PBF Energy

Chalmette, Louisiana

January 21, 2023

Incident Summary

On January 21, 2023, at 1:58 p.m., a mixture of hydrogen and hydrocarbons was accidentally released into the firebox of a fired heater, where it ignited, resulting in a large fire at the Chalmette Refining, L.L.C.'s refinery in Chalmette, Louisiana, a subsidiary of the PBF Holding Company LLC ("PBF Energy") (**Figure 1**). PBF Energy estimated the property damage from the incident to be approximately $34.1 million.

Figure 1. The PBF Energy refinery in Chalmette, Louisiana. (Credit: PBF Energy)

According to PBF Energy's investigation, four months before the incident, a contractor performed an infrared ("IR") scan of the fired heater and found elevated temperatures in the heater, with one tube section operating above 1,300 degrees Fahrenheit (°F). At the time, the contractor concluded that the high temperatures were measurements of the scale and oxidation on the outside surface of the tubes, not the tube's metal wall temperature. After the incident, PBF Energy determined that the IR temperature measurements taken before the incident were likely accurate, but they had been misinterpreted. As a result, the infrared temperature data was not used to adjust the operating conditions of the fired heater, which could have lowered the tube temperature within the design limit.

PBF Energy's investigation determined that on the day of the incident, the fired heater's tubes experienced another high-temperature event, leading to a tube rupture. The unit had automatically shut down due to a problem in another part of the process. During this shutdown, the hydrogen and hydrocarbons flowing through the fired heater's tubes stopped, but the burners continued operating because the fuel gas control valve did not fully close. Without fluid flow through the tubes to remove heat, the tube's temperature exceeded 1,400°F. Operating at this temperature caused short-term overheating, further degrading the tubes' integrity. As the fired heater was restarted, a tube ruptured (**Figure 2**), releasing a flammable mixture of hydrogen and hydrocarbons into the firebox, where flames from the gas-fired burners ignited it and resulted in a fire at the facility. The investigation concluded that

the tube failure was likely the result of a combination of localized creep damage (which results from prolonged exposure to stress at elevated temperatures) and short-term overheating.

Figure 2. Ruptured tube. (Credit: PBF Energy)

The company estimated that about 51,000 pounds of diesel, 160 pounds of hydrogen, and 560 pounds of methane were released. After the incident, PBF Energy installed larger fired heater viewports to allow for improved infrared scans of the tubes and installed instrumentation to monitor temperature.

Probable Cause

Based on PBF Energy's investigation, the CSB determined that the probable cause of the incident was a fired heater tube rupture from a combination of creep damage and short-term overheating. Flames from the fired heater's burners ignited the released flammable mixture of hydrogen and hydrocarbons, resulting in the fire. Insufficient temperature instrumentation and an inadequate infrared scanning program contributed to the incident.