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Title: Lessons Learned "Establishing an Electrically Safe Work Condition" Specifically related to Racking Electrical Breakers

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Lesson:

During low voltage electrical equipment maintenance, a bad breaker was identified. The breaker was racked out from the substation cubicle without following the hazardous energy control process identified in the Integrated Work Document (IWD). The IWD required the substation to be in an electrically safe work condition prior to racking the breaker. Per NFPA 70E requirements, electrical equipment shall be put into an electrically safe work condition before an employee performs work on or interacts with equipment in a manner that increases the likelihood of creating an arc flash.

Racking in or out a breaker on an energized bus may increase the likelihood of creating an arc flash dependent on equipment conditions. A thorough risk assessment must be performed prior to performing such a task. The risk assessment determines the risk control measures to be put in place prior to performing the work. Electrical Safety Officers (ESO) can assist in performing risk assessments and incorporating risk control measures.

Actions:

Establishing an electrically safe work condition on the bus prior to racking out the circuit breaker can **eliminate** the hazard and is recommended where feasible to do so.

Where infeasible, the following must be performed prior to racking a breaker while the bus is energized:

- Engage the System Engineer responsible for the equipment to obtain concurrence.
- Perform and document a risk assessment in an IWD, engage the FOD Electrical Safety Officer.
  - Check the condition of the equipment to determine proper installation, proper maintenance, and no evidence of impending failure including degradation or unsafe conditions of the equipment.
  - Evaluate if the hazard be can be eliminated, substituted, or an engineering control established to reduce the risk to the worker.
  - Incorporate additional risk control measures to reduce the risk to the worker, which could include:
    - Use of manufacturer's provided built in racking mechanisms that will allow the worker to rack-in or out the equipment while maintaining a safe distance.
    - Utilize aftermarket products to remotely rack breakers.
    - If using a hand crank, use an extension on the crank handle to increase your distance from the equipment and possible arcing location.
- The breaker must be in an opened position, prior to racking.