



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

<b>Report:</b>	Caribbean Petroleum Refining Tank Explosion and Fire
<b>Recommendation Number:</b>	2010-02-I-PR-R9
<b>Date Issued:</b>	October 21, 2015
<b>Recipient:</b>	American Petroleum Institute (API)
<b>New Status:</b>	Closed – Acceptable Alternative Action
<b>Date of Status Change:</b>	January 20, 2021

### Recommendation Text:

*Develop a single publication or resource describing all API standards and other relevant codes, standards, guidance, and information for filling operations of aboveground storage tanks in petroleum facilities that describes:*

- a) The required design and management practices for control of filling operations;*
- b) The minimum set of independent overfill prevention safeguards if the control fails; and*
- c) Operational challenges (e.g., monitoring/calculating flow rates, ability to maintain constant line pressures, and influences of valve cracking) related to loading multiple tanks concurrently from a single product source.*

### 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 while API Standard 2350, *Overflow Protection for Storage Tanks in Petroleum Facilities*, and the API Manual of Petroleum Measurement Standards (MPMS) Ch. 3.1A were the most relevant to overfilling of tanks at storage terminals, many other API standards need to be taken into consideration for proper management of aboveground storage tank operations at terminal facilities. For example, API 2003, *Protection against Ignitions Arising out of Static, Lightning, and Stray Currents*, provides best practices for preventing static and stray electrical currents. API 2003 provides charts that compare pipe diameter, flow velocities, and flow rates that minimize static and stray currents during tank filling thus reducing the possibility of a fire/explosion, but this standard is not specific to tank filling operations.

Consequently, the Board issued a recommendation to API to create one standard practice, or publicize the existence of all standards and recommended practices, governing aboveground storage tank operations including references to international standards and best practices at tank terminals that would enable facilities to readily access these good engineering practices.

#### B. Response to the Recommendation

In March of 2020, API reported to the CSB that it had revised and published API Standard 2610, *Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities*. In its response, API explained how the third edition of this standard satisfies the elements of the CSB recommendation. Namely:

- Section 2 contains a list of normative references of the international standards, U.S. regulatory standards; building codes; API and other organizations consensus and specification standards that apply to terminal and tank facilities
- Sections 5, 6 and 8 provisions address design and management practices for control of filling operations
- Section 8.1.9 specifies the minimum set of independent overfill prevention safeguards if the control fails
- Sections 10.4.4 and 11.2 address operational challenges related to loading multiple tanks concurrently from a single product source

CSB obtained and reviewed the third edition of API Standard 2610 to verify the information provided in API's response.

#### C. Board Analysis and Decision

The Board determined that the third edition of API Standard 2610 addresses all the requirements listed in the CSB recommendation, but because the provisions listed in Section 11.2 pertaining to flow rates and line pressures are not explicitly linked to loading multiple tanks concurrently from a single product source, the Board voted to change the status of CSB Recommendation No. 2010-02-I-PR-R9 to: "Closed—Acceptable Alternative Action."