Montanazo-Lubina: Successful deep subsea tieback in the Mediterranean Sea

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The Casablanca offshore oil Platform is located in Mediterranean sea, at 45 km from the coast of Tarragona in the east of Spain. In production since 1982.
1. Subsea Wells (installed 2009)
2. Control Module, HPU’s & TUTU
3. Production Piping installed and tested to Riser tie-in
4. Train D water recirculation
5. Subsea Manifold
6. Power Umbilical’s and 1 Flying Lead Set
7. Control and Infield Umbilical's and 2 Flying Lead Sets
8. 4.5-Inch Flexible Pipe, 2 Jumpers,
9. SECC Connector
Montanazo-Lubina Tie-back Scope

Note: Installation and hook up of all equipment other than topsides controls is by Installation Contractor.

Legend:
- AKER
- TECHNIP
- FRAMO
- REPSOL
- SECC

AKER SUTA-L1
Flying Leads
Lubina Tree (AKER) Pre-installed

Technip
Casablanca Platform
Repsol*
SDV
Top of Riser, Clamp

Existing Manifold

FRAMO
Pump Controls

Well Controls

PUMPING MANIFOLD
AKER Manifold Controls

UTES

Control Umbilical

Flying Leads

Control Umbilical

Umbilical Hang Off Clamps

Pump Power Umbilical
Flexible Flowlines

Casablanca
Montanazo 8 km
740 m
161 m
Pumping Manifold
4 km
640 m
Pipeline Characteristics:
- Flexible (4.5" ID)
- Buried Flowline
- MPP Umbilical
- Control Umbilical

4.5 Inch ID Pipe, 3 segments
Riser Section & Shallow Water 4.5 km
Montanazo 4.3 km
Lubina 4.0 km

Trenched Pipelines (MODUS Trencher)

External Plastic Sheath
Crosswound Tensile Armours
Pressure Plastic Sheath
Inner Interlocked Steel Carcass

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Umbilicals

Scope of Supply

1. 1 off Basic Control Umbilical (length 8.8 km) to Manifold SDU (Station A-W2)
   - 1 off Basic Termination (UTH1) of length 8.8 km to Manifold SDU

2. 1 off Basic Control Umbilical (length 4.0 km) to Lubina SDU
   - 1 off Basic Termination (UTH2) of length 4.0 km to Lubina SDU

3. 1 off Basic Control Umbilical (length 8.8 km) to Station B-W2
   - 1 off Basic Termination (UTH2) of length 8.8 km to Station B-W2

4. Stop Line Item
   - 1 off Basic Control Umbilical (length) to Manifold SDU

Control

8.8 km - Casablanca to Manifold
4.0 km - Manifold to Lubina SDU

Power

8.8 km long - Casablanca to Manifold

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Subsea Trees (Pre-installed in 2009)

The Montanazo & Lubina design is more similar to a shallow water North Sea field. All Structures and lines are protected.

- **PGB**
  - 25 tonnes

- **Tree**
  - 38 tonnes

- **Cover**
  - 7 tonnes

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Subsea Manifold

- Pump Module Intervention Tool with accumulator package
- Control Umbilical UTH
- Lubina Flowline
- Montanazo Flowline
- MCM/Base
- Casablanca (export) Flowline
- Power Umbilical UTH
- Lubina Inline Umbilical UTH

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Subsea Multiphase Flowmeters (MPFM)

Montanazo MPFM

Lubina MPFM

Separate Pcom POD (retrievable)
Retrievable Subsea Pump

- Framo Single Phase Pump:
  - Rotodynamic Pump
  - Design P: 2000 psia
  - Design T: 90 deg
  - 7 impeller stages
  - Speed Range: 1200-2600 rpm
  - Max Shaft Power: 275 kW @ 2600 rpm
  - Max GVF 5% @ inlet
  - 65 bar maximum operating differential pressure

- One Installed pump and one Spare Pump

- One Intervention Tool
SECC Connector (First of its kind)

Approximate Location of SECC Safety Link Connector (shown below)

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Project Development

- FAT, EFAT, early SIT and SIT in Norway in 2011

- Most of technical incidences captured at SIT and EFAT were related to interfaces between the work scopes of different suppliers
  - E.g. MCM Change-out tool had to be modified after SIT
  - HFL Installation Frame

- The largest delay was not due to technical issues but due to an environmental permit for installation
Installation

- Subsea Wells pre-installed in 2009 (REM Poseidon)

- The largest delay in the project was not due to technical issues but due to a long delay in environmental permit for installation
  - Final permit 20. July 2012
  - All installation contracts signed within 2 weeks

- Two vessels:
  - Normand Pioneer (Technip): Manifold installation, Umbilical Lay, Pipeline Lay, SDU, Matresses, Hydraulic and Electrical Flying Leads, Manifold Hatches
    - 19. August – 18. October
  - Adams Vision (Cortez): Trenching, Survey
    - 5. August – 31. October

- No incidence with the SECC conector installation despite first of its kind

- Startup Date: 19th October 2012
Operation

- Wells are producing better than expected
  - Stable Plateau Production. These two wells doubled the total Casablanca oil production
  - Lubina does not produce water yet, and Montanazo produces water but less than expected

- Montanazo MPFM failed in 2013 in the non-retrievable part (electronics in gamma detector):
  - Allocation still straightforward since Lubina MPFM is operative and M&L prod. has its own separator at platform
  - Since at manifold there are only two phases (water/oil) a virtual metering solution to back up the MPFM is being evaluated based on the venturi ΔP (still operative)

- Subsea Pump:
  - Not in operation yet because not needed
  - Tested during startup
Conclusions

- HSE results were excellent. 1MM+ project manhours to First Oil over 3 years. No LTI’s, includes 260k+ hours of offshore works, more than 600 lifts.

- Montanazo-Lubina has been a successful project that has allowed to extend Casablanca platform life, doubling the oil daily production

- To achieve an appropriate and economic exploitation of the oil reserves in Montanazo-Lubina, novel subsea processing technologies have been used, first of their kind in Repsol
  - Two retrievable subsea pump modules (one installed and one spare)
  - Two subsea MPFM, one per well
  - First of its kind SECC break-away connector which protects Lubina well and flowline in the event of soil movement

- Most critical delay was the delay in the environmental permit for installation

- No major technical issues in the project development, installation or early production.
Thank you to all members of team!