Use of CFD in Onshore Facility Explosion Siting Studies

Irfan Shaikh and Eric Peterson
MMI Engineering
ishaikh@mmiengineering.com

ABSTRACT

Facility siting studies conducted to satisfy Process Safety Management regulations (e.g., OSHA 1910, Seveso-II, API RP-752, etc.) traditionally use analytical 2-D consequence modeling (e.g., PHAST, TRACE, etc.), often in conjunction with a simplified blast load assessment (e.g., CAM2, MEM, BST). Output from these consequence simulations form the input basis in structural response modeling software to a blast. Meanwhile, purely analytical consequence and blast assessment methodologies used in the offshore industry have evolved to produce more realistic 3-D structural responses by incorporating computational fluid dynamics (CFD) modeling.

With current computational processing speeds and software user flexibility, an onshore facility siting incorporating CFD analysis requires little more resources than using only analytical tools. This paper presents examples illustrating how using CFD consequence modeling often avoids unnecessary upgrades to buildings which using strictly 2-D analytical modeling tools would recommend.

This paper also illustrates how CFD can address other limiting factors (e.g., obstacles, mitigation measures, and deflagration-to-detonation between potential explosion zones) to produce more realistic facility siting simulations.