



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE

SUMMARY

Report:	NDK Crystal, Inc. – High Pressure Vessel Rupture
Recommendation Number:	2010-04-I-IL-R4
Date Issued:	November 14, 2013
Recipient:	Office of the Illinois State Fire Marshall (IL-OSFM)
New Status:	Closed – Acceptable Action
Date of Status Change:	July 13, 2016

Recommendation Text:

Develop and implement state requirements and procedures to ensure the pressure vessel approval process accurately identifies vessels that may be subject to corrosion or similar deterioration mechanisms, and ensure regular inspections in accordance with these state requirements.

Board Status Change Decision:

A. Rationale for Recommendation

On December 7, 2009, a 50-foot pressure vessel used to produce synthetic crystals ruptured at the NDK Crystal facility in Belvidere, Illinois. The vessel, located in an enclosed building, generated several projectiles when it ruptured that resulted in one fatality and one injury to members of the public, and significant property damage to both NDK Crystal and an adjacent business.

The CSB determined that although the caustic sodium hydroxide solution used inside the NDK pressure vessels was known to be corrosive to carbon steel, the vessels received their initial certification from the state of Illinois for noncorrosive service. As a result, the state only required the vessels' exteriors to be inspected along with their safety relief valves. No internal inspections were performed, and the December 7, 2009, rupture of one of the vessels resulted from internal stress corrosion cracking.

Based on these findings, the Board voted on November 14, 2013, to issue two recommendations (Nos. 2010-04-I-IL-R3 and R4) to the Office of the Illinois State Fire Marshal (IL-OSFM), Boiler & Pressure Vessel Safety Division. Recommendation No. 2010-04-I-IL-R3 was closed as an acceptable action by the Board on March 31, 2015. This status change summary only addresses IL-OSFM corrective actions pertaining to Recommendation No. 2010-04-I-IL-R4.

B. Response to the Recommendation

On June 3, 2015, a new procedure entitled: "Pressure Vessels Subject to Internal Corrosion;" designated "O. P. No: PVIP2A.R4A" was approved by the Illinois Board of Boiler Rules. The new procedure requires that pressure vessels in the state of Illinois subject to corrosion shall Pressure Vessels subject to internal corrosion shall receive a Certificate Inspection every three years. The new procedure also outlines the steps needed to conduct these internal inspections; including: determining vessel use and design for corrosive service; preparing the pressure vessel for inspection; protecting inspection personnel from hazards; tools and equipment to be used; specific areas to be inspected; documenting results and conducting repairs, if needed; documentation of inspection results; submitting the inspection report to the state for review and issue of inspection certificates.

C. Board Analysis and Decision

As the IL-OSFM has issued and approved a new procedure for internal inspection of pressure vessels that fully satisfies the intent of CSB Recommendation No. 2010-04-I-IL-R4, the Board voted to change its status to: "**Closed – Acceptable Action.**"