Shelley Decommissioning Project
Premier Oil Company Overview

- Independent oil and gas Operating Company with corporate office in London. Established 40 years ago.
- JV Partners in several UK (Wytch Farm, Scott & Telford, Kyle, Nelson), Norway (Froy and Bream), West Africa and Pakistan Assets.
- Operator in oil and gas fields offshore Indonesia and Vietnam.
- Acquired Encore in 2011.
- Several Operated development projects underway; Solan and Catcher.
- Several Non Operated development projects underway; Huntington and Greater Rochelle.
- A growing organisation.
Shelley Decommissioning Project
Agenda

• Shelley Field Overview
• Project sequence
• Project equipment re-cycle for re-use, free issue and disposal
• Project budget & schedule overview
• Summary
Shelley Decommissioning Project
Field Overview

- The Shelley field is located in block 22/2b and 22/3a, in the Central North Sea, approx 192km North East of Peterhead.
- Originally developed by Oilexco with first oil in August 2009.
- The estimated total recoverable reserves for the field was 20million barrels of oil. Subsea design life 3 years.
- Unfortunately due to poor reservoir performance Cessation of Production resulted in July 2010.
- The field was developed based on a 2 well tie back to the FPSO Sevan Voyageur.
- Water depth 96m.
2 subsea production wellheads, xmas trees and fishing friendly structures.

2 dual Electrical Submersible Pumps (Schlumberger).

A production manifold and protection structure, containing SCM and 2 off subsea multiphase meters (Framo).

2km 8” production flowline trenched and buried including rock dump.

2.4km EHCU (OMUK) trenched with natural backfill.

Stabilisation mattresses.

2 risers from seabed to FPSO.

8” production riser (335m). Pliant Wave Distributed Buoyancy type design (22 buoyancy modules). Clump weights on seabed.

Dynamic umbilical riser (319m). Position maintained by two clump weights.

A Leased Sevan 300 FPSO vessel with mooring lines and suction anchors. Duty holder Wood Group.

Oil export via shuttle tanker.
• A cylindrical vessel with a main hull diameter of 60m and an oil storage capacity of 300,000 barrels total fluids.
• Living quarter (LQ) with a maximum POB of 57.
• The top of the cargo tanks was the Main Deck.
• The Process Decks was arranged over two levels. The process consisted of two-stage separation and produced water clean-up. Oil was routed to the cargo tanks. Gas was routed to fuel and flare. Produced water was cleaned-up and discharged to sea.
• The FPSO was equipped with two offloading stations, one on the port side and the other to starboard.
• The mooring system consisted of twelve anchors and mooring lines positioned in three clusters of four around the platform.
• Each mooring line was fixed to the seabed by a suction anchor, a cylindrical steel can 6 or 7m in diameter and 15m long.
• A design life of 25 years for the vessel hull, topside and related systems.

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Voyageur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total liquid [BLPD]</td>
<td>50,000</td>
</tr>
<tr>
<td>Oil [BOPD]</td>
<td>20,000</td>
</tr>
<tr>
<td>Water [BWPD]</td>
<td>30,000</td>
</tr>
<tr>
<td>Gas [mmscfd]</td>
<td>25</td>
</tr>
</tbody>
</table>
Shelley Decommissioning Project
Activities – Sequence of Events

• At Cessation of Production the Sevan Voyageur was depressurised, flushed clean of all hydrocarbons and made safe from production mode, in preparation for relocation.
• The risers and mooring lines were disconnected and laid on the seabed.
• The FPSO was towed away.
• Several dive construction vessels were utilised to support the phased programme of activities.
• The subsea wells were plugged and abandoned using a semi submersible.
• The trees and wellheads were recovered and the casing cut below seabed.
• All equipment recovered to surface was taken ashore for either refurbishment and re-use on other projects or disposal.
14 Jul 2010 COP (Sevan Marine, WoodGroup and POUK)
• Depressurise FPSO and prepare for topside flushing.

17 Jul 2010 - Arrival of DSV Wellservicer (Technip)
• Commence subsea flushing operations from wells, wellheads, jumpers, manifold and the production pipeline, until residual oil in water less than 30ppm arriving at FPSO.
• All flushed material pumped to the FPSO for process treatment. Potential existed to transfer to shuttle tanker as part of the last cargo offload. Additional clean up of slops required onshore.
• Similarly the hydraulic fluid and other chemicals in the umbilical flushed and returned to the FPSO.
• Isolations in place and umbilical and riser disconnected from the topside system. Pulling heads installed ready to lower the umbilical and riser.
• Dynamic section of umbilical cut and both risers recovered to the DSV by lowering them from the FPSO.
• DSV removed the four protection structure legs from the trees to allow access for Sedco 704.
Shelley Decommissioning Project
Sequence of Events – Phase 1
Aug 2010 to May 2011 Sevan Marine (Owner Scope)

- FPSO disconnected from moorings on 22 Aug 2010 and towed to Kristiansand for refurbishment and re-use.
- Polyester sections of the mooring system recovered shortly after.
- The anchor chains and suction can were recovered in May 2011 again for potential re-use (Normad Oceanic).
Shelley Decommissioning Project
Sequence of Events – Well P&A

31st Oct 2010 – Arrival of Transocean Sedco 704
• Commencement of well P&A (22/2b – P1Z & 22/2b-P2S)

29th Dec 2010 – Skandi Skolten SCV
• Cut and recovery of Horizontal XMAS trees by NCA

14th Apr 2011 – Skandi Aker SCV
• Recovery of wellhead recovery
24th May 2011 – Arrival of DSV Orelia (Technip)

- Disconnected all control and production jumpers from the production manifold.
- Recovered the Shelley manifold.
- Recovered all concrete mattresses from the FPSO end.
- Cut and recovered the rigid production pipeline at both ends up to rock dump section.
- Recovered concrete mattresses from the manifold end.
- A total of 120 concrete mattresses (recovered to project baskets)
Shelley Decommissioning Project
Sequence of Events – Phase 2

13th Jul 2011 – Arrival of DSV Orelia (Technip)
• Recovered remaining mattresses.
• Recovered well control jumpers.
• General debris clearance.
• Recovery of manifold protection structure.

13th Aug 2011 – Arrival of Fugro Symphony
• Recovered static section of umbilical and all the production jumpers.
• Completion a side scan as-left survey of the Shelley site.
• Post decom environmental survey to be completed by Q2 2013.
Shelley Decommissioning Project
Sequence of Events – Phase 2

Aug 2011 – Arrival of MV Amythyst Fishing Vessel
• On behalf of SFF completed seabed trawl and verification sweep.
Shelley Decommissioning Project
Total credits from refurbishment, recycle and disposal

<table>
<thead>
<tr>
<th>Scope</th>
<th>Item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Production Riser</td>
<td>Sold to third party for re-use</td>
</tr>
<tr>
<td>2010</td>
<td>Bouyancy Module</td>
<td>Sold to third party for re-use</td>
</tr>
<tr>
<td>2010</td>
<td>Clump Weights</td>
<td>Sold to third party for re-use</td>
</tr>
<tr>
<td>2010</td>
<td>Ballast Blocks</td>
<td>Disposal</td>
</tr>
<tr>
<td>2010</td>
<td>Dynamic section umbilical</td>
<td>Disposal</td>
</tr>
<tr>
<td>2011</td>
<td>Manifold Roof Panels</td>
<td>Disposal &amp; scrap value</td>
</tr>
<tr>
<td>2011</td>
<td>Umbilical SUTU</td>
<td>Disposal &amp; scrap value</td>
</tr>
<tr>
<td>2011</td>
<td>Ballast Blocks</td>
<td>Disposal &amp; scrap value</td>
</tr>
<tr>
<td>2011</td>
<td>General Scrap (Pipe)</td>
<td>Disposal &amp; scrap value</td>
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<tr>
<td>2011</td>
<td>Barracuda Credit</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Buoy credit</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Rigging</td>
<td>Disposal &amp; scrap value</td>
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<tr>
<td>2011</td>
<td>Control jumpers</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Production Jumpers</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Umbilical end fittings</td>
<td>In storage</td>
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<td>2011</td>
<td>Trees</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Protection Structure</td>
<td>Disposal &amp; scrap value</td>
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<tr>
<td>2011</td>
<td>Manifold</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Static section umbilical</td>
<td>Disposal</td>
</tr>
<tr>
<td>2011</td>
<td>SCM</td>
<td>Sold to third party for re-use</td>
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<tr>
<td>2011</td>
<td>Concrete Matts</td>
<td>Given to farmer to save disposal costs</td>
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<tr>
<td>2011</td>
<td>Matt Baskets</td>
<td>Sold to third party for re-use</td>
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</tbody>
</table>

**Total Value** £4,636,928
Shelley Decommissioning Project
Refurbishment and recycle
Shelley Decommissioning Project
Total credits from refurbishment, recycle and disposal

- Relatively new infrastructure allowed for refurbishment and recycle of 98% of the Shelley infrastructure.
- 2% of infrastructure was not used further i.e., protection structure and EHCU.
- An inquiry for purchase of the EHCU was made 1 week prior to planned recovery. Too late for Management of Change process to be put in place in terms of offshore procedures, risk assessments and additional equipment requirements.
# Shelley Decommissioning Project

## Budget & Schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>2010</th>
<th>2011</th>
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<tbody>
<tr>
<td></td>
<td>JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC</td>
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<tr>
<td>COP</td>
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<tr>
<td>Phase 1: Preperations</td>
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<tr>
<td>Phase 2: Subsea Decommissioning (Flushing &amp; Riser Recovery)</td>
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<tr>
<td>Phase 3: FPSO Removal (FPSO Disconnection &amp; Tow)</td>
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<tr>
<td>Phase 3: FPSO Removal (Moooring recovery)</td>
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<td>Phase 4: Subsea Decommissioning (Infrastructure recovery)</td>
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<td>Phase 5: Well Abandonment</td>
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<tr>
<td>Close out report to DECC</td>
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## Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Premier Estimated Cost (£m)</th>
<th>Sevan Estimated Cost (£m)</th>
<th>Premier Actual Cost (£m)</th>
<th>Sevan Actual Cost (£m)</th>
<th>Premier Variance</th>
<th>Sevan Variance</th>
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<tr>
<td>2010 programme to remove subsea facilities</td>
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<td>3.3</td>
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<td>2010 programme to remove the Sevan Voyageur FPSO</td>
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<td>9.7</td>
<td>0.0</td>
<td>8.1</td>
<td>0.0</td>
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<td>2011 programme to remove subsea facilities</td>
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<td>4.6</td>
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<td>1.0</td>
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<td>2011 programme to plug and abandon wells</td>
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<td>0</td>
<td>15.3</td>
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<td>OPX and other charges post-COP</td>
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<td>Post Decommissioning Surveys</td>
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<td><strong>Total</strong></td>
<td><strong>25.8</strong></td>
<td><strong>9.7</strong></td>
<td><strong>24.2</strong></td>
<td><strong>8.1</strong></td>
<td><strong>1.6</strong></td>
<td><strong>1.6</strong></td>
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Shelley Decommissioning Project
Summary

• The project was completed with a small integrated team, safely and within the planned schedule and budget.
• Significant re-cycle and re-use was achieved to support ongoing Operated and Non Operated projects.
Voyageur Spirit on route to Huntington
Safety in Decommissioning

Stewart Millar
HSE Decommissioning focal-point
Presentation Structure

- CO-REGULATION set-up
- Decommissioning Programme - PHASES
- PLANNING –
  Dismantlement Safety Case Requirements
- LESSONS for future safety case submissions – previous assessments / project execution
- SYSTEMS and FRAMEWORKS for lesson-learning?
Decommissioning
CO-REGULATION:

DECC

MCA

HSE

MoU’s
The Decommissioning Programme

CESSATION OF PRODUCTION

WELL ABANDONMENT

COMPLETE DISMANTLEMENT Y/N?

MATERIAL CHANGE SC

DEROGATION

DISMANTLEMENT SC
The ‘Phases of Decommissioning’ and the Safety Case requirements

• Reg 14.2 Material Change covers:
  – Run-down to CoP
  – Well shut-in
  – Installation hydrocarbon-free (i.e. ‘dead’)
  – Partial dismantlement for ‘derogation’
    • DECC has jurisdiction / HSE safety role
    • Still an installation if any part above sea-level

• Reg 11 Dismantlement covers final dismantlement
PLANNING: ‘FINAL’ Dismantlement SC Requirements

- Reg 11 (SCR05)
- (DECC) Decom Program
- Safety Case submission (HSE)
- Schedule 5 contains details of a Reg 11 Safety Case.
DECOMMISSIONING  **UP-FRONT PLANNING**

Schedule 5 Requirements:

- **Start & End** dates of dismantlement plan
- **Safety Reps consultation** re. work plan
- **Max. no. of persons** on ‘installation’ during work
- **General duty** for protection of these persons from F&E, and provision of ER
- **Toxic gas protection** arrangements
- **HOW** Installation & plant to be *dismantled*
Knowledge Capture

- Capturing lessons learned
- Culture of collaboration
- Cost and Availability considerations
- Metocean restrictions
- Co-regulation with ‘Beach’
FURTHER WORK – knowledge capture from previous dismantlements

• Project Management
• Human Factors
• Communication
• ‘Piece Small’ versus Heavy Lift
• Contractualisation
• NO ‘ONE SIZE FITS ALL’ APPROACH
Experience-based LEARNING

• All installations are unique
• Have some common elements
• Face some common hazards
• Need to be mindful of what can go wrong
• Applying lessons learnt
Working Groups

• DTLG
  … *Regulators Forum*

• Decom North Sea
  … *Northern Sector UKCS*

• ODFOS
  … *Southern Sector UKCS*
• Schedule 5 (SCR05) provides framework for planning

• Knowledge capture from previous projects

• Working groups
  - Shared database
  - Communication and Coordination?
Contact Details

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