NATF Redacted Operating Experience Report

Electrical Contact Due to Inducted Voltage

About NATF Redacted Operating Experience (OE) Reports

North American Transmission Forum (NATF) operating experience reports highlight positive or negative transmission (reliability or resiliency) experiences worth sharing for learning opportunities or potential trending. The overall goal is to help each other learn without experiencing the same issues first-hand. This sharing originates confidentially within the NATF membership.

Redacted operating experience reports are posted on the NATF public website to allow the NATF and its members to more broadly share information, especially safety-related alerts and learnings, with contractors and other utilities to benefit the industry at large.

The NATF member company that submitted the initial restricted distribution OE report for this topic/event has approved the NATF to issue this redacted OE report.

Topic

Electrical Contact Due to Induced Voltage

Description

A transmission crew was assigned to replace a static arm and install a structure lifting system on a wood H-frame structure, on line A. The first task at hand was to replace the static arm.

The line involved was a double circuit with another line for most of its length. This incident occurred on a point within a short section where the two lines transfer to parallel wood H-frames. See attachments for photo of the worksite.

Line crew members were in position at the pole-tops in climbers and belts to assist with unbolting and re-bolting the static arms as they were removed and installed. The crew was using a material-handler jib on an insulated bucket truck to move the static wires. Both static wires had been disconnected from the old static arm and secured to the poles with rope. The old static arm had been removed and the new one installed and bonded to the pole grounds.

One of line crew members needed to reposition on the pole to reattach the static wire to the new static arm. While repositioning on the pole, the individual simultaneously grasped the static arm with one hand and the static wire with the other and received an electric shock. The shock was intense enough that the individual was unable to release their grip. The crew member intentionally kicked their feet off the pole and released tension on the climbing belt to allow themself to slide down the pole to the cross-arm position. The slide down allowed the crew member to release their grip from the static arm and static wire. The individual received the necessary medical care and returned to work.

Prior to the work, line A was switched out and a workman protective assurance (WPA) had been issued. Line A runs parallel and mostly double circuit with line B for approximately 33 miles. Line B was energized and carrying 577A. The nearest phases on the two adjacent lines in this area are about 18.5 feet apart.

The static wires for line A are grounded through its hardware attachments and connected to each other by either (1) the static arms on the wood H-frame structures or (2) the steel towers. The structures are connected to earth grounds at all locations. One of the static wires (west side) for line A only runs a short section but is connected to the other static wire as previously mentioned. The static wire (east side) that runs continuous with the tower line was involved in the incident.

The grounding at the worksite consisted of safety-grounds connected between two of the phases that were in the work zone and the eastern pole ground. No other safety grounds were installed at other locations along the line. The western pole ground was disconnected from the earth due to a break at the ground line. Though one of the pole grounds at the structure was disconnected from the earth due to a break at the ground line, the other pole ground was intact. Grounding was then expected to be maintained through the safety-grounds connecting the phases to the unbroken section of the west pole ground to the static arm and then to the intact east pole ground. The crew was aware of this during the pre-job brief.

When the static wires were disconnected from the static arm and secured to the poles with ropes, this electrically isolated the structure being worked from the multi-grounded system. The only ground in play to shunt the induced voltage on the conductors for line A was the individual east pole ground at the structure. When the line crew member grasped the static arm and static wire, that individual and the multi-grounded static wire became electrically connected in parallel with the individual pole ground at the structure being worked.

Lessons Learned

1. Grounding requirements need to address the creation of an equipotential zone around all workers exposed to potentially energized components.

2. Existing safety documentation and standard work practices did not specifically describe grounding requirements for working on normally de-energized components.

Corrective Actions

1. Develop, document, and disseminate grounding requirements for working on normally de-energized components to all affected employees.

2. Bond all conductors and wires to the same ground system to create an equipotential zone around all coworkers exposed to potentially energized components.

3. Develop and enhance standard work practices.

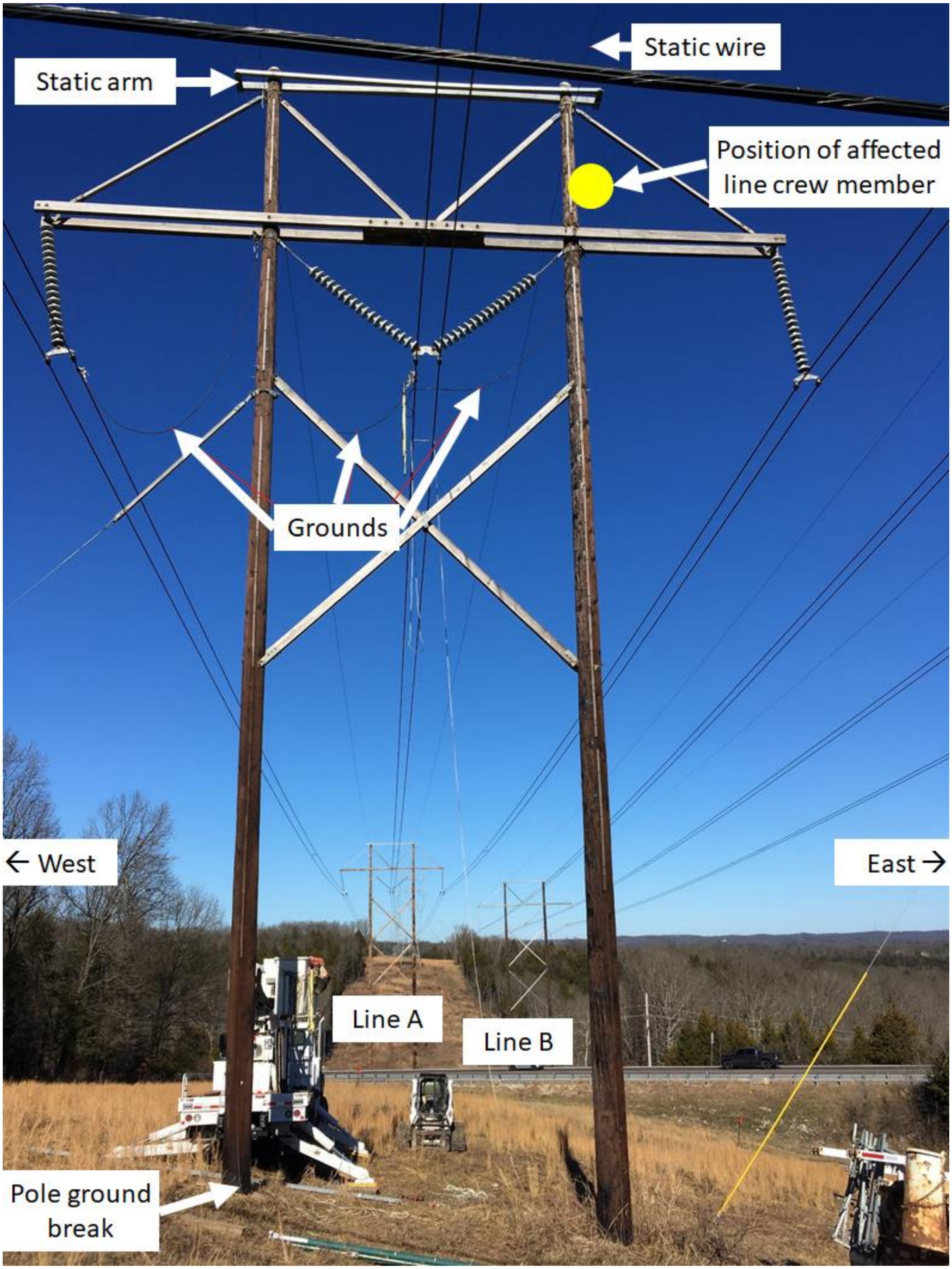
4. Provide training on updated safety documentation and standard work practices.

Extent of Condition

This applies to all instances in which line work will be performed in an area in which parallel circuits exist nearby.

Photos

See photos starting on next page.



Static wire
Static arm
Position of affected line crew member
Grounds
← West
East →
Line A
Line B
Pole ground break


Pole ground
break