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

**STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS**

**TITLE**  
**CHECK AND SERVICE AN OIL SWITCH'S**  
**INSULATING OIL**

**PROCEDURE NUMBER**  
**WC 624 HVE 082**

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

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

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

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

**REVISION**

**A**





## CHECK AND SERVICE AN OIL SWITCH'S INSULATING OIL

### **Purpose:**

Procedure to draw an oil sample from an oil switch, test the dielectric strength of the oil, and to filter the oil if necessary.

### **Potential Energy Sources:**

1. 34.5/11.5/4.16 kv cables connected to the oil switch.

### **Tools and PPE:**

Tools: High voltage tester, pint jar, oil dielectric test set, oil filter machine, hoses, rags. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes(oil resistant), work gloves, safety glasses, 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. IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment, C57.106-1991.
5. SOP WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
6. SOP WC 622 HVE 007, Switchout And Switchback Energized
7. SOP WC 624 HVE 083, Install Nitrogen Blanket.

### **Procedures:**

1. Operations personnel will deenergize the primary circuit per SOPs
  - a) WC 622 HVE 007, Switchout and Switchback Energized Circuit
  - b) WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)

Operations personnel will ensure that the facility's emergency generator or temporary power generator, if present, is isolated and will not back feed to the equipment being serviced.

2. Using a high voltage tester test the primary circuit's cables 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.

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

3. Draw an oil sample and test it's dielectric strength.
    - a) Remove drain plugs from the drain valve and at the top of the switch.
    - b) Drain approximately 1 pint of oil from the switch.
    - c) Perform oil dielectric test. If oil tests 25 KV or greater then the oil is okay. If the oil tests below 25 KV, then the oil requires filtering.
  4. Filter insulating oil if necessary.
    - a) Connect hose to switch and to the filtering machine.
    - b) Filter oil for one hour.
    - c) Draw another oil sample and test per Step 3 above.
  5. When oil tests to acceptable level, add new oil to bring switch's insulating oil to proper level. Test the new oil prior to adding. The new oil should test 30 KV or higher. If the oil does not test at this level either filter it till it does or obtain another batch of oil.
  6. Re-install the drain plugs removed per Step 3(a). Connect a vacuum pump to the switch and pull a 5 psig vacuum on the switch tank. Check for any leaks. Allow the switch to sit for one hour. Refer to SOP WC 624 083, Install Nitrogen Blanket.
  7. Connect hoses to switch and a Nitrogen bottle. Install a 3 psig Nitrogen blanket above the insulating oil surface. Check for leaks and correct as necessary. Refer to SOP WC 624 083, Install Nitrogen Blanket.
- Note - If oil has been added to the switch and Steps 6-7 will not, or can not, be followed, then the switch will have to sit for 8 hours.
8. Operations personnel will energize the primary circuits per SOPs
    - a) WC 622 HVE 007, Switchout and Switchback Energized Circuit
    - b) WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)

END