Changes to industry guidance for relief and blowdown system design and the impact on existing infrastructure

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Abstract

As the last line of defense for process and equipment integrity, relief, blowdown and flare systems need to be adequately designed and maintained. Systems need to be periodically re-assessed so that they operate safely throughout the life of the facility that they help protect. This talk highlights the importance of ensuring flare and relief systems remain fit for purpose throughout their lifetime maintaining accountability for plant modifications, changes to operations, and changes to industry guidance and regulation. Recognizing high profile incidents involving relief and flare systems from Grangemouth to Westlake and to a number of recent incidents that have led to loss of containment due to excessive vibrations and brittle fracture of the flare piping, we show that the root cause of these incidents can be linked to failure to recognize hazards and perform adequate analysis, which is fundamental to Process Hazards Analysis programs under OSHA 3133.

In recognition of these & other incidents, we describe how relief and blowdown adequacy assessment has tightened in recent years in regards to significant changes to API 521, and in particular:

A. the importance of verification of relief and flare systems to ensure they comply with latest Industry Standards
B. to ensuring the suitability of materials of construction so as to avoid brittle fracture risks during depressurization
C. the adoption of the more rigorous analytical methodology for assessing vessel survivability under fire attack for blowdown system design
D. to assessing the likelihood of failure due to acoustic and flow induced vibration in flare piping

Through a number of case studies we describe a methodology for assessing and analyzing existing infrastructure for these risks and explain how a detailed model-based analysis can ensure an inherently safe relief and blowdown system design that is compliant with the latest industry guidance.

Keywords: Incidents, verification, brittle fracture, acoustically induced vibration, flow induced vibration, Low Temperature, fire survivability, blowdown, relief, flare