INTELLIGENT BULK PIPELINE MONITORING & ASSESSMENT

AREA OF EXPERTISE

Bulk or transmission pipelines are often susceptible to reduced flow volumes caused by leaks, bursts, obstructions such as partially open valves, air locks and air valve vandalism. Due to remote location of most bulk pipelines, maintenance is often poor or neglected, adding to the inefficiency of supplying bulk water. This compromises reservoir storage volume and ultimately service delivery to consumers.

JOAT offers secure intelligent monitoring of bulk pipelines and provides advanced warning and notice of hydraulic anomalies, leaks, bursts, air locks and air valve vandalism. Solution offerings extend to:

Detailed field assessment and visual inspection of the pipeline to visit all air valve and scour valve chambers. Part of this assessment would include determining the following:

- Presence of any leaks and estimation of leak rate volumes
- Extent of vandalism (if any)
- Visual inspection of condition of pipework, fittings and valves inside the chambers
- Assessment of corrosion protection/cathodic protection of pipes and fittings
- Determination of rehabilitation/repair works that would be required to either resume functioning of air valves or temporary retrofitting requirements of pressure sensors, communication devices and/or access points for intrusive inspection devices
- Determination of extent and suitability of air valve/scour valve protection (chamber and secure access)
- Drone flyover of pipeline route to determine any visible signs of leakage along pipeline route

Installation and commissioning of accurate pressure sensors and temporary communication devices on existing air valves. This would include the following:

- Retrofitting of digital pressure sensors with 0,1m accuracy or 1% of measuring range on each air valve, complete with access to chamber, temporary security and protection
- Installation and commissioning of data communication devices that would transmit pressure readings in real- or near-time
- Data logging of pressures at all air valves for a 3 to 5 day period at 15-minute intervals
- Comparison of logged pressures to the design hydraulic grade line of the bulk pipeline to determine any deviation from the grade line. This would assist in narrowing down any anomalies between two air valve points, due to either a leak, burst or obstruction

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Installation of temporary flowmeters or verification of existing flow meters to provide bulk pipeline balances and determination of pipeline friction factors.

This would include the following:

- Supply, installation and commissioning of temporary flow meters at WTW outlet, booster pump station inlet, booster pump station outlet and terminal storage inlet if required
- Verification and/or assessment of existing flow meters to determine potential accuracy and suitability of meters to complete a bulk pipeline balance and/or friction factor tests
- Completion of a bulk pipeline balance based on volumetric balance along the pipeline and report thereon with comparison to accepted international norms for leakage rates per kilometre
- Determine of current pipeline friction factor (k factor) using a combination of flow and pressure measurements and comparison to "as designed" or "new" pipeline friction factor as an indication of internal pipeline conditions, which would provide an early indication of remaining useful service life of the pipeline

Completion of pipeline burst frequency analysis. This service entails:

- Collection and collation of all burst and leak repair records carried out on the pipeline
- Completion of a burst frequency analysis according to international best practice
- Determination of Burst Frequency Index of the pipeline to determine the extent of actual experienced bursts compared to the theoretical minimum number of bursts, assiting with calculating the remaining useful service life of the pipeline

Exposure and physical measurement of pipeline wall thickness. This service entails:

- Excavation of slot trenches at various intervals along the pipeline route
- Recording of external visual condition of pipeline in terms of corrosion protection, and general state complete with digital photograph
- Recording of existing pipeline wall thickness using an ultrasonic thickness measurement gauge and determination of deviation of pipe wall thickness from "new" which could be used in determining remaining useful service life of the pipeline

Internal/invasive condition assessment of pipeline. This service includes:

- Modification of existing air valve and scour chambers to allow access points for CCTV internal inspection of the internal condition of the pipeline
- Undertaking of a CCTV survey along either the entire pipeline or selected practical sections of the pipeline
- Output from this service would include a report on internal condition of the pipeline, complete with digital video and location/chainage of inspected sections.

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