



# U. S. Chemical Safety and Hazard Investigation Board

## RECOMMENDATIONS STATUS CHANGE

### SUMMARY

<b>Report:</b>	BP America Refinery Explosion
<b>Recommendation Number:</b>	2005-04-I-TX-R4
<b>Date Issued:</b>	October 31, 2006
<b>Recipient:</b>	American Petroleum Institute (API)
<b>New Status:</b>	Closed - Acceptable Action
<b>Date of Status Change:</b>	April 13, 2016

#### Recommendation Text:

*Revise API Recommended Practice 521, Guide for Pressure Relieving and Depressurizing Systems, to ensure that the guidelines:*

- Identifies overfilling vessels as a potential hazard for evaluation in selecting and designing pressure relief and disposal systems;*
- Addresses the need to adequately size disposal drums for credible worse-case liquid relief scenarios, based on accurate relief valve and disposal collection piping studies;*
- Warns against the use of atmospheric blowdown drums and stacks attached to collection piping systems that receive flammable discharges from multiple relief valves and urges the use of appropriate inherently safer alternatives such as a flare system.*

#### Board Status Change Decision:

##### A. Rationale for Recommendation

On March 23, 2005, a series of explosions and fire occurred at the BP Texas City refinery during the re-starting of an isomerization (ISOM) unit, killing 15 workers, injuring 180, and resulting in substantial economic losses. This event was triggered when a raffinate splitter tower was overfilled during startup. The overfilling caused pressure relief devices on the piping leading from the tower to open and dump flammable liquid into a blowdown drum fitted with a stack without a flare. The blowdown drum also overfilled, releasing flammable liquid out of the stack into the surrounding area where it evaporated as it fell to ground. Subsequent ignition of the flammable vapors led to the explosions and fire.

The CSB investigation found that the blowdown drum and stack were not sized properly to accommodate the release from the dozens of emergency relief valves on the towers and vessels that were piped into it, and that BP had not conducted an adequate assessment of the size needed for the drum. These factors created the conditions necessary to overfill the blowdown drum and stack which led to the flammable liquid release that precipitated the explosions. The CSB also concluded "that a flare system is an inherently safer design than atmospheric vent stack because it safely combusts flammable hydrocarbons before they are vented to atmosphere, where they could become a serious fire or explosion hazard."

At the time of the incident, the American Petroleum Institute (API) Recommended Practice 521, “Guide for Pressure-Relieving and Depressuring Systems,” was the recognized and generally accepted good engineering practice (RAGAGEP) for pressure relieving and disposal systems. The CSB evaluated this standard and identified several gaps: a need to identify and design for potential tower overfilling; a need for proper selection of disposal systems piped with multiple relief devices; guidance on sizing of disposal drums; and guidance for the use of inherently safer approaches. The CSB recommended that the API revise API 521 to address these gaps.

**B. Response to the Recommendation**

On July 30, 2014, the API communicated to the CSB that the sixth edition of API 521, dated January 2014, had been published which addresses all the elements listed in CSB Recommendation No. 2005-04-I-TX-R4. Revisions made to the text in Section 4.4.7 address overfilling as a potential hazard. Revisions made to the text in several parts of Section 5 address the concerns to adequately size disposal drums for credible worse-case liquid relief scenarios based on accurate relief valve and disposal collection piping studies. Revisions made to the text in Sections 5.8.7.1 and 5.8.8 address concerns about releases directly to atmosphere and generally require using inherently safer alternatives when the potential exists for a flammable vapor cloud explosion.

**C. Board Analysis and Decision**

As all the elements of CSB Recommendation No. 2005-04-I-TX-R4 appear to have been addressed by revisions made in the 2014 edition of API 521, the Board voted to change its status to: **“Closed – Acceptable Action.”**