

Proposed Abstract for the 2008 Texas A&M Instrumentation Symposium for the Process Industries

Focus Area: Safety Systems

Title: **Development of Methods for Risk-Based Fire and Gas Detection and Suppression System Assessment**

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Abstract

In the recent past, there has been a move toward the use of risk-based methods instead of prescriptive, rule-based methods for the purposes of design and implementation of equipment related to chemical process safety. One of the best examples of this shift is the wide adoption of the ISA 84.00.01 standard for Safety Instrumented Systems. More and more, the design of all engineered safeguards in the process industries is moving toward risk-based design, including fire and gas (F&G) detection and suppression systems. While the advantages of risk-based approaches are apparent and accepted, their use in some applications is difficult. Specifically, the use of risk-based approaches for fire and gas detection and suppression systems is difficult because many of the simplifying assumptions that allow their use for preventive safety instrumented systems are not valid in the mitigative case. Specifically, F&G systems do not “prevent” a consequence, they reduce its magnitude; and, even though an F&G loop may be operational, its sensors may not be properly located to identify all of the hazard scenarios that might occur. As a result, new analysis techniques are required.

This paper presents an overview of the analysis techniques that will be required to perform risk-based fire and gas detection. Detector characterization, which is the technique for quantifying a detector’s ability to detect a fire based on the amount of thermal radiation that it is exposed to, will be presented, as well as the concept and procedures for determining “geographic coverage”, or the fraction of physical area in which a detector array can sense an event, and “scenario coverage” or the fraction of hazardous event frequency that can be detected by a given detector array.

Author Bio: Edward Marszal, PE, CFSE is President of Kenexis and responsible for engineering consulting activities related to Safety Instrumented Systems. He has a BS Ch.E. from The Ohio State University. Mr. Marszal is the former Director of the ISA Safety Division and the author of “Safety Integrity Level Selection” textbook from ISA. Mr. Marszal is a senior member of ISA, and is an active participant in the ISA 84, 91, and 18 committees. He is a registered professional engineer in Ohio and Illinois and also a TÜV Certified Functional Safety Expert.