



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

| | |
|-------------------------------|--|
| Report: | Arkema Inc. Chemical Plant Fire |
| Recommendation Number: | 2017-08-I-TX-R4 |
| Date Issued: | May 24, 2018 |
| Recipient: | Center for Chemical Process Safety (CCPS) |
| New Status: | Open—Acceptable Response or Alternative Response |
| Date of Status Change: | May 23, 2019 |

Recommendation Text:

Develop broad and comprehensive guidance to help companies assess their U.S. facility risk from all types of potential extreme weather events. Guidance should address the issues identified in this report and cover actions required to prepare for extreme weather, resiliency and protection of physical infrastructure and personnel during extreme weather, as well as recovery operations following an extreme weather event, where appropriate. Include guidance for each of the following:

- Addressing common mode failures of critical safeguards or equipment that could be caused by extreme weather events, including but not limited to flooding. For flooding scenarios, sufficient independent layers of protection should be available if floodwater heights reach the facility.*
- Evaluating facility susceptibility to potential extreme weather events. Relevant safety information such as flood maps should be incorporated as process safety information.*
- Involving relevant professional disciplines, including engineering disciplines, to help ensure risk assessments and process hazard analyses are as robust as practicable for any given facility.*

Board Status Change Decision:

A. Rationale for Recommendation

On August 24, 2017, Hurricane Harvey, a Category 4 hurricane, made landfall in southeast Texas. Extensive flooding caused by heavy rainfall from the hurricane exceeded the equipment design elevations and caused the plant to lose power, backup power, and critical organic peroxide refrigeration systems. Consequently, Arkema used its standby refrigerated trailers to keep the organic peroxide products cool. On August 31, 2017, organic peroxide products stored inside a refrigerated trailer decomposed, causing the peroxides and the trailer to burn. Twenty-one people sought medical attention from exposure to fumes generated by the decomposing products when the vapor travelled across a public highway adjacent to the plant. Emergency response officials initially decided to keep this highway open because this road served as an important route for hurricane recovery efforts. Over the next several days, a second fire and a controlled burn conducted by the Unified Command consumed eight more trailers holding Arkema's remaining organic peroxide products that required low-temperature storage. Over the course of the three fires, in excess of 350,000 pounds of organic

peroxide combusted. As a result, more than 200 residents living within 1.5 miles of the facility who had evacuated the area could not return home for a week.

As a part of its investigation, the U.S. Chemical Safety and Hazard Investigation Board (CSB) reviewed existing industry safety guidance for companies on how to address flood hazards. CSB discovered that the American Institute of Chemical Engineer's (AIChE) Center for Chemical Process Safety (CCPS) has published guidance on this topic, but found that the guidance was either too generic or did not require sufficiently conservative precautions to have helped Arkema prevent this incident. For example, the guidance did not require elevating critical equipment to heights that would have prevented Hurricane Harvey-level floodwater from disabling safety systems at the Arkema facility. Given this shortcoming, the CSB made a recommendation to the CCPS to develop more broad and comprehensive guidance on how to address flood hazards.

B. Response to the Recommendation

In February 2019, CCPS responded to the CSB stating that it intended to address the items listed in the CSB recommendation by updating its 2014 guidance titled "Recovery from Natural Disasters" and advised the CSB that this revision should be finished in 2019.

C. Board Analysis and Decision

As the CCPS has agreed to implement the CSB recommendation and has provided an approximate timetable for completion, the Board voted to change the status of **CSB Recommendation No. 2017-08-I-TX-R4** to: "**Open—Acceptable Response or Alternative Response.**"