

Acoustic Emissions Tank Inspection



ATTAR

Advanced Technology Testing and Research



CASE STUDY:

Meeting API 653 standards for RBI to extend 10-year inspections

Challenge:

- To minimise the substantial operational downtime and health and safety risk associated with internal tank preparation and inspections on a large tank farm of approximately 100 tanks of various ages and conditions.

Solution:

- ATTAR Acoustic Emission (AE) tank inspection provides an accurate assessment of tank floor condition without internal access; incorporated into a compliant risk-based inspection and assessment program.

Result:

- A compliant and risk-based inspection program.
- Confidence on the tank floor condition while mitigating internal access risks.
- Significant on-going savings.



THE CHALLENGE

The client has approximately 100 tanks, of various ages and conditions and requires help in minimising the cost and risk associated with the onerous 10 yearly internal tank inspection regulation (per API Standard 653).

The client is looking for ways to minimise operational downtime, mitigate the health and safety risks of an internal inspection and extend the life of their asset. There is a significant cost associated with tank preparation (including lengthy operational downtime) for traditional internal inspections.

The client is seeking to safely extend the period beyond 10 years by applying a compliant and comprehensive risk-based inspection, which includes obtaining information about the condition of the tank floor, without the actual need for opening the tank.





THE SOLUTION

The client selected ATTAR to provide a compliant inspection service. ATTAR has been providing advanced technology and testing services for more than 30 years; and offers a complete Acoustic Emission testing service using leading-edge software and equipment. Inspection results impart confidence and assure the client about the condition of their tanks.

The client was able to develop a compliant risk-based inspection (RBI) program by incorporating ATTAR Acoustic Emission tank inspections (which **does not require internal access**) into the regime.

ATTAR worked closely with the client to minimise downtime and streamline the tank inspections. For each AE inspection, the client filled the tank to 70% capacity, took it offline and conducted the various isolation processes; then allowed the product to settle (12 to 24 hours depending on the product and size of the tank).

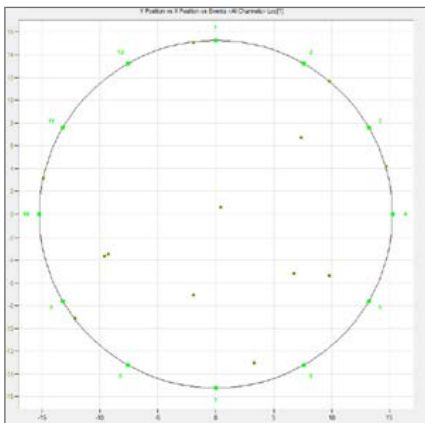
ATTAR technicians set up the equipment and applied the externally mounted acoustic emission sensors to the tank shell; then commenced the inspection. Testing took between 4 and 6 hours per tank. At the conclusion of the test, the client was able to return each tank immediately into service.

ATTAR presents the AE inspection results per 'Condition Classification'; where the classification options assist in the satisfaction of the factors required by the API Standard Clause 6.4.3 items e) and f), which are usually not satisfied without access to the tank floor.

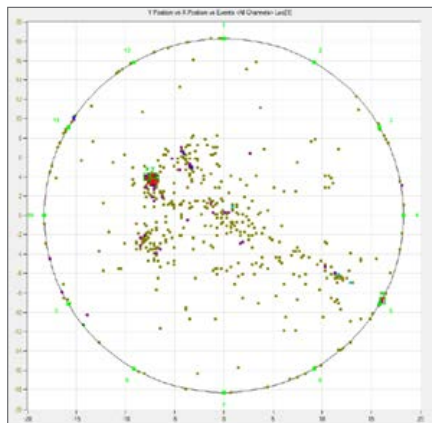
Inspection reports provide results in various forms to best facilitate the Client's risk-based inspection; identifying areas of either corrosion or leak activity, with results provided in tabular and graphical analysis that identifies areas of concern, which is displayed in 2D and 3D formats.

2D Representation of Condition

This graphic is used primarily to show the condition of the tank floor.



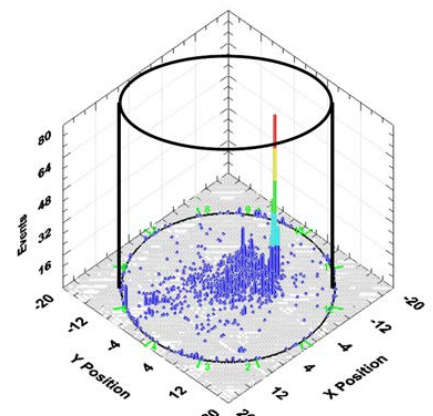
An example of a Classification A = 'good' result:



An example of a Classification E = 'poor' result:

3D Representation of Condition

A 3D representation of the data provides further understanding of the condition of the floor.



The following is a 3D representation of the tank with the 'poor' result (Classification E)

THE RESULT

The client was able to prioritise their maintenance budgets in specific areas, push out internal inspection intervals and schedule retesting with Acoustic Emission based on ATTAR's recommendations. (Refer Table)

■ A compliant and risk-based inspection program

- By incorporating ATTAR's AE inspections into the regime, the client was able to develop and implement an ongoing compliant risk-based inspection (RBI) and assessment program. The inspection status of each tank is currently compliant, and re-inspections have been scheduled according to risk.

■ Confidence about tank condition while mitigating internal access risk

- Detailed ATTAR AE inspection reports on the condition of the tank floor, enabling the client to mitigate the risk of product leak, schedule timely and planned repair or replacement, therefore reducing the overall risk from unnecessary internal inspections.

■ Significant on-going savings

- ATTAR's AE inspections typically require a tank to be out of service for 24 hours or less. The AE inspection results enabled reinspections to be scheduled to confirm the condition of the tank floors and further extensions of the internal inspection. Without ATTAR's AE inspection, the client would need to conduct a traditional 10 yearly internal inspection, which involves prolonged tank downtime and risk.

Table: Condition Classifications and Re-Inspection Intervals

A truncated example of the client's risk-based inspection program, resulting from AET is as follows:

TANK	Result Classification	Prior to ATTAR inspection:	Post ATTAR inspection:	
		Next Internal Inspection due	The client pushed Internal Inspection date out by	The client has set next ATTAR Acoustic Emission inspection for
1	E	Overdue	Internal Inspection required to determine Repair or Replacement requirement	If the tank can be repaired (rather than replaced); then inspection within two years of repair
2	B	Overdue	10 years (i.e. 2029)	3 years
3	B	Overdue	10 years (i.e. 2029)	3 years
4	A	2019	10 years (i.e. 2029)	5 years
5	A	2020	10 years (i.e. 2029)	5 years
6	A	2027	10 years (i.e. 2029)	5 years