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## Three-Dimensional Fire and Gas Detector Mapping Study – Different Assumptions to be Considered for Design and Operate Stages

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### **Abstract Text:**

The acceptance for Fire and Gas (F&G) detector mapping has been gaining momentum in recent times due to recent technological advancements in the domain of fire and gas detection and mapping. The placement of Fire and Gas detectors has been shifting from conventional two-dimensional approach to three-dimensional geographical assessment tools and aiding in better understanding of consequence effects like flame and gas cloud behavior.

Conducting 3D F&G mapping study and finalizing the detector layouts is highly beneficial at the design stage, ideally. However, 3D F&G mapping can also be conducted for operational process facilities where there are major changes or modifications in the facility. Cholamandalam MS Risk Services has wide experience in carrying out 3D F&G mapping at different stages (i.e., during design and operation) of process plant. It has been observed that the assumptions considered differ at design stage and operations stage.

This paper details the application and examines the various assumptions to be considered when conducting 3D F&G mapping at design stage and operations stage. This paper also presents the various how the results would vary. Few assumptions to be discussed are listed below:

- Various perspectives (E.g., determination of leak sizes, weather parameters to analyze dispersion patterns etc.) available for using consequence effects into 3D F&G mapping.
- Defining the detector performance target criteria to be considered.
- Factors (E.g., obstruction levels, geographical location of the release scenarios, determining optimal quantity and location of flame and gas detectors etc.) to be considered in positioning of flame, flammable gas and toxic gas detectors.
- Engineering aspects (E.g., Maintenance access, height of the detector etc.) to be considered when mapping Fire and Gas detectors.

Overall, it is intended that this paper can be used as a reference to understand and choose the different assumptions available for positioning Fire and Gas detectors in three-dimensional geographical assessment. Relevant examples and case studies will be presented for better understanding of application of 3D F&G mapping at design stage and operational stage.

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