

DISCLAIMER: These Standard Operating Procedures (SOP's) are for the exclusive use of Navy Public Works Center (PWC) Norfolk. They are promulgated as guidance for their NAVFAC Commands. If intended to be used by other activities, they must be tailored to each activity's particular requirements and must be reviewed/approved by the activity's safety professionals prior to use.

---

**NAVY PUBLIC WORKS CENTER  
NORFOLK, VIRGINIA  
UTILITIES DEPARTMENT**

**STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS**

**TITLE**

**REMOVE/REPLACE SECONDARY CONDUCTORS**

**PROCEDURE NUMBER  
WC 624 HVE 029**

**DISTR:  
601A  
610  
620  
WC 624  
WC 622**

**SIGNED: \_\_\_\_\_  
(DATE)**

**APPROVED: \_\_\_\_\_  
(DATE)**

**SAFETY PROFESSIONAL: \_\_\_\_\_  
(DATE)**

**MANAGEMENT OFFICIAL: \_\_\_\_\_  
(DATE)**

**DATE: \_\_\_\_\_**

**REVISION DATE: \_\_\_\_\_**

## REMOVE/REPLACE SECONDARY CONDUCTORS

### **Purpose:**

Procedure to remove and replace overhead secondary conductors.

### **Potential Energy Sources:**

1. Energized circuits in close proximity of work.
2. Deenergized circuits which are not included in the work and have not been grounded.
3. Generators supplying temporary power to facilities which have had their normal power switched off due to this work.

### **Tools and PPE:**

Tools: Bucket truck, hand line, hot hoist, wire grips, rubber hoses, rubber blankets. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, work gloves, safety glasses, orange vest, safety harness, hearing protection, and back brace if required by back injury prevention and control program. The class of rubber gloves and sleeves will depend on the exposure voltage as per the following: Class 0 - up to 1,000 volts, Class 1 - up to 7,500 volts, Class 2 - up to 17,000 volts, Class 3 - up to 26,500 volts, Class 4 - up to 36,000 volts.

### **References:**

1. PWC Occupational Safety and Health Program Manual, PWCNORVAINST 5100.33E
2. SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck
3. Occupational Safety and Health Standards for General Industry (29 CFR PART 1910): Subpart I, Personnel Protective Equipment; Subpart R, Electrical Power Generation / Transmission / Distribution; Subpart S, Electrical
4. NFPA 70 E approach distances to exposed, energized, electrical conductors and circuit parts.
5. ANSI C2-1987 National Electrical Safety Code
6. Electrical Transmission and Distribution Safety Manual, P-1060
7. The Lineman's and Cableman's Handbook, 5th ED
8. SOP WC 622 HVE 013, Deenergization, Lockout, Tagout
9. SOP WC 622 HVE 007, Switchout and Switchback Energized Circuit

### **Procedures:**

1. Depending on the service's load and installation, WC 622 personnel may have to deenergize the circuit to be worked, and all other circuits which can be deenergized, as per the following SOPs:

#### REMOVE/REPLACE SECONDARY CONDUCTORS

WC 622 HVE 007, Switchout and Switchback Energized Circuit  
WC 622 HVE 013, Deenergization, Lockout, Tagout

A lightly loaded service whose installation is uncomplicated, and which can be isolated from the load, can be cut away and reinstalled energized. The mechanic(s) performing the job shall decide whether to do the job energized will have the conductors deenergized per above SOPs.

2. Set up bucket truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger truck for details. Note - The job may require several bucket truck et ups. Refer to SOP WC 624 HVE 001 each time.

3. When operating a bucket truck the following safety rules will be followed.

a) Only an authorized person, one with a current government license to

operate an aerial lift, will operate the bucket.

b) Do not use the bucket truck if winds exceed the truck manufacture's specified limit.

c) Do not perform energized work in wet weather.

d) Personnel in bucket will wear a safety harness with a lanyard attached to the boom or bucket.

e) Do not exceed the bucket's weight limitations.

f) Stand firmly on the floor of the bucket with both feet. Do not sit on the bucket's edge or use planks, ladders, or other such devices.

4. Insulate energized conductors within 3 feet of the work area. Insulate deenergized overhead circuits within 3 feet of the work area which are not included in the work and have not been grounded as per Lockout and Tagout procedures. Personnel in the bucket shall wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat.

5. The following rules will apply to job.

a) Bucket personnel working poles which have energized circuits or circuits which have not been properly grounded, insulated per Step 4, will wear Nomex coveralls, safety glasses, safety shoes, hard hat, safety harness, insulating rubber gloves insulating rubber sleeves, and a back brace if required to wear.

b) Bucket personnel working poles which have all other high voltage and secondary circuits deenergized and properly grounded, or no other circuits on the poles, will wear hard hats, work gloves, safety shoes, safety harness, safety glasses when required, and a back brace if required to wear.

REMOVE/REPLACE SECONDARY CONDUCTORS

c) Personnel in the bucket will carry a hand line aloft with them.

d) Ground personnel will wear hard hats, safety shoes, work gloves, and safety glasses.

e) Ground personnel will wear orange vests if working adjacent to a road or in a parking lot.

- f) Ground personnel not involved with the work will watch the personnel working aloft.
- g) Ground personnel will stay clear of area underneath the bucket unless the work dictates.
- h) If ground personnel are present, then at least one of them will have been trained to operate the bucket in an emergency situation where the bucket personnel are no longer able to operate the bucket controls.

6. Prior to beginning work test the existing conductors, which were deenergized for removal, for potential per SOP WC 624 HVE 031, Secondary Service Check.

7. Cut the jumpers to service at both ends - Prior to cutting, mark the rotation if the installation is a three phase service and identify all neutral and ground wires. If the load can be isolated from the service, the jumpers may be cut energized. If the load can not be isolated from the service then the service must be deenergized per Step 1.

8. Catch off the service conductors with hoist and lower - When working open wire services, catch off and lower each conductor separately from bottom to top. Self supporting aerial cable can be lowered all together by catching off to the bare conductor.

To lower - Secure one end of a hot hoist, or slack blocks, to deadend shoe or attach a nylon strap around pole, or to building. Attach the other end of the hoist, or blocks, to the service conductor(s) using a wire grip. Secure a hand line to the pole, or building, and, using a wire grip, attach the hand line hook to the conductor(s). Take up the hoist, or blocks, to reduce the conductor's tension till the ground personnel can handle the wire(s) with the hand line. Release the tension on the hoist, or blocks, and remove the hoist, or blocks, and the wire grip. The ground personnel may now lower the conductor(s) to the ground. Repeat this step till all conductors on all poles have been lowered.

9. Roll up or cut up the old service conductors. Load onto truck and dispose of in the proper metal bin.

#### REMOVE/REPLACE SECONDARY CONDUCTORS

10. Pull out new conductors onto the ground - Set up cable trailer, or jack stands with reel of wire, at one deadend pole. Pull wire the entire length of the job if possible. The cable reel may have to be set up several times if the job is to long for one pull. When several pulls are required the wire will have to be sleeved together or double deadends will have to be used.

11. Attach service conductors to one deadend pole, or building - Bucket personnel will drill holes, if necessary, and attach eyebolts, deadend shoes, or clevises to the pole, or building. When drilling, the bucket personnel will wear hearing protection in addition to the other PPE. The ground personnel will attach deadend shoes to the conductors, or make up deadends by wrapping

conductors around spool insulators and fastening them off with split bolts, or two bolt connectors. The bucket personnel will hang a hand line and the ground personnel will use this line to pull the conductors aloft and hold them in position until the bucket personnel can attach the conductors to the pole, or building.

12. When service conductors extend more than one span, they will have to be attached to lift poles. When open wire conductors are being installed, bucket personnel will have to drill holes, if necessary, to attach either eye bolts or clevises. When drilling, the bucket personnel will wear hearing protection in addition to the other PPE. Bucket personnel will attach an eyebolt or clevis for each conductor on every pole between each deadend. When self supporting aerial cable is being used Steps 10 and 11 can be combined if desired and pull the cable up at each pole as the work progresses down the line. Ground personnel will pull the conductors, or cable, aloft using a hand line. When cables are not pulled up as the work moves down the line, the conductors will be hung on each pole and, after being pulled to proper sag and tension, tied in on insulator spools with tie wire.

13. Attach the conductor or cable to the other deadend pole, or building. - The bucket personnel will drill any necessary holes and install all required hardware such as eyebolts, clevises, guy hangers, etc. When drilling, the bucket personnel will wear hearing protection in addition to the other PPE. The bucket personnel will secure the hot hoist, or slack blocks, to the deadend shoe, clevis, or a nylon strap attached to pole or building. The bucket personnel will hang a hand line on the pole, or building. The ground personnel will attach the conductor, or cable, to the hand line, using a wire grip, and pull the service aloft. After the ground personnel have pulled as much of the slack as possible, the bucket personnel will attach the hoist, or blocks, to the conductor, or cable, using a wire grip. Using

#### REMOVE/REPLACE SECONDARY CONDUCTORS

the hoist or blocks, the bucket personnel will jack the conductor to the proper sag per the lineman's judgment and experience, as well as the clearances per the National Safety Code. Excess conductor tail will be cut off and the conductor will be bolted to the deadend shoe, or the bucket personnel will wrap the conductor around spool insulators and deadend with split bolts, or two bolt clamps. The bucket personnel can then release the hoist, or blocks, and grip from the conductor, or cable, and then release the hoist, or blocks, from the deadend shoe, clevis, or a nylon strap attached to pole or building. Repeat this process till all conductors have been installed.

14. Make up jumpers at both deadends, and any other required jumpers. Use compression or mechanical connectors as applicable. Insure jumpers are reconnected to match the phase rotation mark in Step 7. All neutral and ground wires will be identified.

15. Refer to attached LANTDIVENGCOM Pole Line Plates for further information on the procedures above.

16. If necessary, remove insulation placed on energized conductors. Remove insulation placed on conductors which are not included in the work and have not been grounded as per Lockout and Tagout procedures. Personnel in the bucket shall wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat. Remove insulation in reverse order that it was placed.

17. Secure bucket truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck, for details.

18. If necessary WC 622 personnel will energize the service as per the following SOPs:

WC 622 HVE 007, Switchout and Switchback Energized Circuit

WC 622 HVE 013, Deenergization, Lockout, Tagout