



Asset Integrity Survey Services

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## AISS Case Study – Anaerobic Reactor Leak Survey



### Objective

Anaerobic reactor Methane production efficiency improvement.

### The Project

Locate, identify, quantify and report methane gas emission losses from an anaerobic reactor.

Identify additional process improvement opportunities from the same data set.

### Key Results

- Increase Methane Recovery
- Eliminate methane loss from the reactor cover tapping points and perimeter seal.
- Quantitatively monitor the effectiveness of a crust minimisation program.
- Increase Methane recovery flow rates to over tapping points.

### Client

Regional Council

### Work Site

Water Treatment Facility  
Gippsland, Victoria, Australia

### Type of work

Aerial and Terrestrial - Asset Integrity Survey

### Scope of work

- ✓ On-Site Risk Management
- ✓ Gas Leak Detection & Quantification
- ✓ Drone Survey Solution
- ✓ Asset Condition Assessment
- ✓ Contextual Reporting

Asset Integrity Survey Services Pty Ltd (AISS)  
Industrial Asset Condition Monitoring Leak Detection And Risk Management Since 1993  
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## Key Challenges

### Hazardous atmosphere

- Potentially explosive methane gas mixture due to known leaks to atmosphere from the reactor.
- Presence of Hydrogen sulphide in the environment as a by-product of the anaerobic reaction process.

### Hazardous work areas

- Highly aerated liquid inside the reactor presents a drowning risk to personnel if the cover fails while walking to survey process gas tapping points on top of the reactor cover

### Methane Gas

- Methane gas is invisible
- Accurate Methane gas loss quantification is difficult because methane leaks are highly buoyant and disperse quickly.
- Remote measurement of methane plume density in the atmosphere above the leak source.



## AISS Survey Solution

### Optical Gas Imaging

- We deployed a medium wave cooled infrared optical gas imaging sensor to locate and visualise methane gas leaks.

### Laser Absorption Spectroscopy

- We deployed a laser absorption spectroscopy sensor to validate and remotely quantify Methane emissions while remaining outside the potentially explosive environment.

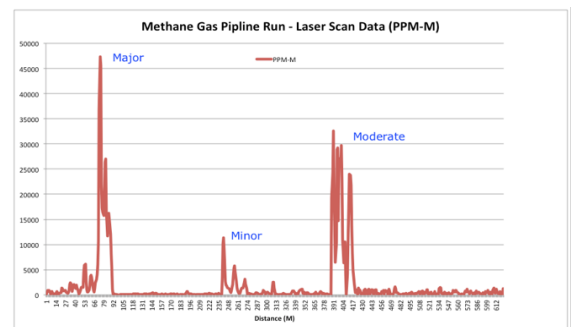
### Custom survey drone sensor integration

- We integrated the optical gas imaging sensor and the laser absorption spectroscopy sensor into our remote-controlled gimbal attached to our industrial (drone) survey platform.
- The AISS industrial survey drone platform eliminated any drowning risk by being able to survey all potential leak sources while flying over the entire reactor cover.



### Risk Mitigation

- In addition to pinpointing all Methane gas leak locations on the reactor cover, Optical Gas Imaging also minimised the explosive atmosphere risk by enabling us to see and avoid flying through any methane gas emissions.
- Laser Absorption Spectroscopy enabled methane plume density measurement in parts per million (ppm) per metre of atmosphere while flying above the leak location.







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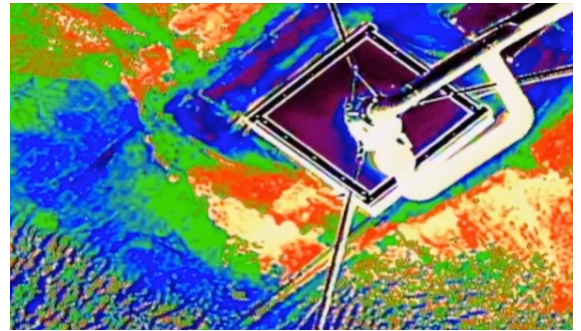
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## Value Added

Crust formation on top of the aerated liquid inhibits free flow of methane to collection points

- We used the medium wave infrared spectrum thermal sensitivity of the optical gas imaging sensor to locate and visualise the extent of crust formation below the cover.
- Non-Radiometric infrared images for each methane collection point formed the base-line against which follow-up "crust" surveys will be compared.



Measure the effectiveness of crust inhibition activities.

- Follow-up leak surveys gauge the effectiveness of crust inhibition measures by visually comparing crust location and grow rates between surveys.



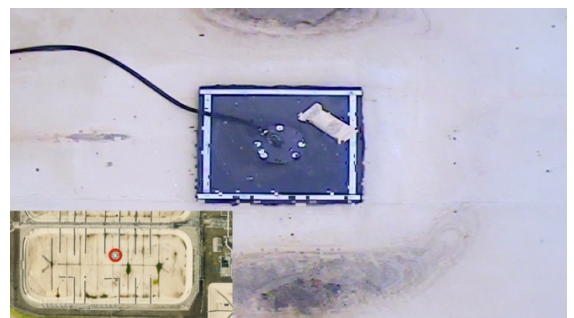
Reporting & Data Visualisation

- We merged the output from different data analysis software applications into a user-friendly visual report interface.
- This allowed non-technical personnel to visualise and contextually locate and compare methane emissions from various locations on the anaerobic reactor cover.
- Comparison of non-radiometric thermal imagery between follow-up surveys provides visual indication of the effectiveness of crust minimisation activities.



## Related AISS services

- ✓ Confined space asset surveys using reality capture sensors on remote operated vehicles: AISS-ROV 360
- ✓ Flare tip heat shield & refractory condition monitoring programs.
- ✓ Maintenance induced leak risk minimisation during plant start-up after schedule maintenance shutdowns.
- ✓ Thermographic anomaly surveys of critical process equipment – Switchboards, Motor control systems.
- ✓ Plant shut-down work-pack collaboration and digital twin reality capture services.
- ✓ Regulated Leak Detection And Risk Management (LDAR) monitoring programs.
- ✓ Ultrasonic Leak Detection – Hydrocarbon and Inert Gas-Instrument Air, Compressed Air.



Contact us to discuss how we can help you with your asset integrity management program

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