

# Instrument air and control system leak risk management



## Leak risks in process control systems

AIS (Asset Integrity Survey Services) specializes in leak risk management surveys of critical infrastructure across upstream oil & gas production, water and wastewater treatment facilities.

Our leak risk management (LRM) services are used by major clients including Santos, Incitec Pivot, QNP, Energy Australia, Oil Search, AMPOL, Gippsland Water, etc..

Water and wastewater treatment facilities rely on finely tuned process automation and control systems to maintain produced water quality to regulated standards.

If not detected in time, instrument air leaks can introduce control system risk.

Leak risks include reduction in available break-away torque from pneumatic valve actuators, spring return actuators overriding system commands, and lag in proportional control system feedback loops.

Instrument control systems therefore must remain at design pressure and volumetric capacity levels on order to maintain produced water quality and maximize plant uptime.

Over time undetected instrument air leaks can impact process control system reliability, efficiency and can lead to unplanned plant shutdowns.

## Minimise operations budget risks

Unscheduled plant shutdowns and unplanned maintenance do impact operations and maintenance budgets.

Scheduled instrument air system leak detection surveys of water & wastewater treatment plant control systems can reduce unplanned and non-budgeted maintenance expenses in the long term.



## Scheduled, targeted, systematic leak surveys

Most water and wastewater treatment plants are operated and maintained with limited manpower from a centralized operations control room often located long distances away from the plant.

One or more instrument air system leaks can result in distributed control system (DCS) error messages and unplanned callouts.

Distance logistics and limited available manpower means plant operators / maintainers are then burdened with performing leak surveys of their instrument air control systems to find the small leaks which caused the DCS errors.

AIS has the experience and leak detection technologies to find very small instrument air system leaks through regular surveys before they become big enough to result in unplanned callouts.



## Asset Integrity Survey Services (AIS)

AIS have been delivering process leak risk management (LRM) surveys since 1999.

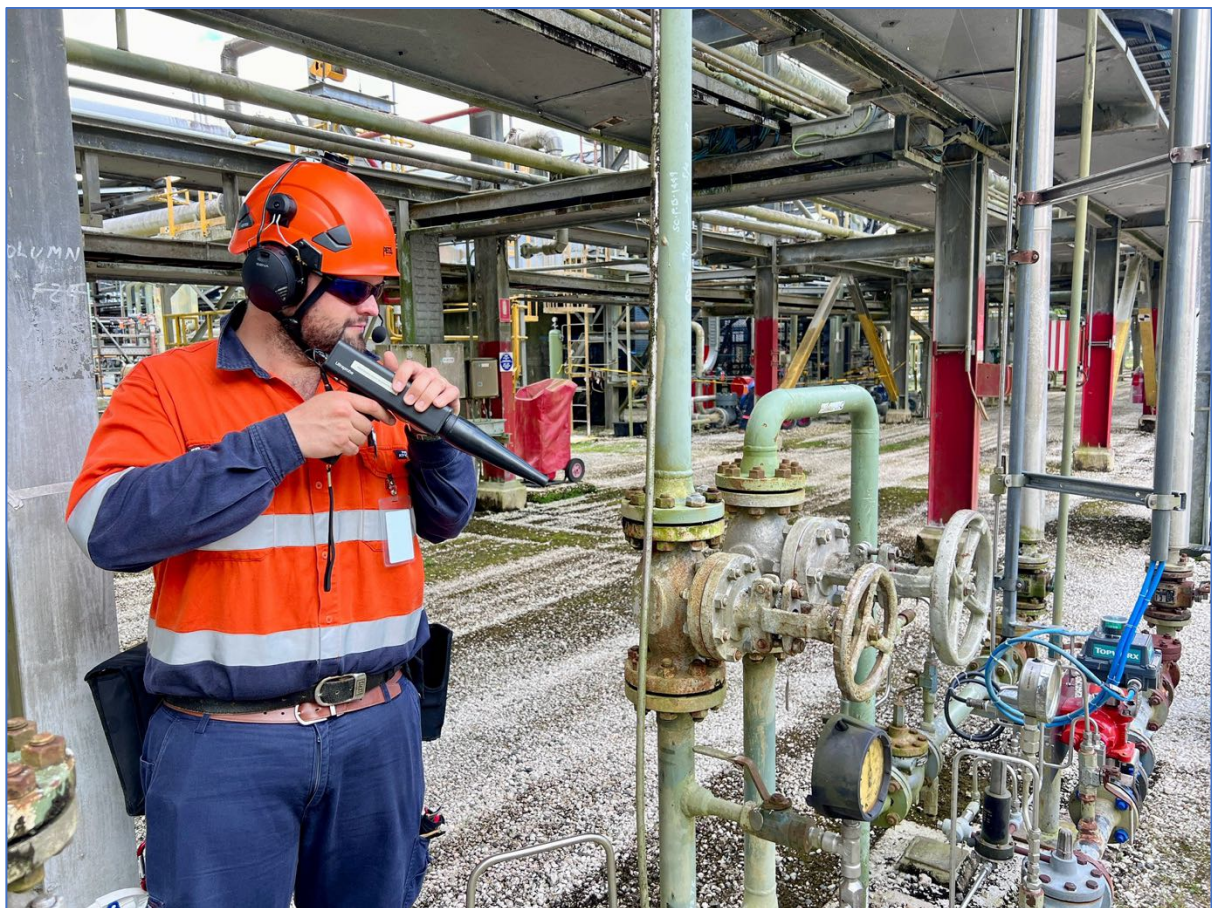
AIS leak risk management survey findings are integrated directly into our client's maintenance work order prioritization and scheduling system using leak classification and priorities based on asset class and asset type specific Risk And Priority Assessment (RAPA) parameters.

Our unique RAPA workflow results in context-based work order prioritization and timely remediation to reduce process integrity risk.

AIS personnel have relevant experience in valve and control system design and maintenance.

We survey all potential leak sources that can often be masked by background process noise, are out of reach, and undetectable using conventional techniques.

Our process control system knowledge, leak detection technology, and survey methods mean we quickly locate, quantify, document and report instrument control system leaks.



*AIS Leak Detection And Risk Management Survey using airborne ultrasonic emission detection technology to quickly find risk assess and report very small leaks*

**[Contact us for a confidential discussion on how we quantitatively reduce your leak risk and improve your process control system integrity.](#)**

## Examples of instrument air system leaks, root cause & remediation.

Asset	Leak Risk
	<ul style="list-style-type: none"> <li>– <b>Backwash system control valve positioner.</b></li> <li>– Delayed control response.</li> <li>– Position feedback control loop timing delay.</li> <li>– Quantified venting from the positioner bleed air vent as “above normal OEM Specification” .</li> <li>– <b>Replaced torn / cracked positioner differential pressure diaphragm assembly.</b></li> </ul>
	<ul style="list-style-type: none"> <li>– <b>Filter Outlet Valve Actuators.</b></li> <li>– Delayed opening.</li> <li>– Instrument air pressure drop reducing available break-away torque.</li> <li>– Leaks from instrument air isolation ball valve gland assemblies.</li> <li>– <b>Replaced multiple ball valves with better specification / gland design.</b></li> </ul>
	<ul style="list-style-type: none"> <li>– <b>Instrument air reservoir.</b></li> <li>– Not reaching &amp; holding system design pressure.</li> <li>– Verified pressure relief valve is not passing to atmosphere.</li> <li>– Low but steady pressure drop traced to pin hole leaks from welded process piping connections.</li> <li>– <b>API Pressure vessel inspection and repair activity added to planned shut-down maintenance work scope.</b></li> </ul>



## Examples of instrument air system leaks, root cause & remediation.



- **Sludge Discharge System.**
- Intermittent actuation of butterfly valve.
- Vent / silencer from 3 port 2 position solenoid valve masking a pressure leak from the spring return actuator end-cap gasket each time the solenoid passed air to the actuator.
- **Fitted actuator kit and validated repair prior to recommissioning.**



- **Inlet Isolation Valve**
- Progressive reduction of travel on the butterfly valve requiring progressive adjustment of the limit switch box NO/NC contacts.
- Leak across the 5 port 2 position solenoid valve NAMUR mount interface plate / seals.
- Exhaust port speed controller blocked creating back pressure causing the leak.
- **Replace speed controller and NAMUR interface block seals.**



- **Filtered Water outlet control valve**
- Slow actuation resulting in delayed DCS position feedback signal.
- Air scavenging due to undersized air supply tubing and leaks in the air supply galvanized pipe run "T" Connection joints.
- **Re-calculate & recommend required air supply manifold system capacity increase and add to shut-down work scope.**