

Incident Investigation Findings Summary



Incident Date(s): March 17, 2022
Incident Title: Electrical Arc Flash with Power Outage
Executive Summary <p>While under normal operation, an electrical arc flash occurred at an onsite Power Distribution Center (PDC) in Plant 2, which ultimately resulted in multiple operating units shutting down in both Plant 1 and Plant 2. During the shutdown of the operating units, gases that are normally processed in the units are sent to - the Plant 1 Main Plant Flare for safe combustion. These gases, including hydrogen sulfide (H₂S), are combusted at the flare, which results in the generation of sulfur dioxide (SO₂) and water vapor. The refinery plant alarm system was sounded which, per procedure, activated the Suncor Emergency Operations Center (EOC) and the Refinery Emergency Response Team (ERT). There were no injuries as a result of the incident.</p>
Incident Summary <p>While under normal operation, an electrical arc flash occurred at the refinery from an onsite Power Distribution Center (PDC) in Plant 2. Personnel in the area noted what appeared to be flames and smoke and activated the Refinery Plant Alarm system in the area. Per procedure, this activated the Suncor Emergency Operations Center (EOC) and the Refinery Emergency Response Team (ERT). No personnel were injured during the response.</p> <p>Several operating units in Plant 1 and Plant 2 shut down due to the arc flash and resulting power loss. The unplanned shutdown and routing of the process gases to the flare caused permit limit exceedances and an Emergency Planning and Community Right to Know Act (EPCRA) reportable quantity (RQ) exceedance of sulfur dioxide (SO₂).</p> <p>The incident was brought under control quickly as emergency shutdown systems brought the operating units to a safe state quickly.</p>
Incident Investigation Summary <p>There were two major items investigated as part of this incident: the initiating event causing the electrical arc flash in the PDC in Plant 2 and the subsequent power loss to operating units in Plant 1.</p> <ol style="list-style-type: none">1. Electrical Arc Flash in PDC 41<p>The investigation into this incident showed that the initiating event was a fault in the wiring for two small potential transformers (PTs) in power distribution center 41 (PDC 41). These transformers step down the voltage from 13.6 kV to 120 V so electricians can check the phasing. The shielded jumper cables on the PTs were improperly installed. The conductors were touching or nearly touching fuse holders for different phases and the enclosure. Additionally, the shielding on the cables was not grounded. The improper installation and unintentional ground fault caused the arc flash in the PDC.</p>2. Power Loss to Plant 1 Operating Units<p>A project was executed in 2021 to upgrade controls on the 115 kilovolt (kV) feed coming from the main transformer that supplies power to both Plant 1 and Plant 2. An incorrect setting was entered into the transformer protection relays during this project, which caused the protection settings to activate at the 115 kV feed source, prior to the activation of the protection settings near the source of the fault. When the arc flash occurred in PDC 41, the incorrect setting on the transformer protection relays caused a power disruption to 6 electrical substations in the refinery, instead of 1, which resulted in the Plant 1 process units shutting down and an exceedance of permit conditions.</p>

**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:

- Prior to restarting Plant 2, sub41 was switched to an alternate 115 kV feed source to enable the investigation to take place and will remain in this configuration until all corrective repairs are complete.
- Replace the potential transformers involved in the arc flash and ensure wiring is installed correctly to prevent unintentional grounding.
- Perform a coordination study and update the transformer protection relays to ensure protection at the lowest equipment level.