Veslefrikk B: Retrieval and tow

of a production semi-submersible for decommissioning

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Semar at a glance

- Established in 1980 – Independent and effective organization
- 40+ years of experience in marine and offshore installation projects
- Specialized and multi-disciplinary competences
- Extensive experience in engineering, mooring, offshore foundations, and marine operations
- World record in float-over operations (Hibernia and Hebron)
- Engineering roles in many offshore projects worldwide

Markets

- Offshore oil & gas
- Renewables: Offshore wind and solar parks
- Aquaculture
- Civil contracting
- Salvage

Engineering disciplines

- Concept, design and drafting
- Analyses (structural and hydrodynamical)
- Installation methods and procedures
- Marine installation/decommissioning supervision

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Veslefrikk

- Discovered 1981
- Production 1989 – 2022
- VFA: fixed steel wellhead facility
- VFB: semisubmersible production and accommodation unit
- VFB upgrade at Stord 1999

Veslefrikk B decommissioning - MME

- Marine Management and Engineering contract with Equinor
- DOF / Semar partnership: integrated team
- Semar: Engineering, marine operations, interface management
- DOF Subsea: Contract, procurement, chartering, QHSE
- CPI vessels on Equinor long charter – all AHTs
- Operations April – September 2022

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Contract structure

Thruster removal site **CCB Ågotnes**			Thruster removal, marine systems decom		
MME **DOF Subsea** Incl. interface	VFA-VFB hose/cable removal	Tow to thruster removal site	Mooring system removal	Tow to disposal site	
Disposal site **M.A.R.S. Frederikshavn**					Semisub recycling

Scope of work - operations

- Removal of flexible hoses and cables between VFA and VFB
- Disconnection of VFB from mooring and tow to Thruster Removal Site
- Offshore mooring line retrieval
- Tow to Disposal site

Removal of hoses and cables

- Removal of 4” and 8” multi-purpose risers
- Removal of power cables
- Total 15 products connecting VFA and VFB
- Product length 150 m
- Discharge at CCB Mongstad

- All products removed in 2 campaigns using AHV
- Hoses and cables cut into 23-m segments
- Total duration 13 days

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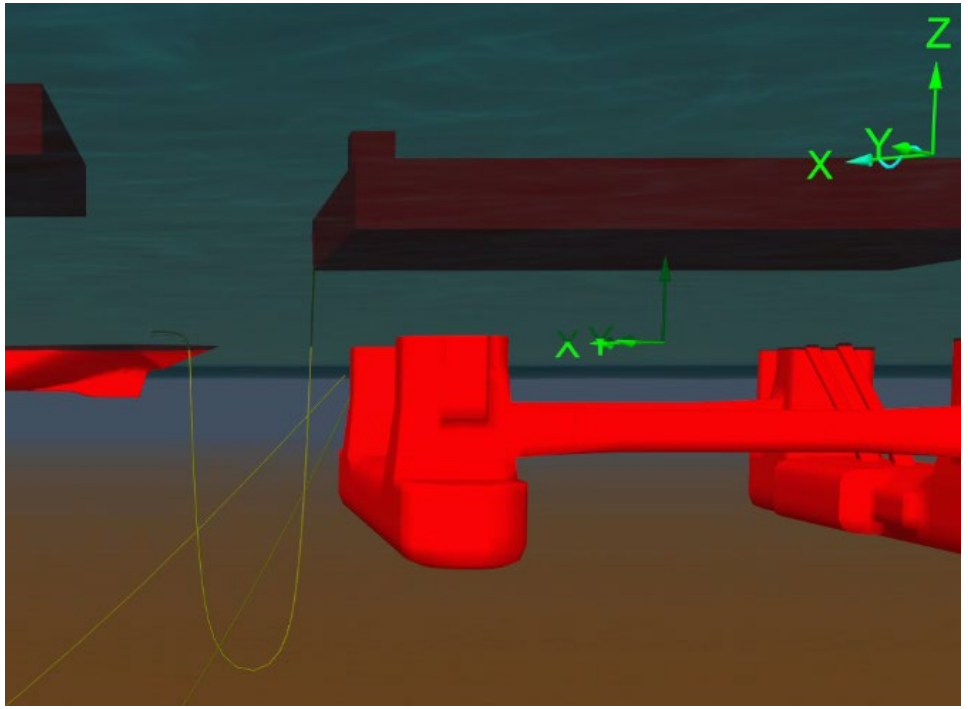
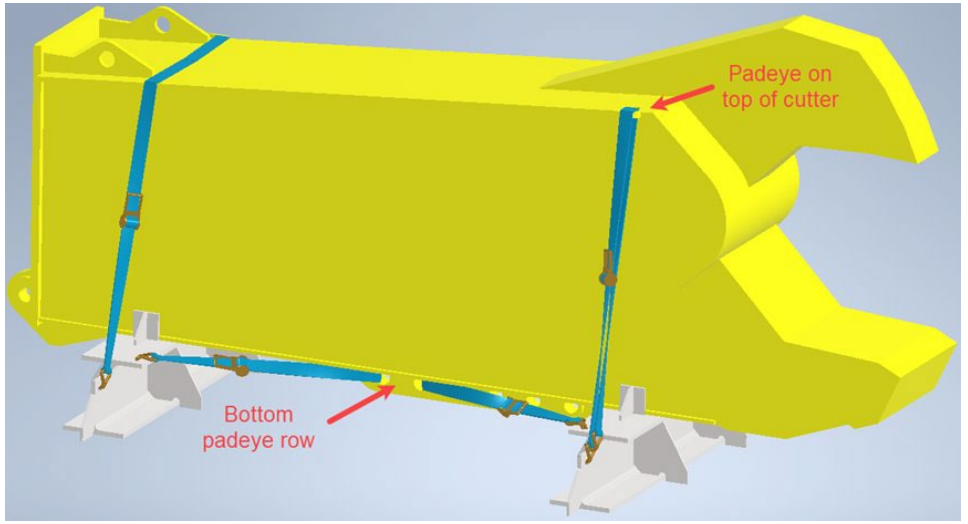
Hose removal engineering

- Riser transfer analysis
- Equipment capacities
  - VFB deck crane
  - AHT winches
  - AHT rail cranes
- Holdback forces
- Dynamics
- Weather constraints
- Contingencies
- Deck space
- Offloading





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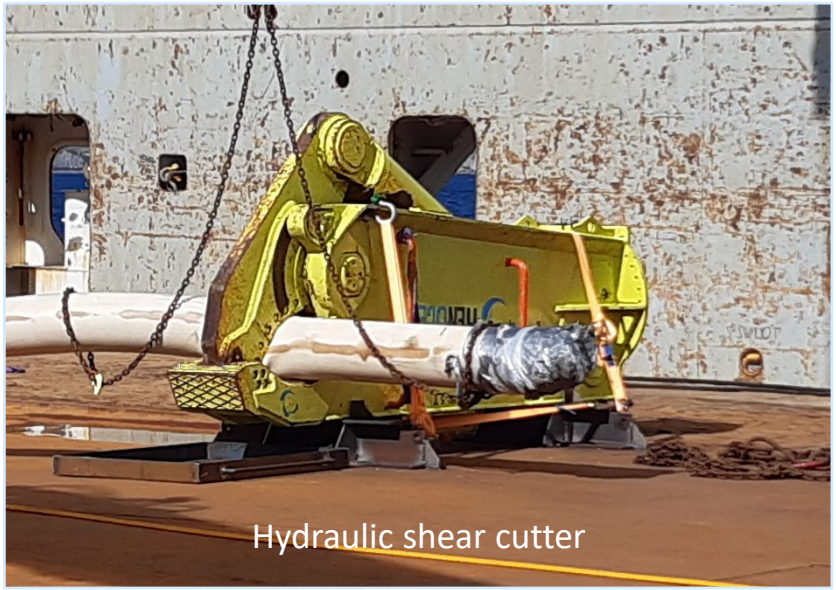
Mobilization: key equipment

Deck layout



Hydraulic shear cutter

“V” beams fwd and aft of towing pins

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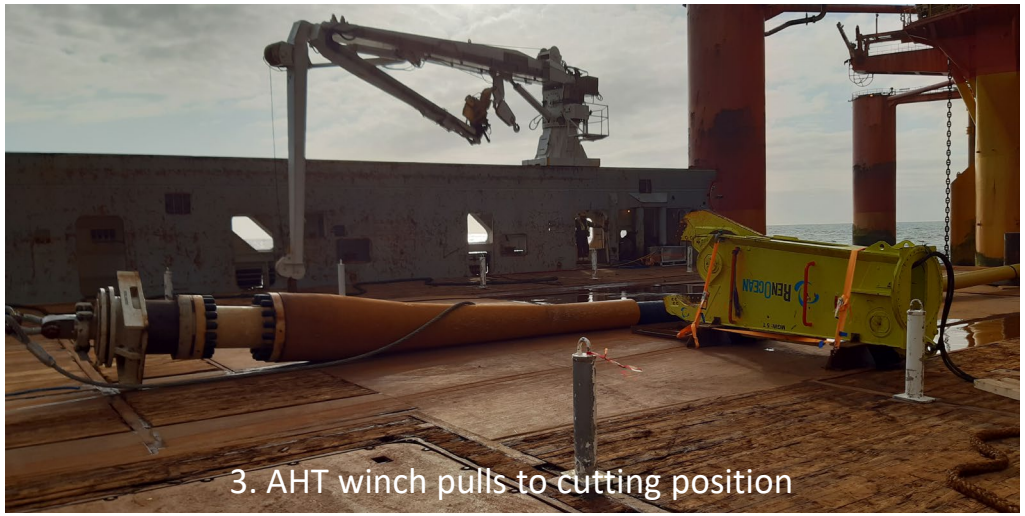
Hose removal method

1. VFB crane transfers VFA end to VFB hang-off

Hose removal method

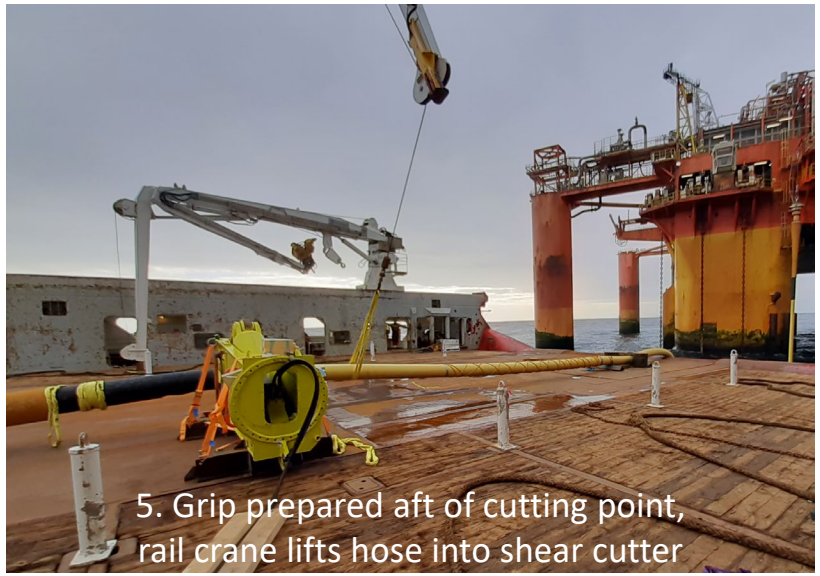
2. VFB crane transfers VFB end to AHT,
AHT connects pull head to main winch

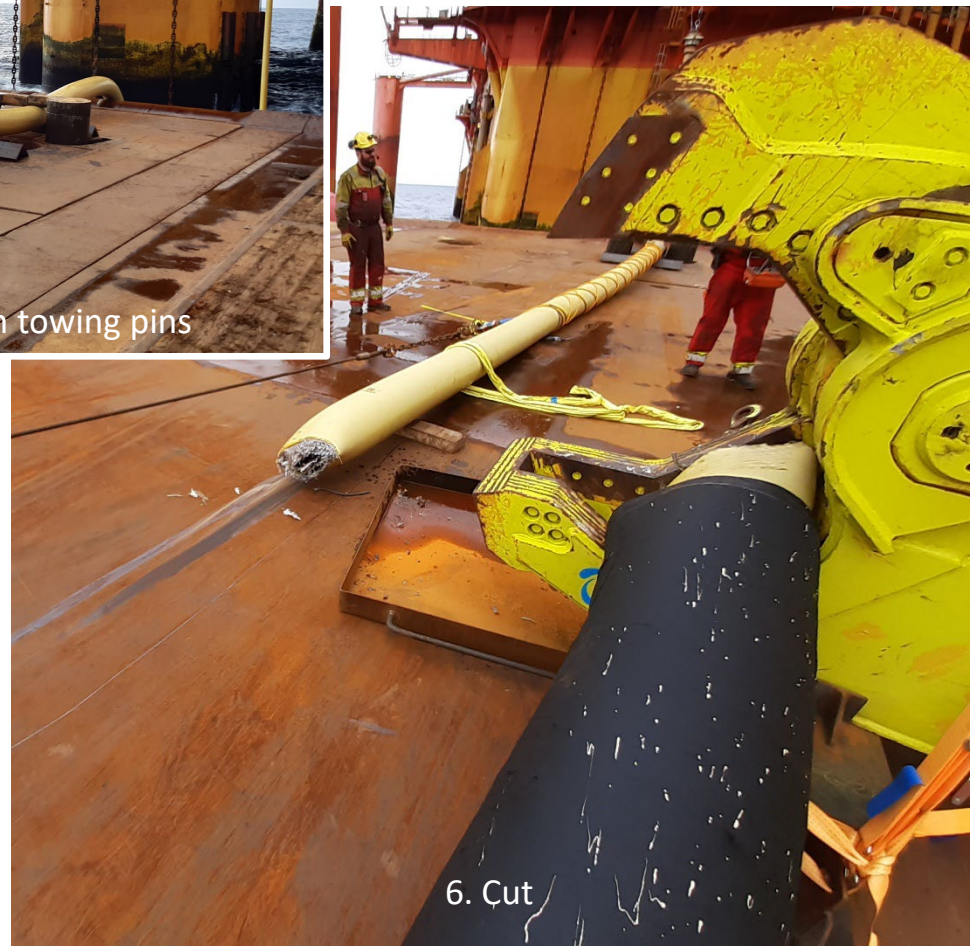
Hose removal method



3. AHT winch pulls to cutting position


4. Hose secured with towing pins


5. Grip prepared aft of cutting point, rail crane lifts hose into shear cutter


6. Cut

Hose removal method

7. Rail cranes and deck winches stow cut section

8. Tow pins released, winch pulls hose forward to next cutting point

Marine growth removal with FF water cannons

Stowed hose sections

Hose removal method

VFB crane transfers second hose end

Hose removal

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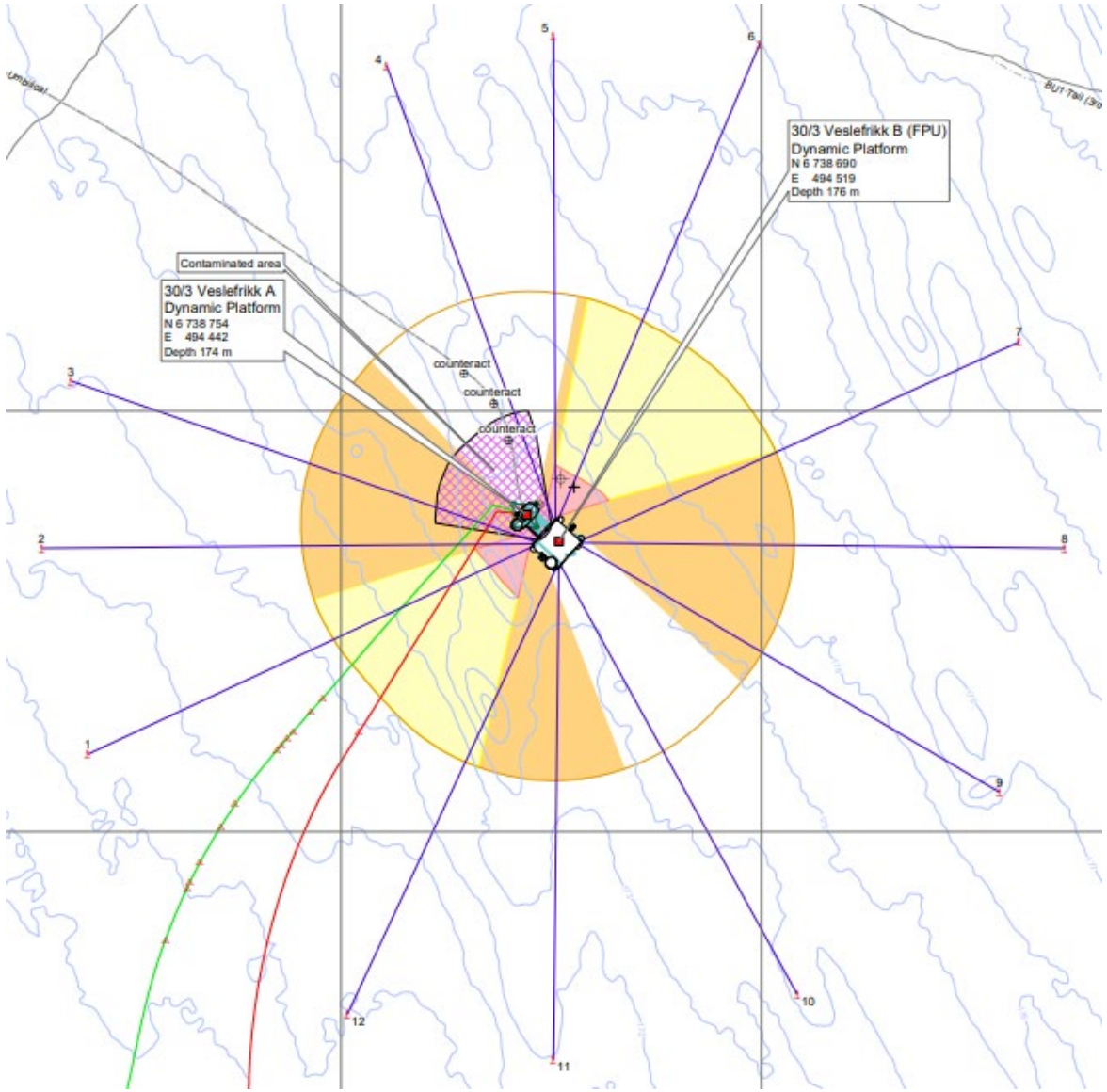
Disconnection and tow

- Disconnection of 12 mooring lines
  - Some crossing seabed utilities
- Hang-off of rig chains on deck
- Buoying off of mooring chains
  - For later recovery
- Towing bridle made from rig chains
- Tow to CCB Ågotnes
  - Manned platform during tow
- Mooring with harbor tugs



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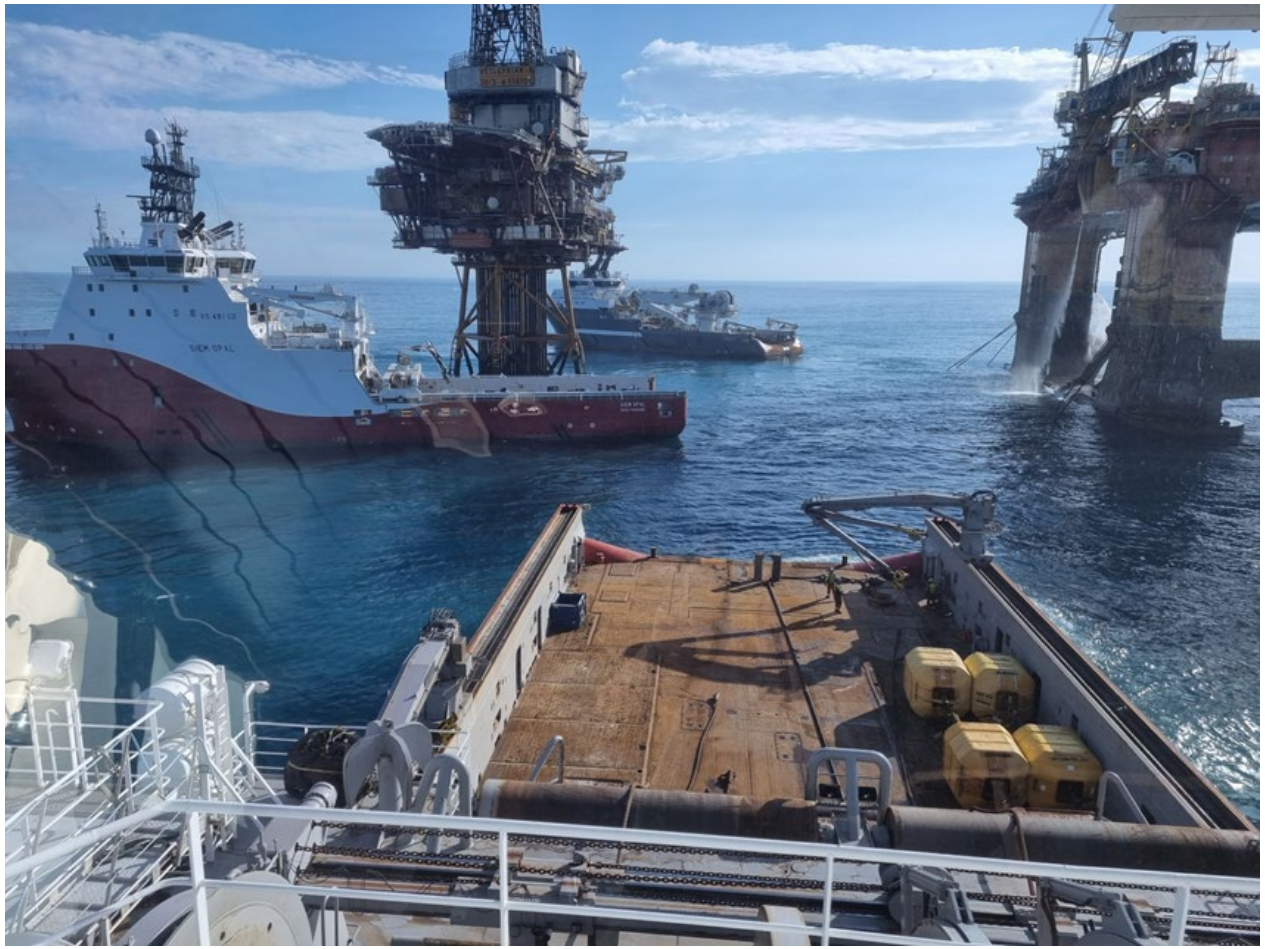
Preparations at Veslefrikk site

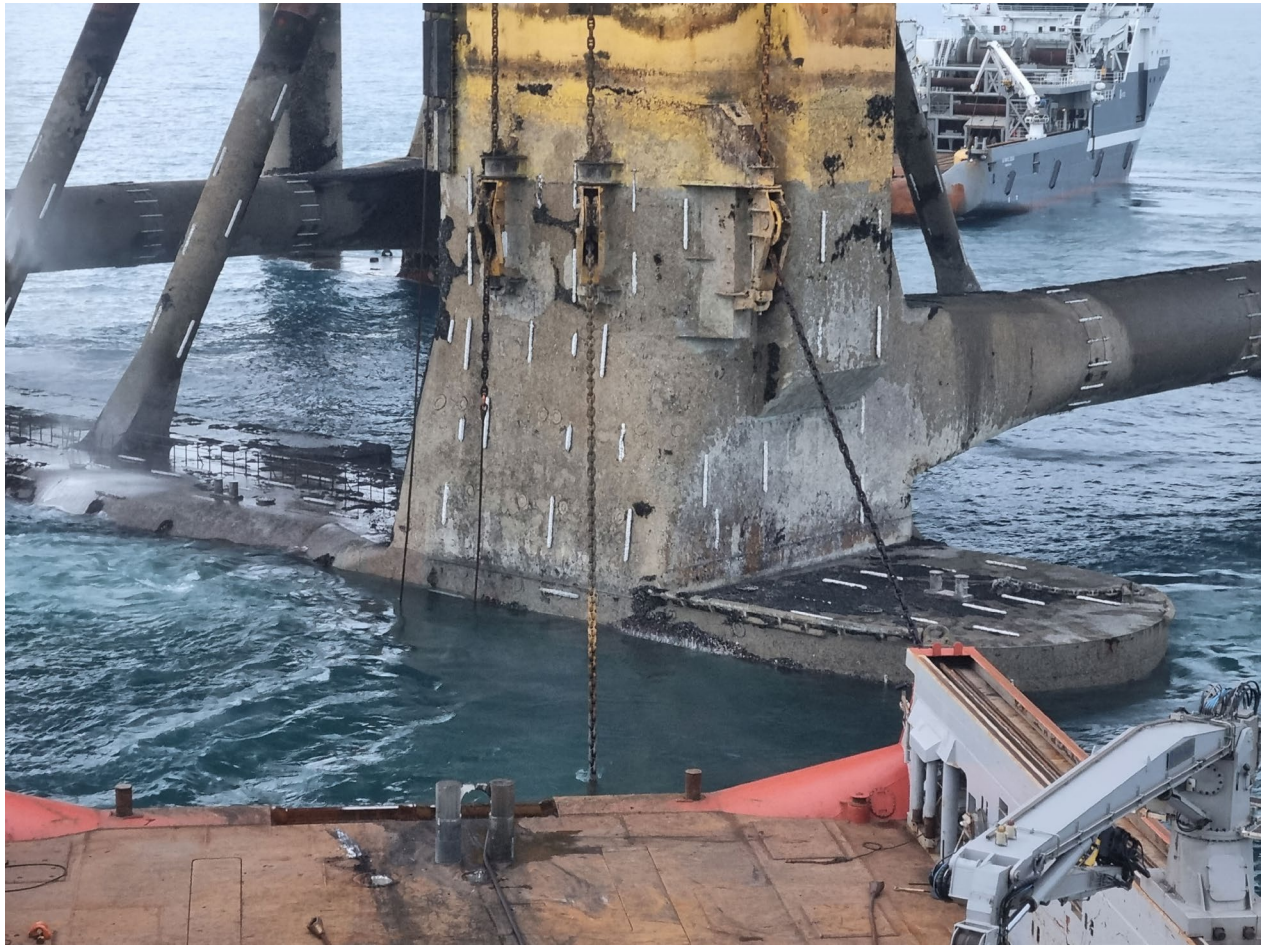
- VFA-VFB walkbridge retracted
- Cable bundle removed
- VFB deballasted

- VFB manned, marine systems operational:
  - Winches used for positioning
  - Thrusters available, kept as contingency



Disconnection from mooring system

- 9 of 12 rig chains hung off of topside porch
- 2 rig chains used for tow bridle
- 1 rig chain used for holdback

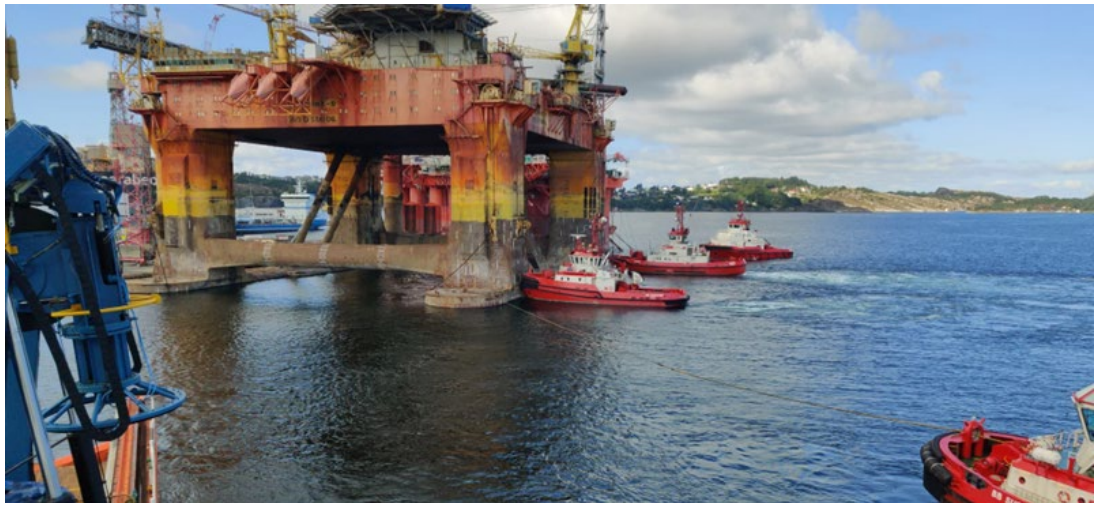


Arrival and mooring at CCB Ågotnes

- 4 BuBe harbour tugs take over
  - 2 push-pull
  - 2 connected to rig chains
- Rig chains used for quayside mooring

- At CCB Ågotnes
  - Thrusters removed from under pontoons
  - Marine systems decommissioned

➢ Unmanned “dead” platform for next tow



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Disconnection and tow

- 5 days operations
- 3 AHVs for disconnection
- 2 AHVs for tow
- 4 harbor tugs for mooring

Offshore mooring line retrieval

- Recovery of 12 mooring chains
  - 120-mm chain, ~1000 m length
- Dredging of anchor chain end on seabed
- Chain discharge at GMC Gismarvik

- 1 AHV, 10 days operations
- 3 discharge port calls

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Tow to disposal site

- Preparations at CCB Ågotnes
- Inshore and offshore tow
  - Unmanned “dead” platform
- Approach and mooring at MARS Frederikshavn

- Duration 5 days
- 4 harbor tugs for departure
- 2 AHVs for tow
  - 1 in bridle, 1 escort
- 4 harbor tugs for channel passage, docking and mooring

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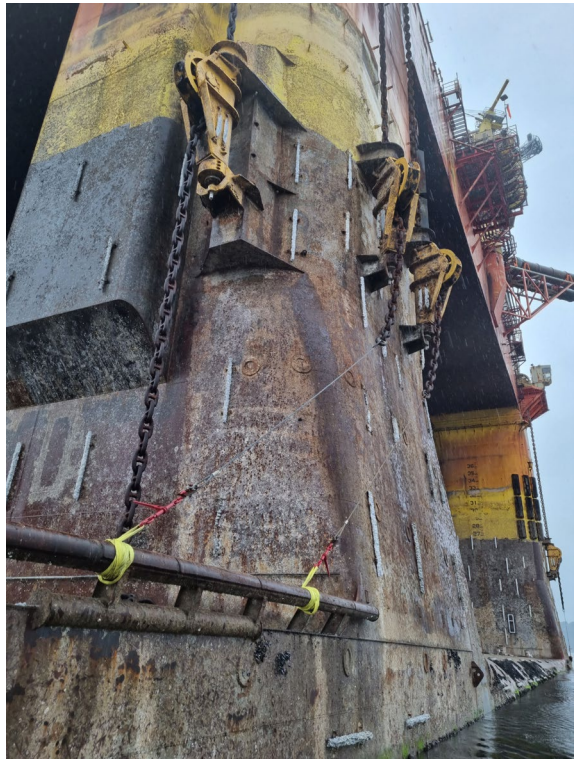
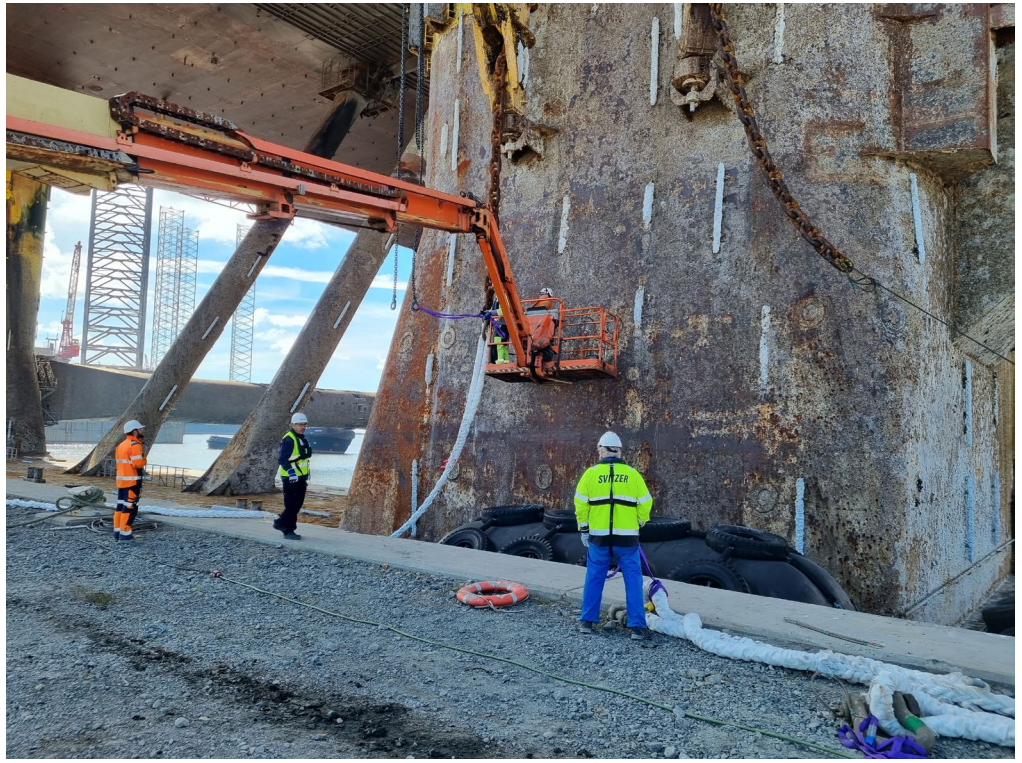
Arrival at M.A.R.S. Frederikshavn

Mooring at M.A.R.S. Frederikshavn

- Unmanned platform
- No winches
- Rig chains at agreed lengths tied off at pontoon
- Hooked up to mooring ropes by Stevedores upon arrival





Integrated decommissioning solutions

EQUIPMENT

PROJECT DELIVERY

ENVIRONMENT

CDP DISCLOSER 2022

DOF has reported to CPD since 2011

A-

DOF result

VESSELS

PEOPLE

WASTE MANAGEMENT

Safe the RITE way®

Safe the RITE way enhances our behaviour-based programme, integrating three main elements: "Values", "Safe Behaviours" and "Rules, processes and procedures".

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Thank you!