



U. S. Chemical Safety and Hazard Investigation Board RECOMMENDATION STATUS CHANGE SUMMARY

Report:	Caribbean Petroleum Refining Tank Explosion and Fire
Recommendation Number:	2010-02-I-PR-R5
Date Issued:	October 21, 2015
Recipient:	International Code Council (ICC)
New Status:	Closed – Acceptable Alternative Action
Date of Status Change:	December 19, 2024

Recommendation Text:

Revise the Section 5704.2.7.5.8 (2015), Overfill Prevention of the International Fire Code (IFC) to require an automatic overfill prevention system (AOPS) for bulk aboveground storage tank terminals storing gasoline, jet fuel, other fuel mixtures or blendstocks, and other flammable liquids having an NFPA 704 flammability rating of 3 or higher, or equivalent designation. These safeguards shall meet the following requirements:

- a) *Engineered, operated, and maintained to achieve an appropriate safety integrity level in accordance with the requirements of Part 1 of International Electrotechnical Commission (IEC) 61511-SER ed1-2004, Functional Safety – Safety Instrumented Systems for the Process Industry Sector.*
- b) *Specified to achieve the necessary risk reduction as determined by a documented risk assessment methodology in accordance with Center for Chemical Process Safety Guidelines for Hazard Evaluation Procedures, 3rd Edition, accounting for the following factors:*
 - i. *The existence of nearby populations and sensitive environments;*
 - ii. *The nature and intensity of facility operations;*
 - iii. *Realistic reliability for the tank gauging system; and*
 - iv. *The extent/rigor of operator monitoring.*
- c) *Proof tested in accordance with the validated arrangements and procedures with sufficient frequency to maintain the specified safety integrity level.*
- d) *Ensure that the above changes are not subject to grandfathering provisions in the codes.*

Board Status Change Decision:

A. Rationale for Recommendation

On October 23, 2009, an above ground storage tank at the Caribbean Petroleum Corporation (CAPECO) tank farm facility in Bayamón, Puerto Rico was overfilled. The overfill occurred during the offloading of the tank ship, Cape Bruny. An estimated 200,000 gallons of gasoline was spilled during the overfill.

During the overflow some of the gasoline, which sprayed from the tank's roof vents and hit the tank's wind girder as it fell, aerosolized forming a large vapor cloud (estimated to encompass an area of about 107 acres) that subsequently ignited after reaching an ignition source in CAPECO's wastewater treatment facility. The ensuing blast, multiple secondary explosions and fire resulted in significant damage to 17 of 48 petroleum storage tanks. The blast created a pressure wave that registered 2.9 on the Richter scale and damaged approximately 300 homes and businesses, up to 1.25 miles from the site. Fortunately, there were no fatalities and only three people experienced minor injuries offsite as a result of the initial blast. The fires burned for almost 60 hours. Petroleum products leaked into the soil, nearby wetlands, and navigable waterways in the surrounding area.

As a part of its investigation, the U.S. Chemical Safety and Hazard Investigation Board (CSB) analyzed relevant regulatory, industry, and consensus standards for safety and management of bulk aboveground storage facilities. While certain requirements in the *International Fire Code* apply to bulk aboveground storage terminals, such as CAPECO, the CSB determined that these code requirements do not offer sufficient protection to prevent catastrophic explosion and fire incidents due to overfilling that may occur at such facilities that store gasoline, jet fuels, blendstocks, and other flammable liquids having an NFPA 704 flammability rating of 3 or higher. As a result of this finding, the CSB issued one recommendation to the International Code Council (ICC). This status change summary addresses CSB Recommendation No. 2010-02-I-PR-R5.

B. Response to the Recommendation

The International Fire Code (IFC) 2024 Edition requires storage tanks in refineries and bulk plants or terminals to have overfill protection in accordance with API 2350, *Overfill Protection for Storage Tanks in Petroleum Facilities*, 5th Edition (API 2350) (IFC 5704.2.7.5.8). This requirement applies specifically to prevention of overfills during the transfer of Class I and II liquids from mainline pipelines and marine vessels (IFC 5706.4.6). The ICC has adopted the requirements of API 2350 into the IFC. These requirements are applicable to the type of facility and the specific operation involved in the CAPECO incident.

C. Board Analysis and Decision

The Board has voted to close CSB Recommendation No. 2010-02-I-PR-R7 to the API "Closed – Acceptable Alternative Action" in recognition of the technical improvements for the automated overfill prevention systems (AOPS) made to API 2350. As ICC has adopted this standard as the basis for their requirements for overfill prevention at facilities such as CAPECO, the Board voted to change the status of CSB Recommendation No. 2010-02-I-PR-R5 to: "Closed – Acceptable Alternative Action" also.