

**FAC-003-1 Mapping to Proposed NERC Reliability Standard FAC-003-2**

Standard FAC-003-1 NERC Board Approved	Comment	Proposed Standard FAC-003-2
<b>0. Definitions</b>	<b>0.</b> The definition of Active Transmission Line Right of Way was added in response to FERC 693 and industry comments. The glossary definition of Vegetation Inspection was changed in response to industry comments.	<b>Active Transmission Line Right of Way</b> — A strip of land that is occupied by active transmission facilities. This corridor does not include the inactive Right of Way or unused part of the Right of Way intended for other facilities. <b>Vegetation Inspection</b> — The systematic examination of vegetation conditions on an Active Transmission Line Right of Way. This inspection may be combined with a general line inspection. The inspection includes the documentation of any vegetation that may pose a threat to reliability prior to the next planned inspection or maintenance work, considering the current location of the conductor and other possible locations of the conductor due to sag and sway for rated conditions.
<b>1. Title:</b> Transmission Vegetation Management Program	<b>1. Title:</b> No Change (N/C)	<b>1. Title:</b> Transmission Vegetation Management Program
<b>3. Purpose:</b> 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).	<b>3. Purpose:</b> Changed to a shorter more concise purpose statement. The various explanatory objectives are now addressed within the standard's requirements.	<b>3. Purpose:</b> To improve the reliability of the electric transmission system by preventing those vegetation related outages that could lead to Cascading.
<b>4. Applicability:</b>	<b>4. Applicability:</b>	<b>4. Applicability:</b>

<p>4.1. Transmission Owner</p> <p>4.2. Regional Reliability Organization</p> <p>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.</p>	<p>4.1 N/C</p> <p>4.2 Removed Regional Reliability Organization in response to FERC Order 693 and later added Planning Coordinator in lieu of Reliability Coordinator in response to industry comments to the October 27, 2008 comments.</p> <p>4.3 (Note that the version 1 section 4.3 is now covered in version 2 section 4.2)</p> <p>4.2.1 Added reference to lines that cross lands owned by federal, state, provincial, public, private, or tribal entities. Changed RRO to Planning Coordinator</p> <p>4.2.2. Added criterion to identify the time frame provided to manage sub 200kV lines to the standard after the Planning Coordinator has determined that they are subject to the standard.</p> <p>4.2.3. Added criterion to specify when a newly acquired line above 200kV will become</p>	<p><b>4.1. Functional Entities</b></p> <p>4.1.1. Transmission Owner</p> <p>4.1.2. Planning Coordinator</p> <p><b>4.2. Facilities</b></p> <p>4.2.1. Transmission lines (“applicable lines”) operated at 200kV or higher, and transmission lines operated below 200kV designated by the Planning Coordinator as being subject to this standard including but not limited to those that cross lands owned by federal<sup>1</sup>, state, provincial, public, private, or tribal entities.</p> <p>4.2.2. Transmission lines operated below 200kV designated by the Planning Coordinator as being subject to this standard become subject to this standard 12 months after the date the Planning Coordinator initially designates the transmission line as being subject to this standard.</p> <p>4.2.3. Existing transmission line(s) operated at 200kV or higher that are newly acquired by a Transmission Owner and were not previously subject to this standard, become subject to this standard 12 months after the acquisition date of the transmission line(s).</p>
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<sup>1</sup> EPAAct 2005 section 1211c: “Access approvals by Federal agencies”

<p><b>Effective Dates:</b></p> <p><b>5.1</b> One calendar year from the date of adoption by the NERC Board of Trustees for Requirement 1 and 2.</p> <p><b>5.2</b> Sixty calendar days from the date of adoption by the NERC Board of Trustees for the Requirements 3 and 4.</p>	<p>subject to the standard.</p> <p><b>Effective Dates:</b></p> <p>Consistency with standards approval process for a standard revision.</p>	<p><b>5. Effective Dates:</b></p> <p>In those jurisdictions where regulatory approval is required, the first calendar day of the first calendar quarter one year after applicable regulatory authority approval for all requirements; or, in those jurisdictions where no regulatory approval is required, the first calendar day of the first calendar quarter one year following Board of Trustees adoption.</p>
<p><b>R1.</b> 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<sup>1</sup>.</p> <p><b>R1.1.</b> 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.</p> <p><b>R1.2</b> The Transmission Owner, in the TVMP, shall identify and document the 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.</p>	<p><b>R1.</b> Changed R1 to be a TVMP “documentation” requirement not an implementation requirement.</p> <p>Items changed or modified were removed Clearance 1 (which was a fill in the blank) Clearance 2 was replaced by MVCD (to find a more acceptable alternative to MAID), added the frequency of at least once per calendar year to Vegetation Inspections, moved imminent threat action from the original R1.5 to the new requirement R2, removed personnel qualifications (they were fill-in-the-blank), replaced the term “mitigation measures “ with “interim corrective action process” to avoid conflict with NERC’s use of the term “imminent threat; specified that maintenance strategies to achieve clearance must consider the sag and sway under all rated conditions, and clarified that this applies on the active transmission line ROW. Added requirements for the documentation of an annual work plan</p>	<p><b>R1.</b> Each Transmission Owner shall have a documented transmission vegetation management program that describes how it conducts work on its Active Transmission Line Rights of Way to prevent Sustained Outages due to vegetation, considering all possible locations the conductor may occupy under the effects of sag and sway throughout its operating range under rated conditions. The transmission vegetation management program shall:</p> <p><b>1.1.</b> Specify the methods that the Transmission Owner may use to control vegetation.</p> <p><b>1.2.</b> Specify a Vegetation Inspection frequency of at least once per calendar year that takes into account local and environmental factors.</p> <p><b>1.3.</b> Require an annual work plan. An annual work plan shall:</p> <p><b>1.3.1.</b> Identify the applicable lines to be maintained</p> <p><b>1.3.2.</b> Identify the work to be performed and methods to be used</p> <p><b>1.3.3.</b> Be flexible to adjust to changing conditions and to findings from Vegetation Inspections. Adjustments to the plan within the year are permissible.</p> <p><b>1.3.4.</b> Take into consideration permitting and scheduling requirements from landowners or</p>

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

**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

regulatory authorities.

- 1.4.** Require a process or procedure for response to an imminent threat of a vegetation-related Sustained Outage. The process or procedure shall specify actions which shall include communication of the threat to the responsible control center.
- 1.5.** Specify an interim corrective action process for use when the Transmission Owner is temporarily constrained from performing vegetation maintenance as planned.
- 1.6.** Specify the maintenance strategies used (such as minimum vegetation-to-conductor distance or maximum vegetation height) to ensure that Table 1 clearances in Attachment 1 are never violated. The maintenance strategies shall consider the sag and sway of the conductor throughout its operating range under rated conditions.

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.

**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

**R2.** Reduced the verbiage, moved the “create” function and other documentation activities/actions into new R1.section 1.3, and moved the implementation function into R9.

**R9.** Each Transmission Owner shall implement its annual work plan for vegetation management to accomplish the purpose of this standard.

<p>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.</p>		
<p><b>R3.</b> 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.</p>	<p>Reporting requirements are now located in the compliance section, <b>Additional Compliance Information</b>, as required by “NERC Standard format”, specifically, reporting outages in and of itself does not improve reliability.</p>	<p><b>Additional Compliance Information</b></p> <p>The Transmission Owner shall report quarterly to its Regional Entity, or the Regional Entity’s designee, Sustained Outages of its transmission lines determined by the Transmission Owner to have been caused by vegetation, including the following:</p> <p>The name of the circuit(s), 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, and Sustained Outage Category based on the following:</p> <ul style="list-style-type: none"> <li>• 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 Active Transmission Line ROW;</li> <li>• Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines but are not identified</li> </ul>



		<p>as an element of an IROL (or Major WECC Transfer Path) by vegetation inside and/or outside of the Active Transmission Line ROW;</p> <ul style="list-style-type: none"> <li>• Category 2 — Fall-ins: Sustained Outages caused by vegetation falling into lines from within the Active Transmission Line ROW;</li> <li>• Category<sup>2</sup> 4 — Blowing together: Sustained Outages caused by vegetation and lines blowing together from within the Active Transmission Line ROW.</li> </ul>
<p><b>R4.</b> 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.</p>	<p>This is now covered in the <b>Additional Compliance Information</b> as is appropriate for all reporting issues.</p>	
<p><b>NOTE: Below are new requirement in Version 2 that were not in Version 1 and were not mapped above.</b></p>		
	<p>The new Version 2 of the standard now has a separate requirement for documenting and implementing the imminent threat.</p>	<p><b>R2.</b> Each Transmission Owner shall implement its imminent threat procedure when the Transmission Owner has actual knowledge of such a threat, obtained through normal operating practices</p>
	<p>The new Version 2 of the standard now has a separate requirement for documenting and implementing the Vegetation Inspections.</p>	<p><b>R3.</b> Each Transmission Owner shall conduct Vegetation Inspections of all applicable lines (as measured in line miles) in accordance with the frequency specified in its transmission vegetation management program, unless constrained by natural disasters<sup>5</sup>. When constrained by a natural disaster, the Transmission Owner shall conduct the</p>

<sup>2</sup> Category 3 reporting is eliminated.

		<p>Vegetation Inspection(s) within 6 months or a period agreed to by its Regional Entity, whichever is greater</p>
	<p>The new Version 2 utilizes MVCD, a technically justifiable separation distance at which flashover will not occur, and applies it to real time observations to provide the clarity needed for field applications. The combination of choosing an effective maintenance strategy (R1 section 1.6), effective inspections (R3), and annual work performance (R9), will ensure a high level of reliability while imminent threat implementation (R2) and MVCD findings (R4) will provide the feedback to the Transmission Owner necessary to in make improvements in the overall maintenance of vegetation.</p>	<p><b>R4.</b> Each Transmission Owner shall prevent encroachment of vegetation into the Minimum Vegetation Clearance Distances (“MVCD”) listed in FAC-003-2-Attachment 1 for its applicable lines as observed in real-time operating between no-load and their Rating with the following exceptions:</p>
	<p>R5, R6, R7 and R8 explicitly state that sustained outages from vegetation are violations of this standard. This removes the implicit interpretation that is currently in Version 1.</p> <p>R5 and its companion R6 apply to grow-ins. R5 applies to the most significant circuits and is separated from R6 to allow application of the most appropriate VRF.</p> <p>R7 addresses blowing together and R8 addresses fall-ins.</p>	<p><b>R5.</b> Each Transmission Owner shall prevent Sustained Outages of applicable lines that are identified as an element of an Interconnection Reliability Operating Limit (or Major WECC Transfer Path in the Western Interconnection) due to vegetation growing into a conductor operating between no-load and its Rating with the following exceptions:</p> <ul style="list-style-type: none"> <li>• Sustained Outages of applicable lines that result from natural disasters.</li> <li>• Sustained Outages of applicable lines that result from human or animal activity.</li> </ul> <p><b>R6.</b> Each Transmission Owner shall prevent Sustained Outages of applicable lines that are not an element of an Interconnection Reliability Operating Limit (or Major WECC Transfer Path in the Western</p>



		<p>Interconnection) due to vegetation growing into a conductor operating between no-load and its Rating with the following exceptions:</p> <ul style="list-style-type: none"> <li>• Sustained Outages of applicable lines that result from natural disasters.</li> <li>• Sustained Outages of applicable lines that result from human or animal activity.</li> </ul> <p><b>R7.</b> Each Transmission Owner shall prevent Sustained Outages of applicable lines due to the blowing together of vegetation and a conductor within an Active Transmission Line Right of Way (operating within design blow-out conditions) with the following exception:</p> <ul style="list-style-type: none"> <li>• Sustained Outages of applicable lines that result from natural disasters or wind-blown debris.</li> </ul> <p><b>R8.</b> Each Transmission Owner shall prevent Sustained Outages of applicable lines due to vegetation falling into a conductor from within an Active Transmission Line Right of Way with the following exceptions:</p> <ul style="list-style-type: none"> <li>• Sustained Outages of applicable lines that result from natural disasters or wind-blown debris.</li> <li>• Sustained Outages of applicable lines that result from human or animal activity.</li> </ul>
	<p>Two separate and distinct elements in this standard were created to remove confusion about the difference between the TVMP (a document) and the annual work plan. The annual work plan documentation is in R1</p>	<p><b>R9.</b> Each Transmission Owner shall implement its annual work plan for vegetation management to accomplish the purpose of this standard.</p>

	section 1.3 and the implementation of the annual work plan is in R9,	
	In response to FERC order 693 and industry comment, the PC has been assigned as the appropriate functional entity to prepare the list of applicable lines below 200 kV.	<b>R10.</b> Each Planning Coordinator shall prepare and keep current, a list of lines that are operated below 200 kV, if any, which are subject to this standard. Each Planning Coordinator shall consult with its Transmission Owner(s) and neighboring Planning Coordinators to obtain input to develop the list.
	This requirement captures the methodology and the parameters to be used by each PC to assess the significance of sub 200 kV lines.	<b>R11.</b> Each Planning Coordinator shall develop and document its method for assessing the reliability significance of sub-200kV transmission lines whose loss would place the grid at an unacceptable risk of instability, separation, or cascading failures.