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

**STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS**

**TITLE**  
**REPLACE 34.5 KV STATION ARRESTERS**

**PROCEDURE NUMBER**  
**WC 624 HVE 078**

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

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

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

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

REVISION

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## REPLACE 34.5 KV STATION ARRESTERS

**Purpose:**

Procedure to replace 34.5 kv circuit surge arresters which are installed at a switchyard or substation.

**Potential Energy Sources:**

1. 34.5 kv cables and equipment of circuit the arresters are part of.
2. 34.5 kv cables and equipment of adjacent circuits.
3. 34.5 kv outdoor bus.

**Tools and PPE:**

Tools: Bucket truck, Auger truck, ladders, certified slings, collar rope, hand tools, high voltage tester. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, work gloves, safety glasses, safety harness, 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. 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
3. NFPA 70 E approach distances to exposed, energized, electrical conductors and circuit parts.
4. SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck
5. SOP WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
6. SOP WC 622 HVE 007, Switchout And Switchback Energized Circuit

**Procedures:**

1. WC 622 personnel will deenergize the primary circuit the arresters are connected to. Depending on the job, WC 622 personnel may have to deenergize part of the outdoor bus, and/or all adjacent primary circuits per SOPs

- a) WC 622 HVE 007, Switchout and Switchback Energized Circuit
- b) WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)

Note - The outdoor bus, and/or all adjacent primary circuits can be covered with insulating blankets if they can not be deenergized. Wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat while placing the insulating material.

2. Using a high voltage tester test all deenergized equipment and cables to verify they are deenergized. Before the equipment and cables are checked, test the high voltage tester on a known energized circuit to verify the tester is working. Test each deenergized item separately, taking care not to cross phase during test. If voltage is detected, stop the test and (a) notify WC

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622 personnel that the circuit is still energized, (b) wait for WC 622 personnel to correct the problem, (c) perform the deenergization verification test once again after WC 622 personnel finish switching operations and declare the equipment and cables deenergized. If no voltage is indicated, retest the high voltage tester to re-verify it is working properly. Wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat while testing.

3. Set up bucket and/or Auger trucks. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger truck for details.

Ladders may be used in place of a bucket truck. When ladders are used, they will be secured at the top with a collar rope. Ground personnel will secure the ladder at the bottom until the top has been secured.

4. 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.
5. The following rules will apply to job.
  - a) Personnel in the bucket will carry a hand line aloft with them.
  - b) All personnel will wear hard hats, safety shoes, work gloves, and safety glasses.
  - c) Ground personnel will stay clear of area underneath the bucket and ladders unless the work dictates.
  - d) 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.
  - e) Personnel working on ladders will wear a safety harness connected to the secured ladder. Refer to attached ladder safety rules for further information.
  - f) If there are exposed, energized components within 19 feet of the work site, then all personnel will wear Nomex coveralls.
6. Remove the primary jumper from the circuit conductor to the arrester.
7. Remove the ground connection from the surge arrester.

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8. Secure the boom winch line, or a hand line, to the existing arrester using a certified nylon sling or collar rope.
9. Remove the arrester's mounting bolts and have the ground personnel lower the unit to the ground.

Repeat Steps 6-9 for each arrester to be removed.

10. The new arrester will be as follows:

Rating - 27 kv ( MCOV - 22 kv)

Type - MOV

Class - Intermediate

11. Inspect new arrester's porcelain carefully. There should be no chips or cracks. Perform an insulation resistance test as per attached table from NETA Maintenance and Testing Specifications. Use 25 kv values for 27 kv rated arrester.

12. The ground personnel will secure the boom winch line, or a hand line, to the new arrester using a certified nylon sling or collar rope.

13. The ground personnel will raise the new arrester to its mounting position. The personnel aloft will position the arrester and secure it with its mounting bolts. Once the arrester has been secured, release the winch cable or hand line.

14. Reconnect the arrester ground connection. Attach the primary jumper to the arrester. Connect a hotline clamp to the opposite end of the jumper and attach the jumper to the appropriate circuit conductor.

Repeat Steps 11-13 for each arrester to be installed.

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

If ladders were used, secure them. Ground personnel will hold the ladder while the personnel on the ladder remove the collar ropes, which secured the ladder top, and then climb down off the ladder.

16. WC 622 personnel will energize all equipment as per the following SOPs:  
WC 622 HVE 007, Switchout and Switchback Energized Circuit  
WC 622 HVE 013, Deenergization, Lockout, Tagout

Note - If insulating blankets were placed, then these have to be removed as well. Wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat while removing the insulating material.

**REPLACE 34.5 KV STATION ARRESTERS**

END