Cost Efficient Drilling Operations

From Rig to Vessel in Exploration Drilling

FFU Seminar 2010

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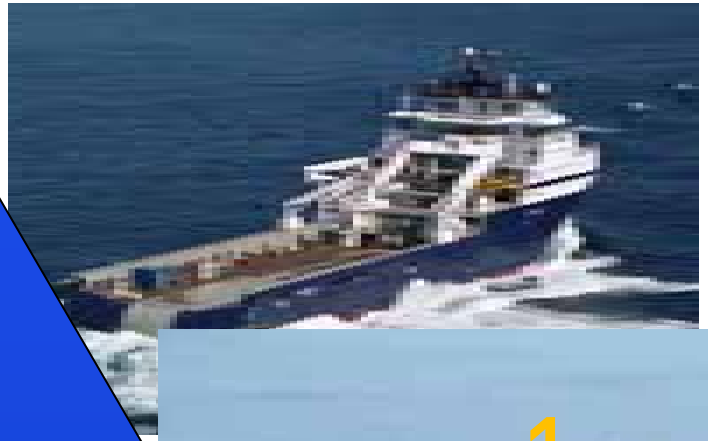
From Rig to Vessel in Exploration Drilling

THE WORLD LEADING DECOMMISSIONING SPECIALIST

- Prelay mooring
- Preinstallation of wellheads and conductors
- Rig chase



Who is Norse Cutting & Abandonment?

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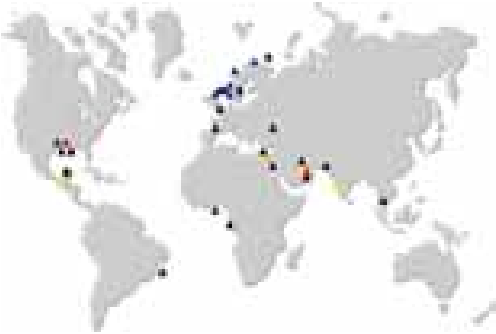
- Norwegian owned oilfield service company with head office in Tananger
- 500MNOK/yr revenue – 220 employees
- Global operation – offices in Aberdeen, Houston, New Orleans and Dubai

Project Management - Turn-key Projects - Integrated Services		
Repair and Maintenance Services *"Specialist Services Supporting Asset Integrity"*	**P&A and Decommissioning Services** *"The One-stop-shop for P&A and Decommissioning Services"*	**Mooring Services** *"A Complete Provider of Temporary Mooring Solutions"*
• Cold Cutting • Onsite Machining • Flange Repair • Bolt Tensioning • Leakage Sealing • Hot Tapping • Planning and management of maintenance shutdowns	• Rigless Plug and Abandonment • Multistring conductor removal • Pile & conductor cutting • Subsea wellhead removal • Pipeline, riser and caisson cutting • Subsea cutting • Conductor slot recoveries • Jacket cutting and splitting	• Rig mooring • Pre-lay mooring systems • Special mooring arrangements • Towing and lifting operations • Spooling • Inspection services • Rental and sales • Engineering and analysis
Engineering Services – Tool Development – Research and Development		



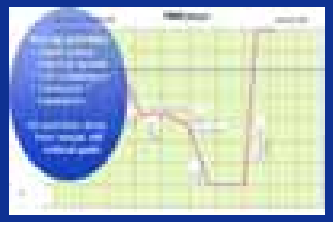
From Rig to Vessel in Exploration Drilling

Benefits

- Reduced rig time -> more time available for drilling
- Activities moved from a ~5-10 mill NOK/day rig spread to a ~1 mill NOK/day vessel spread
- Work moved from critical path to flexible timing

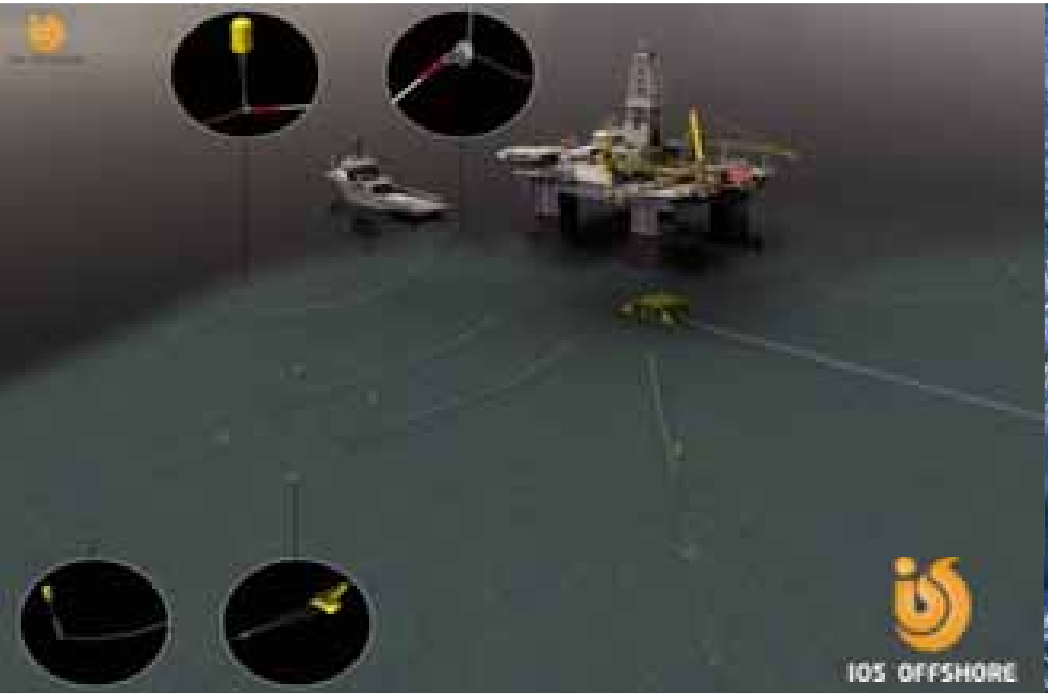
⇒Reduced cost
⇒Reduced risk (schedule and cost)
⇒Economies of scale by bundling pre and post rig activities (multiwells and multi client campaigns)

Pre Rig Activities from Vessel



- Prelay of Mooring Spread
  - Complete mooring spread installed prior to rig arrival
  - Rig is hooked up to prelay mooring instead of using its own mooring equipment

- Installation of well foundation and conductor
  - CAN (Conductor Anchor Node) installation - a more solid foundation for the wellhead
  - Conductor driving with hydraulic hammer



Post Rig Activities from Vessel

- Removal of Prelay Mooring Spread
  - Recovery of chain, buoys, fibers and anchors
  - Reinstallation on new location

- Removal of CAN & multistring conductor
  - Cutting of multistring conductor
  - Subsea wellhead removal
  - Recovery of CAN/subsea wellhead – reinstallation on new location

Case Studies

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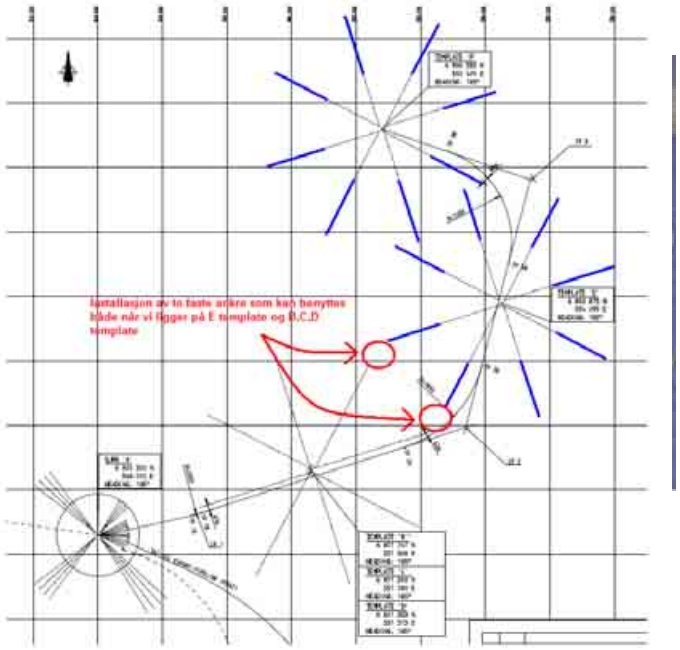
Case Study 1

Gjøa prelay



Case study 2

Peon CAN & conductor installation

Case study 3

Trolla rig chase

Prelay of Temporary Mooring System

Case 1

Gjøa Prelay Project

Gjøa Prelay Mooring Project

IOS OFFSHORE

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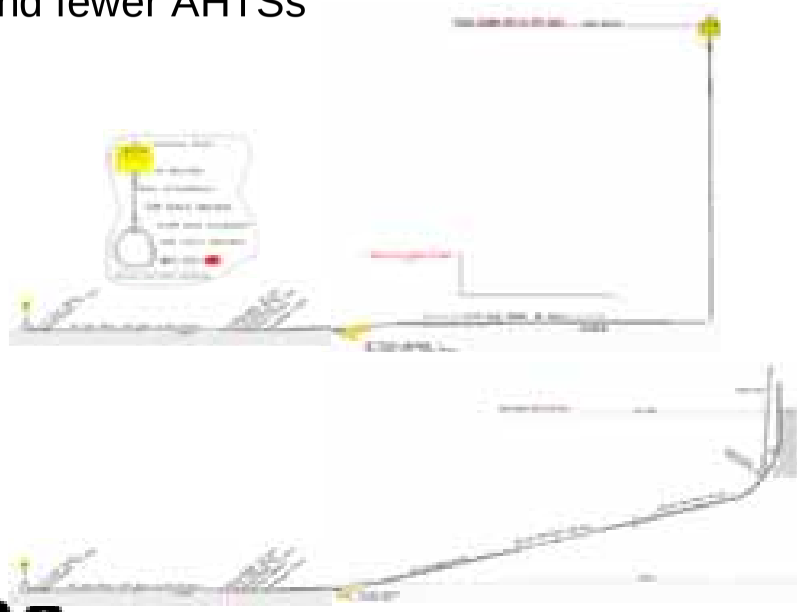
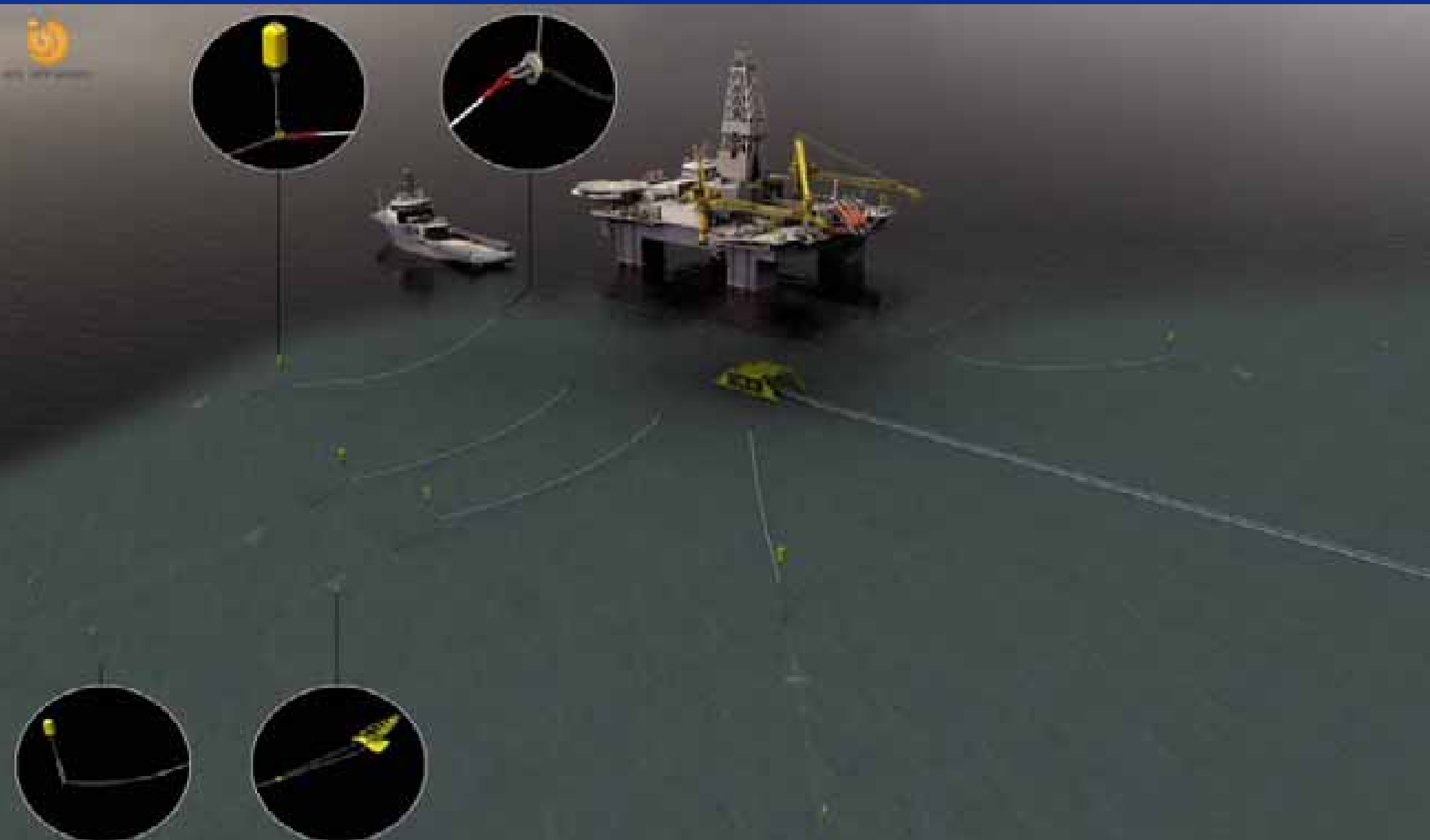
- Prelay mooring spreads for 6 different well locations on the Gjøa field in 2009
  - 8 x Rig 1000m chain on BCD location
  - 16 x 1000m chain on E&F location
  - 8 x 800m Fiber
  - 16 x 15Te Vryhof Mk 6 anchors
- Saved approx 3 rig spread days per location
- Reduces loads on the AHTS – safer + can use lower spec and fewer AHTSs



Prelay of Rig Mooring (video)



Summary - Prelay of Temporary Mooring System

- Proven concept from several projects over the last years
- Prelay = approx 3 rig spread days saved per well

- Savings: 20-30MNOK/well less cost for vessel and mooring spread

- Reduced risk of weather delays
- Can install the mooring system with fewer and lower spec AHTSs

- Additional HSE benefits: Reduces loads on the AHTS (ref Bourbon Dolphin)

- Moves activities from critical path for the rig to flexible timing for a vessel

Wellhead and Conductor Installation

Case 2

Peon CAN and Conductor Installation

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Peon CAN and Conductor Installation

- Pre-installation of CAN and conductor on the Peon field in 2009
- Vessel: Island Constructor
- The Peon CAN
  - Dimensions: Ø: 6m x H: 12m
  - Weight: 80 ton (dry) – 72 ton (wet)
  - Penetration: 11m
  - Deployed by crane over the side and installed within 12 hours
- The Peon conductor
  - Dimension: Ø: 30” x 1”wt x L: 33m (in one length)
  - Driven by subsea hammer (toe drive) to 30m in approx 6 hours
- Saved approx 3 rig spread days + made drilling on Peon possible (due to soil and reservoir conditions)

CAN Installation on Peon

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Peon CAN deployment:

- CAN weight, air: 80t
- CAN weight, sea: 72t
- Crane Cap. (AHC): 140t
- Crane ops. time: 1 ½ hrs

=> Safe & efficient CAN deployment demonstrated!

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Peon Conductor Installation on *Island Constructor*

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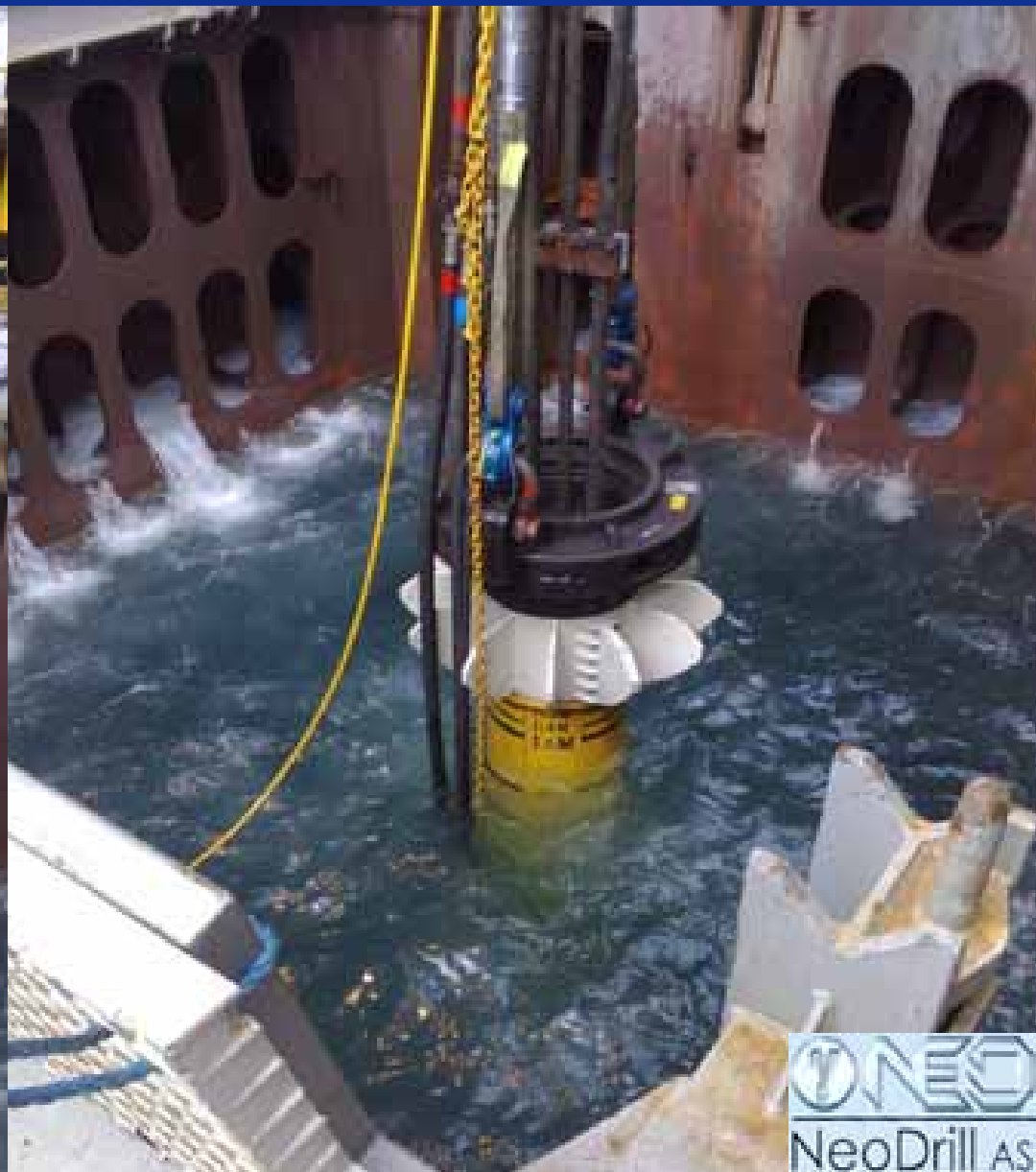

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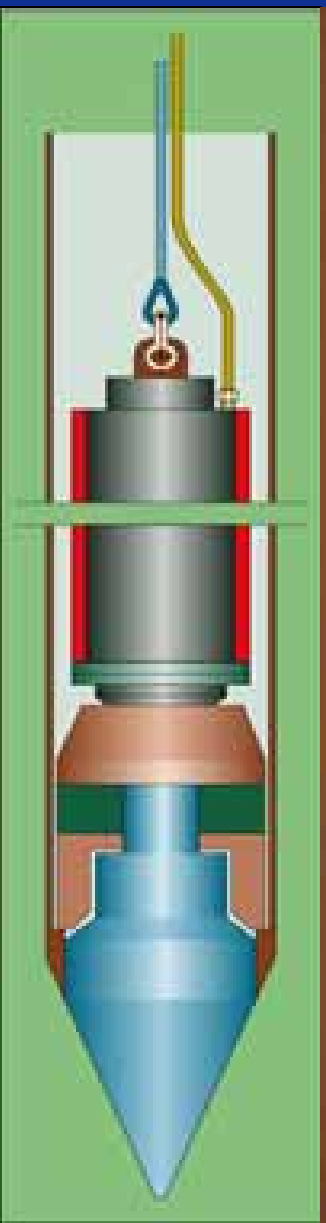
Peon Conductor Installation w/ToeDrive hammer



Summary - Wellhead and Conductor Installation

- Proven concept from Peon and other projects
- Technically as good or better compared to conventional methods

- Vessel based CAN and conductor installation saves approx 3 rig days per well for moderate water depth
- Significantly higher time savings on deeper water (10-15 days)
- Total cost savings: 15-75MNOK/well less cost for vessel, CAN and conductor driving services

- Moves activities from critical path for the rig to flexible timing for a vessel

- The CAN offers a significantly better foundation for the wellhead than conventional methods
  - Can make drilling possible and more reliable on certain fields (soil and reservoir)
  - Can make drilling possible and more reliable from certain rigs (heavy BOPs)

“Rig Chase” - Subsea Wellhead Removal

Case 3

Trolla Rig Chase

Trolla Rig Chase

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- Subsea wellhead located on the Trolla field
- The well permanently abandoned (cemented) by the rig
- The wellhead was left behind for future removal from a vessel
- Wellhead removed by use of the Olympic Zeus in Nov 2009
- NCA's patented *Subsea Wellhead Picker*
- Well data:
  - Casing configuration: 9 5/8"-20"-30"
  - Water depth: 270m
  - Net guard installed above the wellhead

- Saved 2 rig spread days per well

- Moves activities from critical path for the rig to flexible timing for a vessel

Trolla Rig Chase (video)

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Summary – Subsea Wellhead Removal

- Proven concept from 12 subsea wells in the North Sea
- Technically as good or better compared to conventional methods (mechanical cutting from rig)

- Vessel based wellhead removal saves approx 2 rig days per well for moderate water depth
- Total cost savings: 5-10MNOK/well less cost for vessel and cutting services

- Moves activities from critical path for the rig to flexible timing for a vessel

Overall Summary - Cost Efficient Exploration Drilling

Benefits

- Reduced rig time -> more time available for drilling
- Activities moved from a ~5-10 mill NOK/day rig spread to a ~1 mill NOK/day vessel spread
- Work moved from critical path to flexible timing

⇒Reductions in cost (total 35-55MNOK/well for mod. WD)
⇒Reductions in risk (schedule and cost)
⇒Economies of scale by bundling pre and post rig activities

Where do we go from here?

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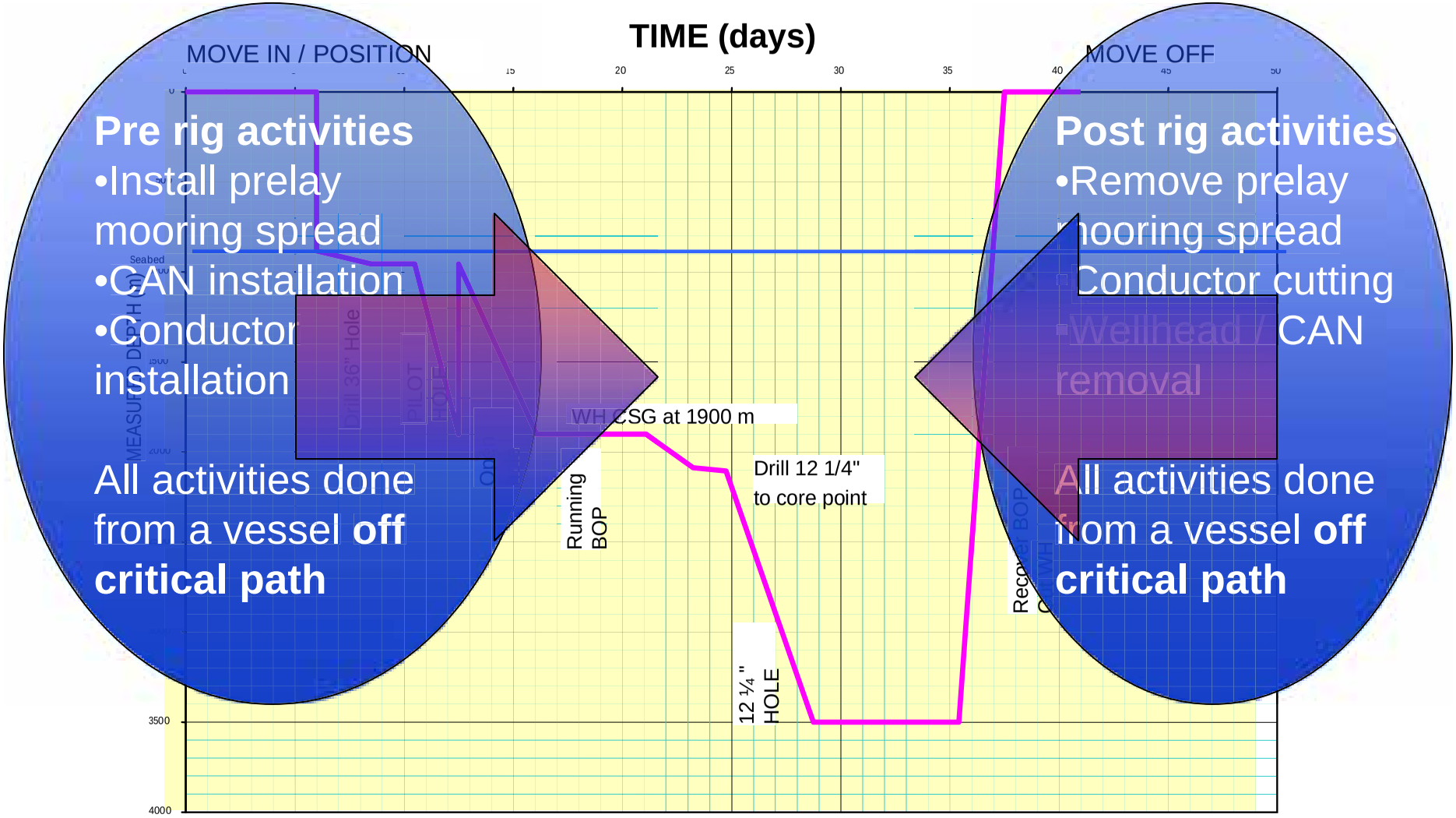

Thank You for the Attention!

Questions?