

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
REPLACE HIGH VOLTAGE FUSE**

**PROCEDURE NUMBER
WC 622 HVE 055**

SIGNED: _____ (DATE)

APPROVED: _____ (DATE)

SAFETY PROFESSIONAL: _____ (DATE)

MANAGEMENT OFFICIAL: _____ (DATE)

REVISION

A

REPLACE HIGH VOLTAGE FUSE

Purpose:

Procedure to replace 34.5/11.5/4.16 kv fuse in a fused oil switch, fused air switch, oil fuse cut out, or a pad transformer.

Potential Energy Sources:

1. 34.5/11.5/4.16 kv cables connected to switch.
2. Facility emergency generator.
3. Facility second transformer on a double end substation.

Tools and PPE:

Tools: Hand tools, shot gun stick, high voltage tester. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, safety glasses, and back brace(if required to wear one). 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. PWC SOP WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
5. PWC SOP# 600 HVE 6, PWC Switching or Breaker Operation
6. PWC SOP WC 622 007, Switchout and Switchback Energized Circuit

Procedures:

1. Assess conditions at switch site. Wear Nomex coveralls, safety shoes, and hard hat while visually checking area.
2. Deenergize the fused switch.
 - a) Fused Air Switch, Oil Fuse Cut Out, Pad Transformer (11.5/41.6 kv) - operations personnel will open, tag, and lock the fused switch per the SOPs WC 622 HVE 013, Hazardous Energy Control(Lockout/Tagout) 600 HVE #6, PWC Switching Or Breaker Operation Operations personnel will ensure that the facility's emergency generator or secondary power from a second transformer, if present, is isolated and will not back feed to the fused switch. Personnel will wear Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, safety glasses.
 - b) Fused Oil Switch, Fused Air Switch, Pad Transformer (34.5 kv) -

REPLACE HIGH VOLTAGE FUSE

Operations personnel will open, lock, and tag all devices in order to deenergize the circuit the switch is on. WC 622 will follow SOPs WC 622 HVE 013, Hazardous Energy Control(Lockout/Tagout) WC 622 HVE 007, Switchout and Switchback Energized Circuit

Operations personnel will ensure that the facility's emergency generator or secondary power from a second transformer, if present, is isolated and will not back feed to the fused switch. Personnel will wear Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, safety glasses.

3. Depending upon the switching per Step 2, use a high voltage tester to test the switch or primary circuit to verify they are deenergized. Before the conductors are checked, test the high voltage tester on a known energized circuit to verify the tester is working. Test each deenergized conductor separately, taking care not to cross phase during test. If voltage is detected, stop the test and (a) notify operations personnel that the circuit is still energized, (b) wait for operations personnel to correct the problem, (c) perform the deenergization verification test once again after operations personnel finish switching operations and declare the 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.

If the conductors can not be accessed at the work site, then go to another transformer site on the same circuit, which has accessible conductors, and perform the deenergization verification test there.

4. Replace the blown fuse(s).

a) Fused Air Switch - Open the fuse cabinet. Note, key interlocks may have to be operated to open the fuse cabinet. Pull the fuse(s) out and put the new fuse(s) in. Close the fuse cabinet and, if applicable, reset the key interlock system.

b) Fused Oil Switch - Take fuse section's top off the oil tank. Remove the blown fuse(s) and put new fuse(s) back in. Replace the top and the top's gasket and tighten down. Put a Nitrogen blanket over the switch's oil surface per SOP WC 624 HVE 083, Install a Nitrogen Blanket.

c) Oil Fuse Cut Out - Remove the fuse carrier hold down bolts and switch handle. Pull the fuse carrier out of the oil tub. Remove the blown fuse(s) and put new fuse(s) back in. Place the fuse carrier back into the oil tub. Put the hold down bolts back in place and tighten down. Re-install the switch handle.

REPLACE HIGH VOLTAGE FUSE

d) Pad Transformer - Move transformer's switch-fuse interlock to position which allow fuses to be removed. For bayonet fuses in oil, check the transformer tank's oil pressure and relieve the pressure if positive. Using a shotgun stick, remove the blown fuse(s) and put new fuse(s) back in. Put the transformer's switch-fuse interlock to position which prevents fuse removal.

Replace a blown fuse with a fuse of the same type and rating. If the same size is not available, then place another size which is still within National Electrical Code Restriction that a fuse size will not be greater than 3 times the transformer's primary full load amps. If the only available fuse size is greater than 3 times the transformer's primary full load amps, then put this in and open a work order to purchase and install the correct size fuses. Personnel will wear Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, safety glasses.

5. Operations personnel will reenergize

a) the 11.5/4.16 kv fused air switch, oil fuse cut out, or pad transformer per SOPs

WC 622 HVE 013, Hazardous Energy
Control(Lockout/Tagout)

600 HVE #6, PWC Switching Or Breaker Operation
b) the 34.5 kv circuit per SOPs

WC 622 HVE 013, Hazardous Energy
Control(Lockout/Tagout)

WC 622 HVE 007, Switchout and Switchback Energized
Circuit

END