CASE STUDY – ACOUSTIC EMISSION TESTING

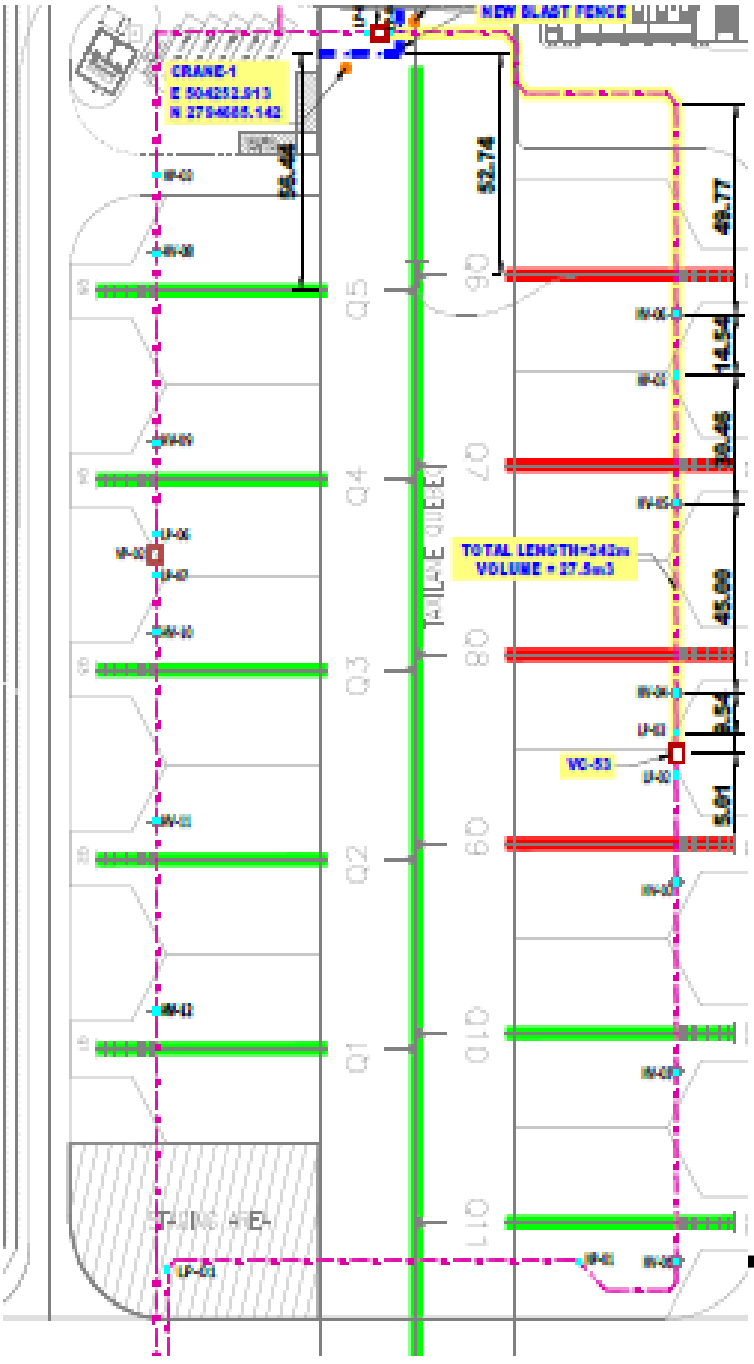
DUBAI AIRPORT – 16" BURIED JET FUEL PIPELINE LEAKAGE DETECTION

Background:

Dubai airport has buried jet fuel pipeline running below the apron across the parking bays. These buried pipelines have valve stations and hose connection to surface for refuelling the aircrafts.

During second half of year 2018 pressure drop was observed in one row of parking bays. This pipeline area was isolated, and 4 aircraft parking slots were affected. This parking bay constraint put tremendous pressure on airport operators, Dubai airport being one of the busiest airports in the region. It was critical to rectify the situation at the earliest.

The maintenance contractor resorted to visual inspection on surface, then concrete excavation at apron to find evidence of leaked jet fuel and suspected locations. These all efforts were not successful and the airport operations at 4 parking bays remained curtailed.



Maintenance contractor approached Blue Horizon Services & Oil Field Maintenance LLC in Abu Dhabi, an Arise Global group company, to help them detect the pipeline leakage location for immediate repair.

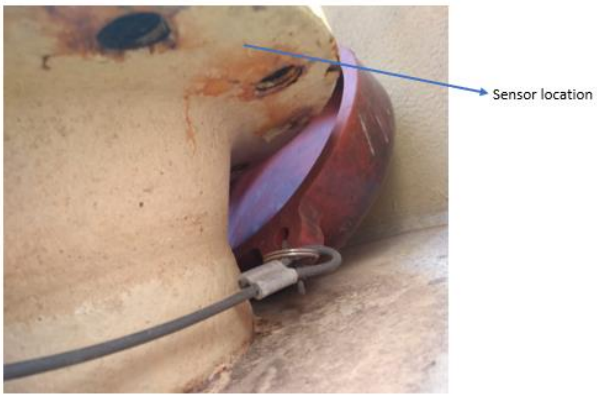
Job Overview

Our engineers visited the airport site for available access points to the buried pipeline and proposed non-invasive acoustic emission inspection.

The first Acoustic Emission Testing of buried jet fuel pipeline was performed in December 2018.

- The inspection was carried out by mounting AE sensors at the access points along the buried pipeline.
- Pressurised test Nitrogen gas was fed from valve station according to the ASTM/ASME standards and the data was collected for analysis.
- The data was analysed to detect the leakage and reported with confirmed location of the leak

Fig.1 – 16" JET FUEL PIPELINE



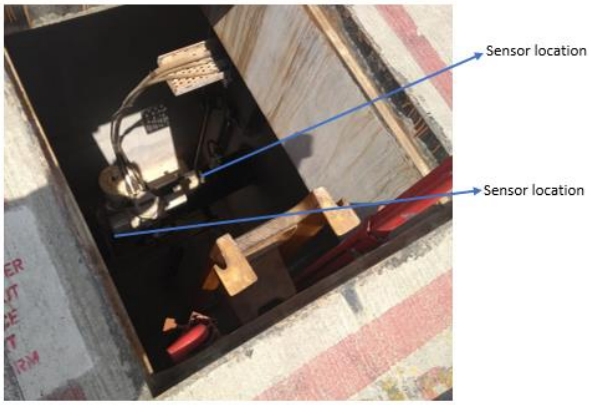


Fig.2 – Sensor location at riser

Fig.3 – Sensors location at valve station

Jet Fuel Pipeline Information	
Length	240 Meters (Appx.)
Outside Dia.	406mm

Testing Equipment Details:

Fig.4 – Vallen AE system & AE Sensor

AE Inspection Results Analysis and Discussion:

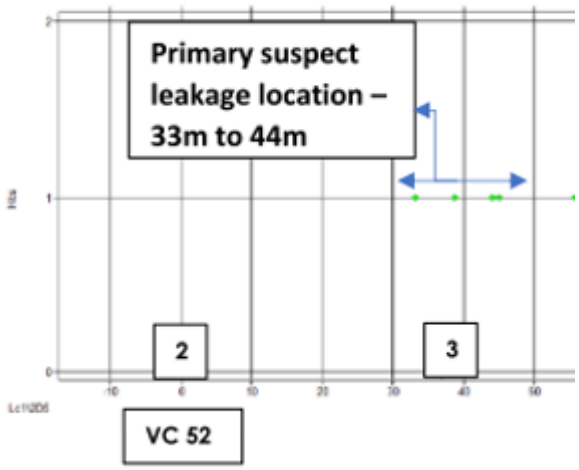


FIG.5 – Detected Leakage Location

As per the acoustic emission inspection data analysis, primary suspect leakage location was found between 33m to 44m from Valve Chamber (VC) 52 and was reported to client

Client excavated the identified area by acoustic emission testing and the leakage location was found. The leakage was repaired quickly, and normal airport operations were restored.

The acoustic emission inspection and result reporting duration took just 1 week, without any site excavation from client side due to non-invasive and volume inspection nature of acoustic emission technology employed.

The inspection was carried out with nearby parking bays in operation which caused high ambient noise of aircraft engines (while arriving and departing from parking bays), however due to advance analytical techniques employed by our analyst engineers, this noise was effectively filtered to find the leakage location.

In-house analysis was carried out in both the Time and Frequency domain.

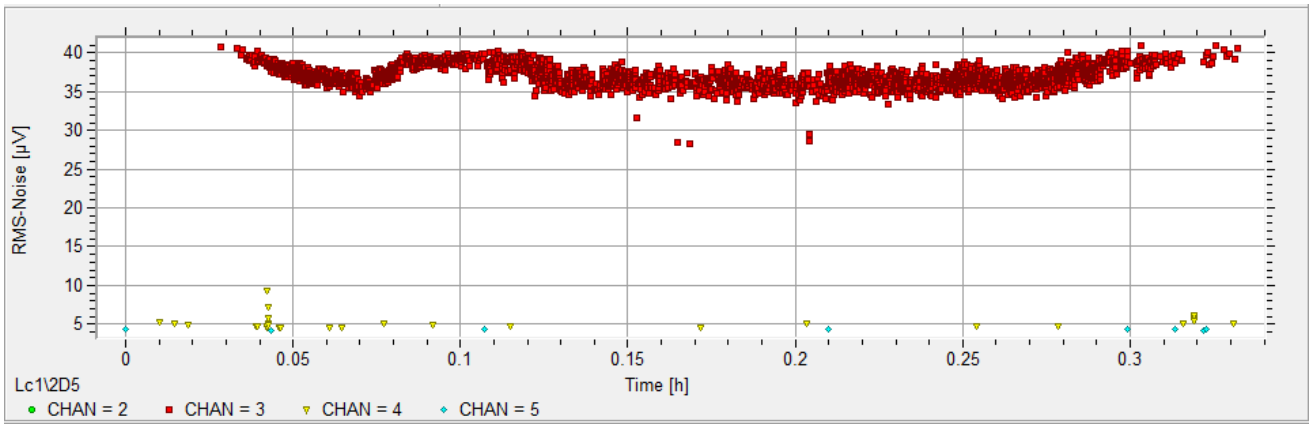


Figure A

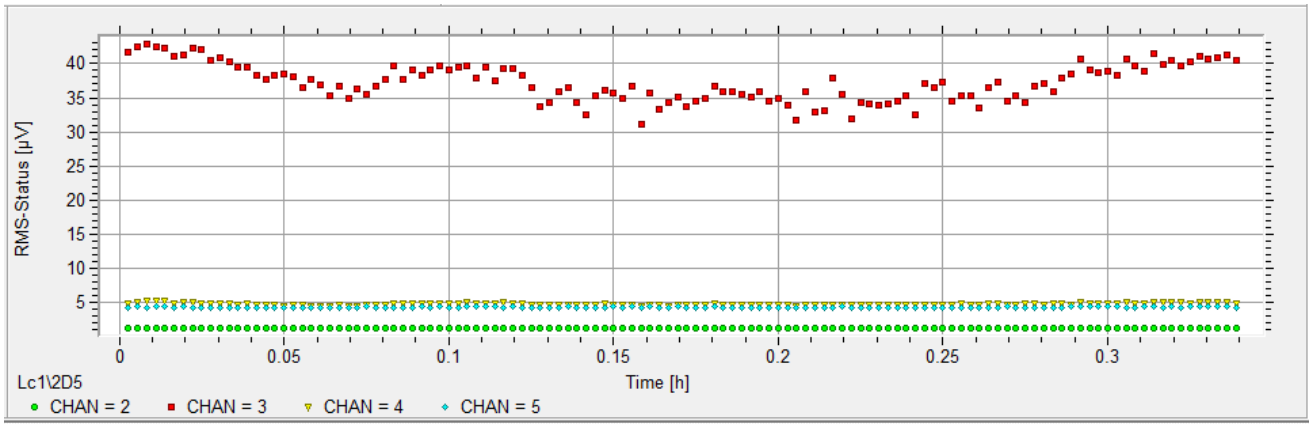


Figure B

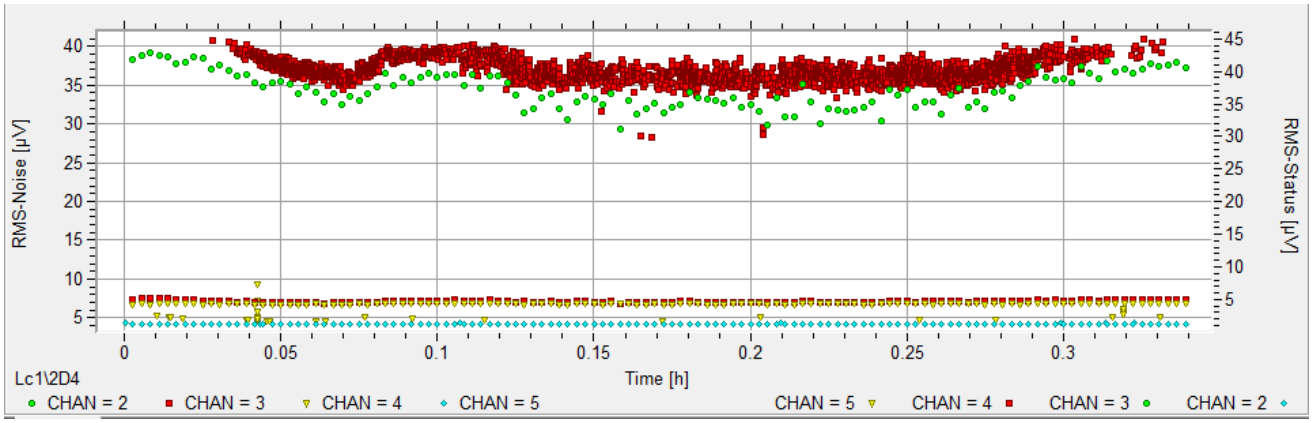


Figure C

Figure A, B & C: DEFECT ACTIVITIES NEAR EACH CHANNEL.

The above graphs indicate the response from each sensor with respect to the time. As shown, the Acoustic Emission activities from the sensor 3 (CHAN =3) are higher, that clearly indicates the presence of defect near that sensor location. When closely analysing the signals, the primary suspect was found to be between 33m to 44m in the pipeline from Valve Chamber (VC) 52.