Chevron Phillips

Port Arthur, Texas

February 15, 2021

Incident Summary

On February 15, 2021, at 9:53 p.m., a hydrogen and hydrocarbon gas mixture was accidentally released into the firebox of a fired heater, where it ignited, creating a fire at the Chevron Phillips Chemical Company ("Chevron Phillips") facility in Port Arthur, Texas (**Figure 1**). Chevron Phillips estimated that the property damage from the incident was $5.8 million.

Figure 1. The Chevron Phillips facility in Port Arthur, Texas. (Credit: Google Maps)

Chevron Phillips' investigation determined that freeze-related operational issues due to extreme cold weather from Winter Storm Uri caused the facility's boiler units to shut down. This shutdown decreased the supply of steam and water to an ethylene unit at the facility. A safety system automatically shut the fired heater down due to insufficient steam and water flow. Although the automatic valves closed to prevent feed from entering the tubes, the fired heater's fuel gas isolation valve failed to close as intended. This failure allowed the burners to continue operating. Without any flow through the tubes to remove heat from their walls, the tubes in the fired heater reached excessively high temperatures. Some tubes ruptured, likely due to short-term overheating, but a metallurgical analysis was not performed to confirm the cause of the tube failures (**Figure 2**). When the tubes ruptured, hydrocarbons downstream from the fired heater were released through the broken tubes and ignited by the burner flames inside the firebox, causing a fire.

Figure 2. Failed fired heater tubes. (Credit: Chevron-Phillips)

During post-incident testing by Chevron Phillips in temperatures above freezing, the fuel gas isolation valve successfully closed as designed. Chevron Phillips' investigation concluded that the fuel gas isolation valve did not close because water in the instrument air supply had frozen or ice formed on the external actuator components (related to inadequate winterization), preventing the isolation valve from closing.

Probable Cause

Based on Chevron Phillips's investigation, the CSB determined that the probable cause of the incident was the rupture of fired heater tubes from short-term overheating. When the tubes were broken, a hydrogen and hydrocarbon gas mixture flowed from downstream equipment into the firebox. Flames from the burners ignited the flammable materials, resulting in the fire. Inadequate winterization of flow control equipment contributed to the incident.