A Supercritical Pressure BLEVE in Nihon Dempa Kogyo Crystal Inc.

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Abstract
On December 7, 2009, a 50-foot high-pressure vessel ruptured in the Nihon Dempa Kogyo Crystal (NDK), Inc. facility in Belvidere, Illinois. Several projectiles rapidly travelled outward from the facility, killing one truck driver 650 feet away and injuring an employee in another building 435 feet away. This presentation summarizes the lessons learned from this incident both on causal and consequential aspects. Stress corrosion cracking (SCC) was identified as the failure mechanism by the U.S. Chemical Safety and Hazard Investigation Board (CSB). After analyzing the operating conditions and the aftermath, this incident has been identified as a supercritical pressure Boiling Liquid Expanding Vapor Explosion (BLEVE). A consequence analysis of the incident is performed where overpressure and fragment distance are calculated, together with safety distance estimation. Additionally, other safety-related problems, such as poor safety culture, poor management inside the corporation, and poor communication between this facility and the government are also discussed.

Keywords
BLEVE, stress corrosion cracking, supercritical pressure, facility siting