Decarbonise case study Multi Tube Integrity

Enhanced multistage cut and pull out operations with major rig time cost and emissions savings

Location: UK
Well type: Plug and abandon
Reference: SPE-204066
Field: Cormorant
Customer: TAQA UK

Case benefits

— Achieved a significant reduction in rig time for plug and abandonment operations.
— Reduced energy consumption and carbon emissions associated with surface equipment.
— Delivered cost savings through improved efficiency.
— Enabled a targeted and efficient multistage cut and pull out operation in a situation where well documentation was unavailable.

Challenge

Setting surface plugs in offshore wells requires multistage cutting and pulling out of well casings. The milling process may last between a day and a week, depending on the well structure and the depth of the cutting window. The aim is to define the cutting interval so it contains the smallest volume of metal to be processed. The presence of collars, centralisers and welded fins can also substantially increase cutting time.

A multistage ultrasound survey is the conventional method for locating zones of minimal total wall thickness in the tubulars and determining the completion elements. This approach requires well preparations and logging after each stage of the retrieval process. The time spent on well preparation activities such as cleanout, pressure logging and interpretation is active rig time and a target for optimisation.

Solution

Multi-tube scanning using TGT's Pulse (electromagnetic) platform can identify and characterise completion elements in up to four concentric metal barriers. The electromagnetic response from the barriers is not affected by the presence of scale or fluids and does not require the tubing to be pulled out of the hole. As a result, the Pulse system enables rigless scanning of tubulars to prepare cut and pull out operations, thereby minimising the time required for these operations. The cutting windows can be determined precisely, enabling the selection of a location with no completion elements and where the total nominal thickness is minimal. The electromagnetic scanning survey can be perfomed riglessly or in a single run at the beginning of the plug and abandonment process. By enabling lighter or rigless interventions, TGT helps minimise carbon footprint.

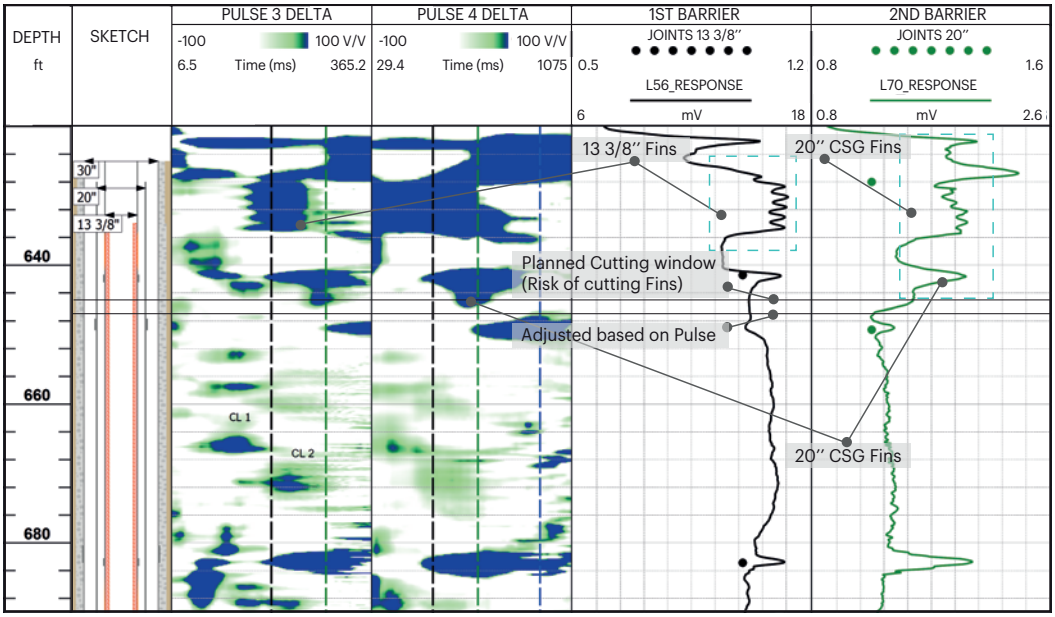

Figure 1
Results from the TGT Pulse platform survey enabled the operator to adjust the depth of cutting/milling to avoid the risk of cutting the welded fins on the 20-in. casing.

Result

In this case study, the Pulse survey was conducted on the rig timeline with real-time decisions being made from the results. This called for rapid interpretation, and the average delivery time for results was set at 3–4 hours after the tools rigged down.
In each of the four logged wells, all the completion elements were located, described and the cutting window determined. In some cases, the window was adjusted by several feet from the initial plan (Figure 1). All cut and pull out operations went smoothly and using the Pulse system in this way saved more than 100 hours of rig time and resources. Rigs and surface equipment are powered by diesel engines or gas turbines that emit carbon dioxide when fuel is burned. A typical jack-up rig emits around 70t of carbon dioxide per day, and so a 100-hour reduction in rig time translates into substantial energy consumption and emissions savings.

The survey showed that the Pulse platform could detect fins, collars and other completion elements in the third or fourth concentric metal barrier with casing outer diameters of up to 20 in (Figure 2). This means it is possible to determine the exact position for well barrier cutting and enable effective pull out operations, even in situations where the detailed well barrier schematics are unavailable.

Figure 2
Casings retrieved during the plugging and abandonment operations at Cormorant field show precise milling of four tubulars and avoidance of elements such as welded fins on the 20-in. casing.