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

**STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS**

**TITLE**

**REPAIR CIRCUIT BREAKER HYDRAULIC  
OPERATING MECHANISM**

**PROCEDURE NUMBER**

**WC 624 HVE 092**

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

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

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

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

**REVISION**

**A**





## REPAIR CIRCUIT BREAKER HYDRAULIC OPERATING MECHANISM

### **Purpose:**

Procedure to repair the hydraulic actuator of a circuit breaker's hydraulic operating mechanism.

### **Potential Energy Sources:**

1. 34.5 kv cables and disconnect switches of circuit breaker.
2. 34.5 kv cables and equipment of adjacent circuits.
3. 34.5 kv outdoor bus.

### **Tools and PPE:**

Tools: Hand tools, high voltage tester. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, 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. SOP WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
5. SOP WC 622 HVE 007, Switchout And Switchback Energized Circuit
8. Individual Breaker Manufacture's Instruction Book

### **Procedures:**

1. WC 622 will deenergize the breaker per SOPs
  - a) WC 622 HVE 007, Switchout and Switchback Energized Circuit
  - b) WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
  
2. Using a high voltage tester test the breaker to verify it is deenergized. Before the breaker is checked, test the high voltage tester on a known energized circuit to verify the tester is working. Test each breaker bushing separately, taking care not to cross phase during test. If voltage is detected, stop the test and (a) notify WC 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 breaker 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. The required PPE for the work will be
  - a) Work gloves, safety shoes, safety glasses

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- b) If adjacent 34.5 kv equipment is energized, including the bus, then personnel will wear Nomex coveralls.
4. Deenergize DC power to the circuit breaker. Place a Danger Hold Tag and test the circuit with a Multimeter to verify they are deenergized.
  5. Ensure the breaker is in the open position and place an operating mechanism safety pin to prevent inadvertent operation.
  6. Observe the hydraulic pump operation as the system charges back up.
    - a) If the pressure drops steadily after the operating pressure is reached and the pump cuts off, then the check valve requires replacement.
    - b) If the pressure will not build up to 2250 psig, check that the controls will allow this. If the pump controls are okay, then the pump requires replacement.
    - c) Check for hydraulic leaks.
  7. Deenergize AC power to the circuit breaker. Place a Danger Hold Tag and test the circuit with a Multimeter to verify they are deenergized.
  8. Discharge the hydraulic pressure.
  9. Lower the sump tank and inspect the hydraulic system.
    - a) Inspect the hydraulic fluid. If necessary drain the oil and clean the sump tank.
    - b) Inspect for damaged or broken parts. Repair or replace damaged parts.
  10. Put the sump tank, and all gaskets, back in position.
  11. Refill the sump tank with hydraulic fluid.
  12. Check, and refill if necessary, the Nitrogen accumulator.
  13. Purge the hydraulic system per the manufacture's manual.
  14. Remove Danger Hold tags, and then restore AC and DC power to the breaker.
  15. Remove the operating mechanism safety pin.
  16. Operate the breaker a couple of times to check operating mechanism.
  17. WC 622 personnel will energize the breaker as per the following SOPs:
    - WC 622 HVE 007, Switchout and Switchback Energized Circuit
    - WC 622 HVE 013, Deenergization, Lockout, Tagout

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18. Remain at the work site till WC 622 energizes the equipment to verify the breaker is operating correctly. Wear Nomex coveralls, safety shoes, safety glasses and a hard hat while in the station yard area.

END