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

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

**INSTALL PRIMARY CTs, PTS, AND
WATT-HOUR METER ON A POLE**

**PROCEDURE NUMBER
WC 624 HVE 056**

SIGNED: _____ (DATE)

APPROVED: _____ (DATE)

SAFETY PROFESSIONAL: _____ (DATE)

MANAGEMENT OFFICIAL: _____ (DATE)

REVISION

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INSTALL PRIMARY CTs, PTs, AND WATT-HOUR METER ON A POLE

Purpose:

Procedure to install primary metering on a distribution pole. The installation will include primary CTs, primary PTs, and a Watt-hour meter.

Potential Energy Sources:

1. Energized 34.5/11.5/4.16 kv circuits in close proximity of work.
2. Deenergized 34.5/11.5/4.16 kv circuits which are not included in the work and have not been grounded.

Tools and PPE:

Tools: Bucket truck, rubber hoses, rubber blankets, rubber insulator hoods, cutters, hand tools, high voltage tester, shotgun stick, Multimeter, hydraulic drill, pneumatic drill, brace and bit, and hand line. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, work gloves, safety glasses, orange vest, safety harness, 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. SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck
3. 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
4. NFPA 70 E approach distances to exposed, energized, electrical conductors and circuit parts.
5. ANSI C2-1987 National Electrical Safety Code
6. Electrical Transmission and Distribution Safety Manual, P-1060
7. The Lineman's and Cableman's Handbook, 5th ED
8. SOP WC 624 HVE 014, Install/Replace Surge Arrester On A Utility Pole
9. SOP WC 624 HVE 026, Install Fused Cutouts - Overhead

Procedures:

1. WC 622 personnel will deenergize the circuit and cutouts as per the following SOPs:
WC 622 HVE 007, Switchout and Switchback Energized Circuit
WC 622 HVE 013, Deenergization, Lockout, Tagout
2. When operating a bucket truck the following safety rules will be followed.
 - a) Only an authorized person, one with a current government license to operate an aerial lift, will operate the bucket.
 - b) Do not use the bucket truck if winds exceed the truck manufacture's

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specified limit.

- c) Do not perform energized work in wet weather.
- d) Personnel in bucket will wear a safety harness with a lanyard attached to the boom or bucket.
- e) Do not exceed the bucket's weight limitations.
- f) Stand firmly on the floor of the bucket with both feet. Do not sit on the bucket's edge or use planks, ladders, or other such devices.

3. Insulate energized conductors within 3 feet of the work area. Insulate deenergized overhead circuits within 3 feet of the work area which are not included in the work and have not been grounded as per Lockout and Tagout procedures. Personnel in the bucket shall wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat.

4. Using a high voltage tester test the circuit to be worked on to verify it is deenergized. Before the circuit conductors are checked, test the high voltage tester on a known energized circuit to verify the tester is working. Test each deenergized circuit conductors 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 circuit deenergized. If no voltage is indicated, retest the high voltage tester to re-verify it is working properly. Wear listed Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat.

5. The following rules will apply to job.

- a) Bucket personnel working on a pole which has energized circuits or circuits which are not included in the work and have not been grounded as per Lockout and Tagout procedures, will wear Nomex coveralls, safety glasses, safety shoes, hard hat, safety harness, insulating rubber gloves insulating rubber sleeves, and a back brace if required to wear. The circuits in question have been insulated per Step 3.
- b) Bucket personnel working on pole which has all other high voltage circuits deenergized and properly grounded, or which has no other circuits on the pole, will wear hard hats, work gloves, safety shoes, safety harness, safety glasses when required, and a back brace if required to wear
- c) Personnel in the bucket will carry a hand line aloft with them.
- d) Ground personnel will wear hard hats, safety shoes, work gloves, and safety glasses.
- e) Ground personnel will wear orange vests if working adjacent to a road or in a parking lot.
- f) Ground personnel not involved with the work will watch the personnel working aloft.
- g) Ground personnel will stay clear of area underneath the bucket unless the work dictates.
- h) If ground personnel are present, then at least one of them will have been

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trained to operate the bucket in an emergency situation where the bucket personnel are no longer able to operate the bucket controls.

6. Install fuse cut out switch(s) on pole crossarm per SOP WC 624 HVE 026, Install Fused Cutouts - Overhead. Install fuse(s) in the fused cut out(s). Size the fuse(s) per the transformer KVA rating. The National Electrical Code restricts the maximum fuse size to be 3 X the transformer's primary full load amps.
7. Install surge arresters on pole crossarm per SOP WC 624 HVE 014, Install/Replace Surge Arrester On A Utility Pole.
8. Install Current Transformers and Potential Transformers.
 - a) Drill pole for 5/8" bolts using a hydraulic drill, pneumatic drill, or brace and bit. Do not use an extension cord on a pole with energized circuits.
 - b) Attach Alumaform primary metering mounts to pole using 5/8" galvanized bolts.
 - c) Hang current transformers horizontal and potential transformers vertical on the mounting bracket.
9. Install meter base.
 - a) Install 3/4", exterior grade, plywood on the pole.
 - b) Mount meter base on the plywood using 1" wood screws.
 - c) Install raintight hub on the meter base.
 - d) Run 3/4" rigid conduit from meter base to the CT and PT mounting bracket.
 - e) Install a weatherhead and weatherhead plus 3/4" nipple at the CTs and at the PTs.
10. Pull a 7 conductor, #16 gauge, color coded, meter wire from the meter base to the CT and PT installation. Use red, white, and blue for voltage wires. Use orange, white/tracer, and black for current wires. Use green for all neutral and ground connections. Connect the wires per the proper Meter Form Diagram.
11. Connect current and potential transformers.
 - a) Install jumper wire from primary circuit conductors to the line side of the fused disconnects.
 - b) Install jumper wire from load side of the fused disconnects to the potential transformers. Connect Wye or Delta per the voltage and meter requirements.
 - c) Install current transformer wiring in series with the potential connections. Have polarity dot towards the current source.
 - d) Install 3/4" by 10' ground rod at bottom of pole.
 - e) Install #4 stranded ground wire from CT/PT mounts down the pole and connect to the ground rod using the appropriate connector. Install a pole ground guard.

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- f) Test the ground resistance to ensure it is 2 OHMs or less. If the resistance is higher then install another rod, connect to the first rod, and test ground resistance once again.
 - g) Bond PTs, CTs, and meter base to the pole ground.
12. Plug in the meter. Install the meter door and attach meter seal.
13. Remove insulation placed on energized conductors. Remove insulation placed on conductors which are not included in the work and have not been grounded as per Lockout and Tagout procedures. Personnel in the bucket shall wear Nomex coveralls, Nomex hood, safety glasses, safety shoes, insulating rubber gloves and sleeves, and hard hat. Remove insulation in reverse order that it was placed.
14. WC 622 personnel will energize the circuit, or equipment as per the following SOPs:
WC 622 HVE 007, Switchout and Switchback Energized Circuit
WC 622 HVE 013, Deenergization, Lockout, Tagout
15. Check meter disk operation for proper rotation and speed. Check that the voltage indicators are illuminated.

END