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

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

TERMINATE HIGH VOLTAGE CABLES
OIL SWITCH WITH STUD BUSHINGS

PROCEDURE NUMBER

WC 624 HVE 048

SIGNED: _____
(DATE)

APPROVED: _____
(DATE)

SAFETY PROFESSIONAL: _____
(DATE)

MANAGEMENT OFFICIAL: _____
(DATE)

REVISION

A

TERMINATE HIGH VOLTAGE CABLES OIL SWITCH WITH STUD BUSHINGS

Purpose:

Procedure to terminate high voltage cables onto an oil switch equipped with stud bushings.

Potential Energy Sources:

1. The cables being terminated can be a potential energy source if they have already been spliced into the underground circuit.
2. All cables already terminated on the oil switch

Tools and PPE:

Tools: Shotgun stick, cable cutters, hydraulic press, torch, and assorted hand tools. 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. ANSI C2-1987 National Electrical Safety Code
5. Electrical Transmission and Distribution Safety Manual, P-1060
6. SOP WC 622 HVE 013, Deenergization, Lockout, Tagout
7. SOP WC 622 HVE 007, Switchout and Switchback Energized Circuit

Procedures:

1. WC 622 will deenergize
 - a) the high voltage cables to be terminated if they are connected to an energized circuit.
 - b) All circuits terminated on the oil switch.

WC 622 will follow the following SOPs

- WC 622 HVE 007, Switchout and Switchback Energized Circuit
- WC 622 HVE 013, Deenergization, Lockout, Tagout

2. After the switch has been cleared for work by WC 622 personnel, close all the switch ways and, using a high voltage tester, test the stud bushings to be terminated on to verify that all circuits are deenergized. Before the stud bushings are checked, test the high voltage tester on a known energized circuit to verify the tester is working. Test each stud 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(s) 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

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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.

3. Cut the cables to proper length and prepare the cable ends per the stud bushings' manufacture's instructions.

4. Using a hydraulic press, install lugs onto the cable ends. Bolt the lugs to the terminator studs. Apply 130-C rubber insulating tape in accordance with the voltage of the cables. Apply semi-con(Scotch 13) tape for stress relief. Apply stress relief tape(Scotch 2220). Attach bond wire with shielding braid(Scotch 24) and solder in place. Apply rubber insulating tape(Scotch 130-C) for waterproofing. Cover with vinyl tape(Scotch 88) for exterior protection.

6. WC 622 personnel energize all circuits as per the following SOPs:
WC 622 HVE 007, Switchout and Switchback Energized Circuit
WC 622 HVE 013, Deenergization, Lockout, Tagout

END