

BP Quad 204 / Schiehallion UK Continental Shelf Decommissioning Experience

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Overview: BP Schiehallion / Quad 204

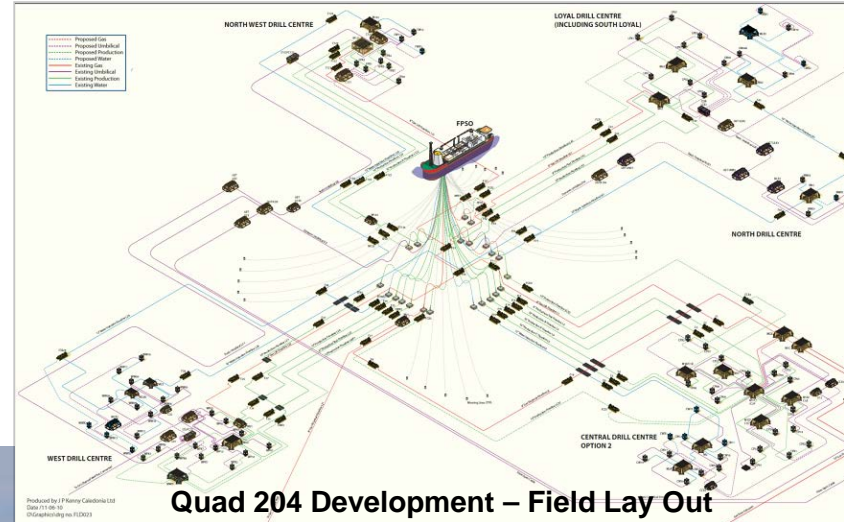
- Redevelopment of the greater Schiehallion field, encompasses the Schiehallion and Loyal fields, located approximately 150km west of Shetland Island in Quadrant 204 of the UKCS in water depths of 350m-500m. Schiehallion FPSO was installed in 1998.
- Current Field Partners: BP (33.35%), Shell (54.89%) and OMV (11.76%).
- Field discovery: 1993
- Original estimated total reserve: 450 million barrels
- Original Subsea Development: 52 Wells arranged in 5 clusters
- Original life of field: 20 years (until 2018)
- 1st Oil Production: 1998
- Demobilisation of Risers and Moorings: Summer (March-September) 2013 & 2014
- Demobilisation of Schiehallion FPSO: 2014
- Field Revitalisation: 2014 – 2017.



Why replace: Maximise Production

Replacing an FPSO and develop the subsea system:

- The existing FPSO 'Schiehallion' will be replaced by the new build Glen Lyon.
- Further expansion to the riser and subsea system will take place during project.



Schiehallion FPSO 2013



Glen Lyon at HHI
Ulsan, Korea, Q2 2015

FPSO Schiehallion Riser Removal Scope

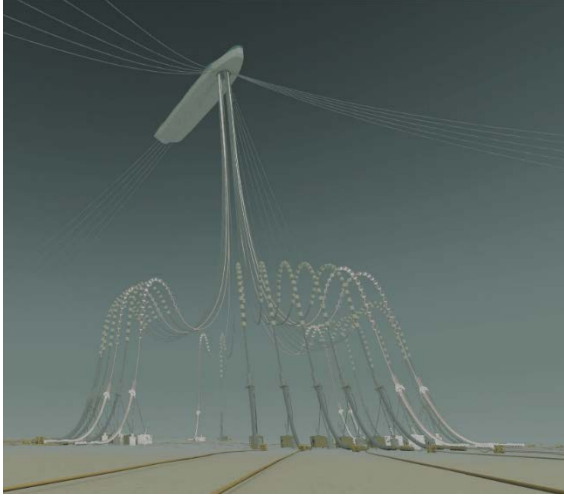


Removal scope in 2013/14:

- Disconnection and recovery of x14 flexible pliant wave riser systems (c. 750m long) and x3 dynamic umbilicals (700m – 2000m).
- Disconnection and recovery of 15 Flexible Jumpers
- Disconnection and recovery of c. 50 Control Jumpers

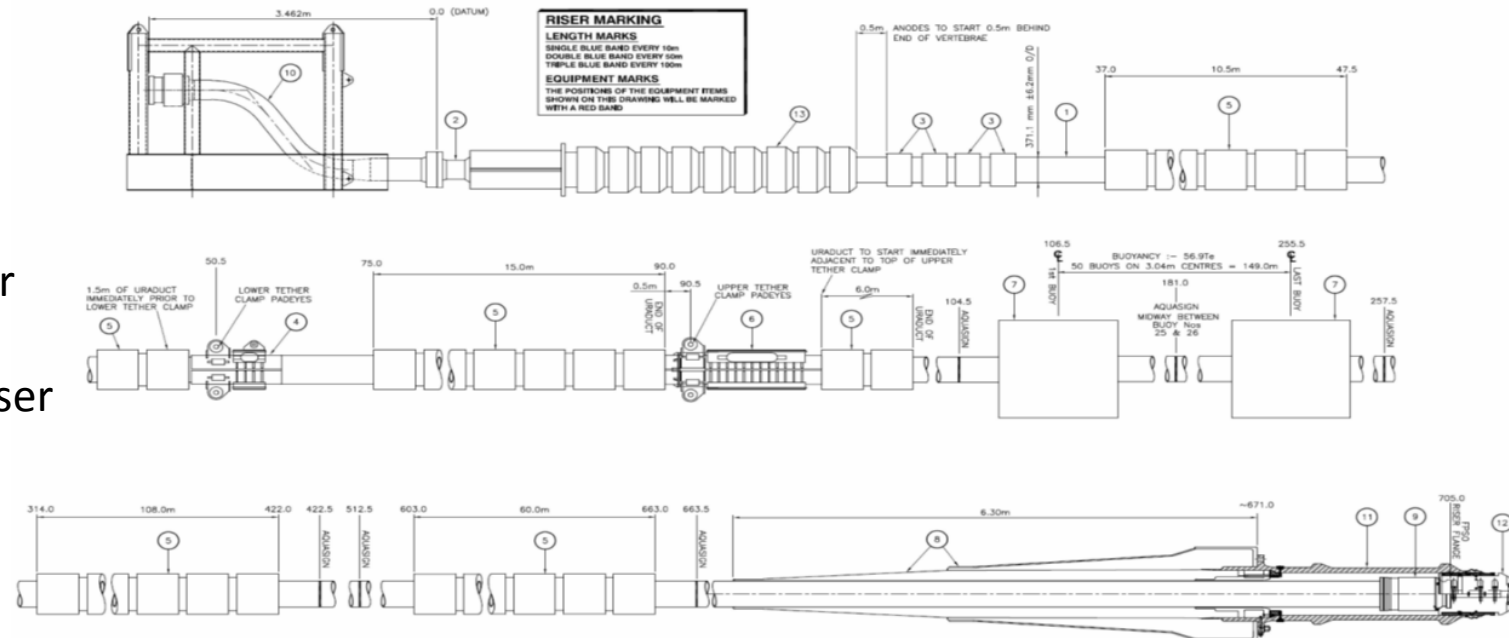
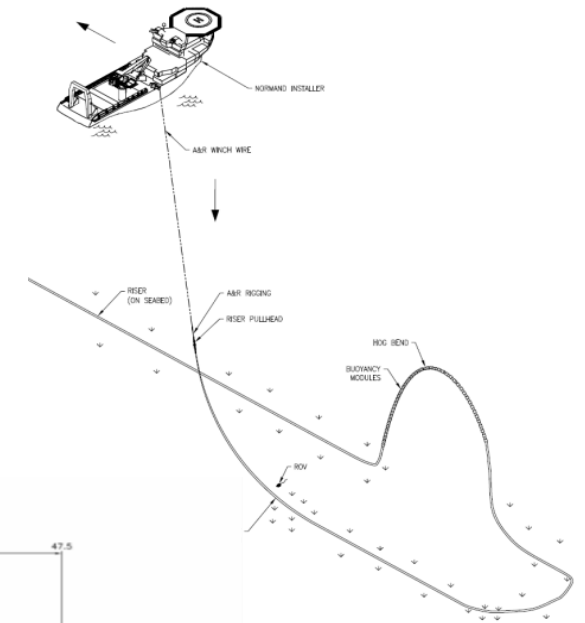


FPSO Schiehallion Riser Removal Scope



- Around 9,500 Te of steel and plastic recovered
- Specialist onshore contractor responsible for disposal
- In excess of 90% of the riser system recycled

Item	Quantity	Total Length (m)	Total Weight (Te)
Risers	15	11.057	2.650
Umbilicals	3	3.389	510
Jumpers	15	1858	300
Bend Stiffeners	15	N/A	66
Buoyancy Module	1021	N/A	700
Tether Clamps	36	N/A	40
DMaC/RET	15	N/A	90
Uractut	1536	2304	100
DUTA	3	N/A	50
Top hats	18	N/A	30
Anode Skid	19	N/A	10
Riser Anchor Pile	38	N/A	210
Chains (Mooring)	14 legs	670	4500

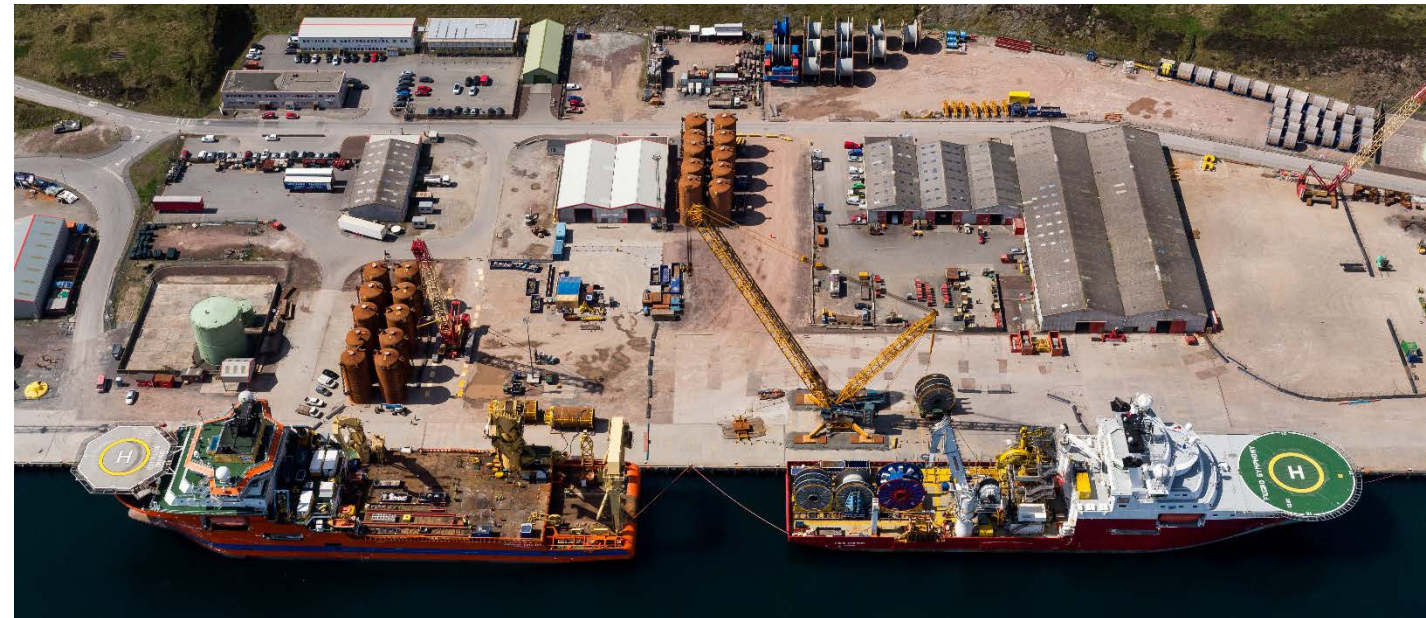


FPSO Schiehallion Mooring Disconnect & Tow



Mooring removal & Tow scope in 2014:

- Disconnect and recovery x14 Mooring Lines from top mounted internal turret.
- Mooring lines consist of 6.25in studless chain and spiral strand wire rope, fixed to anchor piles at a 1650m. Chain and spiral strand wire recovered only.
- Vessel was towed from field to the tank cleaning berth at Rotterdam.



Managing Hydrocarbon in Deconstruction

- Topside contractor (not Technip) was responsible for Riser Decommissioning.
- Risers were decommissioned by: Hot oil and extensively flushed clean.
- Risers tested on completion of decommissioning for:-
 - Hydro Carbon (HC) content – Liquid
 - Hydro Carbon (HC) content – Gas
 - H₂S
 - NORM / LSA
- Risers re-tested within 2 weeks of removal from FPSO to confirm no migration from the annulus.
- Operator obtained consent permits for the risers to free to flood during release and recovery
- Risers were precautionary sealed with blinds at each end on the construction vessel to contain any HC / NORM / LSA.



Control of Work & Project Organisation



- It is critical to set up an offshore construction management team focused on the decommissioning activities with the correct levels of authority to prioritise work.

Less obvious issues to consider:

- Existing platform **Control of Work**
- Personnel new to a **construction environment**
- 'Soft Issues': Personnel losing their existing **place of work**
- Specific **construction PTW** may prove to be more effective.
- Construction **specialist platform OIMs**

- It is essential to build a collaborative one team (all stakeholders) environment in a decommissioning / brown field project.
- Consider **all stakeholders**: Operators Project Team / Operators Operations Team / Main Subcontractor/ Topsides Contractors / Critical Service Providers....
- Managing **emerging work** and change effectively requires input from many parties, however priority / authority and accountability needs to be clearly understood.



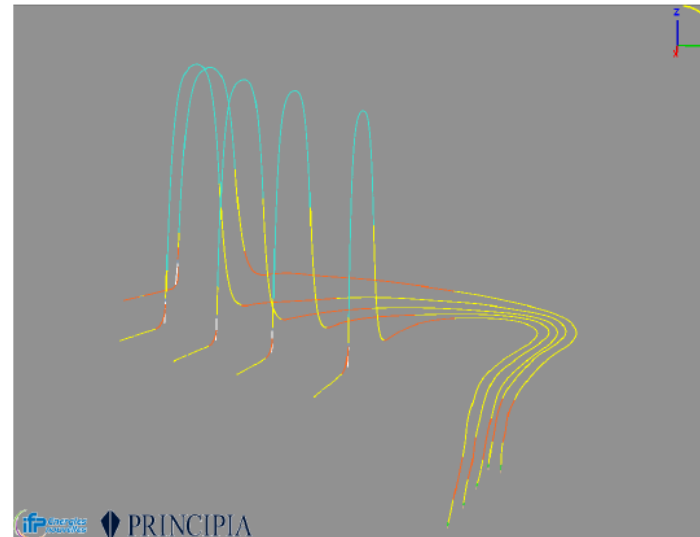
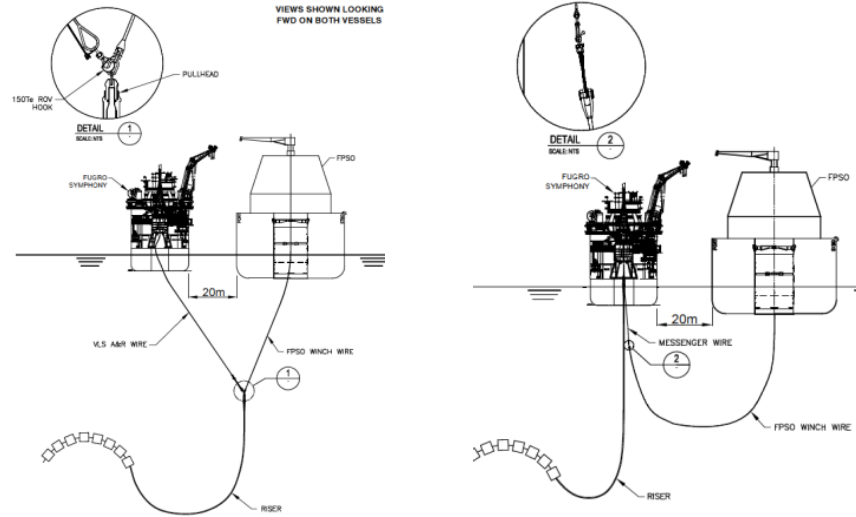
Riser Removal Scope: Considerations (1/2)

Sequence and Priorities:

- Quad 204 priorities were clearly to ensure the safe removal of the FPSO within the short working window West of Shetland UKCS
- All risers were disconnected from the FPSO, cross hauled to a construction vessel and laid on the seabed in a wet store configuration to allow for expedited FPSO release.
- Riser were recovered to the construction vessel, all ancillaries removed reeled and offloaded onshore (separate phase)

Optimisation of Removal & Wet Store Analysis:

- Construction vessel analysis needs to be optimised, considering the condition of the recovered equipment.
- Convention analysis restrictions may not be applicable (product damage)
- Wet store planning should be optimised for quick lay down and low risk recovery. Consider direct lay down from FPSO to expedite release.



Riser Removal Scope: Considerations (2/2)

Construction Vessel - Managing Gas:

- Gas awareness and management plan essential
- Procedures and test equipment provided on deck
- Specialist gas team to test and maintain monitoring equipment
- Gas was vented from the riser (gassing off) in the water column – significant schedule impact.



Construction Vessel - Managing NORM / LSA:

- Procedures to test and contain any NORM and LSA are essential
- Training and expectation awareness required
- Easily manageable with the correct training and equipment



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Construction Vessel - Marine Growth Removal:

- Extensive cleaning with hand tools and water cleaning systems may be required.
- Factor into schedules (removal could take longer than installation).



Mooring Disconnect & Tow: Considerations

Clear Roles & Responsibilities:

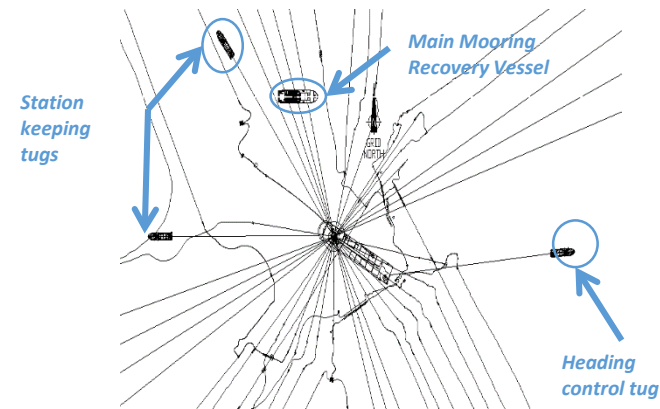
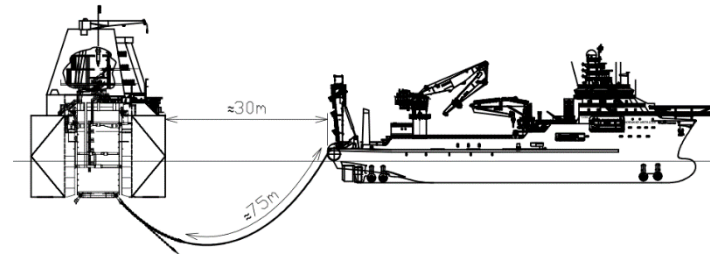
- Concise management of the many stakeholders in the FPSO removal operation is essential.
- Accountability transfer may be required for the decision to proceed with removal.
- Good communication and stakeholder engagement will help to expedite offshore decisions.

Vessel Simops Management:

- Standard operators vessel simops process may not be applicable and may have to be replaced with a bespoke control of work system.
- Training and expectation awareness required
- Easily manageable with the correct training and equipment

Tow Plan and Maritime Compliance:

- Tow plan must consider ongoing logistics of the decommissioning scopes on the FPSO.



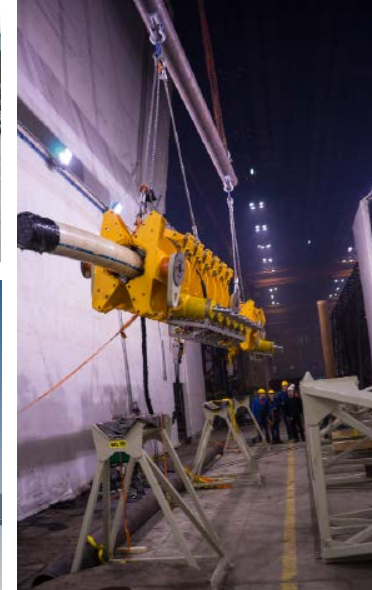
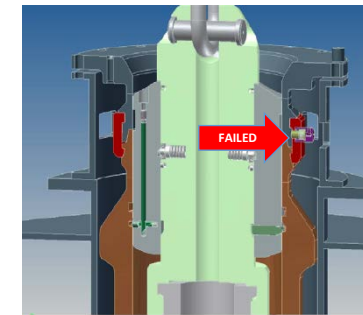
Important Focus: Contingencies

Risk ID: Original FPSO Installation equipment:

- Installation systems for risers and moorings may not have been maintained during the asset operational life, such as:
 - Main Riser Pull-in Winch
 - Main Moorings Pull-in Gantry / Winch
 - Subsea Riser / Turret interface mechanism
 - Riser Hang offs
 - Mooring Chain Stoppers / Hang Off
 - Mooring Hawsers
 - Dive Systems (LARS)
 - Access and Walkways
- Perhaps difficult to test and refurbish during operation (not zone rated)
- Equipment may be out of cert and design code: current design code cant be applied to equipment that is 20 years old.

Systematically look for Vulnerabilities:

- By its nature deconstruction work presents increased equipment reliability risk.
- Provide contingency for all (reasonable) vulnerabilities: both equipment and procedure



Embrace the fact that there are more unknowns in a deconstruction project. A healthy paranoia to mitigate vulnerabilities ahead of the offshore phase will ensure robust offshore execution programme.



What is next: Final Hook Up 2016

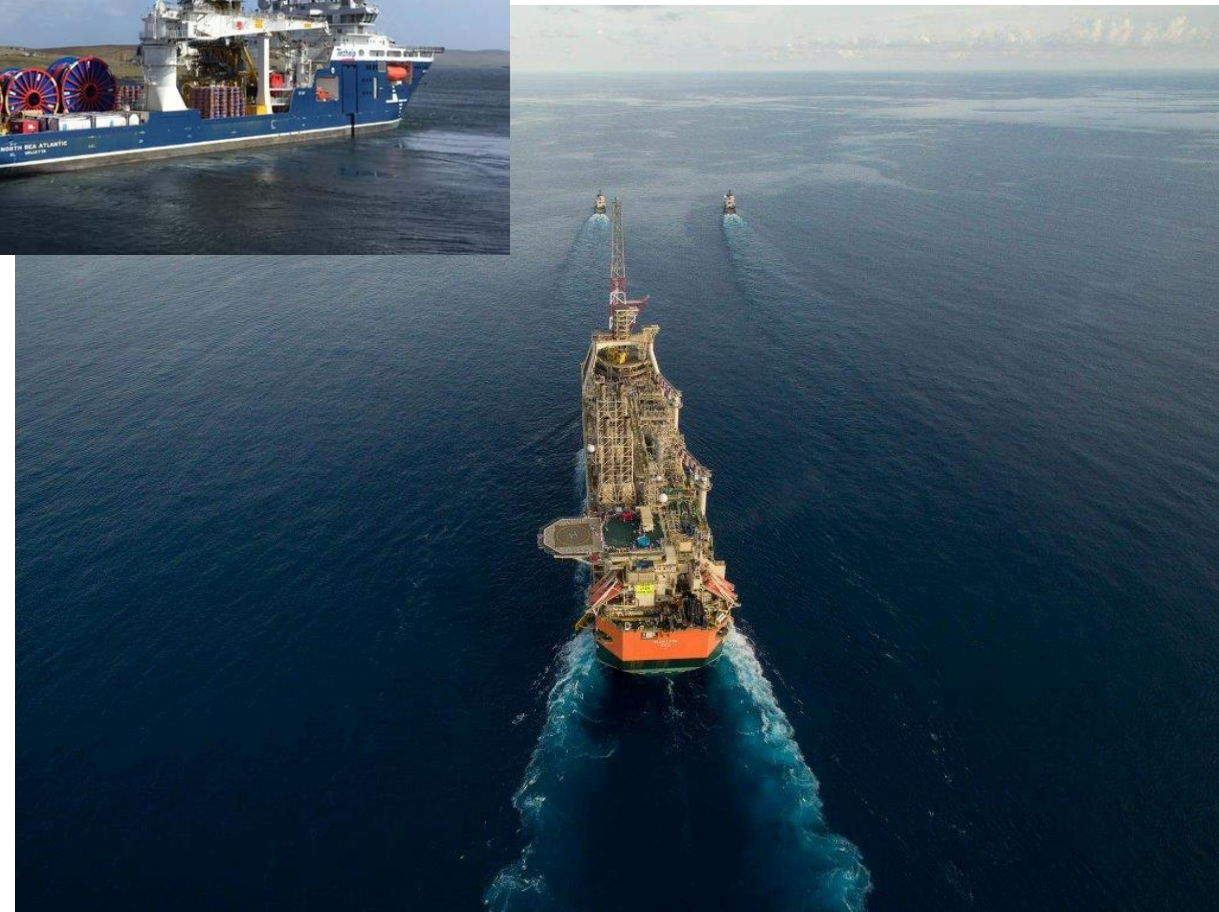
2016: FPSO Tow, Mooring Hook up and Riser Pull in:

- BP will undertake final commissioning and preparations at Aibel, Haugesund.
- Technip are responsible for the FPSO short tow to field and mooring hook up (x20) {with SBM OC}, and the final pick up and cross haul of 21 risers and installation of (x2) Dynamic Umbilical Risers.
- The riser pull in scope will be executed with two subsea construction vessel equipped with vertical lay systems (picking up pre-installed risers).



Construction Work Complete to date:

- Installation of x15 CRA-clad rigid pipelines
- Pre-Installation of x21 pliant wave riser systems (including piles)
- Pre-Installation of x20 Mooring Lines (including piles)
- Installation of the majority of Manifolds, Jumpers, Flying Leads.
- x5 Static Umbilicals Installed
- x78 Flexible Jumpers Installed



Summary & Conclusions

- Very successful decommissioning and deconstruction programme undertaken over 2 seasons
- Safe operation with no environmental incidents
- High quality procedures, contingencies and meticulous planning is required to achieve a successful operation
- Equipment and infrastructure which is not used regularly on an installation requires special focus to ensure that it is serviced, tested and fit for purpose ahead of decommissioning activities.
- Construction teams and construction control of work system should be considered on existing installations. High levels of integration between project teams and operations departments is an important factor to achieve an efficient operation.
- Good collaboration between BP and Technip to rapidly respond to emerging issues and manage change through the correct process



BLANK SLIDE: ARS QUESTIONS NEXT



ARS Questions

1. Do you consider the offshore operations risk higher for a decommissioning project?
A - Yes
B - No
C - Equal
2. Do you consider additional contingencies are necessary compared to green field projects?
A - Yes
B - No
3. Recycling of materials in riser system was:
A - 70%
B - 80%
C - over 90%

