Halliburton helped perform first rigless abandonment of offshore wells in North Sea

Plug and abandonment operation executed ahead of schedule and under budget

**OVERVIEW**
A global oil and gas company planned to decommission several mature wells on multiple platforms in the North Sea. These wells ceased production several years ago. The company needed a safe, cost-effective way to plug and abandon the wells that would meet both its high standards and government requirements.

The company teamed with Halliburton to come up with a plan to permanently plug the wells so that they would be safe for the surrounding environment. The two companies worked as one unit to develop and execute the plan, which included the use of a support barge and crane instead of a rig. The result was the first rigless abandonment of offshore platform wells in the North Sea. Halliburton completed the abandonment of the wells 77 days ahead of schedule, 20 percent under budget and without any lost time or environmental incidents.

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<th>CHALLENGE</th>
<th>SOLUTION</th>
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<td><strong>How to abandon offshore well riglessly</strong></td>
<td><strong>Barge and crane worked as pseudo-rig</strong></td>
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<td>Most offshore wells in the North Sea are abandoned with the use of a rig to pull tubing, remove casing and mill. This company wanted a more cost-effective method and believed it could plug and abandon the wells without the use of a rig while continuing to meet the highest safety requirements.</td>
<td>A support barge was placed alongside the platform to provide additional deck space, accommodation and a large capacity crane. A “dummy” work floor was created over the wellheads, with a slip bowl and tubular handling equipment. Together these were used to pull and hang-off tubing.</td>
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<td><strong>Complex wells required alternative methods</strong></td>
<td><strong>HWO unit and gel pill removed need for drilling</strong></td>
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<td>Most of the wells were abandoned and plugged with the use of wireline, cement and pumping services. But for four wells, more complex methodologies were required including casing removal and the use of alternative pills to hold the cement in place.</td>
<td>For two wells, a Hydraulic Workover Unit was deployed in the event of casing removal or milling. On two other wells, coiled tubing was used to spot the Thermatek® gel pill as an alternative to a wireline deployed bridge plug to support cement placement where wireline access was restricted.</td>
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<td><strong>Reducing costs with multiple crews on site</strong></td>
<td><strong>Multidisciplinary crew helped save time and money</strong></td>
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<td>An operation of this magnitude required several different Halliburton services to complete the job. This usually means a different crew for each service line used for the project, creating an additional cost for the company.</td>
<td>Halliburton identified the specific services needed for this project and cross-trained the crew to reduce both headcount and costs. The crew worked together on all the wells, improving efficiency and ensuring lessons learned were captured and implemented as the project progressed.</td>
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A support barge was placed alongside the platform to provide additional deckspace, accommodation and a large capacity crane. A “dummy” work floor was created over the wellheads, with a slip bowl and tubular handling equipment. These were used to pull and hang-off tubing.

Halliburton recorded no lost time incidents or recordable spills during the project, spanning 305 days.

The job was completed 77 days ahead of schedule, thanks to the extensive planning and the use of rigless plug and abandonment methods.

The successful plug and abandonment of the 16 wells on three platforms was completed 20% under budget.
Global company wanted to abandon several wells in the North Sea

This global oil and gas company wanted to develop abandonment designs for the decommissioning of several wells on multiple platforms in the North Sea. These wells were no longer in production and needed to be securely plugged to help ensure environmental safety before topsides and jacket were removed.

The company wanted a safe, cost-effective way to plug and abandon these unmanned installations that would meet or exceed government regulations and its own standards. The company chose Halliburton to develop plans and help execute the abandonments.

Wells dated back to 1970s

Each well presented unique sets of challenges due to its age and construction. In some instances information from the construction and early production phase was limited due to the fact that the wells dated back to the 1970s. Also, during the construction phase, not all the casing was logged for cement bond, meaning that the actual bond of the primary cement behind the production casing was not known in detail. This could have lead to additional milling, pipe removal or logging.

Halliburton worked with company to devise plan

Collaboration was vital to the success of this operation. Halliburton planning and engineering personnel worked side-by-side with the company’s personnel to come up with the best, most cost-effective way to abandon and plug these wells. That included weeks of planning and months on site. The two teams became one, sending out joint reports and meeting as one group.

First rigless plug and abandonment operation in North Sea

To keep costs to a minimum, instead of bringing a rig on site, a support barge was placed alongside the platform. This barge gave crews deck space, utilities, power and other essentials needed to complete the job. A large capacity crane helped move equipment around and a “dummy” work floor complete with a slip bowl and tubular handling equipment was built over the wellheads.

Together these were used to pull and hang-off tubing, essentially working in the same capacity as a rig would, but without drilling. This method saved both time and money, and created the first rigless platform plug and abandonment operation in the North Sea.
Plug and abandonment operation executed ahead of schedule and under budget

**Alternative methods found for complex wells**
While most of the wells were plugged with wireline, cementing and pumping services, four of the wells were more complex and required alternative methodologies. In two of those cases, a Hydraulic Workover Unit was mobilized as a contingency to remove the tubulars and perform any milling that needed to occur. However, wireline logging determined that the cement could be placed without the need to mill.

Two other wells required coiled tubing to insert a gel pill to hold the cement plug in place. Halliburton used its Thermatek® fluid to help keep the cement from falling downhole before it set. Thermatek fluid remains as a low viscosity fluid during placement, then sets rapidly providing a platform on which to spot the cement and thus creates a gas-tight seal. This pill not only kept the cement in place, but also helped ensure the environmental quality of the plug.

**Multi-skilling improved crew and reduced cost**
Another advantage Halliburton provided during this project was an integrated crew, able to perform multiple functions. Instead of using different crews for each operation, leaders of one service team were cross-trained for supporting roles in other services, including cementing, slickline, e-line, and others. In addition to supporting other Halliburton business units, the core crew supported activities normally taken care of by rig, deck and maintenance crew. Clear roles and responsibilities were defined and a comprehensive Health, Safety, Environment, and Quality (HSEQ) plan was implemented. The teams were maintained during each phase of the project, learning lessons after completing work on each platform. This contributed to increasingly more efficient and more cost-effective operations as the work progressed.

**Wells plugged ahead of schedule, under budget and without incident**
All the wells were successfully plugged and abandoned. Crews inserted three cement barriers – 500 to 1000 feet of cement at the bottom of each hole, plus 500 feet of cement at an intermediate depth and 300 feet of cement at the mudline. Halliburton helped execute the project with no lost time or environmental incidents. The project was also completed 77 days ahead of schedule and 20 percent under budget. The successful decommissioning of these offshore fields helped maintain environmental safety in the area for years to come.

“The core crew quickly developed into a multidisciplinary team that was kept together throughout the project. This has proven key in achieving an excellent operational and safety performance on the project.”

Lead Well Engineer
Global Oil and Gas Company

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