

Incident Investigation Findings Summary



Incident Date(s): December 17, 2021
Incident Title: Plant 1 Hydrogen Unit Trip and No. 3 Hydrodesulfurization Unit Fire
Executive Summary During maintenance work on the Plant 1 Hydrogen Unit, the unit tripped inadvertently when instrumentation was being calibrated. This unit trip caused a compressor in the No. 3 Hydrodesulfurization Unit (HDS) to also trip, which resulted in excess gases being routed to the Plant 1 Main Plant flare. As the No. 3 HDS was being shut down, a leak developed in one of the heat exchangers, which resulted in a fire. The plant alarm was sounded, which activated the Suncor Emergency Operations Center (EOC) and Emergency Response Team (ERT). The fire was quickly brought under control and no injuries were reported.
Incident Summary On Dec. 17 th , instrumentation on the Plant 1 Hydrogen Unit started to drift and come into the control room as an alarm for a deviation. Instrument technicians responded to a notification to calibrate the transmitters. The technician and chief operators discussed and agreed on how to complete the work and then the instrument technician began calibrating the two transmitters. During this calibration process, one of the transmitters was not bypassed in the programming and control of the unit, which caused a false alarm to activate. This caused the Hydrogen Unit to trip, which cascaded to the No. 3 HDS. This Hydrogen Unit trip caused a pressure increase of about 100 pounds per square inch (psi) in the No. 3 HDS, which caused a leak at a thermowell on a heat exchanger in the unit. Operators who were working nearby saw smoke and began to respond when a fire developed at a thermowell flange. Suncor operations personnel responded by activating refinery response equipment and the plant alarm was sounded. Suncor Emergency Response Team (ERT) personnel responded and the fire was contained in less than 10 minutes with no injuries.
Incident Investigation Summary Two investigations were launched following this incident. The first was to investigate the cause of the Hydrogen Unit trip. The second was to investigate the flange leak and fire on the No. 3 HDS. 1 - Hydrogen Unit Trip Two instruments were showing up in the control room as deviations from their normal indication. The typical response to this situation is to recalibrate the instruments to bring them back into proper range. During the calibration process, it was not seen in the instrument documentation that the value from this instrument was in two locations in the unit programming. The value is normally set by the instrument technicians in order to prevent a unit trip. This gap in the documentation caused the unit to trip when the calibration began as the unit programming believed this to be an actual value. 2 - Flange Leak and Fire With the Hydrogen Unit tripping offline, a pressure cycle of roughly 100psi cascaded through the No. 3 HDS. A thermowell located in between a set of heat exchangers began to leak due to the pressure change, which resulted in a fire at this flange. After the fire was extinguished, the thermowell and flange were inspected and found to have loose bolts which is the likely cause of the leak. It was determined that this flange may have loosened during the operation of the unit since it was last torqued to specification during previous unit outages and turnarounds.

**Information in this report is based on the facts known to Suncor Energy (U.S.A.) Inc. at the time of preparation. We may update or change the information contained herein if and to the extent additional facts become available.*

Recommended Actions to Prevent Recurrence

To reduce the likelihood of recurrence, the following actions were recommended:

1. Revise documentation to state where unit trip systems can be found for each unit. Review process and instrumentation diagrams, along with process level control logic, prior to calibration of these trip systems.
2. Evaluate all thermowell flanges and bolts on the heat exchangers for the No. 3 HDS through creation of a preventative maintenance (PM) program.
 - a. Torque all bolts during next outage and, if loose, evaluate additional preventative maintenance needs.