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

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

**TITLE
INSTALL TRANSFORMER -
SINGLE PHASE POLE MOUNTED**

**PROCEDURE NUMBER
WC 624 HVE 051**

SIGNED: _____ (DATE)

APPROVED: _____ (DATE)

SAFETY PROFESSIONAL: _____ (DATE)

MANAGEMENT OFFICIAL: _____ (DATE)

REVISION

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INSTALL TRANSFORMER - SINGLE PHASE POLE MOUNTED

Purpose:

Procedure to install a single phase transformer on a distribution pole.

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, certified slings, 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
10. National Electrical Code

Procedures:

1. Set up bucket truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger truck for details.
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 specified limit.

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- 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. The following rules will apply to job.
- a) Bucket personnel working 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 trained to operate the bucket in an emergency situation where the bucket personnel are no longer able to operate the bucket controls.
5. Measure the transformer's hanger bracket bolt hole spacing and use this to bore pole for 5/8" mounting bolts. Use hydraulic, pneumatic, or brace and bit to drill hole(s). Avoid using an extension cord when working near energized conductors over 600 volts. Install 5/8 bolts.
6. Set up auger truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger truck for details.

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7. Check the nameplate primary and secondary voltages of the transformer to ensure the transformer is rated for the installation. Check the internal connections of the transformer to ensure they are correct.
8. Using a certified nylon sling, attach the transformer to the rope winch of the auger truck. Using the auger truck's boom, raise the transformer to a height above the mounting point on the pole. Lower the transformer, using the auger truck's rope winch, till the transformer's hanger brackets line up with the 5/8" bolts previously installed. Tighten the bolt nuts to secure the transformer to the pole.
9. Install fuse cut out switch(s) on pole crossarm per SOP WC 624 HVE 026, Install Fused Cutouts - Overhead.
10. Install surge arresters on pole crossarm per SOP WC 624 HVE 014, Install/Replace Surge Arrester On A Utility Pole. Attach ground wire to arrester's ground connection point and tie the wire to the #4 pole ground wire.
11. Drive a 3/4" diameter by 10' long ground rod and attach pole ground wire to the rod. 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.
12. Connect primary and secondary wires to the transformer.
13. 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.
14. Close the fuse cut outs. Personnel performing this task will wear Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety glasses, and safety shoes. Use a shotgun stick.
15. Test the transformer's secondary voltage at the secondary bushings. Personnel performing this task will wear Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety glasses, and safety shoes.
16. 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.
17. Secure bucket and auger trucks. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck, for details.

END

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