



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE

SUMMARY

Report:	Valero Refinery Propane Fire
Recommendation Number(s):	2007-5-I-TX-R2
Date Issued:	June 19 th , 2008 (released July 9 th , 2008)
Recipient:	American Petroleum Institute
New Status:	Closed – Acceptable Alternative Action
Date of Status Change:	August 12 th , 2015

Recommendation Text(s):

Revise API 2218, Fireproofing Practices in Petroleum and Petrochemical Processing Plants, so that conformance with the standard addresses jet fire scenarios, and requires more protective fireproofing radii and other measures (e.g., emergency isolation valves, depressuring systems) for pipe rack support steel near process units containing highly pressurized flammables.

Board Status Change Decision:

A. Rationale for Recommendation

The U.S. Chemical Safety and Hazard Investigation Board (CSB) conducted an investigation of a massive fire that injured four workers and caused the total shutdown and evacuation in February 2007 of the Valero McKee Refinery in Sunray, Texas. The investigation concluded that water leaked through a valve, froze and cracked an out-of-service section of piping, causing a release of high pressure liquid propane. The investigation found that the pipe rack support that failed, which greatly increased the magnitude of the fire, was positioned 77 feet from the jet fire, beyond the recommended radius of 50 feet for fireproofing piping for liquefied petroleum gas by the American Petroleum Institute (API) in Recommended Practice 2210. The CSB recommended that the API revise recommended practice 2218, *Fireproofing Practices in Petroleum and Petrochemical Processing Plants*, to require more protective fireproofing for pipe rack support steel near process units containing highly pressurized flammables.

B. Response to the Recommendation

On July 9th, 2008, the Valero Refinery Propane Fire report was released along with recommendations. In August of 2008, API responded stating that they have directed the recommendation to their Safety and Fire Protection Subcommittee. Based on this response, on November 19th, 2008, the Board voted to change the status of the recommendation to “Open-Acceptable or Alternate Response.”

In December 2012, API indicated that RP 2218 was under revision, that an informative Annex on Jet Fire Considerations was being included, and that the third edition was to be published in the first quarter of 2013. In July of 2013, CSB received a copy of the third edition of RP 2218, along with a cover letter regarding the justification for creation of an Annex. API noted that 2218 was developed and intended to be a pool fire standard.^{1,2} They also noted that the 2218 task group decided that the best way to ensure the new information on jet fire scenarios would be disseminated to fire protection experts was by adding a new Annex to provide information and guidance. They also note that fire protection measures, emergency

¹ Pool fires are predictable, form on horizontal surfaces and are not pressurized, whereas jet fires are pressure fed and randomly directional.

² Page ii of RP 2218 states “API 2218 is a “pool fire” standard.”

isolation valves and depressuring systems are covered in API RP 2001, *Fire Protection in Refineries*, Section 5.4.3.4 on Isolation Valves, and in API Std. 521, *Pressure-relieving and Depressuring Systems*.³

The Annex, “Jet Fire Considerations”, which is five pages including references, includes information on: background of jet fires, pool fires versus jet fires, prior studies on jet fires, jet fire computer modeling, fire proofing tests, prevention, intervention, active and passive protection. The last two paragraphs in Annex C directly address the CSB recommendation, reading:

Where jet fires are a concern a Fire Hazard Analysis should evaluate potential release sites, associated hazards and risks and consider needs. Scenario definition responsibility remains with the facility owner/operator. Emphasis should remain on: prevention, appropriate use of active protection for important systems where jet fires are possible (even though specific scenarios remain undefined), and passive fireproofing for both pool fires (using a scenario approach such as outlined in this standard) and jet fires based on a Fire Hazard Analysis.

The results of the Fire Hazard Analysis may identify jet fire scenarios which require more protective fireproofing radii for pipe rack support steel near process units containing highly pressurized flammables, and/or other measures such as emergency isolation valves and depressuring systems. Where identified these needs should be prioritized and integrated into the facility’s fire protection program.

This language addresses all elements of the CSB recommendation, including more protective fireproofing radii, other measures such as emergency isolation valves, depressuring systems, for pipe rack support steel near process units containing highly pressurized flammables. Although the Annex does not contain “shall” language indicating that conformance with this standard will *require* fireproofing, CSB staff believes that the Annex provides useful guidance and direction to further resources on jet fire and fireproofing. We therefore believe that the Annex developed by API is an acceptable alternative implementation of the recommendation. The Annex could be strengthened by adding references to API’s RP 2001 for guidance on Fire Hazard Analysis and emergency isolation valves and Standard 521 for depressuring systems.

C. Board Analysis and Decision

As API developed an Annex to RP 2218 that provides guidance on jet fire scenarios, fireproofing, and other fire protection methods, the Board voted to change the status of CSB Recommendation No. 2007-5-I-TX-R2 to: “**Closed – Acceptable Alternative Action.**”

³ CSB also made a recommendation, 2007-5-I-TX-R3, to API to update RP 2001 and 2030 so that conformance with these recommended practices includes the design, installation, and use of remotely operable shut-off valves (ROSOVs) and interlocked equipment controls to enable the safe and rapid emergency isolation of process equipment containing highly pressurized flammables. Both RPs have been updated, and as of 4/16/2015, CSB is awaiting the receipt of 2030 prior to evaluating this recommendation.