



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATION STATUS CHANGE

SUMMARY

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| Report: | Husky Energy Superior Refinery Explosion and Fire |
| Recommendation Number: | 2018-02-I-WI-R1 |
| Date Issued: | December 23, 2022 |
| Recipient: | Cenovus Superior Refinery |
| New Status: | Closed – Acceptable Action |
| Date of Status Change: | February 16, 2024 |

Recommendation Text:

Establish safeguards to prevent explosions in the FCC unit during transient operation (including startup, shutdown, standby, and emergency procedures). Incorporate these safeguards into written operating procedures. At a minimum establish the following specific safeguards:

- a) Implementation of the reactor steam barrier, or a similar inert gas flow, to maintain an inert barrier at an elevated pressure between the main column (containing hydrocarbon) and the regenerator (containing air);*
- b) Purging the main column with a non-condensable gas as needed to prevent a dangerous accumulation of oxygen in the main column overhead receiver;*
- c) Monitoring to ensure that there is a sufficient non-condensable gas purge of the main column to prevent a dangerous accumulation of oxygen in the main column overhead receiver (either through direct measurement of the oxygen concentration and/or through engineering calculation);*
- d) Monitoring of critical operating parameters for flows, pressures, pressure differences, and catalyst levels;*
- e) Documentation of consequences of deviating from the transient operation safe operating limits and of predetermined corrective actions; and*
- f) Inclusion of the above items in the appropriate FCC operator training curricula.*

Board Status Change Decision:

A. Rationale for Recommendation

On the morning of April 26, 2018, the primary and sponge absorber of the Husky Energy Superior Refinery exploded during the planned shutdown of the facility's fluidized catalytic cracking (FCC) unit. Debris from the explosion struck an asphalt storage tank approximately 200 feet away. Asphalt leaked from the damaged tank and over the containment wall spreading into the FCC and crude unit operating areas before eventually catching fire. Husky Superior Refinery reported that 39,000 pounds of a flammable hydrocarbon vapor mixture as well as approximately 17,000 barrels of asphalt were released during the incident.

36 refinery and contract workers received medical treatment as a result of the incident. Of those 36 injuries, 11 met the criteria to be considered an Occupational Safety and Health

Administration (OSHA) recordable injury. None of the injuries suffered were deemed life-threatening. It was reported that the explosion shook buildings up to a mile away. The plume from the burning asphalt was visible from neighboring communities. An evacuation order was issued by county officials to protect the public from the smoke plume and as a precaution for fear the incident would escalate.

As a result of the incident the facility was destroyed. The incident resulted in \$550 million of onsite and \$110,000 of off-site property damage. This incident was recorded as having the 33rd largest adjusted property damage loss in the hydrocarbon extraction, transport, and processing industry since 1974¹. In September 2019 a permit was issued to rebuild the refinery and construction began soon after. Husky Energy merged with Cenovus Energy, Inc., a Canadian oil and natural gas company, on January 1, 2021. The refinery is expected to resume operations in 2023 as Cenovus Superior Refinery.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated the incident and found several safety issues including ineffective transient operation safeguards, a lack of process knowledge, ineffective process safety management systems, a lack of available industry knowledge and guidance, and failures in emergency preparedness. As a result of these findings, the CSB issued one recommendation to Cenovus Superior Refinery (Cenovus). This status change summary addresses CSB Recommendation No. 2018-02-I-WI-R1.

B. Response to the Recommendation

Cenovus notified the CSB on November 8, 2023, that they had successfully implemented the recommendation. Cenovus installed new safety features in their rebuilt FCC unit, updated several operating procedures, and provided training to their FCC unit operators in implementing the recommendation. Cenovus provided ample documentation in support of their assertions which was reviewed by the CSB and determined to be sufficient.

C. Board Analysis and Decision

Based upon the information above, the Board voted to change CSB Recommendation No. 2018-02-I-WI-R1 to: “Closed – Acceptable Action.”

¹ Marsh JLT Specialty, “100 Largest Losses in the Hydrocarbon Industry,” 2022. [Online]. Available: <https://www.marsh.com/us/insights/research/100-largest-losses-hydrocarbons-industry-html>. [Accessed 5 October 2022].