Abstract

Fire and Gas Detection Systems (FGDS) are critical tools utilised to minimise risk to personnel, the environment and facility. Well configured systems will facilitate the isolation of leaking inventories, and expedite timely escape and evacuation of personnel. Typically the systems are used to detect leaks and dangerous build-up of toxic or flammable gas or the presence of fires that may cause dangerous escalation. The systems should be configured to minimise potential false/spurious alarms which interrupt production output at a minimum cost (both installed and operational).

Historically, a prescriptive based approach has been applied during the placement of these detectors, which in itself is typically based on engineering judgement. Modern fire and gas mapping tools are becoming more widespread in order understand optimum layout of the detectors in question.

As outlined in ISA technical report (TR 84.00.07) two approaches can be utilised by the modern Fire and Gas Detection Mapping tools. A more traditional geographic approach can be utilised to estimate detector coverage and determine detector numbers in a three dimensional (3D) environment. However this paper discusses the more sophisticated ‘3D risk based approach’ which can be utilised to incorporate consequence analysis and company risk criteria. Concepts from Fire and Gas Detection Mapping, QRA, Reliability and SIL (IEC 61511) are incorporated to ensure an in-depth risk-based analysis, consistent with site asset integrity and safety studies.

This paper aims to highlight that through the implementation of a ‘risk based approach’ for the placement and coverage of detectors, the magnitude of the consequence, frequency of occurrence and the relative risk reduction effectiveness can be investigated and utilised in ensuring the risk is as low as reasonable practicable. This paper utilises a sample study on an existing facility to demonstrate the application of a risk based approach along with its general findings.