CASE STUDY: Safety Device Failure Results in Tanker BLEVE

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ABSTRACT

In October of 2007, a highway transport trailer (11,000 gallon capacity) was delivering liquid propane to bulk storage containers located at a casting foundry. During the process of offloading the liquid propane, field repairs performed on a flexible hose connector failed, which resulted in a large release of propane and subsequent fire. The remote shutoff for the internal valve located on the highway transport trailer was either never actuated and/or failed to operate properly, which allowed the fire to progress. An emergency safety device on the internal valve failed to operate as designed and allowed the fire to continue until the highway transport trailer experienced a Boiling Liquid Expanding Vapor Explosion (BLEVE). The explosion fatally injured the driver and caused significant property damage to the facility and surrounding area.

The investigation to determine the root cause of the BLEVE is detailed in this study. This study also discusses the failure mechanism of the emergency shutoff valve including inherent design flaws associated with its operation and recent re-design. This study will also review the best engineering practices regarding the selection of coefficients of friction and safety factors when designing an emergency shutoff device used in internal valves of this type.