# Delek

**El Dorado, Arkansas**

**December 23, 2022**

## Incident Summary

On December 23, 2022, at about 4:08 a.m., approximately 1,800 gallons of naphtha were accidentally released into the firebox of a fired heater, where it ignited, resulting in a serious fire at the Delek US Holdings, Inc.'s ("Delek") Lion Oil Refinery in El Dorado, Arkansas (**Figure 1**). Delek estimated that the property damage from the incident was $36 million.


**Figure 1.** The Delek refinery in El Dorado, Arkansas. (Credit: Google Earth)

Delek's investigation identified that ambient temperatures at the facility dropped to 12 degrees Fahrenheit by 11:00 p.m. on the night of the incident. This cold weather caused operational issues with some instruments and controls, leading to low hydrocarbon flow through the tubes of a fired heater. The decreased flow resulted in reduced heat transfer, which likely caused the metal temperatures in the tubes to rise significantly. This high-temperature condition ultimately caused a tube to rupture (**Figure 2**), releasing flammable hydrocarbons into the firebox, where the existing burner flame ignited them. Delek commissioned a metallurgical examination and found that the tube ruptured due to creep damage (which results from prolonged exposure to stress at elevated temperatures) and short-term overheating.

**Figure 2**. The ruptured tube within the fired heater (left) and after removal (right). (Credit: Delek)

Delek's investigation found that some instruments and controls were not effectively winterized for cold weather conditions, which impacted their performance. As a result, some controls were put in manual mode, and some alarms were interpreted by Delek employees as unreliable, leading to reduced hydrocarbon flow through the tubes and elevated tube wall temperatures. Additionally, the fired heater was not equipped with instrumentation to measure the tube's metal wall temperatures. Delek's investigation further revealed that Delek's process hazard analysis for this fired heater relied on safeguards that were insufficient or not in place to prevent low tube pass flow conditions. In addition, a low-flow safety interlock did not work because it was improperly set.

## Probable Cause

Based on Delek's investigation, the CSB determined that the probable cause of the naphtha release was a tube rupture, which resulted from creep damage and short-term overheating. Flames from the fired heater's burners ignited the flammable hydrocarbons, resulting in the fire. Fired heater safeguards that were not in place or improperly set, in addition to inadequate winterization of flow control equipment, contributed to the incident. Had the fired heater been equipped with instrumentation to measure the tube's metal wall temperatures and other safeguards been in place, this incident likely could have been prevented.