



# U. S. Chemical Safety and Hazard Investigation Board

## RECOMMENDATION STATUS CHANGE

### SUMMARY

<b>Report:</b>	TPC Port Neches Explosions and Fire
<b>Recommendation Number:</b>	2020-02-I-TX-R1
<b>Date Issued:</b>	December 19, 2022
<b>Recipient:</b>	TPC Group
<b>New Status:</b>	Open – Acceptable Response or Alternate Response
<b>Date of Status Change:</b>	July 26, 2023

#### Recommendation Text:

*For all TPC PNO terminal operations in high-purity butadiene service (e.g., greater than 80 percent butadiene concentration), develop and implement a program to identify and control, or eliminate, dead legs. At a minimum, the program must require:*

- a) a comprehensive review of equipment configurations in high-purity butadiene service using both Piping and Instrumentation Diagrams (P&IDs) and field evaluations to identify all permanent dead legs. Implement a process to identify changes in operating conditions in high-purity butadiene service that could result in the formation of temporary or new permanent dead legs, such as when primary or spare pumps are temporarily or permanently out of service. Ensure this review is conducted at least every five years;*
- b) evaluation and implementation of design strategies, where practical, to prevent dead legs in areas susceptible to popcorn polymer formation;*
- c) mitigation, control, or prevention of hazardous popcorn polymer buildup in all identified dead legs in high-purity butadiene service, such as through increased monitoring, flushing of equipment, use of inhibitor(s), or planning maintenance activities to minimize the amount of time that a temporary dead leg is present; and*
- d) periodic continual auditing (at a minimum annually) by TPC PNO management to ensure that the process is being implemented.*

#### Board Status Change Decision:

##### A. Rationale for Recommendation

On the morning of November 27, 2019, a dead leg between the Final Fractionator A and the manual isolation valve upstream of an offline pump in the TPC Group Port Neches Operations facility's butadiene unit ruptured. Approximately 6,000 gallons of liquid, primarily butadiene, were released. The liquid butadiene vaporized forming a flammable vapor cloud that ignited moments later causing multiple fires and explosions. After the initial fires were contained, smaller fires burned for more than one month while isolation efforts were underway.

During the initial explosion two TPC Group employees and a security contractor suffered nonlife-threatening injuries. Jefferson County officials reported that five additional minor injuries were suffered by residents of the community. Additionally, the blast damaged nearby homes and buildings and was reportedly felt as far away as 30 miles from the facility. County officials declared a state of disaster and multiple shelter-in-place and evacuation orders were issued.

As a result of the incident, the butadiene unit was completely destroyed, and butadiene production operations ceased indefinitely. The incident caused \$450 million in on-site property damage, and an additional \$153 million in off-site property damage. The facility has since been transitioned to a “terminal and services” operation and on June 1, 2022, TPC Group filed for Chapter 11 bankruptcy.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated the incident and found several safety issues including failures in dead leg identification and control, process hazard analysis action item implementation, control and prevention of popcorn polymer, and a lack of remotely operated emergency isolation valves. As a result of these findings, the CSB issued three recommendations to TPC Group. This status change summary addresses CSB Recommendation No. 2020-02-I-TX-R1.

B. Response to the Recommendation

TPC Group notified the CSB that they have developed and implemented a program to identify and control, or eliminate, dead legs, for all the Port Neches Operations facility operations in high-purity butadiene service as required by the recommendation. TPC Group verified this by providing policy documents and records of past program activities. TPC Group has three open mitigation actions left to perform on their remaining permanent dead legs which they estimate will be finished this calendar year.

C. Board Analysis and Decision

As TPC Group has substantially implemented the recommendation, has confirmed their intentions to fully implement the recommendation, and provided an estimated timeline for completion, the Board voted to change CSB Recommendation No. 2020-02-I-TX-R1 to: “Open – Acceptable Response or Alternate Response.”