Use and Comparison of Different Passive Fire Protection Assessment Methods for LNG Plants

Presenters

Sanjay Ganjam (Chief Engineer, Chemical Process Safety), et al., Kiewit Oil, Gas and Chemical Engineering

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Abstract

LNG plants pose hazards due to pool fire, jet fire and cryogenic temperature brittle fracture and embrittlement of supporting steel. In a Fire Hazard Evaluation, the first step is to evaluate location and types and area of fire hazard. Fire hazard protection analysis considers mitigation methods and protective systems to protect against these hazards including instrumented shutdown systems which prevent process excursions and prevent loss of containment.

However, after loss of containment some of the passive methods are effective in limiting the extent of damage and prevent escalation of the incident. Passive fire proofing (PFP) is an excellent tool that can be used to protect equipment and pipe steel supports from effects of fire and cryogenic exposure. PFP is not directly mandated by code, but generally regarded as part of best practice design.

Usually such applications are based on gross extents extending 20-30 feet in all directions from a hazard source and coating every structural member within. This can result in higher costs and its use questioned by cost conscious projects in a competitive market. In this paper we demonstrate different methodical techniques of identifying the hazard and specifying the PFP requirements. These techniques usually include detecting pool, jet fire and cryogenic hazards of LNG and evaluating their impact on load bearing structural members. Then the amount and location of PFP application is optimized to prevent failure and escalation of the incident thus achieving cost reductions. With such optimization, PFP be considered for smaller LNG projects and applied in a cost effective way precisely where needed using advanced structural analysis. Using these techniques cost saving of 40% or more can be achieved compared to traditional tools and methods.