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BENEFITS OF USING AN ROV TO CONDUCT AS1851-2012 TANK INSPECTIONS

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Record of Revision

Issue	Date	Section	By	Revision Details
1	19/11/2019	Whole Document	G. McCulloch	Original

1. AS1851 Legislative Requirements

AS1851-2012 (incorporating Amendment 1 2016) Routine Service of Fire Protection Systems and Equipment is the most recent standard available for fire water storage tank inspections. Under the requirements of Section 5 (Table 5.4.3) of AS1851-2012, all fire water storage tanks must undergo an annual inspection.

Regular maintenance of fire protection systems is part of every building owner's responsibility to ensure adequate protection of property and life, with penalties applicable if maintenance is not conducted in accordance with relevant legislation. While legislation is different in various states and territories in Australia, inspecting to AS1851-2012 requirements generally fulfills duty of care under common law.

Without regular internal inspections, fire water storage tanks can fall into disrepair with often costly repairs required. The aim of regular inspections is to prevent small problems that are easily fixed from becoming expensive repairs or even full tank replacements.

2. Benefits of Using an ROV for Internal Inspections

Internal AS1851-2012 fire tank inspections, regardless of the age, height or external state of the tank, are essential to ensure that a fire system operates without failure in an emergency.

Utilising a remote operated vehicle (ROV) to conduct these inspections allows:

- all the internal components of a fire tank to be viewed as per Table 5.4.3;
- the inspection to be recorded to provide evidence of Table 5.4.3. items being viewed;
- issues to be easily monitored as previous recordings can be reviewed and compared;
- the water conservation aspects of AS1851-2012 and AS2304 to be met as there is no need to drain a tank to view internal items;
- the life expectancy of a tank to be extended by identifying maintenance items early;
- for better asset management through providing a greater understanding of the specific maintenance requirements required for each tank;
- fire service providers to clearly identify the state of the asset at the time it comes into their care.

The following photographs demonstrate the benefits of internal ROV tank inspections. All photographs have been taken by The Tank Inspectors while undertaking AS1851 inspections with stills taken directly from ROV footage. All source pictures are verifiable. Using an ROV to conduct AS1851-2012 internal fire tank inspections.

3. Example of Visual Inspection from Hatch

The view from the hatch of a 5.24m high tank. Visibility is limited to a depth of 2 – 2.5m and is distorted with reflections. Note that while the growth on the liner is visible above the waterline, it is not as clear below the waterline.

4. Example of ROV Inspection

Table 5.4.3, 3.6 – Corrosion "Check for corrosion of all external components and surfaces, and internal components as far as is safe to do so from the top inspection/access hatch".

The bubbles behind the liner are rust caused by water sitting behind the liner. The rust will eventually penetrate the liner causing leakage, as well as corroding the panels from the inside. These bubbles are not visible from the hatch and require an internal inspection to be identified.

The advantage of using an ROV instead of a full tank empty in this circumstance is that the rust is not disturbed and further damage to the liner during unnecessary empty and fill situations is avoided. Once a tank is emptied, the liner generally falls away from the wall so that these issues are not always identifiable.

Table 5.4.3, Item 3.8 – Ladder "Check the ladder system is secure and free from corrosion".

A rusting and broken ladder with a piece from the upper rungs of the ladder having fallen to the floor. The ladder is in a tank 5.75m high with the still taken from an ROV fitted with auxiliary high powered lighting at approximately 3m depth. At this height, the bottom of the tank is not visible from the hatch. Reliance on this ladder for access and egress poses safety issues for maintenance or inspection personnel. The broken metal falling to the floor of the tank may also have caused damage to the liner resulting in leaking.

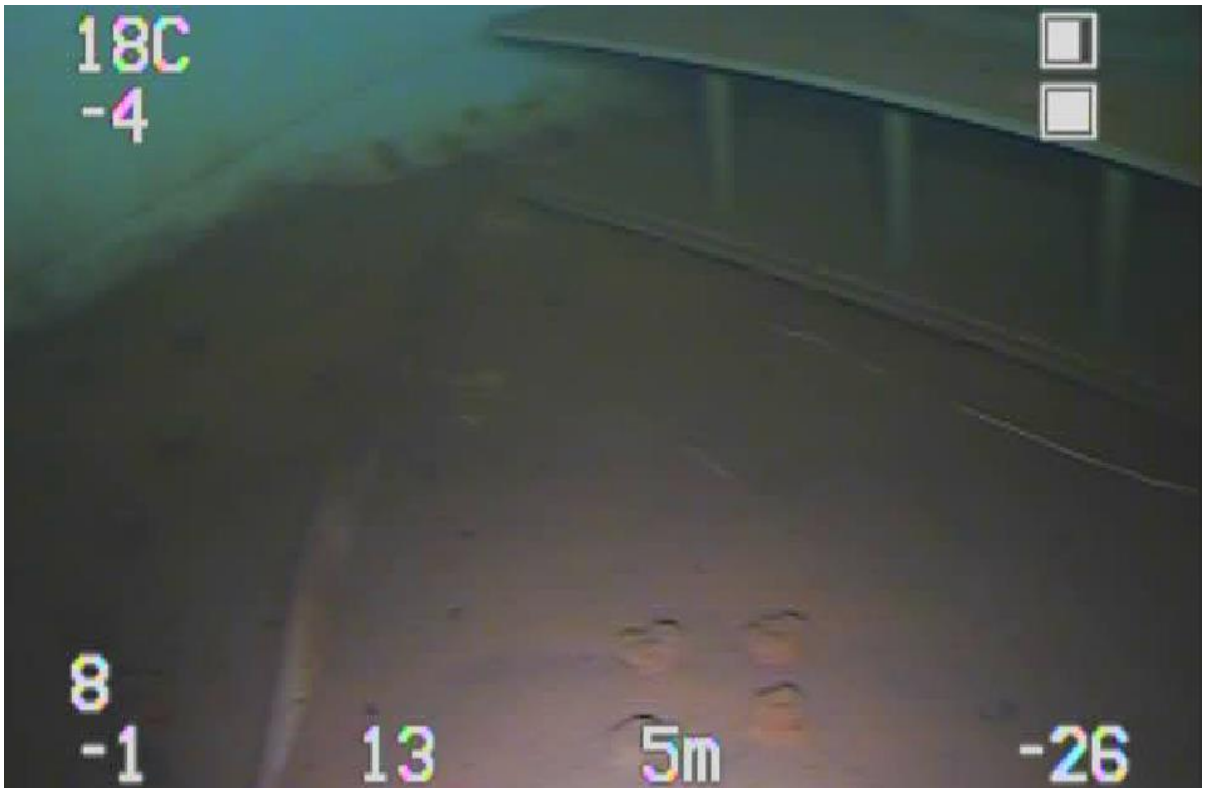
Table 5.4.3, 3.3.9 – Roof "Check the roof structure for: (a) stability and security, ensure roof sheets are secured (b) adequacy of sealing of penetrations".

Rusted truss distance from hatch

A visual only hatch inspection where a rusted truss was not identified from the hatch. The rusted truss was identified during a subsequent reline by personnel working inside the tank.

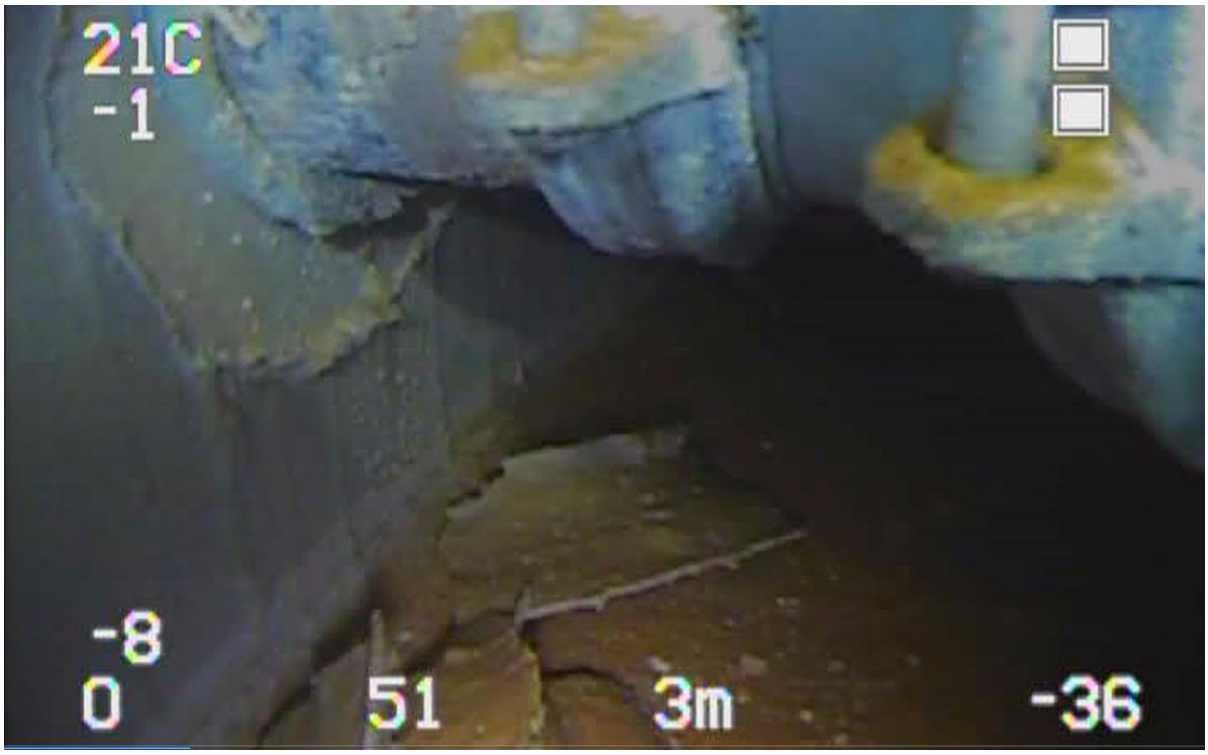
Located on a remote site, this resulted in a costly return to site for the client when the reline and truss repair could have been conducted at the same time. Additionally, personnel walking on the roof were unknowingly exposed to the roof failing under their weight.

Table 5.4.3, 3.11 – Foreign objects "Check for internal foreign objects visually through the top inspection/access hatch".



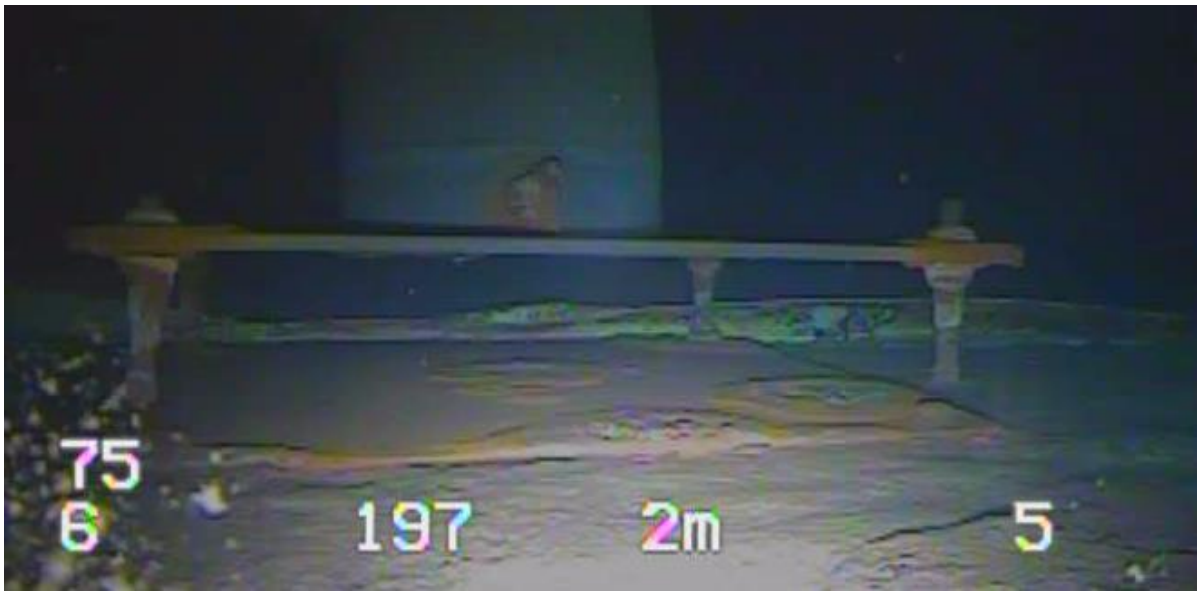
Nuts sitting on the floor of the tank can be sucked into the anti-vortex during emergency use and cause pump failure. The objects captured by the ROV are in a 6m high tank and would not be visible from the hatch. This picture also identifies that scheduled maintenance may not have been carried out due to the lack of disturbance to sludge around the fitting.

Table 5.4.3, 3.16 – Gaskets and seals "Check the condition of all gaskets and sealants".



Waterproofing failure around the anti-vortex in a one year old concrete tank servicing a multi-storey office development. The chambered configuration of this concrete tank is such that the anti-vortex is not visible from the hatch. Using an ROV to conduct AS1851-2012 internal fire tank inspections

Table 5.4.3, 3.17 – Vortex inhibitor "Check the condition of the vortex inhibitor visually from the access hatch if practicable".



At only 2m high, while the base fittings in this tank may be visible from the hatch, viewing of the anti-vortex plate is not possible. The anti-vortex pictured shows rusted bolts that can result in the cavitation plate being sucked onto the anti-vortex during use, causing failure.

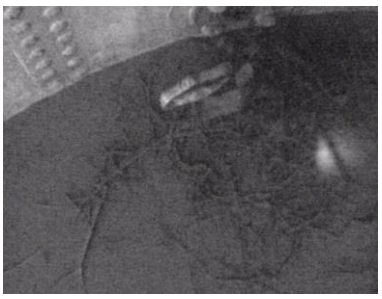
Table 5.4.3, Item 3.21 – Eyelets and other liner fixing systems "Check eyelets, attachment connectors and other mechanical fixings for wear, detachment or corrosion".

A torn liner allowing water to slip behind the liner and cause wall panel corrosion which is not visible externally until significant repairs are required. It is not possible to view the full liner attachment of a tank with a hatch only inspection. This picture was taken by the ROV about 110 degrees west of the hatch. Using an ROV to conduct AS1851-2012 internal fire tank inspections.

Table 5.4.3, 3.31 – Leaks, cuts and tears "Check for signs of leaks, cuts and tears of the liner".

External scour

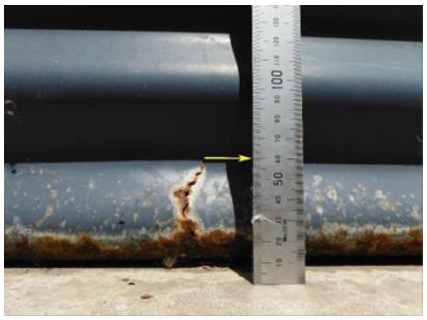
Poisoned tree



Internal root intrusion

The internal ROV capture shows tree root intrusion which causes liner penetration and eventual leaking once the dying tree root shrinks back, exposing a hole. At 6.5m high and on a 90 degree angle from the hatch, the tree root intrusion would not be possible to view from the hatch. The tree root in the pictures above had been removed, however, a thorough internal inspection would have identified the extent of the issue.

Catastrophic Failures



Cause

Effect

Corrosion to the bottom ring of a steel wall panel can be missed during routine inspections by untrained personnel. The tank above had been signed off as being inspected for corrosion on an annual basis. While the corrosion may not have appeared significant the resulting tank explosion was catastrophic and could have been avoided with knowledgeable maintenance inspections and recommendations. You are the end user so what you want is imperative.