



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-R7
Date Issued:	October 21, 2015
Recipient:	American Petroleum Institute (API)
New Status:	Closed – Acceptable Alternative Action
Date of Status Change:	November 18, 2024

Recommendation Text:

Revise ANSI/API 2350, Overfill Protection for Storage Tanks in Petroleum Facilities (2015), to require the installation of an automatic overfill prevention systems for existing and new facilities at bulk aboveground storage tanks storing gasoline, jet fuel, other fuel mixtures or blendstocks, and other flammable liquids having an NFPA 704 flammability rating of 3 or higher. At a minimum, this system shall meet the following requirements:

- a. Separated physically and independent from the level control and monitoring system.*
- b. 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.*
- c. Specified to achieve the necessary risk reduction as determined by a documented risk assessment methodology set in accordance with Center for Chemical Process Safety Guidelines for Hazard Evaluation Procedures, 3rd Edition, accounting for the following factors:*
 - 1. The existence of nearby populations and contamination of nearby environmental resources;*
 - 2. The nature and intensity of facility operations;*
 - 3. Realistic reliability for the tank gauging system; and*
 - 4. The extent/rigor of operator monitoring.*
- d. Proof tested with sufficient frequency in accordance with the validated arrangements and procedures to maintain the required safety integrity level.*
- e. Ensure that the above changes are not subject to grandfathering provisions in the standard.*

Board Status Change Decision:

A. Rationale for Recommendation

On October 23, 2009, explosions and fire occurred at the Caribbean Petroleum Corporation (CAPECO) facility in Bayamon, Puerto Rico. While offloading the contents of the tanker ship, Cape Bruny, into the CAPECO onshore tank farm, an estimated 200,000 gallons of gasoline

overflowed from an aboveground storage tank into a secondary containment dike that had an open drain.

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 the 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. Although there were no fatalities and only three people experienced minor injuries off site 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. The CSB noted in its investigation report that a number of industry trade groups, professional associations, and code officials, such as the American Petroleum Institute (API), National Fire Protection Association (NFPA), and International Code Council (ICC), publish national consensus standards that apply to aboveground storage tanks. In its review of API's national consensus standards, the CSB determined that API Standard 2350, *Overfill Protection for Storage Tanks in Petroleum Facilities* (2012) only required an automatic overfill prevention system for remotely operated facilities and did not offer substantial guidance on conducting a risk assessment that considers the complexity of site operations, the type of flammable and combustible liquids stored at the facility, or proximity to nearby communities when considering the necessary safeguards to protect the public.

Consequently, the CSB Board issued three recommendations to the API to revise its standards pertaining to storage tank overfill protection systems, risk assessments and tank terminal operations (CSB Recommendation Nos. 2010-02-I-PR-R7 through 2010-02-I-PR-R9). This status change summary addresses CSB recommendation No. 2010-02-I-PR-R7.

B. Response to the Recommendation

In December of 2020, API informed the CSB that they had published the 5th Edition of Standard 2350, *Overfill Prevention for Storage Tanks in Petroleum Facilities*. In their response, API notes that all technical requirements from the recommendation addressing automated overfill prevention systems (AOPS) have been addressed in this updated edition, but there is no requirement that AOPS be installed on all bulk aboveground storage tanks as described in the recommendation. The CSB verified this information and provided feedback to the API that the requirement for AOPS from the recommendation should be implemented.

On July 26, 2023, the CSB reconsidered CSB Recommendation No. 2010-02-I-PR-R6, which was issued to the NFPA and contained requirements similar to those of this recommendation. The rationale for reconsideration of this recommendation can be found in the status change

summary posted on [csb.gov](https://www.csb.gov)¹. During a meeting held between the CSB and the API, the API stated that they would not be implementing the aspect of the recommendation requiring AOPS be installed on all bulk aboveground storage tanks as described in the recommendation due to concerns of the introduction of unintended hazards into processes unsuited for AOPS. The API provided a written response to this effect on August 14, 2024.

C. Board Analysis and Decision

The API has substantially improved the technical requirements for AOPS contained with API 2350. The updates made to the 5th edition of this standard meet the requirements listed in the subparagraphs of the recommendation. Owner/operators installing AOPS at their facilities will benefit from this information leading to an increase in safety and reliability. The updated standard does not require AOPS on all bulk aboveground storage tanks as described in the recommendation, however, for the reasons described in the status change summary for CSB Recommendation No. 2010-02-I-PR-R6, and the concerns brought up by the API the Board reconsiders this aspect of the recommendation. All standing requirements of the recommendation have been implemented. Accordingly, the Board voted to change the status of CSB Recommendation No. 2010-02-I-PR-R7 to: “Closed – Acceptable Alternative Action.”

¹ CSB Recommendation No. 2010-02-I-PR-R6 “Closed – Reconsidered/Superseded”. Available: [https://www.csb.gov/assets/recommendation/status_change_summary_nfpa_\(capeco_r6\)_c-rs.pdf](https://www.csb.gov/assets/recommendation/status_change_summary_nfpa_(capeco_r6)_c-rs.pdf). Accessed October 24, 2024.