**BEFORE**
**THE PUBLIC UTILITIES COMMISSION OF OHIO**

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| In the Matter of Duke Energy Ohio, Inc.'s Application for Approval of Proposed Programs for Inspection, Maintenance Repair and Replacement of Distribution and Transmission Lines | ) ) ) ) ) | 09- 807-EL-ESS |

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**AMENDED APPLICATION OF DUKE ENERGY OHIO, INC. FOR APPROVAL OF PROPOSED PROGRAMS FOR INSPECTION, MAINTENANCE, REPAIR AND REPLACEMENT OF DISTRIBUTION AND TRANSMISSION LINES**

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Now comes Duke Energy Ohio, Inc. (Duke Energy Ohio or Company) and submits the following Amended Application for Approval of its proposed Programs For Inspection, Maintenance, Repair And Replacement Of Distribution And Transmission Lines.

In May of 2008, the Governor of Ohio signed into law, Amended Substitute Senate Bill No. 221 (SB 221) which amended Substitute Senate Bill 3 and altered various provisions of the Ohio Revised Code relating to energy and regulatory policy. Subsequent to SB 221, the Public Utilities Commission of Ohio (Commission) issued a Finding and Order in Case No. 06-693-EL-ORD, modifying chapters of the Ohio Administrative Code (O.A.C.) including O.A.C. 4901:1-27.

In its Finding and Order of August 26, 2009, the Commission ordered the electric utilities to file proposed new program descriptions and standards within sixty days of the effective date of the new rules in chapter 4901:1-26 and 4901:1-27, O.A.C.

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Duke Energy Ohio submitted its Application in this matter on September 15, 2009 and now seeks to supplement its filing with the attached documents. Duke Energy Ohio respectfully requests that the attached documents be incorporated with its existing filing and that the combined information be accepted as its filing in this matter.

Respectfully submitted,

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**4901:1-10-27 (E)(1) Inspection, maintenance, repair, and replacement of transmission and distribution facilities (circuits and equipment).**

**(a) Poles and Towers**

Duke Energy Ohio shall inspect all DEO owned poles on a 10 year schedule and treat, repair or replace as needed. Poles and towers shall be visually inspected in compliance with inspection program 4901:1-10-27 (D)(1),(2). The goal shall be to maintain adequate strength and integrity of poles and towers per the National Electrical Safety Code. Based on the inspection results, repair work orders shall be prepared as needed and tracked until complete.

All equipment and hardware on poles shall be inspected as follows: Duke Energy shall check condition of base of the pole for rotting, termites, and other abnormalities. Poles involved with landslides or "wash outs", leaning for any reason; objects hanging on or near pole; burning pole, cross-arms, and/or braces; ground wire broken; cross-arms or broken braces; bird holes; and vehicular damage. Communities or municipalities often have permission to post/attach traffic control and similar signs on utility poles. Business, political, and yard sale or similar signs shall be removed.

Refer to Exhibit A for complete pole inspection specifications.

Towers shall be inspected as follows: Duke Energy Ohio will inspect for loose, bent, rusty, or missing steel; Duke Energy Ohio shall inspect numbers and "Danger Hi-Voltage" signs; base of tower rusted; involved with landslides or "wash outs"; objects hanging on or near tower; and flashings lights on tower (FAA).

**(b) Circuit and Line Inspections**

The distribution inspection program shall consist of a driving or walking visual inspection. All distribution circuits shall be inspected on a 5-year schedule as part of the distribution inspection program 4901:1-10-27(D)(1),(2). Inspectors shall document physical defects or other potential hazards to the safe and reliable operation of the circuits. Based on the inspection results, those findings that are determined to be critical will be immediately reported for assessment and repair. Otherwise, repair work orders are prepared as needed and tracked until complete.

Refer to Exhibit B for LEVEL definitions and examples.

When LEVEL 3 (L3) situations are found, the inspector will contact the appropriate district Work Coordinator immediately. If there is no answer, the inspector will leave a message and contact the appropriate District Supervisor and provide complete, detailed and thorough as possible description of the situation found when entering details into MAXIMO. MAXIMO is Duke Energy's computerized maintenance management system in which Duke Energy maintains centralized records of all equipment and maintenance performed on that equipment. This will assist Transmission & Distribution Construction in evaluating the situation.

Two pole conditions are those where in the field, two poles sit side by side and where one pole is in the process of being removed/changed out. Duke Energy Ohio shall log two pole conditions into MAXIMO when found in the field. Enter pole numbers, physical location, and attachments; type and number of attachments. Deteriorated "Elephant Ear" cutouts, deteriorated "Fuzzy Barrel" fuse tubes, taped fuse tubes, and deteriorated, checked or cracked Durabute ("Chicken Wing") cutouts should be logged as a priority LEVEL 2 (L2).

**(c) Primary enclosures (e.g., pad-mounted transformers and pad-mounted switch gear) and secondary enclosures (e.g., pedestals and hand holes)**

The distribution inspection program shall consist of a visual inspection. All pad-mounted transformers, secondary pedestals, hands holes and primary switchgear shall be inspected on a 5-year schedule as part of the distribution inspection program 4901:1-10-27(D)(1). Inspectors shall document physical defects or other potential hazards to the operations of the transformers. This inspection shall identify exterior physical defects in equipment or potential hazards such as transformers that are rusted, leaking, oil-stained, have broken hinges, missing locks. Based on the inspection results, repair work orders shall be prepared as needed and tracked until complete.

Refer to Exhibit C for priority definitions.

In MAXIMO, the term "TRANSFORMER" – "OTHER" shall be used to refer to damage(s) to box pads. The terms "TRANSFORMER" – "PAINT" shall be used for transformers requiring new paint. This will ensure that Material & Repair receives notification.

**(d) Line reclosers**

Line reclosers, sectionalizers and OVR devices shall be visually inspected each year. The units shall be inspected for signs of damage or deterioration and the operations-counter readings shall be recorded. Items to look for are black or burnt marks on equipment and/or molten metal, indicating that a flash has occurred at the recloser installation. Based on the inspection results, repair work orders shall be prepared as needed and tracked until complete.

Refer to Exhibit D for an example of the Recloser Inspection Form.

2009 – 2010 shall be a pilot timeframe for finalizing the recloser maintenance program details. A Commissioning Test is performed on electrically controlled reclosers. Hydraulic under oil units shall be removed from service every 6 years for maintenance. Vacuum under oil units shall be removed from service every 7 years for maintenance. Paper work orders shall be initiated for annual inspections of reclosers. Inspectors shall visually inspect the recloser site for issues, document the counter reading, etc. The inspectors then shall enter the paper work order information into an Excel spreadsheet. The technicians shall then analyze the Excel spreadsheet and the information shall be entered in MAXIMO.

**(e) Line capacitors**

Line capacitors shall be visually and operationally inspected each year. The units shall be inspected for signs of damage or deterioration and an operational test is performed to verify proper function. Based on the inspection results, repair work orders are prepared as needed and tracked in until complete.

Capacitors will be inspected as follows: Duke Energy Ohio shall inspect for damaged controls, broken insulators, and other abnormalities; bulged capacitors; capacitors leaking fluid; and check cutouts hanging open and/or fuses blown.

Problems with capacitor bank installations (i.e. open/blown cutouts, missing u-guard, damage, etc.) shall not be entered into MAXIMO. Duke Energy Ohio shall record poles number and any pertinent information about the installation(s) and forward this information to the Customer Power Quality supervisor via email. The Operations Technicians shall then evaluate the situation and enter the issue into MAXIMO if appropriate so the records do not get duplicated in MAXIMO.

The repair intervals for issues found during an inspection are the same duration as Circuit and Line inspections. A Level 3 (L3) = 72 hours, Level 2 (L2) = 60 working days maximum, Level 1 (L1) = 6 to 12 months, and Level 0 (L0) = no time frame, not a safety or reliability issue. The repair work for Level 0 issues shall be completed when other equipment is repaired at that location.

**(f) Right-of-way vegetation management**

Distribution Vegetation Management – Duke Energy Ohio shall perform vegetation line clearing on distribution circuits once every four years. The goal shall be to help provide safe and reliable electric service by limiting contact between vegetation and power lines.

Transmission Vegetation Management – Duke Energy Ohio shall provide vegetation line clearing on transmission circuits once every six years. The goal shall be to help provide safe and reliable electric service by limiting contact between vegetation and power lines.

For two phase and three phase primary lines, side clearances shall be ten feet from tree branches to nearest conductor. Duke Energy Ohio shall remove overhanging/encroaching limbs/branches above the conductor. Unsuitable overhang includes limbs that are smaller diameter, weak, diseased, decaying, or are positioned in a horizontal manner. Mature, well-established hardwood trees with structurally sound overhanging limbs or branches greater than six inches diameter may remain. Ten feet clearance shall be obtained from the lowest conductor to the nearest vegetation for trees underneath the primary.

For transmission lines 69kV and above, side clearances should a minimum of fifteen feet clearance from the tree branches to the nearest conductor. Duke Energy Ohio shall remove overhanging or encroaching branches above the conductor. For trees underneath the primary, Duke Energy Ohio shall maintain a fifteen feet minimum clearance from the lowest conductor to the nearest vegetation.

For over-builds, where there are transmission circuits on the same structure as the distribution circuits, the circuits shall be trimmed to fifteen feet clearance from the tree branches to the nearest conductor.

For single phase lines, side clearances shall be ten feet clearance from the tree branches to the nearest conductor. For overhang on a single phase line, all live branches above the conductors shall be removed to a minimum height of fifteen feet above the nearest conductor, and at a 45-degree angle. Duke Energy Ohio shall remove all branches that will potentially become overhang and lighten up remaining overhang and remove all dead and structurally weak branches overhanging any primary voltages. Underneath the primary, Duke Energy Ohio shall maintain a ten foot clearance from the lowest conductor to the nearest vegetation.

For open wire secondary (without primary), open wire secondaries shall be pruned to obtain a minimum of five feet of clearance around the conductors. Other secondaries and service drops shall be pruned to remove any obvious line-damaging limbs. These would be limbs of a size substantial enough that through continued rubbing or pressure due to weight will likely lead to service interruptions.

For open wire or triplex services, and street lighting, all service and street light wires shall have a twelve inch swing clearance to move without obstruction. Any limbs large enough to create pressure on these conductors, such that the conductor is pushed out of normal "sag" configuration, shall be removed back to qualified lateral.

All vines are to be cut down from all electric poles and guy wires. Vines are to be cleared at least ten feet off the ground and stump chemically treated.

Special clearances: Down, span, and other guys shall be free of weight, strain, or displacement because of pressure caused by contact with tree parts, particularly of fast-growing trees. Vines shall be removed from guys and poles. Working clearance from trees shall be obtained around transformers, cross-arms, and risers. In addition, to the amount of separation between conductors and trees specified above, allowance shall be made for wire sag and horizontal displacement due to weather extremes and high winds, maximum of wire sag and sway occurs at span centers. All tree pruning and removal should be done accordingly.

Poles with switching mechanisms, transformers, or other mechanical equipment for the electric system installed in the right of way or that are not accessible by bucket truck shall be cleared from ground to sky to a minimum ten foot radius.

Leaning, weakened, or dead trees outside of the clearance requirements, which pose an imminent threat to the adjacent electric equipment, shall be identified by the Contractor and brought to the Duke Forester's attention. The Duke Forester may authorize the removal of such trees on a time and material basis but no removal may take place until Contractor has contacted and received approval from the property owner or agent to remove such trees.

When performing routine circuit line clearing, all unsuitable trees twelve inches diameter breast height (DBH) or less with the trunk within ten feet of the conductor shall be removed where permissible by the property owner or Township. Removal of trees greater than twelve inches DBH must be approved by a Duke Forester prior to beginning the work. Removal of all trees with the trunk more than ten feet from the conductor should be approved by a Duke Energy Forester prior to the beginning the work. A signed permission notice must be obtained from the property owner or their agent prior to removing such trees or brush. Removals of secondary and service wires should not be performed unless there are extenuating circumstances that are approved by the Duke Energy Forester prior to beginning the work. In most cases, on secondary and service wires customers should be informed that they may request the temporary disconnection of the conductor so the customer can then make arrangements for the tree's removal. Contractor shall utilize the most efficient and cost-effective methods available to perform the removals including, but not limited to; cutting, mowing, hand cutting, and chemical applications. All stumps from downed trees shall be treated with herbicides where applicable and possible.

**(g) <u>Substations</u>**

All Duke Energy safety rules shall be observed when entering any substation:

Appropriate Personal Protective Equipment

Minimum Approach Distance

Personal Protective Grounds

Special Precautionary Techniques

Environmental Rules and Regulations

**Station Visual Inspection**

Substation visual inspections shall be performed once a month. These visual inspections and recorded readings can help indicate the need for maintenance on a piece of equipment, reasons for unplanned outages, the presence of unbalanced or overloaded circuits, and the presence of potentially dangerous situations. Bus structure, circuit breakers, transformers, the control building, and the general yard are specific items that shall be covered under the station visual inspection.

Visual inspections of the bus structure and the equipment mounted in the structure are performed every time the substation is entered. When performing the inspection, items or conditions that appears abnormal should be closely inspected, such as a sudden change in color on the bus structure which could indicate a spot where flashing has occurred or where overheating has occurred. The connection points and lines of a static line shall be visually checked for damage. Insulators, bushings, and arresters are checked for broken, cracked, or discoloration. Air break, load break or disconnect switches are visually inspected to ensure that they are properly seated if closed and that padlocks are in place and locked. Wave traps, coupling capacitor transformers, potential transformers, fault bus and other equipment mounted on the bus structure shall be checked for signs of overheating, loose connections, vandalism, corrosion, dirt, and lightning strikes. Steel structures are also inspected for signs of excessive rust, cracks, excessive vibration and debris.

Visual inspections on circuit breakers will vary depending on the type/model of the circuit breaker. The overall appearance of the circuit breaker shall be visually checked for anything abnormal such as cracks, chips, or oil leaks. High/low gas pressures and temperatures, air pressure, oil level, counter numbers, elapsed time readings on the compressors, and compressor oil level are all checked and recorded. The semaphore indications shall also be checked to ensure true circuit breaker status.

The overall appearance of the transformer shall be visually checked for anything abnormal such as oil leaks, fans and pumps not operating, and bushings that are cracked, chipped, or leaking. The main tank and load tap changer liquid temperatures and winding temperatures are checked and recorded. Lightning arresters are also checked and the counters are recorded if applicable. The load tap changer compartment and controls are checked for signs of damage and correct automatic operation. The Mulsifyre® system, a high velocity water spray system, and nitrogen supplies are checked and valves are opened to ensure the system is in a state of readiness.

The yard shall be visually inspected for damage and deterioration from vandalism, accidents. The general appearance of the yard shall be checked for excessive vegetation and equipment appearance. The yard lights shall be visually checked and any bulbs that are blown are replaced.

Equipment in control buildings shall be visually inspected and readings recorded. An operator shall visually check all relays for targets and records information and resets targets. This person shall also ensure that primary relay and backup relay indicating lights are lit and checks the remainder of indicating lights to ensure they agree with equipment status. The annunciator panel shall be tested to ensure all lamps are operational and alarm cutout switches closed unless tagged. The control panel switches are checked to ensure they are in the proper position. The operator shall also change charts and records date, time, and initials the chart where applicable. Digital fault recorder targets shall be checked and reset as necessary. The fault bus shall be tested to ensure the voltage level is approximately 15 volts. Power station panels shall be checked for tripped breakers or breakers placed in the wrong position. Station power supplies are checked to ensure both the normal and reserve power sources are available and the DC control panels shall be checked to ensure switches are in the proper position. The substation batteries and battery charger shall be visually inspected. Fire extinguishers shall be visually inspected to ensure acceptable pressure in the tank

**Infrared Inspection**

An infrared scan of substation equipment shall be performed annually. All outdoor substation equipment shall be scanned using suitable infrared detection equipment to check for signs of abnormal heating or below normal expected temperature. Abnormal heating may be caused by high resistance connections, excessive loading, restricted air or oil flow, or deteriorated equipment. Below normal temperatures can be caused by unbalanced loading, restricted air or oil flow, or device malfunction.

Bus conductor, connectors, fittings, fuses, bushings, lightning arresters, switches, transformer case and auxiliary equipment, circuit breaker interrupter tanks, line neutral and static connections and power cable terminations shall be scanned for abnormalities. Control and relay cabinet doors shall be opened to scan circuit breakers, contactors, control wiring, fuses, heaters, relay terminals, and terminal blocks. Station batteries shall be checked for uneven heating, high resistance connections, and contamination losses. The thermography and field repair records shall be reviewed and analyzed to determine cause.

**Power Factor Testing**

Power factor tests shall be performed on a time period from 2 – 9 years based on station equipment type/size/condition/criticality. Power factor tests establish baseline readings on new equipment for future reference when tests are performed to evaluate the integrity of equipment at later date.

Refer to Exhibit E for power factor intervals.

The guidelines set forth in the Power Factor Test Set instructions are followed. The readings from the Power Factor Test Set shall then be recorded for future assessment or compare readings to evaluate the piece of equipment being tested.

**Dissolved Gas Analysis Testing – Transformer and Transformer Load Tap Changer Oil Sampling**

A dissolved gas analysis test shall be performed on transformers with a 3-phase rating 7.5 MVA – 49.9 MVA once per year. A dissolved gas analysis test shall be performed on transformers with a 3-phase rating 50 MVA and larger twice per year. The dissolved gas analysis determines the gas levels within the insulating oil and overall health of the transformer.

A dissolved gas analysis test shall be performed on transformer load tap changers once per year for GE: LRT200-2 w/fiberglass drum, LRT300 and LRT500, Reinhausen: RMV-A and RMV-II, Westinghouse: UVT. A dissolved gas analysis test shall be performed on transformer load tap changers twice per year for ABB: UZE w/filter, Allis Chalmers: SJ5 w/filter and TLF w/filter, ASEA/Waukesha: UZD w/filter, GE: LRT48 w/filter, LR65 w/filter, LRT65 w/filter, LRT68 w/filter, LRT72 w/filter, LR83 w/filter, LRS83 w/filter, and LRT83 w/filter, McGraw Edison: V2PA, Westinghouse: UNR w/filter, URS w/filter, URT w/filter, and UTS w/filter, also twice per year for ABB: UZE no filter, Allis Chalmers/Siemens: TLB w/filter and TLH-21 w/filter, Allis Chalmers: SJ5 no filter and TLF no filter, ASEA/Waukesha: UZD no filter, Federal Pacific: TC546 w/filter, TC525 w/filter, and TC25E w/filter, GE: LRT200 w/paper drum, LRT48 no filter, LR65 no filter, LRT65 no filter, LRT68 no filter, LRT72 no filter, LR83 no filter, LRS83 no filter, and LRT83 no filter, McGraw Edison: 394 w/filter, 550 w/filter, 550B w/filter, and 550C w/filter, Moloney: T-MB w/filter, TC-MA w/filter, TC-MB w/filter, TC-MC w/filter, Westinghouse: UNR no filter, URS no filter, URT no filter, UTS no filter, and UTT w/filter. A dissolved gas analysis test shall be performed on transformer load tap changers three times per year for Allis Chalmers/Siemans: TLB no filter and TLH-21 no filter, Federal Pacific: TC546 no filter, and TC25E no filter, McGraw Edison: 394 no filter, 550 no filter, 550B no filter, and 550C no filter, Moloney: T-MB no filter, TC-MA no filter, TC-MB no filter, TC-MC no filter, and Westinghouse: UTT no filter. The dissolved gas analysis determines the gas levels within the insulating oil and overall health of the load tap changer.

**Circuit Breaker Test**

A circuit breaker test shall be performed every 3 years for all air, vacuum, gas, and oil circuit breakers. The purpose of this test is to provide a non-intrusive method of evaluating the circuit breaker to ensure its integrity.

**Metal Enclose Capacitor Assemblies**

Metal enclosed capacitor assemblies without unbalanced protection shall be internally inspected each year and every 3 years for metal enclosed capacitor assemblies with unbalanced protection. The capacitors within enclosures shall be inspected to ensure equipment is functioning properly.

Capacitors must be de-energized for a minimum of five minutes before they are grounded. Duke Energy Ohio shall check isolation and check voltage and ground after five minutes. Duke Energy Ohio shall check all electrical connections, check capacitor fuses and replace blown fuses after checking capacitor with capacitor tester and check fuse clips and all ground connections. Duke Energy Ohio shall inspect capacitors for any damage or leaking cases, broken or cracked bushings, and replace if necessary. Duke Energy Ohio shall clean and inspect insulators for damage and repair/replace if necessary. If isolation permits, clean and lubricate disconnect switch and ground disconnect if equipped. Duke Energy Ohio shall clean and inspect neutral pot for damage and repair/replace if necessary and clean and inspect capacitor structure or enclosure for damage and clear isolation and return equipment to service.

**Planned Maintenance**

Planned Maintenance work (i.e. MAXIMO Work Type "PM") shall be completed and the associated MAXIMO work order closed within the following time interval from the date on which the work order was generated:

| PM Frequency/Interval[1] | Work Order Should Be Completed Within |
|---|---|
| 1 Week or Less | 1 Week |
| 1 Month | Within the calendar month in which work order generated. |
| 3 Months | 30 Days |
| 6 Months | 60 Days |
| 1 Year | 90 Days |
| 3 Years | 1 Year |
| 6 Years or Greater | 2 Years |
| Relays (all frequencies) | 12 months after the due date in the Aspen relay database. |

Note 1: For PM frequencies/intervals that fall between those shown in this table, the next lower interval from this table will apply.

| Duke Energy | Ohio Distribution & Transmission Specification |
|---|---|
| Ground-line Inspection and Treatment of Wood Poles | |

## 1.0 Scope of Work

The Contractor shall furnish and maintain all tools, equipment, preservative/treatment material, inspection/reject tags, and labor as required for the completion of wood distribution/transmission pole inspection and treatment as set forth in these specifications.

## 2.0 Technical Specifications

2.1 Duke Energy will provide maps and the locations of all poles to be inspected and/or treated.

2.2 The Contractor shall provide the Duke Energy T&D Administrator(s) with proof of at least 5 years experience in ground line inspection and treatment application of wood preservatives.

2.3 The Contractor shall supply written verification of the pole inspection, treating experience and associated training of each Foreman and Supervisor to the Duke Energy T&D Administrator.

2.3.1 Each Foreman/Crew Leader shall be a permanent, full-time employee of the Contractor having not less than one-year experience in ground line inspection and treatment.

2.3.2 Each Supervisor (oversees multiple crews) shall be a permanent, full-time employee of the Contractor having not less than two years experience in supervising ground line inspection and treatment.

2.3.3 Each crew person/foreperson/supervisor must speak fluent English in order to communicate with property owners and customers of Duke Energy.

2.3.4 The same inspection/treatment contractor cannot be awarded the associated follow-up refurbishment contract.

2.4 The Contractor shall supply the Duke Energy T&D Administrators with a list of employees that hold a valid Pesticide Applicator License as issued by the State in which the work will be performed. The Contractor shall comply with all State requirements for applying ground line preservative materials. The Contractor shall be responsible for the disposal of all leftover pesticide materials, packaging, containers and refuse off of Duke Energy property in accordance with all applicable Federal, State and local laws and regulations.

2.5 All preservative materials used shall bear appropriate EPA approved labels stipulating the intended end use. All preservative material used shall conform to all Local and State requirements; see Exhibit "A", Approved Preservatives. Any alternate preservatives proposed by the Contractor must be approved in writing by Duke Energy prior to being used.

2.6 Prior to the start of work, the Contractor shall send the Duke Energy T&D Administrator(s) a complete set of MSDS sheets and copies of the labels of those chemicals and preservative materials identified in Exhibit "A" that are proposed for use on Duke Energy property. The Contractor shall also supply these same documents for any proposed alternative chemicals or preservative materials prior to their approval for use and introduction to Duke Energy property.

2.7 The Contractor shall develop and provide a pre-work check list to be completed at a "kick-off" meeting with the District Representative prior to the start of work. This checklist addresses any special concerns, requests, directions, or situations unique to this District that are outside the scope of this specification. This checklist is to also contain all necessary land-based and mobile telephone numbers for reaching Contractor personnel. A copy of this completed check list shall be supplied to the Duke Energy T&D Administrator for each District before the start of work.

2.7.1 The contractor shall provide a supervisor for each of the areas where work is being performed. The supervisor shall remain in the assigned area through the duration of the work.

2.8 The Contractor shall provide and maintain operational for each Supervisor/foreperson/crew leader a cellular telephone equipped with a method for leaving messages so that the Duke Energy Representative shall have instant communication capability in case of emergency, customer complaint, or other reason.

2.9 The Contractor shall develop a detailed schedule identifying how the work will be accomplished. This schedule should include such data as the order in which maps, areas will be worked, start/finish dates, anticipated crew sizes, and the number of crews that will be working. This schedule is to be reviewed with the Duke Energy T&D Administrator prior to the start of work.

2.10 All assigned poles shall be inspected per Sections 3.1 "Above Ground line Inspection" and 3.2 "Below Ground line Inspection".

2.10.1 All poles will receive a visual inspection. See Exhibit "F" for detailed list of items.

2.10.2 All poles will be hammer sounded regardless of the birthmark date.

2.10.2.1 All poles will be hammer sounded a minimum of 5 times in each quadrant (total of 20 hammer marks) of the pole with a waffle head hammer starting at ground line to 7 ft. above ground line. Sounding should leave a mark on the pole that is auditable.

2.10.2.2 Any location on the pole that fails the hammer sounding test will have an evaluation hole drilled, 30 degree off vertical, in that location to determine whether internal decay or wood ring separation exists.

2.10.2.2.1 Determination of internal decay will result in a full ground-line excavation inspection/treatment.

2.10.2.2.2 Determination of no internal decay will have the evaluation hole treated with 2 Genics Cobra rods and sealed with a tight fitting removable plastic plug pending no other inspection/treatment needs as outlined below.

2.10.3 All poles that are 20 years or older will have a condition based inspection completed. This condition based inspection will consist of a shovel full of soil (approximately 10" wide by 6" to 8" deep) at the base of the pole in two locations 180 degrees apart.

2.10.3.1 The exposed below ground-line area will be cleaned, scraped, and evaluated for external decay.

2.10.3.1.1 Any external ground-line decay will result in a full ground-line excavation inspection/treatment.

2.10.3.1.2 No external decay will result in an evaluation hole being drilled just below ground-line, at 30 degrees from vertical, at one inspection "divot" and the other at 6" above ground-line, 30 degrees from vertical, at the other inspection "divot".

2.10.3.1.2.1 Any internal decay will result in a full excavation inspection/treatment.

2.10.3.1.2.2 No internal decay will see the inspection holes filled with 2 Genics Cobra rods and sealed with a tightly fitting removable plastic plug. Soil from "divots" will be returned and packed by stepping on "divot" areas.

2.10.4 Any pole that has been assigned for inspection/treatment and has received a ground line treatment 5 years or more prior to the current year's inspection program shall have a full ground-line excavation inspection/treatment.

2.10.5 Poles that have received a treatment less than 5 years **shall not** be treated during the current year's program unless visual and hammer sounding indicate need for further investigation.

2.11 The Contractor shall report work location(s) to the Duke Energy representative daily or advise Duke Energy if no work is to be performed on that day. If the Contractor fails to provide a daily work location, then Duke Energy assumes no work is being performed and no units will be paid for that day.

2.12 The Contractor shall obtain, at his expense, any necessary permits from any owner, municipality or other authority on whose premises the work is to be done prior to the start of work.

2.13 Accurate records of all work performed on each pole shall be collected as outlined on the "electronic data requirements" in Exhibit "E". All poles which are inspected and/or treated shall be identified by:

| | | |
|---|---|---|
| Pole Number | Year Manufactured | Height and Class |
| Species of Timber | Original Treatment | Effective Circumference |
| Manufacturer | Original Circumference | Descriptive Unit (T, D, T&D) |

2.14 Effective and original circumference is communicated electronically against each pole inspected. All electronic communication is in place to expedite transmittal/storage of data. Extent and location of decay will be noted in comments against pole (Example: Internal decay 2" pocket at 30" above ground-line).

All other pertinent information shall be noted in the remarks column (Example: address/directions for all follow-up maintenance sites.)

2.15 The Contractor will be required to collect pole information outlined in the "electronic data requirements" and supply computer generated pole summaries for each District or department as directed by Duke Energy. It is *imperative* that the pole number and the District be correctly identified for the data to be acceptable. Inaccurate data will be rejected and returned to the Contractor for correction. The Contractor is required to supply the Duke Energy T&D Administrator with electronic data formatted to Duke Energy specifications, see Exhibit "E". This data is to be submitted within 30 days of the completion of each District or department assignment.

2.16 Priority situations are communicated immediately by phone in addition to being noted on this report.

2.17 When a District area or other defined working grid is completed, the Contractor shall provide the Duke Energy T&D Administrator with a detailed summary of inspections, defects, and recommended reinforcement options before the invoice will be accepted.

2.18 All work shall be entirely satisfactory to Duke Energy and shall be subject to inspection by and approval of Duke Energy. The Contractor's Supervisor shall perform Quality Control inspection on no less than 1% of all poles inspected by each Foreman in each District. Poles are to be selected at random, re-excavated, treated and checked for accuracy and quality of work being performed. This Quality Control inspection is to be done at the Contractor's own expense. The 1% inspection shall be distributed equitably and proportionally across the crews doing the inspections/treatment and returned to the designated Duke Energy representative weekly.

2.18.1 Contractor audits are communicated electronically weekly to Duke with inspection data against the specific pole audited and tied to the inspection data electronically.

***3.0 Pole Inspection*** - All poles designated by Duke Energy are to be inspected per the following:

3.1 Above Ground line Inspection

3.1.1 All assigned poles shall be visually inspected from the ground line to the top for defects in the pole that would classify it as a reject. Also note any faulty equipment or components on the pole that are in need of maintenance or repair as formatted in Exhibit E. The codes will be discussed in detail with the successful bidder. If the pole is judged to be an obvious reject due to excessive damage, the pole is to be noted as "Rejected" and "Replace" on the electronic data requirements and no treatment is to be applied.

3.1.2 Hazardous conditions that may endanger life, property, or cause an outage shall be reported to the Duke Energy Representative immediately

3.1.3 All poles designated by Duke Energy to be have a full ground-line excavation inspection/treatment and that pass the above ground-line inspection but cannot be excavated at least 3/4 of the ground line circumference due to pavement, standing water, erosion, or for any other reason (example: electric riser), shall be sounded from ground line to 7 feet above ground line and have evaluation holes drilled to locate interior decay.

All evaluation holes shall be made a ½" by 18" drill bit at 30 degree off vertical. The evaluation holes shall be at 3" above ground-line, 6" above ground-line, 9" above ground-line, and 12 inches above ground-line rotating 90 degrees around the pole each time. Finding adequate structural integrity will result in the pole receiving an internal treatment. Internal treatment will result in each evaluation hole being filled with 2 Genics cobra rods and sealed with a tightly fitting removable plastic plug.

Such poles shall be noted as "Internally Treated" on the electronic data requirements. Poles sounded and drilled which, in the judgment of the Contractor, should be rejected, shall be noted as both "Extensive Internal Decay" and "Rejected" on the electronic data requirements. Poles that cannot be excavated and pass the sound and drill inspection shall be further evaluated for fumigation treatment as described in 4.3.

3.2 Below Ground-line Inspection

3.2.1 All poles that pass the above ground line inspection and are judged to be candidates for full excavation ground-line inspection treatment shall be excavated to a depth of 18 " below the ground-line. The width of the hole around the pole shall provide a minimum clearance of 4" at the bottom of the hole and 10" at the ground line. When necessary to protect turf on public or private property, the Contractor shall provide and use tarpaulins to place the dirt on while excavating the pole. Turf shall be carefully cut and replaced after the hole has been backfilled.

3.2.2 After excavation, the exposed portion of the pole butt shall be scraped and or wire brushed to remove all foreign material and examined for external decay. The ground-line circumference shall be measured and recorded on the electronic data requirements.

3.2.3 After scraping/wire brushing, the pole shall be sounded with a hammer for internal decay around the circumference from the bottom of the hole to 7 feet above ground line. If decay is suspected, the pole shall have evaluation holes drilled in the questionable area and as many evaluation holes drilled as may be necessary to determine the location and extent of the decay.

If scraping, brushing and sounding does not indicate decay, one evaluation hole shall be made just below the ground-line at a 30 degree angle off vertical.

All evaluation holes shall be made a ½" by 18' drill bit. All evaluation holes shall be loaded with 2 Genics Cobra rods and will be plugged with tightly fitting removable plastic plugs.

If decay extends eighteen inches below ground line, excavation shall continue to a depth of four inches below the decay, but not to exceed twenty-four inches below ground-line.

3.2.4 All loose, weathered and/or decayed wood shall be removed to at least six inches above ground line. Good or visually sound wood shall not be removed from the pole. Removal of decay shall be made with an approved tool; an ax or hatchet shall not be used for this purpose. All loose, decayed wood chips and pieces shall be removed from the hole and the surrounding area and disposed of properly.

3.2.5 Final circumference (effective ground line circumference) is to be measured at the narrowest point below ground line and checked against approved "Loading Tables", see Exhibit "D". Poles having sufficient sound wood to support their load shall be wrap & rod treated as appropriate. Poles not meeting this condition shall be rejected and noted on the electronic data requirements as "Rejected", tagged and evaluated for reinforcement as set forth in 3.3 "Rejected Poles" of this specification.

3.3 Rejected Poles

3.3.1 Rejected poles shall be marked with 1 1/2" x 1 1/2" square aluminum tags as follows:

3.3.1.1 Reject Replace Pole: one white tag placed six inches below Duke Energy pole tag.

3.3.1.2. High Priority Reject Replace Pole: two white tags placed side-by-side six inches below the Duke Energy pole tag.

3.3.1.3 Reject Reinforce Pole: one yellow tag placed six inches below Duke Energy pole tag.

3.3.2 Any pole having an average shell thickness of less than one inch around its complete circumference is to be considered a High Priority Reject Replace pole. All High Priority Reject Replace poles are to be reported to the Duke Energy Representative immediately and noted as high priority poles in the "Remarks" column.

3.3.3 Rejected poles shall be evaluated for reinforcement; poles with serious top defects shall not be recommended for reinforcement.

3.3.4 When follow-up remediation poles are reported, a 30 ft. or 35 ft. service/light pole will be replaced unless line/digger derrick truck access is not available. Please note truck access issues in remarks when directing reinforcement of such poles.

3.3.5 Reinforcement criteria are as follows:

3.3.5.1. Any internal decay at a hole drilled at 48 inches above ground-line and, if found, will disqualify a pole from pole reinforcement remediation and require pole replacement.

3.3.5.2. An average shell thickness of 2 inches between evaluation holes drilled in alternating quadrants at 3 inches, 6 inches, 9 inches, and 12 inches above ground-line. The 12 inch hole should line up above the just below ground line evaluation hole.

3.3.5.2. All poles recommended for reinforcement will have all evaluation holes filled with 2 Genics Cobra rods and a tightly fitting removable plastic plug.

***4.0 Pole Treatment*** - All poles that are reinforced shall receive an external ground line treatment and an internal/fumigant treatment.

Per 4.3.2 Impel (boron) rods are an approved fumigant. Genics Cobra Rods combine the Boron treatment capabilities of Impel Rods coupled with Copper treatment capabilities. The Boron enables treatment to flow up and down the pole in the straw fibers. The Copper enables treatment flow across fibers in the horizontal plane of the pole.

4.1 Full Excavation Ground line Treatment

4.1.1 A Duke Energy approved supplemental wood preservative (Genics External Wrap Treatment) shall be applied to the entire exposed surface of the pole from two inches above ground line to eighteen inches below ground line. The preservative shall be applied in accordance with the manufacturer's label instructions. Treated poles shall be noted as "Ground-line Treated." on the electronic data requirements.

4.1.2 All excavated holes shall be solidly backfilled and compacted to eliminate air pockets. The soil shall be replaced in six inch layers and solidly compacted before adding the next layer. Rocks or stones shall not be placed directly against the bandage and care shall be used to prevent the compaction from tearing the bandage. Backfills shall be mounded around the pole to at least three inches above the ground line to allow for settling. No debris or loose dirt shall be left in the pole area. All turf, flowers, etc. shall be replaced with care.

4.1.3. Inspection and treatment tags are designed to be stacked under the same nail and indicate the company, year inspected, and treatment types (rod and/or wrap).

4.2 Internal Treatment - All poles which have a heart decay, enclosed pockets or internal decay or which are infested with insects, but which have sufficient sound wood to support their load, shall be treated internally with an approved preservative, see Exhibit "A".

4.2.1 **Internal Decay Pockets or Insect Infestation** - Internal decay/infestation is treated with cobra rods at each location on a pole where sounding indicates potential decay. Any hole drilled where internal decay is not found is still treated with 2 Genics cobra rods and sealed with a removable plastic plugs.

4.3 Fumigant Treatment

4.3.1 All poles requiring a ground line treatment that cannot be excavated at least 3/4 around their ground line circumference for causes beyond the contractor's control such as concrete, blacktop paving, standing water, or other obstructions (Example: electric risers) shall be treated with a fumigant. Only large, significant roots and rocks will be accepted as a reason for a 3/4 excavation

4.3.1.1 All Douglas Fir and Cedar poles that pass the visual and the sound and drill inspections shall be treated with a fumigant ***unless*** they exhibit excessive checking and cracking or have internal decay pockets.

4.3.2 ***Fumigants*** - Genics Cobra Rods shall be the fumigant used unless specified differently by Duke Energy representative.

Genics Cobra Rods combine the Boron treatment capabilities of Impel Rods coupled with Copper treatment capabilities. The Boron enables treatment flow up and down the pole in the straw fibers. The Copper enables treatment flow across fibers in the horizontal plane of the pole.

4.3.2.1 The Contractor shall follow manufacturer's specifications for the application of fumigants.

4.3.2.2 The first hole in the installation of fumigant shall be at or below ground line unless a significant obstruction exists or there is insufficient sound wood.

4.3.2.3 Previously Treated Poles Requiring Re-treatment:

Old wooden plugs are extremely hard to drill out without damaging/further widening the holes for retreat. Further widening of the hole could compromise the ability to seal the hole after treatment is applied. The current DEO 2008 pole inspection shows that the pole will be retreated with new holes drilled and cobra rods applied appropriately with removable plastic plugs.

4.3.2.4 Poles receiving a fumigant treatment shall be marked with a suitable non-ferrous tag placed six inches below the pole tag, and such poles be noted as "Internal Treatment" on the electronic data requirements.

Cobra Rod and Cobra Wrap tags are placed under the same nail with the inspection tag.

## LINE PATROL REPORT (LRP)

**DEFINITION by LEVEL:**

**LEVEL 3 (L3)** – Imminent danger to the general public and/or system reliability.
***As stated in the procedural manual,*** *"When these situations are found, call the appropriate district Work Coordinator ASAP and follow-up with the MAXIMO work order number as soon as possible. (If the Work Coordinator is unavailable contact a district supervisor.) Some of these situations may require that you remain at the site to keep the area secure until district personnel arrive to assess the situation. It is IMPORTANT that you contact the Work Coordinator or District Supervisor as soon as the condition is found and NOT wait until a later date and time!"*

**LEVEL 2 (L2)** – Potential safety and system reliability issues.

**LEVEL 1 (L1)** – To be worked at the convenience of the districts.

**DURATION by LEVEL:**

The following LPR levels will be addressed within the following durations.

- L3 = 72 hours
- L2 = 60 working days max.
- L1 = 6 to 12 months
- L0 = No time frame, not a safety or reliability issue. Will do the repair work when other equipment at that location is repaired.

**EXAMPLES:**

**LEVEL 3 (L3)**

- Leaning pole creating a clearance problem
- Pole Top Pin (PTP) pulled out with conductor lying on the arm
- Broken down guy with potential of coming in contact with general public or phase or neutral conductors
- Active leaking/weeping oil from transformer (TRANS - LEAKING) (i.e. continuous oil running)
- Hole in transformer (TRANS - OTHER)
  - Include the transformer size (kVA) and voltage marked on the transformer.
- Holes in secondary pedestals
- Transformer shifted on pad exposing conductor (TRANS - OTHER)
- Two (2) *broken cross arm* braces
- Slack guys – when phase contact is possible and when it creates a system reliability threat
- Broken insulator/pothead skirts – unsure of physical characteristics
- Broken strands of conductor – unsure of physical characteristics
- Tree branches lying on lines causing imminent danger to the general public or system reliability.
- Exposed cable on riser pole from ground level to eight foot (8') in height
- Missing "penta" transformer bolt that cannot be re-installed by inspection personnel and **allows** foreign items to be introduced into the energized compartment of the transformer through the bolt hole.

**LEVEL 2 (L2)**

- Leaning pole
- Twisted cross arms
- Broken or damaged guys (other than those listed in L3)
- Transformer shifted on pad not exposing conductor
- Leaning transformer/pad/secondary pedestals
- Stained, surface rust or pitting found on transformers with no evidence of active weeping/leaking (TRANS - PAINT)
- One (1) broken cross arm brace
- Blown or broken lightning arresters
- Decayed pole top – only if equipment is being displaced
- Broken insulator/pothead shirts – couple of skirts
- Broken strands of conductor – couple of strands
- Broken pole ground on pole with equipment (transformers, capacitor banks, etc.) **(TRANSMISSION ONLY)**
- Bird holes
- Two (2) Pole Situations as noted in the directives above
- Buried anchor rod eyelet, guy wire or guy grip
- Pole climbers ("steps") lower than 8 feet
- Standing Orders described in bullet # 25, a-d

**LEVEL 1 (L1)**

- Guys improperly positioned (isolation)
- Missing radial switch tags
- Faded feeder designation tags
- Slack guys – when no phase contact is possible and when it does not create a system reliability threat
- Wood pins slipping
- Shoes hanging on line
- Broken pole ground on pole with NO equipment **(TRANSMISSION ONLY)**
- Exposed cable on riser pole above eight foot (8') ground level
- Disconnected overhead transformers still on poles

**LEVEL 0 (L0)**

- Missing "penta" transformer bolt that can or cannot be re-installed by inspection personnel and **__does not__** allow foreign items from being introduced into the energized compartment of the transformer through the bolt hole.
- Missing guy guards
- Broken **or missing** pole ground on **DISTRIBUTION ONLY** pole **WITH** equipment (transformers, capacitor banks, etc.)
- Broken **or missing** pole ground with no other driven grounds installed at least every ¼ mile on **DISTRIBUTION ONLY** poles, with NO equipment
- Missing switch tags (circuit switch tags)
- Missing pole tag
- *Missing aerial tag*
- Missing warning sign ("Danger Feedback" & "Loop Feed")
- Missing canister cap or canister
- **Miscellaneous-N/A**
- Missing phase designation tags (3 phase UG terminal poles only) (Originally listed as Level 2.)

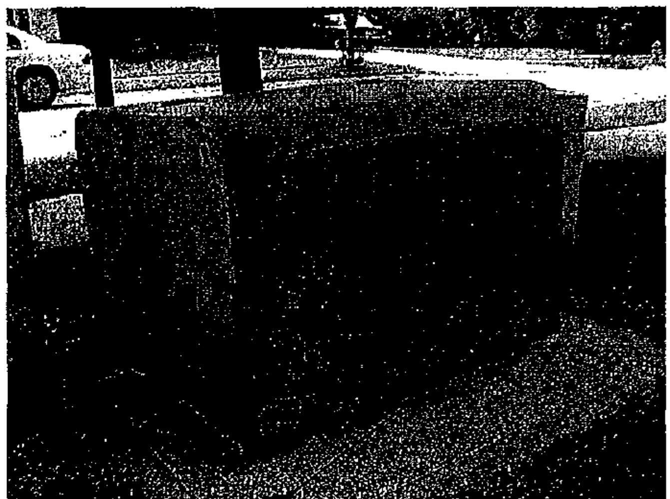
# Pad-Mount Transformer Inspection Priority Criteria for Reporting Cabinet Condition and Leakage

CONFIDENTIAL

**Low Priority – Level 1**

Pad-mount transformer paint condition is described by one of the following:

Paint is faded and the primer coating of paint (usually reddish-brown) is showing
Paint is chipping and the primer coat is showing
Paint is faded and surface rust (not pitted or there is no degradation of the metal) is showing



Paint chipping and primer showing

Surface rust and primer showing

## Pad-Mount Transformer Inspection Priority Criteria for Reporting Cabinet Condition and Leakage

CONFIDENTIAL

Primer Paint showing

**<u>Medium Priority – Level 2</u>**

Pad-mount transformer shows signs of leakage. This may be oil stains on the pad or the cabinet.
Pad-mount transformer has rust that is causing the metal to deteriorate. Pitting of the metal or corrosion that has eaten into the metal are examples of deterioration.

Pad stain with oil (not wet)

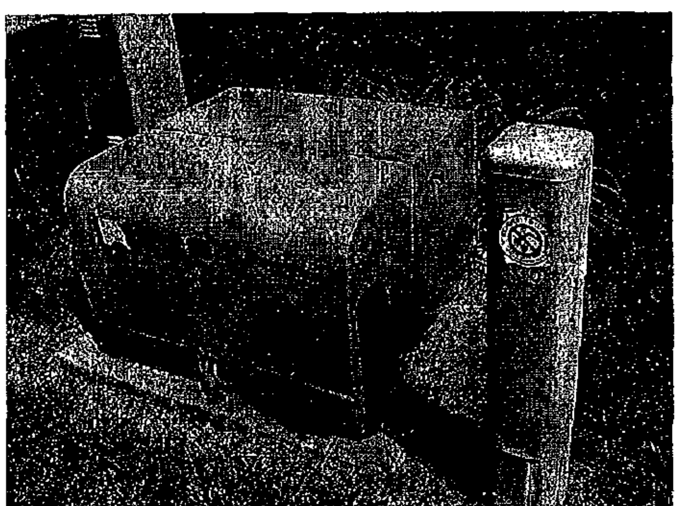
# Pad-Mount Transformer Inspection Priority Criteria for Reporting Cabinet Condition and Leakage

CONFIDENTIAL

Rusting at back edge

**High Priority – Level 3**

Pad-mount transformer has oil leaking.
Pad-mount transformer has rust holes that could allow an object to be inserted causing electrical contact



Wet oil on pad and cabinet

# 2009 OVR / Recloser Inspection Form

| Location/ Description | CG115LINE41 | Prev. Insp. Date: **12/18/2008** |
|---|---|---|
| | **Oxford-Middletown Pk. E/O Rt 503** | |

| | |
|---|---|
| Maximo #: 9474 | Maximo Loc.: **CG115LINE41** |
| Pole #: **44BT-20E** | District: **TODH (461)** |
| Substation: **7MILE** | Line/Circuit #: **41** |

| Recl Units: | **Device/Control Type, Please Circle One:** |
|---|---|
| Amps Rating: | OVR Recloser OVR Sectionalizer OVR Switch Hydraulic Recloser |

## Breaker/Mechanism - Operations Counters

| Phase A/1 | | Phase B/2 | | Phase C/3 | |
|---|---|---|---|---|---|
| 2008 Counter | 332 | 2008 Counter | 95 | 2008 Counter | 200 |
| 2009 Counter | | 2009 Counter | | 2009 Counter | |

## Over-Current/Control - Trip Operations Counters

| Phase A/1 | | Phase B/2 | | Phase C/3 | | Neutral | |
|---|---|---|---|---|---|---|---|
| Type | | Type | | Type | | | |
| MFR | | MFR | | MFR | | | |
| Serial # | | Serial # | | Serial # | | | |
| Curve | | Curve | | Curve | | | |
| AMPS | | AMPS | | AMPS | | | |
| 2007 Counter | | 2007 Counter | | 2007 Counter | | 2007 Counter | |
| 2008 Counter | | 2008 Counter | | 2008 Counter | | 2008 Counter | |

| **Self-Check - Please Circle One:** | |
|---|---|
| Pass | Fail |

| **Battery Test - Please Circle One:** | |
|---|---|
| Pass | Fail |

Date: / / 2009 Inspector: ____________

Comments:

Please return completed for to Karen Tanner, R&I Planning, Mail Drop: WP631 Printed: 9/30/2009

| Power Factor Test Intervals | | | | | |
|---|---|---|---|---|---|
| Equipment | Ratings | Acceptance Tests | Level One Tests | Level Two Tests | Level Three Tests |
| Circuit Breakers | Generator ≥ 44 kV with grading capacitors - Oil or SF6 | Yes | 4 years | 2 years | 2 years |
| Circuit Breakers | ≥ 345 kV Westinghouse type SFA | Yes | 3 years | 2 years | 2 years |
| Circuit Breakers | ≥ 345 kV Oil | Yes | 6 years | 3 years | 3 years |
| Circuit Breakers | ≥ 345 kV with grading capacitors - SF6 & Air(GA/GB, FX22, HVB, ATB, HPL) | Yes | 9 years | 6 years | 3 years |
| Circuit Breakers | 230 kV - Oil | Yes | 9 years | 6 years | 3 years |
| Circuit Breakers | 230 kV with grading capacitors - SF6 (HVB) | Yes | 9 years | 6 years | 3 years |
| Circuit Breakers | 115 - 138 kV - Oil | Yes | 9 years | 6 years | 3 years |
| Circuit Breakers | 44 - 69 kV - Oil | Yes | 9 years | 6 years | 3 years |
| Circuit Breakers | ≤ 34.5 kV | Yes | No | | |
| Current Transformers | 161 kV Class and Above - Oil (Assoc. with CB) | Yes | Test when assoc. CB is tested | 3 years | 2 years |
| Current Transformers | 161 kV Class and Above - Oil (Assoc. with Line) | Yes | 9 years | N/A | N/A |
| Grounding Transformers | 44 kV HV and below with condenser bushings | Yes | 9 years | 4 years | 2 years |
| Power Transformers | GSU | Yes | 4 years | 2 years | 2 years |
| Power Transformers | Unit Aux (Generator Connected) | Yes | 8 years | 4 years | 2 years |
| Power Transformers | Start-up/Reserve Aux (Grid Connected) | Yes | 6 years | 3 years | 2 years |
| Power Transformers | 161 kV HV and Above | Yes | 5 years | 3 years | 2 years |
| Power Transformers | 115 kV - 138 kV HV | Yes | 6 years | 3 years | 2 years |

| | | | | | |
|---|---|---|---|---|---|
| Power Transformers | 24.9 kV - 69 kV HV - 7.5 MVA (3Ph) and Above | Yes | 9 years | 4 years | 2 years |
| Station Service Transformers | 44 kV HV and Above with condenser bushings | Yes | 9 years | 4 years | 2 years |
| Voltage Regulators | Bus Regulators (No CB between VR and bank) | Yes | Test when assoc. bank is tested | 4 years | 2 years |
| Voltage Transformers (VTs or PTs) | 161 kV Class and Above | Yes | 9 years | 3 years | 2 years |
| Voltage Transformers (VTs or PTs) | 115 kV - 138 kV Class | Yes | N/A | 3 years | N/A |

Level One - This level is for equipment with no known problems and no history of problems.

Level Two - This level is for equipment with no known problems but there is a history of problems with other similar equipment.

Level Three - *This level is for a specific piece or type of equipment with known problems which are to be closely monitored.*