ExxonMobil

Baytown, Texas

March 17, 2024

Incident Summary

On March 17, 2024, at approximately 12:50 p.m., about 250,000 pounds of hydrogen and naphtha mixture were accidentally released into the firebox of a fired heater, where it ignited, creating a major fire at the ExxonMobil Corporation Refinery ("ExxonMobil") in Baytown, Texas (**Figure 1**). ExxonMobil estimated that the property damage from the incident was $32 million.

Figure 1. The ExxonMobil facility in Baytown, Texas. (Credit: CNBC)

ExxonMobil's investigation revealed that three days before the incident, on March 14, 2024, the temperature of the tubes in the fired heater exceeded 1,200 degrees Fahrenheit, the heater's operating limit. When the alarms indicated that the temperature exceeded the operating limit, operators at the facility lowered the temperature in the fired heater by reducing the fuel gas flow to the heater's burners.

On March 17, 2024, the day of the incident, the same fired heater reached similar high temperatures, prompting operators to respond again. The situation escalated when two tubes within the fired heater ruptured, releasing hydrogen and naphtha into the firebox. The existing burner flame ignited these flammable hydrocarbons, resulting in a major fire.

ExxonMobil's investigation found that fire blankets and insulation material ("debris") were present inside the failed tubes (**Figure 2**). ExxonMobil determined that this debris was likely left inside the equipment after the conclusion of maintenance work (turnaround) that had been done three weeks earlier. This debris restricted the flow through the tubes, causing an increase in the temperature of the metal walls and ultimately leading to the tube failures. Additionally, the fired heater was not equipped with individual pass flow instrumentation. ExxonMobil's metallurgical examination determined that the

tubes ruptured because of a combination of creep damage (which results from prolonged exposure to stress at elevated temperatures) and short-term overheating.

Figure 2. Failed fired heater tubes (left) and debris removed post-incident (center and right). (Credit: ExxonMobil)

ExxonMobil's investigation revealed that the refinery's process for ensuring that equipment was clean before resuming operations did not include checks of piping or fired heater tubes. Additionally, ExxonMobil determined that its operational readiness programs assessed only the external status of piping and valves and did not evaluate their internal condition.

Probable Cause

Based on ExxonMobil's investigation, the CSB determined that the probable cause of the hydrogen and naphtha release was that tubes in the fired heater ruptured due to a combination of creep damage and short-term overheating. Flames from the fired heater's burners ignited these flammable materials, resulting in the fire. Reduced flow through the fired heater's tubes, caused by debris left inside the equipment after maintenance, contributed to the incident.