Pipeline Blockage Removal Methods – Invasive Options
Pipeline Blockage: Causes

- Gradual changes in pipeline contents (Temperature, Flowrates, Pressure, Chemistry)
- Production upsets (Chemical Injection)
- Operational changes – pigging frequency
- Insufficient pipeline preparation / cleaning and geometry proving for In-line Inspection
- Overzealous progressive pigging campaigns
- Incorrect selection and application of type of pig. e.g. using a non-bypass pig for pipeline dewaxing
Pipeline Blockage: Composition

- Wax /Asphaltenes
- Scale
- Debris
- Hydrates
- Pigs or pigged tools such as inline inspection tools becoming stuck
Pipeline Blockage: Consequence

- Reduced or total pipeline production
- If the blockage cannot be removed, then the pipeline (or a section of it) need to be replaced
Pipeline Blockage: Locating

To enable blockage removal the location and extent of the blockage needs to be determined.

Pipelines blockages can be located by:

- Pressure pulsing – can detect a blockage and in some cases disassociate and remove a blockage
- Density change scanning tools / Flooded Member Detection (if the pipeline is unburied)
- Pig detectors trackers – if transponders were included in the pig that has stopped moving
- Pressurisation / Depressurisation timing
Pipeline Blockage: Remediation

The options available to remove a blockage are highly dependent on what the blockage is comprised of, the location and extent of the blockage, pipeline length / diameter / depth / contents etc.

Blockage remediation methods:

- Depressurisation can lead to hydrate dissociation
- Reversing flow and high-speed flushing
- Deploying various types of pigs (bypass pigs, shunt pigs, foam pigs)
- Pressure pulsing of high frequency low amplitude pressure pulses can in some cases disassociate and remove a blockage – better suited to liquid lines, limited to approximately 8km
Coiled tubing inserted into the pipeline can remove blockages - limited to approximately 16km

Injecting high pressure water / diesel / chemicals to remove debris such as wax, scale, sand, asphaltenes

With a fishing tool attachment could recover a stuck pig
If the less invasive blockage removal methods are unable to remove the blockage then a more invasive remedy may be required, such as

1) Locally injecting a blockage flushing product (treated water / solvents / glycol / diesel) via small bore hot taps

2) Isolating the pipeline upstream and downstream of the blockage then cutting out, removing and replacing the entire blocked section

3) Replacing the pipeline or pipeline section
Small-bore hot taps allow local injection of blockage flushing product

Midway, upstream and downstream of blockage
STATS Patented Lightweight Subsea Hot Tap Strap Clamp

- Fully pressure rated to pipeline design pressure (25yr design life)
- High pressure sealing with lightweight construction
- Easily re- configured for a range of pipe sizes by simple change-out of components
- Both seals fully tested prior to breaking containment
- Double piston effect design enhances sealing when pipeline pressure is applied to the clamp
- Easily installed by diver or modified for ROV installation
- Can be installed over live pin-hole leak, if required
- Suitable for a wide range of pipe sizes
Lightweight Strap Clamp: Dual Seal Testing

Secondary Seal: Leak-Off Test
Pressurising and locking in the annulus test pressure and monitoring for pressure decay proves Secondary Seal

Primary Seal: Pressure Build-Up Test
Pressurising the clamp body and monitoring the annulus for pressure build-up proves the Primary seal in the correct direction

Double Piston Effect - Sealing Enhancement
Due to the difference between piston areas A and B
Piston effect on the floating seal cartridge increases the sealing efficiency of the clamp to pipeline seals
Minor Intervention - Animation
Pipeline Blockage Removal – Section Removal Methodology

Dual BISEP® Isolation Section Replacement

If bypass installed production can resume during sectional replacement
- Fit Hot Tap Clamp
- Deployed c/w Slab Valve and Hot Tap machine
- Leak test joints, Perform hot tap
- Recover coupon into hot tap unit, Close slab valve
- Remove hot tap machine, deploy and install BISEP launcher
- Leak test joints, open slab valve
- Deploy BISEP, set and test seals
- Inject flushing medium to confirm unrestricted flow through upstream pipeline section
- Unset, rotate (180 degrees) and redeploy BISEP
- Test BISEP seals
- Inject to attempt blockage removal
- If blockage removal is unsuccessful, install downstream BISEP
- Confirm unrestricted flow through downstream pipeline section
- Unset, rotate (180 degrees) and redeploy BISEP
- Prove Double Block Isolation of both BISEPs
  - **Fully Proved Double Block & Bleed Isolation**
- Inject to attempt blockage removal
- Proceed with cutting the block section of pipeline
- Remove blocked section
- Replace pipeline section
- Leak test new connections – against rear of BISEPS
- Remove both BISEPS and prepare to install completion plugs with the hot tap machine
- Install completion plugs
- Remove slab valves and install permanent blinds
- Remove slab valves
- Install blind flanges c/w ½” NPT test ports
- Leak test blind flange connection
- Blockage removed - pipeline service resumed
Pipeline Blockage Removal Methods – Invasive Options

Major Intervention – Section Replacement Animation
Thank You For Your Attention
Questions?

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