



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE

SUMMARY

Report:	Valero Refinery Propane Fire
Recommendation Number(s):	2007-5-I-TX-R3
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:	July 13, 2016

Recommendation Text:

Revise API Recommended Practice 2001, Fire Protection in Refineries, and API 2030, Application of Fixed Water Spray Systems for Fire Protection in the Petroleum Industry, so that conformance with these recommended practices includes the design, installation, and use of ROSOVs and interlocked equipment controls to enable the safe and rapid emergency isolation of process equipment 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 uncontrolled fire at the McKee refinery occurred in a process unit not equipped with Remotely Operated Shutoff Valves (ROSOVs)¹, which would allow an operator to remotely interrupt flows of fuel to a process unit in the event of a fire. The investigation found that the American Petroleum Institute's (API) Recommended Practice (RP) 2001, Fire Protection in Refineries, and RP 2030, Application of Fixed Water Spray Systems for Fire Protection in the Petroleum Industry, discuss the use of isolation valves in emergencies, including considering access to valves during fires. However, while these recommended practices briefly reference ROSOVs, they focus on fire and heat-actuated valves and their limitations. The investigation noted that the 2007 release of API 521, Pressure-relieving and Depressuring Systems, addresses the limitations of pressure relief systems in protecting against jet fires, and states that "unlike a pool fire, a jet fire can, in essence, be 'turned off' through isolation and depressurization of the jet fire source...". None of these guidance documents provide specific guidance on the design, location, and use of ROSOVs for the rapid isolation of processes during emergencies. Therefore, the CSB made a recommendation to API to include in RP 2001 and 2030, information on the design, installation and use of ROSOVs.

¹ Remotely operated shutoff valve (ROSOV) is defined as: A valve designed, installed and maintained for the primary purpose of achieving rapid isolation of plant items containing hazardous substances in the event of a failure of the primary containment system (including, but not limited to, leaks from pipework, flanges and pump seals). Closure of the valve can be initiated from a point remote from the valve itself. The valve should be capable of closing and maintaining tight shutoff under foreseeable conditions following such a failure (which may include fire). Definition source: HSE.

B. Response to the Recommendation

API stated after reviewing the two recommended practices referenced in the recommendation, RP 2001 and 2030, that API felt that the recommendations encouraging the use of ROSOVs are not appropriate for these documents, as they are fire protection documents. API stated in particular that though RP 2030 does provide guidance on deluge and water spray systems, it does not cover ROSOVs or isolation equipment.

The CSB's Valero McKee investigation reviewed the 1998 editions of both RP 2001, Fire Protection in Refineries, and RP 2030, Application of Fixed Water Spray Systems for Fire Protection in the Petroleum Industry. As API did not include ROSOVs in RP 2030, the CSB's evaluation for this recommendation is of API's proposed alternate action: inclusion of ROSOVs in RP 2001, consistent with the original recommendation, and RP 553, the alternate action.

Between the 1998 edition and the 2012 edition, API added language to RP 2001 that states process hazard analysis (PHAs) and fire hazard analyses (FHA) should consider ROSOVs. The ninth edition of RP 2001 was published in April 2012 and addresses ROSOVs in section 5.4.3.4.2. RP 2001 was updated to include information on ROSOVs and interlocked equipment controls, and includes a discussion on the use of ROSOVs and the review process to determine the application of these types of valves, as well as references RP 553.

RP 553, Refinery Valves and Accessories for Control and Safety Instrumented Systems, Section 8 of the second edition, was updated to include information on Emergency Block Valves (EBVs)². The information provided in RP 553 is more thorough than that in RP 2001. The 2012 version of RP 553 provides guidance for the installation and use of EBVs for vessels containing light ends (flammables) and toxic materials. It also states any branch connection should have its own EBV and that the flow from these vessels should be isolated. In addition, RP 553 second edition, added a new section on control stations, stating that they should be located outside the fire zone, the use of redundant controls through isolation of multiple control stations, consideration of human and environmental factors, and additional facility siting considerations.

Although the language provided is voluntary for conformance to the standards, overall RP 2001, and more so RP 553, have been updated to provide more information on the installation and use of ROSOVs/EBVs for process units with pressurized flammables. Had Valero followed the guidance for the use of ROSOVs at the time of the incident, and used control stations like those described in RP 553, it is likely the uncontrolled fire would have been contained. Although API has not fulfilled the exact language of the recommendation, it has updated RP 2001 and 553.

C. Board Analysis and Decision

As API update RP 2001 and 553 to include more information on the use and installation of ROSOVs, the Board voted to change the status of CSB Recommendation No. 2007-5-I-TX-R3 to: “**Closed – Acceptable Alternative Action.**”

² Valves performing the same or similar function to an ROSOV may be referred to as: emergency isolation valves (EIVs); remotely-operated block valves (RBVs); emergency shutdown valves (ESDVs); and Type D (remotely operated) emergency block valves (EBV).