BEFORE THE

PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc. to Revise and Amend its Circuit Inspection Program.	))))	Case No. 12-1679 -EL-UNC

APPLICATION OF DUKE ENERGY OHIO, INC., TO REVISE AND AMEND ITS CIRCUIT INSPECTION PROGRAM

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1. Duke Energy Ohio, Inc., (Duke Energy Ohio or the Company) is an Ohio corporation engaged in the business of supplying electric transmission, distribution, and generation service in Adams, Brown, Butler, Clinton, Clermont, Hamilton, Montgomery, and Warren Counties in Southwestern Ohio to approximately 500,000 consumers, and supplying electric transmission and distribution service to approximately 180,000 customers who receive generation service from competitive retail electric service (CRES) providers.

2. Duke Energy Ohio is a "public utility" as defined by Sections 4905.02 and 4905.03, Revised Code, and an "electric distribution company," "electric light company," "electric supplier," and "electric utility" as defined by Section 4928.01, Revised Code.

3. In this Application, the Company requests approval, pursuant to Ohio Administrative Code (O.A.C.) Section 4901:1-10-27 (F), to revise some of the procedures set forth in its programs for inspection, maintenance, repair and replacement of its distribution circuits and equipment. Specifically, as a benefit of its SmartGrid deployment of distribution automation (DA), Duke Energy Ohio now has the capability to remotely and electronically operate and monitor the performance of its capacitor banks. All distribution line switched capacitor bank controls 12KV and greater, have

been, or will be upgraded to accommodate communications via digital cell to allow for remote operation and diagnostics, as well as enabling integrated Volt/VAR control.

4. As a result of the newly deployed DA technology, distribution line switched capacitor banks may be assessed in real time to assure that they are functioning properly. These capacitor banks are currently being inspected visually on a yearly rotation. If a capacitor bank fails after an inspection, it is possible for the capacitor bank to remain non-functioning for as long as one year. Under the new methodology, the Company will have information related to capacitor bank performance available to it in real time and will be able to address problems more expeditiously.

5. The changed inspection methodology, allowing inspections via electronic monitoring instead of requiring visual inspection, will result in savings that were anticipated as a result of the Company's SmartGrid deployment.

6. Attached to this Application a copy of the Company's currently approved Rule 27 Programs with edits to show the necessary change to the document. All changes are shown on page 3 of the attachment.

As set forth above, and pursuant to O.A.C. 4901:1-10-27 (F), Duke Energy Ohio requests the Commission's approval of necessary changes to its capacitor control inspection program to permit inspection via electronic remote monitor.

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 1 (L1) 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 3 (L3).

(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.

(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**

(f) All distribution line switched capacitor bank controls greater than 12 KV will be remotely monitored through DEO's SCADA system. Failed capacitors will alarm operators who will act to have them repaired upon receiving the alarm. Capacitor functionality will be validated through a database query run periodically to ensure proper operation of the capacitor.

Capacitor banks will still get a physical inspection within each five years via a line patrol program.

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. LEVEL 1 (L1) = 72 hours, LEVEL 3 (L3) = 60 working days maximum, LEVEL 5 (L5) = 6 to 12 months, and LEVEL 7 (L7) = no time frame, not a safety or reliability issue. The repair work for Level 7 issues shall be completed when other equipment is repaired at that location.

(g) 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~~ Inspection

A circuit breaker ~~test~~ inspection shall be performed every 3 years for all air, vacuum, gas, and oil circuit breakers. The purpose of this ~~test~~ inspection 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.