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LG&E KU
PPL companies

EAOP

ELECTRIC APPROVED OPERATING POLICIES

Subject
System Inspection

AOP Number
EAOP-SI-001-V&M

Effective Date
January 05, 2022

Policy
INSPECTION AND MAINTENANCE REQUIREMENTS FOR VAULTS AND MANHOLES IN THE LEXINGTON SERVICE AREA

SECTION 1 –PURPOSE

1.1 This policy describes operating, maintenance, and inspection requirements for vaults & manholes within the Lexington service area, as mandated by the Kentucky Public Service Commission (KYPSC). Whereas the KYPSC requires the inspection of underground electric lines (per Title 807 KAR 5:006), the intended purpose of this procedure is to describe the manner in which the required inspection functions are to be performed on a certain subset of such facilities, vaults, and manholes, and to describe procedures of record keeping for such activities.

1.2 Inspection activities for this procedure shall be of such frequency to ensure that each vault and manhole is inspected at intervals not to exceed two years.

1.3 Inspection and maintenance activities are intended to ensure public safety, minimize the potential for public property damage resulting from delivery system failures, provide safe access and working conditions for operating and maintenance personnel, and to provide reliable electric service.

1.4 This AOP shall be reviewed by Distribution Standards at least once per three calendar years.

SECTION 2 – SCOPE

2.1 This policy addresses facility inspection and preventive maintenance requirements applicable to the LG&E and KU Energy system of overhead/underground/submersible transformers, switching equipment, and associated equipment located in vaults and manholes within the Lexington service area.

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SECTION 3 – REFERENCES

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3.1 Kentucky Administrative Regulations, Title 807 KAR 5:006, Section 26, Inspection of Systems.

3.2 National Electric Safety Code, Latest edition

3.3 National Electric Code, Latest edition

3.4 LG&E and KU Environmental Affairs Spill-Release Reporting Card

3.5 Kentucky Safety and Health (OSH) Program.

3.4 LG&E and KU Health & Safety Manual, Latest edition.

3.5 LG&E and KU Confined/Enclosed Space Program

3.6 EOM&I SI-001, Inspection Requirements for Electric Distribution Substations and Lines, Latest edition

SECTION 4 –RESPONSIBILITIES

4.1 The Electric System Codes and Standards group shall have responsibility for revising and communicating the requirements of this Policy. Revisions to this policy shall be reviewed and approved by the Directors of Substations & Asset Management and Distribution Operations.

4.2 Lexington Operations Center shall have responsibility for execution of this policy.

a. A supervisor shall assign employees or contractors, i.e., inspectors, for the duties described herein. Supervisors shall have the responsibility of ensuring that inspectors have sufficient knowledge and training of the applicable procedures to properly perform their duties. If deemed necessary by the supervisor, training shall be provided to ensure that inspectors are knowledgeable. Training may include testing and/or observation of the inspectors performing the function. Interviewing may be used to confirm appropriate understanding and ability to perform the procedures.

b. Inspectors shall have the responsibility of knowing and following the procedures as described herein. Inspectors shall be able to indicate the location of vaults and manholes. The inspectors shall be responsible for keeping current all inspection records and associated lists, drawings, & diagrams. Such records may be subject to regulatory audit or inspection. Inspectors shall be responsible for maintaining a key cabinet for any special keys that may be needed in gaining access to the vaults or manholes. Inspectors shall keep a list of contacts of building owners (or building maintenance personnel) and phone numbers which may be needed to gain access to the vaults or manholes. Inspector(s) shall immediately report to their supervisor any serious and immediately hazardous conditions that may be found during the course of inspection.

c. Inspectors shall be trained to follow the procedures described in the LG&E and KU Health and Safety Manual and the LG&E and KU Confined/Enclosed Space Program.

d. Each responsible inspector shall be provided with access to the applicable procedures. Upon revision of a procedure, or adoption of a new procedure, each supervisor shall ensure that all inspectors under their supervision are informed and trained, as necessary.

4.3 The Safety and Training department shall have responsibility for maintaining training records of employees in association with these procedures.

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SECTION 5 –PROCEDURES FOR VAULTS

5.1 In accordance with company policies, the inspector shall wear appropriate PPE and follow the procedures described in the LG&E and KU Health and Safety Manual and the LG&E and KU Confined/Enclosed Space Program.

5.2 The inspector shall maintain a means of communication with other company personnel during the inspection activities.

5.3 Energized underground primary conductors may not be disturbed during inspection activities except for an emergency.

5.4 Record inspection identification information for the vault. Identifying information shall include:

- Name and location of the vault
- The date and time of the inspection and who was performing the inspection
- Company equipment numbers and/or manufacturer serial numbers for transformers
- Substation(s) & circuit(s) feeding the vault
- Rated voltage of the service(s)

5.4 Inspection of the vault shall include, but not be limited to:

- Inspect for ready access to the vault by Kentucky Utilities personnel.
  - ✓ Test operation of doors, door locks, company padlocks
  - ✓ Lubricate door locks and KU padlocks as needed
  - ✓ Notify building owner of replacement or maintenance required
  - ✓ Notify property owners to remove combustible materials stored in vaults or other materials hindering ready access to electrical equipment in the vault (this is a violation of NEC Articles 450.13 & 450.48, & 490.41)
- Inspect the as-found conditions of the vault.
  - ✓ Ensure that signage indicating Warning and Danger are appropriately displayed
  - ✓ Note the presence of any Hold, Caution, or Lockout tags present.
  - ✓ Inspect for signs of tampering or unqualified person(s) access -- broken meter seals, broken or missing company padlocks, damaged equipment, damaged grates, etc.
  - ✓ Inspect exposed support racks and equipment cases for corrosion or damage
  - ✓ Ensure that cables/conductors are fastened to their supports
  - ✓ Inspect exposed splices for cracks, discoloration, evidence of overheating, signs of arcing, tracking, damage, etc.
  - ✓ Ensure that insulating materials are in place
  - ✓ Ensure that guards, shields, or isolating barriers for live un-insulated parts are in place
  - ✓ Inspect drains
  - ✓ Clean oil leak sensors (if present)
  - ✓ Inspect and test operation of sump pumps (if present). Coordinate testing with customer personnel.
  - ✓ Look for evidence of past water level rising
  - ✓ Inspect ventilation system for obstructions
  - ✓ Test automatic and manual operation of mechanical ventilation system (if present). Coordinate testing with customer personnel.

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- ✓ Vault Lighting – Inform building owner of faulty lighting and request repairs, if needed

- Inspect the as-found conditions of the equipment.
  - ✓ Record oil level gauge on transformers
  - ✓ Look for signs of leaking transformer oil
  - ✓ Record transformer current operating temperature and compare to previous records to ensure that the gauge is working.
  - ✓ Record transformer maximum operation temperature and compare to established transformer standards and report overloads.
  - ✓ Reset transformer maximum temperature indicator for next monitoring period
  - ✓ Measure and record transformer secondary voltages using a calibrated voltmeter and compare to standards
  - ✓ Measure and record the vault ambient temperature and the temperatures of the exposed terminals using an IR instrument.
  - ✓ Ensure that access to high voltage is restricted via company locks installed on company equipment
  - ✓ Visually inspect exposed grounding for mechanical damage and/or harmful corrosion
  - ✓ Inspect exposed terminator bodies, terminators, arresters, bus, and bushings for cracks, discoloration, evidence of overheating, signs of arcing, tracking, damage, etc.
  - ✓ Ensure that any special operating tools are present in the vault or with the associated equipment
  - ✓ Verify that tags are placed on conductors at every termination and/or every access opening of the conduit system. Tags are to be legibly marked with substation & circuit numbers as well as lateral name (if applicable). Such tags are to be verified against company records and are to accurately reflect the physical conditions which they represent, including ongoing switching arrangements. Investigate and correct any discrepancies found and report such to a supervisor and to Asset Information.

5.5 Perform maintenance activities for the vault:

- Restock fused transformers and fused switchgear with spare fuses if none are present.
- Clean ventilation screens of dirt & debris
- Sweep & clean the vault.

5.6 Reporting and correcting of defects.

- Record any corrective activities performed on a standard inspection form for each vault
- Create repair orders for work which is not immediately correctable
- For any abnormalities not immediately corrected, the inspector shall record the defects found and report such to immediate supervisor.

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SECTION 6 – PROCEDURES FOR MANHOLES

6.1 In accordance with company policies, the inspector shall wear appropriate PPE, and follow the procedures described in the LG&E and KU Health and Safety Manual and the LG&E and KU Confined/Enclosed Space Program.

6.2 The inspector shall maintain a means of communication with other company personnel during the inspection activities.

6.3 Energized underground primary conductors may not be disturbed during inspection activities except for an emergency.

6.4 Prior to entry and inspection, manholes may require pumping to remove water

6.5 Manhole inspections may require access permits -- street blocking permits or confined space entry permits. If applicable, access permits shall be present during inspection activities and made available to authorities upon their request at the worksite during inspection activities.

6.6 Record inspection identification information for the manhole. Identifying information shall include:

- Name and location of the manhole
- The date and time of the inspection and who was performing the inspection
- Company equipment numbers and/or manufacturer serial numbers for transformers
- Substation(s) and circuit(s) feeding the manhole
- Rated voltage of the service(s)

6.7 Inspection of the manhole shall include, but not be limited to:

- Inspect for ready access to the manhole by Kentucky Utilities personnel.
  - ✓ Remove the manhole lid and clean the lid's receiving ring of dirt & debris. Lubricate the receiving ring's fit with the manhole lid for easy future removal.
  - ✓ Lubricate the locking mechanism if one is present.
- Inspect the as-found conditions of the manhole.
  - ✓ Inspect for signs of tampering or unqualified person(s) access
  - ✓ Note the presence of any Hold, Caution, or Lockout tags present.
  - ✓ Inspect exposed support racks and equipment cases for corrosion or damage
  - ✓ Ensure that cables/conductors are fastened to their supports
  - ✓ Inspect exposed splices for cracks, discoloration, evidence of overheating, signs of arcing, tracking, damage, etc.
  - ✓ Ensure that insulating materials are in place (such as on secondary bus)
  - ✓ Inspect drains
  - ✓ Clean oil leak sensors (if present)
  - ✓ Inspect and test operation of sump pumps (if present)
  - ✓ Inspect for overall structural integrity of the manhole

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- Inspect the as-found conditions of the equipment.
    - ✓ Record oil level gauge on transformers
    - ✓ Look for signs of leaking transformer oil
    - ✓ Record transformer current operating temperature and compare to previous records to ensure that the gauge is working.
    - ✓ Record transformer maximum operation temperature and compare to established transformer standards and report overloads.
    - ✓ Reset transformer maximum temperature indicator for next monitoring period
    - ✓ Measure and record transformer secondary voltages and compare to standards
    - ✓ Visually inspect exposed grounding for mechanical damage and/or harmful corrosion
    - ✓ Inspect exposed terminator bodies, terminators, arresters, bus, and bushings for cracks, discoloration, evidence of overheating, signs of arcing, tracking, damage, etc.
    - ✓ Ensure that any special operating tools are present in the vault or with the associated equipment
    - ✓ Verify that tags are placed on conductors at every termination and/or every access opening of the conduit system. Tags are to be legibly marked with substation & circuit numbers as well as lateral name (if applicable). Such tags are to be verified against company records and are to accurately reflect the physical conditions which they represent. Investigate and correct any discrepancies found and report such to a supervisor and to Asset Information.
    - ✓ Verify that spare conduits and circuit (conductor) positions in duct banks that enter the manhole, agree with company records. Report any discrepancies found to a supervisor and to Asset Information.

6.8 Perform maintenance activities for the manhole:

- Restock fused transformers and fused switchgear with spare fuses if none are present (spare fuses must be kept above the normal water level)
- Clean sump hole of dirt & debris

6.9 Reporting and correcting of defects.

- Record any corrective activities performed on a standard inspection form for each manhole
- Create repair orders for work which is not immediately correctable
- For any abnormalities not immediately corrected, the inspector shall record the defects found and report such to immediate supervisor.

SECTION 7 - SAFETY

7.1 All applicable provisions of the LG&E and KU Health & Safety Manual shall be observed.

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SECTION 8 – ENVIRONMENTAL

8.1 Whereas the inspection procedure may discover an oil leak, such event(s) shall be handled in accordance with established procedures, as documented in the LG&E and KU Environmental Affairs Spill-Release Reporting Card

SECTION 9 – TRAINING AND QUALIFICATIONS

9.1 Employees or contractors performing cleaning, inspection, testing, and rebuilding must be qualified by training and/or experience.

SECTION 10 – RECORD KEEPING

10.1 Vault and manhole inspection and maintenance records shall be retained by the Lexington Operations Center for a minimum of six years.

10.2 A standard inspection form shall be used during the inspection of each vault or manhole facility.

10.3 An up-to-date physical and/or connection diagram of each facility shall be kept with each facilities inspection record.

10.4 A list of all vaults and manholes shall be kept and maintained in the inspection records file.

10.5 A copy of these inspection procedures shall be kept with the inspection records file