



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

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| 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: | Open—Acceptable Response or Alternative Response |
| Date of Status Change: | July 27, 2022 |

Recommendation Text:

Revise ANSI/API 2350, Overfill Protection for Storage Tanks in Petroleum Facilities (2012), 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 in September 2020 API published the 5th edition of Standard 2350, *Overfill Prevention for Storage Tanks in Petroleum Facilities*. In its response, API explained how the fifth edition attempted to satisfy the elements of the CSB recommendation

CSB obtained and reviewed the fifth edition of API 2350 to verify the information provided in API's response.

C. Board Analysis and Decision

While API has taken steps to address all the technical requirements for AOPS in API 2350 (2020) that were specified in the CSB Recommendation, this standard does not require that AOPS be installed on all bulk aboveground storage tanks at existing and new facilities that store gasoline, jet fuel, other fuel mixtures or blendstocks, and other flammable liquids having an

NFPA 704 flammability rating of 3 or higher and permits each owner/operator to establish their own risk tolerance with respect to these tanks.

As the risk reduction envisioned by the CSB Recommendation has not yet been achieved, the Board voted to change the status of CSB Recommendation No. 2010-02-I-PR-R7 to: “Open—Acceptable Response or Alternative Response.”