Effects of Tank Configuration & Rupture Variables on the Consequence of LNG Spillage onto Water

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ABSTRACT

The events of September 11, 2001 have raised concerns about the potential for terrorist attacks on LNG tankers. The spillage of LNG ensued from a boat bomb attack could result in pool fire or flash fire during vapor cloud dispersion process. In this paper, we extrapolate the effects of tank size and rupture configuration on the consequence of LNG spillage onto water, including the pool spread process, pool fire, vapor cloud formation, flash fire and so on.

Models for predicting the consequence of LNG spills onto water are constructed from fluid mechanics principles and published experiment data. For LNG spill from an ocean tanker, there are dependent upon the tank size and configuration, and the size and location of the vessel’s rupture opening. We will model the discharge process, the pool spread behavior and the possible resulted pool fire, expressing the significant results (pool area, pool fire duration, heat release rate) in term of the tank configuration and rupture opening variables.

If the spill is not ignited immediately, a flammable vapor cloud will be formed. The dimensions of the flammable cloud are indicative of the area affected by the resulting flash fire. The dispersion process of the flammable cloud and the potential resulted fire are assessed by CANARY, commercially available software for consequence analysis. The effects of container size and rupture configuration on the formation of vapor cloud are extrapolated.