Decom North Sea – Lunch & Learn

Well Ops services

21st January 2015

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WellOps Decom Overview

Helix Well Ops UK Ltd pioneered both subsea Light Well Intervention (LWI) and Plug and Abandonment (P&A) operations, without the need of a MODU and has been since 1987

To date, **Helix Well Ops** has completed:

- **59 live well abandonments**
- **136 suspended well abandonments**
  - 32 Category 1 (wellhead removal only)
  - 104 Category 2 wells (cement plug and abandon – wellhead removal)

The first vessel in service was the ***MSV Seawell*** in 1987, followed by the ***Well Enhancer*** in 2009 ***& Skandi Constructor*** in 2013.

In H2 2016 the Q7000 is scheduled for delivery.

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Helix Well Ops – well deco track-record in the North Sea Region

1993
Hamilton Oil Co. 13 live wells
ARGYLE FIELD

1994
AMERADA HESS 3 live wells
ANGUS FIELD

1996
Midland & Scottish Energy 16 live wells
EMERALD FIELD

1997
BP 7 suspended wells
ELF 6 suspended wells
BP 4 suspended wells

1998
BP 7 suspended wells
BP 2 live wells
DONAN FIELD

1999
AMERADA HESS 5 live wells
AMERADA HESS 5 suspended wells
DURWARD & DAUNTLESS FIELDS
Phillips 1 live well
MOIRA FIELD
ELF 2 suspended wells
Total 1 suspended well

2000
Statoil 6 live wells
TOMMELITEN FIELD
Talisman 4 live wells
BLENHEIN & BLADON FIELDS

2000/1
BP 5 suspended wells
Talisman Energy 3 suspended wells
Marathon Oil 3 suspended wells
Enterprise 1 suspended well
HESS 4 suspended wells

2003
Marathon Oil 4 suspended wells

2004
Conoco 5 suspended wells
Shell 3 live wells

2005
BP 8 suspended wells

2009
BP 1 live well
DON FIELD

2010
Shell 1 suspended well
HESS 4 live wells
IV/RR FIELD
BP 5 live wells
DON FIELD

2011
HESS 6 live wells
IV/RR FIELD
BP 2 live wells
DON & MAGNUS FIELDS

2012
Talisman Energy 3 suspended wells
BP 3 live wells
MAGNUS FIELD

2013
HESS 5 live wells
IV/RR FIELD
ERT 1 suspended well
EnQuest 1 suspended well
Total E&P UK 3 live wells
ALWYN NORTH EXTENSION FIELD

2014
HESS 2 live wells
IV/RR FIELD
Talisman Sinopec Energy 3 suspended wells
BP 1 suspended well

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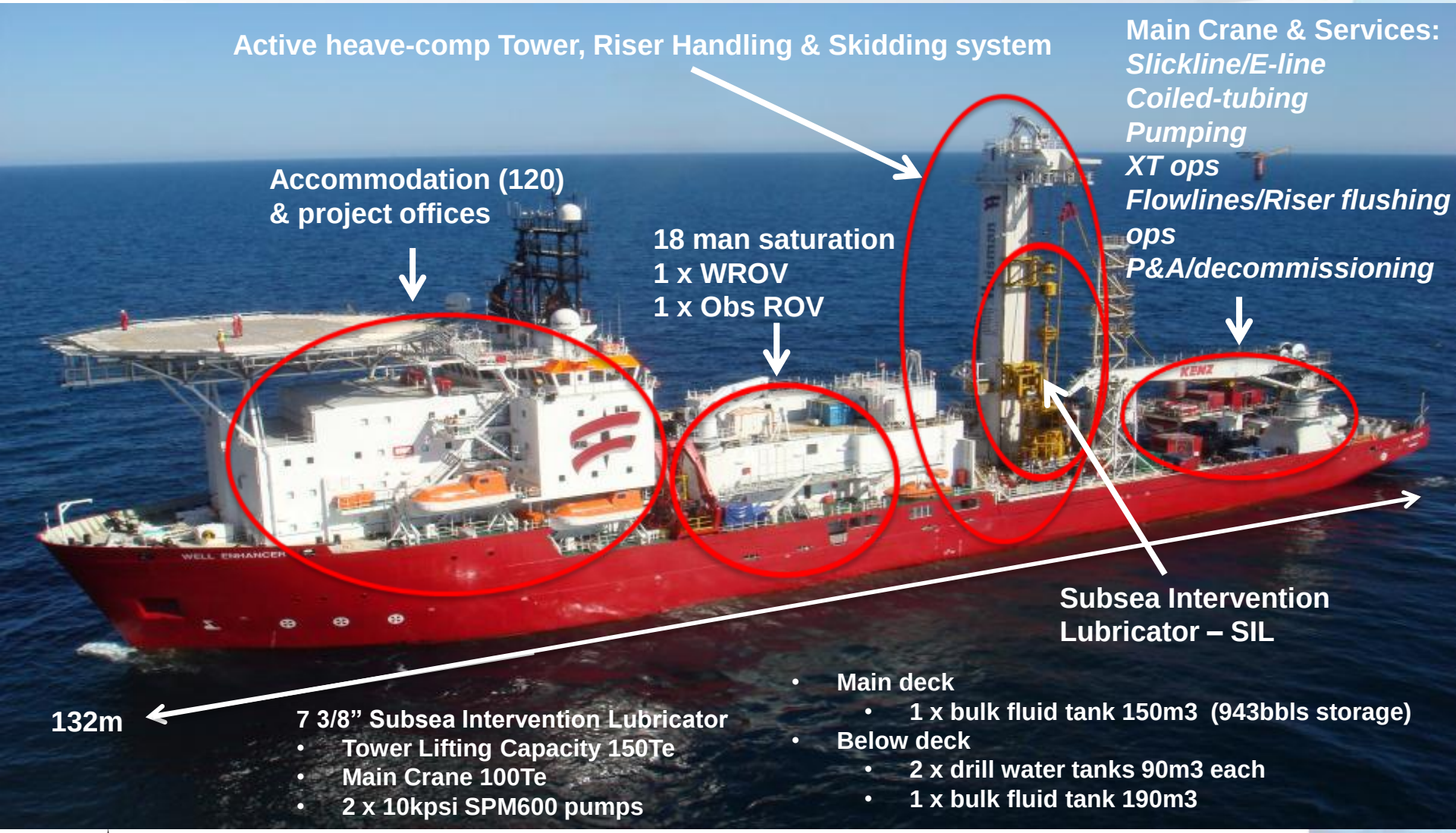
Key:
Purple – Suspended E&A well abandonment
Green – Prep live well abandonment
Red – Full live well abandonment

Typical Well Ops vessel : Well Enhancer



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7 3/8” SIL – Subsea Intervention Lubricator

The Subsea Intervention Lubricator (or SIL) provides access to both vertical & horizontal XT wellbores for interventions. Its primary functions are:

- *Enabling access into a live subsea well*
- *The primary well control equipment throughout the intervention process*

The SIL is made up of 3 elements:

1. Subsea stuffing box/grease injection head c/w latch and gate valve
    - Slickline – static seal (rubber packer assy.)
    - E-line – dynamic seal (hi viscosity grease injection)
2. Riser/lubricator section
3. LRP/EDP assembly c/w gate valve & wireline BOP’s blind ram and shear/seal) – **well control package**

The SIL is deployed, via guide wires (Tree/PGB) to the Tree and controlled via an umbilical from surface

- The SIL has failsafe close valves
- In the event of an ESD the valves are closed in sequence with time delays to allow a toolstring to drop through the SIL and DHSV
- The umbilical is connected via a stabplate with a shear pin for a vessel drive-off scenario

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Phases of decommissioning

1st Preparation work

2nd Zonal isolation and tubing removal

3rd Wellhead and seabed clearance

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HESS – Durward/Dauntless (FULL DECO)

Project: 1999 (35 days)

Objective: P&A 10 wells (5 live)

Workscope includes:

Downhole (Phase 1)

- -Permanent plugs and cement
- -Cut tubing
- -Unlatch XT

Decom (Phase 2)

- -Recover XT's & Flowbases
- -Recover tubing-hangers
- -Blow wellheads – recover and/or wet store

Wellhead recovery (Phase 3)

- -Wellhead recovery
- -Seabed clearance

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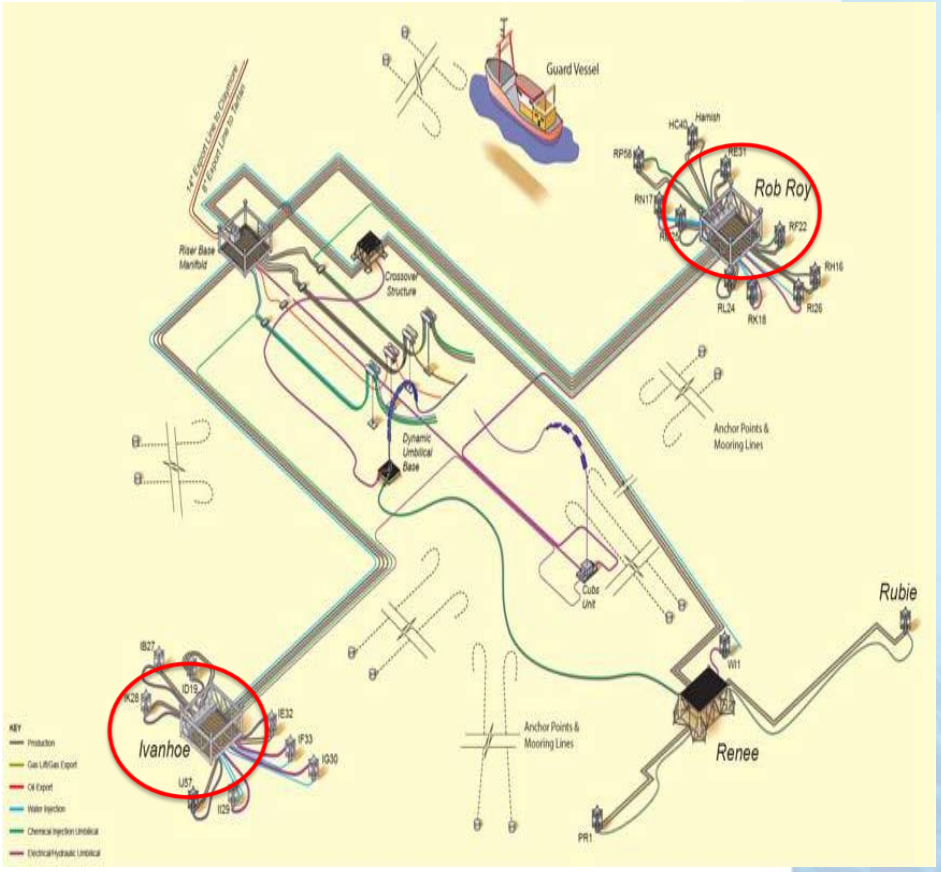
HESS – IV/RR (PREP DECO)

Project: 2010 (2 campaigns)/2011/2013
(2 campaigns) & 2014 (final campaign)

Workscope includes:

- XT valve/barrier integrity testing
- DHSV control line checks
- TC testing ops – TCRT to vessel
- Wireline drift well to confirm well/tubing integrity
- Plug and suspend production & annulus bores
- Punching/cutting tubing in preparation of full abandonment
- Disconnect flowlines & umbilicals – fitting and testing blind flanges to the manifolds
- Recover XT's back to the vessel

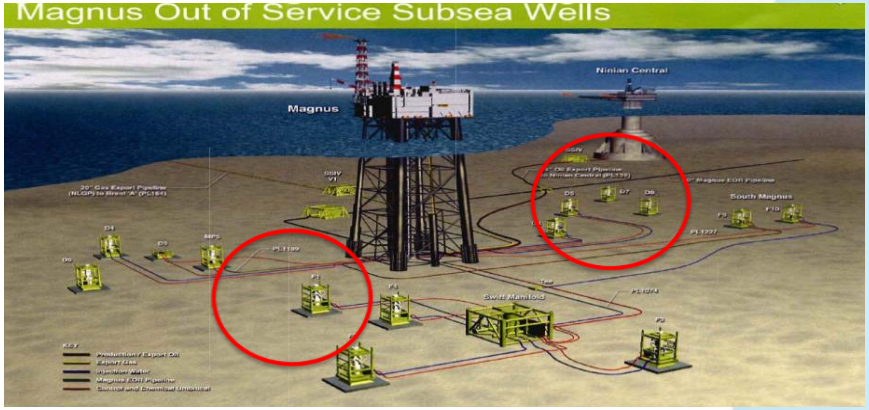


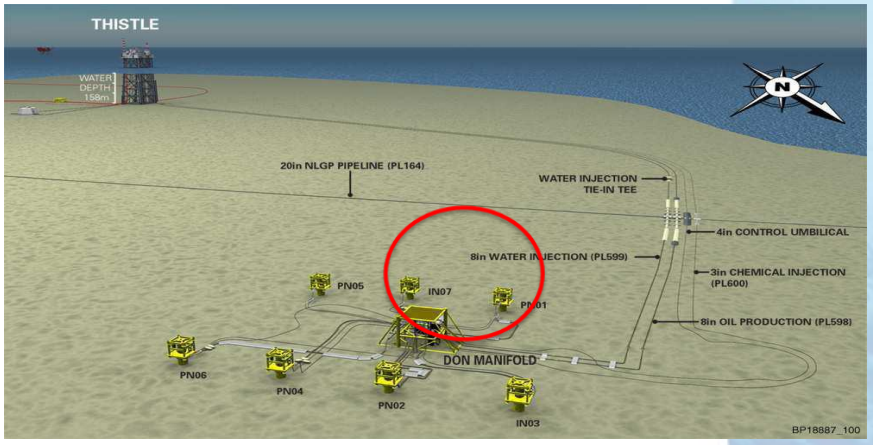
BP – Don & Magnus (PREP DECO)

Projects: 2009/2010/2011 (2 campaigns) & 2012

Workscope includes:

- Bullhead tubing contents into formation, via vessel kill pumps
- Wireline drift well to confirm well/tubing integrity
- Plug and suspend production & annulus bores
- Punching/cutting tubing in preparation of full abandonment – at a later date
- Disconnect flowlines & hydraulic umbilicals
- diving operations to install & test blind flanges on the flowline & annulus flow spool
- Converting the XT hydraulics to ROV compatible for MODU ROV XT access at a late date for well P&A





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Suspended Well Abandonment

Final Well Abandonment

- CAT 2.1 = ‘A’ annulus perforating & cement plug placement
- CAT 2.2 = ‘A’ and ‘B’ annulus perforating and cement plug placement

Both operations circulating out/return to LWIV WBM/OBM in casing string(s)

- CAT 1 Wellhead is cut and recovered

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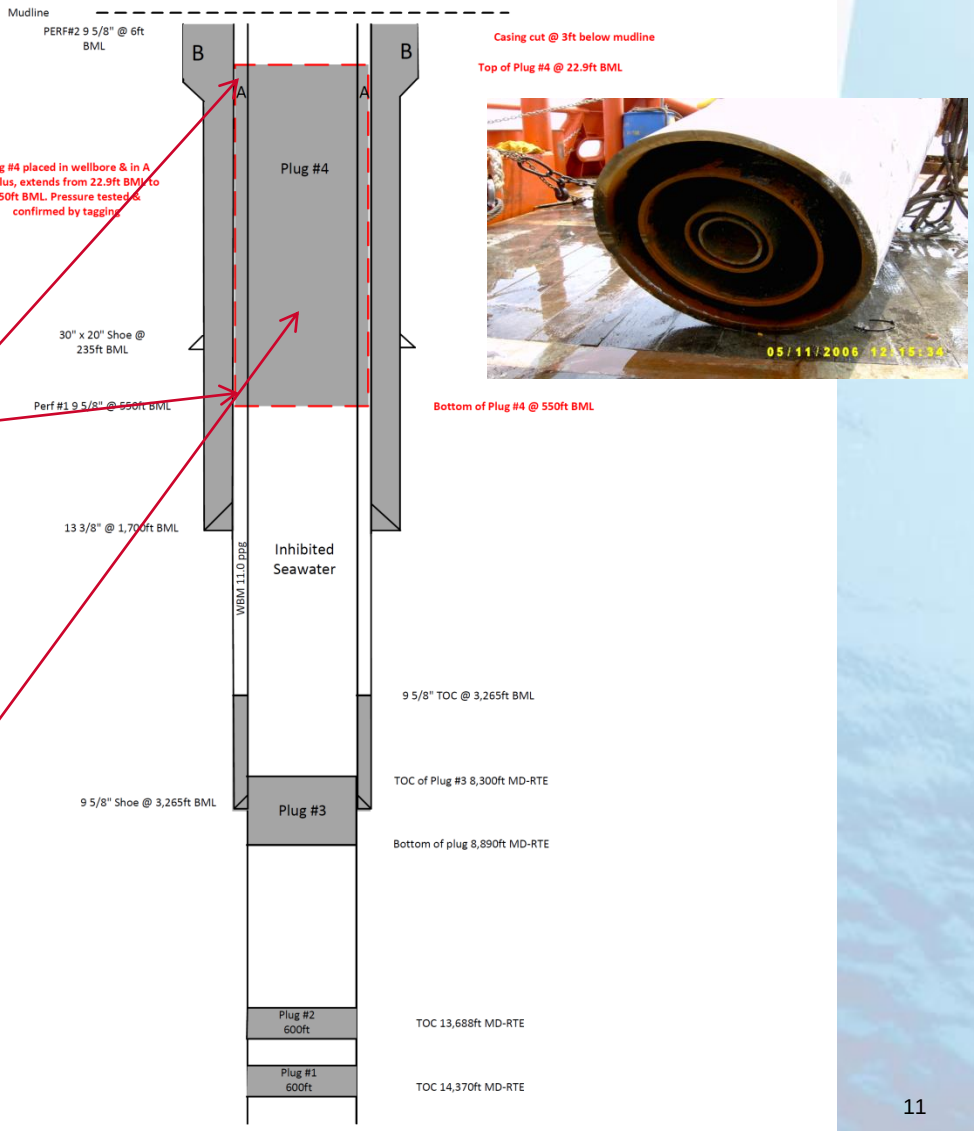
Final Abandonment Schematic

Packers are set at the top to seal the well with a cement stinger running through the packers

Annulus perforated in 2 places to create a flow path using TCP guns

The annulus is then ‘cleaned out’

Cement is then pumped down the main bore and is forced up the annulus to create a plug ~500ft



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BP North West Hutton – Hardware removal

Projects: 2012 (2 campaigns)
Trenching and pipeline removal

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Q7000 – heavy well intervention & decommissioning unit

- Short duration campaigns
- Heavy well intervention & CTD
- Full or partial well abandonment
- Well workovers
- Field development

- Open flat deck – 3 sided access
- Efficiency of rig-up & service change
- DP3 fast move & position vs MODU
- Safety improvements vs MODU
- Operability improvements vs MODU

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One Stop Shop

- **Integrated Onshore/Offshore Management, Project Management – all in-house**
- **Bespoke vessels with Subsea Intervention Lubricators for well access**
  - **Wireline (slickline & E-line)**
  - **Pumping (well kill, cementing & stim)**
- **Xmas Tree recovery**
- **Saturation Diving/ROV operations**
- **Prep abandonment**
- **Full abandonment**
- **Field infrastructure recovery**
  - **Jumpers/flowlines/Mattresses/Manifolds**

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Commercial advantages

Time & Cost – efficiency

- **Typically lower spread rate than a rig**
- **Transit – infield from well to well (10 – 12knts.)**
- **Set-up at wellsite – HOURS versus DAYS**
  - Rig might take 3 or more days to set up
  - LWIV 36+/- hours – then well access
    - Has no anchors/ballast or J/U ops, just set up on Dynamic Positioning (DP)
    - No make and break riser-equipment deployed on a winch

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END

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