North American Transmission FORUM

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NATF Redacted Operating Experience Report

Safety – Air Blast Breaker Muffler Injury

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

Air Blast Breaker Muffler Injury

Description

A partially installed 161 kV air blast circuit breaker (ABCB) muffler separated from the breaker head during a manual trip and struck an employee, who suffered three fractured vertebrae and several cracked ribs.

A service center crew consisting of three electricians and one foreman was working to repair a 161 kV ABCB so that service could be restored to a transformer bank at a fossil plant. As the crew was finishing up the repair on the breakers and mufflers, they had installed four flange bolts in the steel retaining ring when it started raining. The rain delayed the completion of the installation, which would have consisted of installing the remaining six flange bolts and securing two U-bolts underneath each muffler.

The crew members began to return the equipment back to the owner and clean up before departing for the day. After completion of these tasks, they noticed a leak had developed in "B" phase of the 161kV ABCB. The employees found the leak at the control block tank end O-ring and tightened the bolts, which decreased the leak. The pressure on the "B" phase tank was 80 pounds lower than "A" and "C", thus prompting a discussion and action to manually trip the breaker and equalize the air in the phases. Once the breaker was manually tripped, the partially bolted muffler dislodged and fell from "B" and "C" phases. The "B" muffler struck and injured an employee that was standing at the base of the breaker. The "C" muffler struck an adjacent control panel.

Immediate Actions Taken

- Onsite electrical control building operator contacted local emergency services and called for medical assistance
- Employee taken to hospital via an ambulance

Lessons Learned and Planned Actions

1. Implement requirements for workplan development and use during maintenance activities.
2. Develop and implement controls around overtime and fatigue management.
3. Implement alternative method for operating breaker away from the cabinet during maintenance or testing.

Reference: NATF-OER-318

4. Revise Substation Maintenance Manual to include de-pressurization verbiage for maintenance work on air blast circuit breakers.
5. Revise job work plan to include de-pressurization of air tank prior to removing or installing muffler heads and for any other work that doesn't require pressure in the tank and require that crews ensure the area is clear during an expected or manual trip of air blast circuit breakers.
6. Incorporate comments to safe work practices regarding safe distances to be maintained during breaker testing and operation (outside of the work boundary).
7. Update job plans in outage schedule application for air blast circuit breakers.
8. Evaluate alternative configuration of mufflers, such turning them upside down, installing them differently, or simply removing them.