Decontamination of Tyra Topsides

Steam cleaning - the way forward

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TOPICS:

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DISCLAIMER:

To the best of IKM's knowledge, the information given here is correct. However, the content of this presentation has not been verified or sanctioned by any third party and reflects IKM's views and opinions only.

STEAM - BUT WHY?

ADDING VALUE AND INCREASING SAFETY:

- Adds value during the decontamination step, and also beyond:
  - Reduces or eliminates cleaning scope throughout the project
  - Minimise the need for vessel entry during offshore phase
  - Minimise handling of NORM and mercury during offshore phase
- Far superior removal of hydrocarbons when compared to traditional decontamination by DFPV (drain, flush, purge vent):
  - No pockets of hydrocarbons left in process plant
  - No venting of hydrocarbons to deck
  - No further cleaning/measures needed to perform ‘hot work’
- Excellent HSE track record:
  - No high pressures involved (0 - 5 bars)
  - No exposure to harmful substances or atmospheres

STEAM - HISTORY AND FACTS

FROM THE NORWEGIAN SECTOR:

- Steam cleaning of process plants was introduced to the Norwegian sector by Phillips Petroleum more than 40 years ago
- IKM started steam cleaning approx. 20 years ago and has developed the technology dramatically over this period
- Steam cleaning is now the main cleaning method used to remove hydrocarbons - HP jetting is reduced to approx. 5 %
- IKM has 98 % of this market and provided this service to 31 turnarounds in 2019 alone
- During the last two decades, IKM has steam cleaned more than 2400 separator and vessels using steam
- IKM has now used steam to decontaminate 27 individual offshore installations as part of decommissioning projects

In case you wondered why steam cleaning is the preferred cleaning method in Norway. Vessel prior to mechanical cleaning.

STEAM - BASIC PRINCIPALS

HOW IS IT DONE?

- Simple principle: steam in - drain and vent out:
  - Lighter hydrocarbon fractions ‘flash off’ and are vented to safe location
  - Heavier fractions ‘melt down’ and are drained together with steam condensate
- Large segments of the process are steamed at the same time
- Specialist chemicals can be added: enhanced steam cleaning
  - Highly effective for cleaning out asphaltenes and vessel deposits
- Low rigging requirements:
  - Little or no need for removal of inline equipment
  - Only small dia. interfaces needed: 1" - 2"
- Low equipment footprint
- Low personnel requirement: typically 2 - 3 technicians
- Excellent HSE track record:
  - No high pressures involved
  - Closed loops topside: no exposure to toxic substances/atmospheres

Typical steam equipment: small footprint

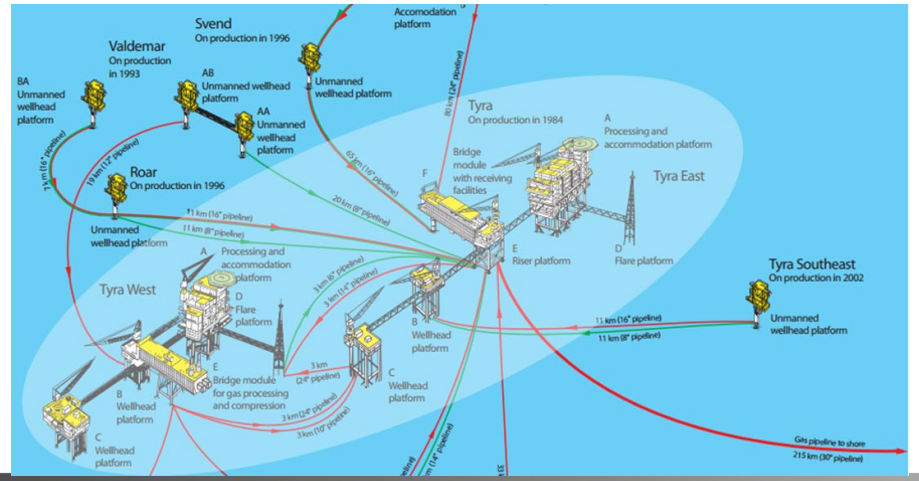
TYRA REDEVELOPMENT - OVERVIEW

THE TYRA REDEVELOPMENT PROJECT:

- 9 topsides removed and replaced with 7 new
- The largest offshore decom. project in Europe to date
- Total investment: $3.36 bn

TOPSIDE CONFIGURATION:

- Two large field centres:
  - Tyra East: 5 topsides
  - Tyra West: 4 topsides
  - Approx. 800 metres of bridges in total



Tyra West

Tyra East

TYRA - DECONTAMINATION

CLEANING PHILOSOPHY:

- Drain, flush purge and steam (DFPS) of all ‘wet’ hydrocarbon systems
- Drain, flush and purge of all ‘dry’ hydrocarbon systems
- Decontamination without vessel entry (Tyra had 62 vessels)
- Decontamination without removal of main process equipment

ENGINEERING:

- Detailed steam packs: 41 in total
- 635 P&ID mark-ups in total

EXECUTION:

- 7 steam units in use
- Average crew: 12 per shift, per field centre
- Tyra West:
  - Start: 06.011.2019
  - Completion: 14.01.2020
- Tyra East:
  - Start: 30.11.19
  - Completion: 01.11.19

Tyra A process platform (14 000 ton) was cleaned using 10 steam segments

TYRA - THE RESULTS

CLEANING RESULTS:

- Steam time:
  - Tyra East: 32 days
  - Tyra West: 39 days
- Hydrocarbon level after decontamination:
  - 201 measurements: average 0,3 % LEL (0.015 % vol. methane)

PROJECT RESULTS:

- Decontamination delivered on schedule and as agreed
- Steam time several weeks less than allowed for

HSE RESULTS:

- Decontamination delivered without injuries or accidents

Tyra East A platform on its last journey

The 'islands' are safely removed

IKM - CONTACT DETAILS

If you found this interesting and require more information, please feel free to contact us - see details below. We are more than willing to discuss everything from high-level cleaning strategies to the nitty-gritty details of NORM handling - and anything in between.

IKM ABERDEEN:

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IKM - key facts:

- Established in 1989
- Head-office in Sola, Norway
- Approx. 2 400 employees
- Offices in 12 countries
- Deliver services globally

IKM - five divisions:

- Instrument / Automation / Inspection
- Subsea / Renewables
- Engineering / Operations
- Completion / Commissioning
- Electrical / Rig / Downhole Services