NAVY PUBLIC WORKS CENTER
NORFOLK, VIRGINIA
UTILITIES DEPARTMENT

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

REPLACE PRIMARY OIL FUSE CUT OUT SWITCH, GE OR G&W TYPE

PROCEDURE NUMBER

WC 624 HVE 060

SIGNED:_____
(DATE)

APPROVED:_____
(DATE)

SAFETY PROFESSIONAL:_____
(DATE)

MANAGEMENT OFFICIAL:_____
(DATE)

REVISION A

REPLACE PRIMARY OIL FUSE CUT OUT SWITCH,
GE OR G&W TYPE

DISTRIBUTION

CODE	REV/DATE	REV/DATE	REV/DATE	REV/DATE	REV/DATE	REV/DATE	REV/DATE
601.C3							
620							
622							
610.E1							
622.3							

REPLACE PRIMARY OIL FUSE CUT OUT SWITCH,
GE OR G&W TYPE

REVISIONS

REV	DESCRIPTION	SIGNATURE	DATE
A	Initial Issue.		

REPLACE PRIMARY OIL FUSE CUT OUT SWITCH, GE OR G&W TYPE

Purpose:
Procedure to replace a GE or G&W oil fuse cut out switch.

Potential Energy Sources:
1. 11.5/4.16 kv cables and equipment.
2. Generators if installed at facilities to provide temporary power during the transformer change out.

Tools and PPE:
Tools: Auger truck, certified slings, chain hoists, machine casters, machine roll bars, rope, hand tools, high voltage tester, Multimeter, and phase rotation meter. 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 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. Check the facility's phase rotation with a phase rotation meter prior to operations personnel's outage switching. If the facility's power voltage is less than 300 volts, wear Nomex coveralls, safety shoes, and hard hat. Avoid contact with energized components while measuring the voltage. If the facility's voltage is greater than 300 volts, wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, hard hat, and insulating rubber gloves.

2. 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 transformer.

3. 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.

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.

The PPE for the repair work will include work gloves, safety shoes(oil resistant), safety glasses, and hard hats. Refer to the JHA for further information.

4. Drain the oil from the switch tanks using hose and buckets.

5. Using phasing tape, identify the cable phasing. Identically mark the line and load side cables to a phase's switch. This will ensure they will be reconnected to the same switch way later.

6. Cut the cables loose from the oil fuse cut out. Remove any lock nuts and bushings from conduits attached to the switch's connection cabinet.

7. Remove case ground.

8. Set up auger truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger truck for details.

Outdoor Installation

9. Connect a certified sling to the switch cabinet and attach the auger truck's boom winch to the sling. Lift and remove the switch. Set the switch on the stake body truck for transporting to storage/disposal site.

10. Connect a certified sling from the auger truck's boom winch to the replacement switch, lift, and put the switch in place. Take care to not damage the primary circuit's cables while setting switch.

Indoor Installation

9. Using chain hoists, machine casters, machine roller bars, rope, Auger truck with certified sling, etc., move the switch outside the facility. Using a certified sling, attach the switch to the auger truck's boom winch. Lift and set the switch on the stake body truck for transporting to storage/disposal site.

10. Using a certified sling, attach the new switch to the auger truck's boom winch. Lift and set the new switch close to, or inside the facility door. Using chain hoists, machine casters, machine roller bars, rope, Auger truck with certified sling, etc., put the new switch in place. Take care to not damage the primary circuit's cables while setting switch.

11. Use a drill and knock out set to cut holes for conduits. Secure the conduits to the switch cabinet with locknuts and bushings.

12. Splice or terminate the cables, per appropriate SOPs, to the line and load sides of each switch way. Refer to cable markings made previously.

13. Reattach case ground. If the case was not grounded, bond the cabinet to a driven ground(and system neutral if switch is on 4.16 kv system).

14. Place new oil into the switch tanks. Test the new oil prior to placing in the device. If the oil is less than 30 kv obtain another batch of oil. Test the new oil after it has been placed in the device. If the oil tests below 30 kv, then oil has to be filtered and retested till the 30 kv point is reached.

15. Install fuse(s) in the fused cut out(s). Size the fuse(s) per the transformer KVA rating, or circuit size. The National Electrical Code restricts the maximum fuse size to be 3 X a transformer's primary full load amps for transformer protection.

16. Operatins personnel will remove grounds and reenergize the circuit and transformer in order to allow testing of the facility's voltage and phase rotation. Operations personnel will follow SOP WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout).

17. Check the secondary voltage and phase rotation with a phase rotation meter and compare this with the check performed prior to the switch change out. Wear PPE per Step 1.

If the rotation has reversed, operations personnel will deenergize and ground the circuit once again as per SOP WC 622 HVE 013. After operations personnel completes the deenergization, exchange two connections to the switch. Operations personnel will then remove grounds and reenergize the unit and the phase rotation can be checked once again.

If Step 1 of this procedure was not done, then to check the rotation, locate a 3 phase motor to verify it's rotation is correct.

If the phase rotation is correct proceed to Step 18.

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

END