



Asset Care Counts

November 2014

Risk Based Inspection of Aging Water Pipe Work

Potable water piping can be a particularly challenging asset to manage.

Due to the varying age of water systems, piping is constructed from a wide variety of materials, from cast iron to cement mortar lined steel pipe through to asbestos cement piping, reinforced concrete piping and plastic piping.

In addition, piping is both above and below ground. Piping can be located under critical infrastructure, such as roads, or in basements.

The consequences from pipeline leaks may be high due to interruption of supply and disruption to both the public and business users. Collateral damage, from flooding, is sometimes a major issue.

Using Risk Based Inspection for Water Piping

When leaks occur, an initial reaction can be to implement a 100% inspection program of similar piping to ensure the condition of piping is fully understood. This however can be very costly due to:

- Obtaining access to items for inspection.
- The overall length of piping to be inspected is large.

ALS Industrial has been working with our clients to implement **Risk Based Inspection** protocols on critical water assets.

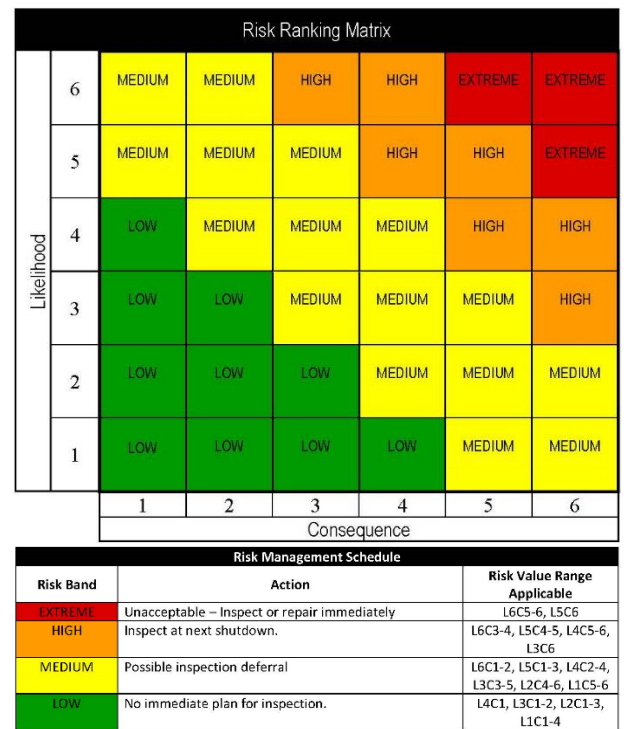


Figure 1 - Example Risk Matrix for RBI

The benefits of this approach are:

- Inspection plans are created that target the expected damage mechanisms e.g. lining failure and consequent corrosion.
- Inspection methodology, with an appropriate likelihood of detection (LOD), is chosen.
- Over-inspection and under-inspection is avoided. The extent and frequency of inspection is matched to the risk and the damage mechanism. Inspection “value-for-money” is maximized.

- **A living RBI Manual is created for the asset.** This document is updated, or evergreened, each time new inspection data is gathered, ensuring the inspection plans are always appropriate to the condition of the asset.

An example – Risk Based Inspection of Mild Steel Cement Lined Piping

Mild steel cement lined piping suffers multiple failure mechanisms including:

- Loss of Internal Lining due to cavitation / turbulence, pressure pulsing, concrete degradation.
- Corresponding steel pipe corrosion in areas of lining loss.
- Corrosion of steel pipe also associated with depleted cement lining that has lost its alkalinity.

Assessment of the risk of these mechanisms occurring in this water pipeline led to ALS creating an RBI Manual and a tailored inspection program for this MSCL pipe system.

The inspection program used a variety of NDT techniques designed to supplement each other and provide a high likelihood of detection (LOD) of the damage mechanisms. Techniques included:

- SLOFEC Pipe Inspection for rapid scanning of long lengths of piping.
- Phased Array Ultrasonic Testing (PAUT) of wall thickness
- Ultrasonic thickness grid surveys and spot readings.
- Thermography.

Key Benefits in This Case Study

By applying the RBI process:

- The initial specification of 100% UT scanning of all pipework was avoided.

- Inspection direct cost was reduced to 66% of the original specification.
- The total cost of the project including the provision of the RBI System development was still below the cost of the original specification.
- The client had an established RBI system for future use.

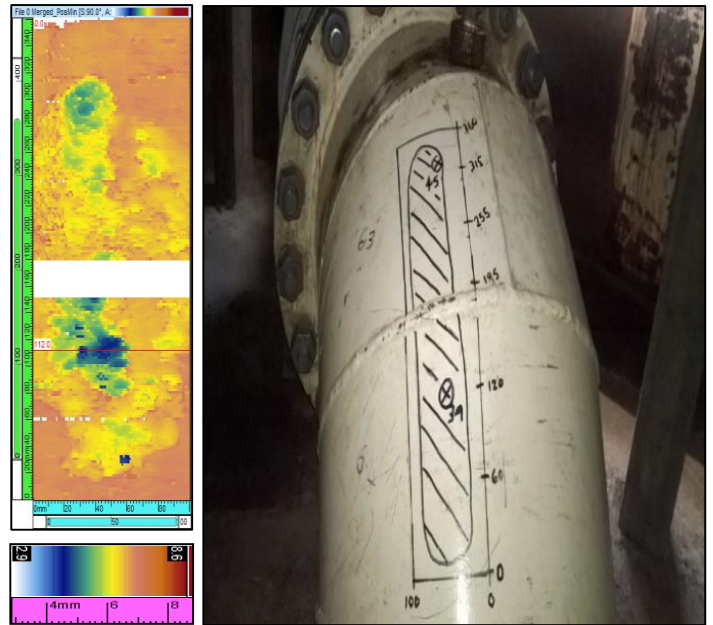


Figure 2 – Corrosion Mapping in MSCL Piping

Our Engineering Team

ALS Industrial has a dedicated engineering team to provide Risk Based Inspection investigation assessments and consulting services.

These staff are supported by our extensive group of Inspection technicians, Condition Monitoring technicians, Materials and Mechanical engineers.

For enquiries in regard to your piping infrastructure, please contact.

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