



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE

SUMMARY

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| Report: | CAI/Arnel Chemical Plant Explosion |
| Recommendation Number: | 2007-03-I-MA-R11 |
| Date Issued: | May 13, 2008 |
| Recipient: | International Code Council (ICC) |
| New Status: | Closed – Unacceptable Action/No Response Received |
| Date of Status Change: | January 11, 2017 |

Recommendation Text:

2007-03-I-MA-R11 *Revise the International Fire Code:*

- Chapter 20
 - Specifically include “printing inks” in the definition of “organic coating.”
 - Define equipment specifically discussed in the standard, such as open and closed kettles.
 - Require heated tanks and vessels containing flammable and combustible liquids to have equipment to prevent overheating, such as:
 - Devices to stop the heating process if the temperature exceeds the safe operating limits,
 - Devices to stop the heating process if the flammable vapor control equipment malfunctions (e.g., building ventilation system or heated tank vent), and
 - A heating medium that is unable to heat the tank above safe operating temperatures.
- Chapters 20, 27, and 34
 - Define “open,” “closed,” and “sealed and vented” process tanks.
 - Define “non-listed” process tanks.
 - Prohibit heating flammable and combustible liquids above their flashpoints in tanks inside buildings unless the tanks are sealed and vented to the building exterior.

Board Status Change Decision:

A. Rationale for Recommendation

On November 22, 2006, a powerful explosion and fire occurred at the CAI/Arnel ink and paint products manufacturing facility in Danvers, Massachusetts. CAI Inc. (CAI) manufactured solvent-based inks and stored alcohols, heptane, other solvents, pigments, resin, and nitrocellulose in its Danvers facility. The immediate cause of the incident was that a steam valve on a mix tank heater had been inadvertently left open overnight, heating the material in the mix tank and releasing highly flammable vapor. The investigation concluded that a flammable vapor cloud within the building ignited and completely destroyed the ink and paint manufacturing facility. The fire department ordered an evacuation of more than 300 residents within a half mile radius of the facility. Nearby homes and businesses were extensively damaged, many beyond repair.

The International Fire Code (IFC) is a model fire code adopted by many state and local jurisdictions that provides criteria for the safe storage, use and handling of hazardous materials. Specific chapters under the IFC apply to operations similar to those that took place at the CAI/Arnel facility. The CSB investigation found that the IFC did not specifically include ink manufacturing under the relevant section and did not clearly define certain terms which could potentially lead to misinterpretation. The IFC does not prohibit the indoor heating of flammable and combustible liquids above their flashpoints or require that when the indoor heating occurs, that vessels be vented to the outdoors. As a result, the CSB made the below recommendation to the International Code Council (ICC) to amend the IFC.

B. Response to the Recommendation

The CSB made similar recommendations to the National Fire Protection Association (NFPA) as a result of the CAI/Arnel investigation, relating to NFPA 35, *Standard for Manufacture of Organic Coatings*, and NFPA 30, *Flammable and Combustible Liquids Code*. The ICC relies heavily on NFPA for technical fire protection requirements. Both recommendations No. 2007-03-I-MA-R9 and No. 2007-03-I-MA-R10 to NPFA relating to NFPA 30 and 35, were closed acceptably by the Board in 2013.

NFPA 35 was updated in the 2011 edition to include new clarifications that are discussed more in depth in the [status change summary for this recommendation](#). Chapter 29 of the IFC 2015 (formerly Chapter 20), the section related to general requirements (2901.3), incorporates by reference the requirements of NFPA 35. Therefore, CSB believes the requirements for the first portion of this recommendation have been met.

In response to the CSB's recommendations NFPA added a new section (17.3.7) to the 2012 NFPA 30, to prohibit the heating of liquids to a temperature above its flashpoint unless the liquid is in a closed vessel that is vented to the outdoors. The second list of requirements for Chapters 29, 50 and 57 in the IFC 2015 (formerly Chapters 29, 27 and 34), do not incorporate recent updates from NFPA 30 and there is no requirement for ventilation to the outdoors.

C. Board Analysis and Decision

As ICC has not acted on this recommendation, the Board voted to designate Recommendation **No. 2007-03-I-MA-R11** with the status of **“Closed – Unacceptable Action.”** Should ICC choose to prohibit the heating of combustible liquids above their flashpoints indoors without ventilation in the next cycle of IFC revisions for 2021, then the CSB will revisit and reconsider this recommendation status at that time.