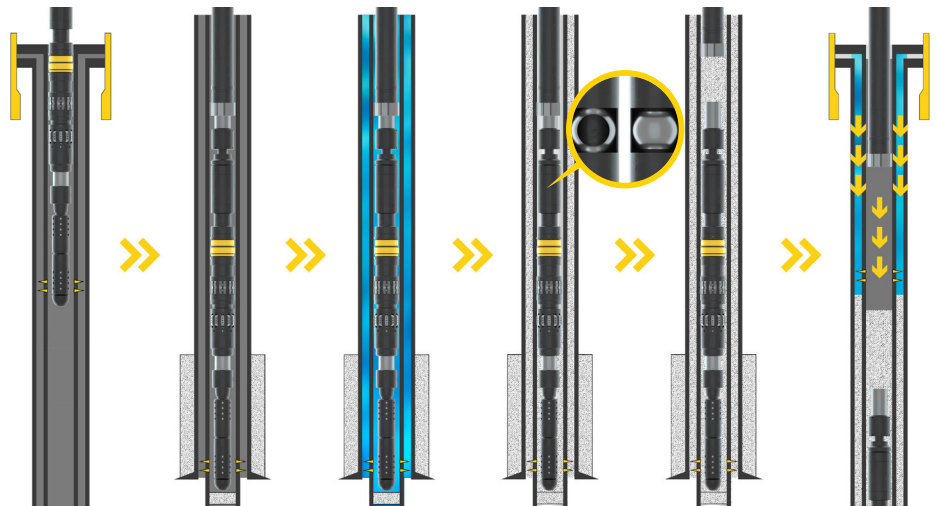
Solution

The solution for this challenge is the SPARTAN plug and perf system. This system consists of the unique SPARTAN retrievable bridge plug, and two separate activated single casing perforation guns. This enables the first casing to be perforated without compromising the integrity of the second casing.

With this solution, the objective of circulating out oil based mud and setting the environmental cement plug can be met with no cutting and pulling, or milling of tubulars.

Result

A permanent barrier is set between two casings without cutting and pulling.



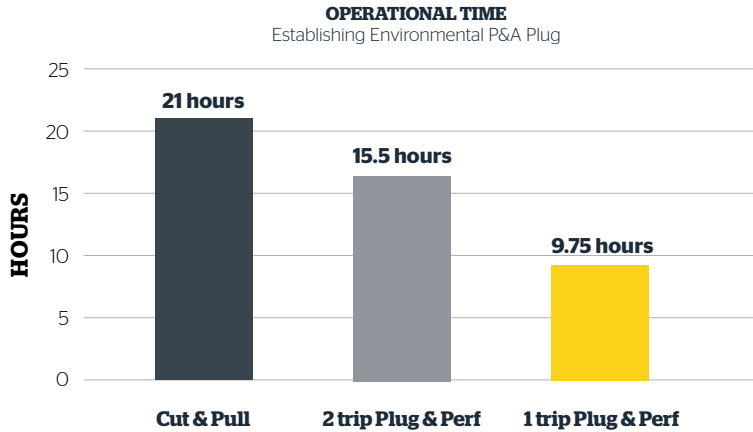
Method

- » Run in hole and perforate the casing just below seal assembly.
- » Run in hole to just above the casing shoe; set the plug and perforate.
- » Pump down string to establish communication between the deep and shallow perforations. Circulate all oil based mud out of the well and displace to seawater to prepare for the cement job.
- » Displace the cement slurry through the drill string and into the deep perforations. Returns are taken through the shallow perforations. By displacing the cement through the SPARTAN plug and into the perforations the B annulus is cemented. The integral ball valve in the SPARTAN plug is closed, so that the cement will stay in place without U-tuning back up the drill string.
- » After the ball valve is closed, the running tool is released from plug and a balanced cement plug is pumped through the running tool and on top of the SPARTAN plug. This completes the barrier. At this stage, a barrier is complete in both A and B annuli.
- » After the cement is set, the barrier can be verified. A unique feature is that due to the shallow perforations, both the A and B annuli can be pressure tested and verified. At this stage, the oil based mud has been removed and the environmental barrier is in place - all without removal of the tubular.



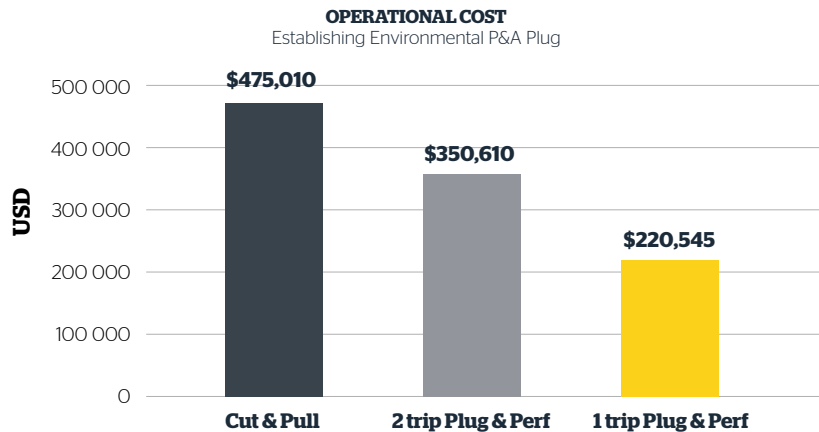
Gaining Efficiency

- Cutting and Pulling 9-5/8" casing, and setting a cement plug is estimated at 21 hours
- The 2-trip Plug & Perf operation took 15.5 hours
- The new 1-Trip Plug & Perf operation takes only 9.75 hours
- Improving efficiency by more than 50%
- Setting a new benchmark for environmental barriers



Saving Operational Cost

- A traditional Cut & Pull operation has an operational cost of \$475,010
- The 2-Trip Plug and Perf operation had an operational cost of \$350,610
- The new 1-Trip Plug & Perf operation has an operational cost of \$220,545
- Operational cost per hour \$ 22,619



Benefits

- No need for Cutting & Pulling tubulars
- No need for handling, shipping and disposal of tubulars
- No Casing Milling, or Swarf handling
- No BOP Damage from Swarf
- Reduced risk profile



Archer is a global oil services company with a heritage that stretches back over 40 years. With a strong focus on safety and delivering the highest quality products and services, Archer operates in 40 locations over 19 countries providing drilling services, well integrity & intervention, plug & abandonment and decommissioning to its upstream oil and gas clients. **We are Archer.**

