FILE

PUCO EXHIBIT FILING

Date of Hearing: November 7, 2018

Case No. 17-2344-EL-CSS

PUCO Case Caption:

In the Matter of the Complaint of

Citizens Against Clear Cutting, et al.,
Complainants

vs.

Duke Energy Ohio, Inc.,
Respondent

List of exhibits being filed: (Volume II)

Complainants Ex. 19→21, 23→34

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Reporter's Signature: Carolyn M. Burke
Date Submitted: 11/26/2018

BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

- - -

Citizens Against Clear Cutting, et al.,	:	
Complainants,	:	
vs.	:	Case No. 17-2344-EL-CSS
Duke Energy Ohio, Inc.,	:	
Respondent.	:	

- - -

PROCEEDINGS

before Ms. Megan Addison and Ms. Anna Sanyal, Attorney Examiners, at the Public Utilities Commission of Ohio, 180 East Broad Street, Room 11-A, Columbus, Ohio, called at 9:05 a.m. on Wednesday, November 7, 2018.

- - -

VOLUME II

- - -

ARMSTRONG & OKEY, INC.
222 East Town Street, 2nd Floor
Columbus, Ohio 43215-5201
(614) 224-9481 - (800) 223-9481

- - -

COMPLAINANT
EX 19

Duke Energy Ohio
Case No. 17-2344-EL-CSS
Citizens Against Clear Cutting Request for Production of Documents
Date Received: January 25, 2018

CACC-POD-01-003

REQUEST:

Produce and attach true and accurate copies of all emails sent or received by any employee of Duke Energy Ohio regarding Duke's plan to clear cut vegetation on properties owned by Complainants.

RESPONSE:

Objection. This Document Request seeks privileged and confidential documents that are protected by the attorney work product doctrine or the attorney client privilege. The Document Request also is overly broad and unduly burdensome because it is not limited to the transmission lines at issue in this case. Objecting further, it seeks information that is irrelevant and not likely to lead to the discovery of admissible evidence. Finally, the Document Request is vague and ambiguous as to the "plan" referenced therein, and also misstates the terms and provisions of the Company's Programs for Inspection, Maintenance, Repair and Replacement of Distribution and Transmission Lines, Section (f), as approved by Rule on June 13, 2017. Finally, this Interrogatory is vague and ambiguous as to the meaning of the phrase "clear cut" as such phrase is undefined.

PERSON RESPONSIBLE: Legal

From: Adams, Ron A
Sent: Tuesday, March 27, 2018 10:47 AM
To: Culbertson, David W; Burton, Bryce M; Holton, Steven; Ferrill, Mark A; Lux, Matthew B
Subject: Fwd: First Energy Practice

FYI

Sent from my iPhone

Begin forwarded message:

> **From:** "McQuaide, Johnathan D" <Johnathan.McQuaide@duke-energy.com>
> **Date:** March 27, 2018 at 10:34:30 AM EDT
> **To:** "Adams, Ron A" <Ron.Adams@duke-energy.com>
> **Subject: First Energy Practice**
>
> Ron, I spoke with Shawn Standish of First Energy this morning regarding their practices around IVM. He stated they do manage with a Wire Zone/Border Zone approach but do not have any formal set distances and/or heights. They manage for compatible vegetation within the ROW that will not impact the lines or impede access and this is done per site based on site specific factors. He did say as unformal number they look for nothing to mature taller than 3-5 ft. within their wire zone. With that being said they do manage per location and may leave a brush/small tree that have been there for years depending on line construction and species if they determine it is compatible.
>
> I asked if this approach has caused issue with property owners feeling that they were treated differently and he said that they have been able to defend their approach because they can show what is and is not compatible.
>
> I left a message with Richard Karber of AEP and am waiting to hear back from him.
>
> Johnathan McQuaide
> Transmission System Forester
> Office: 765-454-6525
> Cell: 765-620-5227
>
> DUKE ENERGY

COMPLAINANT
EX 20

BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Commission's	)	
Review of the Ohio Power Company's	)	
Revised Vegetation Management Program	)	**Case No. 12-3320-EL-ESS**
Resulting from Commission	)	
Case No. 11-346-EL-SSO et al.	)	

Ohio Power Company's Commission Requested
Revised Vegetation Management Program

On August 8, 2012 the Commission approved an Electric Security Plan for Ohio Power Company ("AEP Ohio" or "Company"), including approval of the continuance of the Enhanced Service Reliability Rider (ESRR) through 2014 in Commission Case Nos. 11-346-EL-SSO et al. ("*ESP II Order*"). As part of the approval of the ESRR, the Commission instructed the Company to file a revised vegetation management program reflecting the end-to-end cycle trimming which is to begin in 2014. Specifically the Commission stated:

> We direct AEP-Ohio to file a revised vegetation management program consistent with this Order and Rule 4901:1-10-27(E)(2) and (3), O.A.C., by no later than December 31, 2012. We see no need to wait until December 2013 for the filing, as requested by Staff, in light of our ruling in the Order

This filing represents AEP Ohio's 2014 vegetation management program. AEP Ohio asks that this filing have an effective date of no earlier then January 1, 2014, since it will not reflect the current vegetation management program until that timeframe. This will allow for AEP Ohio's current filed and approved vegetation work-plan to remain in place until the end of 2013. The Company may make additional changes to the 2014 plan during 2013 if needed. Any changes made would follow the normal filing and approval period as outlined in Rule 4901:1-10-27(F)(1).

AEP Ohio is filing a redline version of the changes as well as a clean copy of the changes to the distribution vegetation management section. AEP Ohio has not filed the entire maintenance program so that changes could be made to other sections prior to the effective date of this forestry maintenance section on January 1, 2014.

Respectfully submitted,

/s/ Steven T. Nourse

Steven T. Nourse
Matthew J. Satterwhite
American Electric Power Service Corporation
1 Riverside Plaza, 29th Floor
Columbus, Ohio 43215
Telephone: (614) 715-1608
Fax: (614) 716-2950
Email: stnourse@aep.com
mjsatterwhite@aep.com

Counsel for Ohio Power Company

ATTACHMENT 1

Table of Contents

Distribution: Right-of-Way Vegetation Control

Program Details

The objective of AEP Ohio's vegetation management program is to address public safety and service reliability in a cost effective manner. A well-planned vegetation management program should be long-term and should address vegetation issues through three key components. The first component is cyclic right-of-way clearing which proactively maintains vegetation on all circuits. Second is a reactive component that addresses immediate outage and safety concerns. The third aspect of the program is a quality of service component that is reliability based ~~and includes breaker zone clearing,~~ remediation of Rule 11 worst performing circuit vegetation issues, and correction of intermediate cycle vegetation issues caused by fast growing tree species, also known as cycle busters.

An effective vegetation management program will prescribe a maintenance plan for each circuit being addressed. The program should utilize best practices and prescriptions should take into account the location of rights-of-way, the types of vegetation present, the environmental impact of the work being performed and any restrictions in the program plan. This approach is referred to as an integrated vegetation management plan or IVM. The considerations to be taken into account include, but are not limited to:

- Type of maintenance treatment, i.e. mechanical clearing with mowers or mechanical pruning, manual climbing and pruning, herbicide application, etc., based on right-of-way and environmental conditions;
- A priority and schedule of treatment by line/circuit or section within a circuit;
- Cost of treatment

As the plan progresses over time, these work prescriptions will change based on the size and type of vegetation. The initial prescription for clearing an easement may include several types of activity such as: pruning, removing, mowing and herbicide treatment. In four years that same easement's work prescription may only require herbicide treatment. AEP Ohio's Forestry staff and contractors continuously work to insure the appropriate prescription is utilized to increase effectiveness and efficiency.

AEP Ohio Vegetation Management Program Elements

- Forestry's annual work plan
- Rule 11 Worst Performing Circuits
- Unscheduled Work
- New Construction
- Storm Work

Annual Work Plan – With approval in March 2009 and August 2012 of AEP Ohio's Enhanced Vegetation Management Program, AEP Ohio ~~is moving~~ has moved to a 4-year full circuit vegetation clearing program beginning in 2014. ~~In order to put the systems in position for the wholesale move to a 4-year cycle, AEP Ohio, over the 5-year period 2009-2013, will prepare the distribution systems for the move to a 4-year cycle. This 5-year preparatory period will allow AEP Ohio to prepare the systems through end to end~~

~~clearing of all circuits and gathering of necessary data to implement an effective 4-year, program.~~ End-to-end clearing of circuits involves the clearing of vegetation from all overhead primary lines, from the start of the circuit at the substation to the end of the primary line. AEP Ohio's line clearance guidelines are attached as Exhibit A.

~~In 2008, AEP Ohio began a 4 year program to clear circuit breaker zones of vegetation in order to reduce tree related circuit breaker lockouts and improve reliability and customer satisfaction. A circuit's breaker zone is the section of distribution line from the circuit breaker in the substation to the circuit's first downstream automatic sectionalizing device. A fault in the breaker zone will interrupt service to all customers served by that circuit.~~

~~When the breaker zone program began in 2008, a 4 year plan was laid out that prioritized the circuits based upon historical tree related outage performance. The circuits with the worst performance were scheduled to have their breaker zones cleared early on in the cycle. 2009 is the second year of the 4 year breaker zone program.~~

~~During this first year (2009) of the 5 year preparatory period AEP Ohio will begin completing end to end clearing on the circuits that had their breaker zones cleared in 2008. In the second year AEP Ohio will begin end to end clearing of the circuits that had their breaker zones cleared in 2009. It should be noted that, as part of the work going forward for end to end clearing of the 2008 and 2009 breaker zone circuits, AEP Ohio will inspect the breaker zones again and clear any vegetation necessary to make it through the cycle.~~

~~The 4 year breaker zone program started in 2008 is to be modified in 2010. In 2010 and 2011 AEP Ohio will do minimal clearing of the breaker zones of the remaining circuits. Vegetation within the breaker zones of these circuits will be addressed as necessary to carry them through to the planned end to end clearing of the circuit. Full end to end clearing will occur within one to two years of initially trimming the breaker zone.~~

~~The circuits are prioritized and work plans are developed based on historical tree related reliability performance and grouping of circuits served from the same substation for cost effectiveness.~~ AEP Ohio's work plans consist of removing or pruning trees in and out of right-of-way, pruning mature trees not in the line but that could be within a 4-year period, mowing overgrown right-of-way with a follow up herbicide application and removing overhang above multiphase lines. Overhang above single phase lines is either totally removed or removed to provide 10 feet of hinge or swing clearance above the conductor.

Tree removals are emphasized to promote long-term vegetation control. This requires a collaborative effort with property owners and community leaders. Soft wooded, fast growing tree species are removed where possible. Where removal permission is not obtained, fast growing species are pruned to greater clearances than slower growing varieties. Young trees of any species that have sprouted up naturally, commonly referred to as volunteer trees, are controlled with herbicides. Stump grinding/removal and/or tree replacements are offered on a limited basis as a tool to aid in securing permission for tree removals where there are easement related restrictions.

Once the annual work plan is developed, graphics personnel provide copies of the necessary detailed circuit maps to be used for the program. In addition, AEP Ohio personnel identify tree conditions through the course of their everyday work.

During planned clearing, each vegetation unit needing to be pruned, removed or other type of treatment is noted during a pre-planning process for each circuit. ~~These units are recorded on circuit maps and assigned to contractor tree crews to perform the work. Copies of the completed work plan maps and time sheets are kept on file at the offices of Forestry staff. AEP Ohio is currently investigating the use of GIS based mapping as an electronic planning and data collection tool for all future work planning.~~ AEP Ohio has developed and adopted the use of a GIS based circuit mapping system (Smallworld) to capture this work plan information. This system was developed in collaboration with ArborMetrics Solutions Inc. and Asplundh Tree Expert Co. to electronically collect distribution forestry work plan data from each work planner while in the field. Each planner is provided a mobile computer with electronic maps for their assigned work areas. Planners can collect and record work information and routinely synch multiple times each work day with the ArborMetrics server to create a circuit work plan. Twice a week ArborMetrics sends that information to AEP servers where it is then loaded into and updates the Smallworld maps and is made available to the AEP Ohio distribution foresters for use. AEP foresters can develop and print a manifest document and circuit map for each specific circuit work project. A variety of information is collected for each circuit or portion of a circuit and includes such information as customer / landowner contact information, work units type and quantity, work hazards, location of the work, type of work needed, and special alerts. Currently this system is used only with AEP Ohio's primary vendor Asplundh Tree Expert Co; other contractors and some work plan information is still collected on paper maps.

A third party ~~auditor~~ inspector (ACRT) is currently used in conjunction with on-going AEP Ohio forestry staff inspections to assure work is completed to contract and guideline specifications. These inspections are filed in each forester's office and also entered in the RWM (Right-of-Way Maintenance) database.

Rule 11 Worst Performing Circuits – AEP Ohio annually submits to the PUCO a list of their 8% worst performing circuits. A number of these circuits have had tree-related outages and AEP Ohio Forestry works closely with the districts to develop comprehensive action plans to improve service reliability on these circuits.

Required work may involve extensive end-to-end clearing or isolated Quality of Service clearing (protective zone, one or more laterals, etc.) to address the tree reliability of the circuit. A specific forestry action plan is developed for each circuit in conjunction with the district's remedial plan to improve service reliability for each of these circuits.

Unscheduled Work – AEP Ohio Forestry deals with a dynamic, living system. Variables such as tree species, weather patterns and soil conditions all affect initial tree growth and the re-growth rates of pruned trees. Examples include isolated stands of fast growing

trees or vines growing on AEP Ohio poles and hardware that may affect only a portion of the circuit's overall reliability.

Even the most aggressive line clearance program must still make allowances for responding to isolated tree-related outages, reliability issues and customer requests. AEP Ohio Forestry has traditionally dedicated a percentage of its total budget and crew strength for this type of work that is incremental to the work plan.

New Construction Clearing – AEP Ohio Forestry clears easements in advance of new line construction activities. This work is accomplished to establish an initial cleared width and height for the conductors. Subsequent re-clearings on these lines are based on the extent of initial clearing.

Storm Work – AEP Ohio foresters and contract tree crews respond to district requests to clear trees within AEP Ohio easements to restore electrical service during storm restoration efforts or to prevent an imminent outage or safety hazard.

Additional Program Basics

Customer Relations & Community Involvement

AEP Ohio values its customer relationships as much as our customers value their trees. Great efforts are made to strike a balance between service reliability and the homeowner's landscaped vegetation. AEP Ohio frequently utilizes telephone messages broadcast to all customers located on a circuit scheduled for vegetation work as a first notification of the work scheduled in the area. The messages notify the customer/landowner that a forestry representative will be in contact in the near future. Contract work planners utilize face-to-face communication and door cards to contact property owners before routine line clearance work is performed. Contact with local community leaders is also made prior to work beginning in many areas to assure trees located on municipal properties are properly maintained.

AEP Ohio has invested time and resources into public education concerning proper tree care and sound environmental practices. AEP Ohio's forestry group participates in many arboriculture organizations such as: National Arbor Day Foundation, Utility Arborist Association, International Society of Arboriculture, and other various state and local vegetation management organizations. Many of the staff are certified arborists and/or licensed by the Ohio Department of Agriculture for herbicide and tree growth regulator application. The AEP Ohio Forestry group has developed and distributes an all-purpose tree care book called 'The Right Tree.' AEP Ohio Forestry also conducts community forum presentations based on the 'The Right Tree' to local and regional groups.

While AEP Ohio Forestry has gone to great lengths to satisfy our customers there are times when a property owner lodges a complaint either directly to the companies or to the Commission. Forestry complaints can be grouped into two simplistic categories: a) a customer wants their tree(s) trimmed and it falls outside the scope of AEP Ohio's responsibility or AEP Ohio is unable to address the concern in a timeframe suitable to the

customer; b) AEP Ohio has worked on the property and the end result is undesirable to the customer. Complaints are viewed as inputs as to potential program changes and AEP Ohio works diligently to amicably resolve any differing points of view.

Maintenance

AEP Ohio has adopted clearing guidelines that provide ample clearances from conductors and appurtenances. Costs for right-of-way clearing are effectively managed through recently completed vegetation clearing contract bid process (RFP). Asplundh Tree Expert Company is AEP Ohio's primary clearing contractor, however, AEP Ohio also has in place contracts with multiple vegetation clearing vendors and annually requests firm clearing cost pricing (lump sum) for a percentage of the scheduled line miles that are worked each year. All contractors are required to use of manual and mechanical clearing methods and various chemical applications. Customers are notified of vegetation management to be done in their area. This communication enhances productivity and customer relations.

Aerial Saw Pruning

AEP Ohio contracts with Aerial Solutions, Inc. and Haverfield Aviation, Inc. to remove lateral vegetation growth from our rights-of-way using aerial saws. Suspended on a vertical boom beneath a helicopter, and powered by a separate motor, a series of rotary blades quickly, safely, and efficiently prune trees along the edge of the right-of-way. Rights-of-way maintained with the aerial saw normally possess the following characteristics: steep, mountainous terrain; limited access, and prohibitive costs to trim by conventional means. ~~On readily accessible lines, traditional tree trimming crews use bucket trucks or skidder mounted saws or hand climb each tree individually. In just a few hours the aerial saw can clear remote lines that would take ground crews weeks or months to complete.~~

The aerial saw eliminates the need for workers to enter private property to reach rights-of-way. There is no need to make repeated trips across private property, eliminating the possibility of damaging lands by hauling heavy equipment across a customer's property. ~~The aerial saw also eliminates the need for workers to climb countless trees in close proximity to energized conductors, which reduces the opportunity for personal injury accidents.~~ Slash, brush and other debris from aerial saw operations is left along the edge of the right-of-way or mowed, leaving the center open for line access. This debris would also be left on site were AEP Ohio Forestry to clear these lines using conventional means. ~~Any brush that falls into roadways, waterways, fences or pastures is moved to a wooded edge of the right of way or is chipped or mowed. Clearing lines with the aerial saw prevents countless numbers of outages. Pilot training, radio contact and ground observers have significantly reduced the number of limb contacts with the line. Finally, brush growing on the floor of the right of way may be mowed or treated with a herbicide in advance of using the aerial saw to aid in increasing the pilot's visibility. The aerial saw is a powerful, cost effective tool enabling AEP Ohio Forestry to maintain more miles of line each year efficiently and improving overall system reliability.~~

Tree Growth Regulators

AEP Ohio employs the use of Tree Growth Regulators (TGRs), on a limited basis to control crown growth and reduce the frequency and amount that trees must be trimmed. TGRs control ~~regrowth~~ re-growth, allowing a tree to use its reserves to survive disease and insect attacks, and to withstand environmental assaults such as drought and pollution.

A treated tree grows more slowly, and requires less trimming meaning less biomass is removed when they are pruned. That results in a healthier, more natural-looking tree, and fewer visits from contract tree crews. TGR products reduce tree growth for two to eight years, depending on species, rates of growth and other environmental conditions.

Analysis/Assessment
A monthly review is conducted to determine if each area is meeting planned right-of-way clearing goals. This includes addressing the volume of work for worst performing circuits. Any necessary adjustments are made at this time, which would move work forces onto circuits with tree-related concerns or change the number of crews to solve any problems. Circuit reliability is continually monitored to address tree-related issues. Work force productivity is also reviewed to provide the most cost effective management of these forces. Tree crew sizes or types may be altered and different equipment or right-of-way maintenance techniques employed to insure the work is completed in an efficient manner.

~~**Maintenance**~~
~~AEP Ohio has adopted clearing guidelines that provide ample clearances from conductors and appurtenances. Costs for right-of-way clearing are effectively managed through our sole source contract with Asplundh Tree Expert Company, use of manual and mechanical clearing methods and various chemical applications. Customers are notified of vegetation management to be done in their area. This communication enhances productivity and customer relations.~~

Records/Reporting
RWM is an internally developed invoicing and data collection program that AEP Ohio utilizes to collect information and data from the contractors timesheets. Electronic invoicing is available for all contractors for payment through this system and information regarding circuit costs to clear, man-hours per work unit, and costs per work unit are collected. Various reports are available in RWM which help to monitor program effectiveness, contractor productivity and costs. The reports are available by distribution circuit, area and district within the program.

Transmission: Right-of-Way Vegetation Control

Program Details

Objective

The primary objective of the AEP Vegetation Management Program is to safeguard public and worker safety, prevent outages and to minimize reliability events from vegetation located within and adjacent to the rights-of-way in a safe, environmentally friendly, and cost-effective manner. AEP's vegetation management program is compliant with NERC FAC-003-1, which governs vegetation maintenance on lines operating at 200 kV and higher.

Inspection/Collection

AEP foresters conduct aerial patrols, except where the Federal Aviation Administration (FAA) or other ordinance prohibits flight, covering substantial portions of the transmission system to identify areas where attention may be needed to prevent vegetation from interfering with circuit operation. Where flights are prohibited, foot patrols are used to identify areas requiring maintenance.

Analysis/Assessment

Circuit criticality, historical data, line voltage, location, vegetative inventory information and land use are among the items considered when developing the annual vegetation management plan.

Outcome/Incorporation

The key measure of success is zero vegetation-related outages or operations on AEP's transmission system with a goal of achieving 25% less vegetation grow-in events over a 3-year period based upon 2005 statistics. AEP has a database called Transmission Operating Reporting System (TORS) that is used to track the operating record for each transmission line. A monthly TORS report is monitored to assess current vegetation reliability conditions or trends that may require mitigation measures.

Maintenance Activities

The AEP System Vegetation Management Program emphasizes tree removal to promote longterm vegetation control and to minimize future maintenance expenditures. AEP vegetation maintenance activities may consist of manually or mechanically removing and/or trimming trees in and out of the rights-of-way, selective or broadcast applications of herbicides, either aerially or from the ground, and the application of tree growth regulators.

Maintenance Frequency

Transmission Vegetation Management Program frequency is conditioned based and is not performed on a time based frequency schedule.

Records

A systematic vegetation management work plan is annually entered into Forestry Operation's Right of Way Maintenance (RWM) software system to allow tracking and

reporting of each year's progress and expenses. At the end of the calendar vegetation management cycle an annual completion report, including variances, is analyzed to provide guidance toward future plans.

General Discussion

The System Forestry group of AEP manages the vegetation along the transmission rights-of-way in Ohio. This is done through the implementation of a comprehensive, systematic integrated vegetation management (IVM) program designed to ensure that the vegetation along each transmission line is managed at the proper time, and in the most cost-effective and environmentally sound manner. AEP System Forestry is a centralized organization in both reporting and budgeting and primarily employs degreed foresters to oversee this program.

AEP's transmission system is managed on a prescriptive basis. Ongoing evaluation of the system, through comprehensive ground and aerial inspections by both Transmission Line and System Forestry personnel, provides the basic information used by System Forestry to develop its prescriptions. Additionally, line criticality, historical data, line voltage, location, vegetative inventory information and land use are among the items considered when developing management prescriptions. Factors considered by AEP when developing annual prescriptions include, but are not limited to:

- A priority and schedule of treatment by line/circuit;
- Type of treatment (mechanical, manual, herbicide) based on vegetative and environmental conditions;
- Cost of treatment

As succession occurs within the plant communities along the rights-of-way, these work prescriptions will change based on the sizes and types of vegetation present. Prescriptions, therefore, may include several activities such as tree trimming, tree removal, mechanical clearing and ground and aerial herbicide applications. Subsequent prescriptions may address isolated locations requiring "yard tree" trimming, the removal of danger trees outside the maintained rights-of-way or control of fast growing brush, before the line is again maintained in its entirety. AEP's System Forestry staff and its contractors continuously work to ensure the appropriate prescription is utilized to maximize effectiveness and efficiency.

Certified utility line clearance contractors provide the labor force for the ground based clearing and herbicide applications. FAA-licensed aerial contractors provide patrol, side trimming and herbicide application services. Contract work is designated and inspected by AEP foresters to ensure that the work is complete, performed in a timely manner, to AEP and industry standards, at reasonable cost, and with courtesy to property owners and to the public. Foresters travel throughout their assigned regions of the AEP companies to accomplish these tasks.

AEP Vegetation Management Program Elements

- Inspections
- Annual Work Plan

- Unscheduled Work
- Storm Work

Inspections – In general, 100% of the AEP transmission system is inspected each year by AEP Forestry. The vast majority of these miles are inspected aerially, wherever the FAA or other similar law or ordinance does not prohibit overhead flight, and locations of concern are noted using inspection forms, which are forwarded to AEP foresters. Forestry personnel investigate all observed and reported concerns and take appropriate actions to mitigate any threat to safety or reliability.

Detailed climbing inspections and/or ground patrols are also performed periodically by line maintenance crews on the AEP transmission system. Locations of concern identified during these "walking" inspections are also directed to AEP foresters for investigation and action. AEP foresters check locations of concern and appropriate actions are taken.

Annual Work Plan – Using inspection information and data from AEP asset managers, each line is prioritized based on its potential for tree-caused outages, criticality of the line, voltage, etc. For lines requiring attention, AEP work plans may consist of manually or mechanically removing and/or trimming trees on and off the rights-of-way, selective or broadcast applications of herbicides, either aerially or from the ground, and the application of tree growth regulators. The range of required work may either involve management of the vegetation along the entire line or simply addressing individual locations of concern. Site conditions, growth rates, length of time until the next anticipated maintenance, wind and conductor sag are all taken into consideration when determining which maintenance practices must be applied.

Transmission work plans are normally developed in the fall of the preceding year, and input from asset managers and line maintenance personnel is solicited during development. Finalized plans are normally presented to all interested parties for approval before being initiated.

AEP's program is an integrated vegetation management program utilizing a variety of management techniques depending upon the condition of the vegetation and the management tool to be applied.

Unscheduled Work – Forestry deals with a dynamic, living system. Variables such as tree species, weather patterns and soil conditions all affect tree growth and the regrowth rates of trimmed trees.

Even the most comprehensive line clearance program must make allowances for responding to isolated vegetation-related threats and customer requests. AEP Forestry has traditionally dedicated a portion of its total budget and crew strength to this type of work that is incremental to the work plan. Such work may include isolated stands of fast growing trees, vines growing on AEP poles and hardware, fire or insect damaged stands adjacent to the rights-of-way, or trees located in slips or slide areas.

Storm Work – AEP foresters and contract tree crews respond as required to trim, remove and clear trees within AEP easements to restore electrical service during storms or to prevent an imminent outage or safety hazard.

Additional Program Basics

Customer Relations & Community Involvement
Forestry personnel utilize face-to-face communication and door cards to contact resident property owners before routine line clearance work is done. AEP has invested time and resources into public education concerning proper tree care and sound environmental practices. AEP System Forestry participates in many organizations such as the National Arbor Day Foundation, the Utility Arborist Association, the International Society of Arboriculture, the U. S. Environmental Protection Agency's *Pesticide Environmental Stewardship Program*, and various state and local vegetation management organizations. AEP Corporate Communications in cooperation with Transmission Management has produced a brochure, Transmission Right of Way Clearing and Maintenance, *A Balanced Approach to Vegetation Management*, which is given to landowners and other community groups, outlining general policies for AEP's Transmission vegetation management program.

While AEP Forestry goes to great lengths to satisfy our customers there are times when a homeowner lodges a complaint either directly to AEP or to a state commission. Forestry complaints can be grouped into two categories: a) a customer wants their tree pruned and it falls outside the scope of AEP responsibility or AEP is unable to prune it in a timeframe suitable to the customer; and, b) AEP has pruned a tree and the result is unacceptable to the customer. Complaints are viewed as advice on potential program changes, and AEP works diligently to amicably resolve any differing points of view.

Tree Growth Regulators
Caring for trees under power lines requires regular pruning. Each new pruning places a tree under stress because it removes leaves and branches, which manufacture and store nutrients. This forces the tree to tap its reserves to grow new wood. Tree Growth Regulators (TGRs) control crown growth and reduce the frequency and amount that trees must be trimmed. TGRs control regrowth, allowing a tree to use its reserves to survive disease and insect attacks, and to withstand environmental assaults like drought and pollution.

A treated tree grows more slowly and requires less pruning, meaning fewer branches may be removed when it is re-pruned. That means a healthier, more natural-looking tree, and fewer visits from line clearance crews. TGR products reduce tree growth for two to eight years, depending on species, application rates and other environmental conditions.

Summary
AEP System Forestry continually seeks technological innovations and process improvements to maintain our vegetation management program as one of the best in the industry. AEP System Forestry personnel participate in and/or lead vegetation

management organizations such as: the Edison Electric Institute's Vegetation Management Task Force, the International Society of Arboriculture, the Utility Arborist Association, the U.S. EPA's Pesticide Environmental Stewardship Program, numerous state or regional vegetation management associations and numerous state and local urban and community forestry councils.

ATTACHMENT 2

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Distribution: Right-of-Way Vegetation Control

Program Details

The objective of AEP Ohio's vegetation management program is to address public safety and service reliability in a cost effective manner. A well-planned vegetation management program should be long-term and should address vegetation issues through three key components. The first component is cyclic right-of-way clearing which proactively maintains vegetation on all circuits. Second is a reactive component that addresses immediate outage and safety concerns. The third aspect of the program is a quality of service component that is reliability based remediation of Rule 11 worst performing circuit vegetation issues, and correction of intermediate cycle vegetation issues caused by fast growing tree species, also known as cycle busters.

An effective vegetation management program will prescribe a maintenance plan for each circuit being addressed. The program should utilize best practices and prescriptions should take into account the location of rights-of-way, the types of vegetation present, the environmental impact of the work being performed and any restrictions in the program plan. This approach is referred to as an integrated vegetation management plan or IVM. The considerations to be taken into account include, but are not limited to:

- Type of maintenance treatment, i.e. mechanical clearing with mowers or mechanical pruning, manual climbing and pruning, herbicide application, etc., based on right-of-way and environmental conditions;
- A priority and schedule of treatment by line/circuit or section within a circuit;
- Cost of treatment

As the plan progresses over time, these work prescriptions will change based on the size and type of vegetation. The initial prescription for clearing an easement may include several types of activity such as: pruning, removing, mowing and herbicide treatment. In four years that same easement's work prescription may only require herbicide treatment. AEP Ohio's Forestry staff and contractors continuously work to insure the appropriate prescription is utilized to increase effectiveness and efficiency.

AEP Ohio Vegetation Management Program Elements

- Forestry's annual work plan
- Rule 11 Worst Performing Circuits
- Unscheduled Work
- New Construction
- Storm Work

Annual Work Plan – With approval in March 2009 and August 2012 of AEP Ohio's Enhanced Vegetation Management Program, AEP Ohio has moved to a 4-year full circuit vegetation clearing program beginning in 2014. End-to-end clearing of circuits involves the clearing of vegetation from all overhead primary lines, from the start of the circuit at the substation to the end of the primary line. AEP Ohio's line clearance guidelines are attached as Exhibit A.

AEP Ohio's work plans consist of removing or pruning trees in and out of right-of-way, pruning mature trees not in the line but that could be within a 4-year period, mowing overgrown right-of-way with a follow up herbicide application and removing overhang above multiphase lines. Overhang above single phase lines is either totally removed or removed to provide 10 feet of hinge or swing clearance above the conductor.

Tree removals are emphasized to promote long-term vegetation control. This requires a collaborative effort with property owners and community leaders. Soft wooded, fast growing tree species are removed where possible. Where removal permission is not obtained, fast growing species are pruned to greater clearances than slower growing varieties. Young trees of any species that have sprouted up naturally, commonly referred to as volunteer trees, are controlled with herbicides. Stump grinding/removal and/or tree replacements are offered on a limited basis as a tool to aid in securing permission for tree removals where there are easement related restrictions.

Once the annual work plan is developed, graphics personnel provide copies of the necessary detailed circuit maps to be used for the program. In addition, AEP Ohio personnel identify tree conditions through the course of their everyday work.

During planned clearing, each vegetation unit needing to be pruned, removed or other type of treatment is noted during a pre-planning process for each circuit. AEP Ohio has developed and adopted the use of a GIS based circuit mapping system (Smallworld) to capture this work plan information. This system was developed in collaboration with ArborMetrics Solutions Inc. and Asplundh Tree Expert Co. to electronically collect distribution forestry work plan data from each work planner while in the field. Each planner is provided a mobile computer with electronic maps for their assigned work areas. Planners can collect and record work information and routinely synch multiple times each work day with the ArborMetrics server to create a circuit work plan. Twice a week ArborMetrics sends that information to AEP servers where it is then loaded into and updates the Smallworld maps and is made available to the AEP Ohio distribution foresters for use. AEP foresters can develop and print a manifest document and circuit map for each specific circuit work project. A variety of information is collected for each circuit or portion of a circuit and includes such information as customer / landowner contact information, work units type and quantity, work hazards, location of the work, type of work needed, and special alerts. Currently this system is used only with AEP Ohio's primary vendor Asplundh Tree Expert Co; other contractors and some work plan information is still collected on paper maps.

A third party inspector (ACRT) is currently used in conjunction with on-going AEP Ohio forestry staff inspections to assure work is completed to contract and guideline specifications. These inspections are filed in each forester's office and also entered in the RWM (Right-of-Way Maintenance) database.

Rule 11 Worst Performing Circuits – AEP Ohio annually submits to the PUCO a list of their 8% worst performing circuits. A number of these circuits have had tree-related

outages and AEP Ohio Forestry works closely with the districts to develop comprehensive action plans to improve service reliability on these circuits.

Required work may involve extensive end-to-end clearing or isolated Quality of Service clearing (protective zone, one or more laterals, etc.) to address the tree reliability of the circuit. A specific forestry action plan is developed for each circuit in conjunction with the district's remedial plan to improve service reliability for each of these circuits.

Unscheduled Work – AEP Ohio Forestry deals with a dynamic, living system. Variables such as tree species, weather patterns and soil conditions all affect initial tree growth and the re-growth rates of pruned trees. Examples include isolated stands of fast growing trees or vines growing on AEP Ohio poles and hardware that may affect only a portion of the circuit's overall reliability.

Even the most aggressive line clearance program must still make allowances for responding to isolated tree-related outages, reliability issues and customer requests. AEP Ohio Forestry has traditionally dedicated a percentage of its total budget and crew strength for this type of work that is incremental to the work plan.

New Construction Clearing – AEP Ohio Forestry clears easements in advance of new line construction activities. This work is accomplished to establish an initial cleared width and height for the conductors. Subsequent re-clearings on these lines are based on the extent of initial clearing.

Storm Work – AEP Ohio foresters and contract tree crews respond to district requests to clear trees within AEP Ohio easements to restore electrical service during storm restoration efforts or to prevent an imminent outage or safety hazard.

Additional Program Basics

Customer Relations & Community Involvement

AEP Ohio values its customer relationships as much as our customers value their trees. Great efforts are made to strike a balance between service reliability and the homeowner's landscaped vegetation. AEP Ohio frequently utilizes telephone messages broadcast to all customers located on a circuit scheduled for vegetation work as a first notification of the work scheduled in the area. The messages notify the customer/landowner that a forestry representative will be in contact in the near future. Contract work planners utilize face-to-face communication and door cards to contact property owners before routine line clearance work is performed. Contact with local community leaders is also made prior to work beginning in many areas to assure trees located on municipal properties are properly maintained.

AEP Ohio has invested time and resources into public education concerning proper tree care and sound environmental practices. AEP Ohio's forestry group participates in many arboriculture organizations such as: National Arbor Day Foundation, Utility Arborist Association, International Society of Arboriculture, and other various state and local

vegetation management organizations. All of the distribution forstry staff are certified arborists and/or licensed by the Ohio Department of Agriculture for herbicide and tree growth regulator application. The AEP Ohio Forestry group has developed and distributes an all-purpose tree care book called 'The Right Tree.' AEP Ohio Forestry also conducts community forum presentations based on the 'The Right Tree' to local and regional groups.

While AEP Ohio Forestry has gone to great lengths to satisfy our customers there are times when a property owner lodges a complaint either directly to the companies or to the Commission. Forestry complaints can be grouped into two simplistic categories: a) a customer wants their tree(s) trimmed and it falls outside the scope of AEP Ohio's responsibility or AEP Ohio is unable to address the concern in a timeframe suitable to the customer; b) AEP Ohio has worked on the property and the end result is undesirable to the customer. Complaints are viewed as inputs as to potential program changes and AEP Ohio works diligently to amicably resolve any differing points of view.

Maintenance

AEP Ohio has adopted clearing guidelines that provide ample clearances from conductors and appurtenances. Costs for right-of-way clearing are effectively managed through recently completed vegetation clearing contract bid process (RFP). Asplundh Tree Expert Company is AEP Ohio's primary clearing contractor, however, AEP Ohio also has in place contracts with multiple vegetation clearing vendors and annually requests firm clearing cost pricing (lump sum) for a percentage of the scheduled line miles that are worked each year. All contractors are required to use of manual and mechanical clearing methods and various chemical applications. Customers are notified of vegetation management to be done in their area. This communication enhances productivity and customer relations.

Aerial Saw Pruning

AEP Ohio contracts with Aerial Solutions, Inc. and Haverfield Aviation, Inc. to remove lateral vegetation growth from our rights-of-way using aerial saws. Suspended on a vertical boom beneath a helicopter, and powered by a separate motor, a series of rotary blades quickly, safely, and efficiently prune trees along the edge of the right-of-way. Rights-of-way maintained with the aerial saw normally possess the following characteristics: steep, mountainous terrain; limited access, and prohibitive costs to trim by conventional means.

The aerial saw eliminates the need for workers to enter private property to reach rights-of-way. There is no need to make repeated trips across private property, eliminating the possibility of damaging lands by hauling heavy equipment across a customer's property. Slash, brush and other debris from aerial saw operations is left along the edge of the right-of-way or mowed, leaving the center open for line access. This debris would also be left on site were AEP Ohio Forestry to clear these lines using conventional means.

Tree Growth Regulators

AEP Ohio employs the use of Tree Growth Regulators (TGRs), on a limited basis to control crown growth and reduce the frequency and amount that trees must be trimmed. TGRs control re-growth, allowing a tree to use its reserves to survive disease and insect attacks, and to withstand environmental assaults such as drought and pollution.

A treated tree grows more slowly, and requires less trimming meaning less biomass is removed when they are pruned. That results in a healthier, more natural-looking tree, and fewer visits from contract tree crews. TGR products reduce tree growth for two to eight years, depending on species, rates of growth and other environmental conditions.

Analysis/Assessment

A monthly review is conducted to determine if each area is meeting planned right-of-way clearing goals. This includes addressing the volume of work for worst performing circuits. Any necessary adjustments are made at this time, which would move work forces onto circuits with tree-related concerns or change the number of crews to solve any problems. Circuit reliability is continually monitored to address tree-related issues. Work force productivity is also reviewed to provide the most cost effective management of these forces. Tree crew sizes or types may be altered and different equipment or right-of-way maintenance techniques employed to insure the work is completed in an efficient manner.

Records/Reporting

RWM is an internally developed invoicing and data collection program that AEP Ohio utilizes to collect information and data from the contractors timesheets. Electronic invoicing is available for all contractors for payment through this system and information regarding circuit costs to clear, man-hours per work unit, and costs per work unit are collected. Various reports are available in RWM which help to monitor program effectiveness, contractor productivity and costs. The reports are available by distribution circuit, area and district within the program.

Transmission: Right-of-Way Vegetation Control

Program Details

Objective

The primary objective of the AEP Vegetation Management Program is to safeguard public and worker safety, prevent outages and to minimize reliability events from vegetation located within and adjacent to the rights-of-way in a safe, environmentally friendly, and cost-effective manner. AEP's vegetation management program is compliant with NERC FAC-003-1, which governs vegetation maintenance on lines operating at 200 kV and higher.

Inspection/Collection

AEP foresters conduct aerial patrols, except where the Federal Aviation Administration (FAA) or other ordinance prohibits flight, covering substantial portions of the transmission system to identify areas where attention may be needed to prevent vegetation from interfering with circuit operation. Where flights are prohibited, foot patrols are used to identify areas requiring maintenance.

Analysis/Assessment

Circuit criticality, historical data, line voltage, location, vegetative inventory information and land use are among the items considered when developing the annual vegetation management plan.

Outcome/Incorporation

The key measure of success is zero vegetation-related outages or operations on AEP's transmission system with a goal of achieving 25% less vegetation grow-in events over a 3-year period based upon 2005 statistics. AEP has a database called Transmission Operating Reporting System (TORS) that is used to track the operating record for each transmission line. A monthly TORS report is monitored to assess current vegetation reliability conditions or trends that may require mitigation measures.

Maintenance Activities

The AEP System Vegetation Management Program emphasizes tree removal to promote longterm vegetation control and to minimize future maintenance expenditures. AEP vegetation maintenance activities may consist of manually or mechanically removing and/or trimming trees in and out of the rights-of-way, selective or broadcast applications of herbicides, either aerially or from the ground, and the application of tree growth regulators.

Maintenance Frequency

Transmission Vegetation Management Program frequency is conditioned based and is not performed on a time based frequency schedule.

Records
A systematic vegetation management work plan is annually entered into Forestry Operation's Right of Way Maintenance (RWM) software system to allow tracking and reporting of each year's progress and expenses. At the end of the calendar vegetation management cycle an annual completion report, including variances, is analyzed to provide guidance toward future plans.

General Discussion
The System Forestry group of AEP manages the vegetation along the transmission rights-of-way in Ohio. This is done through the implementation of a comprehensive, systematic integrated vegetation management (IVM) program designed to ensure that the vegetation along each transmission line is managed at the proper time, and in the most cost-effective and environmentally sound manner. AEP System Forestry is a centralized organization in both reporting and budgeting and primarily employs degreed foresters to oversee this program.

AEP's transmission system is managed on a prescriptive basis. Ongoing evaluation of the system, through comprehensive ground and aerial inspections by both Transmission Line and System Forestry personnel, provides the basic information used by System Forestry to develop its prescriptions. Additionally, line criticality, historical data, line voltage, location, vegetative inventory information and land use are among the items considered when developing management prescriptions. Factors considered by AEP when developing annual prescriptions include, but are not limited to:

- A priority and schedule of treatment by line/circuit;
- Type of treatment (mechanical, manual, herbicide) based on vegetative and environmental conditions;
- Cost of treatment

As succession occurs within the plant communities along the rights-of-way, these work prescriptions will change based on the sizes and types of vegetation present. Prescriptions, therefore, may include several activities such as tree trimming, tree removal, mechanical clearing and ground and aerial herbicide applications. Subsequent prescriptions may address isolated locations requiring "yard tree" trimming, the removal of danger trees outside the maintained rights-of-way or control of fast growing brush, before the line is again maintained in its entirety. AEP's System Forestry staff and its contractors continuously work to ensure the appropriate prescription is utilized to maximize effectiveness and efficiency.

Certified utility line clearance contractors provide the labor force for the ground based clearing and herbicide applications. FAA-licensed aerial contractors provide patrol, side trimming and herbicide application services. Contract work is designated and inspected by AEP foresters to ensure that the work is complete, performed in a timely manner, to AEP and industry standards, at reasonable cost, and with courtesy to property owners and to the public. Foresters travel throughout their assigned regions of the AEP companies to accomplish these tasks.

AEP Vegetation Management Program Elements

- Inspections
- Annual Work Plan
- Unscheduled Work
- Storm Work

Inspections – In general, 100% of the AEP transmission system is inspected each year by AEP Forestry. The vast majority of these miles are inspected aerially, wherever the FAA or other similar law or ordinance does not prohibit overhead flight, and locations of concern are noted using inspection forms, which are forwarded to AEP foresters. Forestry personnel investigate all observed and reported concerns and take appropriate actions to mitigate any threat to safety or reliability.

Detailed climbing inspections and/or ground patrols are also performed periodically by line maintenance crews on the AEP transmission system. Locations of concern identified during these "walking" inspections are also directed to AEP foresters for investigation and action. AEP foresters check locations of concern and appropriate actions are taken.

Annual Work Plan – Using inspection information and data from AEP asset managers, each line is prioritized based on its potential for tree-caused outages, criticality of the line, voltage, etc. For lines requiring attention, AEP work plans may consist of manually or mechanically removing and/or trimming trees on and off the rights-of-way, selective or broadcast applications of herbicides, either aerially or from the ground, and the application of tree growth regulators. The range of required work may either involve management of the vegetation along the entire line or simply addressing individual locations of concern. Site conditions, growth rates, length of time until the next anticipated maintenance, wind and conductor sag are all taken into consideration when determining which maintenance practices must be applied.

Transmission work plans are normally developed in the fall of the preceding year, and input from asset managers and line maintenance personnel is solicited during development. Finalized plans are normally presented to all interested parties for approval before being initiated.

AEP's program is an integrated vegetation management program utilizing a variety of management techniques depending upon the condition of the vegetation and the management tool to be applied.

Unscheduled Work – Forestry deals with a dynamic, living system. Variables such as tree species, weather patterns and soil conditions all affect tree growth and the regrowth rates of trimmed trees.

Even the most comprehensive line clearance program must make allowances for responding to isolated vegetation-related threats and customer requests. AEP Forestry has traditionally dedicated a portion of its total budget and crew strength to this type of work that is incremental to the work plan. Such work may include isolated stands of fast

growing trees, vines growing on AEP poles and hardware, fire or insect damaged stands adjacent to the rights-of-way, or trees located in slips or slide areas.

Storm Work – AEP foresters and contract tree crews respond as required to trim, remove and clear trees within AEP easements to restore electrical service during storms or to prevent an imminent outage or safety hazard.

Additional Program Basics

Customer Relations & Community Involvement
Forestry personnel utilize face-to-face communication and door cards to contact resident property owners before routine line clearance work is done. AEP has invested time and resources into public education concerning proper tree care and sound environmental practices. AEP System Forestry participates in many organizations such as the National Arbor Day Foundation, the Utility Arborist Association, the International Society of Arboriculture, the U. S. Environmental Protection Agency's *Pesticide Environmental Stewardship Program*, and various state and local vegetation management organizations. AEP Corporate Communications in cooperation with Transmission Management has produced a brochure, Transmission Right of Way Clearing and Maintenance, *A Balanced Approach to Vegetation Management*, which is given to landowners and other community groups, outlining general policies for AEP's Transmission vegetation management program.

While AEP Forestry goes to great lengths to satisfy our customers there are times when a homeowner lodges a complaint either directly to AEP or to a state commission. Forestry complaints can be grouped into two categories: a) a customer wants their tree pruned and it falls outside the scope of AEP responsibility or AEP is unable to prune it in a timeframe suitable to the customer; and, b) AEP has pruned a tree and the result is unacceptable to the customer. Complaints are viewed as advice on potential program changes, and AEP works diligently to amicably resolve any differing points of view.

Tree Growth Regulators
Caring for trees under power lines requires regular pruning. Each new pruning places a tree under stress because it removes leaves and branches, which manufacture and store nutrients. This forces the tree to tap its reserves to grow new wood. Tree Growth Regulators (TGRs) control crown growth and reduce the frequency and amount that trees must be trimmed. TGRs control regrowth, allowing a tree to use its reserves to survive disease and insect attacks, and to withstand environmental assaults like drought and pollution.

A treated tree grows more slowly and requires less pruning, meaning fewer branches may be removed when it is re-pruned. That means a healthier, more natural-looking tree, and fewer visits from line clearance crews. TGR products reduce tree growth for two to eight years, depending on species, application rates and other environmental conditions.

Summary

AEP System Forestry continually seeks technological innovations and process improvements to maintain our vegetation management program as one of the best in the industry. AEP System Forestry personnel participate in and/or lead vegetation management organizations such as: the Edison Electric Institute's Vegetation Management Task Force, the International Society of Arboriculture, the Utility Arborist Association, the U.S. EPA's Pesticide Environmental Stewardship Program, numerous state or regional vegetation management associations and numerous state and local urban and community forestry councils.

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Case No(s). 12-3320-EL-ESS

Summary: Application Commission's Review of the OPC's Revised Vegetation Management Program Resulting from Commission Case No. 11-346-EL-SSO et al electronically filed by Mr. Steven T Nourse on behalf of Ohio Power Company

COMPLAINANT
EX 21

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of the Dayton Power and Light Company to Amend its Transmission and Distribution Inspection, Maintenance, Repair and Replacement Programs Pursuant to Section 4901:1-10-27, Ohio Administrative Code, Regarding Electric Companies.	)))))))	Case No. 14-1771-EL-ESS

APPLICATION OF THE DAYTON POWER AND LIGHT COMPANY TO AMEND ITS TRANSMISSION AND DISTRIBUTION INSPECTION, MAINTENANCE, REPAIR AND REPLACEMENT PROGRAMS

Pursuant to Section 4901:1-10-27(F)(1), the Dayton Power and Light Company ("DP&L" or "the Company") submits this application to amend its Transmission and Distribution Inspection, Maintenance, Repair and Replacement Programs ("Programs"). In support of the application, the Company has attached Exhibit A, redline to current Programs; and Exhibit B, clean version of proposed modifications to the Programs.

DP&L is a public utility and electric light company as defined by R.C. §4905.02 and §4905.03(C) respectively, and an electric distribution utility as defined by R.C. §4928.01(A)(6). Pursuant to Section 4901:1-10-27(E)(1), each electric utility and transmission owner shall establish, maintain, and comply with written programs, policies, procedures, and schedules for the inspection, maintenance, repair, and replacement of its transmission and distribution circuits and equipment ("Programs"). Section 4901:1-10-27(E)(2) provides that utilities and transmission owners shall file with the Commission the utilities' inspection, maintenance, repair, and replacement programs. Utilities and transmission owners must also file with the

Commission revisions and amendments to the Programs. Accordingly, descriptions of the Company's proposed amendments are set forth in sections I and II below.

I. Distribution Right of Way (Vegetation Management)

Effective with the 2015 program year, DP&L will adopt a cycle leveling process to transition to a work schedule that more closely maintains 20% of the vegetation conditions on an annual basis. The schedule will strive to achieve a more stable workload over the duration of the cycle. In some cases, circuits will be delayed (or accelerated) a maximum of one year from the original cycle schedule. This process will be completed at the end of 2019.

As part of this transition, DP&L will employ an "Inspect/Maintain" initiative for those circuits that experience a delay in full circuit maintenance. This initiative will include a full circuit patrol by a line clearance expert knowledgeable in the specifications of DP&L's vegetation management program. During the "Inspect/Maintain" patrols, any vegetation conditions found that may result in service interruptions will be mitigated as quickly as possible.

The Company also will amend its line clearance cycle from 60 months to 5 calendar years. The adoption of a 5 calendar cycle puts DP&L in a better operational position to plan and execute full circuit maintenance trimming and appropriately deal with contingencies that may arise. The strict 60 month cycle gives very little latitude to make adjustments to bid processes, work planning and customer notification and may hinder DP&L's ability to modify trimming priorities if specific reliability concerns arise that require schedule modification.

II. Relays

Beginning in 2015, DP&L will revise its transmission protective relay testing program to align with the new North American Electric Reliability Corporation ("NERC") Order, PRC-005-2; Protection System Maintenance Program that became effective in 2014. The NERC Order

establishes maintenance intervals for both unmonitored relays and monitored microprocessor protective relays. Table 1 illustrates the amendments associated with implementing NERC Order, PRC-005-2.

Table 1

Relay Type	Current Cycle (years)	Proposed Cycle (years)	Approximate Relay Count
Non-digital UFLS[1]	2	5	63
Digital UFLS	10	10	79
138kV digital	8	12	103
138kV non-digital	8	6	569
345kV digital	6	12	69
345kV non-digital	6	6	238
69kV digital	8	12	302
69kV non-digital	8	8	2623
12kV digital	10	12	406
12kV non-digital	10	10	2847

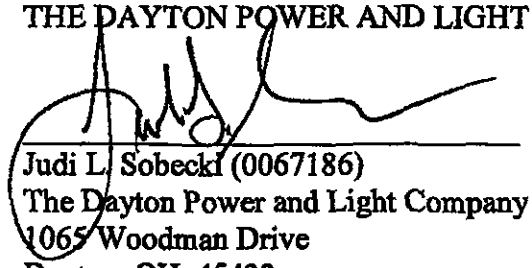
III. Conclusion

DP&L respectfully submits the above amendments to be incorporated within the Company's Transmission and Distribution Inspection, Maintenance, Repair and Replacement Programs beginning in 2015.

[1] Under Frequency and Load Shedding Relays

Respectfully Submitted,

THE DAYTON POWER AND LIGHT COMPANY



Judi L. Sobecki (0067186)
The Dayton Power and Light Company
1065 Woodman Drive
Dayton, OH 45432
Telephone: (937) 259-7171
Facsimile: (937) 259-7178
judi.sobecki@DPLINC.com

Attorney for the Dayton Power and Light Company

Exhibit A - Redline

The Dayton Power and Light Company
Inspection, Maintenance, Repair and Replacement of Transmission
And Distribution Facilities (Circuits and Equipment) Program

Introduction

The Dayton Power & Light Company has adopted a results-based approach to the development and evaluation of maintenance and inspection programs. All maintenance, inspection and capital planning practices contribute to overall system performance. Reliability performance is regularly reviewed and integrated into our programs. DP&L's system level reliability performance is measured by the following industry standard indicators

- SAIFI (System Average Interruption Frequency Index)
- CAIDI (Customer Average Interruption Duration Index)
- SAIDI (System Average Interruption Duration Index)

This report provides a detailed overview of Dayton Power and Light's maintenance and inspection programs. In addition to the programs listed herein, the following operational practices work to ensure safe and reliable operation of the electric transmission and distribution system:

- Dayton Power and Light maintains a 24-hour emergency response operation and all unplanned outages are promptly addressed.

- Adequate inventory is maintained such that the supply of parts does not impact restoration time.

- All employees performing maintenance and inspection work are properly trained to do their jobs safely. OSHA (Occupational Health and Safety Administration) guidelines are followed for inspection and maintenance programs, just as they are for all other types of work.

- All facilities are designed and operated to meet NESC (National Electric Safety Code) requirements. Any safety violation noted during an inspection is promptly repaired.

Table of Contents

a. Poles and Towers

1. Program objectives

The goal of this program is to inspect, maintain, repair and replace poles to ensure safe and reliable operation of the distribution system.

2. Overview of procedures

Poles with an actual or estimated vintage greater than 25 years, or those poles that have visible defects will be tested to determine suitability, structural soundness and need for maintenance, repair, or replacement (if applicable). Identified poles shall be sound tested, bored and ground line excavated by a third party contractor. Poles which fail visual and physical screening as referenced in the '*Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)*', will either be replaced or reinforced.

3. Identification of poles inspected and tested

Ten percent (10%) of DP&L's circuits will be identified on an annual basis for pole inspections and test[1]. All poles from the substation to the customer drop will be examined. Poles with an actual or estimated vintage greater than 25 years or older will be visually and physically inspected and tested. Poles that fail either the visual inspection or the physical inspection and test will be replaced or reinforced. At any point in the inspection process, a pole is designated as "fail", no additional visual or physical inspection or testing will be performed; the pole will be scheduled for replacement or reinforcement.

4. Justification for program schedule

Industry standards generally indicate a 10 year inspection cycle is warranted. Where possible, this evaluation program is to coincide with DP&L's Overhead Distribution Patrol Program (DLP), referenced in the '*Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)*'.

5. Process of documenting and recording program activities

Circuits identified for inspection will be electronically documented annually. Inspection data on all inspected poles will be gathered in accordance with the procedures outlined in the, '*Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)*'. Inspection data for all poles which receive physical inspection and testing will be tracked using GPS coordinates and/or pole numbers. All pole inspection and test information will be recorded into electronic database files or other appropriate records. Pole inspection information shall be kept in an electronic format that has the capability of generating statistical information. The inspection process also includes the identification and documentation of any two-pole conditions that may be present.

[1] DP&L will complete the first cycle of the pole inspection within 8 years (i.e. first cycle 2006 through 2013, second cycle 2016 – 2025). All subsequent cycles will be based upon a 10 year cycle.

Pole failure statistics will be tracked (effective 1/1/2006) and monitored by circuit to evaluate program performance and effectiveness.

6. **Process for reviewing program results and making repair/replacements based upon those findings.**
   The decision to repair or replace a pole will be based upon field testing results by qualified field personnel in accordance with inspection procedures outlined in the, *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*. Poles and Towers with recorded defects that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of the many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed.**
   Reliability Operations will review the progress of the inspections on a periodic basis to ensure program compliance. On an annual basis, the effectiveness of the program will be evaluated.

b. Circuit and Line Inspections

1. Program objectives

The goal of this program is to maintain reliable operation of the electric distribution system.

2. Overview of procedures

This primarily corrective program is designed to target reliability problem areas. Distribution circuit and branch line reliability performance is monitored, problem areas are identified and corrective action is taken as needed. The detailed procedures, which inspect all segments of the distribution circuit (primary and secondary) from the substation to the customer service drop are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*. The Program components are as follows:

a. ***Task Name***: Monitor circuit reliability performance
Frequency: Annually
Description: Identify circuits that are performing poorly in terms of reliability. Evaluate the outage history and physical condition of all circuits and initiate remedial action, if necessary, on the worst 8% of the circuits (as defined by the previously submitted DPL index).

b. ***Task Name***: Monitor branch line reliability performance
Frequency: Monthly
Description: Identify branch lines that are performing poorly in terms of reliability. Evaluate the outage history and physical condition of the branch lines and initiate remedial action if necessary.

c. ***Task Name***: Electric Distribution Patrol (Overhead Distribution Patrol Program)
Frequency: Every five years (20% of the overhead circuits will be inspected on an annual basis)
Description: The Overhead Distribution Patrol Program is designed to examine the condition of the hardware, conductor, poles, clearances, and tree conditions on the specified overhead distribution circuits. This comprehensive inspection includes the mainline overhead distribution facilities from the substation including all branch lines. The inspection process also includes the identification and documentation of any two-pole conditions that may be present.

3. Identification of equipment examined

Distribution poles, conductor and hardware.

4. Justification for program schedule

The methodology for this program is based on engineering judgment and industry standards.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described above. At a minimum, inspections and deficiencies are documented and maintained.

6. **Process for reviewing program results and making repairs/replacements based on those findings**

The decision to repair or replace is based on field experience and engineering judgment.

For the Overhead Distribution Patrol Program, the program will be reviewed periodically by Reliability Operations to ensure that the inspections are being conducted correctly and that sufficient progress is being made in conducting the inspections. Any recorded deficiencies noted during the Distribution Line Patrol Program that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution circuits and branch lines, if field inspectors identify a high percentage of pole replacements and repairs in a particular area, a capital project may be initiated to rebuild that section of the circuit.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed. In the case of distribution circuits and branch lines, reliability performance is reviewed on a monthly basis and problem areas are targeted as needed.

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

1. **Program objectives**
   The U.R.D. (Underground Residential Distribution) inspection program is a comprehensive program to verify the physical and visual condition of U.R.D. devices and to correct any safety issues. The detailed procedures, which inspect all segments of the distribution circuit (primary and secondary) from the substation to the customer's service are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

2. **Overview of procedures**

   a. ***Task Name***: Inspect U.R.D. equipment
   Frequency: The inspections will be performed by "map grid", not by circuit. 20% of all grids will be inspected yearly, with the entire system being inspected once every five years.
   Description: Inspect and make repairs as needed

3. **Identification of equipment examined**
   The underground device inspection program includes Pad-Mounted Transformers, Pedestals, LBC's (Load Break Centers), PMH's (Pad Mounted Housing Switches) and risers.

4. **Justification for program schedule**
   The program guidelines are based on NESC requirements, industry practice and company experience

5. **Process of documenting and recording program activities**
   Underground devices are highlighted on inspection prints and any repair items are documented on the "Departmental Order" form at the time of inspection. Devices requiring follow-up work are documented and tracked in the Maintenance Work Order (MWO) database until completion.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   The decision to repair or replace is based on the judgment of qualified field personnel. Field inspectors carry a repair kit and all minor repairs are completed at the time of the inspection. If more extensive work is required, the problem is documented and scheduled for repair. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

d. Line Reclosers

1. Program objectives

The goal of this program is to maintain reliable operation of key components of the distribution system.

2. Overview of procedures

Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

a. ***Task Name***: Line Recloser Inspections
Frequency: Annually
Description: Visually check physical condition, record counter reading, ambient temperature and load.

3. Identification of equipment examined

This program includes line reclosers.

4. Justification for program schedule

Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. Process for reviewing program results and making repairs/replacements based on those findings

The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

e. Line Capacitors

1. **Program objectives**
   The goal of this program is to maintain reliable operation of key components of the distribution system.

2. **Overview of procedures**
   Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'.*

   a. ***Task Name***: Capacitor Inspections
      Frequency: Annually
      Description: Check cutouts, switches and controls. Repair or adjust as needed.

3. **Identification of equipment examined**
   This program includes capacitors.

4. **Justification for program schedule**
   Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. **Process of documenting and recording program activities**
   Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

f. **Distribution Right of Way (Vegetation Management)**

1. **Program objectives**
The goal of this program is to maintain the reliability of the electric distribution system by preventing outages and equipment damage due to trees or other vegetation contacting the lines. The detailed procedures are outlined in the *'Dayton Power & Light Company Line Clearance Program Alliance (Rev. 2009)'*.

2. **Overview of procedures**

   a. ***Task Name***: Distribution line clearance
   Frequency: 5 Years (see Cycle "Levelization" Plan below)
   Description: Trim or remove trees and brush as needed. Clearances will vary depending upon tree species.

3. **Identification of equipment examined**
Complete a 5 year trim cycle from substation to the customer service drop with no circuit having a last trim date of greater than ~~60 months~~ 5 calendar years. Line clearance is performed on overhead primary and secondary distribution conductors using ANSI standards (including, but not limited to "A300" and "Z133.1-1994") as a basis for clearance.

4. **Justification for program schedule**
The 5 year cycle interval has been determined to be an optimal timeframe between circuit trims to limit tree outages caused by Trees in ROW and also to meet state regulatory needs.

5. **Process of documenting and recording program activities**
Line clearance activity is tracked in a database including last trim date, total circuit miles and circuit miles trimmed. Subcontractors update primary prints to document their progress. Records will be maintained for a minimum of 5 years.

6. **Process for reviewing program results**
Line clearance field inspectors audit subcontractor performance to ensure clearances are adequate. Deficient work is returned to the subcontractor for remediation. However, The Dayton Power & Light Company does note that exceptions to strict clearances may occur as a result of property owner refusal, political & societal factors, community ordinances and easement rights.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Audits are conducted to ensure contractor work meets specifications. Tree related outages are also reviewed on a monthly basis.

Cycle "Levelization" Plan (Start date 1-1-2015; End Date 12-31-2019)

Effective with the 2015 program year, DP&L will embark upon a "Cycle Levelization" process to transition to a work schedule that more closely maintains 20% of the vegetation conditions on an annual basis. The schedule will strive to achieve a more stable workload over the duration of the cycle. Circuits will be delayed a maximum of 1 year and in some cases accelerated 1 year from the original cycle schedule. This process will be completed at the end of 2019.

As part of this process, DP&L will employ an "Inspect/Maintain" process in the original cycle year for the particular circuit to ensure that the delay in the full circuit maintenance does not create undue safety and/or reliability issues. This "Inspect/Maintain" process will include a full circuit patrol by a person knowledgeable in the specifications of DP&L's vegetation management program. The patrol of the circuit will identify any vegetation conditions that may result in service interruptions prior to the full circuit maintenance to be performed the following year. These conditions will be mitigated as quickly as possible.

g. Substations

Substation Transformers

1. **Program objectives**
   The goal of this program is ensure reliable operation and to extend the operating life of substation class transformers.

2. **Overview of procedures**
   This program is primarily preventive in nature. In addition to the tasks listed below, predictive maintenance is applied to selected units in the form of continuous monitoring of nitrogen pressure, LTC/main tank temperature differential, and main tank oil temperature. Additional tasks such as internal visual inspections, megger test, etc. are performed as needed based on engineering judgment. Substation transformer loading is also continuously monitored to ensure that thermal limits are not exceeded. Routine scheduled tasks include the following:

   a. ***Task Name***: External Visual Inspection
      Frequency: Twelve times annually, with no inspection interval exceeding forty calendar days between inspections.
      Description: Check for oil leaks, ground faults, failed cooling fans, high temperature, high or low pressure, clogged or damaged grills, damaged gauges.

   b. ***Task Name***: Thermographic Imaging
      Frequency: Yearly
      Description: Check for hot spots due to loose connections.

   c. ***Task Name***: Dielectric Oil Breakdown Test
      Frequency: Every five years
      Description: Test the dielectric strength of the oil. Replace or filter oil if needed.

   d. ***Task Name***: LTC Maintenance
      Frequency: Every five years
      Description: Perform routine maintenance on LTC's

   e. ***Task Name***: Perform Doble Test
      Frequency: Every five years
      Description: Perform this test to check for insulation degradation.

3. **Identification of equipment examined**
   All substation transformers are included in this program.

4. **Justification for program schedule**
   Maintenance and inspection practices are based on engineering experience and industry practices. The criticality of equipment is determined based on the voltage class, system configuration and loading.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is made based on engineering judgment and life cycle cost. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Circuit Breakers

1. **Program objectives**
   The goal of this program is ensure reliable operation and extend the operating life of circuit breakers.

2. **Overview of procedures**

   a. ***Task Name***: Operational Test
      Frequency: As needed to ensure breakers are operated at least once per year
      Description: Test to ensure proper operation. Repair or adjust as needed.

   b. ***Task Name***: Visual Inspection
      Frequency: Twelve times annually, with no inspection interval exceeding forty calendar days between inspections.

      Description: Check for oil leaks, cracked or damaged bushings and other items depending on the type of unit. Repair or adjust as needed.

   c. ***Task Name***: Preventive Maintenance
      Frequency: Varies depending on type (i.e. oil, vacuum, SF6, etc.) and vintage

Description: Varies depending on type (i.e. oil, vacuum, SF6, etc.) and vintage

3. **Identification of equipment examined**
   This program includes all substation circuit breakers.

4. **Justification for program schedule**
   The breaker maintenance program is preventive in nature and methodology is based on company experience. The criticality of equipment is determined based on the voltage class, system configuration and loading.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is made based on engineering judgment and life cycle cost. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Relays

1. **Program objectives**
   The goal of this program is ensure reliable operation of relays.

2. **Overview of procedures**
   This program is preventive in nature. The testing schedule is as follows:

   a. ***Task Name***: Calibration and Trip Test
      Frequency: 345 kV and 138 kV – every six years for non-digital relays and every twelve years for digital relays,

~~138 kV,~~ 69 kV and 33 kV – every eight years for non-digital relays and every twelve years for digital relays,
12 kV and 4 kV – every ten years for non-digital relays and every twelve years for digital relays,
Under Frequency and Load Shed Relays – every 5 years for non-digital relays and every 10 years for digital relays.

Description: Calibrate and test to ensure proper operation.

3. **Identification of equipment examined**
   All relays are included in the program.

4. **Justification for program schedule**
   Procedures are based on company experience and manufacturer documentation. Criticality is determined based on voltage class.

5. **Process of documenting and recording program activities**
   Calibration/trip test results are documented on Relay Field Test Cards. The most recent test results are kept on file for every relay on the system. The Computerized Maintenance Management System (CMMS) shows the overall program schedule and status.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   After reviewing test results, the decision to repair or replace is made based on engineering judgment and manufacturer specifications.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Substation Switches

1. **Program objectives**
   The goal of this program is to maintain the reliable operation of switches in substations.

2. **Overview of procedures**
   This program is preventive in nature.

3. **Identification of equipment examined**
   All substation switches are included in the program.

4. **Justification for program schedule**
   Equipment criticality is determined based on voltage class and system configuration.

   a. ***Task Name***: Thermographic Inspection
      Frequency: Annually
      Description: Check for hot spots and repair or adjust as needed.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is based on company experience. If field personnel experience problems operating a particular switch, the switch will be maintained and lubricated. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

h. Air Break Switches

1. Program objectives

The goal of this program is to maintain reliable operation of key components of the distribution system.

2. Overview of procedures

Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

a. ***Task Name***: Visual Inspection of Air Break Switches
Frequency: Annually
Description: Visually check handle and locking mechanism, ground connections, insulators and lightning arresters.

3. Identification of equipment examined

This program includes air break switches.

4. Justification for program schedule

Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. Process for reviewing program results and making repairs/replacements based on those findings

The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

i. Voltage Regulators

1. Program objectives

The goal of this program is to maintain reliable operation of key components of the distribution system.

2. Overview of procedures

Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

a. ***Task Name***: Voltage Regulator Inspections
Frequency: Biennially
Description: Inspection that includes a control check, and visual check of the physical condition and indicator readings (min, max and current).

3. Identification of equipment examined

This program includes voltage regulators.

4. Justification for program schedule

Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. Process for reviewing program results and making repairs/replacements based on those findings

The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

j. Transmission

Transmission Lines

1. **Program objectives**
   The goal of this program is to maintain the reliability and safety of the electric transmission system including facilities ranging from 33kV to 345 kV.

2. **Overview of procedures**
   This preventive program consists primarily of visual and infrared inspections of structures/poles, insulators, switches and conductors. Guidelines for each voltage class/type are as follows:

345 kV

a. ***Task Name***: Helicopter Patrol
Frequency: Quarterly
Description: Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

138 kV

a. ***Task Name***: Helicopter Patrol or ground patrols for areas in Metro Dayton "No Fly" Zones.
Frequency: Quarterly
Description: Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

69 kV and 33 kV

a. ***Task Name***: Helicopter Patrol or ground patrols for areas in Metro Dayton "No Fly" Zones.
Frequency: Semiannually
Description: Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

Underground

a. ***Task Name***: Cathodic Protection System Test (if applicable)
Frequency: Yearly
Description: Test the integrity of the corrosion protection on the steel pipe housing for the underground transmission cable. Initiate corrective action as needed.

3. **Identification of equipment examined**
This program includes transmission structures/poles, insulators, switches and conductors from 33kV through 345 kV.

4. **Justification for program schedule**
The National Electric Safety Code is used as a guideline to establish minimum requirements. Criticality of equipment is determined by voltage class (i.e. 345 kV lines are the most critical).

5. **Process of documenting and recording program activities**
All deficiencies are documented and maintained in a database.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
The determination to repair or replace is based on the inspection findings combined with engineering judgment.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Transmission Right of Way (Vegetation Management)

1. **Program objectives**
   The goal of this program is to maintain the reliability of the electric transmission system by preventing outages and equipment damage due to trees or other vegetation contacting the lines.

2. **Overview of procedures**

   a. ***Task Name***: Line Clearance
   Frequency: Varies depending on line location, clearance requirements and species of vegetation present
   Description: Trim or remove trees and brush as needed. Clearance will vary based on the species of tree and the voltage class of the line.

   b. ***Task Name***: Herbicide Application
   Frequency: As needed.
   Description: Herbicide is applied as needed.

   c. ***Task Name***: Visual Inspection
   Frequency: "Walking patrols" are used to inspect the Metro Dayton "No Fly" Zones. These inspection patrols are scheduled three to four times per year.

   "Helicopter Patrols" are targeted as follows:

All 345kV circuits	Quarterly
All 138kV circuits	Quarterly
All 69kV circuits	Semi annually
All 33kV circuits	Semi annually

   Description: Visually inspect and identify any problems spots. Off-cycle trimming "hot-spotting" will be performed as needed to correct problem areas.

3. **Identification of equipment examined**
   All overhead transmission lines are included in the vegetation management program.

4. **Justification for program schedule**
   The vegetation management program is preventive in nature and the guidelines are based on company experience. Criticality of lines is determined based on voltage class and system configuration. DP&L also maintains and keeps current it's' Transmission Vegetation Management Program as required in NERC Standard FAC-003-1.

5. **Process of documenting and recording program activities**
   Program activities are recorded in a database.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Information from field inspections is entered into the transmission line clearance database. This database is used to track the progress of all work from originating inspection to final inspection. This database is targeted for weekly updates. All completed work is inspected for quality control.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Exhibit B - Clean

The Dayton Power and Light Company
Inspection, Maintenance, Repair and Replacement of Transmission
And Distribution Facilities (Circuits and Equipment) Program

Introduction

The Dayton Power & Light Company has adopted a results-based approach to the development and evaluation of maintenance and inspection programs. All maintenance, inspection and capital planning practices contribute to overall system performance. Reliability performance is regularly reviewed and integrated into our programs. DP&L's system level reliability performance is measured by the following industry standard indicators

- SAIFI (System Average Interruption Frequency Index)
- CAIDI (Customer Average Interruption Duration Index)
- SAIDI (System Average Interruption Duration Index)

This report provides a detailed overview of Dayton Power and Light's maintenance and inspection programs. In addition to the programs listed herein, the following operational practices work to ensure safe and reliable operation of the electric transmission and distribution system:

- Dayton Power and Light maintains a 24-hour emergency response operation and all unplanned outages are promptly addressed.

- Adequate inventory is maintained such that the supply of parts does not impact restoration time.

- All employees performing maintenance and inspection work are properly trained to do their jobs safely. OSHA (Occupational Health and Safety Administration) guidelines are followed for inspection and maintenance programs, just as they are for all other types of work.

- All facilities are designed and operated to meet NESC (National Electric Safety Code) requirements. Any safety violation noted during an inspection is promptly repaired.

Table of Contents

a. Poles and Towers

1. Program objectives

The goal of this program is to inspect, maintain, repair and replace poles to ensure safe and reliable operation of the distribution system.

2. Overview of procedures

Poles with an actual or estimated vintage greater than 25 years, or those poles that have visible defects will be tested to determine suitability, structural soundness and need for maintenance, repair, or replacement (if applicable). Identified poles shall be sound tested, bored and ground line excavated by a third party contractor. Poles which fail visual and physical screening as referenced in the '*Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)*', will either be replaced or reinforced.

3. Identification of poles inspected and tested

Ten percent (10%) of DP&L's circuits will be identified on an annual basis for pole inspections and test[1]. All poles from the substation to the customer drop will be examined. Poles with an actual or estimated vintage greater than 25 years or older will be visually and physically inspected and tested. Poles that fail either the visual inspection or the physical inspection and test will be replaced or reinforced. At any point in the inspection process, a pole is designated as "fail", no additional visual or physical inspection or testing will be performed; the pole will be scheduled for replacement or reinforcement.

4. Justification for program schedule

Industry standards generally indicate a 10 year inspection cycle is warranted. Where possible, this evaluation program is to coincide with DP&L's Overhead Distribution Patrol Program (DLP), referenced in the '*Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)*'.

5. Process of documenting and recording program activities

Circuits identified for inspection will be electronically documented annually. Inspection data on all inspected poles will be gathered in accordance with the procedures outlined in the, *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*. Inspection data for all poles which receive physical inspection and testing will be tracked using GPS coordinates and/or pole numbers. All pole inspection and test information will be recorded into electronic database files or other appropriate records. Pole inspection information shall be kept in an electronic format that has the capability of generating statistical information. The inspection process also includes the identification and documentation of any two-pole conditions that may be present.

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[1] DP&L will complete the first cycle of the pole inspection within 8 years (i.e. first cycle 2006 through 2013, second cycle 2016 – 2025). All subsequent cycles will be based upon a 10 year cycle.

Pole failure statistics will be tracked (effective 1/1/2006) and monitored by circuit to evaluate program performance and effectiveness.

6. **Process for reviewing program results and making repair/replacements based upon those findings.**
   The decision to repair or replace a pole will be based upon field testing results by qualified field personnel in accordance with inspection procedures outlined in the, *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*. Poles and Towers with recorded defects that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of the many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed.**
   Reliability Operations will review the progress of the inspections on a periodic basis to ensure program compliance. On an annual basis, the effectiveness of the program will be evaluated.

b. Circuit and Line Inspections

1. Program objectives

The goal of this program is to maintain reliable operation of the electric distribution system.

2. Overview of procedures

This primarily corrective program is designed to target reliability problem areas. Distribution circuit and branch line reliability performance is monitored, problem areas are identified and corrective action is taken as needed. The detailed procedures, which inspect all segments of the distribution circuit (primary and secondary) from the substation to the customer service drop are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*. The Program components are as follows:

a. ***Task Name***: Monitor circuit reliability performance
Frequency: Annually
Description: Identify circuits that are performing poorly in terms of reliability. Evaluate the outage history and physical condition of all circuits and initiate remedial action, if necessary, on the worst 8% of the circuits (as defined by the previously submitted DPL index).

b. ***Task Name***: Monitor branch line reliability performance
Frequency: Monthly
Description: Identify branch lines that are performing poorly in terms of reliability. Evaluate the outage history and physical condition of the branch lines and initiate remedial action if necessary.

c. ***Task Name***: Electric Distribution Patrol (Overhead Distribution Patrol Program)
Frequency: Every five years (20% of the overhead circuits will be inspected on an annual basis)
Description: The Overhead Distribution Patrol Program is designed to examine the condition of the hardware, conductor, poles, clearances, and tree conditions on the specified overhead distribution circuits. This comprehensive inspection includes the mainline overhead distribution facilities from the substation including all branch lines. The inspection process also includes the identification and documentation of any two-pole conditions that may be present.

3. Identification of equipment examined

Distribution poles, conductor and hardware.

4. Justification for program schedule

The methodology for this program is based on engineering judgment and industry standards.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described above. At a minimum, inspections and deficiencies are documented and maintained.

6. **Process for reviewing program results and making repairs/replacements based on those findings**

The decision to repair or replace is based on field experience and engineering judgment.

For the Overhead Distribution Patrol Program, the program will be reviewed periodically by Reliability Operations to ensure that the inspections are being conducted correctly and that sufficient progress is being made in conducting the inspections. Any recorded deficiencies noted during the Distribution Line Patrol Program that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution circuits and branch lines, if field inspectors identify a high percentage of pole replacements and repairs in a particular area, a capital project may be initiated to rebuild that section of the circuit.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed. In the case of distribution circuits and branch lines, reliability performance is reviewed on a monthly basis and problem areas are targeted as needed.

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

1. **Program objectives**
   The U.R.D. (Underground Residential Distribution) inspection program is a comprehensive program to verify the physical and visual condition of U.R.D. devices and to correct any safety issues. The detailed procedures, which inspect all segments of the distribution circuit (primary and secondary) from the substation to the customer's service are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'.*

2. **Overview of procedures**

   a. ***Task Name*:** Inspect U.R.D. equipment
      ***Frequency*:** The inspections will be performed by "map grid", not by circuit. 20% of all grids will be inspected yearly, with the entire system being inspected once every five years.
      ***Description*:** Inspect and make repairs as needed

3. **Identification of equipment examined**
   The underground device inspection program includes Pad-Mounted Transformers, Pedestals, LBC's (Load Break Centers), PMH's (Pad Mounted Housing Switches) and risers.

4. **Justification for program schedule**
   The program guidelines are based on NESC requirements, industry practice and company experience

5. **Process of documenting and recording program activities**
   Underground devices are highlighted on inspection prints and any repair items are documented on the "Departmental Order" form at the time of inspection. Devices requiring follow-up work are documented and tracked in the Maintenance Work Order (MWO) database until completion.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   The decision to repair or replace is based on the judgment of qualified field personnel. Field inspectors carry a repair kit and all minor repairs are completed at the time of the inspection. If more extensive work is required, the problem is documented and scheduled for repair. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

d. Line Reclosers

1. **Program objectives**
   The goal of this program is to maintain reliable operation of key components of the distribution system.

2. **Overview of procedures**
   Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'.*

   a. ***Task Name***: Line Recloser Inspections
   Frequency: Annually
   Description: Visually check physical condition, record counter reading, ambient temperature and load.

3. **Identification of equipment examined**
   This program includes line reclosers.

4. **Justification for program schedule**
   Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. **Process of documenting and recording program activities**
   Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

e. **Line Capacitors**

1. **Program objectives**
   The goal of this program is to maintain reliable operation of key components of the distribution system.

2. **Overview of procedures**
   Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'.*

   a. ***Task Name***: Capacitor Inspections
      Frequency: Annually
      Description: Check cutouts, switches and controls. Repair or adjust as needed.

3. **Identification of equipment examined**
   This program includes capacitors.

4. **Justification for program schedule**
   Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. **Process of documenting and recording program activities**
   Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

f. Distribution Right of Way (Vegetation Management)

1. Program objectives

The goal of this program is to maintain the reliability of the electric distribution system by preventing outages and equipment damage due to trees or other vegetation contacting the lines. The detailed procedures are outlined in the *'Dayton Power & Light Company Line Clearance Program Alliance (Rev. 2009)'*.

2. Overview of procedures

a. ***Task Name***: Distribution line clearance
Frequency: 5 Years (see Cycle "Levelization" Plan below)
Description: Trim or remove trees and brush as needed. Clearances will vary depending upon tree species.

3. Identification of equipment examined

Complete a 5 year trim cycle from substation to the customer service drop with no circuit having a last trim date of greater than 5 calendar years. Line clearance is performed on overhead primary and secondary distribution conductors using ANSI standards (including, but not limited to "A300" and "Z133.1-1994") as a basis for clearance.

4. Justification for program schedule

The 5 year cycle interval has been determined to be an optimal timeframe between circuit trims to limit tree outages caused by Trees in ROW and also to meet state regulatory needs.

5. Process of documenting and recording program activities

Line clearance activity is tracked in a database including last trim date, total circuit miles and circuit miles trimmed. Subcontractors update primary prints to document their progress. Records will be maintained for a minimum of 5 years.

6. Process for reviewing program results

Line clearance field inspectors audit subcontractor performance to ensure clearances are adequate. Deficient work is returned to the subcontractor for remediation. However, The Dayton Power & Light Company does note that exceptions to strict clearances may occur as a result of property owner refusal, political & societal factors, community ordinances and easement rights.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

   Audits are conducted to ensure contractor work meets specifications. Tree related outages are also reviewed on a monthly basis.

Cycle "Levelization" Plan (Start date 1-1-2015; End Date 12-31-2019)

Effective with the 2015 program year, DP&L will embark upon a "Cycle Levelization" process to transition to a work schedule that more closely maintains 20% of the vegetation conditions on an annual basis. The schedule will strive to achieve a more stable workload over the duration of the cycle. Circuits will be delayed a maximum of 1 year and in some cases accelerated 1 year from the original cycle schedule. This process will be completed at the end of 2019.

As part of this process, DP&L will employ an "Inspect/Maintain" process in the original cycle year for the particular circuit to ensure that the delay in the full circuit maintenance does not create undue safety and/or reliability issues. This "Inspect/Maintain" process will include a full circuit patrol by a person knowledgeable in the specifications of DP&L's vegetation management program. The patrol of the circuit will identify any vegetation conditions that may result in service interruptions prior to the full circuit maintenance to be performed the following year. These conditions will be mitigated as quickly as possible.

g. Substations

Substation Transformers

1. **Program objectives**
   The goal of this program is ensure reliable operation and to extend the operating life of substation class transformers.

2. **Overview of procedures**
   This program is primarily preventive in nature. In addition to the tasks listed below, predictive maintenance is applied to selected units in the form of continuous monitoring of nitrogen pressure, LTC/main tank temperature differential, and main tank oil temperature. Additional tasks such as internal visual inspections, megger test, etc. are performed as needed based on engineering judgment. Substation transformer loading is also continuously monitored to ensure that thermal limits are not exceeded. Routine scheduled tasks include the following:

   a. ***Task Name***: External Visual Inspection
      Frequency: Twelve times annually, with no inspection interval exceeding forty calendar days between inspections.
      Description: Check for oil leaks, ground faults, failed cooling fans, high temperature, high or low pressure, clogged or damaged grills, damaged gauges.

   b. ***Task Name***: Thermographic Imaging
      Frequency: Yearly
      Description: Check for hot spots due to loose connections.

   c. ***Task Name***: Dielectric Oil Breakdown Test
      Frequency: Every five years
      Description: Test the dielectric strength of the oil. Replace or filter oil if needed.

   d. ***Task Name***: LTC Maintenance
      Frequency: Every five years
      Description: Perform routine maintenance on LTC's

   e. ***Task Name***: Perform Doble Test
      Frequency: Every five years
      Description: Perform this test to check for insulation degradation.

3. **Identification of equipment examined**
   All substation transformers are included in this program.

4. **Justification for program schedule**
   Maintenance and inspection practices are based on engineering experience and industry practices. The criticality of equipment is determined based on the voltage class, system configuration and loading.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is made based on engineering judgment and life cycle cost. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Circuit Breakers

1. **Program objectives**
   The goal of this program is ensure reliable operation and extend the operating life of circuit breakers.

2. **Overview of procedures**

   a. ***Task Name***: Operational Test
   Frequency: As needed to ensure breakers are operated at least once per year
   Description: Test to ensure proper operation. Repair or adjust as needed.

   b. ***Task Name***: Visual Inspection
   Frequency: Twelve times annually, with no inspection interval exceeding forty calendar days between inspections.

   Description: Check for oil leaks, cracked or damaged bushings and other items depending on the type of unit. Repair or adjust as needed.

   c. ***Task Name***: Preventive Maintenance
   Frequency: Varies depending on type (i.e. oil, vacuum, SF6, etc.) and vintage

Description: Varies depending on type (i.e. oil, vacuum, SF6, etc.) and vintage

3. **Identification of equipment examined**
   This program includes all substation circuit breakers.

4. **Justification for program schedule**
   The breaker maintenance program is preventive in nature and methodology is based on company experience. The criticality of equipment is determined based on the voltage class, system configuration and loading.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is made based on engineering judgment and life cycle cost. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Relays

1. **Program objectives**
   The goal of this program is ensure reliable operation of relays.

2. **Overview of procedures**
   This program is preventive in nature. The testing schedule is as follows:

   a. ***Task Name***: Calibration and Trip Test
      Frequency: 345 kV and 138 kV – every six years for non-digital relays and every twelve years for digital relays,

69 kV and 33 kV – every eight years for non-digital relays and every twelve years for digital relays,
12 kV and 4 kV – every ten years for non-digital relays and every twelve years for digital relays,
Under Frequency and Load Shed Relays – every 5 years for non-digital relays and every 10 years for digital relays.

Description: Calibrate and test to ensure proper operation.

3. **Identification of equipment examined**
   All relays are included in the program.

4. **Justification for program schedule**
   Procedures are based on company experience and manufacturer documentation. Criticality is determined based on voltage class.

5. **Process of documenting and recording program activities**
   Calibration/trip test results are documented on Relay Field Test Cards. The most recent test results are kept on file for every relay on the system. The Computerized Maintenance Management System (CMMS) shows the overall program schedule and status.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   After reviewing test results, the decision to repair or replace is made based on engineering judgment and manufacturer specifications.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Substation Switches

1. **Program objectives**
   The goal of this program is to maintain the reliable operation of switches in substations.

2. **Overview of procedures**
   This program is preventive in nature.

3. **Identification of equipment examined**
   All substation switches are included in the program.

4. **Justification for program schedule**
   Equipment criticality is determined based on voltage class and system configuration.

   a. ***Task Name***: Thermographic Inspection
      Frequency: Annually
      Description: Check for hot spots and repair or adjust as needed.

5. **Process of documenting and recording program activities**
   All data is tracked in a Computerized Maintenance Management System (CMMS) program. The CMMS system holds a Maintenance Task Table that shows historical and scheduled maintenance for each device. The system also generates and tracks maintenance and repair work orders.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Repair versus replacement determination is based on company experience. If field personnel experience problems operating a particular switch, the switch will be maintained and lubricated. The CMMS program is an excellent tool for tracking reliability by equipment manufacturer and model. If CMMS data shows a pattern of problems or failures, the entire class of like equipment may be scheduled for replacement or repair.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of substation equipment, specific classes of equipment may be scheduled for replacement based on failure history or total owning cost.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

h. Air Break Switches

1. Program objectives

The goal of this program is to maintain reliable operation of key components of the distribution system.

2. Overview of procedures

Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

a. ***Task Name***: Visual Inspection of Air Break Switches
Frequency: Annually
Description: Visually check handle and locking mechanism, ground connections, insulators and lightning arresters.

3. Identification of equipment examined

This program includes air break switches.

4. Justification for program schedule

Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. Process for reviewing program results and making repairs/replacements based on those findings

The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

i. Voltage Regulators

1. Program objectives

The goal of this program is to maintain reliable operation of key components of the distribution system.

2. Overview of procedures

Distribution system device maintenance programs are primarily preventive in nature. The detailed procedures are outlined in the *'Distribution Maintenance and Inspection Programs Manual (Rev. October 5, 2009)'*.

a. ***Task Name***: Voltage Regulator Inspections
Frequency: Biennially
Description: Inspection that includes a control check, and visual check of the physical condition and indicator readings (min, max and current).

3. Identification of equipment examined

This program includes voltage regulators.

4. Justification for program schedule

Maintenance and inspection schedules for overhead distribution devices are based on a combination of manufacturer recommendations and company experience.

5. Process of documenting and recording program activities

Record keeping practices vary for each of the programs described below. At a minimum, inspections and deficiencies are documented and maintained.

6. Process for reviewing program results and making repairs/replacements based on those findings

The determination to repair versus replace varies for each component and is generally based on the judgment of qualified field personnel and engineering. Deficiencies that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected or isolated. All remaining deficiencies that are likely to cause an outage shall be corrected within one year of the completion of the inspection or testing that originally revealed such deficiencies. All other remaining deficiencies that are not expected to endanger life or property or are not likely to cause an outage will be tracked until complete.

7. Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process

Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process. In the case of distribution system components, capital projects may be initiated based on the finding of field inspections.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**

   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

j. Transmission

Transmission Lines

1. **Program objectives**
   The goal of this program is to maintain the reliability and safety of the electric transmission system including facilities ranging from 33kV to 345 kV.

2. **Overview of procedures**
   This preventive program consists primarily of visual and infrared inspections of structures/poles, insulators, switches and conductors. Guidelines for each voltage class/type are as follows:

345 kV

a. ***Task Name*:** Helicopter Patrol
***Frequency*:** Quarterly
***Description*:** Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

138 kV

a. ***Task Name*:** Helicopter Patrol or ground patrols for areas in Metro Dayton "No Fly" Zones.
Frequency: Quarterly
***Description*:** Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

69 kV and 33 kV

a. ***Task Name***: Helicopter Patrol or ground patrols for areas in Metro Dayton "No Fly" Zones.
Frequency: Semiannually
Description: Look for mechanical problems, erosion and vegetation problems. Initiate corrective action as needed.

b. ***Task Name:*** Thermography
Frequency: As needed
Description: Check line switches for heating indicative of poor electrical connections. Identify "hot spots" and classify according to elevation above ambient temperature. Complete necessary repairs.

Underground

a. ***Task Name***: Cathodic Protection System Test (if applicable)
Frequency: Yearly
Description: Test the integrity of the corrosion protection on the steel pipe housing for the underground transmission cable. Initiate corrective action as needed.

3. **Identification of equipment examined**
This program includes transmission structures/poles, insulators, switches and conductors from 33kV through 345 kV.

4. **Justification for program schedule**
The National Electric Safety Code is used as a guideline to establish minimum requirements. Criticality of equipment is determined by voltage class (i.e. 345 kV lines are the most critical).

5. **Process of documenting and recording program activities**
All deficiencies are documented and maintained in a database.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
The determination to repair or replace is based on the inspection findings combined with engineering judgment.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

Transmission Right of Way (Vegetation Management)

1. **Program objectives**
The goal of this program is to maintain the reliability of the electric transmission system by preventing outages and equipment damage due to trees or other vegetation contacting the lines.

2. **Overview of procedures**

a. ***Task Name***: Line Clearance
Frequency: Varies depending on line location, clearance requirements and species of vegetation present
Description: Trim or remove trees and brush as needed. Clearance will vary based on the species of tree and the voltage class of the line.

b. ***Task Name***: Herbicide Application
Frequency: As needed.
Description: Herbicide is applied as needed.

c. ***Task Name***: Visual Inspection
Frequency: "Walking patrols" are used to inspect the Metro Dayton "No Fly" Zones. These inspection patrols are scheduled three to four times per year.

"Helicopter Patrols" are targeted as follows:

All 345kV circuits	Quarterly
All 138kV circuits	Quarterly
All 69kV circuits	Semi annually
All 33kV circuits	Semi annually

Description: Visually inspect and identify any problems spots. Off-cycle trimming "hot-spotting" will be performed as needed to correct problem areas.

3. **Identification of equipment examined**
All overhead transmission lines are included in the vegetation management program.

4. **Justification for program schedule**
The vegetation management program is preventive in nature and the guidelines are based on company experience. Criticality of lines is determined based on voltage class and system configuration. DP&L also maintains and keeps current it's' Transmission Vegetation Management Program as required in NERC Standard FAC-003-1.

5. **Process of documenting and recording program activities**
   Program activities are recorded in a database.

6. **Process for reviewing program results and making repairs/replacements based on those findings**
   Information from field inspections is entered into the transmission line clearance database. This database is used to track the progress of all work from originating inspection to final inspection. This database is targeted for weekly updates. All completed work is inspected for quality control.

7. **Process for incorporating program findings into the company's capital planning and budgeting, and T&D system reliability process**
   Budgets and long range plans are continually updated as new information becomes available. Results from maintenance and inspection programs are one of many inputs into the capital planning and budgeting process.

8. **Process for reviewing the progress and effectiveness of the program and implementing change where needed**
   The adequacies of all maintenance and inspection programs are evaluated based on the results achieved. Program effectiveness is continually assessed and change is implemented as needed.

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

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in

Case No(s). 14-1771-EL-ESS

Summary: Application to Amend the Company's Transmission and Distribution Inspection, Maintenance, Repair and Replacement Programs electronically filed by Mr. Robert J Adams on behalf of The Dayton Power and Light Company

COMPLAINANT
EX 73

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Second Set Interrogatories
Date Received: January 26, 2018

CACC-POD-02-002

REQUEST:

Produce and attach each and every document reviewed or relied upon by the expert witnesses listed in response to CACC-INT-02-003.

RESPONSE:

Objection. This Document Request seeks the disclosure of information subject to attorney-client privilege or that constitutes attorney work product. Without waiving said objection, to the extent discoverable and in the spirit of discovery, Duke Energy Ohio answers further that it has not yet made a final determination as to which witnesses it intends to call on its behalf and thus, it has not made a final determination as to the documentation that such witnesses will rely upon. Duke Energy Ohio reserves the right to supplement this response.

PERSON RESPONSIBLE: Legal

SUPPLEMENTAL RESPONSE:

Ron Adams – None.

Scott Fletcher – Please see attached:
CACC-POD-02-002 ATTACH A – Curriculum Vitae

John Goodfellow – Please see attached:
CACC-POD-02-002 ATTACH B – Curriculum Vitae
CACC-POD-02-002 ATTACH 1 – EPRI Air Gap Research
CACC-POD-02-002 ATTACH 2 – Duke Energy Ohio Available Fault Current on 3881
CACC-POD-02-002 ATTACH 3 – Duke Energy's FAC-003 Vegetation Management Program Document

Kevin McLoughlin – Please see attached:
CACC-POD-02-002 ATTACH C – Curriculum Vitae
CACC-POD-02-002 ATTACH 4 – Standard FAC-003-1 – Transmission Vegetation Management Program

CACC-POD-02-002 ATTACH 5 – FAC-003-4 Transmission Vegetation Management
CACC-POD-02-002 ATTACH 6 – Integrated Vegetation Management: From its Roots in IPM to the Present
CACC-POD-02-002 ATTACH 7 – Electric Transmission Right-of-Way Post-Blackout Vegetation Management Strategies
CACC-POD-02-002 ATTACH 8 – FERC June 21, 2012 Open Commission Meeting Staff Presentation Item A-3
CACC-POD-02-002 ATTACH 9 – Applicability of the "Gallet Equation" to the Vegetation Clearances of NERC Reliability Standard FAC-003-2
CACC-POD-02-002 ATTACH 10 – Report on Transmission Facility Outages During the Northeast Snowstorm of October 29-30, 2011.

Also, listed below are publicly available documents relied upon in Mr. McLoughlin's testimony:

August 14, 2003 Final Blackout Report – https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf
March 2004 UVM Final Report by FERC -- https://ferc.gov/industries/electric/indus-act/reliability/blackout/uvm-final-report.pdf

PERSONS RESPONSIBLE:

Ron Adams
Scott Fletcher
John Goodfellow
Kevin McLoughlin

A. Introduction

1. **Title:** **Transmission Vegetation Management Program**

2. **Number:** FAC-003-1

3. **Purpose:** To improve the reliability of the electric transmission systems by preventing outages from vegetation located on transmission rights-of-way (ROW) and minimizing outages from vegetation located adjacent to ROW, maintaining clearances between transmission lines and vegetation on and along transmission ROW, and reporting vegetation-related outages of the transmission systems to the respective Regional Reliability Organizations (RRO) and the North American Electric Reliability Council (NERC).

4. **Applicability:**

   4.1. Transmission Owner.

   4.2. Regional Reliability Organization.

   4.3. This standard shall apply to all transmission lines operated at 200 kV and above and to any lower voltage lines designated by the RRO as critical to the reliability of the electric system in the region.

5. **Effective Dates:**

   5.1. One calendar year from the date of adoption by the NERC Board of Trustees for Requirements 1 and 2.

   5.2. Sixty calendar days from the date of adoption by the NERC Board of Trustees for Requirements 3 and 4.

B. Requirements

R1. The Transmission Owner shall prepare, and keep current, a formal transmission vegetation management program (TVMP). The TVMP shall include the Transmission Owner's objectives, practices, approved procedures, and work specifications[1].

R1.1. The TVMP shall define a schedule for and the type (aerial, ground) of ROW vegetation inspections. This schedule should be flexible enough to adjust for changing conditions. The inspection schedule shall be based on the anticipated growth of vegetation and any other environmental or operational factors that could impact the relationship of vegetation to the Transmission Owner's transmission lines.

R1.2. The Transmission Owner, in the TVMP, shall identify and document clearances between vegetation and any overhead, ungrounded supply conductors, taking into consideration transmission line voltage, the effects of ambient temperature on conductor sag under maximum design loading, and the effects of wind velocities on conductor sway. Specifically, the Transmission Owner shall establish clearances to be achieved at the time of vegetation management work identified herein as Clearance 1, and shall also establish and maintain a set of clearances identified herein as Clearance 2 to prevent flashover between vegetation and overhead ungrounded supply conductors.

R1.2.1. Clearance 1 — The Transmission Owner shall determine and document appropriate clearance distances to be achieved at the time of transmission vegetation management work based upon local conditions and the expected time frame in which the Transmission Owner plans to return for future

[1] ANSI A300, Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices, while not a requirement of this standard, is considered to be an industry best practice.

vegetation management work. Local conditions may include, but are not limited to: operating voltage, appropriate vegetation management techniques, fire risk, reasonably anticipated tree and conductor movement, species types and growth rates, species failure characteristics, local climate and rainfall patterns, line terrain and elevation, location of the vegetation within the span, and worker approach distance requirements. Clearance 1 distances shall be greater than those defined by Clearance 2 below.

R1.2.2. Clearance 2 — The Transmission Owner shall determine and document specific radial clearances to be maintained between vegetation and conductors under all rated electrical operating conditions. These minimum clearance distances are necessary to prevent flashover between vegetation and conductors and will vary due to such factors as altitude and operating voltage. These Transmission Owner-specific minimum clearance distances shall be no less than those set forth in the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003 (*Guide for Maintenance Methods on Energized Power Lines*) and as specified in its Section 4.2.2.3, Minimum Air Insulation Distances without Tools in the Air Gap.

R1.2.2.1 Where transmission system transient overvoltage factors are not known, clearances shall be derived from Table 5, IEEE 516-2003, phase-to-ground distances, with appropriate altitude correction factors applied.

R1.2.2.2 Where transmission system transient overvoltage factors are known, clearances shall be derived from Table 7, IEEE 516-2003, phase-to-phase voltages, with appropriate altitude correction factors applied.

R1.3. All personnel directly involved in the design and implementation of the TVMP shall hold appropriate qualifications and training, as defined by the Transmission Owner, to perform their duties.

R1.4. Each Transmission Owner shall develop mitigation measures to achieve sufficient clearances for the protection of the transmission facilities when it identifies locations on the ROW where the Transmission Owner is restricted from attaining the clearances specified in Requirement 1.2.1.

R1.5. Each Transmission Owner shall establish and document a process for the immediate communication of vegetation conditions that present an imminent threat of a transmission line outage. This is so that action (temporary reduction in line rating, switching line out of service, etc.) may be taken until the threat is relieved.

R2. The Transmission Owner shall create and implement an annual plan for vegetation management work to ensure the reliability of the system. The plan shall describe the methods used, such as manual clearing, mechanical clearing, herbicide treatment, or other actions. The plan should be flexible enough to adjust to changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors that may have an impact on the reliability of the transmission systems. Adjustments to the plan shall be documented as they occur. The plan should take into consideration the time required to obtain permissions or permits from landowners or regulatory authorities. Each Transmission Owner shall have systems and procedures for documenting and tracking the planned vegetation management work and ensuring that the vegetation management work was completed according to work specifications.

R3. The Transmission Owner shall report quarterly to its RRO, or the RRO's designee, sustained transmission line outages determined by the Transmission Owner to have been caused by vegetation.

R3.1. Multiple sustained outages on an individual line, if caused by the same vegetation, shall be reported as one outage regardless of the actual number of outages within a 24-hour period.

R3.2. The Transmission Owner is not required to report to the RRO, or the RRO's designee, certain sustained transmission line outages caused by vegetation: (1) Vegetation-related outages that result from vegetation falling into lines from outside the ROW that result from natural disasters shall not be considered reportable (examples of disasters that could create non-reportable outages include, but are not limited to, earthquakes, fires, tornados, hurricanes, landslides, wind shear, major storms as defined either by the Transmission Owner or an applicable regulatory body, ice storms, and floods), and (2) Vegetation-related outages due to human or animal activity shall not be considered reportable (examples of human or animal activity that could cause a non-reportable outage include, but are not limited to, logging, animal severing tree, vehicle contact with tree, arboricultural activities or horticultural or agricultural activities, or removal or digging of vegetation).

R3.3. The outage information provided by the Transmission Owner to the RRO, or the RRO's designee, shall include at a minimum: the name of the circuit(s) outaged, the date, time and duration of the outage; a description of the cause of the outage; other pertinent comments; and any countermeasures taken by the Transmission Owner.

R3.4. An outage shall be categorized as one of the following:

R3.4.1. Category 1 — Grow-ins: Outages caused by vegetation growing into lines from vegetation inside and/or outside of the ROW;

R3.4.2. Category 2 — Fall-ins: Outages caused by vegetation falling into lines from inside the ROW;

R3.4.3. Category 3 — Fall-ins: Outages caused by vegetation falling into lines from outside the ROW.

R4. The RRO shall report the outage information provided to it by Transmission Owner's, as required by Requirement 3, quarterly to NERC, as well as any actions taken by the RRO as a result of any of the reported outages.

C. Measures

M1. The Transmission Owner has a documented TVMP, as identified in Requirement 1.

M1.1. The Transmission Owner has documentation that the Transmission Owner performed the vegetation inspections as identified in Requirement 1.1.

M1.2. The Transmission Owner has documentation that describes the clearances identified in Requirement 1.2.

M1.3. The Transmission Owner has documentation that the personnel directly involved in the design and implementation of the Transmission Owner's TVMP hold the qualifications identified by the Transmission Owner as required in Requirement 1.3.

M1.4. The Transmission Owner has documentation that it has identified any areas not meeting the Transmission Owner's standard for vegetation management and any mitigating measures the Transmission Owner has taken to address these deficiencies as identified in Requirement 1.4.

M1.5. The Transmission Owner has a documented process for the immediate communication of imminent threats by vegetation as identified in Requirement 1.5.

M2. The Transmission Owner has documentation that the Transmission Owner implemented the work plan identified in Requirement 2.

M3. The Transmission Owner has documentation that it has supplied quarterly outage reports to the RRO, or the RRO's designee, as identified in Requirement 3.

M4. The RRO has documentation that it provided quarterly outage reports to NERC as identified in Requirement 4.

D. Compliance

1. Compliance Monitoring Process

1.1. *Compliance Monitoring Responsibility*

RRO

NERC

1.2. *Compliance Monitoring Period and Reset*

One calendar Year

1.3. Data Retention

Five Years

1.4. Additional Compliance Information

The Transmission Owner shall demonstrate compliance through self-certification submitted to the compliance monitor (RRO) annually that it meets the requirements of NERC Reliability Standard FAC-003-1. The compliance monitor shall conduct an on-site audit every five years or more frequently as deemed appropriate by the compliance monitor to review documentation related to Reliability Standard FAC-003-1. Field audits of ROW vegetation conditions may be conducted if determined to be necessary by the compliance monitor.

2. Levels of Non-Compliance

2.1. Level 1:

2.1.1. The TVMP was incomplete in one of the requirements specified in any subpart of Requirement 1, or;

2.1.2. Documentation of the annual work plan, as specified in Requirement 2, was incomplete when presented to the Compliance Monitor during an on-site audit, or;

2.1.3. The RRO provided an outage report to NERC that was incomplete and did not contain the information required in Requirement 4.

2.2. Level 2:

2.2.1. The TVMP was incomplete in two of the requirements specified in any subpart of Requirement 1, or;

2.2.2. The Transmission Owner was unable to certify during its annual self-certification that it fully implemented its annual work plan, or documented deviations from, as specified in Requirement 2.

2.2.3. The Transmission Owner reported one Category 2 transmission vegetation-related outage in a calendar year.

2.3. Level 3:

2.3.1. The Transmission Owner reported one Category 1 or multiple Category 2 transmission vegetation-related outages in a calendar year, or;

2.3.2. The Transmission Owner did not maintain a set of clearances (Clearance 2), as defined in Requirement 1.2.2, to prevent flashover between vegetation and overhead ungrounded supply conductors, or;

2.3.3. The TVMP was incomplete in three of the requirements specified in any subpart of Requirement 1.

2.4. Level 4:

2.4.1. The Transmission Owner reported more than one Category 1 transmission vegetation-related outage in a calendar year, or;

2.4.2. The TVMP was incomplete in four or more of the requirements specified in any subpart of Requirement 1.

E. Regional Differences

None Identified.

Version History

Version	Date	Action	Change Tracking
Version 1	TBA	1. Added "Standard Development Roadmap." 2. Changed "60" to "Sixty" in section A, 5.2. 3. Added "Proposed Effective Date: April 7, 2006" to footer. 4. Added "Draft 3: November 17, 2005" to footer.	01/20/06

COMPLAINANT
EX 24

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Second Set Interrogatories
Date Received: January 26, 2018

CACC-POD-02-002

REQUEST:

Produce and attach each and every document reviewed or relied upon by the expert witnesses listed in response to CACC-INT-02-003.

RESPONSE:

Objection. This Document Request seeks the disclosure of information subject to attorney-client privilege or that constitutes attorney work product. Without waiving said objection, to the extent discoverable and in the spirit of discovery, Duke Energy Ohio answers further that it has not yet made a final determination as to which witnesses it intends to call on its behalf and thus, it has not made a final determination as to the documentation that such witnesses will rely upon. Duke Energy Ohio reserves the right to supplement this response.

PERSON RESPONSIBLE: Legal

SUPPLEMENTAL RESPONSE:

Ron Adams – None.

Scott Fletcher – Please see attached:
CACC-POD-02-002 ATTACH A – Curriculum Vitae

John Goodfellow – Please see attached:
CACC-POD-02-002 ATTACH B – Curriculum Vitae
CACC-POD-02-002 ATTACH 1 – EPRI Air Gap Research
CACC-POD-02-002 ATTACH 2 – Duke Energy Ohio Available Fault Current on 3881
CACC-POD-02-002 ATTACH 3 – Duke Energy's FAC-003 Vegetation Management Program Document

Kevin McLoughlin – Please see attached:
CACC-POD-02-002 ATTACH C – Curriculum Vitae
CACC-POD-02-002 ATTACH 4 – Standard FAC-003-1 – Transmission Vegetation Management Program

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PERSONS RESPONSIBLE:

Ron Adams
Scott Fletcher
John Goodfellow
Kevin McLoughlin

A. Introduction

1. **Title:** **Transmission Vegetation Management**

2. **Number:** **FAC-003-4**

3. **Purpose:** **To maintain a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on transmission rights of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW, thus preventing the risk of those vegetation-related outages that could lead to Cascading.**

4. **Applicability:**

4.1. Functional Entities:

4.1.1. Applicable Transmission Owners

4.1.1.1. Transmission Owners that own Transmission Facilities defined in 4.2.

4.1.2. Applicable Generator Owners

4.1.2.1. Generator Owners that own generation Facilities defined in 4.3.

4.2. Transmission Facilities: Defined below (referred to as "applicable lines"), including but not limited to those that cross lands owned by federal[1], state, provincial, public, private, or tribal entities:

4.2.1. Each overhead transmission line operated at 200kV or higher.

4.2.2. Each overhead transmission line operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator.

4.2.3. Each overhead transmission line operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.

4.2.4. Each overhead transmission line identified above (4.2.1. through 4.2.3.) located outside the fenced area of the switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence.

4.3. Generation Facilities: Defined below (referred to as "applicable lines"), including but not limited to those that cross lands owned by federal[2], state, provincial, public, private, or tribal entities:

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[1] EPAct 2005 section 1211c: *"Access approvals by Federal agencies."*

[2] *Id.*

4.3.1. Overhead transmission lines that (1) extend greater than one mile or 1.609 kilometers beyond the fenced area of the generating station switchyard to the point of interconnection with a Transmission Owner's Facility or (2) do not have a clear line of sight[3] from the generating station switchyard fence to the point of interconnection with a Transmission Owner's Facility and are:

4.3.1.1. Operated at 200kV or higher; or

4.3.1.2. Operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator; or

4.3.1.3. Operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.

5. **Effective Date:** See Implementation Plan

6. **Background:** This standard uses three types of requirements to provide layers of protection to prevent vegetation related outages that could lead to Cascading:

   a) Performance-based defines a particular reliability objective or outcome to be achieved. In its simplest form, a results-based requirement has four components: *who, under what conditions (if any), shall perform what action, to achieve what particular bulk power system performance result or outcome?*

   b) Risk-based preventive requirements to reduce the risks of failure to acceptable tolerance levels. A risk-based reliability requirement should be framed as: *who, under what conditions (if any), shall perform what action, to achieve what particular result or outcome that reduces a stated risk to the reliability of the bulk power system?*

   c) Competency-based defines a minimum set of capabilities an entity needs to have to demonstrate it is able to perform its designated reliability functions. A competency-based reliability requirement should be framed as: *who, under what conditions (if any), shall have what capability, to achieve what particular result or outcome to perform an action to achieve a result or outcome or to reduce a risk to the reliability of the bulk power system?*

   The defense-in-depth strategy for reliability standards development recognizes that each requirement in a NERC reliability standard has a role in preventing system failures, and that these roles are complementary and reinforcing. Reliability standards should not be viewed as a body of unrelated requirements, but rather should be viewed as part of a portfolio of requirements designed to achieve an overall defense-in-depth strategy and comport with the quality objectives of a reliability standard.

[3] "Clear line of sight" means the distance that can be seen by the average person without special instrumentation (e.g., binoculars, telescope, spyglasses, etc.) on a clear day.

This standard uses a defense-in-depth approach to improve the reliability of the electric Transmission system by:

- Requiring that vegetation be managed to prevent vegetation encroachment inside the flash-over clearance (R1 and R2);
- Requiring documentation of the maintenance strategies, procedures, processes and specifications used to manage vegetation to prevent potential flash-over conditions including consideration of 1) conductor dynamics and 2) the interrelationships between vegetation growth rates, control methods and the inspection frequency (R3);
- Requiring timely notification to the appropriate control center of vegetation conditions that could cause a flash-over at any moment (R4);
- Requiring corrective actions to ensure that flash-over distances will not be violated due to work constrains such as legal injunctions (R5);
- Requiring inspections of vegetation conditions to be performed annually (R6); and
- Requiring that the annual work needed to prevent flash-over is completed (R7).

For this standard, the requirements have been developed as follows:

- Performance-based: Requirements 1 and 2
- Competency-based: Requirement 3
- Risk-based: Requirements 4, 5, 6 and 7

R3 serves as the first line of defense by ensuring that entities understand the problem they are trying to manage and have fully developed strategies and plans to manage the problem. R1, R2, and R7 serve as the second line of defense by requiring that entities carry out their plans and manage vegetation. R6, which requires inspections, may be either a part of the first line of defense (as input into the strategies and plans) or as a third line of defense (as a check of the first and second lines of defense). R4 serves as the final line of defense, as it addresses cases in which all the other lines of defense have failed.

Major outages and operational problems have resulted from interference between overgrown vegetation and transmission lines located on many types of lands and ownership situations. Adherence to the standard requirements for applicable lines on any kind of land or easement, whether they are Federal Lands, state or provincial lands, public or private lands, franchises, easements or lands owned in fee, will reduce and manage this risk. For the purpose of the standard the term "public lands" includes municipal lands, village lands, city lands, and a host of other governmental entities.

This standard addresses vegetation management along applicable overhead lines and does not apply to underground lines, submarine lines or to line sections inside an electric station boundary.

This standard focuses on transmission lines to prevent those vegetation related outages that could lead to Cascading. It is not intended to prevent customer outages due to tree contact with lower voltage distribution system lines. For example, localized customer service might be disrupted if vegetation were to make contact with a 69kV transmission line supplying power to a 12kV distribution station. However, this standard is not written to address such isolated situations which have little impact on the overall electric transmission system.

Since vegetation growth is constant and always present, unmanaged vegetation poses an increased outage risk, especially when numerous transmission lines are operating at or near their Rating. This can present a significant risk of consecutive line failures when lines are experiencing large sags thereby leading to Cascading. Once the first line fails the shift of the current to the other lines and/or the increasing system loads will lead to the second and subsequent line failures as contact to the vegetation under those lines occurs. Conversely, most other outage causes (such as trees falling into lines, lightning, animals, motor vehicles, etc.) are not an interrelated function of the shift of currents or the increasing system loading. These events are not any more likely to occur during heavy system loads than any other time. There is no cause-effect relationship which creates the probability of simultaneous occurrence of other such events. Therefore these types of events are highly unlikely to cause large-scale grid failures. Thus, this standard places the highest priority on the management of vegetation to prevent vegetation grow-ins.

B. Requirements and Measures

R1. Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s) which are either an element of an IROL, or an element of a Major WECC Transfer Path; operating within their Rating and all Rated Electrical Operating Conditions of the types shown below[4] *[Violation Risk Factor: High] [Time Horizon: Real-time]:*

[4] This requirement does not apply to circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner subject to this reliability standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the applicable Transmission Owner or applicable Generator Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation. Nothing in this footnote should be construed to limit the Transmission Owner's or applicable Generator Owner's right to exercise its full legal rights on the ROW.

1.1. An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage,[5]

1.2. An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage,[6]

1.3. An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage[7],

1.4. An encroachment due to vegetation growth into the MVCD that caused a vegetation-related Sustained Outage.[8]

M1. Each applicable Transmission Owner and applicable Generator Owner has evidence that it managed vegetation to prevent encroachment into the MVCD as described in R1. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no Real-time observations of any MVCD encroachments. (R1)

R2. Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are not either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below[9] *[Violation Risk Factor: High] [Time Horizon: Real-time]*:

2.1. An encroachment into the MVCD, observed in Real-time, absent a Sustained Outage,[10]

2.2. An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage,[11]

2.3. An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage,[12]

2.4. An encroachment due to vegetation growth into the line MVCD that caused a vegetation-related Sustained Outage.[13]

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[5] If a later confirmation of a Fault by the applicable Transmission Owner or applicable Generator Owner shows that a vegetation encroachment within the MVCD has occurred from vegetation within the ROW, this shall be considered the equivalent of a Real-time observation.

[6] Multiple Sustained Outages on an individual line, if caused by the same vegetation, will be reported as one outage regardless of the actual number of outages within a 24-hour period.

[7] *Id.*

[8] *Id.*

[9] See footnote 4.

[10] See footnote 5.

[11] See footnote 6.

[12] *Id.*

[13] *Id.*

M2. Each applicable Transmission Owner and applicable Generator Owner has evidence that it managed vegetation to prevent encroachment into the MVCD as described in R2. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no Real-time observations of any MVCD encroachments. (R2)

R3. Each applicable Transmission Owner and applicable Generator Owner shall have documented maintenance strategies or procedures or processes or specifications it uses to prevent the encroachment of vegetation into the MVCD of its applicable lines that accounts for the following: *[Violation Risk Factor: Lower] [Time Horizon: Long Term Planning]:*

3.1. Movement of applicable line conductors under their Rating and all Rated Electrical Operating Conditions;

3.2. Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.

M3. The maintenance strategies or procedures or processes or specifications provided demonstrate that the applicable Transmission Owner and applicable Generator Owner can prevent encroachment into the MVCD considering the factors identified in the requirement. (R3)

R4. Each applicable Transmission Owner and applicable Generator Owner, without any intentional time delay, shall notify the control center holding switching authority for the associated applicable line when the applicable Transmission Owner and applicable Generator Owner has confirmed the existence of a vegetation condition that is likely to cause a Fault at any moment *[Violation Risk Factor: Medium] [Time Horizon: Real-time].*

M4. Each applicable Transmission Owner and applicable Generator Owner that has a confirmed vegetation condition likely to cause a Fault at any moment will have evidence that it notified the control center holding switching authority for the associated transmission line without any intentional time delay. Examples of evidence may include control center logs, voice recordings, switching orders, clearance orders and subsequent work orders. (R4)

R5. When an applicable Transmission Owner and an applicable Generator Owner are constrained from performing vegetation work on an applicable line operating within its Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan, then the applicable Transmission Owner or applicable Generator Owner shall take corrective action to ensure continued vegetation management to prevent encroachments [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*].

M5. Each applicable Transmission Owner and applicable Generator Owner has evidence of the corrective action taken for each constraint where an applicable transmission line was put at potential risk. Examples of acceptable forms of evidence may include initially-planned work orders, documentation of constraints from landowners, court orders, inspection records of increased monitoring, documentation of the de-rating of lines, revised work orders, invoices, or evidence that the line was de-energized. (R5)

R6. Each applicable Transmission Owner and applicable Generator Owner shall perform a Vegetation Inspection of 100% of its applicable transmission lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.) at least once per calendar year and with no more than 18 calendar months between inspections on the same ROW[14] [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*].

M6. Each applicable Transmission Owner and applicable Generator Owner has evidence that it conducted Vegetation Inspections of the transmission line ROW for all applicable lines at least once per calendar year but with no more than 18 calendar months between inspections on the same ROW. Examples of acceptable forms of evidence may include completed and dated work orders, dated invoices, or dated inspection records. (R6)

R7. Each applicable Transmission Owner and applicable Generator Owner shall complete 100% of its annual vegetation work plan of applicable lines to ensure no vegetation encroachments occur within the MVCD. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made (provided they do not allow encroachment of vegetation into the MVCD) and must be documented. The percent completed calculation is based on the number of units actually completed divided by the number of units in the final amended plan (measured in units of choice - circuit, pole line, line miles or kilometers, etc.). Examples of reasons for modification to annual plan may include [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]:

7.1. Change in expected growth rate/environmental factors

7.2. Circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner[15]

7.3. Rescheduling work between growing seasons

7.4. Crew or contractor availability/Mutual assistance agreements

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[14] When the applicable Transmission Owner or applicable Generator Owner is prevented from performing a Vegetation Inspection within the timeframe in R6 due to a natural disaster, the TO or GO is granted a time extension that is equivalent to the duration of the time the TO or GO was prevented from performing the Vegetation Inspection.

[15] Circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner include but are not limited to natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, ice storms, floods, or major storms as defined either by the TO or GO or an applicable regulatory body.

7.5. Identified unanticipated high priority work

7.6. Weather conditions/Accessibility

7.7. Permitting delays

7.8. Land ownership changes/Change in land use by the landowner

7.9. Emerging technologies

M7. Each applicable Transmission Owner and applicable Generator Owner has evidence that it completed its annual vegetation work plan for its applicable lines. Examples of acceptable forms of evidence may include a copy of the completed annual work plan (as finally modified), dated work orders, dated invoices, or dated inspection records. (R7)

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority:

"Compliance Enforcement Authority" means NERC or the Regional Entity, or any entity as otherwise designated by an Applicable Governmental Authority, in their respective roles of monitoring and/or enforcing compliance with mandatory and enforceable Reliability Standards in their respective jurisdictions.

1.2. Evidence Retention:

The following evidence retention period(s) identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The applicable entity shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to *retain specific evidence for a longer period of time as part of an investigation.*

- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirements R1, R2, R3, R5, R6 and R7, for three calendar years.
- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirement R4, Measure M4 for most recent 12 months of operator logs or most recent 3 months of voice recordings or transcripts of voice recordings, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- If an applicable Transmission Owner or applicable Generator Owner is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

1.3. *Compliance Monitoring and Enforcement Program*

As defined in the NERC Rules of Procedure, "Compliance Monitoring and Enforcement Program" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated Reliability Standard.

1.4. Additional Compliance Information

Periodic Data Submittal: The applicable Transmission Owner and applicable Generator Owner will submit a quarterly report to its Regional Entity, or the Regional Entity's designee, identifying all Sustained Outages of applicable lines operated within their Rating and all Rated Electrical Operating Conditions as determined by the applicable Transmission Owner or applicable Generator Owner to have been caused by vegetation, except as excluded in footnote 2, and including as a minimum the following:

- The name of the circuit(s), the date, time and duration of the outage; the voltage of the circuit; a description of the cause of the outage; the category associated with the Sustained Outage; other pertinent comments; and any countermeasures taken by the applicable Transmission Owner or applicable Generator Owner.

  A Sustained Outage is to be categorized as one of the following:

- Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW;
- Category 4A — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW;

- Category 4B — Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

  The Regional Entity will report the outage information provided by applicable Transmission Owners and applicable Generator Owners, as per the above, quarterly to NERC, as well as any actions taken by the Regional Entity as a result of any of the reported Sustained Outages.

Violation Severity Levels (Table 1)

R #	Table 1: Violation Severity Levels (VSL)			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1.			The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line identified as an element of an IROL or Major WECC transfer path and encroachment into the MVCD as identified in FAC-003-4-Table 2 was observed in real time absent a Sustained Outage.	The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line identified as an element of an IROL or Major WECC transfer path and a vegetation-related Sustained Outage was caused by one of the following: • *A fall-in from inside the active transmission line ROW* • *Blowing together of applicable lines and vegetation located inside the active transmission line ROW* • *A grow-in*
R2.			The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line not identified as an element of	The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line not identified as an element of

			an IROL or Major WECC transfer path and encroachment into the MVCD as identified in FAC-003-4-Table 2 was observed in real time absent a Sustained Outage.	an IROL or Major WECC transfer path and a vegetation-related Sustained Outage was caused by one of the following: • *A fall-in from inside the active transmission line ROW* • *Blowing together of applicable lines and vegetation located inside the active transmission line ROW* • *A grow-in*
R3.		The responsible entity has maintenance strategies or documented procedures or processes or specifications but has not accounted for the inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency, for the responsible entity's applicable lines. (Requirement R3, Part 3.2.)	The responsible entity has maintenance strategies or documented procedures or processes or specifications but has not accounted for the movement of transmission line conductors under their Rating and all Rated Electrical Operating Conditions, for the responsible entity's applicable lines. (Requirement R3, Part 3.1.)	The responsible entity does not have any maintenance strategies or documented procedures or processes or specifications used to prevent the encroachment of vegetation into the MVCD, for the responsible entity's applicable lines.
R4.			The responsible entity experienced a confirmed	The responsible entity experienced a confirmed

			vegetation threat and notified the control center holding switching authority for that applicable line, but there was intentional delay in that notification.	vegetation threat and did not notify the control center holding switching authority for that applicable line.
R5.				The responsible entity did not take corrective action when it was constrained from performing planned vegetation work where an applicable line was put at potential risk.
R6.	The responsible entity failed to inspect 5% or less of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.)	The responsible entity failed to inspect more than 5% up to and including 10% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).	The responsible entity failed to inspect more than 10% up to and including 15% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).	The responsible entity failed to inspect more than 15% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).
R7.	The responsible entity failed to complete 5% or less of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 5% and up to and including 10% of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 10% and up to and including 15% of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 15% of its annual vegetation work plan for its applicable lines (as finally modified).

D. Regional Variances

None.

E. Associated Documents

- FAC-003-4 Implementation Plan

Version History

Version	Date	Action	Change Tracking
1	January 20, 2006	1. Added "Standard Development Roadmap." 2. Changed "60" to "Sixty" in section A, 5.2. 3. Added "Proposed Effective Date: April 7, 2006" to footer. 4. Added "Draft 3: November 17, 2005" to footer.	New
1	April 4, 2007	Regulatory Approval - Effective Date	New
2	November 3, 2011	Adopted by the NERC Board of Trustees	New
2	March 21, 2013	FERC Order issued approving FAC-003-2 (Order No. 777) FERC Order No. 777 was issued on March 21, 2013 directing NERC to "conduct or contract testing to obtain empirical data and submit a report to the Commission providing the results of the testing."[16]	Revisions

[16] *Revisions to Reliability Standard for Transmission Vegetation Management, Order No. 777,* 142 FERC ¶ 61,208 (2013)

2	May 9, 2013	Board of Trustees adopted the modification of the VRF for Requirement R2 of FAC-003-2 by raising the VRF from "Medium" to "High."	Revisions
3	May 9, 2013	FAC-003-3 adopted by Board of Trustees	Revisions
3	September 19, 2013	A FERC order was issued on September 19, 2013, approving FAC-003-3. This standard became enforceable on July 1, 2014 for Transmission Owners. For Generator Owners, R3 became enforceable on January 1, 2015 and all other requirements (R1, R2, R4, R5, R6, and R7) became enforceable on January 1, 2016.	Revisions
3	November 22, 2013	Updated the VRF for R2 from "Medium" to "High" per a Final Rule issued by FERC	Revisions
3	July 30, 2014	Transferred the effective dates section from FAC-003-2 (for Transmission Owners) into FAC-003-3, per the FAC-003-3 implementation plan	Revisions
4	February 11, 2016	Adopted by Board of Trustees. Adjusted MVCD values in Table 2 for alternating current systems, consistent with findings reported in report filed on August 12, 2015 in Docket No. RM12-4-002 consistent with FERC's directive in Order No. 777, and based on empirical testing results for flashover distances between conductors and vegetation.	Revisions
4	March 9, 2016	Corrected subpart 7.10 to M7, corrected value of .07 to .7	Errata
4	April 26, 2016	FERC Letter Order approving FAC-003-4. Docket No. RD16-4-000.	

FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)[17]

For Alternating Current Voltages (feet)

(AC) Nominal System Voltage (KV)*	(AC) Maximum System Voltage (kV)[18]	MVCD (feet) Over sea level up to 500 ft	MVCD feet Over 500 ft up to 1000 ft	MVCD feet Over 1000 ft up to 2000 ft	MVCD feet Over 2000 ft up to 3000 ft	MVCD feet Over 3000 ft up to 4000 ft	MVCD feet Over 4000 ft up to 5000 ft	MVCD feet Over 5000 ft up to 6000 ft	MVCD feet Over 6000 ft up to 7000 ft	MVCD feet Over 7000 ft up to 8000 ft	MVCD feet Over 8000 ft up to 9000 ft	MVCD feet Over 9000 ft up to 10000 ft	MVCD feet Over 10000 ft up to 11000 ft	MVCD feet Over 11000 ft up to 12000 ft	MVCD feet Over 12000 ft up to 13000 ft	MVCD feet Over 13000 ft up to 14000 ft	MVCD feet Over 14000 ft up to 15000 ft
765	800	11.6ft	11.7ft	11.9ft	12.1ft	12.2ft	12.4ft	12.6ft	12.8ft	13.0ft	13.1ft	13.3ft	13.5ft	13.7ft	13.9ft	14.1ft	14.3ft
500	550	7.0ft	7.1ft	7.2ft	7.4ft	7.5ft	7.6ft	7.8ft	7.9ft	8.1ft	8.2ft	8.3ft	8.5ft	8.6ft	8.8ft	8.9ft	9.1ft
345	362[19]	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft
287	302	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft
230	242	4.0ft	4.1ft	4.2ft	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft
161*	169	2.7ft	2.7ft	2.8ft	2.9ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft	3.3ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft
138*	145	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft	2.7ft	2.8ft	2.8ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft
115*	121	1.9ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.2ft	2.3ft	2.3ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft
88*	100	1.5ft	1.5ft	1.6ft	1.6ft	1.7ft	1.7ft	1.8ft	1.8ft	1.8ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.2ft	2.2ft
69*	72	1.1ft	1.1ft	1.1ft	1.2ft	1.2ft	1.2ft	1.2ft	1.3ft	1.3ft	1.3ft	1.4ft	1.4ft	1.4ft	1.5ft	1.6ft	1.6ft

* Such lines are applicable to this standard only if PC has determined such per FAC-014 (refer to the Applicability Section above)

* *Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)*

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[17] The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

[18] Where applicable lines are operated at nominal voltages other than those listed, the applicable Transmission Owner or applicable Generator Owner should use the maximum system voltage to determine the appropriate clearance for that line.

[19] The change in transient overvoltage factors in the calculations are the driver in the decrease in MVCDs for voltages of 345 kV and above. Refer to pp.29-31 in the Supplemental Materials for additional information.

TABLE 2 (CONT) — Minimum Vegetation Clearance Distances (MVCD)[20]

For **Alternating Current** Voltages (meters)

(AC) Nominal System Voltage (KV)+	(AC) Maximum System Voltage (kV)[21]	MVCD meters Over sea level up to 153 m	MVCD meters Over 153m up to 305m	MVCD meters Over 305m up to 610m	MVCD meters Over 610m up to 915m	MVCD meters Over 915m up to 1220m	MVCD meters Over 1220m up to 1524m	MVCD meters Over 1524m up to 1829m	MVCD meters Over 1829m up to 2134m	MVCD meters Over 2134m up to 2439m	MVCD meters Over 2439m up to 2744m	MVCD meters Over 2744m up to 3048m	MVCD meters Over 3048m up to 3353m	MVCD meters Over 3353m up to 3657m	MVCD meters Over 3657m up to 3962m	MVCD meters Over 3962 m up to 4268 m	MVCD meters Over 4268m up to 4572m
765	800	3.6m	3.6m	3.6m	3.7m	3.7m	3.8m	3.8m	3.9m	4.0m	4.0m	4.1m	4.1m	4.2m	4.2m	4.3m	4.4m
500	550	2.1m	2.2m	2.2m	2.3m	2.3m	2.3m	2.4m	2.4m	2.5m	2..5m	2.5m	2.6m	2.6m	2.7m	2.7m	2.7m
345	362[22]	1.3m	1.3m	1.3m	1.4m	1.4m	1.4m	1.5m	1.5m	1.5m	1.6m	1.6m	1.6m	1.6m	1.7m	1.7m	1.8m
287	302	1.6m	1.6m	1.7m	1.7m	1.7m	1.7m	1.8m	1.8m	1.9m	1.9m	1.9m	2.0m	2.0m	2.0m	2.1m	2.1m
230	242	1.2m	1.3m	1.3m	1.3m	1.3m	1.3m	1.4m	1.4m	1.4m	1.5m	1.5m	1.5m	1.6m	1.6m	1.6m	1.6m
161*	169	0.8m	0.8m	0.9m	0.9m	0.9m	0.9m	0.9m	1.0m	1.0m	1.0m	1.0m	1.0m	1.1m	1.1m	1.1m	1.1m
138*	145	0.7m	0.7m	0.7m	0.7m	0.7m	0.7m	0.8m	0.8m	0.8m	0.9m	0.9m	0.9m	0.9m	0.9m	1.0m	1.0m
115*	121	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.7m	0.7m	0.7m	0.7m	0.7m	0.8m	0.8m	0.8m	0.8m
88*	100	0.4m	0.4m	0.5m	0.5m	0.5m	0.5m	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.7m	0.7m
69*	72	0.3m	0.3m	0.3m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.5m	0.5m	0.5m

* Such lines are applicable to this standard only if PC has determined such per FAC-014 (refer to the Applicability Section above)

+ *Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)*

[20] The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

[21] Where applicable lines are operated at nominal voltages other than those listed, the applicable Transmission Owner or applicable Generator Owner should use the maximum system voltage to determine the appropriate clearance for that line.

[22] The change in transient overvoltage factors in the calculations are the driver in the decrease in MVCDs for voltages of 345 kV and above. Refer to pp.29-31 in the supplemental materials for additional information.

TABLE 2 (CONT) — Minimum Vegetation Clearance Distances (MVCD)[23]

For **Direct Current** Voltages feet (meters)

(DC) Nominal Pole to Ground Voltage (kV)	MVCD meters Over sea level up to 500 ft (Over sea level up to 152.4 m)	MVCD meters Over 500 ft up to 1000 ft (Over 152.4 m up to 304.8 m	MVCD meters Over 1000 ft up to 2000 ft (Over 304.8 m up to 609.6m)	MVCD meters Over 2000 ft up to 3000 ft (Over 609.6m up to 914.4m	MVCD meters Over 3000 ft up to 4000 ft (Over 914.4m up to 1219.2m	MVCD meters Over 4000 ft up to 5000 ft (Over 1219.2m up to 1524m	MVCD meters Over 5000 ft up to 6000 ft (Over 1524 m up to 1828.8 m)	MVCD meters Over 6000 ft up to 7000 ft (Over 1828.8m up to 2133.6m)	MVCD meters Over 7000 ft up to 8000 ft (Over 2133.6m up to 2438.4m)	MVCD meters Over 8000 ft up to 9000 ft (Over 2438.4m up to 2743.2m)	MVCD meters Over 9000 ft up to 10000 ft (Over 2743.2m up to 3048m)	MVCD meters Over 10000 ft up to 11000 ft (Over 3048m up to 3352.8m)
±750	14.12ft (4.30m)	14.31ft (4.36m)	14.70ft (4.48m)	15.07ft (4.59m)	15.45ft (4.71m)	15.82ft (4.82m)	16.2ft (4.94m)	16.55ft (5.04m)	16.91ft (5.15m)	17.27ft (5.26m)	17.62ft (5.37m)	17.97ft (5.48m)
±600	10.23ft (3.12m)	10.39ft (3.17m)	10.74ft (3.26m)	11.04ft (3.36m)	11.35ft (3.46m)	11.66ft (3.55m)	11.98ft (3.65m)	12.3ft (3.75m)	12.62ft (3.85m)	12.92ft (3.94m)	13.24ft (4.04m)	13.54ft (4.13m)
±500	8.03ft (2.45m)	8.16ft (2.49m)	8.44ft (2.57m)	8.71ft (2.65m)	8.99ft (2.74m)	9.25ft (2.82m)	9.55ft (2.91m)	9.82ft (2.99m)	10.1ft (3.08m)	10.38ft (3.16m)	10.65ft (3.25m)	10.92ft (3.33m)
±400	6.07ft (1.85m)	6.18ft (1.88m)	6.41ft (1.95m)	6.63ft (2.02m)	6.86ft (2.09m)	7.09ft (2.16m)	7.33ft (2.23m)	7.56ft (2.30m)	7.80ft (2.38m)	8.03ft (2.45m)	8.27ft (2.52m)	8.51ft (2.59m)
±250	3.50ft (1.07m)	3.57ft (1.09m)	3.72ft (1.13m)	3.87ft (1.18m)	4.02ft (1.23m)	4.18ft (1.27m)	4.34ft (1.32m)	4.5ft (1.37m)	4.66ft (1.42m)	4.83ft (1.47m)	5.00ft (1.52m)	5.17ft (1.58m)

[23] The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

Guideline and Technical Basis

Effective dates:

The Compliance section is standard language used in most NERC standards to cover the general effective date and covers the vast majority of situations. A special case covers effective dates for (1) lines initially becoming subject to the Standard, (2) lines changing in applicability within the standard.

The special case is needed because the Planning Coordinators may designate lines below 200 kV to become elements of an IROL or Major WECC Transfer Path in a future Planning Year (PY). For example, studies by the Planning Coordinator in 2015 may identify a line to have that designation beginning in PY 2025, ten years after the planning study is performed. It is not intended for the Standard to be immediately applicable to, or in effect for, that line until that future PY begins. The effective date provision for such lines ensures that the line will become subject to the standard on January 1 of the PY specified with an allowance of at least 12 months for the applicable Transmission Owner or applicable Generator Owner to make the necessary preparations to achieve compliance on that line. A line operating below 200kV designated as an element of an IROL or Major WECC Transfer Path may be removed from that designation due to system improvements, changes in generation, changes in loads or changes in studies and analysis of the network.

Date that Planning Study is completed	PY the line will become an IROL element	Date 1	Date 2	Effective Date The later of Date 1 or Date 2
05/15/2011	2012	05/15/2012	01/01/2012	05/15/2012
05/15/2011	2013	05/15/2012	01/01/2013	01/01/2013
05/15/2011	2014	05/15/2012	01/01/2014	01/01/2014
05/15/2011	2021	05/15/2012	01/01/2021	01/01/2021

Defined Terms:

Explanation for revising the definition of ROW:
The current NERC glossary definition of Right of Way has been modified to include Generator Owners and to address the matter set forth in Paragraph 734 of FERC Order 693. The Order pointed out that Transmission Owners may in some cases own more property or rights than are needed to reliably operate transmission lines. This definition represents a slight but significant departure from the strict legal definition of "right of way" in that this definition is based on engineering and construction considerations that establish the width of a corridor from a technical basis. The pre-2007 maintenance records are included in the current definition to allow the use of such vegetation widths if there were no engineering or construction standards that

referenced the width of right of way to be maintained for vegetation on a particular line but the evidence exists in maintenance records for a width that was in fact maintained prior to this standard becoming mandatory. Such widths may be the only information available for lines that had limited or no vegetation easement rights and were typically maintained primarily to ensure public safety. This standard does not require additional easement rights to be purchased to satisfy a minimum right of way width that did not exist prior to this standard becoming mandatory.

Explanation for revising the definition of Vegetation Inspection:
The current glossary definition of this NERC term was modified to include Generator Owners and to allow both maintenance inspections and vegetation inspections to be performed concurrently. This allows potential efficiencies, especially for those lines with minimal vegetation and/or slow vegetation growth rates.

Explanation of the derivation of the MVCD:
The MVCD is a calculated minimum distance that is derived from the Gallet equation. This is a method of calculating a flash over distance that has been used in the design of high voltage transmission lines. Keeping vegetation away from high voltage conductors by this distance will prevent voltage flash-over to the vegetation. See the explanatory text below for Requirement R3 and associated Figure 1. Table 2 of the Standard provides MVCD values for various voltages and altitudes. The table is based on empirical testing data from EPRI as requested by FERC in Order No. 777.

Project 2010-07.1 Adjusted MVCDs per EPRI Testing:
In Order No. 777, FERC directed NERC to undertake testing to gather empirical data validating the appropriate gap factor used in the Gallet equation to calculate MVCDs, specifically the gap factor for the flash-over distances between conductors and vegetation. See, Order No. 777, at P 60. NERC engaged industry through a collaborative research project and contracted EPRI to complete the scope of work. In January 2014, NERC formed an advisory group to assist with developing the scope of work for the project. This team provided subject matter expertise for developing the test plan, monitoring testing, and vetting the analysis and conclusions to be submitted in a final report. The advisory team was comprised of NERC staff, arborists, and industry members with wide-ranging expertise in transmission engineering, insulation coordination, and vegetation management. The testing project commenced in April 2014 and continued through October 2014 with the final set of testing completed in May 2015. Based on these testing results conducted by EPRI, and consistent with the report filed in FERC Docket No. RM12-4-000, the gap factor used in the Gallet equation required adjustment from 1.3 to 1.0. This resulted in increased MVCD values for all alternating current system voltages identified. The adjusted MVCD values, reflecting the 1.0 gap factor, are included in Table 2 of version 4 of FAC-003.

The air gap testing completed by EPRI per FERC Order No. 777 established that trees with large spreading canopies growing directly below energized high voltage conductors create the

greatest likelihood of an air gap flash over incident and was a key driver in changing the gap factor to a more conservative value of 1.0 in version 4 of this standard.

Requirements R1 and R2:
R1 and R2 are performance-based requirements. The reliability objective or outcome to be achieved is the management of vegetation such that there are no vegetation encroachments within a minimum distance of transmission lines. Content-wise, R1 and R2 are the same requirements; however, they apply to different Facilities. Both R1 and R2 require each applicable Transmission Owner or applicable Generator Owner to manage vegetation to prevent encroachment within the MVCD of transmission lines. R1 is applicable to lines that are identified as an element of an IROL or Major WECC Transfer Path. R2 is applicable to all other lines that are not elements of IROLs, and not elements of Major WECC Transfer Paths.

The separation of applicability (between R1 and R2) recognizes that inadequate vegetation management for an applicable line that is an element of an IROL or a Major WECC Transfer Path is a greater risk to the interconnected electric transmission system than applicable lines that are not elements of IROLs or Major WECC Transfer Paths. Applicable lines that are not elements of IROLs or Major WECC Transfer Paths do require effective vegetation management, but these lines are comparatively less operationally significant.

Requirements R1 and R2 state that if inadequate vegetation management allows vegetation to encroach within the MVCD distance as shown in Table 2, it is a violation of the standard. Table 2 distances are the minimum clearances that will prevent spark-over based on the Gallet equations. These requirements assume that transmission lines and their conductors are operating within their Rating. If a line conductor is intentionally or inadvertently operated beyond its Rating and Rated Electrical Operating Condition (potentially in violation of other standards), the occurrence of a clearance encroachment may occur solely due to that condition. For example, emergency actions taken by an applicable Transmission Owner or applicable Generator Owner or Reliability Coordinator to protect an Interconnection may cause excessive sagging and an outage. Another example would be ice loading beyond the line's Rating and Rated Electrical Operating Condition. Such vegetation-related encroachments and outages are not violations of this standard.

Evidence of failures to adequately manage vegetation include real-time observation of a vegetation encroachment into the MVCD (absent a Sustained Outage), or a vegetation-related encroachment resulting in a Sustained Outage due to a fall-in from inside the ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to the blowing together of the lines and vegetation located inside the ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to a grow-in. Faults which do not cause a Sustained outage and which are confirmed to have been caused by vegetation encroachment within the MVCD are considered the equivalent of a Real-time observation for violation severity levels.

With this approach, the VSLs for R1 and R2 are structured such that they directly correlate to the severity of a failure of an applicable Transmission Owner or applicable Generator Owner to manage vegetation and to the corresponding performance level of the Transmission Owner's

vegetation program's ability to meet the objective of "preventing the risk of those vegetation related outages that could lead to Cascading." Thus violation severity increases with an applicable Transmission Owner's or applicable Generator Owner's inability to meet this goal and its potential of leading to a Cascading event. The additional benefits of such a combination are that it simplifies the standard and clearly defines performance for compliance. A performance-based requirement of this nature will promote high quality, cost effective vegetation management programs that will deliver the overall end result of improved reliability to the system.

Multiple Sustained Outages on an individual line can be caused by the same vegetation. For example initial investigations and corrective actions may not identify and remove the actual outage cause then another outage occurs after the line is re-energized and previous high conductor temperatures return. Such events are considered to be a single vegetation-related Sustained Outage under the standard where the Sustained Outages occur within a 24 hour period.

If the applicable Transmission Owner or applicable Generator Owner has applicable lines operated at nominal voltage levels not listed in Table 2, then the applicable TO or applicable GO should use the next largest clearance distance based on the next highest nominal voltage in the table to determine an acceptable distance.

Requirement R3:
R3 is a competency based requirement concerned with the maintenance strategies, procedures, processes, or specifications, an applicable Transmission Owner or applicable Generator Owner uses for vegetation management.

An adequate transmission vegetation management program formally establishes the approach the applicable Transmission Owner or applicable Generator Owner uses to plan and perform vegetation work to prevent transmission Sustained Outages and minimize risk to the transmission system. The approach provides the basis for evaluating the intent, allocation of appropriate resources, and the competency of the applicable Transmission Owner or applicable Generator Owner in managing vegetation. There are many acceptable approaches to manage vegetation and avoid Sustained Outages. However, the applicable Transmission Owner or applicable Generator Owner must be able to show the documentation of its approach and how it conducts work to maintain clearances.

An example of one approach commonly used by industry is ANSI Standard A300, part 7. However, regardless of the approach a utility uses to manage vegetation, any approach an applicable Transmission Owner or applicable Generator Owner chooses to use will generally contain the following elements:

1. *the maintenance strategy used (such as minimum vegetation-to-conductor distance or maximum vegetation height) to ensure that MVCD clearances are never violated*

2. *the work methods that the applicable Transmission Owner or applicable Generator Owner uses to control vegetation*
3. *a stated Vegetation Inspection frequency*
4. *an annual work plan*

The conductor's position in space at any point in time is continuously changing in reaction to a number of different loading variables. Changes in vertical and horizontal conductor positioning are the result of thermal and physical loads applied to the line. Thermal loading is a function of line current and the combination of numerous variables influencing ambient heat dissipation including wind velocity/direction, ambient air temperature and precipitation. Physical loading applied to the conductor affects sag and sway by combining physical factors such as ice and wind loading. The movement of the transmission line conductor and the MVCD is illustrated in Figure 1 below.

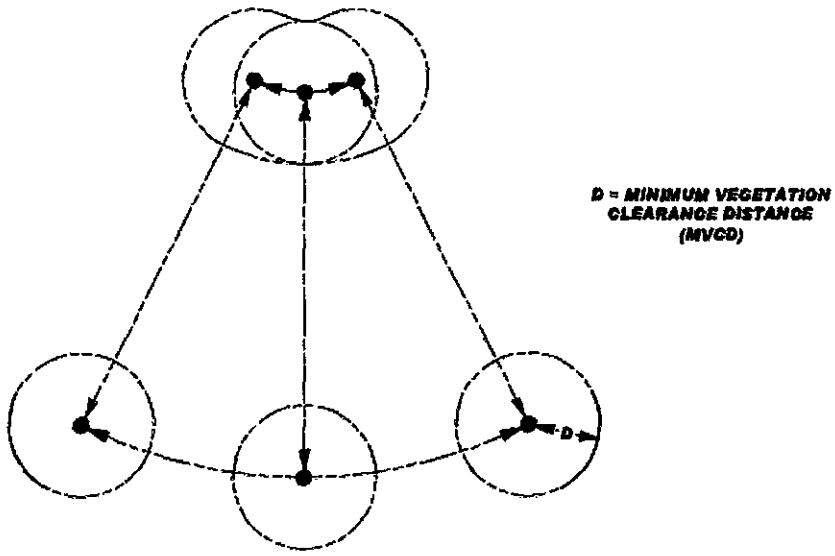

Figure 1

A cross-section view of a single conductor at a given point along the span is shown with six possible conductor positions due to movement resulting from thermal and mechanical loading.

Requirement R4:

R4 is a risk-based requirement. It focuses on preventative actions to be taken by the applicable Transmission Owner or applicable Generator Owner for the mitigation of Fault risk when a vegetation threat is confirmed. R4 involves the notification of potentially threatening vegetation conditions, without any intentional delay, to the control center holding switching authority for that specific transmission line. Examples of acceptable unintentional delays may

include communication system problems (for example, cellular service or two-way radio disabled), crews located in remote field locations with no communication access, delays due to severe weather, etc.

Confirmation is key that a threat actually exists due to vegetation. This confirmation could be in the form of an applicable Transmission Owner or applicable Generator Owner employee who personally identifies such a threat in the field. Confirmation could also be made by sending out an employee to evaluate a situation reported by a landowner.

Vegetation-related conditions that warrant a response include vegetation that is near or encroaching into the MVCD (a grow-in issue) or vegetation that could fall into the transmission conductor (a fall-in issue). A knowledgeable verification of the risk would include an assessment of the possible sag or movement of the conductor while operating between no-load conditions and its rating.

The applicable Transmission Owner or applicable Generator Owner has the responsibility to ensure the proper communication between field personnel and the control center to allow the control center to take the appropriate action until or as the vegetation threat is relieved. Appropriate actions may include a temporary reduction in the line loading, switching the line out of service, or other preparatory actions in recognition of the increased risk of outage on that circuit. The notification of the threat should be communicated in terms of minutes or hours as opposed to a longer time frame for corrective action plans (see R5).

All potential grow-in or fall-in vegetation-related conditions will not necessarily cause a Fault at any moment. For example, some applicable Transmission Owners or applicable Generator Owners may have a danger tree identification program that identifies trees for removal with the potential to fall near the line. These trees would not require notification to the control center unless they pose an immediate fall-in threat.

Requirement R5:
R5 is a risk-based requirement. It focuses upon preventative actions to be taken by the applicable Transmission Owner or applicable Generator Owner for the mitigation of Sustained Outage risk when temporarily constrained from performing vegetation maintenance. The intent of this requirement is to deal with situations that prevent the applicable Transmission Owner or applicable Generator Owner from performing planned vegetation management work and, as a result, have the potential to put the transmission line at risk. Constraints to performing vegetation maintenance work as planned could result from legal injunctions filed by property owners, the discovery of easement stipulations which limit the applicable Transmission Owner's or applicable Generator Owner's rights, or other circumstances.

This requirement is not intended to address situations where the transmission line is not at potential risk and the work event can be rescheduled or re-planned using an alternate work methodology. For example, a land owner may prevent the planned use of herbicides to control incompatible vegetation outside of the MVCD, but agree to the use of mechanical clearing. In

this case the applicable Transmission Owner or applicable Generator Owner is not under any immediate time constraint for achieving the management objective, can easily reschedule work using an alternate approach, and therefore does not need to take interim corrective action.

However, in situations where transmission line reliability is potentially at risk due to a constraint, the applicable Transmission Owner or applicable Generator Owner is required to take an interim corrective action to mitigate the potential risk to the transmission line. A wide range of actions can be taken to address various situations. General considerations include:

- Identifying locations where the applicable Transmission Owner or applicable Generator Owner is constrained from performing planned vegetation maintenance work which potentially leaves the transmission line at risk.
- Developing the specific action to mitigate any potential risk associated with not performing the vegetation maintenance work as planned.
- Documenting and tracking the specific action taken for the location.
- In developing the specific action to mitigate the potential risk to the transmission line the applicable Transmission Owner or applicable Generator Owner could consider location specific measures such as modifying the inspection and/or maintenance intervals. Where a legal constraint would not allow any vegetation work, the interim corrective action could include limiting the loading on the transmission line.
- The applicable Transmission Owner or applicable Generator Owner should document and track the specific corrective action taken at each location. This location may be indicated as one span, one tree or a combination of spans on one property where the constraint is considered to be temporary.

Requirement R6:
R6 is a risk-based requirement. This requirement sets a minimum time period for completing Vegetation Inspections. The provision that Vegetation Inspections can be performed in conjunction with general line inspections facilitates a Transmission Owner's ability to meet this requirement. However, the applicable Transmission Owner or applicable Generator Owner may determine that more frequent vegetation specific inspections are needed to maintain reliability levels, based on factors such as anticipated growth rates of the local vegetation, length of the local growing season, limited ROW width, and local rainfall. Therefore it is expected that some transmission lines may be designated with a higher frequency of inspections.

The VSLs for Requirement R6 have levels ranked by the failure to inspect a percentage of the applicable lines to be inspected. To calculate the appropriate VSL the applicable Transmission Owner or applicable Generator Owner may choose units such as: circuit, pole line, line miles or kilometers, etc.

For example, when an applicable Transmission Owner or applicable Generator Owner operates 2,000 miles of applicable transmission lines this applicable Transmission Owner or applicable

Generator Owner will be responsible for inspecting all the 2,000 miles of lines at least once during the calendar year. If one of the included lines was 100 miles long, and if it was not inspected during the year, then the amount failed to inspect would be 100/2000 = 0.05 or 5%. The "Low VSL" for R6 would apply in this example.

Requirement R7:
R7 is a risk-based requirement. The applicable Transmission Owner or applicable Generator Owner is required to complete its annual work plan for vegetation management to accomplish the purpose of this standard. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made and documented provided they do not put the transmission system at risk. The annual work plan requirement is not intended to necessarily require a "span-by-span", or even a "line-by-line" detailed description of all work to be performed. It is only intended to require that the applicable Transmission Owner or applicable Generator Owner provide evidence of annual planning and execution of a vegetation management maintenance approach which successfully prevents encroachment of vegetation into the MVCD.

When an applicable Transmission Owner or applicable Generator Owner identifies 1,000 miles of applicable transmission lines to be completed in the applicable Transmission Owner's or applicable Generator Owner's annual plan, the applicable Transmission Owner or applicable Generator Owner will be responsible completing those identified miles. If an applicable Transmission Owner or applicable Generator Owner makes a modification to the annual plan that does not put the transmission system at risk of an encroachment the annual plan may be modified. If 100 miles of the annual plan is deferred until next year the calculation to determine what percentage was completed for the current year would be: 1000 – 100 (deferred miles) = 900 modified annual plan, or 900 / 900 = 100% completed annual miles. If an applicable Transmission Owner or applicable Generator Owner only completed 875 of the total 1000 miles with no acceptable documentation for modification of the annual plan the calculation for failure to complete the annual plan would be: 1000 – 875 = 125 miles failed to complete then, 125 miles (not completed) / 1000 total annual plan miles = 12.5% failed to complete.

The ability to modify the work plan allows the applicable Transmission Owner or applicable Generator Owner to change priorities or treatment methodologies during the year as conditions or situations dictate. For example recent line inspections may identify unanticipated high priority work, weather conditions (drought) could make herbicide application ineffective during the plan year, or a major storm could require redirecting local resources away from planned maintenance. This situation may also include complying with mutual assistance agreements by moving resources off the applicable Transmission Owner's or applicable Generator Owner's system to work on another system. Any of these examples could result in acceptable deferrals or additions to the annual work plan provided that they do not put the transmission system at risk of a vegetation encroachment.
In general, the vegetation management maintenance approach should use the full extent of the applicable Transmission Owner's or applicable Generator Owner's easement, fee simple and

other legal rights allowed. A comprehensive approach that exercises the full extent of legal rights on the ROW is superior to incremental management because in the long term it reduces the overall potential for encroachments, and it ensures that future planned work and future planned inspection cycles are sufficient.

When developing the annual work plan the applicable Transmission Owner or applicable Generator Owner should allow time for procedural requirements to obtain permits to work on federal, state, provincial, public, tribal lands. In some cases the lead time for obtaining permits may necessitate preparing work plans more than a year prior to work start dates. Applicable Transmission Owners or applicable Generator Owners may also need to consider those special landowner requirements as documented in easement instruments.

This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. Therefore, deferrals or relevant changes to the annual plan shall be documented. Depending on the planning and documentation format used by the applicable Transmission Owner or applicable Generator Owner, evidence of successful annual work plan execution could consist of signed-off work orders, signed contracts, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, or paid invoices. Other evidence may include photographs, and walk-through reports.

Notes:

The SDT determined that the use of IEEE 516-2003 in version 1 of FAC-003 was a misapplication. The SDT consulted specialists who advised that the Gallet equation would be a technically justified method. The explanation of why the Gallet approach is more appropriate is explained in the paragraphs below.

The drafting team sought a method of establishing minimum clearance distances that uses realistic weather conditions and realistic maximum transient over-voltages factors for in-service transmission lines.

The SDT considered several factors when looking at changes to the minimum vegetation to conductor distances in FAC-003-1:

- avoid the problem associated with referring to tables in another standard (IEEE-516-2003)
- transmission lines operate in non-laboratory environments (wet conditions)
- transient over-voltage factors are lower for in-service transmission lines than for inadvertently re-energized transmission lines with trapped charges.

FAC-003-1 used the minimum air insulation distance (MAID) without tools formula provided in IEEE 516-2003 to determine the minimum distance between a transmission line conductor and vegetation. The equations and methods provided in IEEE 516 were developed by an IEEE Task Force in 1968 from test data provided by thirteen independent laboratories. The distances provided in IEEE 516 Tables 5 and 7 are based on the withstand voltage of a dry rod-rod air gap,

or in other words, dry laboratory conditions. Consequently, the validity of using these distances in an outside environment application has been questioned.

FAC-003-1 allowed Transmission Owners to use either Table 5 or Table 7 to establish the minimum clearance distances. Table 7 could be used if the Transmission Owner knew the maximum transient over-voltage factor for its system. Otherwise, Table 5 would have to be used. Table 5 represented minimum air insulation distances under the worst possible case for transient over-voltage factors. These worst case transient over-voltage factors were as follows: 3.5 for voltages up to 362 kV phase to phase; 3.0 for 500 - 550 kV phase to phase; and 2.5 for 765 to 800 kV phase to phase. These worst case over-voltage factors were also a cause for concern in this particular application of the distances.

In general, the worst case transient over-voltages occur on a transmission line that is inadvertently re-energized immediately after the line is de-energized and a trapped charge is still present. The intent of FAC-003 is to keep a transmission line that is in service from becoming de-energized (i.e. tripped out) due to spark-over from the line conductor to nearby vegetation. Thus, the worst case transient overvoltage assumptions are not appropriate for this application. Rather, the appropriate over voltage values are those that occur only while the line is energized.

Typical values of transient over-voltages of in-service lines are not readily available in the literature because they are negligible compared with the maximums. A conservative value for the maximum transient over-voltage that can occur anywhere along the length of an in-service ac line was approximately 2.0 per unit. This value was a conservative estimate of the transient over-voltage that is created at the point of application (e.g. a substation) by switching a capacitor bank without pre-insertion devices (e.g. closing resistors). At voltage levels where capacitor banks are not very common (e.g. Maximum System Voltage of 362 kV), the maximum transient over-voltage of an in-service ac line are created by fault initiation on adjacent ac lines and shunt reactor bank switching. These transient voltages are usually 1.5 per unit or less.

Even though these transient over-voltages will not be experienced at locations remote from the bus at which they are created, in order to be conservative, it is assumed that all nearby ac lines are subjected to this same level of over-voltage. Thus, a maximum transient over-voltage factor of 2.0 per unit for transmission lines operated at 302 kV and below was considered to be a realistic maximum in this application. Likewise, for ac transmission lines operated at Maximum System Voltages of 362 kV and above a transient over-voltage factor of 1.4 per unit was considered a realistic maximum.

The Gallet equations are an accepted method for insulation coordination in tower design. These equations are used for computing the required strike distances for proper transmission line insulation coordination. They were developed for both wet and dry applications and can be used with any value of transient over-voltage factor. The Gallet equation also can take into account various air gap geometries. This approach was used to design the first 500 kV and 765 kV lines in North America.

If one compares the MAID using the IEEE 516-2003 Table 7 (table D.5 for English values) with the critical spark-over distances computed using the Gallet wet equations, for each of the nominal voltage classes and identical transient over-voltage factors, the Gallet equations yield a more conservative (larger) minimum distance value.

Distances calculated from either the IEEE 516 (dry) formulas or the Gallet "wet" formulas are not vastly different when the same transient overvoltage factors are used; the "wet" equations will consistently produce slightly larger distances than the IEEE 516 equations when the same transient overvoltage is used. While the IEEE 516 equations were only developed for dry conditions the Gallet equations have provisions to calculate spark-over distances for both wet and dry conditions.

Since no empirical data for spark over distances to live vegetation existed at the time version 3 was developed, the SDT chose a proven method that has been used in other EHV applications. The Gallet equations relevance to wet conditions and the selection of a Transient Overvoltage Factor that is consistent with the absence of trapped charges on an in-service transmission line make this methodology a better choice.

The following table is an example of the comparison of distances derived from IEEE 516 and the Gallet equations.

Comparison of spark-over distances computed using Gallet wet equations vs. IEEE 516-2003 MAID distances

(AC) Nom System Voltage (kV)	(AC) Max System Voltage (kV)	Transient Over-voltage Factor (T)	Clearance (ft.) Gallet (wet) @ Alt. 3000 feet	Table 7 (Table D.5 for feet) IEEE 516-2003 MAID (ft) @ Alt. 3000 feet
765	800	2.0	14.36	13.95
500	550	2.4	11.0	10.07
345	362	3.0	8.55	7.47
230	242	3.0	5.28	4.2
115	121	3.0	2.46	2.1

Rationale:
During development of this standard, text boxes were embedded within the standard to explain the rationale for various parts of the standard. Upon BOT approval, the text from the rationale text boxes was moved to this section.

Rationale for Applicability (section 4.2.4):
The areas excluded in 4.2.4 were excluded based on comments from industry for reasons summarized as follows:

1) There is a very low risk from vegetation in this area. Based on an informal survey, no TOs reported such an event.
2) Substations, switchyards, and stations have many inspection and maintenance activities that are necessary for reliability. Those existing process manage the threat. As such, the formal steps in this standard are not well suited for this environment.
3) Specifically addressing the areas where the standard does and does not apply makes the standard clearer.

Rationale for Applicability (section 4.3):
Within the text of NERC Reliability Standard FAC-003-3, "transmission line(s)" and "applicable line(s)" can also refer to the generation Facilities as referenced in 4.3 and its subsections.

Rationale for R1 and R2:
Lines with the highest significance to reliability are covered in R1; all other lines are covered in R2.

Rationale for the types of failure to manage vegetation which are listed in order of increasing degrees of severity in non-compliant performance as it relates to a failure of an applicable Transmission Owner's or applicable Generator Owner's vegetation maintenance program:

1. This management failure is found by routine inspection or Fault event investigation, and is normally symptomatic of unusual conditions in an otherwise sound program.
2. This management failure occurs when the height and location of a side tree within the ROW is not adequately addressed by the program.
3. This management failure occurs when side growth is not adequately addressed and may be indicative of an unsound program.
4. This management failure is usually indicative of a program that is not addressing the most fundamental dynamic of vegetation management, (i.e. a grow-in under the line). If this type of failure is pervasive on multiple lines, it provides a mechanism for a Cascade.

Rationale for R3:
The documentation provides a basis for evaluating the competency of the applicable Transmission Owner's or applicable Generator Owner's vegetation program. There may be many acceptable approaches to maintain clearances. Any approach must demonstrate that the

applicable Transmission Owner or applicable Generator Owner avoids vegetation-to-wire conflicts under all Ratings and all Rated Electrical Operating Conditions.

Rationale for R4:

This is to ensure expeditious communication between the applicable Transmission Owner or applicable Generator Owner and the control center when a critical situation is confirmed.

Rationale for R5:

Legal actions and other events may occur which result in constraints that prevent the applicable Transmission Owner or applicable Generator Owner from performing planned vegetation maintenance work.

In cases where the transmission line is put at potential risk due to constraints, the intent is for the applicable Transmission Owner and applicable Generator Owner to put interim measures in place, rather than do nothing.

The corrective action process is not intended to address situations where a planned work methodology cannot be performed but an alternate work methodology can be used.

Rationale for R6:

Inspections are used by applicable Transmission Owners and applicable Generator Owners to assess the condition of the entire ROW. The information from the assessment can be used to determine risk, determine future work and evaluate recently-completed work. This requirement sets a minimum Vegetation Inspection frequency of once per calendar year but with no more than 18 months between inspections on the same ROW. Based upon average growth rates across North America and on common utility practice, this minimum frequency is reasonable. Transmission Owners should consider local and environmental factors that could warrant more frequent inspections.

Rationale for R7:

This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. It allows modifications to the planned work for changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors, provided that those modifications do not put the transmission system at risk of a vegetation encroachment.

COMPLAINANT
EX 25

Duke Energy Ohio
Case No. 17-2344-EL-CSS
Citizens Against Clear Cutting First Set of Interrogatories
Date Received: January 25, 2018

CACC-INT-01-004

REQUEST:

Which specific transmission lines (identified by circuit number, location, and affected Complainant) are owned by Duke and located on any part of the property owned by any Complainant in this case?

RESPONSE:

Objection. This Interrogatory is vague and ambiguous as to the definition and meaning of the phrase "and located on any part of the property owned by any Complainant." With the exception of equipment such as a transmission tower, Duke Energy Ohio's transmission lines typically are not "located on any" property. Without waiving said objection, to the extent discoverable, and in the spirit of discovery, All affected complainants reside on the circuits and between the locations listed below:

Circuits 3881 and 5483 between Dimmick and Montgomery Substations.
Circuits 3881 and 5487 between Montgomery and Remington Substations.
Circuit 6984 between Summerside and Clermont Substations.
Circuit 9482 between Feldman and Clermont Substations.

PERSON RESPONSIBLE:

As to objection: Legal
As to response: Ron A. Adams

COMPLAINANT
EX 16

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Fourth Set of Interrogatories
Date Received: April 12, 2018

CACC-INT-04-027

REQUEST:

CACC-INT-03-042 asked for Duke to identify all instances within the past ten years where arcing has occurred between the transmission lines identified in CACC-INT-01-004 and any trees or vegetation. In response, Duke stated that there was an outage attributable to vegetation on Circuit 5487 on November 17, 2014. Was the outage that occurred on November 17, 2014 on Circuit 5487 caused by arcing?

RESPONSE: Objection. This Interrogatory is overly broad and unduly burdensome and irrelevant. Objecting further, this Interrogatory exposes Duke Energy Ohio to speculation and guesswork; without being an actual witness to the outage event, it is impossible to say exactly how such an outage is initiated.

PERSON RESPONSIBLE: Legal

COMPLAINANT
EX 27

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Fifth Set of Interrogatories
Date Received: July 20, 2018

CACC-INT-05-004

REQUEST:

In regard to the outage event on Circuit 5487 that occurred on November 17, 2014 that Duke identified in response to CACC-INT-03-042, which specific vegetation caused the outage?

RESPONSE: The outage was listed as being caused by vegetation. No further details are available.

PERSON RESPONSIBLE: Legal

COMPLAINANT
EX 28

Duke Energy Ohio
Case No. 17-2344-EL-CSS
Citizens Against Clear Cutting First Set of Interrogatories
Date Received: January 25, 2018

CACC-INT-01-057

REQUEST:

If the answer CACC-INT-055 is affirmative, what is the cost recovery mechanism for which cost recovery is obtained for Duke's implementation of its vegetation management plan?

RESPONSE:

Objection. This Interrogatory seeks information that is irrelevant and not likely to lead to the discovery of admissible evidence. Objecting further, the Interrogatory is vague, ambiguous, overly broad and unduly burdensome because it is not limited to the transmission lines at issue in this case. Without waiving said objections, Rider BTR.

PERSON RESPONSIBLE: Legal

COMPLAINANT
EX 29

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Fifth Set of Interrogatories
Date Received: July 20, 2018

CACC-INT-05-045

REQUEST:

In response to CACC-INT-01-014, Duke stated that in the past 12 years, it was "was more focused on the maintenance of trees and non-contensious (sic) removals to accommodate individual property owners rather than the full management of the right of way for overall safety and reliability of the transmission system. In doing so, the Company performed vegetation management practices consistent with its vegetation management program that was approved by the Public Utilities Commission of Ohio during the relevant time period." Is it Duke's position that by focusing on non-contentious removals and accommodating individual property owners, it was risking the safety and reliability of Duke's transmission system?

RESPONSE: Objection. This Interrogatory seeks to elicit a narrative response and is thus better suited for deposition. See Generally, *Penn Central Transportation Co. v. Armco Steel Corp.*, 27 Ohio Misc 76 (Montgomery Cty. 1971). Without waiving said objection, to the extent discoverable, and in the spirit of discovery, no. Duke Energy Ohio never put the safety and reliability of its transmission system at risk. During this period, Duke Energy Ohio was taking short term actions to accommodate public concern and creating a situation that required Duke Energy Ohio to perform excessive off-cycle work activity to protect and maintain the safety and reliability of the transmission system.

PERSON RESPONSIBLE:

As to objection: Legal
As to response: Ron Adams

COMPLAINANT
EX 30

Duke Energy Ohio
Case No. 17-2344-EL-CSS
CACC Fifth Set of Interrogatories
Date Received: July 20, 2018

CACC-INT-05-014

REQUEST:

Referring to the last time Duke performed vegetation management related to the five transmission cycles at issue on or near Complainants' properties, what clearance were Duke employees and/or contractors instructed to maintain between trees and/or other vegetation and the nearest transmission conductor?

RESPONSE: Objection. This Interrogatory fails to contain any reasonable time parameters pursuant to which it is to be answered, thereby rendering it overly broad, unduly burdensome, and vague. Objecting further, this Interrogatory causes Duke Energy Ohio to engage in speculation and guesswork given the lack of a definition for the phrase "the last time Duke performed vegetation management," a phrase that is susceptible to different interpretations. Furthermore, this Interrogatory seeks to elicit a narrative response and is thus better suited for deposition. See Generally, *Penn Central Transportation Co. v. Armco Steel Corp.*, 27 Ohio Misc 76 (Montgomery Cty. 1971). Without waiving said objection, to the extent discoverable, in the spirit of discovery, and assuming you are talking about work that was performed in 2011, the directive to the crews would have been to remove incompatible trees within the right of way and target six years growth clearance.

PERSON RESPONSIBLE:

As to objection: Legal
As to response: Ron Adams

Document title:	Document number:
Transmission and Distribution Vegetation Management General Specifications	TECP-MNT-TRM-00010
	Revision No.: 003
Keywords: vegetation management; transmission; distribution; contract; maintenance	Applies to: Vegetation Management – Duke Energy Enterprise

Duke Energy

Transmission and Distribution Vegetation Management General Specifications

2015 to 2019

Duke Energy Vegetation Management Services

DUKE ENERGY®

Rev: 12-18-2017

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EXHIBIT
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Duke Energy Proprietary Business Information – Not for external distribution

Table of Contents

1 Statement of Purpose

Duke Energy Business Services LLC, as agent for and on behalf of Duke Energy Ohio, Inc., Duke Energy Kentucky, Inc., Duke Energy Indiana, Inc., Duke Energy Carolinas, LLC, Duke Energy Progress, Inc. and Duke Energy Florida, Inc. and all of their agents, successors or assigns (hereinafter, collectively and individually referred to as "Owner") desires to outsource the execution of work related to Transmission and Distribution vegetation management and ancillary services as described in this document and incorporated herein by reference (collectively, the "work"). Contractor must be an experienced contractor capable of performing the work and desires to undertake the work.

NOW, THEREFORE, in consideration of the foregoing Statement of Purpose and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows.

2 Owner's Responsibilities

2.1 The Owner should be but is not limited to the Vegetation Management Specialist or contract representative, hereto referred to as the Owner.

2.2 Typically, the Owner's easement of record, franchise rights, permits etc. gives the right of ingress and egress to the right-of-way (ROW) to the Contractor and the right to inspect and maintain the ROW/facilities per these specifications.

2.3 The Owner shall provide documents necessary for the proper execution of the work. When these are not available, the Owner will meet the Contractor in the field or office for assistance as needed.

3 Contractor's Responsibilities: General

3.1 The Contractor shall perform all work in conformance with the Owner's Master Service Agreement and work specifications

3.2 The Contractor shall at all times comply with all Occupational Safety and Health Administration (OSHA) regulations, American National Standards Institute (ANSI) standards and all federal, state, county and municipal laws, statutes and ordinances. The agencies and standards of concern include but are not limited to OSHA, ANSI, the Department of Transportation (DOT), the Fish and Wildlife Service and the Environmental Protection Agency (EPA). Contractor safety is of the utmost importance to the Owner. Periodic safety inspections will be performed by Owner. Any individual, crew or contractor who refuses to comply with the safety standards as set forth by the Owner, industry and/or its governing agencies will be asked to leave immediately.

3.3 The Contractor shall furnish all labor, tools, transportation, equipment and materials necessary to perform the work.

3.4 The Contractor shall be evaluated on the overall effectiveness of its delivery of services during the agreement. Performance measures shall be developed for each Contractor providing services and regular meetings between the Owner and the Contractor will be scheduled to discuss performance. If the Contractor's performance falls below a satisfactory level determined by Owner, the Contractor will be placed on a Performance Improvement Plan. Performance measures may include but are not limited to safety, quality, reliability, cost and value. Failure to meet the terms of the agreement on a consistent basis may include reduction of work and/or termination of the contract.

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3.5 The Contractor shall work with the Owner to determine crew reporting procedures and ensure that the Owner is aware of crew locations at all times. The Contractor is also responsible for ensuring that notification is given if any work under this contract is suspended or stopped during normally scheduled times.

3.6 The Contractor shall be responsible for its personnel's completion of training and demonstration of competency necessary for their job classification. The Contractor shall have and maintain all relevant employee documentation.

3.7 All personnel must be qualified to perform assigned work and operate equipment as assigned. The Contractor shall at all times enforce strict discipline and good order among its employees. Any employees of the Contractor who appear in any way unqualified or present a public image that is detrimental to the Owner shall no longer be assigned to perform any of the services and shall immediately cease performance of any service.

3.8 The Contractor shall be responsible for its personnel's compliance with the Owner's hygiene and substance abuse requirements. The Contractor's employees, agents or other personnel shall begin each day in clean and neat clothing.

3.9 The Contractor shall strictly adhere to agreed-upon project schedules. To obtain payment for work, the Contractor must provide the Owner with details of completed work per the Owner's specifications and approved documentation that can be used for audit purposes.

3.10 The Contractor's field and administrative representatives shall have complete understanding and possession of all documents necessary to perform field work associated with the project. Documents include but are not limited to the Project Specification, Scope of Work and Project Description.

3.11 The Contractor is responsible for leaving the ROW/facilities in the same or better condition than the condition in which they were found. At no time should the Contractor leave trash, containers, supplies or other products on the Owner's ROW/facilities or on private property.

3.12 During the course of normal daily activities in the service area, Contractors shall immediately report to the Owner any hazardous conditions that threaten the Owner's facility or public safety.

3.13 The Owner reserves the right to restrict work days. All weekend and holiday (as observed by the Owner) work must be approved in advance by the Owner. Start and stop times must comply with all local noise ordinances or other laws/restrictions. All alternative work schedules must be authorized by the Owner and documented. Normal work weeks will also be defined as a 40-hour work week between Mondays through Friday unless otherwise approved by Owner.

3.14 The Contractor shall perform work in accordance with any applicable wetland permits. The Contractor shall always minimize soil disturbance when working in wetland areas. Care must always be exercised to avoid destroying or damaging the root mat.

3.15 Technology advances continue to evolve and the Contractor will partner in good faith with the Owner to capture efficiencies related to billing, scheduling and other business functions as these opportunities develop.

3.16 The Owner reserves the right to request that the Contractor performs work activities that are outside the original scope of work. The Owner will reimburse the Contractor for the additional scope of work. If the requested work is within scope, the Contractor shall complete this work without any additional compensation. If any discrepancies are identified through the inspection of completed work, the Contractor will resolve those findings without additional compensation.

3.17 The Owner reserves the right to bring in a different supplier if the Contractor's overall performance does not meet expectations. Upon acknowledgement between Owner and Contractor that reasonable resolutions cannot be made to improve Contractor's performance through meetings, conference calls, quarterly business reviews, or other means, the Owner reserves the right to bring in different Contractors.

3.18 The Contractor is a critical partner in supporting on-system service restoration, including routine, mid-level and major storms. The Contractor shall ensure that sufficient workforce is available for their assigned area. When requested, all Contractor crews are expected to respond after hours for power restoration as needed.

3.19 If the Owners vehicles or equipment (i.e. mechanical equipment, laptops, mobile devices, etc.) are used by the contractors personnel and an incident occurs, the contractor shall be responsible to the Owner for loss or damages to the vehicles and equipment. The Contractor shall also be liable for all damages to the property of others and for all liability for personal injuries including death, while its employees are operating or using the Owners vehicles and equipment.

3.20 In addition to the traditional roles, the Owner expects that the roles listed below will be performed by the Contractor personnel. The Contractor shall indicate which job classification will perform each of the following functions in the Proposal:

- Crew supervision.
- Quality assurance.
- Safety assurance.
- Productivity improvement.
- Property owner permission/notification.
- Outage investigation.
- Capital and new business planning.
- Property owner management (manage external and internal customer requests).
- Project scheduling (manage the Vegetation Management schedule).
- Project cost tracking (manage cost tracking process).
- Support municipal leadership relationship management.

4 Contractor Responsibilities: Supervision

4.1 The Contractor must provide adequate on-site supervision for all work in each Owner-defined area in which work is undertaken.

4.2 The Contractor agrees to make available at least one General Foreman per designated Owner-defined area at all times during the term of this contract. The number of General Foremen required may vary depending on the areas awarded as agreed by the Owner. The Contractor agrees that Supervisors or General Foremen shall respond to Owner calls without intentional delay.

4.3 Each Supervisor, General Foreman and/or lead person overseeing work crews shall have a cellular phone or other suitable method of communication that is not separately billed. The Contractor must make all telephone numbers available to the Owner. All crews must have a suitable means of communication to respond to emergencies and daily work needs. The Contractor must provide the location of office facilities, contact names and telephone numbers for all Supervisors, General Foremen and/or lead persons to the Owner prior to the commencement of any work under this contract. The Contractor shall immediately advise the Owner in writing of any changes in the contact names and numbers as they occur.

4.4 The Supervisor and/or General Foreman shall have an email address with field access so they can send and receive email messages daily.

4.5 All Foremen must be able to communicate effectively in English and be accessible to property owners for questions, unless otherwise directed by the Owner. Courtesy to the property owner is required at all times. The Contractor is required to provide a translator for the non-English speaking crews at all times on the work site.

5 Contractor Responsibilities: Traffic Control

5.1 The Contractor shall at all times provide and maintain in good condition adequate warning signs, barricades, barriers, lights and guard fences for the protection of the public and personnel and maintenance of traffic (MOT). Refer to the manual for Uniform Traffic Control Devices by US DOT and Work Zone Safety Handbooks for local and state jurisdictions.

5.2 The Contractor shall be responsible for flagging work zones either for their own use or being performed concurrently by other contractors at the same location to avoid a hazardous situation. The Contractor shall also flag for the Owner and the Owner may also flag for the Contractor as required by the Owner.

5.3 The Contractor shall provide normal work zone setup and maintenance of traffic as part of fixed compensation contracts.

5.4 The Contractor will be reimbursed for Owner-approved incremental traffic control expense beyond the requirements in 5.3 and can be subcontracted to an Owner-approved supplier. The Contractor shall receive prior approval before scheduling a Contractor flagging crew or subcontracting for each individual assignment from the Owner. The Owner reserves the right to secure and schedule flagging.

6 Right-of-Way and Facilities Access

6.1 Substation control houses are not to be entered by the Contractor unless accompanied by the Owner.

6.2 Keys to access the Owner's work sites or other property may be issued as needed prior to project start or as part of normal business purposes and returned upon work completion or upon employee separation. Any keys that are not returned after project completion or normal business purposes will be subtracted from the total project cost at $50.00 per key.

6.3 The Owner assumes no responsibility for the condition or maintenance of any road, structure or ROW that may be used by the Contractor in performing their work or in transferring materials to and from their site of work.

7 Public Relations

7.1 The Contractor acknowledges and agrees that it has no authority to obligate the Owner for any payments or benefits of any kind to any person.

7.2 The Contractor acknowledges and agrees that the personnel it retains or hires to perform the work may be perceived by the public as representing the Owner. Accordingly, such personnel must be respectful, professional and courteous.

7.3 Each crew member shall wear a garment or personal protective equipment (PPE) with visible Contractor company logo upon start of work. Hard hats shall have a visible label identifying the name of the employee. All Contractor personnel shall look, dress and act professionally.

7.4 The Contractor shall provide and maintain vehicles, equipment and tools that are safe to operate and present a positive public image. All Contractor vehicles shall have a standard decal identifying the Contractor Company or shall follow the Owner's decal-related guidelines. Only minor equipment repairs are to be performed on the Owner's designated ROW, work sites or facilities.

7.5 The Contractor shall supply its employees with business cards from the Supervisor or General Foreman to provide to property owners upon request. Cards should provide the Supervisor or General Foreman's name and telephone number and Contractor company name for information about service, inquiries or claims.

7.6 If the Contractor is approached or contacted by a public media representative, the Contractor shall decline to comment and direct the public media representative to the Owner.

8 Soliciting Other Work

8.1 Neither the Contractor nor the Contractor's personnel shall, during hours worked pursuant to this contract, solicit work from or propose sales to property owners or others.

9 Permits and Licenses

9.1 The Contractor is responsible for obtaining all occupational permits and licenses legally required to perform the work. The Contractor will pay for such permits and licenses. Project-specific construction and environmental permits that are the responsibility of the Owner will be paid for and obtained by the Owner.

10 Customer/Property Owner or Agent Notification

10.1 The Contractor shall notify the customer/property owner or the customer/property owner's agent of upcoming work in accordance with state and/or local requirements, and the Owner's customer/property owner notification process and procedures documents. The Contractor shall be required to complete a customer/property owner notification log for documentation purposes. This documentation shall be maintained by the Contractor as specified by Owner and shall be available at the Owner's request.

10.2 When required by the Owner, the Contractor's personnel must attempt to contact the customer/property owner or the customer/property owner's agent at the property prior to commencing any work. If the customer/property owner or the customer/property owner's agent is not available or does not live at the property, the Contractor shall proceed with the work unless:

10.2.1 The customer/property owner has a history of prior concerns or the extent of the work is likely to cause a concern.

10.2.2 Current ordinances or prior commitments/requirements exist that require customer/property owner notification.

10.3 The Contractor shall notify the Owner of each case of refusal, with the name of the customer/property owner, address and scope of work. The Owner must be notified of any refusals without intentional delay.

10.4 The Contractor shall use past refusal and complaint information when available and provided by the Owner to avoid conflicts with customers/property owners. The Contractor will review historical information provided by the Owner prior to beginning their work. Customers/property owners with previously documented requests for personal notification should be contacted verbally before any work is done at their location.

10.5 Permission for ROW/facility/private property access over adjacent property shall be secured by the Contractor.

11 Injuries and Claims

11.1 Inquiries or claims from the public concerning activities by the Contractor's personnel on or off easements are the Contractor's responsibility. The Contractor is responsible to settle or resolve claims resulting from their activities. Contact on all claims and inquires shall be made by Contractor within 1 business day of the first report of such claim or inquiry. All claims or inquiries should be resolved within 14 calendar days of the claim or inquiry. The Contractor is required to maintain ongoing communication with the Owner and report back to the Owner in written form containing the resolution of claim.

11.2 Customer/property owner inquiries and damage claims with associated dollar amounts should be recorded by the Contractor and reported back to the Owner in a written format at the Owner's request. The Contractor shall be responsible for repairing any property damage and correcting faulty workmanship for a period of 1 year from the date the work is completed and accepted by the Owner. Where property damage or faulty workmanship are found, the Contractor shall correct immediately such defects at no cost to the Owner, including material, equipment and labor. In cases where such faulty workmanship results in an emergency response (during normal or after normal hours) the Owner will reduce payment or invoice the Contractor by the amount (material, equipment and labor) for the repairs.

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11.3 The Contractor shall report damage to the Owner's property caused by negligence or faulty workmanship by its work force. The Contractor shall repair such damage or faulty workmanship in 2 weeks or less, including providing material, equipment and labor. In instances where the Contractor is not qualified or damages result in an emergency response (during normal or after hours); the Owner may repair such damage, negligence or faulty workmanship. The Owner will reduce payment or invoice the Contractor for the repairs, including material, equipment and fully loaded labor.

11.4 The Contractor agrees to repair or restore, to the condition at time of entry, any damage to the customer/property owner's property due to ingress and egress or other activities associated with all work under this contract. Damage includes but is not limited to repair of fences, driveways, lawns and other property.

11.5 The Contractor shall leave all fences, gates and fence gaps in the same or better condition than the condition in which they were found. If fences, gates or fence gaps are in poor condition prior to the start of work and could allow livestock to escape, it will be the Contractor's responsibility to contact the customer/property owner to inform them of the existing conditions. If contact has not been made, gates will be left as found as the Contractor moves through. When gates or fence gaps are needed for access, the Owner should be notified to pursue customer/property owner compliance with regard to accessibility. Fences/gates damaged while performing work or inspection will be promptly repaired by the Contractor to the same or better condition as the condition in which they were found.

12 Accidents, Injuries and Contractor-Caused Interruptions

12.1 The Contractor shall take all necessary safety precautions to protect human life and public and private property, including power lines. Accidents, injuries, near misses, and Contractor-caused interruptions involving the public or Contractor personnel must be reported in accordance with the Owner's current incident reporting process. In case of power interruption or damage, the Contractor shall notify the Owner immediately. The Contractor shall conduct a prompt and thorough investigation of such incidents.

12.2 The Contractor understands that the electric circuits shall at all times remain energized during the performance of their work, unless otherwise agreed upon and scheduled by the Owner. The Contractor shall not interfere with the normal operation of such electric circuits or the electric circuits that are adjacent to, underbuilt or parallel to the facilities found within their scope of work. All Contractor-caused electric service interruptions are subject to repair by the Owner and the Contractor shall be liable for damages resulting from the service interruption.

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12.3 If Contractor is found by the applicable regulatory authority to be solely responsible for a transmission interruption (momentary or sustained) due to human error, the Contractor will make restitution to the Owner of the amount of dollars needed to cover all repair costs and such fines levied by Federal Energy Regulatory Commission and/or North American Electric Reliability Corporation (FERC and/or NERC) against the Owner due solely to the Contractor's actions or inactions, up to a maximum of $100,000 (on account of levied fines only) during the term of this Agreement; provided however, the Owner shall consult with the Contractor on the administrative process with regard to the levying or appeal of such fines to a commercially reasonable extent. In addition to and separate from the applicable maximum amount set forth above, a penalty of up to $5000 will be assessed to the Contractor for the first occurrence of a transmission interruption on a line less than 200kV and a $5000 penalty will be assessed to the Contractor for the first occurrence of a transmission interruption on a line 200kV or greater. For lines less than 200kV, the maximum penalty for subsequent outages will equal $5000 multiplied by the number of penalties issued [e.g., the second occurrence would result in a maximum penalty of $10,000 ($5000 × 2); the fourth occurrence would result in a maximum penalty of $20,000 ($5000 × 4)]. For lines 200kV or greater, subsequent outages will result in a penalty $5000 greater than the previous penalty.

13 Safety

13.1 The ability to perform work safely is critical to the success of any business. Safety is a core value for the Owner and is part of the Owner's corporate culture. The Owner is devoted to a healthy and injury-free workplace and committed to the safety of our employees, customers, contractors and visitors and the communities in which they operate. The Owner is dedicated to using only safety-conscious Contractors who share our vision. Safety shall be given precedence over any other requirement, and unsafe behavior will not be tolerated.

13.2 The Contractor will develop, maintain and administer its own safety program at no cost to the Owner.

13.3 At a minimum, the Contractor shall perform and document weekly tailgate safety sessions and safety briefings prior to the start of each job or as conditions change on the work site.

13.4 If situations are encountered that would involve working closer than the minimum approach distance (MAD), put the crew in an unsafe situation or risk causing an outage, the Contractor Supervisor and the Owner shall be notified prior to continuing work or removing the vegetation.

13.5 Every Contractor employee shall have the appropriate footwear for their assigned tasks and shall adhere to the Contractor's internal policy.

13.6 The Owner requires that every Contractor employee shall be equipped with the appropriate PPE (in good condition) needed for the safe completion of assigned tasks or responsibilities.

13.7 Jewelry (including but not limited to finger rings, necklaces, earrings, body piercing, chains, wrist bands, wrist watches or key rings/chains) shall not be worn while within the work zone. The only exception is nonconductive medical alert jewelry.

13.8 The Contractor shall perform the work with the utmost regard for public safety and welfare, taking all necessary safety precautions as required by the Owner and by local, state or federal authorities to safeguard lives and property. The Contractor shall leave all work sites in a safe condition and with all Owner equipment and facilities properly secured to prevent ingress/egress by unauthorized persons or animals.

13.9 Work performed under this agreement shall comply with the Owner's safe work practices. Exceptions must be presented in writing to the Owner and preapproved. The Owner will at its sole discretion determine if alternative work practices provide equivalent safety.

13.10 The Contractor shall, when requested and in a form acceptable to the Owner, provide the Owner with written documentation of the Contractor's ongoing safety program. Written reports of any investigation and/or settlement of any/all accidents arising out of or related to the work shall be provided upon the Owner's request.

13.11 The Contractor is required to attend Owner-specified training prior to starting work on the Owner's system and on an annual basis thereafter. The Contractor will be compensated using time and equipment (T&E) rates for 100% of the labor and half of the equipment time.

14 Human Performance

14.1 The Owner supports a culture in which continuous improvement is an expectation. The Contractor shall demonstrate a commitment to human performance improvement and actively seek opportunities to avoid, reduce and learn from human errors to prevent reoccurrence. Contractors are strongly encouraged to develop formal programs with tools that demonstrate the commitment to error reduction. The Contractor shall be required to produce documentation showing the program/processes used for continuous improvement (if applicable) when requested by the Owner.

15 Herbicides and Chemicals

15.1 All work will be performed in compliance with federal, state and local laws. All herbicide products must be used in a manner that is consistent with their label ("the label is the law"). All herbicide products used shall be EPA-registered. Contractors shall follow the Owner's approved specified mixes and rates for herbicide applications. The Owner shall be notified in writing and prior approval is required if the Contractor wishes to use herbicide products or product mixes that are not purchased from the preferred vendor. Prior approval is required for any herbicide products and product mixes that will be used on the Owner's property.

15.2 A minimum of 95% control of the target species within the ROW is required for up to 1 year after the initial application on the targeted brush, trees and/or their root systems. In addition, in the wire zone (the area underneath and 10 ft. beyond the outermost conductor), 100% control is required for all woody vegetation taller than 48 in. for up to 1 year. The Contractor will be required to obtain 100% control of all vines growing on the Owner's poles and guy wires. If less than the prescribed control is achieved, it will be the Contractor's responsibility to re-treat the areas in question at their own expense (labor and material) within 60 days of receiving notification of the problem or within a designated time period as specified by the Owner.

15.3 All stumps from felled trees that have a risk of re-sprouting shall be treated with Owner-approved herbicides, unless otherwise directed by the Owner. All herbicides used for stump treatments shall include a colorant that will remain visible for approximately 2 weeks. All stump treatments must be applied within recommended label time of cutting to attain best results, or stumps are to be re-cut and treated. The Contractor will procure and store herbicides to be used for the Owner's vegetation management work. Treatment will be included in the appropriate removal unit or equipment and/or labor rates and shall not be billed separately.

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15.4 The Contractor shall make a regulatory and/or Owner-approved herbicide production report available for reporting all herbicide applications. Copies of all production reports shall be correctly filled out and submitted at the Owner's request.

15.5 The Contractor shall be responsible for the purchase, storage, application, record keeping and proper disposal of herbicides. The Contractor should purchase all chemicals at or below the negotiated rates offered by the Owner's preferred vendor. The Contractor is responsible for obtaining applicable licenses for any herbicide application that the Owner may request.

15.6 Contractors are required to hold a valid pesticide applicator license for the area in which the work is being performed. Copies of the license will be supplied to the Owner upon request prior to beginning work.

15.7 The Contractor shall make every effort to prevent any herbicide spillage on or off the Owner's ROW or property. The Owner shall immediately be notified of any spillage on or off their ROW or property. Proper cleanup of such spillage shall be the Contractor's responsibility.

15.8 The Contractor shall provide current Safety Data Sheets (SDS) and labels to the Owner for all herbicide products proposed for use prior to any chemical applications upon request.

15.9 The Contractor shall immediately report any chemical or oil spill to the local Owner or designee or call 800-527-3853 (Duke Energy Carolinas and Midwest), 866-769-1266 (Duke Energy Florida) or 919-614-2554 (Duke Energy Progress). At the Owner's discretion, the Contractor shall be required to either clean up any spill caused by its actions or compensate the Owner for any spill cleanup costs. Additionally, the Contractor shall be responsible for proper and legal disposal costs of spill cleanup material as a result of negligence on the part of the Contractor as directed by the Owner.

16 Work Hours and Compensation

16.1 Under no circumstances does this agreement guarantee any amount of work volume or work hours.

16.2 Work schedules will be determined by the Owner and are based strictly on business needs.

16.3 The crews and Supervisors who normally work on labor and equipment rates will be scheduled for either a 4- to 10-hour shift or a 5- to 8-hour shift based on business needs.

16.4 A work day shall begin at the designated base location or designated starting point as mutually agreed upon by the Owner and Contractor and end at a designated endpoint.

16.5 The crews' standard work schedules can only be changed for the current week upon approval from the Owner. This may include emergent work, emergency situations or other work such as planned outages and will be handled on an individual and infrequent basis.

16.6 A crew's schedule may be changed for the upcoming work week by the Owner. The Owner shall give schedule change notifications to Contractor supervision prior to the end of the current week's schedule.

16.7 In case of inclement weather, the Contractor will be responsible for communicating with the Owner prior to altering normally scheduled hours. The Owner is not responsible for compensation to the Contractor for any time not worked. Unit crews will work at the discretion of the Contractor unless required by the Owner and will only be compensated for time or units worked.

16.8 In no case will the Owner be required to reimburse the Contractor for meals incurred while performing work for the Owner. Exceptions for crews assigned to major storm restoration activities include the following:

- The Owner will provide meals for all crews.
- The Owner will provide lodging for travel crews (local crews only when pre-approved by Owner).
- The Owner agrees to reimburse the Contractor for reasonable expenses when the Owner cannot provide meals and lodging.

16.9 The Contractor may be offered meal services during major events when services are available. If the Contractor decides not to participate in these services and chooses other options, no compensation will be due to the Contractor.

16.10 All miscellaneous charges must be authorized by the Owner and will be reimbursed at cost plus 5%.

17 Report and Travel

17.1 The Contractor crews shall report to a mutually agreed-upon base location or designated starting point that shall be located within their assigned zone/area at the designated time, ready to begin work. Unit work is all-inclusive, including travel time between work locations. Mobilizations from unit work to T&E will be paid as out of scope work and billed as hourly.

17.2 Hourly crews shall travel the most efficient route between the base location or designated starting point and the work sites. Crews will observe a 30-minute meal break during the work schedule, typically occurring during the middle of the schedule. Crews shall not leave the work site to observe the 30-minute meal break unless both the travel time and meal can be observed within the 30-minute period. Starting and ending time for meals shall be documented. Unit crews are not required to document meal breaks.

17.3 A per diem rate shall be paid only when prior approval is given by the Owner.

18 Service Restoration

18.1 The Owner commits to work in good faith to allow the Contractor's crews to be available to aid other utilities for restoration efforts. The Owner also commits to try and renegotiate customer commitments whenever possible to aid in this release. This would only apply if there were no major restoration efforts occurring on the Owner's system. Additionally, the status of the Annual Vegetation Maintenance plan will be a significant determining factor in any decision to release crews. Crews will return to aid the Owner with restoration efforts if storms affect the Owner's system. The Owner will fill all mutual assistance requests before releasing the Contractor. The Owner will generally allow the Contractor to remain off system for up to 1 week. Durations greater than 1 week will require additional Owner approval. The Contractor is expected to maintain a high level of availability of all crews when the Owner has experienced significant damage to the electrical system. Prior authorization from the Owner is required before Contractor crews can be released to other utilities for storm restoration.

18.2 When crews are used in service restoration efforts, no additional cost for equipment will be incurred, except where the equipment is actually used during restoration.

18.3 For labor and equipment used during service restoration efforts within the Owner's enterprise electric service territory, the Contractor will use the appropriate rates for the classifications and equipment in Exhibit B based on the pricing area origination point. Reasonable expenses incurred during the support of restoration for Contractors working away from their reporting location will be reimbursed when approved by the Owner.

19 On Call

19.1 The Contractor shall identify and provide on-call contact information in writing for each area.

19.2 The Contractor shall provide after-hour crews that will have availability within a reasonable response time. Each crew shall be equipped and staffed to respond to routine outage activity on the Owner's system.

19.3 Reasonable response time is defined as 60 minutes or less between the first call from the Owner to the Contractor for the purpose of securing assistance and the Contractor's arrival on-site at the operation center where the outage originated or outage site, whichever is agreed upon by the Owner and the Contractor at the time of the call. The Owner reserves the right to reasonably adjust requirements on an as needed based upon geographic considerations.

19.4 The Owner will coordinate with the Contractor and determine the number and type of resources requested.

20 Specific Trees

20.1 At the Owner's discretion, compatible vegetation should be preserved unless it presents an accessibility issue for the Owner.

20.2 When removing trees as well as cutting underbrush, make all cuts as close to the ground as practical and no more than 2 in. above the ground or water line.

20.3 All Owners' structures/guy wires (regardless of type) shall be free of vines with a minimum of a 12 in. visible gap/cut in the vines. An Owner-approved herbicide shall be applied to the base of the cut vine.

20.4 Wild cherry trees or other potentially noxious vegetation must be removed in a manner that does not produce a hazardous environment to livestock.

20.5 All debris that impedes the flow of water shall be removed from ditches, canals, channels or other waterways.

21 Wood Removal

21.1 Disposal fees for work performed under unit, lump sum or other fixed pricing is not billable to the Owner.

21.2 For work performed under hourly rates, the Contractor will make every effort to cost effectively dispose of wood, debris and chips without incurring disposal fees.

21.3 When disposal fees cannot be avoided, the Contractor is required to seek prior approval from the Owner and will be reimbursed at cost plus 5%.

22 Payment for Completed Work

22.1 The Contractor shall provide all labor and equipment necessary to perform all services, including but not limited to reactive, routine maintenance, hazard tree removal, capital and or storm work. All miscellaneous tools, supplies, materials and small/minor equipment shall be included as part of the bill rate for the major equipment and/or labor classification as reflected in Exhibit B.

22.2 Invoices for completed work shall be submitted per the Terms and Conditions of the Purchase Order or Contract. Data requirements and frequency of invoicing shall be based on project requirements as well as specific Owner requirements.

22.3 Subcontracted services or leased and rented equipment will be billed at cost plus 5%, unless otherwise authorized by the Owner. Supporting billing documentation and prior Owner approval is required.

22.4 At the end of each month, the Contractor shall provide the Owner representative with an estimate of unbilled work that has been completed to support monthly accruals of work completed.

22.5 The Owner agrees to pay for completed work only after the Contractor provides the appropriate documentation.

22.6 Fuel clause rates for Vegetation Management Services

22.6.1 The Owner agrees to pay fuel cost adjustments that will be calculated on a quarterly basis and submitted as a separate invoice/credit memo to the Owner at the end of each quarter. At the end of each quarter, the Contractor and the Owner will identify the quarterly average cost for "Gasoline All Formulations" and "No 2 Diesel Retail Sales by All Sellers" in the following PADD areas: Lower Atlantic Area for Carolinas and Midwest Area for the Midwest. The prices will be computed from the information provided by the United States Government Energy Information Administration:

- Lower Atlantic: http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_r1z_m.htm.com
- Midwest: http://www.tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_r20_m.htm.com

22.6.2 At the end of each quarter, the Contractor will provide a fuel report showing the actual fuel purchased (whole gallons). At the end of each quarter, the PADD index average for the 3 corresponding months for each Duke Energy region (Carolinas and Midwest) will be compared with base rate shown below. For each whole $0.10 increment above the base rate, the Contractor will be compensated for the increment value multiplied by the gallons used per quarter, or when each whole $0.10 increment is below the base rate, the Contractor will compensate (through a credit memo) the Owner the increment value multiplied by the gallons used per quarter. When requested by the Owner, the Contractor will provide detailed data reports that detail the gallons and reported for the fuel used while in the Owner's system. This base rate is agreed upon between the Contractor and the Owner for this contract period.

Gasoline base rate for fuel clause: $_.__

Diesel base rate for fuel clause: $_.__

Adjustment for each × $0.10: $_.__

- Example 1: Assume a PADD quarterly average diesel rate of $2.75 per gallon and a gasoline rate of $2.35 per gallon for the quarter in question. The Contractor submits fuel usage for the quarter and usage of 5000 gallons of diesel and 4000 gallons of gasoline. For the diesel adjustment, $2.75 – $2.55 = $0.20 times total diesel fuel usage ($0.20 * 5000 gallons = $1,000.00.) For the gasoline adjustment, $2.35 - $2.25 = $0.10 times total gasoline fuel usage ($0.10 * 4000 gallons = $400.00.). Therefore, the final fuel adjustment due the Contractor would be $1,400.00 for quarter ending.
- Example 2: Assume a PADD quarterly average diesel rate of $2.78 per gallon and a gasoline rate of $2.39 per gallon for the quarter in question. The Contractor submits fuel usage for the quarter and usage of 5000 gallons of diesel and 4000 gallons of gasoline. For the diesel adjustment, $2.78 – $2.55 = $0.20 times total diesel fuel usage ($0.20 * 5000 gallons = $1,000.00.) For the gasoline adjustment, $2.39 - $2.25 = $0.10 times total gasoline fuel usage ($0.10 * 4000 gallons = $400.00.). Therefore, the final fuel adjustment due the Contractor would be $1,400.00 for quarter ending.

22.6.3 Quarters shall be:

- January, February, March.
- April, May, June.
- July, August, September.
- October, November, December.

22.6.4 Payment due to the Contractor shall be issued in accordance with contractual payment terms. Payment due to the Owner shall be submitted as a credit memo. Invoices or credit memos are due 30 days after the end of each quarter.

22.7 The Owner will periodically request the Contractor to perform work that is outside of the scope of routine Vegetation Management work or not covered under the established contract agreements. This non-routine work may include miscellaneous customer requests (tickets), project work orders, specialized transmission line clearing and/or emergency response support. The Contractor shall obtain consent or approval from the designated Owner representative prior to performing any non-routine work in order to receive payment. Compensation for authorized non-routine work will be made based on the applicable labor and equipment billing rates established in Exhibit B.

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22.8 Payment for labor and equipment will be made for each applicable classification and figured to the nearest one-quarter of an hour worked.

22.9 The number of work hours in a routine work day may be defined as either 8 hours or 10 hours in a given area, as determined by Owner.

22.10 Contractor crews shall report to a mutually agreed upon base location or designated starting point located within their assigned zone/area at the designated time ready to begin work. Billable time begins when authorized personnel and equipment are assembled as a complete work unit at the base location or designated starting point and ready to start work at the designated reporting time.

22.11 Overtime billing rates shall be invoiced only if specifically requested by the Owner, only for time actually worked and, to the extent permitted by applicable law, only for time in excess of 40 hours per week and/or on a daily basis only for the time as approved by the Owner that exceeds the normal scheduled work day hours.

22.12 The General Foreman will be billed at the straight time rates for both straight time and overtime when directly supervising hourly billed work. The following in 22.12.1 – 22.12.2 – and 22.12.3 will be the exception to this specification.

22.12.1 In the event of a significant storm being declared by the Owner the General Foreman may bill at overtime rates for actual overtime hours worked.

22.12.2 In the event the Owner requires a General Foreman to travel to a different area or zone to assist in storm restoration efforts the General Foreman may bill at overtime rates for actual overtime hours worked.

22.12.3 In the event the Owner requires a General Foreman to work on their specified company holidays, the General Foreman may bill at overtime rates for actual hours worked. The Owner's specified holidays are New Year's Day, Good Friday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, the day after Thanksgiving, Christmas Eve Day or Christmas Day. Contractor holidays may vary from the Owner's specified holidays. It is the responsibility of the contractor to share with the Owner their specified holidays.

22.13 Under a settle-up model, the following activities are billable by the General Foreman and shall be charged to the circuit and included in the total cost calculation:

- Completing unit estimating work.
- Installing door hangers.
- Making safety observations.
- Addressing customer/property owner issues.
- Attending or leading Contractor safety meetings or stand-downs.
- Processing timesheets for the Owner.

When working across multiple circuits then appropriately allocate time.

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22.14 Under a settle-up model, the hours associated with the following activities shall not be billable:

- Paperwork required solely for Contractor use.
- Fixing and repairing equipment.
- Cost of equipment that is not in use.
- Supplier functions and meetings not associated with specific Owner work (e.g., attending the North Carolina Vegetation Management Association or ISA meetings) unless pre-approved by Owner.
- Relocation of equipment not associated with Owner maintenance work.
- Equipment breakdowns.
- Performer unavailability.
- Travel time to the base location or designated starting point.
- Doubling-up crew members (two General Foremen on one site should not charge both to circuit).
- OSHA/ANSI/governmental and other required Contractor training.

22.15 T&E crews working to make up lost time shall be billable at the straight time rate.

22.16 Specialized equipment billable hours shall correspond with operator billable labor hours when a specialized equipment crew (with an operator assigned for each specialized piece of equipment) is dedicated to a work type that requires the specialized piece of equipment. The Contractor will coordinate and optimize equipment utilization and production rates through collaborative T&E work planning activities with the Owner. Only utilized equipment hours during approved overtime hours are billable. Specialized equipment / vehicles are not billable when the equipment is broken down for greater than 30 minutes.

22.17 No time shall be charged for equipment during periods that it is inoperable. Upon authorization by the Owner, personnel may be allowed to continue to work during periods when equipment is inoperable.

22.18 When the Contractor's personnel are required by the Owner to report and remain at their base location or other designated post ready for immediate duty, they are on stand-by. Stand-by time is considered as working time for pay purposes. The Owner will pay a minimum of 2 hours or until released.

22.19 If crews are held on stand-by during normal work hours, one-half of the equipment/vehicle hours may be reported. If crews are being held on stand-by during overtime hours, no equipment/vehicle hours will be reported. Crews will remain on site during stand-by period.

22.20 Payment for vehicles/equipment not in use will be subject to the following criteria: If the vehicle/equipment is not used due to combining of crew personnel caused by the Contractor, no hours shall be reported. If the vehicle/equipment is not used during normal work hours due to combining of crew personnel by the Owner, a maximum of one-half of the scheduled equipment hours for the day may be reported.

22.21 The Contractor's employees who are required by the Owner to work on New Year's Day, Good Friday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, the day after Thanksgiving, Christmas Eve Day or Christmas Day shall be billed at the overtime rate for the hours actually worked.

22.22 When it is evident that the necessary work in a location will not be enough to justify the Contractor's workforce full-time, the Owner agrees to allow mutually agreed-upon resource staffing adjustments. Such schedules may be changed with 24 hours' notice by the Owner.

22.23 The Owner reserves the right to change the normal reporting hours for Contractor personnel with 24 hours' notice. In this case, straight time rates will apply for the normally scheduled work hours (8 or 10 hours). Hours worked in excess of the normal schedule will be paid at the applicable overtime rates.

22.24 If a crew is scheduled to be off but is required to work due to an emergency, the pay for these hours will be at overtime rates. This overtime provision will apply only to crews regularly working on the Owner's system.

22.25 Crews working under a settle up or T&E contract may be reassigned at Owners discretion to a new base location or designated starting point. When new starting points are assigned, the Owner will be billed one time only for the time to relocate to that new starting point. Crews will be notified of any base location or designated starting point changes prior to the day of the change.

22.26 Any fueling of vehicles or equipment shall be done outside of normal working hours at the Contractors expense.

22.27 For Contractor crews traveling to work for other utilities, upon return, the Owner will pay overtime in excess of the normal daily work schedule or 40 hours worked on the Owner's system.

22.28 Off-system crews traveling to work for the Owner: if, during the normal week, the crew works for the Owner, returns to its home base lending utility and is able to work a 40-hour work week or portion thereof back at home base, the Owner will pay all time worked on its system that is in excess of 40 hours for the week at the applicable overtime rates.

22.29 The Owner agrees to pay overtime rates for work performed over and above the daily work schedule.

22.29.1 Time and conditions relating to the Owner begin when the crew leaves its home base and end when crew arrives back to its designated home base, in accordance with the instructions outlined on this document. If another entity requests the services of an off-system work unit that has been working for the Owner, the billing will terminate at the time that the crew begins its route to the requesting entity.

22.29.2 Labor and equipment rates paid by the Owner for off-system crews shall be the higher of the crews' home base rates or the applicable Owner labor and equipment rates.

22.30 Owner-based Contractor crews traveling to work for other utilities: if the contract crew is one assigned on a regular basis elsewhere on the Owner's system, upon returning, the crew will be reassigned on a normal basis, taking into consideration the normal work week and conditions relating thereto.

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23 Job Classifications and Descriptions

23.1 The acceptable labor classifications and job descriptions that shall be used to identify the persons performing the work are as follows:

23.1.1 General Foreman (GF): Supervisory/Management Classification. Will normally supervise between six and eight crews, depending on crew sizes and geographic distribution of crews or at the discretion of the Owner.

- Must be safety-conscious.
- Be responsible, trustworthy and of the highest integrity.
- Have a thorough knowledge of proper pruning techniques (natural and directional pruning).
- Demonstrate possession of the knowledge and experience required in subordinate positions.
- Understand the Line Clearance Contract with the Owner and be able to adhere to it.
- Have good knowledge of and the ability to interpret engineering drawings.
- Be an overall well-rounded individual and a good manager and decision-maker.
- Have a broad knowledge of all climbing skills and all other technical aspects (mechanical and manual) of electrical line clearance operations.
- Have working knowledge of all equipment associated with line clearance activities.
- Have excellent people skills to work in partnership with the tree crews and intelligently converse with customers to convey explanations of the procedures and techniques to be used.
- Have excellent communication skills with customers, crews and Owner personnel.
- Have the proper work ethic, with an innate desire and self-motivation to achieve the highest productivity levels possible from crews.
- Adept at efficient scheduling of crews and have adequate capabilities for keeping necessary records (written and computer records).
- Flexibility to adapt quickly to abrupt changes in plans and schedules.
- Have good self-control.

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23.1.2 Foreman A (FA): Crew leader with superior experience and proven success in the leadership position.

- Must be safety conscious.
- Be trustworthy and responsible.
- Have a thorough knowledge of proper pruning techniques (natural and directional pruning).
- Demonstrate possession of the knowledge and experience required in subordinate positions.
- Readily accept accountability for crew availability.
- Assist in on-the-job training for less experienced climbers and bucket operators.
- Must have proven skills through job performance as a top climber (CA).
- Have a broad knowledge of all climbing skills and all other technical aspects (both mechanical and manual) of electrical line clearance operations.
- Have good leadership abilities.
- Have a good working knowledge of all the equipment and tools used on crews and know how to operate the equipment in the most efficient manner.
- Possess sufficient communication skills to ensure that crew members have proper understanding of work directives and the ability to effectively communicate with customers/property owners about work practices to obtain their concurrence with the necessary work.
- Be self-motivated so that the drive to be productive comes from within rather than from close supervision.

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23.1.3 Foreman B (FB): Beginning level crew leader.

- Must be safety conscious.
- Be trustworthy and responsible.
- Have a thorough knowledge of proper pruning techniques (natural and directional pruning).
- Demonstrate possession of the knowledge and experience required in subordinate positions.
- Readily accept accountability for crew availability.
- Assist in on-the-job training for less experienced climbers and bucket operators.
- Must have proven skills through job performance as a top climber (CA).
- Have a broad knowledge of all climbing skills and all other technical aspects (mechanical and manual) of electrical line clearance operations.
- Have good leadership abilities.
- Have a good working knowledge of all the equipment and tools used on his crew and know how to operate the equipment in the most efficient manner.
- Possess sufficient communication skills to ensure that crew members have proper understanding of work directives and the ability to effectively communicate with our customers/property owners about work practices to obtain their concurrence with the necessary work.
- Be self-motivated so that the drive to be productive comes from within rather than from close supervision.

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23.1.4 Trimmer A (TA): Top climbers or top trimmers who have proven through previous performance in lower level positions that they are capable of performing any and all tasks involving climbing techniques, rigging involved in pruning and removal and innovations needed to safely and effectively do any type of removals an pruning operations. Trimmer A may or may not be proficient in the operation of aerial lifts.

- Always be safety conscious.
- Be trustworthy and responsible.
- Have a thorough knowledge of proper pruning techniques (natural and directional pruning) and know and be able to use the techniques necessary during emergency restoration.
- Possess all the requirements for the lower climber classifications.
- Assist in on-the-job training of less experienced climbers and bucket operators.
- Have a thorough knowledge of all skills involved in climbing trees around energized lines and be proficient at removing trees, pruning limbs, and roping tree sections around these lines. These skills include the ability to safely and effectively work portions of the tree that are overhanging the conductors.
- Have a thorough knowledge of all the skills involved in climbing trees around energized conductors and be proficient at removing trees, pruning limbs and roping tree sections around these lines and if the individual is working on a bucket, have the ability to effectively accomplish these tasks through the use of that bucket.
- Have an excellent working knowledge of the equipment in use, including bucket trucks, chain saws, bucket operation and chippers.
- Have the good judgment to make sound logical day-to-day decisions.
- Have a good work ethic.

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23.1.5 Trimmer B (TB): Mid-level experienced climber or trimmer. May be a climber on a conventional crew or a bucket crew. Shall be capable of doing the majority of work required aloft, other than the most difficult tree removals or overhang removal.

- Always be safety conscious.
- Be trustworthy and responsible.
- Have a thorough knowledge of proper pruning (natural and directional pruning) techniques.
- Possess all the requirements for the Climber C classification
- Have a thorough knowledge of all the skills involved in climbing trees around energized lines and be capable of performing all types of maintenance work in a tree other than the most difficult tasks.
- Have the ability to safely remove overhang, with assistance as appropriate, and perform routine pruning around open wire secondary and primary electrical conductors.
- Have the ability to safely remove most trees that present a danger to Owner facilities.
- Have good working knowledge of the chipper, split-dump, chain saws and bucket, if applicable.
- Be familiar with procedures for maintaining good customer relations.
- If working on a bucket crew, must be thoroughly familiar with the operation of the bucket and capable of acquiring the skills needed to use the bucket and hydraulic circular saw to accomplish any type work in the tree that is within the limits of the equipment.

23.1.6 Trimmer C (TC): Entry level climber or trimmer position.

- Always is safety conscious.
- Have a thorough knowledge of proper pruning techniques (natural and directional pruning).
- Possess all the requirements for the "learner" classification.
- Have the ability to safely ascend trees by use of the three-point contact method and the climbing with hooks method as appropriate.
- Have a thorough knowledge of climbing skills, be familiar with all uses of the ropes and know how to tie the necessary knots for use in climbing and roping.
- Be open to instruction.
- Be able to identify the majority of the predominant tree species in the geographic area and know the basic characteristics of these species.
- Understand the basics of electricity, be able to identify the different lines found on the poles and distinguish between the different types and voltages of the electrical conductors found on the pole.
- Know how to safely and efficiently operate the chain saw and chipper.

23.1.7 Apprentice/Groundman (L): Entry-level position on a line clearance crew. May also serve as a flagger.

- Always be safety conscious.
- Have the physical fitness capability to endure the demands of strenuous activities.
- Be dependable and conscientious in job attendance.
- Be able to follow directions and work on a team.
- Have the ability to learn the basics of electricity, how to operate the chipper and chain saws and the basic knots necessary for ground work.

23.1.8 Work Planner (WP): Individual used to pre-plan work activities for line clearance crews. Work will involve identification of trees to be removed and trimmed as well as the trimming techniques that need to be employed. The Work Planner position will also involve significant customer interface.

- Must be self-directed.
- Must be thoroughly knowledgeable of the tree species of the area.
- Must have a good understanding of utility line clearance, basics of electricity and differences in line voltages and other type conductors found on pole lines.
- Must be able to understand specific line clearance specifications and apply these specifications into the planning process.
- Be capable of understanding and following circuit maps and the documentation of the work that is identified.

23.1.9 Equipment Operator (EO): Specially trained in the operation and maintenance of specialized pieces of equipment such as Jarraffs, brush cutters and Timberlands.

- May or may not have expertise in other aspects of line clearance work, such as pruning and removal of trees in close proximity to electrical conductors.
- Must be thoroughly knowledgeable of the particular machines they operate and all safety aspects of its operation.

23.2 Where the Contractor's internal labor classification and pay structure differs from the labor classifications above, the Contractor shall bill the Owner at the classification that most appropriately matches their internal pay structure for each billable Contractor employee.

24 Performance Incentive Cost-Share Guidelines (When Applicable)

24.1 The availability of a performance incentive cost-share for work typically completed by circuit will be evaluated annually. The evaluation will be based on a comparison of cost targets vs. actual costs, along with an evaluation of Contractor performance on work completed within a designated area within the calendar year. The Owner will review the status of performance with the Contractor throughout the year.

24.2 If the total actual cost to complete circuits in a designated area for the year differs from the target cost, the cost savings or overruns will be shared by the Owner and Contractor as described in the following paragraphs.

24.3 Cost sharing calculations shall be done annually and will apply to completed circuits within the year.

24.4 Cost sharing will be calculated for each designated area. If the Contractor has multiple designated areas and the Owner and Contractor agree, the cost sharing amounts may be combined across multiple designated areas.

24.5 Cost savings: if the total actual cost to complete circuits in a designated area for the year is less than the cumulative cost target of the circuits in such designated area, the resulting savings will be shared by the Owner and the Contractor. The cost savings will be shared 50% by the Owner and 50% by the Contractor. There is no cap on the amount of cost savings that will be shared by the Owner and Contractor.

The following are examples of calculations under this incentive cost-sharing provision:

Circuit	Target Cost	Actual Cost	Variance
Circuit #1 (15 miles)	$ 97,500	$ 105,000	(-$ 7,500)
Circuit #2 (10 miles)	$ 75,000	$ 70,000	$ 5,000
Circuit #3 (42 miles)	$ 230,000	$ 220,000	$ 10,000
Total	**$402,500**	**$ 395,000**	**$7,500**

Incentive Cost-Share	Owner	Contractor
Savings Cost-Share	50% of $7,500	50% of $7,500
	$3,750	$3,750

24.6 The Owner recommends that the Contractor shares a performance incentive with the Contractor's field employees, to be distributed as cash to non-management classification employees (General Foreman and below) in lieu of goods, benefits or other services. The Contractor has complete responsibility for determining the guidelines and administration of any incentive program. This recommendation is not intended to replace other incentive programs that the Contractor's management may have in place or deem appropriate to compensate their employees.

24.7 Cost overruns: if the total actual cost to complete circuits in a designated area for the year is greater than the cumulative cost target of the circuits in such designated area, the resulting cost overrun will be shared by the Owner and the Contractor. The cost overruns will be shared 50% by the Owner and 50% by the Contractor. There is no cap on the amount of cost overruns that will be shared by the Owner and Contractor.

The following is an example of the calculations under this incentive cost-sharing provision:

Circuit	Target Cost	Actual Cost	Variance
Circuit #1 (15 miles)	$ 105,000	$ 97,500	$ 7,500
Circuit #2 (10 miles)	$ 70,000	$ 75,000	(-$ 5,000)
Circuit #3 (42 miles)	$ 220,000	$ 230,000	(-$ 10,000)
Total	**$ 395,000**	**$402,500**	**(-$7,500)**

Incentive Cost-Share	Owner	Contractor
Savings Cost-Share	50% of $7,500	50% of $7,500
	$3,750	$3,750

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Transmission Document Approval Form

issued 1/4/18

Section A: Document identification and type of action

Document no.: TECP-MNT-TRM-00010 | Revision no.: 003

Document title: Transmission and Distribution Vegetation Management General Specifications

Type of action

- ☐ New
- ☐ Cancellation
- ☐ Suspension
- ☑ Revision
- ☐ Ownership Change
- ☐ Renumber
- ☐ Periodic review completed, as required

For Document Management staff use only:

- ☐ Editorial Change
- ☐ Migration
- ☐ Control element revision _____ (does not require approval authority signature)

Applies to: (Select all that apply)

- ☑ Duke Energy
- ☑ Duke Energy Carolinas, LLC
- ☑ Duke Energy Progress, LLC
- ☑ Duke Energy Florida, LLC
- ☑ Duke Energy Indiana, Inc.
- ☑ Duke Energy Kentucky Inc.
- ☑ Duke Energy Ohio, Inc
- ☑ Group Prog Mgmt& Contr Alliances
- ☐ Department _____
- ☐ Other _____

Security Restrictions Required: ☐ Yes ☐ No

If yes, explain (see instructions on page 2) _____

Compliance Applicability: (required field)

- ☐ None
- ☐ State Codes/Standards
- ☐ HIPAA
- ☐ Sarbanes-Oxley
- ☐ OSHA _____
- ☐ NERC
- ☐ FERC Standards of Conduct
- ☐ Patriot Act
- ☐ Other _____

Complete if submitting a form: (see instructions on page 2)

Does the form have a parent, governing or instructional procedure? ☑ No ☐ Yes (Procedure No: _____)

How is the form to be completed or used? ☐ Hard Copy (completed by hand) ☑ Online Data Entry (fillable PDF)

☑ Communication plan established ☐ Impact Reviews completed

Description of document action or summary of changes.

1- Title Date changed from (2015 to 2017) to (2015 to 2019)

2 - Revision Date changed from 4-24-2015 to 12-18-2017

3 - Section 3.19 in General Specifications changes
From:
3.19 If the Owner's vehicles/equipment is used by the Contractor's personnel and an incident occurs, the Contractor shall be responsible to the Owner for any damage to the vehicles and equipment. The Contractor shall also be liable for all damages to the property of others and for all liability for personal injuries, including death, while its employees are operating or using the Owner's vehicles and equipment.

To.
3.19 If the Owners vehicles or equipment (i.e... mechanical equipment, laptops, mobile devices, etc.) are used by the contractors personnel and an incident occurs, the contractor shall be responsible to the Owner for loss or damages to the vehicles and equipment. The Contractor shall also be liable for all damages to the property of others and for all liability for personal injuries including death, while its employees are operating or using the Owners vehicles and equipment.

Section B: Approval **Who should sign?** see instructions on page 2

Preparer(s)/Author(s)/Writer(s) *(signature not required)*:
Ricky G Nicholson

Approval recommended (print name)	*(signature)*	Date:
Approval recommended *(print name)*	*(signature)*	Date:
Approval recommended *(print name)*	*(signature)*	Date:
Final Approval *(print name)* James Best	*(signature)*	Date: 12/21/17

RETURN SIGNED FORM AS SCANNED PDF VIA E-MAIL OR FAX TO (919) 235-3165

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Document title:	Document number:
TVM: Duke Energy's FAC-003 Vegetation Management Program Document	GDLP-MNT-TRM-00018
	Revision No.: 002
Keywords: vegetation management; transmission; North American Electric Reliability Corporation (NERC); FAC-003; imminent threat; annual work plan; outage reporting	Applies to: Transmission Vegetation Management: DEC, DEF, DEI, DEK, DEO and DEP

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Duke Energy's FAC-003 Vegetation Management Program Document

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Table of Contents

Duke Energy Proprietary Business Information – Not for external distribution

1.0 Introduction

Duke Energy's (DE) FAC-003 Vegetation Management Program Document defines how the enterprise addresses the latest version of the North American Electric Reliability Corporation (NERC) Standard FAC-003. DE Transmission Vegetation Management (TVM) employs an Integrated Vegetation Management Program (IVMP) and a defense-in-depth strategy that combines various components to manage vegetation on the electric transmission utility right of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW. Through the use of different integrated methods, the optimum results of improved reliability, increased safety, and greater access can be achieved. Maintaining ROWs, in accordance with ANSI, OSHA and other applicable safety requirements/laws as well as Duke Energy specifications, guidelines, and established procedures, prevents the risk of vegetation-related outages that could lead to Cascading.

2.0 Applicability

This FAC-003 Document applies to DE's transmission and generation lines operated at 200kV or higher and to each overhead line operated below 200kV identified as an element of an Interconnection Reliability Operating Limit (IROL) as designated under NERC Standard FAC-014 by the Planning Coordinator based upon the known Planning Horizon.

2.1 Applicable Overhead Transmission Lines (located outside the fenced area of a switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence):

2.1.1 DE's Transmission Planning provides facility information to TVM anytime major changes are made to the System.

2.1.2 DE's Transmission Planning and the Compliance Group notifies TVM when a Planning Horizon IROL is identified and/or added to the System.

2.2 Applicable Overhead Generation Lines (that extend greater than one mile beyond the fenced area, or do not have a clear line of sight, of or between the generating station switchyard to the point of interconnection with the Transmission Owner's facility):

2.2.1 DE's Generation Operations requests TVM to maintain those lines determined to be applicable to FAC-003.

2.2.2 TVM maintains those lines in accordance with this FAC-003 VM Program Document and the applicable associated Regional Documents.

3.0 Purpose and Program Scope

3.1 Purpose

The purpose of this document is to facilitate compliance with the NERC Reliability Standard FAC-003 and to serve as a general guide for TVM personnel engaged in supervision of vegetation management activities. This document will be reviewed annually and updated as necessary if / when a revision to the Vegetation Standard occurs or circumstances warrant.

3.2 Program Scope

The visual inspection and appropriate maintenance of transmission line ROWs comprise the FAC-003 Vegetation Management Program. Inspections are performed to monitor vegetation growth and encroachments as well as ROW contractor effectiveness. All work performed by our designated contractors, shall be performed in accordance with ANSI, OSHA and other applicable safety requirements, laws and DE guidelines (Legal and Safety Requirements). Periodic quality assessments will be made by qualified personnel to assure legal and safety requirements are being met. The Regional TVM Manager will maintain the Regional processes, procedures and documentation to ensure that vegetation impacting the transmission system is properly maintained. Vegetation Governance will maintain this FAC-003 VM Program Document as well as other associated System TVM documents.

4.0 Integrated Vegetation Management Program (IVMP)

The IVMP program encompasses environmental stewardship and utilizes various ROW management tools— mechanical, herbicide, and/or manual floor maintenance, tree removal/trimming, and danger/hazard tree cutting. Herbicide use keeps vegetation from posing a threat to the transmission lines and equipment while promoting a transmission ROW compatible ecosystem within the ROW corridor. The IVMP applies to two areas of maintenance: 1) inside ROW corridors and 2) outside ROW corridors.

4.1 Right-of-Way (ROW)

The corridor of land under a transmission line(s) needed to operate the line(s). The width of the corridor is established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built. The ROW width in no case exceeds the applicable Transmission Owner's or applicable Generator Owner's legal rights but may be less based on the aforementioned criteria.

4.2 Vegetation Inside ROW Corridors

Inside ROW corridors, in general, DE manages vegetation in a manner so as to establish growth of species that will not exceed a height at maturity that will encroach into the Minimum Vegetation Clearance Distance (MVCD).

4.2.1 No Maintenance Areas (Leave Area)

In some ROW corridors (typically in mountainous terrain), line heights are such that matured "tall-growing" species will not threaten the operation of transmission lines, apparatus or equipment, and thus is not dangerous or detrimental to safe and reliable electric service. These sections of lines are integrated into the inspection processes.

4.3 Vegetation Outside the ROW Corridors

Maintenance outside the ROW corridor typically encompasses the felling of danger and/or hazard trees. A danger tree is any tree outside of the ROW tall enough to endanger DE facilities. A hazard tree is a tree that is dead, dying, diseased, leaning, or damaged either on or off the right of way that endangers DE facilities. The felling of hazard or danger trees can be triggered by our inspection processes.

5.0 Vegetation Control Methods

5.1 ROW Herbicides

The preferred method of vegetation control of brush on transmission ROWs is through the use of herbicides. Where herbicides cannot be applied on a case by case basis, ROWs will be mowed or hand-cut. DE will use herbicides where it is the safe and environmentally sound option in order to eliminate undesirable woody species from the rights of way while promoting lower growing vegetation that does not create a hazard to transmission lines and apparatus.

5.2 ROW Mowing

Use of mechanical equipment – e.g., rotary mowers, Kershaw, Hydro-Ax, etc., to reclaim all of the wooded sections of the ROW, where possible, to the width as determined by the ROW definition in 4.1 above.

5.3 ROW Hand Cutting

All of the wooded sections of the ROW that cannot be reclaimed with mechanical equipment are to be hand cut to the width as determined by the ROW definition in 4.1 above.

5.4 Tree Felling/Trimming

All trees requiring felling/trimming shall be managed to prevent encroachment into the MVCD.

5.5 Side-trimming

Trees within and along the edge of the ROW will be selected for felling, and trees outside of the ROW with growth potential into the ROW will be side-trimmed at a minimum (some may require felling if side-trimming is not adequate) to meet clearance requirements. These trees or limbs, due to their height and location, have the potential to make contact with, or be in close proximity to, the conductor due to reasonably expected conductor movement (i.e. conductor blowout).

6.0 Preventing Encroachments into the Minimum Vegetation Clearance Distance (R1 & R2)

Manage vegetation to prevent encroachment into the MVCD for applicable lines that are (R1) or are not (R2) an element of an IROL.

6.1 DE maintains a list of applicable lines subject to R1 and R2. If lines are elements of an IROL, the lines/circuits are noted as to R1 or R2 applicability in that list. If no lines are an element of an IROL, Transmission Planning personnel will provide a letter of attestation, and all FAC-003 applicable lines/circuits will be subject to Requirement 2.

6.2 DE conducts an annual vegetation inspection of its applicable lines. Real-time, observed encroachments into the MVCD during the inspection are reported to the TVM Specialist or Regional TVM Manager. Appropriate information reported by the Inspector is documented and reported to the TVM Specialist or Regional TVM Manager who in turn, reports to the applicable Transmission Energy Control Center and Regulatory Compliance.

6.2.1 The documentation of Type 1 encroachments will be maintained for compliance purposes.

6.2.2 A letter of attestation will be provided if no real time observations of MVCD encroachments absent a sustained outage (Type 1) occur during an audit period.

6.3 DE maintains records of sustained outages from all causes including those applicable to FAC-003 for R1 and R2 (fall-ins from inside the ROW, blowing together of lines and vegetation inside the ROW, and vegetation growth into the MVCD). DE attests that these records are an accurate classification of all FAC-003 sanctioned outages.

6.4 MVCD Definition and Table 2

MVCD is the calculated minimum distance stated in feet to prevent flashover between conductors and vegetation for various altitudes and operating voltages. The MVCD will be maintained under all rated electrical operating conditions. The following is Table 2 from FAC 003-Minimum Vegetation Clearance Distances (MVCD) for Alternating Current Voltages (feet).

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6.4 MVCD Definition and Table 2 (Continued)

FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)[17]

For Alternating Current Voltages (feet)

(AC) Nominal System Voltage (KV)*	(AC) Maximum System Voltage (kV)[18]	MVCD (feet) Over sea level up to 500 ft	MVCD feet Over 500 ft up to 1000 ft	MVCD feet Over 1000 ft up to 2000 ft	MVCD feet Over 2000 ft up to 3000 ft	MVCD feet Over 3000 ft up to 4000 ft	MVCD feet Over 4000 ft up to 5000 ft	MVCD feet Over 5000 ft up to 6000 ft	MVCD feet Over 6000 ft up to 7000 ft	MVCD feet Over 7000 ft up to 8000 ft	MVCD feet Over 8000 ft up to 9000 ft	MVCD feet Over 9000 ft up to 10000 ft	MVCD feet Over 10000 ft up to 11000 ft	MVCD feet Over 11000 ft up to 12000 ft	MVCD feet Over 12000 ft up to 13000 ft	MVCD feet Over 13000 ft up to 14000 ft	MVCD feet Over 14000 ft up to 15000 ft
765	800	11.6ft	11.7ft	11.9ft	12.1ft	12.2ft	12.4ft	12.6ft	12.8ft	13.0ft	13.1ft	13.3ft	13.5ft	13.7ft	13.9ft	14.1ft	14.3ft
500	550	7.0ft	7.1ft	7.2ft	7.4ft	7.5ft	7.6ft	7.8ft	7.9ft	8.1ft	8.2ft	8.3ft	8.5ft	8.6ft	8.8ft	8.9ft	9.1ft
345	362[19]	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft
287	302	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft
230	242	4.0ft	4.1ft	4.2ft	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft
161*	169	2.7ft	2.7ft	2.8ft	2.9ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft	3.3ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft
138*	145	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft	2.7ft	2.8ft	2.8ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft
115*	121	1.9ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.2ft	2.3ft	2.3ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft
88*	100	1.5ft	1.5ft	1.6ft	1.6ft	1.7ft	1.7ft	1.8ft	1.8ft	1.8ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.2ft	2.2ft
69*	72	1.1ft	1.1ft	1.1ft	1.2ft	1.2ft	1.2ft	1.2ft	1.3ft	1.3ft	1.3ft	1.4ft	1.4ft	1.4ft	1.5ft	1.6ft	1.6ft

- * Such lines are applicable to this standard only if PC has determined such per FAC-014 (refer to the Applicability Section above)

ᶧ Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)

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[17] *The distances in this Table are the minimums* required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

[18] Where applicable lines are operated at nominal voltages other than those listed, the applicable Transmission Owner or applicable Generator Owner should use the maximum system voltage to determine the appropriate clearance for that line.

[19] The change in transient overvoltage factors in the calculations are the driver in the decrease in MVCDs for voltages of 345 kV and above. Refer to pp.29-31 in the Supplemental Materials for additional information.

7.0 Documented Maintenance Strategies (R3)

DE has documented maintenance strategies and procedures to prevent vegetation encroachment into the MVCD of its applicable lines. Strategies and procedures account for the movement of applicable line conductors under their rating and all rated electrical conditions while considering the interrelationships between vegetation growth rates, control methods, and previous maintenance activities.

The following clearance considerations ensure that vegetation encroachment into the MVCD do not occur.

7.1 Floor Growth (vertical)

The following criteria for vertical clearances is to be considered in the planning and execution of all TVM work:

7.1.1 The maximum operating sag of the conductor is to be used as the reference point for TVM work for vegetation clearances.

7.1.1.1 If the actual maximum sag ground clearances are not known, the line design ground clearance for the specific voltage is to be used.

7.1.1.2 The appropriate MVCD vegetation to conductor clearance in Table 2 of this document.

7.1.1.3 Any other site specific factors, including but not limited to indigenous vegetation, easement/permit.

7.2 Side Growth (horizontal)

To ensure side growth and conductor movement impacts are limited, the TVM program will ensure vegetation side growth clearance based on the following criteria:

7.2.1 The TVM Program, to address side growth, will be based on reasonable conductor movement (i.e. conductor blowout) with 4.1 psf wind loading or less which is equivalent to approximately 40 mph winds (i.e., sub-tropical storm winds or fresh gale winds) and in no case is greater than the following:

7.2.1.1 The applicable NESC design criteria for conductor blowout used for the line

7.2.1.2 The edge of the defined Right of Way

7.2.1.3 For cases where side growth cannot be managed to meet the above criteria, corrective action measures to achieve sufficient clearances will be developed.

7.3 Each Region maintains records of vegetation control methods and inspections as well as a record of the annual work plan as executed including changes.

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8.0 Imminent Threat Communications (R4)

Notify, without intentional time delay, the control center holding switching authority for the associated applicable line once a confirmed vegetation condition exists that is likely to cause a Fault at any moment in accordance with TVM Program Imminent Threat Communication Procedure (GDLP-MNT-TRM-00017) and practices.

8.1 During the course of TVM work and inspections, any vegetation situation or condition that is observed and deemed to present an imminent threat to the Transmission System shall be reported without intentional time delay. Once vegetation is confirmed to be an actual viable imminent threat to the transmission system, DE (TVM) personnel or Field Line/Substation Operations (after consultation with TVM personnel), notify the control center, without intentional time delay.

8.2 Other DE employees, or contractors, may contact Field Operations or TVM Personnel with potential imminent threats prior to confirmation by TVM Personnel. Once the threat is confirmed, without intentional delay, the threat shall be addressed.

8.3 TVM completes and retains documentation for Imminent Threat notification to the applicable control center and actions taken.

9.0 Corrective Action Plan (Mitigation) (R5)

When constrained from performing vegetation work on an applicable line that may lead to a vegetation encroachment into the MVCD prior to implementation of the next Annual Work Plan, corrective action shall be taken to ensure continued vegetation management to prevent encroachments.

9.1 In situations where DE cannot exercise its legal rights or is prevented from performing work that may lead to encroachment prior to the next scheduled maintenance on that circuit, contractors will contact their designated VM Specialist. The VM Specialist will then take the appropriate actions to resolve the issue or implement any corrective action.

9.2 If the hazard is considered an imminent threat, the VM Specialist will initiate the Imminent Threat Process.

9.3 In cases where DE cannot obtain clearance distances due to limited legal rights, the VM Specialist will develop a documented corrective action plan.

10.0 Inspections (R6)

Perform an inspection of 100% of applicable transmission lines at least once per calendar year and with no more than 18 calendar months between inspections on the same ROW to ensure no encroachments occur into the MVCD.

10.1 All transmission circuits (100%) subject to FAC-003 shall be completely inspected at least once a year. The inspection interval should not exceed eighteen months from the last inspection.

10.2 The timing and number of inspections is flexible and may adjusted based on changing conditions.

10.3 DE tracks and maintains inspection documentation as evidence that 100% of its inspections are completed.

11.0 Annual Work Plan (R7)

DE will complete 100% of its annual work plan of applicable lines to ensure no vegetation encroachments occur within the MVCD. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made (provided they do not allow for encroachment of vegetation into the MVCD) and must be documented.

11.1 An annual work plan will be maintained for each area. The plan will be developed using previous work completion dates, inspection data, existing vegetation conditions, and based on anticipated growth rates. Components in the annual work plan may include but are not limited to inspection, herbicide, and maintenance activities.

11.2 DE tracks and maintains its annual work plan documentation by circuit, corridor or other unit of measure as evidence that 100% of the work is completed. Changes to the annual plan shall be documented.

12.0 Transmission Vegetation Outage Reporting

On a periodic basis, as defined by the Region Reliability Organization, DE will report any outage that meets the criteria defined in FAC-003.

A Sustained Outage is to be categorized as one of the following:

o Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;

o Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;

o Category 2A— Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;

o Category 2B— Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;

o Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW;

o Category 4A— Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

o Category 4B— Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

13.0 FAC-003 Vegetation Management Program Document Revision Tracker

Date	Description of Change	Revision by:
06/02/2014	Approval of MNT-TRMX-00305 of FAC-003 VM Program Document, REV 0 effective July 1, 2014.	Cathy Hope, Ron Adams, and Jeff Racey
01/14/2015	Renumbered to GDLP-MNT-TRM-00018 REV 000 with following clarifications and changes: 1.0 Introduction 6.2.1 Type 1 Encroachment Documentation 6.2.2 Attestation in Absence of Type 1 Encroachments 7.1 Floor Growth 7.1.1 Maximum Operating Sag 7.2 Side Growth 7.2.1 Conductor Movement/Blowout 8.0 Referenced Imminent Threat Procedure Document 8.2 Confirmation of Potential Imminent Threat 9.3 Documented Corrective Action Plan	Cathy Hope, Ron Adams, and Jeff Racey
03/02/2016	REV 001: added word "not" to 11.0 to correct typographical error and corrected Revision Tracker. Added hyperlink in 8.0.	Cathy Hope, Ron Adams, and Jeff Racey
07/22/2016	Added new MVCD Table 2 from FAC-003-4 effective October 1, 2016.	Cathy Hope, Ron Adams, and Jeff Racey

The following members of the DE Vegetation Management Team have reviewed and approved this FAC-003 Vegetation Management Program Document:

Catherine Hope – Director, Transmission Vegetation Management

Catherine Hope Date Approved: July 22, 2016

Ron A. Adams – Director, Vegetation Management Governance

Ron A. Adams Date Approved: July 22, 2016

Jeffrey H. Racey - System Transmission Forester, Vegetation Management Governance

Jeffrey H. Racey Date Approved: July 22, 2016

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Document Approval Form

published 8/8/16

Section A: Document identification and type of action

Document no.: GDLP-MNT-TRM-00018 | Revision no.: 002

Document title: TVM: Duke Energy's FAC-003 Vegetation Management Program Document

Type of action:

- ☐ New
- ☐ Cancellation
- ☐ Suspension
- ☐ *Renumber*
- ☐ *Ownership Change*
- ☑ Revision
- ☑ Periodic review completed, as required

For Corporate Document Center use only:

- ☐ Editorial Change
- ☐ Migration
- ☐ Control element revision _____ (does not require approval authority signature)

Applies to: (Select all that apply)

- ☐ Duke Energy
- ☑ Duke Energy Carolinas, LLC
- ☑ Duke Energy Progress, LLC
- ☑ Duke Energy Florida, LLC
- ☑ Duke Energy Indiana, Inc.
- ☑ Duke Energy Kentucky, Inc.
- ☑ Duke Energy Ohio, Inc.
- ☑ Group *Trans. Vegetation Management*
- ☐ Department _____
- ☐ Other _____

Security Restrictions Required: ☐ Yes ☐ No

If yes, explain (see instructions on page 2) _____

Compliance Applicability: (required field)

- ☐ None
- ☑ NERC
- ☐ State Codes/Standards
- ☐ FERC Standards of Conduct
- ☐ HIPAA
- ☐ Patriot Act
- ☐ Sarbanes-Oxley
- ☐ Other _____
- ☐ OSHA _____

Applicable to forms only: (see instructions on page 2)

Does the form have a parent, governing or instructional procedure? ☐ No ☐ Yes (Procedure No: _____)

How is the form to be completed or used? ☐ Hard Copy Completion (by hand) ☐ Online Data Entry

☑ Communication plan established ☑ Impact Reviews completed

Description of document action or summary of changes:

Added new MVCD Table 2 from FAC-003-4 effective October 1, 2016.

Section B: Approval **Who should sign?** see instructions on page 2

Preparer(s)/Author(s)/Writer(s) *(signature not required)*:

Jeff Racey

Approval recommended (print name): Ron Adams	*(signature)* R L Adams	Date: 7-22-16
Approval recommended *(print name):*	*(signature)*	Date:
Approval recommended *(print name):*	*(signature)*	Date:
Final Approval *(print name):* Cathy Hope	*(signature)* C Hope	Date: 7-29-16

RETURN SIGNED FORM AS SCANNED PDF VIA E-MAIL OR FAX TO (919) 235-3165

AUTHORIZED COPY

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Document title:	Document number:
Transmission Technical Specifications (DEM)	TECP-MNT-TRM-00013
	Revision No.: 002
Keywords: maintenance; transmission; vegetation management; contract	Applies to: Transmission Vegetation Management - Duke Energy Midwest

Duke Energy Midwest (DEM) Transmission Technical Specifications

Applicable to all Vegetation Management Activity, Including Time and Equipment and Planned Vegetation Maintenance

2015 to 2017

Duke Energy Vegetation Management Services

DUKE ENERGY®

Rev: 02-22-16

Suppliers who participate in this Duke Energy RFP Event must keep all information provided by Duke Energy confidential in accordance with signed 2009 Mutual Confidentiality Agreement. All information provided by Duke Energy, whether written, oral, observed, or in electronic form, should be considered confidential. This includes all bidding information submitted and witnessed in the online marketplace.

Any supplier who does not honor these confidentiality provisions may be excluded from participating in any Duke Energy supply opportunities as well as be liable for other remedies provided Duke Energy by law. In addition, if a supplier observes practices that are unethical or counterproductive to the fair operation of the online marketplace, they should notify Duke Energy immediately. Unless directed otherwise by Duke Energy, all RFP documentation, including all copies thereof in whatsoever form or medium, should be destroyed at the conclusion of this bidding process.

Table of Contents

Duke Energy Proprietary Business Information – Not for external distribution

1 Definitions

Note: This is a comprehensive list of definitions for all areas. Some definitions may not apply to all areas.

Active Pasture: Any fenced portion of the right-of-way easement within which livestock are currently contained.

Brush: A perennial woody stem less than or equal to 6 in. in diameter, measured at breast height (DBH).

Customer: A person, household, business or other entity that receives electric service from the Owner. Customers may or may not also be property owners.

Danger Tree: Any tree inside or outside of the right-of-way that is tall enough to endanger the Owner's facilities.

DBH: Abbreviation for diameter at breast height; tree diameter measured outside bark, typically at 4.5 ft.

Duke Energy Carolinas: The Duke Energy operating company in North Carolina and South Carolina known as Duke Energy Carolinas (abbreviated as DEC). Duke Energy Carolinas is sometimes referred to as Carolinas West.

Duke Energy Florida: The Duke Energy operating company in Florida (abbreviated as DEF).

Duke Energy Mid-West: The Duke Energy operating companies in Indiana, Ohio and Kentucky, collectively referred to as DEM.

Duke Energy Progress Carolinas: The Duke Energy operating company in North Carolina and South Carolina known as Duke Energy Progress (abbreviated as DEP). Duke Energy Progress Carolinas is sometimes referred to as Carolinas East.

Hazard Tree: A danger tree that is dead, structurally unsound, dying, diseased, leaning or damaged, whether on or off the right-of-way, and that endangers the Owner's facilities.

Inactive Line/Inactive Right-of-Way: A right-of-way easement with or without transmission structures and wires that have been taken out of service and are non-operational.

IROL: Abbreviation for interconnection reliability operating limit.

Leave Area: An area defined by the Owner where fully mature trees will not interfere with the safe and reliable operation of the line, considering all factors of the growing conditions, line design, sag, wind and conductor blowout.

Maintained Area: An area where cut brush cannot be left on-site. Maintained areas are considered improved areas. Examples of maintained areas include but are not limited to yards, landscaped areas, pastures, agricultural crops, fields and nurseries.

No-Spray Area: Any area within the right-of-way easement that should not have herbicides applied, as designated by agreement between the Owner and the property owner.

Non-Active Pasture: Any fenced area of the right-of-way easement that livestock may have occupied in the past but is not currently occupied by livestock.

Non-Maintained Area: Any area where cut brush can be left on-site.

Owner: Representative of Duke Energy. The Owner should be, but is not limited to, the Vegetation Management Specialists or Contract Representative.

Planned Maintenance Work: Vegetation management work that is planned and executed on a line or group of lines by work type (e.g., mechanical side trim, herbicide and tree removals) or that is all-inclusive from endpoint to endpoint.

Production Documentation: Documentation requested by the Owner that provides details of the work, such as man-hours, number of trees removed and spans/miles completed.

Property Owner: Person or entity that retains legal ownership of land.

Reactive Work: Work that is unplanned or any work that is not considered planned maintenance work. Examples of reactive work include (but are not limited to) emergency work and work that results from ground and aerial patrols and property owner requests.

Refusal: A refusal occurs when the crew is unable to perform the work due to customer/property owner refusal to allow work to be performed.

ROW: Abbreviation for right-of-way.

Side Trimming: Trimming to the edge of the easement using mechanical or manual methods. Side trimming does not include tree removals.

Stream Buffers: Not associated with wetlands. A buffer zone of 25 ft on each side of all stream and lake crossings within the transmission right-of-way easement. The stream buffer area is generally protected from all soil-disturbing activities, and mechanized equipment is not to be used in the stream buffer zone without Owner approval.

Transmission Area: Each of the designated geographic regions that generally correspond with Duke Energy Vegetation Management Specialists' areas of responsibility.

Transmission Line: Electric conductor(s) that typically transmit more than 44,000V of electricity. Some transmission line assets may be operated at voltages lower than 44,000V.

Tree: A perennial woody stem that is more than 6 in. in diameter, measured at breast height (DBH).

Wire Zone: The area that extends beyond the outermost conductor.

Work Day: The work day begins at an agreed starting point and time as locally designated by the Owner or designee and ending at the work site with the cessation of work.

Yard Tree: A tree that is typically in a landscaped or maintained setting.

2 General

2.1 Scope

2.1.1 The technical specifications include all information for and incidental to executing and completing all right-of-way (ROW) clearing and maintenance work shown on the drawings, schedules, notes and general specifications and as specified herein.

2.1.2 See Duke Energy Midwest Transmission Vegetation Management Areas for information about the service area covered by this contract (section 0 Reference Documents).

2.1.3 See Transmission and Distribution Vegetation Management General Specifications for general specifications (section 0 Reference Documents).

2.2 Voltages

2.2.1 Duke Energy transmission voltages are as follows:

- Above 200kV (NERC-regulated): 230kV, 345kV, 500kV, 525kV, 765kV.
- Below 200kV (non-NERC-regulated): 44kV, 69kV, 115kV, 138kV, 161kV.

NOTE: Lines designated as interconnection reliability operating limit (IROL) lines can be NERC-regulated below 200kV.

2.3 Coordination

2.3.1 All vegetation management should be coordinated with the Owner.

3 Policies and Procedures

3.1 Tree Topping and Crown Reduction

3.1.1 Tree topping is not generally accepted as an ROW maintenance practice for danger trees near transmission lines. The exceptions to this rule are as follows:

- Hazard trees that are off the ROW.
- Situations in which Duke Energy does not have a purchased ROW and the property owner does not want the tree(s) removed.
- The ROW agreement does not include danger tree rights (the right to cut down trees outside the specified strip).

3.1.2 Crown reduction is a generally accepted ROW maintenance practice when appropriate, including but not limited to cases of limited easement rights.

3.2 Replacement Trees

3.2.1 As a general rule, Duke Energy does not provide replacement trees to property owners.

3.3 Stump Grinding and Treatment

3.3.1 As a general rule, Duke Energy does not grind the stumps from trees cut down during maintenance activities, and stump grinding is only to be performed under direction of the Owner. The Contractor will cut the stump as close to the ground as possible.

3.3.2 Trees that are topped at fence height shall be treated with an approved low-volume basal/cut stump application.

3.4 Inspection

3.4.1 The Owner will conduct quality and quantity audits on the crew's scope of work for all maintenance work. The quality and quantity audits will ensure that the Owner is satisfied with the herbicide application, tree removal, tree trimming, mechanical side-trimming, mechanical re-clearing and/or hand-cutting practices of the field crew(s).

3.4.2 The Owner will conduct periodic quality and quantity audits at selected locations on the crew's scope of work for reactive work. The quality and quantity audits will ensure that the Owner is satisfied with the herbicide application, tree removal, tree trimming, mechanical side-trimming, mechanical re-clearing and/or hand-cutting practices of the field crew(s).

3.4.3 The Contractor is responsible for correcting items identified as work not done to required specifications. This work is to be completed in a timely and workmanlike manner.

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4 Reactive Work

4.1 Reactive Work Crew

4.1.1 A typical reactive work crew shall be skilled in all aspects of tree removal and other assigned vegetation tasks performed near high-voltage facilities.

4.2 Reactive Work Assignment

4.2.1 The Owner will assign work that is defined as reactive work to the Contractor. The Contractor will be paid time and materials for crews that perform this work.

4.2.2 All of the Owner's ROW and lines are inspected during the course of the year to ensure the safety and reliability of the transmission system. Any problems identified will be classified according to the current priority ratings and mitigated according to the priority ratings and target response timeframes listed in the table below.

Work Order Type	Target Response Time Frame
Service Response (SR)	Divert personnel to address immediately. May also be classified as an imminent threat.
As Soon as Possible (ASAP)	Prioritize and complete as soon as possible within normal work flow
Routine Work (RW)	In the normal course of work (or before next growing season)

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5 Planned Maintenance Specifications

5.1 Wood Removal and Debris Disposal

5.1.1 As a general rule, Duke Energy does not remove wood. Any exceptions must be approved by Owner.

5.1.2 In maintained areas, all brush will be chipped and piled in an area designated by the property owner or removed from the site and disposed of in the most environmentally and economically sound manner. Contractors will work with the property owner and cut wood into usable lengths (18 to 24 in., or longer if needed) and stack wood neatly at the base of the tree or the edge of the ROW. Wood will be secured to prevent movement at the location where it is cut.

5.1.3 In non-maintained areas, any trees that are removed will be dropped into wooded areas or felled lengthwise along the edge of the ROW (windrowed). Brush and debris shall be mowed, hashed or reduced in a manner that allows rapid decomposition.

5.1.4 Brush and debris shall not be left in a way that poses a safety hazard or inhibits access by the Owner's personnel or equipment.

5.1.5 Cut brush and trees shall not be left in streams, waterways, ditches, on access roads or across roads or driveways.

5.1.6 It shall be the Contractor's responsibility to abide by and be aware of the restrictions and quarantines associated with the emerald ash borer (EAB). The Owner's service territory includes state and county EAB quarantine areas.

5.2 Communication and Notification Guidelines

5.2.1 The Contractor will be responsible for notifying the property owner of pending work at least 2 calendar weeks in advance of the anticipated start of work. Indiana notification requirements shall adhere to Indiana Utility Regulatory Commission (IURC) Rule #LSA #12-42 (f) prior to the anticipated start of work. The notification process for other DEM areas will adhere to IURC Rule #LSA #12-42 (f) as a best practice. Any associated Rule makings shall also govern the notification process.

5.2.2 The Contractor will be required to complete a Customer/Property Owner Notification Log (section 0 Reference Documents) documenting that the customer/property owner was contacted with details of the work to be performed. All Customer/Property Owner Notification Logs will be submitted to the Owner according to the Owner's requirements.

5.2.3 The standard method of notifying customers/property owners of upcoming ROW maintenance activities is through contact by the Contractor. A short in-person meeting is the preferred method of notice.

5.2.4 If personal contact is made, the Contractor will explain the nature and extent of the work to the property owner. The property owner should be given a door hanger, appropriate tree trimming letter and any other materials specified by the Owner (the Duke Energy Notification Packet; section 0 Reference Documents). The notification packet will include contact information and phone numbers for the appropriate Contractor supervisor and the Owner's website address for further contact.

5.2.5 If personal contact cannot be made, the Contractor will leave the door hanger packet with the previously mentioned materials to inform the property owner of the intent to perform ROW maintenance.

5.2.6 Trees identified for removal shall be marked with colored flagging around their bases a minimum of 2 weeks (IURC notification ruling) prior to removal. Yard tree removal will require in-person customer contact or verbal communication prior to removal. If customer contact cannot be made, the Contractor shall contact the Owner.

5.3 Refusals and Disputes

5.3.1 If customer/property owner refuses to allow the work to be performed or refuses access to the ROW, the Contractor supervisor will make a second attempt to resolve the issue with the customer/property owner. If that effort is unsuccessful, Contractor shall notify the Owner within 3 business days of each case of refusal using the Owner-supplied Customer/Property Owner Notification Log (section 0 Reference Documents), which must include the name of the property owner, the property address or location and a description of the work to be performed and the refusal.

5.3.2 If a dispute between the property owner and the Contractor is not resolved within a reasonable timeframe, the Owner will allow the Contractor to continue on the project and temporarily skip the disputed area. After the dispute is resolved, the Contractor is expected to return to the site and complete work as agreed or as modified by the Owner.

5.4 Technical Specifications for All Voltages

5.4.1 The best management practice for Duke Energy is to exercise its legal rights as defined by its ROW agreements and as identified within the terms of this contract. Typically, this is a 150-ft ROW corridor for 230kV and 345kV systems and a 100-ft ROW corridor for 138kV and 69kV systems. The contract terms specify pruning all encroaching branches back to the ROW easement edge, ground to sky, and removing all hazard trees outside the specified ROW easement.

5.4.2 Parallel lines: When two or more transmission lines run parallel within the ROW easement for any given length, the Contractor will be required to maintain the entire corridor until the parallel lines separate, according to the Owner specifications set forth in this document. Costs shall be tracked and kept separate for each line. If a line that is not owned by the Owner (foreign line) is also in that part of the corridor, the foreign line will not be maintained by the Owner's Contractor. When a foreign line runs between Owner lines in the same corridor, only the area associated with the Owner's lines in the corridor will be maintained to the full extent of the Owner's ROW.

5.4.3 Stub cutting will not be approved for manual side pruning.

5.4.4 For 69kV circuits, the wire zone would extend 15 ft; for 230kV, 20 ft; and for 231kV or more, 25 ft. The border zone is the area from the edge of the wire zone to the outside edge of the ROW. Inside the wire zone, any trees or shrubs that can reach a mature height of more than 7 ft shall be removed. Inside the border zone, any species that can reach a mature height of more than 15 ft shall be removed. Considerations may be given for situations as the Owner deems appropriate.

5.4.5 All trees in maintained areas that have a mature height of more than 7 ft for the wire zone and 15 ft for the border zone shall be removed unless the property owner refuses. The work shall include yard tree removal and disposal of brush, whether trimmed or removed.

5.4.6 Trees and shrubs that can exceed a mature height of 7 ft shall be removed from the wire zone.

5.4.7 On every line as requested, the Contractor shall supply the Owner with a job prescription and formal cost analysis prior to the commencement of work. The job prescription will be used to demonstrate the Contractor's knowledge of the current conditions and demonstrate their application of the contract documents involved in the project. When required, the job prescription shall take into consideration all Transmission and Distribution Vegetation Management General Specifications, these technical specifications and the scope of work, including but not limited to the following items:

- Line name or line code acronym(s).
- Line voltage(s).
- Starting and stopping points.
- Beginning and ending dates.
- Equipment types, number of personnel and estimated duration of work.
- Ground conditions, including the dominant types of vegetation that will be targeted.
- No-spray agreements.
- Endangered species and designated wetlands in the service area.
- Any exceptions or problems that would keep the Contractor from meeting the terms of the Transmission and Distribution Vegetation Management General Specifications, these Technical Specifications or the Scope of Work.
- Encroachments that affect the project.

5.4.8 Utility hazards, such as guy wires, utility poles/structures, padmount transformers, shall be identified by a buffer area surrounding the hazard prior to mowing/equipment clearing operations (example: mechanical side trimmers, bushhog tractors, and/or heavy mowing machines). A clearly marked 10 ft buffer zone around the hazard vegetation, visible in tall brush, shall be delineated (example: high-visibility, fluorescent, pennant-style marking flags with flagging tape connecting each) to establish the buffer zone. Once the buffer area is marked, equipment is not to enter the 10 ft buffer zone area unless unavoidable while traversing the right-of-way with mowing equipment disengaged and a spotter observing movement within cleared area. Once all vegetation management tasks are complete, removal of all marking flags/tapes/ribbons is required.

5.4.9 The ROW easement edge shall be determined by measuring from the center of the transmission line to the outer edge of the easement, unless otherwise noted by the Owner. Colored flagging will be installed to clearly identify the ROW easement edge. Vegetation that encroaches on ROW easement edges shall be measured so that a full ROW easement width can be re-established. Any tree on the ROW easement edge whose trunk is at least 25% within the easement edge shall be cut to the ground after contacting the property owner.

5.4.10 Hand-cutting will require brush to be felled at its existing location, cut into small sections and safely secured. Hand-cut brush shall not be left in a way that poses a safety hazard, nor shall it be left in a way that inhibits access by the Owner's personnel or equipment. Cut brush and trees shall not be left in streams, waterways, ditches, on access roads or across roads or driveways.

5.4.11 Brush mowing is approved in non-maintained locations where the vegetation density is high and the brush height is appropriate for such mechanical work. Brush mowing shall be limited to these areas to protect and promote the growth of compatible vegetation within the ROW. Vegetation below the height described in section 5.4.4 that remains in the ROW will be addressed through other transmission floor maintenance programs, *such as the foliar herbicide application program.*

5.4.12 In areas where the ROW must be re-established, brush mowing the inside easement edge is required and will be performed after all cutting work is complete. The contractor must mow one 6-ft swath on each side of the ROW easement, cut 6 ft inside the ROW easement starting at the edge of the defined ROW easement and cutting parallel for the full length of the forest edge. The Contractor will be liable for damages due to brush mowing outside the purchased ROW easement. Any wood that is too large for mowing shall be piled or stacked separately so that property owners can use it.

5.4.13 Butt logs shall be cut into smaller logs if needed and shall be secured flat to the ground. Butt logs and brush shall be left in a manner that ensures the safety of the property owner and/or the public.

5.4.14 Within active pasture areas, all brush and/or trees, regardless of height, shall be cut to the ground. Stumps will be cut flush with the ground and will not exceed 2 in. above ground level, if possible. All brush and debris of 6 in. diameter at breast height (DBH) or less shall be chipped and/or disposed of in the most environmentally and economically sound manner. Stumps shall not be treated with herbicides without property owner notification and approval.

5.4.15 Non-active pasture areas will be subject to the same methods of vegetation control as non-maintained areas and as described in section 5.4.4.

5.4.16 No-spray areas should be marked by the property owner with no-spray signs at a minimum of two points, identifying the beginning point (entry point) and ending point (exit point) where herbicides will not be applied. The Contractor will be responsible for cutting all trees and brush in no-spray areas flush to the ground using the following two approved methods:

- Hand-cutting with chain saws or brush saws.
- Brush mowing.

5.4.17 When a non-maintained area is in close proximity to a maintained or otherwise sensitive area, the Contractor shall exercise prudent decision-making and good judgment in determining whether the area is appropriate for mechanical methods of vegetation control. The Owner shall be consulted on work plans for these areas.

5.4.18 Stream buffers: The 25-ft stream buffer zone shall be clearly measured, identified and flagged with colored flagging prior to clearing operations. The Contractor will be required to hand-cut all vegetation inside the buffer zone that is more than 8 ft in height and all species that have a mature height of more than 8 ft (regardless of current height). All hardwood stumps within stream buffers shall be stump-treated. When it is necessary to cut canopy trees or danger trees, understory vegetation that will not exceed 8 ft in height at maturity will be left and protected to ensure shading of streams. Trees and other cut vegetation will not be left in or across streams. Removal of felled trees and debris from stream and creek channels is required.

5.4.19 Wetlands: see Wetland Classification and Vegetation Removal Specifications (section 0 Reference Documents).

5.4.20 Identified access roads shall be inspected and pruned back to ensure adequate clearance for the Owner's line maintenance equipment and personnel. Clearance requirements for the Owner's bucket trucks and digger derricks are 14 ft of height and 16 ft of width. All vegetation within the access road should be cut and windrowed to the side of the road. Based on the location and customer request, chipping may be required for the brush. This work is usually required during the ingress of the tree crews to the job location.

5.4.21 No trees shall be felled toward conductors.

5.4.22 Leave areas: if the Contractor encounters a location that has not been maintained previously and has trees of more than 24 in. DBH, the Contractor shall contact the Owner to review and confirm classification of the area. Classified leave areas will have the following clearance distances:

- 230kV: trees will never be allowed to mature to a height within 25 ft of the conductors.
- 345kV: trees will never be allowed to mature to a height within 35 ft of the conductors.
- 138kV/69kV: leave areas may apply. Consult with the Owner for further instructions.

5.4.23 Trees damaged by the Contractor or damaged outside the easement during maintenance operations that are not classified as hazard trees are subject to claims and will be the responsibility of the Contractor to resolve.

5.4.24 The Owner recommends that Contractors use appropriate tree measuring devices to ensure that all hazard trees are properly measured and identified by height in relationship to the present conductor height. The following devices for measuring distance from conductor to tree are recommended, but are not required (other devices may be appropriate, but are not listed here):

- TruPulse Laser Rangefinder 200 and 360 series.
- Opti-Logic InSight 400LH Laser Rangefinder with Hypsometer.

5.5 Technical Specifications for Voltages above 200kV

5.5.1 The minimum clearance from the conductor at the time of maintenance shall not be less than the following:

- 230kV: 25 ft from any conductor.
- 345kV: 30 ft from any conductor.

5.5.2 Vegetation Management mitigation strategy: When Duke Energy cannot exercise its legal rights or may be limited to obtaining adequate clearance to maintain minimum clearance distances, the Contractor shall complete the Customer/Property Owner Notification Log and contact the Owner within 1 hour of identification. The Owner will work with the Contractor to determine a long-term solution.

5.5.3 Follow the Duke Energy Midwest Imminent Threat Procedure (section 0 Reference Documents) if there is an immediate vegetation threat to the transmission system. A copy of this process is in Attachment 7.4.

5.5.4 Outside the ROW corridors: hazard trees shall be removed (with property owner consent). Evergreen and conifer danger trees that require more than 50% side pruning should be removed rather than trimmed. Hazard trees further from the edge of the ROW shall be removed if the potential hazard exists for the tree to fall and make contact with healthy trees that are tall enough to break the minimum separation of 15 ft if felled or pushed in the direction of the conductors.

5.6 Technical Specifications for Voltages below 200kV

5.6.1 There are no technical specifications for voltages below 200kV that differ from the technical specifications listed previously in this document.

6 Reference Documents

- Duke Energy Midwest Transmission Vegetation Management Areas Map
- Transmission and Distribution Vegetation Management General Specifications (TECP-MNT-TRM-00010)
- Vegetation Management Customer/Property Owner Notification Log and Packet
- Wetland Classification and Vegetation Removal Specifications
- TVM Program: Imminent Threat Communication Procedure (GDLP-MNT-TRM-00017)
- TVM: Duke Energy Imminent Threat Procedure Event Report Form (GDLF-MNT-TRM-00003)

Document Approval Form

published 3/28/16

Section A: Document identification and type of action

Document no.: TECP-MNT-TRM-00013 | Revision no: 002

Document title: *Transmission Technical Specifications (DEM)*

Type of action:

- ☐ New
- ☐ Cancellation
- ☐ Suspension
- ☐ Renumber
- ☐ Ownership Change
- ☑ Revision
- ☑ Periodic review completed, as required

For Corporate Document Center use only:

- ☐ Editorial Change
- ☐ Migration
- ☐ Control element revision _____ (does not require approval authority signature)

Applies to (Select all that apply)

- ☐ Duke Energy
- ☐ Duke Energy Carolinas, LLC
- ☐ Duke Energy Progress, LLC
- ☐ Duke Energy Florida, LLC
- ☑ Duke Energy Indiana, Inc.
- ☑ Duke Energy Kentucky, Inc.
- ☑ Duke Energy Ohio, Inc.
- ☐ Group Transmission Vegetation
- ☐ Department _____
- ☐ Other _____

Security Restrictions Required: ☐ Yes ☑ No

If yes, explain (see instructions on page 2)

Compliance Applicability: (required field)

- ☐ None
- ☐ *State Codes/Standards*
- ☐ HIPAA
- ☐ *Sarbanes-Oxley*
- ☐ *OSHA* _____
- ☑ NERC
- ☑ FERC Standards of Conduct
- ☐ Patriot Act
- ☐ Other _____

Applicable to forms only: (see instructions on page 2)

Does the form have a parent, governing or instructional procedure? ☐ No ☐ Yes (Procedure No: _____)

How is the form to be completed or used? ☐ Hard Copy Completion (by hand) ☐ Online Data Entry

☑ Communication plan established ☑ Impact Reviews completed

Description of document action or summary of changes

Added the following to 5.4.8:

Utility hazards, such as guy wires, utility poles/structures, padmount transformers, shall be identified by a buffer area surrounding the hazard prior to mowing/equipment clearing operations (example: mechanical side trimmers, bushhog tractors, and/or heavy mowing machines) A clearly marked 10 ft buffer zone around the hazard vegetation, visible in tall brush, shall be delineated (example: high-visibility, fluorescent, pennant-style marking flags with flagging tape connecting each) to establish the buffer zone Once the buffer area is marked, equipment is not to enter the 10 ft buffer zone area unless unavoidable while traversing the right-of-way with mowing equipment disengaged and a spotter observing movement within cleared area. Once all vegetation management tasks are complete, removal of all marking flags/tapes/ribbons is required

Removed:

The Contractor shall put colored flagging on all guy wires around structures to ensure that the operator of any equipment can see the guy wires and maintain a safe distance from the wires.

Section B: Approval Who should sign? see instructions on page 2

Preparer(s)/Author(s)/Writer(s) (*signature not required*):

Jeff Racey, Tom Johnson, Cathy Hope, Matt Lux

Approval recommended (*print name*) Matt Lux	Matt Lux	(*signature*)	Date: 2/22/16
Approval recommended (*print name*) Catherine Hope	C Hope	(*signature*)	Date: 2/22/16
Approval recommended (*print name*)		(*signature*)	Date:
Final Approval (*print name*): Ron A. Adams	R A Adams	(*signature*)	Date: 2/24/16

RETURN SIGNED FORM AS SCANNED PDF VIA E-MAIL OR FAX TO (919) 235-3165

Keywords: procedures and forms, procedures program – general, dat; ADMP-PRO-ADS-00002; corporate document program
Applies to: Duke Energy

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Document title:	Document number:
Transmission Technical Specifications (DEM)	TECP-MNT-TRM-00013
	Revision No.: 002
Keywords: maintenance; transmission; vegetation management; contract	Applies to: Transmission Vegetation Management - Duke Energy Midwest

Duke Energy Midwest (DEM) Transmission Technical Specifications

Applicable to all Vegetation Management Activity, Including Time and Equipment and Planned Vegetation Maintenance

2015 to 2017

Duke Energy Vegetation Management Services

Rev: 02-22-16

Suppliers who participate in this Duke Energy RFP Event must keep all information provided by Duke Energy confidential in accordance with signed 2009 Mutual Confidentiality Agreement. All information provided by Duke Energy, whether written, oral, observed, or in electronic form, should be considered confidential. This includes all bidding information submitted and witnessed in the online marketplace.

Any supplier who does not honor these confidentiality provisions may be excluded from participating in any Duke Energy supply opportunities as well as be liable for other remedies provided Duke Energy by law. In addition, if a supplier observes practices that are unethical or counterproductive to the fair operation of the online marketplace, they should notify Duke Energy immediately. Unless directed otherwise by Duke Energy, all RFP documentation, including all copies thereof in whatsoever form or medium, should be destroyed at the conclusion of this bidding process.

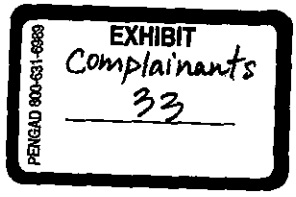

Table of Contents

Duke Energy Proprietary Business Information – Not for external distribution

1 Definitions

Note: This is a comprehensive list of definitions for all areas. Some definitions may not apply to all areas.

Active Pasture: Any fenced portion of the right-of-way easement within which livestock are currently contained.

Brush: A perennial woody stem less than or equal to 6 in. in diameter, measured at breast height (DBH).

Customer: A person, household, business or other entity that receives electric service from the Owner. Customers may or may not also be property owners.

Danger Tree: Any tree inside or outside of the right-of-way that is tall enough to endanger the Owner's facilities.

DBH: Abbreviation for diameter at breast height; tree diameter measured outside bark, typically at 4.5 ft.

Duke Energy Carolinas: The Duke Energy operating company in North Carolina and South Carolina known as Duke Energy Carolinas (abbreviated as DEC). Duke Energy Carolinas is sometimes referred to as Carolinas West.

Duke Energy Florida: The Duke Energy operating company in Florida (abbreviated as DEF).

Duke Energy Mid-West: The Duke Energy operating companies in Indiana, Ohio and Kentucky, collectively referred to as DEM.

Duke Energy Progress Carolinas: The Duke Energy operating company in North Carolina and South Carolina known as Duke Energy Progress (abbreviated as DEP). Duke Energy Progress Carolinas is sometimes referred to as Carolinas East.

Hazard Tree: A danger tree that is dead, structurally unsound, dying, diseased, leaning or damaged, whether on or off the right-of-way, and that endangers the Owner's facilities.

Inactive Line/Inactive Right-of-Way: A right-of-way easement with or without transmission structures and wires that have been taken out of service and are non-operational.

IROL: Abbreviation for interconnection reliability operating limit.

Leave Area: An area defined by the Owner where fully mature trees will not interfere with the safe and reliable operation of the line, considering all factors of the growing conditions, line design, sag, wind and conductor blowout.

Maintained Area: An area where cut brush cannot be left on-site. Maintained areas are considered improved areas. Examples of maintained areas include but are not limited to yards, landscaped areas, pastures, agricultural crops, fields and nurseries.

No-Spray Area: Any area within the right-of-way easement that should not have herbicides applied, as designated by agreement between the Owner and the property owner.

Non-Active Pasture: Any fenced area of the right-of-way easement that livestock may have occupied in the past but is not currently occupied by livestock.

Non-Maintained Area: Any area where cut brush can be left on-site.

Owner: Representative of Duke Energy. The Owner should be, but is not limited to, the Vegetation Management Specialists or Contract Representative.

Planned Maintenance Work: Vegetation management work that is planned and executed on a line or group of lines by work type (e.g., mechanical side trim, herbicide and tree removals) or that is all-inclusive from endpoint to endpoint.

Production Documentation: Documentation requested by the Owner that provides details of the work, *such as man-hours, number of trees removed and spans/miles completed.*

Property Owner: Person or entity that retains legal ownership of land.

Reactive Work: Work that is unplanned or any work that is not considered planned maintenance work. Examples of reactive work include (but are not limited to) emergency work and work that results from ground and aerial patrols and property owner requests.

Refusal: A refusal occurs when the crew is unable to perform the work due to customer/property owner refusal to allow work to be performed.

ROW: Abbreviation for right-of-way.

Side Trimming: Trimming to the edge of the easement using mechanical or manual methods. Side trimming does not include tree removals.

Stream Buffers: Not associated with wetlands. A buffer zone of 25 ft on each side of all stream and lake crossings within the transmission right-of-way easement. The stream buffer area is generally protected from all soil-disturbing activities, and mechanized equipment is not to be used in the stream buffer zone without Owner approval.

Transmission Area: Each of the designated geographic regions that generally correspond with Duke Energy Vegetation Management Specialists' areas of responsibility.

Transmission Line: Electric conductor(s) that typically transmit more than 44,000V of electricity. Some transmission line assets may be operated at voltages lower than 44,000V.

Tree: A perennial woody stem that is more than 6 in. in diameter, measured at breast height (DBH).

Wire Zone: The area that extends beyond the outermost conductor.

Work Day: The work day begins at an agreed starting point and time as locally designated by the Owner or designee and ending at the work site with the cessation of work.

Yard Tree: A tree that is typically in a landscaped or maintained setting.

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2 General

2.1 Scope

2.1.1 The technical specifications include all information for and incidental to executing and completing all right-of-way (ROW) clearing and maintenance work shown on the drawings, schedules, notes and general specifications and as specified herein.

2.1.2 See Duke Energy Midwest Transmission Vegetation Management Areas for information about the service area covered by this contract (section 0 Reference Documents).

2.1.3 See Transmission and Distribution Vegetation Management General Specifications for general specifications (section 0 Reference Documents).

2.2 Voltages

2.2.1 Duke Energy transmission voltages are as follows:

- Above 200kV (NERC-regulated): 230kV, 345kV, 500kV, 525kV, 765kV.
- Below 200kV (non-NERC-regulated): 44kV, 69kV, 115kV, 138kV, 161kV.

NOTE: Lines designated as interconnection reliability operating limit (IROL) lines can be NERC-regulated below 200kV.

2.3 Coordination

2.3.1 All vegetation management should be coordinated with the Owner.

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3 Policies and Procedures

3.1 Tree Topping and Crown Reduction

3.1.1 Tree topping is not generally accepted as an ROW maintenance practice for danger trees near transmission lines. The exceptions to this rule are as follows:

- Hazard trees that are off the ROW.
- Situations in which Duke Energy does not have a purchased ROW and the property owner does not want the tree(s) removed.
- The ROW agreement does not include danger tree rights (the right to cut down trees outside the specified strip).

3.1.2 Crown reduction is a generally accepted ROW maintenance practice when appropriate, including but not limited to cases of limited easement rights.

3.2 Replacement Trees

3.2.1 *As a general rule, Duke Energy does not provide replacement trees to property owners.*

3.3 Stump Grinding and Treatment

3.3.1 As a general rule, Duke Energy does not grind the stumps from trees cut down during maintenance activities, and stump grinding is only to be performed under direction of the Owner. The Contractor will cut the stump as close to the ground as possible.

3.3.2 Trees that are topped at fence height shall be treated with an approved low-volume basal/cut stump application.

3.4 Inspection

3.4.1 *The Owner will conduct quality and quantity audits on the crew's scope of work for all* maintenance work. The quality and quantity audits will ensure that the Owner is satisfied with the herbicide application, tree removal, tree trimming, mechanical side-trimming, mechanical re-clearing and/or hand-cutting practices of the field crew(s).

3.4.2 The Owner will conduct periodic quality and quantity audits at selected locations on the crew's scope of work for reactive work. The quality and quantity audits will ensure that the Owner is satisfied with the herbicide application, tree removal, tree trimming, mechanical side-trimming, mechanical re-clearing and/or hand-cutting practices of the field crew(s).

3.4.3 The Contractor is responsible for correcting items identified as work not done to required specifications. This work is to be completed in a timely and workmanlike manner.

4 Reactive Work

4.1 Reactive Work Crew

4.1.1 A typical reactive work crew shall be skilled in all aspects of tree removal and other assigned vegetation tasks performed near high-voltage facilities.

4.2 Reactive Work Assignment

4.2.1 The Owner will assign work that is defined as reactive work to the Contractor. The Contractor will be paid time and materials for crews that perform this work.

4.2.2 All of the Owner's ROW and lines are inspected during the course of the year to ensure the safety and reliability of the transmission system. Any problems identified will be classified according to the current priority ratings and mitigated according to the priority ratings and target response timeframes listed in the table below.

Work Order Type	Target Response Time Frame
Service Response (SR)	Divert personnel to address immediately. May also be classified as an imminent threat.
As Soon as Possible (ASAP)	Prioritize and complete as soon as possible within normal work flow
Routine Work (RW)	In the normal course of work (or before next growing season)

Duke Energy Proprietary Business Information – Not for external distribution

5 Planned Maintenance Specifications

5.1 Wood Removal and Debris Disposal

5.1.1 As a general rule, Duke Energy does not remove wood. Any exceptions must be approved by Owner.

5.1.2 In maintained areas, all brush will be chipped and piled in an area designated by the property owner or removed from the site and disposed of in the most environmentally and economically sound manner. Contractors will work with the property owner and cut wood into usable lengths (18 to 24 in., or longer if needed) and stack wood neatly at the base of the tree or the edge of the ROW. Wood will be secured to prevent movement at the location where it is cut.

5.1.3 In non-maintained areas, any trees that are removed will be dropped into wooded areas or felled lengthwise along the edge of the ROW (windrowed). Brush and debris shall be mowed, hashed or reduced in a manner that allows rapid decomposition.

5.1.4 Brush and debris shall not be left in a way that poses a safety hazard or inhibits access by the Owner's personnel or equipment.

5.1.5 Cut brush and trees shall not be left in streams, waterways, ditches, on access roads or across roads or driveways.

5.1.6 It shall be the Contractor's responsibility to abide by and be aware of the restrictions and quarantines associated with the emerald ash borer (EAB). The Owner's service territory includes state and county EAB quarantine areas.

5.2 Communication and Notification Guidelines

5.2.1 The Contractor will be responsible for notifying the property owner of pending work at least 2 calendar weeks in advance of the anticipated start of work. Indiana notification requirements shall adhere to Indiana Utility Regulatory Commission (IURC) Rule #LSA #12-42 (f) prior to the anticipated start of work. The notification process for other DEM areas will adhere to IURC Rule #LSA #12-42 (f) as a best practice. Any associated Rule makings shall also govern the notification process.

5.2.2 The Contractor will be required to complete a Customer/Property Owner Notification Log (section 0 Reference Documents) documenting that the customer/property owner was contacted with details of the work to be performed. All Customer/Property Owner Notification Logs will be submitted to the Owner according to the Owner's requirements.

5.2.3 The standard method of notifying customers/property owners of upcoming ROW maintenance activities is through contact by the Contractor. A short in-person meeting is the preferred method of notice.

5.2.4 If personal contact is made, the Contractor will explain the nature and extent of the work to the property owner. The property owner should be given a door hanger, appropriate tree trimming letter and any other materials specified by the Owner (the Duke Energy Notification Packet; section 0 Reference Documents). The notification packet will include contact information and phone numbers for the appropriate Contractor supervisor and the Owner's website address for further contact.

5.2.5 If personal contact cannot be made, the Contractor will leave the door hanger packet with the previously mentioned materials to inform the property owner of the intent to perform ROW maintenance.

5.2.6 Trees identified for removal shall be marked with colored flagging around their bases a minimum of 2 weeks (IURC notification ruling) prior to removal. Yard tree removal will require in-person customer contact or verbal communication prior to removal. If customer contact cannot be made, the Contractor shall contact the Owner.

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5.3.1 If customer/property owner refuses to allow the work to be performed or refuses access to the ROW, the Contractor supervisor will make a second attempt to resolve the issue with the customer/property owner. If that effort is unsuccessful, Contractor shall notify the Owner within 3 business days of each case of refusal using the Owner-supplied Customer/Property Owner Notification Log (section 0 Reference Documents), which must include the name of the property owner, the property address or location and a description of the work to be performed and the refusal.

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5.4.1 The best management practice for Duke Energy is to exercise its legal rights as defined by its ROW agreements and as identified within the terms of this contract. Typically, this is a 150-ft ROW corridor for 230kV and 345kV systems and a 100-ft ROW corridor for 138kV and 69kV systems. The contract terms specify pruning all encroaching branches back to the ROW easement edge, ground to sky, and removing all hazard trees outside the specified ROW easement.

5.4.2 Parallel lines: When two or more transmission lines run parallel within the ROW easement for any given length, the Contractor will be required to maintain the entire corridor until the parallel lines separate, according to the Owner specifications set forth in this document. Costs shall be tracked and kept separate for each line. If a line that is not owned by the Owner (foreign line) is also in that part of the corridor, the foreign line will not be maintained by the Owner's Contractor. When a foreign line runs between Owner lines in the same corridor, only the area associated with the Owner's lines in the corridor will be maintained to the full extent of the Owner's ROW.

5.4.3 Stub cutting will not be approved for manual side pruning.

5.4.4 For 69kV circuits, the wire zone would extend 15 ft; for 230kV, 20 ft; and for 231kV or more, 25 ft. The border zone is the area from the edge of the wire zone to the outside edge of the ROW. Inside the wire zone, any trees or shrubs that can reach a mature height of more than 7 ft shall be removed. Inside the border zone, any species that can reach a mature height of more than 15 ft shall be removed. Considerations may be given for situations as the Owner deems appropriate.

5.4.5 All trees in maintained areas that have a mature height of more than 7 ft for the wire zone and 15 ft for the border zone shall be removed unless the property owner refuses. The work shall include yard tree removal and disposal of brush, whether trimmed or removed.

5.4.6 Trees and shrubs that can exceed a mature height of 7 ft shall be removed from the wire zone.

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5.4.7 On every line as requested, the Contractor shall supply the Owner with a job prescription and formal cost analysis prior to the commencement of work. The job prescription will be used to demonstrate the Contractor's knowledge of the current conditions and demonstrate their application of the contract documents involved in the project. When required, the job prescription shall take into consideration all Transmission and Distribution Vegetation Management General Specifications, these technical specifications and the scope of work, including but not limited to the following items:

- Line name or line code acronym(s).
- Line voltage(s).
- Starting and stopping points.
- Beginning and ending dates.
- Equipment types, number of personnel and estimated duration of work.
- Ground conditions, including the dominant types of vegetation that will be targeted.
- No-spray agreements.
- Endangered species and designated wetlands in the service area.
- Any exceptions or problems that would keep the Contractor from meeting the terms of the Transmission and Distribution Vegetation Management General Specifications, these Technical Specifications or the Scope of Work.
- Encroachments that affect the project.

5.4.8 Utility hazards, such as guy wires, utility poles/structures, padmount transformers, shall be identified by a buffer area surrounding the hazard prior to mowing/equipment clearing operations (example: mechanical side trimmers, bushhog tractors, and/or heavy mowing machines). A clearly marked 10 ft buffer zone around the hazard vegetation, visible in tall brush, shall be delineated (example: high-visibility, fluorescent, pennant-style marking flags with flagging tape connecting each) to establish the buffer zone. Once the buffer area is marked, equipment is not to enter the 10 ft buffer zone area unless unavoidable while traversing the right-of-way with mowing equipment disengaged and a spotter observing movement within cleared area. Once all vegetation management tasks are complete, removal of all marking flags/tapes/ribbons is required.

5.4.9 The ROW easement edge shall be determined by measuring from the center of the transmission line to the outer edge of the easement, unless otherwise noted by the Owner. Colored flagging will be installed to clearly identify the ROW easement edge. Vegetation that encroaches on ROW easement edges shall be measured so that a full ROW easement width can be re-established. Any tree on the ROW easement edge whose trunk is at least 25% within the easement edge shall be cut to the ground after contacting the property owner.

5.4.10 Hand-cutting will require brush to be felled at its existing location, cut into small sections and safely secured. Hand-cut brush shall not be left in a way that poses a safety hazard, nor shall it be left in a way that inhibits access by the Owner's personnel or equipment. Cut brush and trees shall not be left in streams, waterways, ditches, on access roads or across roads or driveways.

5.4.11 Brush mowing is approved in non-maintained locations where the vegetation density is high and the brush height is appropriate for such mechanical work. Brush mowing shall be limited to these areas to protect and promote the growth of compatible vegetation within the ROW. Vegetation below the height described in section 5.4.4 that remains in the ROW will be addressed through other transmission floor maintenance programs, such as the foliar herbicide application program.

5.4.12 In areas where the ROW must be re-established, brush mowing the inside easement edge is required and will be performed after all cutting work is complete. The contractor must mow one 6-ft swath on each side of the ROW easement, cut 6 ft inside the ROW easement starting at the edge of the defined ROW easement and cutting parallel for the full length of the forest edge. The Contractor will be liable for damages due to brush mowing outside the purchased ROW easement. Any wood that is too large for mowing shall be piled or stacked separately so that property owners can use it.

5.4.13 Butt logs shall be cut into smaller logs if needed and shall be secured flat to the ground. Butt logs and brush shall be left in a manner that ensures the safety of the property owner and/or the public.

5.4.14 Within active pasture areas, all brush and/or trees, regardless of height, shall be cut to the ground. Stumps will be cut flush with the ground and will not exceed 2 in. above ground level, if possible. All brush and debris of 6 in. diameter at breast height (DBH) or less shall be chipped and/or disposed of in the most environmentally and economically sound manner. Stumps shall not be treated with herbicides without property owner notification and approval.

5.4.15 Non-active pasture areas will be subject to the same methods of vegetation control as non-maintained areas and as described in section 5.4.4.

5.4.16 No-spray areas should be marked by the property owner with no-spray signs at a minimum of two points, identifying the beginning point (entry point) and ending point (exit point) where herbicides will not be applied. The Contractor will be responsible for cutting all trees and brush in no-spray areas flush to the ground using the following two approved methods:

- Hand-cutting with chain saws or brush saws.
- Brush mowing.

5.4.17 When a non-maintained area is in close proximity to a maintained or otherwise sensitive area, the Contractor shall exercise prudent decision-making and good judgment in determining whether the area is appropriate for mechanical methods of vegetation control. The Owner shall be consulted on work plans for these areas.

5.4.18 Stream buffers: The 25-ft stream buffer zone shall be clearly measured, identified and flagged with colored flagging prior to clearing operations. The Contractor will be required to hand-cut all vegetation inside the buffer zone that is more than 8 ft in height and all species that have a mature height of more than 8 ft (regardless of current height). All hardwood stumps within stream buffers shall be stump-treated. When it is necessary to cut canopy trees or danger trees, understory vegetation that will not exceed 8 ft in height at maturity will be left and protected to ensure shading of streams. Trees and other cut vegetation will not be left in or across streams. Removal of felled trees and debris from stream and creek channels is required.

5.4.19 Wetlands: see Wetland Classification and Vegetation Removal Specifications (section 0 Reference Documents).

5.4.20 Identified access roads shall be inspected and pruned back to ensure adequate clearance for the Owner's line maintenance equipment and personnel. Clearance requirements for the Owner's bucket trucks and digger derricks are 14 ft of height and 16 ft of width. All vegetation within the access road should be cut and windrowed to the side of the road. Based on the location and customer request, chipping may be required for the brush. This work is usually required during the ingress of the tree crews to the job location.

5.4.21 No trees shall be felled toward conductors.

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5.4.22 Leave areas: if the Contractor encounters a location that has not been maintained previously and has trees of more than 24 in. DBH, the Contractor shall contact the Owner to review and confirm classification of the area. Classified leave areas will have the following clearance distances:

- 230kV: trees will never be allowed to mature to a height within 25 ft of the conductors.
- 345kV: trees will never be allowed to mature to a height within 35 ft of the conductors.
- 138kV/69kV: leave areas may apply. Consult with the Owner for further instructions.

5.4.23 Trees damaged by the Contractor or damaged outside the easement during maintenance operations that are not classified as hazard trees are subject to claims and will be the responsibility of the Contractor to resolve.

5.4.24 The Owner recommends that Contractors use appropriate tree measuring devices to ensure that all hazard trees are properly measured and identified by height in relationship to the present conductor height. The following devices for measuring distance from conductor to tree are recommended, but are not required (other devices may be appropriate, but are not listed here):

- TruPulse Laser Rangefinder 200 and 360 series.
- Opti-Logic InSight 400LH Laser Rangefinder with Hypsometer.

5.5 Technical Specifications for Voltages above 200kV

5.5.1 The minimum clearance from the conductor at the time of maintenance shall not be less than the following:

- 230kV: 25 ft from any conductor.
- 345kV: 30 ft from any conductor.

5.5.2 Vegetation Management mitigation strategy: When Duke Energy cannot exercise its legal rights or may be limited to obtaining adequate clearance to maintain minimum clearance distances, the Contractor shall complete the Customer/Property Owner Notification Log and contact the Owner within 1 hour of identification. The Owner will work with the Contractor to determine a long-term solution.

5.5.3 Follow the Duke Energy Midwest Imminent Threat Procedure (section 0 Reference Documents) if there is an immediate vegetation threat to the transmission system. A copy of this process is in Attachment 7.4.

5.5.4 Outside the ROW corridors: hazard trees shall be removed (with property owner consent). Evergreen and conifer danger trees that require more than 50% side pruning should be removed rather than trimmed. Hazard trees further from the edge of the ROW shall be removed if the potential hazard exists for the tree to fall and make contact with healthy trees that are tall enough to break the minimum separation of 15 ft if felled or pushed in the direction of the conductors.

5.6 Technical Specifications for Voltages below 200kV

5.6.1 There are no technical specifications for voltages below 200kV that differ from the technical specifications listed previously in this document.

6 Reference Documents

- Duke Energy Midwest Transmission Vegetation Management Areas Map
- Transmission and Distribution Vegetation Management General Specifications (TECP-MNT-TRM-00010)
- Vegetation Management Customer/Property Owner Notification Log and Packet
- Wetland Classification and Vegetation Removal Specifications
- TVM Program: Imminent Threat Communication Procedure (GDLP-MNT-TRM-00017)
- TVM: Duke Energy Imminent Threat Procedure Event Report Form (GDLF-MNT-TRM-00003)

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Document Approval Form

published 3/28/16

Section A: Document identification and type of action

Document no.: TECP-MNT-TRM-00013 | Revision no: 002

Document title: Transmission Technical Specifications (DEM)

Type of action:

- ☐ New
- ☐ Cancellation
- ☐ Suspension
- ☐ Renumber
- ☐ Ownership Change
- ☑ Revision
- ☑ Periodic review completed, as required

For Corporate Document Center use only:

- ☐ Editorial Change
- ☐ Migration
- ☐ Control element revision _____ (does not require approval, authority signature)

Applies to (Select all that apply)

- ☐ Duke Energy
- ☐ Duke Energy Carolinas, LLC
- ☐ Duke Energy Progress, LLC
- ☐ Duke Energy Florida, LLC
- ☑ Duke Energy Indiana, Inc.
- ☑ Duke Energy Kentucky, Inc.
- ☑ Duke Energy Ohio, Inc.
- ☐ Group Transmission Vegetation
- ☐ Department _____
- ☐ Other _____

Security Restrictions Required: ☐ Yes ☑ No

If yes, explain (see instructions on page 2) _____

Compliance Applicability: (required field)

- ☐ None
- ☐ State Codes/Standards
- ☐ HIPAA
- ☐ Sarbanes-Oxley
- ☐ OSHA _____
- ☑ NERC
- ☑ FERC Standards of Conduct
- ☐ Patriot Act
- ☐ Other _____

Applicable to forms only: (see instructions on page 2)

Does the form have a parent, governing or instructional procedure? ☐ No ☐ Yes (Procedure No: _____)

How is the form to be completed or used? ☐ Hard Copy Completion (by hand) ☐ Online Data Entry

☑ Communication plan established ☑ Impact Reviews completed

Description of document action or summary of changes:

Added the following to 5.4.8:

Utility hazards, such as guy wires, utility poles/structures, padmount transformers, shall be identified by a buffer area surrounding the hazard prior to mowing/equipment clearing operations (example: mechanical side trimmers, bushhog tractors, and/or heavy mowing machines). A clearly marked 10 ft buffer zone around the hazard vegetation, visible in tall brush, shall be delineated (example: high-visibility, fluorescent, pennant-style marking flags with flagging tape connecting each) to establish the buffer zone. Once the buffer area is marked, equipment is not to enter the 10 ft buffer zone area unless unavoidable while traversing the right-of-way with mowing equipment disengaged and a spotter observing movement within cleared area. Once all vegetation management tasks are complete, removal of all marking flags/tapes/ribbons is required.

Removed:

The Contractor shall put colored flagging on all guy wires around structures to ensure that the operator of any equipment can see the guy wires and maintain a safe distance from the wires.

Section B: Approval Who should sign? see instructions on page 2

Preparer(s)/Author(s)/Writer(s) (*signature not required*):

Jeff Racey, Tom Johnson, Cathy Hope, Matt Lux

Approval recommended (*print name*): Matt Lux	Matt Lux	(*signature*)	Date: 2/22/16
Approval recommended (*print name*) Catherine Hope	C Hope	(*signature*)	Date: 2/22/16
Approval recommended (*print name*)		(*signature*)	Date:
Final Approval (*print name*): Ron A. Adams	R A Adams	(*signature*)	Date: 2/24/16

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ANSI A300 Standards

ANSI A300 standards are the generally accepted industry standards for tree care practices.

They are voluntary industry consensus standards developed by TCIA and written by a committee called the Accredited Standards Committee (ASC) A300, whose mission is to develop consensus performance standards based on current research and sound practice for writing specifications to manage trees, shrubs, and other woody plants.
Learn more about the history of ANSI A300.

A300 Community Members Site >

ANSI A300 by Parts

The standards are divided into parts, based on tree care practices. Click on their title for more details:

- Part 1 - Pruning
- Part 2 – Soil Management
- Part 3 – Supplemental Support Systems
- Part 4 – Lightning Protection Systems
- Part 5 – Management
- Part 6 – Planting and Transplanting
- Part 7 – Integrated Vegetation Management
- Part 8 - Root Management Standard
- Part 9 – Tree Risk Assessment
- Part 10 - IPM

Current Projects & Public Review Periods

You can review which projects the ASC A300 committee is current working on, learn more about public review and comment periods and submit your comments for consideration.

Get Involved

- **ASC A300 Committee**

  The ASC A300 committee has representatives and experts from a broad and diverse group of industrial and governmental organizations. Contact your organization's committee member to find out how you can be involved. View a list of current committee members.

- **Upcoming Meetings & Events**

  The ASC A300 committee usually meets twice a year to write, revise and review standards and proposed standard projects. As the committee writes new standards or revises existing standards, TCIA holds public review periods so all materially affected parties can review and provide comments.

  View upcoming ANSI A300 meetings, and all upcoming events, in the Industry Calendar.

ASC A300 Procedures

View the current ASC A300 Procedures

Contact/Request Information

Contact Bob Rouse if you have questions or would like more information about ANSI standards

Learn more about support systems

Watch a video where Bartlett's Peter Becker discusses the various support systems that arborists can use to limit branch movement and support tree weight and architecture in order to guarantee value and safety for the tree and property owner.

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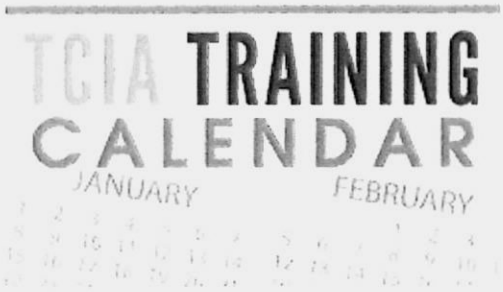

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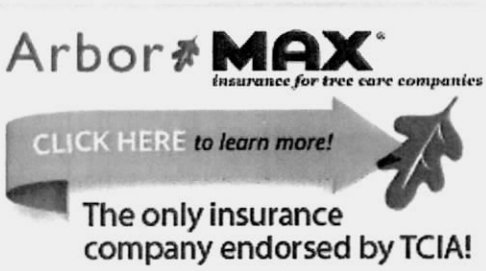

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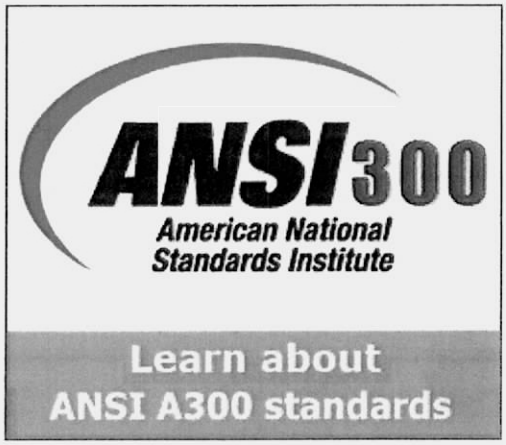

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Part 1

ANSI A300 (Part 1) - 2017 Pruning

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This part of the A300 standards applies to pruning and trimming operations.

Part 1 Pruning addresses:

- **Pruning objectives**
- **Pruning systems**
- **Pruning specifications**
- **Pruning cuts**
- **Pruning practices**
- **Palms and similar plants**
- **Pruning definitions**

A300 Pruning standards recognize, but are not limited to, the following pruning objectives:

- **Manage risk**
- **Manage health**
- **Develop structure,** such as to: Improve branch and trunk architecture Promote or subordinate certain leaders, stems, or branches; Promote desirable branch spacing; Promote or discourage growth in a particular direction (directional pruning); Minimize future interference with traffic, lines of sight, or infrastructure, or other plants; Restore plants following damage; and/or, Rejuvenate shrubs.

- **Provide clearance,** such as to: Ensure safe and reliable utility services; Minimize current interference with traffic, lines of sight, infrastructure, or other plants; Raise crown(s) for movement of traffic or light penetration; Ensure lines-of-sight or desired views; Provide access to sites, buildings, or other structures; and/or, Comply with regulations.
- **Manage size or shape**
- **Improve aesthetics**
- **Manage production of fruit, flowers, or other products**
- **Manage wildlife habitat**

Advisory Notice:

Certain pruning practices are not acceptable and can injure trees:

- **Topping:** The reduction of a tree's size using heading cuts that shorten limbs or branches back to a predetermined crown limit.
- **Lion's Tailing:** The removal of an excessive number of inner, lateral branches from parent branches.
- **Rooster-Tailing:** The over-thinning of palms, usually by removing too many lower, live fronds.

Part 1 Pruning Resources:

- Download the "How to Write Pruning Specifications"

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Part 2

ANSI A300 (Part 2) - 2011 Soil Management a. Modification, b. Fertilization, and c. Drainage

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The A300 Part 2 standard addresses the following items:

Soil Management

a. Modification section

- Evaluating site soil condition practices
- Managing soil organic matter content practices
- Incorporation of soil amendments
- Compaction – prevention and mitigation practices
- Mechanical soil loosening
- Surface application of organic mulch

Soil Management

b. Fertilization section

- Soil reaction (pH) adjustment
- Fertilization practices
- Calculations for fertilization area
- Fertilization applications

Note: The Fertilization section recognizes and provides standards for basic fertilization methods:

- **Surface fertilization:** The application of dry fertilizer on the soil surface.
- **Subsurface dry fertilization:** The application of dry fertilizer below the soil surface.
- **Subsurface liquid fertilizer injection:** The application of liquid fertilizer below the soil surface.
- **Alternative fertilization:** A number of techniques that may include spraying a liquid directly on the foliage, injecting a liquid directly into the plant, or implanting a solid directly into the plant.

Advisory Notice:

Surface application shall not be made where surface runoff is likely to occur.

Soil Management

c. Drainage section:

- Mitigation of impenetrable layers
- Mitigation/adjustment of surface drainage
- Mitigation/adjustment of subsurface drainage

Part 2 Soil Management Resources:

- Download "How to use Tree Fertilization Standards," a TCI Magazine article written by Tim Johnson.

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Part 3

ANSI A300 (Part 3) -2013 Supplemental Support Systems (includes Cabling, Bracing, Guying, and Propping)

Buy This Standard Now

This part of the A300 standards applies to installation and maintenance of tree support systems, including cabling, bracing, and guying.

Part 3 Supplemental Support Systems addresses:

- Tools and equipment
- Cabling objectives
- Types of cabling systems
- Bracing objectives
- Dead-end bracing
- Through-bracing
- Guying established trees
- Guying newly transplanted trees
- Tree-to-ground guying
- Tree-to-tree guying
- Propping trees and branches
- Hardware sizing and selection tables

A300 Part 3 Supplemental Support Systems standards provide four basic cabling methods:

- **Direct:** Direct cabling consists of a single cable between two tree parts, e.g., two limbs, two stems, or a trunk and a limb.
- **Triangular:** Triangular cabling consists of connecting tree parts in combination of threes. This method should be preferred, when maximum support is required.
- **Box:** Box cabling consists of connecting four or more tree parts in a closed series. This system should be used only when minimal direct support is needed.
- **Hub and Spoke:** Hub and Spoke cabling consists of a center attachment (hub) with spans (spokes) of cable radiating to three or more leaders. Hub and Spoke cabling should only be used when other installation techniques cannot be installed.

Advisory Notices:

- Supplemental Support Systems need periodic inspections by an arborist. Scheduling inspections shall be the responsibility of the tree owner.
- Supplemental support systems are used to provide additional support or limit movement of a tree or tree part. They do not provide primary support to a tree.

A300 Part 3 Supplemental Support Systems standards provide installation standards:If cables in your trees are not two thirds of the way up, it may be time to get your system updated.

Part 3 *Supplemental Support Systems* Resources:

- Download "What's New in Cabling, Bracing, and Guying" a TCI Magazine article written by Michael Roche, a TCIA-accredited tree care company owner.

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Part 4

ANSI A300 (Part 4)-2014 Lightning Protection Systems

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This part of the A300 standards applies to installation and maintenance of Lightning Protection Systems in Trees.

Part 4 Lightning Protection Systems addresses:

- Tools and equipment
- Materials
- Conductors
- Connectors and Fasteners
- Ground terminals
- Installation practices

A300 Part 4 Lightning Protection Systems standards recognize three basic ground systems:

- **Single ground rod:** A ground terminal composed of one ground rod.
- **Multiple ground system:** A ground terminal composed of two or more ground rods or copper ground plates.
- **Horizontal ground system:** A ground terminal composed of ground rod(s) or copper ground plate(s) that are not fully driven or installed in the ground due to site conditions.

Advisory Notice:

The objective of a tree lightning protection system is to provide a preferred path to ground for the electrical charge; protected trees shall not be considered a safe haven from lightning strikes.

When considering tree lightning protection systems, the user has to keep in mind that the purpose of the ANSI A300 (Part 4)-2008 standard is to provide standards for developing specifications for tree lightning protection system installation (43.1). The only reason for installing a tree lightning protection system is to reduce the risk of damage to trees from lightning strikes (43.2). Tree lightning protection systems do not protect buildings or property from damage or provide safe havens from lightning. The user needs to understand that the only objective for a tree lightning protection system is to provide a preferred path to ground for the electrical charge (46.1).

If there is danger from side flash or other lightning-induced damage to non-tree components, property, buildings, etc., or, the trees owner or owners agent have a different objective than outlined in this standard (46.1), then the appropriate standard practices must be followed as detailed by this standards normative references (44).

Which trees should be protected from lightning strikes?

- Trees with trunks within 10 feet (3 m) of a structure, or with branches that extend to a height above the structure, should be equipped with a lightning protection system because of the danger of side flash, fire, or superheating of the moisture in the tree, which could result in the splintering of the tree. (NFPA – 780 F-1)
- Trees of historical interest; trees of unusual value; shade trees within 10 feet (3 m) of a building; trees with branches overhanging buildings; tall trees in recreational or park areas; trees that are more likely to be struck by lightning due to their location, such as isolated trees on a hill, in a golf course, or in a pasture, etc.; and similar trees; should be equipped with lightning protection systems.
- Lightning protection for trees is intended to safeguard trees against damage caused by lightning; protected trees should not be considered a safe haven from lightning strikes.

Part 4 Lightning Protection Systems Resources:

Download "Providing Lightning Protection" a TCI Magazine article written by Guy Meilleur.

Learn about lightning protection systems

In this video, Steve Nagy of Davey Tree advises why lightning protection systems are necessary to safeguard against damage, and recommends materials needed to create an effective system.

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Part 5

ANSI A300 (Part 5)-2012: Management of Trees and Shrubs During Site Planning, Site Development, and Construction

Buy This Standard Now

This part of the A300 standards applies to management, and the writing of management plans, for trees during site planning, development, and construction.

Part 5 Management standards address:

- Planning phase
- Tree resource evaluation
- Design phase
- Tree conservation
- Pre-construction phase
- Construction phase
- Landscape phase
- Post construction phase
- Tree protection practices proir to and during demolition, construction, and landscaping
- Implementation of tree conservation recommendations
- Barriers
- Demolition

- Disposal of building waste
- Fill soil (grade change)
- Excavation/Trenching
- Utilities
- Pavement
- Management report information (Annex)

Part 5 Management of Trees and Shrubs During Site Planning, Site Development, and Construction Resources:

- View the Tree Management Flow Chart

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Part 6

ANSI A300 (Part 6)-2012 Planting and Transplanting

Buy This Standard Now

This part of the A300 standards applies to planting and transplanting trees, shrubs, palms, and other woody plants operations.

Part 6 Transplanting addresses:

- Plant and site inspection
- Timing of transplanting
- Determining the root ball size (for transplanting)
- Digging trees and shrubs
- Transplanting
- Lifting
- Moving and Storage
- Digging the planting hole
- Planting woody plants
- Planting container stock
- Specific palm standatds
- Post-planting care

A300 transplanting standards recognize four basic transplanting methods:

- **Balled and wrapped:** Plants established in the ground that have been prepared for transplanting by digging so that the soil immediately around the roots remains undisturbed. The ball of earth containing the roots of the plant is then bound up.
- **Bare root (B.R.):** Harvested plants from which the soil or growing medium has been removed.
- **Boxed:** A method for protecting roots that includes digging a trench, constructing and installing a box around the roots, and then using the box to lift, transport, and install the landscape plant.
- **Tree spade:** Equipment used to transplant large trees.

Advisory Notice

The correct planting depth of a tree is based on locating the trunk flare and being certain that the bottom of the trunk flare is at finish grade upon completion of the operation.

Part 6 Planting and Transplanting Resources:

- Read the ANSI A300 Standards for Tree Care Operations Press Release

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Part 7

ANSI A300 (Part 7)-2012 Integrated Vegetation Management (IVM)

Buy This Standard Now

This part of the A300 standards applies to the creation and implementation of integrated vegetation management plans.

Part 7 *IVM* addresses:

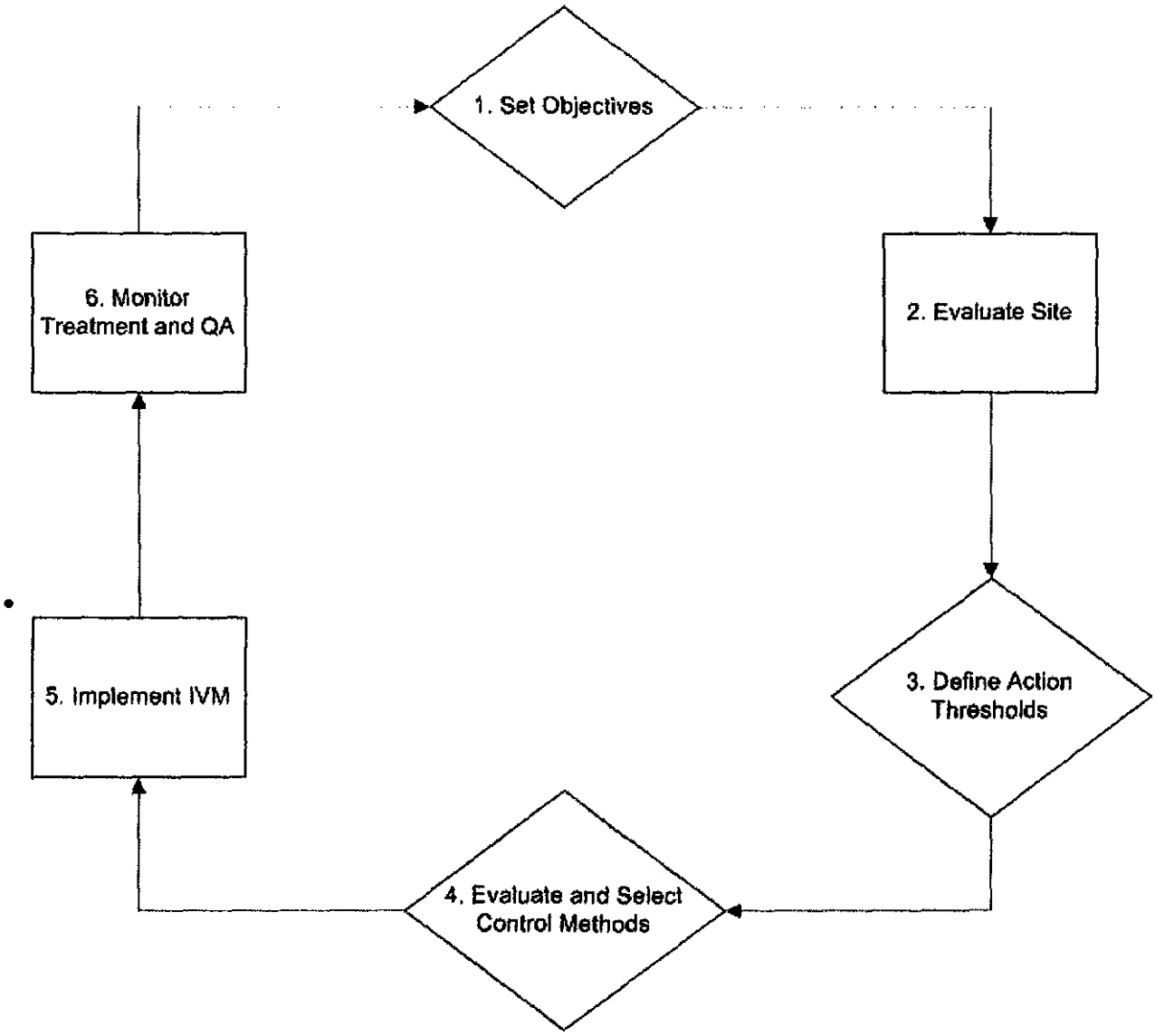
- Site evaluations
- Management control method selections
- Cultural control methods
- Biological control methods
- Initial clearing of rights-of-way
- IVM applications
- Chemical control applications
- Selective and non-selective management
- Wire zone – border zone concept

A300 IVM standards recognizes the wire zone – border zone concept.

Part 7 Integrated Vegetation Management Resources:

IVM Flowchart

ANSI A300 Part 7 – IVM



Diamond = Decision

Rectangle = Process

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Part 8

ANSI A300 (Part 8) - 2013 Root Management Standard

Buy This Standard Now

This part of the A300 Standard seeks to improve the quality, life expectancy, and safety of trees by promoting and facilitating the care of roots.

Part 8 Root Management Standard is a guide to writing good specifications on work, and addresses the following:

- Trenching near a tree
- Root pruning to mitigate tripping hazards and infrastructure damage
- Managing stem-girdling and stem-circling roots

Please note that this A300 Part 8 standard takes precedence in the USA over previous tree care management standards and guidelines.

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Part 9

ANSI A300 (Part 9) - 2017 *Tree Risk Assessment a. Tree Failure*

Buy This Standard Now

"State forestry agencies support local programs to inventory public trees in a wide range of settings – from street trees to trails to wooded parks. Managing risk for those public trees is 'Job 1' for city tree managers and the new ANSI standard for tree risk assessment helps state and local governments define appropriate methods and work plans for getting this work done." **Pete Smith, Partnership Coordinator with the Texas Forest Service-Urban Forestry Program**

The A300 Part 9 *Tree Risk Assessment* standard takes precedence over any previous tree care management standards and guidelines. The standard addresses:

- Tree structure assessment practices
- Levels of tree risk assessment
- Risk analysis and reporting
- Owner determination

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Part 10

ANSI A300 (Part 10)-2016: IPM

Buy This Standard Now

The manual provides standards for practice and a specification writing guideline to implement IPM programs. IPM provides a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes health, environmental and economic risks.

The standard incorporates a specification-writing guide that includes:

- How to address IPM management strategy
- Target pests or diseases
- Timing of monitoring
- A threshold for treatment
- Evaluation and reporting
- IPM practices, tools & equipment and definition of terms Includes an IPM specification
- Writing flowchart and a flowchart for establishing and evaluating an IPM program as a commercial service.

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