Case Study: Implementing Performance Based Gas Detector Placement per ISA TR 84.00.07 on a Gas Oil Hydrotreating Unit

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Abstract

The placement of gas detectors has traditionally been an imprecise field of engineering. With no detailed prescriptive rules on when and where to place gas detection equipment, designs have been left to experts who use their judgment along with rules of thumb to set designs. These ad hoc methods have left industry in a position where different process units within the same refinery have vastly different gas detection designs for equipment in similar operating profiles. Furthermore, often no documented basis for the selection exists making it difficult to justify the differences in designs between units to stakeholders and regulators.

In 2011, ISA released a technical report describing performance based methods for fire and gas system (FGS) design. This technical report laid out a safety lifecycle and introduced the new metric of “coverage” to define FGS designs. The approach presented in ISA TR84.00.07 was applied to the problem of H2S gas detection on a refinery Gas Oil Hydrotreater unit. All of the process equipment was assessed using calibrated semi-quantitative techniques, resulting in graded areas with associated coverage targets. Fire and gas mapping software was then utilized to confirm that the assigned coverage targets were achieved. This paper describes how that project was executed, presents an overview of the results, and compares the resulting design against other process units and expectations.