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

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

PM 11.5/4.16 KV OIL CIRCUIT BREAKER

**PROCEDURE NUMBER
WC 624 HVE 074**

SIGNED: _____ (DATE)

APPROVED: _____ (DATE)

SAFETY PROFESSIONAL: _____ (DATE)

MANAGEMENT OFFICIAL: _____ (DATE)

REVISION

A

PM 11.5/4.16 KV OIL CIRCUIT BREAKER

Purpose:

Procedure to perform preventative maintenance on an 11.5/4.16 kv, drawout, oil, circuit breaker.

Potential Energy Sources:

1. Primary cables
2. Primary bus

Tools and PPE:

Tools: Hand tools, Meggar, Micro-Ohm meter. PPE: Safety shoes, work gloves, safety glasses, insulating rubber gloves, hard hat, Nomex coveralls, and back brace if required by back injury prevention and control program.

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
6. SOP WC 624 HVE 062, Clean, Repair, Replace Insulating Barrier Boards.
7. Individual Breaker Manufacture's Instruction Book
8. NFPA 70B, Electrical Equipment Maintenance, 1990 Edition

Procedures:

1. There are two scenarios for the PM work.
 - a) The breaker will be worked on an individual basis with the rest of the substation still energized. In this case WC 622 personnel will open the breaker, if not already open, per SOP 600 HVE #6, PWC Switching or Breaker Operation. WC 622 will rack down the breaker off it's stabs as well.
 - b) The breaker will be worked as part of a total or partial substation PM outage. In this case the breaker will be deenergized per SOPs WC 622 HVE 007, Switchout And Switchback Energized Circuit WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)
2. The required PPE for the PM work will be
 - a) Work gloves, safety shoes, safety glasses, for all work except electrical tests.
 - b) Insulating rubber gloves, hard hat, safety shoes, safety glasses, and Nomex coveralls while performing electrical tests.

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3. Remove the breaker from the cubicle.
 - a) Roll breaker cart in place and secure to the cabinet.
 - b) Rack breaker onto the cart and lock down.
 - c) Release the cart lock and roll breaker away from the cubicle.
 - d) If the PM scenario is 1a then close the cubicle door and place a lock on the door to prevent entry into cube while breaker is away. There is no need to place a tag on the cubicle door.

4. Perform preventative maintenance on the breaker. If available, have the manufacture's instruction book on site. Refer to attached table for Meggar test information.
 - a) Remove access cover to operating mechanism.
 - .check for loose bolts, missing cotter keys, etc.
 - .clean and lubricate
 - .check electrical parts for damage
 - b) Clean breaker stabs. Lubricate.
 - c) Drop the tank and inspect the breaker's contacts, arc quenchers, and other interior parts. Note this is not done every PM. Once every 3 years is acceptable.
 - d) Inspect oil and take a sample for a dielectric test.
 - .if oil is visually bad(black or dark brown, sludge present) replace the oil.
 - .old oil should test to 25 kv, filter if not at this value
 - .replace oil if can not filter to 25 kv
 - e) If replacing oil test the oil prior to adding, it should test at 30 kv. If the oil tests below 30 kv obtain another batch. To add oil and not introduce air into the fluid
 - i) Connect pump/filter and hose assembly to device's bottom drain valve.
 - ii) Turn pump on and open the device's drain valve's test port. Pump oil into a container till no air bubbles are present in the oil stream. At this point close the test port; open the drain valve and fill the tank to the proper level.
 - f) Settling time - If air has been introduced into the switch's insulating oil by (a) not following the pumping procedure, (b) air bubbles in the oil stream, (c) air pumped into oil due to emptying the new oil container, (d) oil has been through a filter operation, then the switch will have to have a settling time of 8 hours. The settling time can be reduced to 1 hour by placing a vacuum in the oil tank. Do not exceed the tank's pressure strength. If this is not known then a 5 psig vacuum should be used.
 - g) Perform insulation resistance tests; phase to phase and each phase to ground. Personnel will stay clear of breaker while it is being tested.
 - h) Perform contact resistance tests.
 - i) Check the operation of the breaker: electrically and manually.

5. Place breaker back in cubicle.

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- a) If the PM scenario is 1a then remove the lock placed on the door to prevent entry into cube while breaker was away and open the door.
 - b) Roll breaker cart in place and secure to the cabinet.
 - b) Unlock the breaker and rack it into the cube, but not in connected(racked completely into stabs) position.
 - c) Release the cart lock and roll it away from the cubicle.
6. Based on the PM scenario, 1a or 1b, WC 622 will do the following
- a) Scenario 1a - WC 622 will rack the breaker back onto its stabs and will close the breaker, unless it remains open, per SOP 600 HVE #6, PWC Switching or Breaker Operation.
 - b) Scenario 1b - The breaker will be rolled back onto it's stabs and closed, unless it is to remain open, as part of the overall substation PM switching. WC 622 will follow the following SOPs
 - WC 622 HVE 007, Switchout And Switchback Energized Circuit
 - WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)

END