Decommissioning in Practice

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Decommissioning in practice

Introduction

Developing the decommissioning scope

1. **Decommissioning planning**
2. **Field operational history** - Understanding field specifics and technical differences.
3. **Subsea flushing** - Demonstrate ALARP residual Oil In Water (OIW)
4. **Contaminated materials** (Normally Occurring Radioactive Materials)
5. **Engineering, design and contingency plans** for all events
6. **Equipment divestment or disposal?**

Decommissioning in practice

1. Decommissioning planning

- Decommissioning planning should generally start one to two years before Cessation of Production (CoP).
- Provides the opportunity to add value and prevent asset value erosion.
- Need to consider the entire decommissioning system scope at the start. Decisions made early can influence future phased costs.
- Decommissioning is the opposite of field development. It starts with the huge amount of engineering design data available which has to be reduced down to what's necessary for the scope **OR** engineering applied to resolve uncertainties or concerns to mitigate risks.

Decommissioning in practice - example

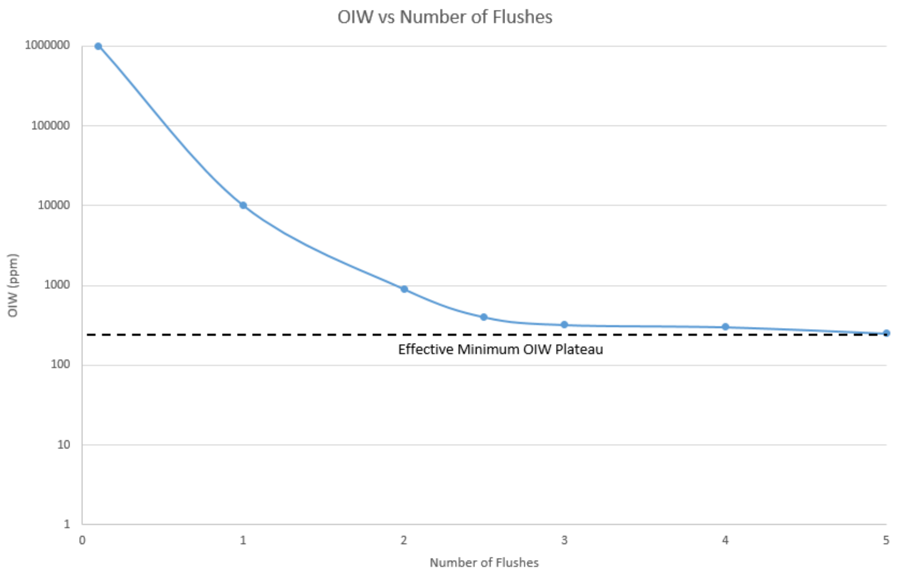
2. Operational history - Understand the field and any technical issues.

- Production and injection fluid composition changes over field life and any risks with this in the system.
- Well integrity concerns - downhole corrosion, annulus fluid, final reservoir pressures if being left unmonitored for a period of time before Plug & Abandon. Frequency of visual inspections post sail away.
- Technical integrity or process safety deviations from original design.
- System blowdown and depressurisation to ambient can provide challenging operating conditions to be managed within design envelopes.
- Potential leak paths to environment or fluid transfer i.e. via passing valves, gas lift mandrels or subsurface control line flow paths.
- Hazardous contaminants in spools, manifolds, flowlines and topsides. Topsides analysis is primary point to gather data prior to sail away.

Decommissioning in practice - example

3. Subsea flushing - Demonstrate ALARP residual OIW

- Subsea system flushing and well isolation procedures should be prepared well in advance of CoP. Timing can change quickly with critical equipment failures.
- Flushing ideally requires turbulent flow allowing reduced volumes and chemical usage. Specific to system size and pressure limits requiring engineering time to develop necessary procedures.
- Residual OIW ppm converted to a final OIW actual volume i.e. 100 ppm in 100 m3 system = 10 litres residual oil.



Decommissioning in practice - example

4. Contaminated materials

Develop management and mitigation plans for unexpected findings which may not be obvious from non intrusive topsides sampling.

Disposal options;

1. Dispose of concentrated waste after cleaning the item.
2. Dispose of the entire contaminated item.

Consider cleaning options;

1. In-situ at source with scale dissolver product (residence time?).
2. HP water jet at the onshore general disposal site to concentrate the waste.
    - Local disposal locations.
    - International disposal of concentrated waste and associated freight and regulatory approvals.

Water Injection riser with NORM's scale

Decommissioning in practice

5. Engineering, design and contingency plans

- Challenging engineering requirements for technically complex operations.
  - Intervening on aged equipment. Will the equipment operate?
  - Integrity concerns. Installation load conditions vs removal load conditions and installed equipment.
  - Marine growth impact to recovery loads.

- Schedule and weather requirements for operations.
  - Consider CoP timing and any immediate weather critical scope requirements.
  - Equipment heavy lifts and recovery.

Decommissioning in practice - example

6. Equipment divestment or disposal

- Subsea equipment has high capital cost.
- Negligible value for the recovered items.
- High refurbishment costs for re-use.
- Re-installation costs and residual risks of used, refurbished hardware.
- Generally old equipment – obsolescence issues.

Recycling of recovered product is main option.

- Adds HS exposure with handling and operations potentially being in a low labour cost environment.
- Minimal return for scrap material.

Disposal of recovered material

Description Of Materials	Weight (Metric Tonnes)
Riser / Umbilical Cord 8" - Iron (70%) - Recycled - Plastic (20%) - Recycled - Duplex 2205 (5%) - Recycled - Fiber (2%) - Disposed - Wastage (3%) - Material Loss	565.92
Riser / Umbilical Cord 6" - Iron (70%) - Recycled - Plastic (20%) - Recycled - Copper (2%) - Recycled - Fiber (2%) - Disposed - Wastage (6%) - Material Loss	130.18
Iron Scrap - 100 % - Recycled	235.19
Stainless Steel - 100% - Recycled	28.50

Decommissioning in practice

Summary

- Time for preparation of a decommissioning project should not be underestimated.
- Recovery of subsea equipment can be more challenging than installation and exposes personnel to additional risk i.e. aging equipment, unknown integrity for lifting and recovery loads.
- Develop comparison ALARP and NEBA positions for HS and E risks to consider in-situ decommissioning.
- Questions?

Typical FPSO On-station