Process Safety Aspects of Jet Fire Hazards

By

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Accidental releases of fuels under pressure can create significant combustion hazards. Jet fires result from immediate ignition or from burn back to source following vapour cloud explosion after delayed ignition. Process safety in the oil, gas and petrochemical industries demands that such hazards should be identified, assessed and controlled. Consequently, there has been considerable research over the last 50 years on the combustion properties and consequences of such hazards. The presentation will explore current understanding and correlations of flame stability and flame blow-off, flame lift-off and length. Models for the external radiation field will be described. The effectiveness of water sprays designed to cool fire-engulfed vessels at large scale will also be shown.

Measurements of internal heat flux densities will be summarised for hydrocarbon fuels and mixtures with hydrogen and their relevance to the resistance of passive fire protection. The ISO jet fire test Standard 22899-1 is currently being updated by the PFPNet project to incorporate a re-analysis of the internal heat flux density data. These data showed considerably higher values in large natural gas and mixed composition hydrocarbon flames than are simulated in the existing ISO Standard.

The behaviour of jet fires in vented compartments will be described following tests performed after the Piper Alpha disaster. The tests also included the effectiveness of standard water deluge in mitigating the hazard consequences. Heat flux density data derived from these tests are also included in the new ISO Standard.