

Appalachian Power Company Policy / Procedure No. 14:
Non-Reclose Orders

Policy Summary:

A. A non-reclose order is required:

1. When primary or primary and neutral conductors are being moved on multi-phase lines as a part of the work.
 - The reclosing on the first up-line automatic protective device (circuit breaker or recloser) shall be disabled if so equipped
 - If the first up line automatic protective device does not have non-reclosing capability, then a non-reclose order is not required
 - In those cases when non-reclosing capability is not available on the first up line protective device and due to the complexity of the work, the crew feels additional safe guards are necessary, then the job is to be worked dead or engineering guidance requested in how to disable reclosing.
 - For work past multi-phase line fuses, reclosing shall be disabled on the first protective device up line from that fuse, if that device is an automatic protective device (circuit breaker or recloser) equipped with a method to disable reclosing
 - A non reclose order is not required when the job only involves the lowering of the primary neutral conductor
2. When the job requires hands on primary work in the station zone of a circuit that is on the NRO required circuit list. (As a reminder 12 calorie clothing is required when working hands on in all station zones and 8 calorie clothing is required when working in the first zone of protection beyond all line reclosers. Refer to Procedure 18 for details on proper FR clothing to meet these calorie requirements)
3. When installing or removing conductors crossing over conductors energized in excess of 600 volts
4. When entering vaults or manholes occupied by energized primary circuits

B. What is required:

1. The NRO must follow proper switching and tagging procedures
 - i. Issued by the DDC for those devices under their control
 - ii. Issued by the crew person in charge for other devices
2. The crew person in charge must notify the DDC when they disable reclosing on a device
3. For planned work that will require an NRO, the preparer of the work order will identify the first up line protective device, including the pole number and location and verify whether or not that device has the capability of disabling reclosing. This information is to be noted on the work order.

1) Statement of Policy

The purpose of this procedure is to summarize in a single document when a Non-Reclose Order (NRO) is required to perform work on energized primary conductors in Appalachian Power. Included here is an Appalachian Power site specific rule requiring a non-reclose order for a certain

type of work, requirements from the National Electric Safety Code arc flash ruling that went in to effect on January 1, 2009, and non-reclose requirements included in the AEP Safety and Health Manual and from the AEP Transmission and Distribution Switching and Tagging Policy.

- Reclosing shall be disabled on the first up-line automatic protective device (circuit breaker or recloser) when primary or primary and neutral conductors are being moved on multi-phase lines as part of the work and that protective device has the capability of turning off reclosing. This is to include work in the station breaker zone of protection and beyond a line recloser with non-reclose capability. Work past multi-phase line fuses will also require that reclosing be disabled when moving primary or primary and neutral conductors because most of distribution circuits are designed to allow the up-line automatic protective device to operate one time for a fault beyond a line fuse. This distribution protection practice is designed to prevent damage to the fuse for temporary short circuit conditions. If the first up-line automatic protective device does not have non-reclosing capability, then a non-reclose order is not required. In those cases when non-reclosing capability is not available on the first up line protective device and due to the complexity of the work, the crew feels additional safe guards are necessary, then the job is to be worked dead or engineering guidance requested in how to disable reclosing. A non-reclose order is not required when the job only involves the lowering of the primary neutral conductor
- A non-reclose order is required when the job will require hands on work requiring PIPE on energized conductors and/or equipment over 1000 V in the station breaker zone of protection of a circuit on the NRO required list associated with the NESC arc flash ruling. Field personnel will be responsible for making this determination for planned work, with assistance from the DDC dispatcher on unplanned jobs. The application of cover-up is included in the defined hands on work. A non-reclose order will not be required for hands on work beyond a line fuse in the station breaker zone of protection unless the primary or primary and neutral conductor is being moved on multiphase lines as part of the work.
- “When conductors being installed or removed cross over energized conductors in excess of 600 volts and if the design of the circuit interrupting devices protecting the lines so permit, the automatic-reclosing feature of these devices shall be made inoperative.” Article 7.33 of the AEP Safety and Health Manual
- “A Non-Reclose Order shall be obtained before entering vaults or manholes occupied by energized primary circuits that utilize automatic reclosing. Instantaneous reclose on a bus is excluded.” Article 8.B.1 of the AEP Transmission and Distribution Switching and Tagging Policy

2) Discussion

There are inherent risks of an arc flash or possibly an energized conductor falling to the ground when primary or primary and neutral conductors are being moved while energized. Such an event poses a risk to both employees working aloft and on the ground and possibly to the public. Unplanned occurrences that could result in a flash incident are conductor breakage, contact with a grounded object or contact with a conductor operating at a different potential or phase relationship. Limiting the number of operations of the up-line automatic protective device to one trip can greatly

reduce the heat generated by an electrical arc thereby minimizing personal injury. Due to this potential risk of injury, Appalachian Power has implemented a site specific rule to require a non-reclose order anytime primary or primary and neutral conductors are being moved on multi-phase lines as part of the work and the first up-line device has non-reclose capability. A non-recloser order is not required when the job only requires that the primary neutral conductor be lowered.

Line personnel may find locations where a non-reclose order is desired due to the complexity of the work, but the first up-line device does not have that capability. In these situations, two possible solutions are available. The first option is to determine if the second up-line protective device has the non-reclose feature available and then request engineering to determine if that second up-line device is capable of sensing a fault at the work location. If engineering determines this is a viable alternative, then proceed with turning off reclosing on the second up-line device. The crew needs to be aware that operating in this arrangement is not a true non reclose arrangement and multiple operations could result if a fault were to occur due to operation of the first up line device prior to lock out of the device where reclosing is disabled. The second option is to work the line dead.

The National Electric Safety Code required beginning on January 1, 2009 that employers complete an arc hazard assessment of lines and equipment and to provide adequate protection for arc hazards of 2 cal/sq cm or greater when hands on work is being performed on conductors and/or equipment operating at more than 1000 V. An evaluation of fault current levels has been completed on all distribution circuits within Appalachian Power and concluded that when working in the circuit breaker zone of protection, layering of FR clothing to a 12 calorie rating will provide adequate protection. This analysis found there are a small number of feeder breaker zones of protection where a non-reclose order is also required. Turning off automatic reclosing in these locations would prevent a re-strike of an electrical arc limiting the time of exposure should an arc occur. Engineering maintains a spreadsheet of these circuits which is made available to job designers, line employees and the Distribution Dispatch Center. This fault current analysis also concluded that 8 cal/sq cm FR clothing is required beyond some 100 amp and larger Type DV reclosers on 34.5kV distribution circuits, in addition to some three phase electronically controlled reclosers. Hence, in order to minimize confusion and potential tracking difficulties, the decision was made by the Central Safety Committee to require 8 cal/sq cm clothing beyond all reclosers. Finally, when available, use of the hot line tag feature is preferred over the use of non-reclosing due to a faster clearing time in the event of a short circuit. This feature is available on some of our newer electronic recloser controls. For additional information regarding the proper apparel to meet these FR clothing requirements, refer to Procedure 18.

Proper switching and tagging procedures must be followed for this work, including issuing of a non-reclose order by the appropriate dispatching authority. The AEP Transmission and Distribution Switching and Tagging Policy define two switching authorities for the distribution system. They are the Distribution Dispatch Center or DDC and the Crew Person in Charge. The DDC is the dispatching authority for any switching inside of the station fence, the tying of circuits and for the main three phase line for those circuits with line reclosers and switches operating as part of an automated distribution restoration scheme. The switching of all other line reclosers is delegated to the Crew Person in Charge. The Crew Person in Charge, acting as the dispatching authority, shall have all associated controls and switches on line reclosers properly tagged with Hold tags using their name on the tag and will authorize a non-reclose order to perform the work.

When the Crew Person in Charge disables reclosing on a line recloser, the DDC is to be notified that a non-reclose order has been issued at the time of the log on to the circuit. The DDC will verify that the non-reclose order has been issued on the correct line device and will remind the crew at the log off to restore reclosing to normal. Requests for non-reclose orders on the station circuit breaker or on circuits with distribution automated restoration schemes require 24 hours advance notice to the DDC. This is to allow adequate time for the DDC to prepare the switching order, perform necessary checks to the order, and make arrangements for a switch person and to fax the switch order to the field.

In support of this policy on those jobs requiring a non-reclose order, the engineering job planner will be responsible for identifying the first up line protective device and determining if that device has non-reclosing capability. That information, along with the location of the device, will be noted on the work order.

3) Definitions

A **Non-Reclose Order (NRO)** is an operating order issued by a Dispatching Authority to an authorized person to perform work on, or near, designated energized equipment after all its reclosing devices, including SCADA supervisory points, are disabled and tagged.

Dead – De-energized, tested and grounded.

4) Attachments

5) OSHA / Safety Manual References

National Electric Safety Code 2007 Edition, Part 4, Section 41 – Effective as of January 1, 2009, the employer shall ensure an assessment is performed to determine potential exposure to an electric arc for employees who work on or near energized parts or equipment. If the assessment determines a potential employee exposure greater than 2 cal/sq cm exists, the employer shall require employees to wear clothing or a clothing system that has an effective arc rating not less than the anticipated level of arc energy.

Safety Manual E 2.31 - When conductors being installed or removed cross over energized conductors in excess of 600 volts and if the design of the circuit interrupting devices protecting the lines so permit, the automatic reclosing feature of these devices shall be made inoperative.

Switching and Tagging 8.B.1 - A Non-Reclose Order shall be obtained before entering vaults or manholes occupied by energized primary circuits that utilize automatic reclosing. Instantaneous reclose on a bus is excluded.

6) Date Adopted: November 4, 2009