Jefferson Lab
Thomas Jefferson National Accelerator Facility

Electrical Safety

As a result of an electrical incident that occurred in June 2018, the following **Electrical Safety Rules** have been established related to Facilities Management work or activities:

- Any breaker found in the off position shall be assumed the breaker was not tagged out and work is in progress. Condition must be verified prior to turning on breaker.
- Any utility found in an unexpected state shall be thoroughly investigated prior to changing this state.
- Utilities or services not in use shall be air gapped unless they have been properly insulated/terminated and enclosed.
- No dead leg utilities shall be installed. Any spare circuits for future use shall be properly terminated or insulated and shall be installed within a proper enclosure. Circuit breakers upstream of this circuit shall be marked with the location of the enclosure.
- Notification of Power (Utility) Outages – All planned power (utility) outages shall be coordinated with Operations Managers using ATLis type planning tools. Once dates and times are agreed upon, it is the responsibility of the Operations Manager to coordinate the activity of affected employees and their subcontractors. Where areas do not have Operations Managers, areas are not covered by ATLis type planning tools and/or where a larger population may be affected, Facilities personnel shall use the on-line Outage Management System for notification.
- Procedure for Resetting and Restoring Power to a Tripped Circuit Breaker:

  1. Locate tripped breaker(s).
  2. Examine breaker(s) and downstream devices/panels 1 level downstream from tripped breaker(s) for possible damage to include smoke marks, melted plastic, scorched labels etc.

     If damage is observed, stop activities and call for assistance (electricians) to lockout (LOTO) upstream tripped breaker, open panels and perform additional internal observations where damage is discovered. If no damage is observed, proceed to Step 3.

     a. Clear area and setup DANGER boundaries to warn others of potential safety hazard for the upcoming work. Barriers are to be setup at the point where the breaker tripped and at the next location downstream (the equipment that the breaker supplies power).

     b. Tripped breakers represent an off-normal condition and require wearing appropriate arc rated PPE before opening covers or

operating device handles (Safety Glasses, hearing protection, arc rated clothing according to equipment arc flash label or Cat 2 clothing, leather gloves) regardless of any maintenance program.

c. Turn off downstream breakers since the problem may be at the downstream circuit.

d. Identify circuits that will be damaged by meggering (metering, etc.) and disconnect same. Megger feeder and branch circuits without operating breakers. If an issue is found, record breaker positions (Open/Closed) for each breaker, either written or a picture. Open remaining breakers and megger to identify potentially problem circuits.

e. Leave problem circuits Off, reinstall covers that were removed and Proceed to Step 3.

   If upstream breaker trips again, stop recovery actions and proceed with more in-depth examination. At this point, the upstream breaker may be damaged and may need to be replaced.

3. Reset Breakers Procedure

   a. Clear area and setup DANGER boundaries to warn others of potential safety hazard for the upcoming work. Barriers are to be setup at the point where the breaker tripped and at the next location downstream (the equipment that the breaker supplies power).

   b. Wear appropriate PPE before opening covers or operating device handles (Safety Glasses, hearing protection, arc rated clothing according to equipment arc flash label or Cat 2 clothing, leather gloves) regardless of any maintenance program.

   c. Record positions of downstream breakers or other circuit opening devices (written or pictures).

   d. Turn off downstream devices/circuit breakers (one level below tripped breaker(s)).

   e. While wearing PPE, reset and close upstream breaker. If this breaker trips, stop activities, call electricians and once they are present, go to step 2c and proceed to find problem.

   f. If breaker does not trip, proceed to lower level breakers and turn them On and back Off, one at a time, to see if there is a problem circuit. Note when the upstream breaker trips and label that downstream circuit as a potential problem. Call electricians to investigate potentially problem circuits.

   g. Proceed using the above steps until all circuits have been tested and cleared or identified as problems. If required due to multiple

tripped breakers, proceed to downstream circuits and repeat this procedure until all possible sources have been tested.

h. If no additional problems have been discovered via switching, it is likely that the problem resulted from an unexpected operation/condition of one of the downstream loads. This could have been a mechanical or electrical surge. We have many electronic loads (VFDs, DC Power Supplies, etc.) that generate harmonics that electronic circuit breakers analyze and conclude are phantom problems (short circuits or ground faults). These will cause the breakers to trip and set flags/indicators that problems exist that are not true. If this is the condition that presents itself, then work is complete. Remove PPE and barriers (danger tape).

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Revision Number:	Revision Date:	Revision Description:
1	1/1/2021	Updated format of the page
2	5/5/2021	Added Procedure for Resetting and Restoring Power to a Tripped Circuit Breaker
3	5/6/2021	Added “arc rated clothing according to equipment arc flash label or Cat 2 clothing” to PPE requirements
4	6/11/2021	Removed duplicated/Obsolete material