Case Study: Shell UK Subsea Wellhead Recovery Campaign 2017

SPE Late Well Life & Well Abandonment Conference
28th June 2018

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Agenda

- Setting the Scene
- Contracting Strategy
- Cost Savings & Realised Opportunities
- Overview of Operations
- Reducing HSE Exposure
- Looking Ahead
Setting the Scene: Decommissioning Strategy

- Compliance with regulatory guidelines
- Minimizing Cost
- Optimal commercial models to align service partner goals
- Simplification of Scope
- Reduction in HSE exposure
Background

- Everest and Atlantic & Cromarty P&A Campaigns
  
  - 4x E&A Everest wells abandoned as part of a rig based P&A campaign completed in Q4 2016
  
  - 3x production Atlantic & Cromarty wells abandoned as part of a rig based P&A campaign completed in Q3 2017
  
  - Both campaigns included deep isolation against the reservoir to isolate all formations identified to be flowable
  
  - The shallow displacement of OBM from behind the casing strings and setting of environmental plug was undertaken using the Perforate, Circulate and Cement (PCC) method
Wellhead Recovery Campaign

What did we set out to do?
Cut and recover 4x Everest and 3x Atlantic & Cromarty wellheads and 3x subsea Xmas trees safely and efficiently

What did we achieve?
Safe recovery of all 7x wellheads and 3x subsea Xmas trees in a total of 14 days with no incidents or accidents. All wellheads severed at a minimum of 10ft below mudline as per OGUK guidelines (Issue 5, July 2015)
What did we do differently?

- Wellhead recovery was not new to Shell UK but had never been attempted before as part of a campaign using a work vessel.
- Initial work focused on the clear definition of scope and a comparison between rig and vessel based options, after having confirmed sufficient number of wells to form a campaign.
- Vessel option not only provided a cost saving opportunity but also helped minimise offshore HSE exposure.
- As a result of this stand-alone piece of work, the decision was made to go out to market for a turn-key delivery on a lump sum basis.
- Key consideration was to provide the vessel operator with maximum flexibility to execute the scope at an optimum time.

The single constraint we had when completing the wellhead recovery campaign related to a time restriction for the Everest wellhead severance workscope to be completed prior to 31st October 2017, official transition date of the asset to Chrysaor.
Contracting Process

- As the project was part of decommissioning scope, the work was tendered to a wide range of companies and different commercial models were considered
- Out of a total of 14 candidates taking part in the tendering exercise, the contract was awarded to DeepOcean AS
- Key criteria included safety, ability to project manage scope and integration between the vessel operator and wellhead severance supplier
- Contracting process viewed as a pilot project and an opportunity to test the market’s ability to deliver in advance of the upcoming 25 well subsea P&A campaign. This allowed us to try an alternative approach
- Drew on internal experience of C&P and Subsea Projects, working together as ‘Performance Partners’ throughout the planning and execution phases. Although the Wells function planned the work, this was supervised by a Subsea Projects supervisor onboard the vessel

Performance Partnering and Goal Alignment between Wells, C&P and Subsea Projects was KEY!
Edda Freya Offshore Construction Vessel

- DP3
- Built in 2016
- 150m length
- Max POB: 140
- 600T AHC Offshore Crane
- 2300m³ deck area
- 2x ROVs

First wellhead recovery campaign of this size for Shell and first time completing such workscope on an offshore construction vessel
The use of a vessel based wellhead severance campaign resulted in savings in the order of £millions compared to the same scope of work being completed with a rig straight after the abandonment of the wells.

- Risk based decision making

Example: Lump sum approach included all risk such that the impact of any inefficiencies from WOW / NPT was minimised

Example: Elimination of drift cleaning tool (DCT) run by replacing with simple check with ROV snake camera. Estimated time saving of 2hrs per well.

- Control of Work

Example: Authority to Work (ATW) obtained from nearby pipeline operator meaning less interfacing compared with previous experience using Permit to Work (PTW) system during rig P&A campaign.

- Leveraging global Shell relationships

Example: Renting SXT lift caps from major oil operator in Norway

42% Of Original budget Spent
DeepOcean selected Proserv’s abrasive technology to complete the wellhead severance campaign.

- Multi string cutting tool (MSCT) allowed multiple 360° passes to achieve cut.
- Multi Wellhead recovery tool (MWRT) to pull and recover the wellhead.
Operations Storyboard

- Crane deploys MWRT and ROV uses hotstabs to activate locking dogs and secure to wellhead.

- Crane deploys MSCT while ROV assists with securing it inside MWRT. Umbilical secured to tugger wire.

- ROV manipulates locking handles to secure MSCT inside MWRT.
MSCT performs cut and is subsequently recovered. ROV manipulates locking handles to release tool from MWRT.

MWRT rigging re-attached to crane by ROV and wellhead pulled from seabed and recovered to vessel. On surface, MWRT is removed from wellhead before this is safely sea-fastened on deck.
Performance

WELLHEAD SEVERANCE CAMPAIGN PERFORMANCE

Campaign duration incl. mob & de-mob:
14 days

Fastest Everest WH severance completed in just 16.8 hrs
Everest Wellhead Recovery

- Debris / netting removal completed prior to start of wellhead severance operations
- Proximity agreement with nearby pipeline operator and Everest platform liaison
- All 4 wellheads c/w guidebases recovered without any issues
- 4 strings (30”, 20”, 13-3/8”, 9-5/8”) severed with a single cut
- Maximum pull required for wellhead recovery ~30T
- Wellhead c/w guidebase ~20T lift in air
Atlantic & Cromarty Xmas Tree Recovery

- In an attempt to minimise HSE exposure, at the end of the A&C P&A campaign, the Xmas trees were lifted off the wellhead and placed back in an unlocked position to avoid taking them back to the rig and having to handle them through the moonpool.
- Prior to recovering the trees, the telescopic joint legs had to be cut to assist in their safer recovery and also, in order to comply with the transportation limit requirements. These were cut using diamond wire cutters.
- All 3 SXTs c/w torque reaction bases (TRBs) recovered without any issues ~60T lift in air.
Atlantic & Cromarty Wellhead Recovery

- 4 string design (30”, 20”, 13-3/8” and 9-5/8”) similar to Everest
- Atlantic & Cromarty wellhead recovery proved a little more challenging compared to the Everest E&A wells
  - Difficulties encountered in maintaining the required air gap to achieve successful cuts
  - Conductor and surface casings were thicker than the ones on Everest
- 2 cuts required for successful retrieval of the 2 wellheads and third cut required to recover the third and final wellhead
- Max ~150T pull required for retrieval
Minimising HSE Exposure

- Had the wellhead severance been completed immediately following the P&A operations on the rig, the recovery of the wellheads would have been effected through the moonpool and double lifting would have been required, once onto a suitable area on the rig and additionally onto a supply vessel in order to be returned to Aberdeen.

- Through the use of the Edda Freya the wellheads were recovered in a single lift and stored on deck until the vessel returned to port eliminating additional heavy lifts, logistics and overall exposure to other risks.

- Last minute optimisations relating to securing the SXT on the TRBs were accommodated, thereby eliminating the requirement for separate lifts of the two components upon their arrival back to Aberdeen.
Lessons Learnt

**Contracting Phase**
- Tender for both lump sum and day rate contracts and evaluate accordingly using discrete models. This is an important consideration if wellhead recovery is to be bundled with other decommissioning work
- Award contracts early to ensure schedule flexibility

**Planning Phase**
- Ensure project manager is on seat from early planning stages through to execution and project close-out
- Planning of contingency options while ensuring sufficient time for these to be included in any relevant permit applications
- Ensure permits & notifications for rig-based activities consider the subsequent vessel-based operations

**Operational Phase**
- Defining maximum pull limits for wellheads upfront
- Review of critical spares with supplier
- Ensure detailed well and casing information is available to offshore team on vessel
Looking Ahead

- Thousands of wells require abandonment in the North Sea and wellhead severance and recovery forms an integral part of such abandonment operations.

- Vessel based wellhead recovery has now been tried and tested successfully as part of a campaign, resulting in significant cost savings and reducing offshore HSE exposure.

- Shell UK’s upcoming 25 well subsea P&A campaign plans on continuing to use the same approach of a vessel based wellhead severance campaign to complete the phase 3 abandonment of subsea wells.

- Regulatory guidelines
- Moral responsibility
- Operational risk
- Environmental Impact
- Long term exposure of leaving equipment in place
Acknowledgements

- Patrick McGrath (Well Engineer), Bora Uysal (Contract Engineer), St.John Read (Subsea Ops Team Lead), Euan Magill (A&C Project Lead), Leon McManus (Transport Analyst), Steve Arcus (Underwater Ops Supervisor), Tony Moore and Ian Finlayson (Marine Services), Todd Franks (Well Ops Team Lead), Hamish Hogg (Senior Well Engineer), Vinit Raje (Well Ops Manager) and many others

- DeepOcean, Proserv and OneSubsea onshore and offshore teams
Questions and Answers
Deck Plan Example