

## Standard Development Timeline

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

### Development Steps Completed

1. SC approved SAR for initial posting (January 11, 2007).
2. SAR posted for comment (January 15–February 14, 2007).
3. SAR posted for comment (April 10–May 9, 2007).
4. SC authorized moving the SAR forward to standard development (June 27, 2007).

### Proposed Action Plan and Description of Current Draft

This is the ~~second~~<sup>first</sup> posting of the proposed revisions to the standard in accordance with Results-Based Criteria. ~~—The drafting team requests posting for a 30-day informal comment period.~~

### Future Development Plan

Anticipated Actions	Anticipated Date
<del>Drafting team considers comments, makes conforming changes, posts for 30-day informal comment period.</del>	<del>April</del> 2010
Drafting team considers comments, makes conforming changes, and requests SC approval to proceed to formal comment and ballot.	June <del>–July</del> 2010
Recirculation ballot of standards.	<del>July</del> –August 2010
Receive BOT approval	<del>August</del> <sup>September</sup> 2010

## **Definitions of Terms Used in Standard**

~~This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.~~

### **Active Transmission Line Right-of-Way**

~~A strip or corridor of land that is occupied by active transmission facilities. This corridor does not include the parts of the Right-of-Way that are unused or intended for other facilities.~~

#### **Examples of active portions of corridors include:**

The width of any Active Transmission Line Right of Way (ROW) is the portion of the ROW that has been cleared of vegetation to meet design clearance requirements such as National Electrical Safety Code or other design criteria, for the reliable operation of active facilities.

#### **Examples of inactive portions of corridors include:**

- ~~1) The portions of the ROW acquired to accommodate future Facilities. Power plant exits are examples where large ROWs are obtained for maximum corridor utilization and may currently have fewer circuits constructed.~~
- ~~2) The portion of the ROW where corridor edge zones are designated by regulatory bodies for vegetation to exist.~~
- ~~3) The portions of the ROW where double circuit structures are installed but only one circuit is currently strung with conductors.~~

### **Vegetation Inspection**

~~The systematic examination of vegetation conditions on an Active Transmission Line Right of Way which may be combined with a general line inspection.~~

The current glossary definition of this NERC term is modified to allow both maintenance inspections and vegetation inspections to be performed concurrently.

Current definition of Vegetation Inspection: The systematic examination of a transmission corridor to document vegetation conditions.

**Effective Dates**

Requirement	Jurisdiction							
	Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland	Nova Scotia	Ontario	Quebec
R1	4	4	4	3	TBD	TBD	2	TBD
R2	4	4	4	3	TBD	TBD	2	TBD
R3	4	4	4	3	TBD	TBD	2	TBD
R4	4	4	4	3	TBD	TBD	2	TBD
R5	4	4	4	3	TBD	TBD	2	TBD
R6	4	4	4	3	TBD	TBD	2	TBD
R7	4	4	4	3	TBD	TBD	2	TBD

1. First calendar day of the first calendar quarter one year after applicable regulatory authority approval for all requirements
2. First calendar day of the first calendar quarter one year following Board of Trustees adoption unless governmental authority withholds approval
3. First calendar day of the first calendar quarter that is at least one year following Board of Trustees adoption

Exceptions:

**A line** ~~Lines~~ operated below 200kV, designated by the Planning Coordinator as an element of an IROL or as a Major WECC transfer path, ~~becomes~~ **become** subject to this standard 12 months after the date the Planning Coordinator or WECC initially designates the lines as being subject to this standard.

An existing transmission line operated at 200kV or higher that is newly acquired by an asset owner and was not previously subject to this standard, becomes subject to this standard 12 months after the acquisition date of the line. ~~(s).~~

## Version History

Version	Date	Action	Change Tracking
1	TBA	<ol style="list-style-type: none"><li>1. Added “Standard Development Roadmap.”</li><li>2. Changed “60” to “Sixty” in section A, 5.2.</li><li>3. Added “Proposed Effective Date: April 7, 2006” to footer.</li><li>4. Added “Draft 3: November 17, 2005” to footer.</li></ol>	01/20/06
1	April 4, 2007	Regulatory Approval — Effective Date	New
2			

## **Definitions of Terms Used in Standard**

*This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary. When this standard has received ballot approval, the text boxes will be moved to the Guideline and Technical Basis Section.*

### **Vegetation Inspection**

The systematic examination of vegetation conditions on a maintained transmission line Right-of-Way which may be combined with a general line inspection.

The current glossary definition of this NERC term is modified to allow both maintenance inspections and vegetation inspections to be performed concurrently.

Current definition of Vegetation Inspection: The systematic examination of a transmission corridor to document vegetation conditions.

## Introduction

1. **Title:** Transmission Vegetation Management
2. **Number:** FAC-003-2
3. **Objectives:** To improve the reliability of the electric Transmission system by preventing those vegetation related outages that could lead to Cascading.

## 4. Applicability

### 4.1. Functional Entities:

~~4.1.1~~ Transmission Owners

- 4.2. **Facilities:** Defined below, including but not limited to those that cross lands owned by federal<sup>1</sup>, state, provincial, public, private, or tribal entities:

~~4.2.1.~~ 4.2.1. Overhead transmission lines operated at 200kV or higher.

~~4.2.2.~~ 4.2.2. Overhead transmission lines operated below 200kV having been identified as included in the definition elements of an Interconnection Reliability Operating Limit (IROL) under NERC Standard FAC 014 by the Planning Coordinator.

~~4.2.3.~~ 4.2.3. Overhead transmission lines operated below 200 kV having been identified as included in the definition of one of the *Major WECC Transfer Paths in the Bulk Electric System*.

~~4.2.4.~~ 4.2.4. This Standard does not apply to Facilities identified above (4.2.1 through 4.2.3) located in the fenced area of a switchyard, station or substation.

**4.3. Enforcement:** The reliability obligations of the applicable entities and facilities are contained within the technical requirements of this standard. [Straw proposal]

### ~~4.3.4.4.~~ Other:

~~4.3.1.~~ This Standard does not apply to any occurrence, non-occurrence, or other set of circumstances that are beyond the ~~reasonable~~ control of a Transmission Owner subject to this ~~reliability standard~~ Reliability Standard, ~~and are not caused by the fault or negligence of the Transmission Owner~~, including acts of God, flood, drought, earthquake, major storms, fire, hurricane, tornado, landslides, ice storms, vehicle contact with tree, human activity involving: removal of, installation of, or digging around vegetation logging activities, animals severing trees, lightning, epidemic, strike, war, riot, civil disturbance, sabotage, vandalism, terrorism, wind shear, or fresh gale (or higher wind speed) gales that restricts or prevents performance to comply with this reliability standard's requirements. Nothing in this section should be construed to limit

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<sup>1</sup> EPA Act 2005 section 1211c: "Access approvals by Federal agencies".

the Transmission Owner's right to exercise its full legal rights on the active transmission line ROW<sup>2</sup>.

## 5. Background:

This NERC Vegetation Management Standard (“Standard”) uses a defense-in-depth approach to improve the reliability of the electric Transmission System by preventing those vegetation related outages that could lead to Cascading. This Standard is not intended to address non-preventable outages such as those due to vegetation fall-ins or blow-ins from outside the Active Transmission Line Right-of-Way, vandalism, human activitieserrors and acts of nature. Operating experience indicates that trees that have grown out of specification have contributed to Cascading, especially under heavy electrical loading conditions.

With a defense-in-depth strategy, this Standard utilizes 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.
- b) Risk-based — preventive requirements to reduce the risks of failure to acceptable tolerance levels.
- c) Competency-based — defines a minimum capability an entity needs to have to demonstrate it is able to perform its designated reliability functions.

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. 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

Thus the various requirements associated with a successful vegetation program could be viewed as using R1, R2 and R3 as first levels of defense; while R4 could be a subsequent or final level of defense. R6 depending on the particular vegetation approach may be either an initial defense barrier or a final defense barrier.

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<sup>2</sup> A strip or corridor of land that is occupied by active transmission facilities. This corridor does not include the parts of the Right-of-Way that are unused or intended for other facilities. However, it is not to be less than the width of the easement itself unless the easement exceeds distances as shown in Table 3 for various voltage classes.

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 that serve to connect one electric station to another. However, this Standard~~ 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~~ **Bulk Electric 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 multiple line failures and Cascading. Conversely, most other outage causes (such as trees falling into lines, lightning, animals, motor vehicles, etc.) are statistically intermittent. 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’s emphasis is on vegetation grow-ins.



## Requirements and Measures

**R1.** Each Transmission Owner shall manage prevent vegetation to prevent encroachment that could result in a Sustained Outage ~~from encroaching within the Minimum Vegetation Clearance Distance (MVCD)~~ of any ~~each~~ line ~~conductor that is~~ identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major Western Electricity Coordinating Council (WECC) transfer path (operating within Rating and Rated Electrical Operating Conditions). Types of encroachment include: ~~to avoid a Sustained Outage.~~

### Rationale

The MVCD is a calculated minimum distance stated in feet (meters) to prevent spark-over between conductors and vegetation, for various altitudes and operating voltages. The distances in Table 2 were derived using a proven transmission design method.

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**M1.** Evidence of violation of Requirement R1 is limited to:

- **1. Real-time observation of** encroachment into the Minimum Vegetation Clearance Distance (MVCD) as shown in Table 2, observed in real time, absent a Sustained Outage, ~~or~~
  - An encroachment ~~A vegetation-related Sustained Outage~~ due to a fall-in from inside the active transmission line ~~Active Transmission Line~~ ROW that caused a, ~~or~~
- 2. A vegetation-related Sustained Outage,
  - An encroachment due to blowing together of applicable lines and vegetation located inside the active transmission line ~~Active Transmission Line~~ ROW that caused a, ~~or~~
- 3. A vegetation-related Sustained Outage,
- 4. An encroachment due to a grow-in that caused a vegetation-related Sustained Outage.

[VRF – High] [Time Horizon – Real-time]

**M1.** Each Transmission 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.

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. If an investigation of a Fault by a qualified person confirms that a vegetation encroachment within the MVCD occurred, then it shall be considered a Real-time observation.

**R2.** Each Transmission Owner shall manage vegetation to prevent encroachment that could result in a Sustained Outage of applicable lines that are not elements of an Interconnection Reliability Operating Limit (IROL) or Major Western Electricity Coordinating Council (WECC) transfer path (operating within Rating and Rated Electrical Operating Conditions). Types of encroachment include:

**Rationale**

The MVCD is a calculated minimum distance stated in feet (meters) to prevent spark-over between conductors and vegetation, for various altitudes and operating voltages. The distances in Table 2 were derived using a proven transmission design method.

1. An encroachment into the Minimum Vegetation Clearance Distance (MVCD) as shown in Table 2, observed in real time, absent a Sustained Outage,
2. An encroachment due to a fall-in from inside the active transmission line ROW that caused a vegetation-related Sustained Outage,
3. An encroachment due to blowing together of applicable lines and vegetation located inside the active transmission line ROW that caused a vegetation-related Sustained Outage,
4. An encroachment due to a grow-in that caused a vegetation-related Sustained Outage.

[VRF – Medium] [Time Horizon – Real-time]

- **M2.** Each Transmission 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.

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. If an investigation of a Fault by a qualified person confirms that a vegetation encroachment within the MVCD occurred, then it shall be considered a Real-time observation.

**R3R2.** Each Transmission Owner shall document the procedures, processes, or specifications it uses to prevent the encroachment of vegetation into from encroaching within the MVCD. Such documentation will incorporate the dynamics of a transmission of each applicable line conductor's movement throughout its conductor, which are not elements of an IROL and are not a Major WECC transfer path, (operating within Rating and Rated Electrical Operating Conditions and the inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency, for the Transmission Owner's applicable lines) to avoid a Sustained Outage.

#### **Rationale**

The MVCD is a calculated minimum distance stated in feet (meters) to prevent spark-over between conductors and vegetation, for various altitudes and operating voltages. The distances in Table 2 were derived using a proven

#### **Rationale**

Provide a basis for evaluation on the intent and competency of the Transmission Owner in maintaining vegetation. There may be many acceptable approaches to maintain clearances. However, the Transmission Owner should be able to state what its approach is and how it conducts work to maintain clearances. See Figure 1 for an illustration of possible conductor locations.

*[VRF – Lower] [Time Horizon – Long Term Planning]*

**M3.** The procedures, processes, or specifications provided demonstrate that the Transmission Owner can prevent

**M2.** Evidence of violation of Requirement R2 is limited to:

- Real-time observation of encroachment into the MVCD, or
- A vegetation-related Sustained Outage due to a fall-in from inside the Active Transmission Line ROW, or
- A vegetation-related Sustained Outage due to blowing together of applicable lines and vegetation located inside the Active Transmission Line ROW, or
- A vegetation-related Sustained Outage due to a grow-in.

~~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.~~

**R3.** Each Transmission Owner shall have a documented transmission-vegetation management program that describes how it conducts work on its Active Transmission Line ROWs to avoid Sustained Outages due to vegetation, considering the factors identified in the requirement all possible locations the conductor may occupy assuming operation within Rating and Rated Electrical Operating Conditions.

#### **Rationale**

To ensure expeditious communication between qualified field personnel and proper operating personnel when a critical situation is confirmed. Qualified field personnel may include lineworkers and utility arborists.

~~M3. Each Transmission Owner has a documented transmission vegetation management program that describes how it conducts work on its Active Transmission Line ROW to avoid Sustained Outages due to vegetation, considering all possible locations the conductor may occupy assuming operation within Rating and Rated Electrical Operating Conditions.~~

#### Rationale

Provide a basis for evaluation on the intent and competency of the Transmission Owner in maintaining vegetation. There may be many acceptable approaches to maintain clearances. However, the Transmission Owner should be able to state what its approach is and how it conducts work to maintain clearances. See Figure 1 for an illustration of possible conductor locations.

R4. Each Transmission Owner, without any intentional time delay, shall notify the responsible control center holding switching authority for the associated transmission line when qualified personnel confirm the existence ~~it has verified knowledge~~ of a vegetation ~~imminent threat~~ condition that - ~~A vegetation imminent threat condition is one which~~ is likely to cause a Fault ~~Sustained Outage~~ at any moment.

#### Rationale

To ensure rapid notification of the correct personnel when an occurrence of a critical situation is observed. Verified knowledge includes observations by journeyman lineman, utility arborist, or other qualified personnel, or a report verified by these personnel.

*[VRF – Medium] [Time Horizon – Real-time]*

M4. Each Transmission Owner that has a vegetation condition likely to cause a Fault at any moment, as confirmed by qualified personnel, ~~experienced a verified vegetation imminent threat~~ will have evidence that it notified the responsible 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.

**R5.** Each Transmission Owner shall take ~~interim~~ corrective action when it is ~~temporarily~~ constrained from performing planned vegetation work, where a transmission line is put at potential risk due to the constraint.

*[VRF – Medium] [Time Horizon – Operations Planning]*

**M5.** Each Transmission Owner has evidence of the ~~interim~~ corrective action taken for each ~~temporary~~ constraint where a 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, and evidence that a line was de-energized ~~or inspection records~~.

**Rationale**

Legal actions and other events may occur which result in constraints that prevent the Transmission 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 Transmission Owner to put interim measures in place, rather than do nothing. For example, in the 2003 NE blackout a Transmission Owner was prevented by a court order from performing planned work. However, when the court order expired, the TO failed to take action to maintain the vegetation resulting in a sustained outage that contributed to the cascade. 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.

**R6.** Each Transmission Owner shall perform a Vegetation Inspection of all applicable transmission lines at least once per calendar year.

*[VRF – Medium] [Time Horizon – Operations Planning]*

**M6.** Each Transmission Owner has evidence that it conducted Vegetation Inspections at least once per calendar year for all applicable transmission lines. Examples of acceptable forms of evidence may include completed and dated work orders, dated invoices, or dated inspection records.

**Rationale**

Inspections are used by Transmission Owners to assess the condition of the 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

**R7.** Each Transmission Owner shall complete the work in an~~execute a flexible~~ annual vegetation work plan 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 and documented provided they do not put the transmission system at risk of a vegetation encroachment. Examples of reasons for modification to annual plan may include:

- Change in expected growth rate/ environmental factors
- Major storms
- Rescheduling work between growing seasons
- Crew or contractor availability/ Mutual assistance agreements
- Identified unanticipated high priority work
- Weather conditions/Accessibility
- Permitting delays
- Land ownership changes/Change in land use by the landowner
- Funding adjustments (increase or decrease)
- Emerging technologies

*[VRF – Medium] [Time Horizon – Operations Planning]*

**M7.** Each Transmission Owner has evidence that it completed its~~executed a flexible~~ annual vegetation work plan. Examples of acceptable forms of evidence may include a copy of the completed annual work plan (including modifications if any), dated work orders, dated invoices, or dated inspection records.

### **Rationale**

This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. An annual vegetation work plan allows for work to be modified for changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors, provided that the changes do not violate the encroachment within the MVCD.

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## Compliance

### Compliance Enforcement Authority

- Regional Entity

### Compliance Monitoring and Enforcement Processes:

- Compliance Audits
- Self-Certifications
- Spot Checking
- Compliance Violation Investigations
- Self-Reporting
- Complaints

### Evidence Retention

The Transmission Owner retains data or evidence of Requirements R1 through R7, Measures M1 through M7 for three calendar years to show compliance unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Transmission Owner is found non-compliant, it shall keep information related to the non-compliance until found compliant, or for the duration specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

### Additional Compliance Information

Periodic Data Submittal: (See Administrative Procedure)

**Time Horizons, Violation Risk Factors, and Violation Severity Levels**

Table 1							
R#	Time Horizon	VRF	Violation Severity Level				
			Lower	Moderate	High	Severe	
R1	Real-time	High	The Transmission Owner failed to prevent vegetation from encroaching within the MVCD of a transmission line as described in R1.	The Transmission Owner incurred a Sustained Outage due to vegetation falling into a transmission line as described in R1 from within the Active Transmission Line ROW.	The Transmission Owner incurred a Sustained Outage due to the blowing together of vegetation and a transmission line as described in R1 from within the Active Transmission Line ROW.	The Transmission Owner incurred a Sustained Outage due to vegetation growing into a transmission line as described in R1.	
R2	Real-time	Medium	The Transmission Owner failed to prevent vegetation from encroaching within the MVCD of a transmission line as described in R2.	The Transmission Owner incurred a Sustained Outage due to vegetation falling into a transmission line as described in R2 from within the Active Transmission Line ROW.	The Transmission Owner incurred a Sustained Outage due to the blowing together of vegetation and a transmission line as described in R2 from within the Active Transmission Line ROW.	The Transmission Owner incurred a Sustained Outage due to vegetation growing into a transmission line as described in R2.	
R3	Long-Term Planning	Lower		The Transmission Owner has a documented transmission vegetation management program, but the transmission vegetation management program does not describe how work is conducted on the Active Transmission Line ROWs to avoid Sustained Outages due to vegetation.	The Transmission Owner has a documented transmission vegetation management program, but the transmission vegetation management program does not consider all possible locations the conductor may occupy assuming operation within Rating and Rated Electrical Operating Conditions	The Transmission Owner does not have a documented transmission vegetation management program.	



R4	Real-time	Medium					The Transmission Owner had verified knowledge of a vegetation imminent threat condition and did not notify the responsible control center.
R5	Operations Planning	Medium					The Transmission Owner did not take interim corrective action when it was temporarily constrained from performing planned vegetation work where an applicable transmission line was put at potential risk.
R6	Operations Planning	High	The Transmission Owner inspected greater than 95% but less than 100% of the ROW as measured by applicable line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).	The Transmission Owner inspected greater than 90% but less than or equal to 95% of the ROW as measured by applicable line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).	The Transmission Owner inspected greater than 85% but less than or equal to 90% of the ROW as measured by applicable line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).	The Transmission Owner inspected less than or equal to 85% of the ROW as measured by applicable line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).	
R7	Operations Planning	High	The Transmission Owner executed greater than 95% but less than 100% of its annual work plan as adjusted.	The Transmission Owner executed greater than 90% but less than or equal to 95% of its annual work plan as adjusted.	The Transmission Owner executed greater than 85% but less than or equal to 90% of its annual work plan as adjusted.	The Transmission Owner executed less than or equal to 85% of its annual work plan as adjusted.	

## **Administrative Procedure**

The Transmission Owner will submit a quarterly report to its Regional Entity, or the Regional Entity's designee, identifying all Sustained Outages of transmission lines determined by the Transmission Owner to have been caused by vegetation that includes, 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 Transmission 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 transmission 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~~Active Transmission Line~~ ROW;
- Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable transmission lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the active transmission line~~Active Transmission Line~~ ROW;
- Category 2 — Fall-ins: Sustained Outages caused by vegetation falling into applicable transmission lines from within the active transmission line~~Active Transmission Line~~ ROW;
- Category<sup>3</sup> 4 — Blowing together: Sustained Outages caused by vegetation and applicable transmission lines blowing together from within the active transmission line~~Active Transmission Line~~ ROW.

The Regional Entity will report the outage information provided by Transmission 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.

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

At the request of the Standards Committee, stakeholders are asked to review and comment on the proposed VSLs for R1 and R2. Following the comment period and nonbinding poll, only one set of VSLs will move forward for R1 and R2.

**Time Horizons, Violation Risk Factors, and Violation Severity Levels**

**Table 1**

<u>R#</u>	<u>Time Horizon</u>	<u>VRF</u>	<u>Violation Severity Level</u>			
			<u>Lower</u>	<u>Moderate</u>	<u>High</u>	<u>Severe</u>
<u>R1-SDT Version</u>	<u>Real-time</u>	<u>High</u>	<u>The Transmission Owner had an encroachment into the MVCD observed in real time, absent a Sustained Outage.</u>	<u>The Transmission Owner had an encroachment due to a fall-in from inside the active transmission line ROW that caused a vegetation-related Sustained Outage.</u>	<u>The Transmission Owner had an encroachment due to blowing together of applicable lines and vegetation located inside the active transmission line ROW that caused a vegetation-related Sustained Outage.</u>	<u>The Transmission Owner had an encroachment due to a grow-in that caused a vegetation-related Sustained Outage.</u>
<u>R1 Staff Version</u>	<u>Real-time</u>	<u>High</u>			<u>The Transmission Owner 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-Table 2 was observed in real time absent a Sustained Outage.</u>	<u>The Transmission Owner 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:</u> <ul style="list-style-type: none"> <li>• <u>A fall-in from inside the active transmission line ROW</u></li> <li>• <u>Blowing together of applicable lines and vegetation located inside the active transmission line ROW</u></li> <li>• <u>A grow-in</u></li> </ul>
<u>R2-SDT Version</u>	<u>Real-time</u>	<u>Medium</u>	<u>The Transmission Owner had an encroachment into the MVCD observed in real time, absent a</u>	<u>The Transmission Owner had an encroachment due to a fall-in from inside the active transmission line</u>	<u>The Transmission Owner had an encroachment due to blowing together of applicable lines and vegetation located inside the</u>	<u>The Transmission Owner had an encroachment due to a grow-in that caused a vegetation-related Sustained Outage.</u>

<b>Table 1</b>							
<b>R#</b>	<b>Time Horizon</b>	<b>VRF</b>	<b>Violation Severity Level</b>				
			<b>Lower</b>	<b>Moderate</b>	<b>High</b>	<b>Severe</b>	
			<u>Sustained Outage.</u>	<u>ROW that caused a vegetation-related Sustained Outage.</u>	<u>active transmission line ROW that caused a vegetation-related Sustained Outage.</u>		
<u>R2 Staff Version</u>	<u>Real-time</u>	<u>Medium</u>			<u>The Transmission Owner 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-Table 2 was observed in real time absent a Sustained Outage.</u>	<u>The Transmission Owner 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 a vegetation-related Sustained Outage was caused by one of the following:</u> <ul style="list-style-type: none"> <li>• <u>A fall-in from inside the active transmission line ROW</u></li> <li>• <u>Blowing together of applicable lines and vegetation located inside the active transmission line ROW</u></li> <li>• <u>A grow-in</u></li> </ul>	
<u>R3</u>	<u>Long-Term Planning</u>	<u>Lower</u>		<u>The Transmission Owner has documented the procedures, processes, or specifications but does not incorporate the inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.</u>	<u>The Transmission Owner has documented the procedures, processes, or specifications but does not incorporate the dynamics of a transmission line conductor’s movement throughout its Rating and Rated Electrical Operating Conditions, for the Transmission Owner’s</u>	<u>The Transmission Owner does not have any documented procedures, processes or specifications used to prevent the encroachment of vegetation into the MVCD, for the Transmission Owner’s applicable lines.</u>	

<b>Table 1</b>							
<b>R#</b>	<b>Time Horizon</b>	<b>VRF</b>	<b>Violation Severity Level</b>				
			<b>Lower</b>	<b>Moderate</b>	<b>High</b>	<b>Severe</b>	
				<u>for the Transmission Owner's applicable lines.</u>	<u>applicable lines.</u>		
<u>R4</u>	<u>Real-time</u>	<u>Medium</u>			<u>The Transmission Owner experienced a vegetation threat confirmed by qualified personnel and notified the control center holding switching authority for that transmission line, but there was intentional delay in that notification.</u>	<u>The Transmission Owner experienced a vegetation threat confirmed by qualified personnel and did not notify the control center holding switching authority for that transmission line.</u>	
<u>R5</u>	<u>Operations Planning</u>	<u>Medium</u>				<u>The Transmission Owner did not take corrective action when it was constrained from performing planned vegetation work where a transmission line was put at potential risk.</u>	
<u>R6</u>	<u>Operations Planning</u>	<u>Medium</u>	<u>The Transmission Owner failed to inspect 5% or less of the ROW as measured by applicable-line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).</u>	<u>The Transmission Owner failed to inspect more than 5% up to and including 10% of the ROW as measured by applicable-line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).</u>	<u>The Transmission Owner failed to inspect more than 10% up to and including 15% of the ROW as measured by applicable-line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).</u>	<u>The Transmission Owner failed to inspect more than 15% of the ROW as measured by applicable-line miles (kilometers) (based on units of choice: circuit, pole line, ROW, etc.).</u>	
<u>R7</u>	<u>Operations Planning</u>	<u>Medium</u>	<u>The Transmission Owner failed to complete up to 5% of its annual work plan (including modifications if any).</u>	<u>The Transmission Owner failed to complete more than 5% and up to 10% of its annual work plan (including modifications if any).</u>	<u>The Transmission Owner failed to complete more than 10% and up to 15% of its annual work plan (including modifications if any).</u>	<u>The Transmission Owner failed to complete more than 15% of its annual work plan (including modifications if any).</u>	

<b>Table 1</b>						
<b>R#</b>	<b>Time Horizon</b>	<b>VRF</b>	<b>Violation Severity Level</b>			
			<b>Lower</b>	<b>Moderate</b>	<b>High</b>	<b>Severe</b>
				any).		

**Variances**

None.

**Interpretations**

None.

## Guidelines



## Guideline and Technical Basis

### Requirements R1 and R2:

~~Requirements~~ R1 and R2 are performance-based requirements. The reliability objective or outcome to be achieved is the prevention of 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 ~~state that if a~~ Transmission Owner to prevent vegetation from encroaching within the Minimum Vegetation Clearance Distance of transmission lines. R1 is applicable to lines “identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major Western Electricity Coordinating Council (WECC) transfer path (operating within Rating and Rated Electrical Operating Conditions) to avoid a Sustained Outage”. R2 applies to all other applicable lines that are not an element of an IROL or Major WECC Transfer Path.

The separation of applicability (between R1 and R2) recognizes that an encroachment into the MVCD of an IROL or Major WECC Transfer Path transmission line is a greater risk to the electric transmission system. Applicable lines that are not an element of an IROL or Major WECC Transfer Path are required to be clear of vegetation but these lines are comparatively less operationally significant. As a reflection of this difference in risk impact, the Violation Risk Factors (VRFs) are assigned as High for R1 and Medium for R2.

These requirements (R1 and R2) state that if vegetation encroaches ~~observes vegetation~~ within the distances prescribed in ~~FAC-003—Table 2~~, it is in violation of ~~the standard. Table 2 delineates this Standard. The MVCD table contains~~ the distances necessary to prevent ~~which are required to ensure that~~ spark-over will not occur; ~~the distances are~~ based on the Gallet equations as described more fully in a supplemental *Transmission Vegetation Management Standard FAC-003-2 Technical Reference*.

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 (potentially in violation of other standards), the occurrence of a clearance encroachment may occur. For example, emergency actions taken by a Transmission Operator or Reliability Coordinator to protect an Interconnection may cause the transmission line to sag more and come closer to vegetation, potentially causing an outage. Such vegetation-related outages are not a violation of these requirements.

Evidence of violation of Requirement ~~Requirements~~ R1 and R2 include real-time ~~refer to~~ 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 active transmission line ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to blowing together of applicable lines and vegetation located inside the active transmission line ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to a grow-in. If an investigation of a Fault by a qualified person confirms that a vegetation encroachment within the MVCD occurred, then it shall be considered a Real-time ~~in “real time”~~. ~~This means an actual field observation, or measurement of the conductor to vegetation distance and not a calculated determination of relative positions.~~

With this approach, the VSLs were defined such that they directly correlate to the severity of a failure to keep vegetation away from conductors and to the corresponding performance level of

the Transmission Owner's vegetation program's ability to meet the goal of "preventing a Sustained Outage that could lead to Cascading." Thus violation severity increases with a Transmission 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 a limb that only partially breaks and intermittently contacts a conductor. 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.

The MVCD is a calculated minimum distance stated in feet (or meters) to prevent spark-over, for various altitudes and operating voltages that is used in the design of Transmission Facilities. Keeping vegetation from entering this space will help prevent transmission outages. ~~The movement of the transmission line conductor and the MVCD is illustrated in Figure 1 below.~~

### **Requirement R3:**

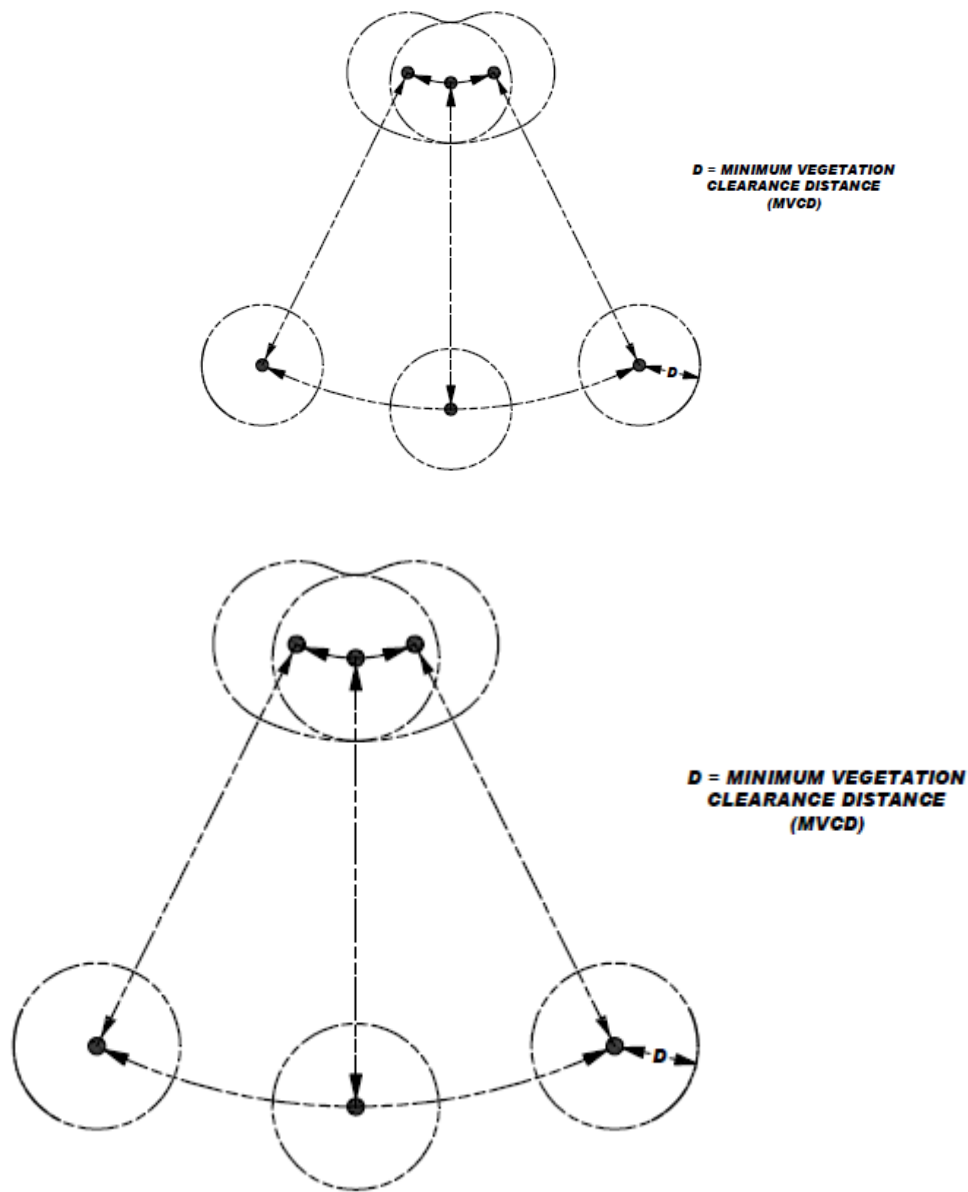
Requirement R3 is a competency based requirement concerned with the procedures, processes, or specifications, a Transmission Owner uses for vegetation management.

An adequate transmission vegetation management program formally establishes the approach the Transmission 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 Transmission Owner in managing vegetation. There are many acceptable approaches to manage vegetation and avoid Sustained Outages. However, the Transmission Owner must be able to state what its approach is 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 a Transmission 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 Transmission 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 as a 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**

Cross-section view of a single conductor at a given point along the span showing 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 Transmission 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~~By complying with encroachment prevention Requirements R1 and R2, together with the competency-based Requirement R3 (for a documented transmission vegetation management program), the Transmission Owner will have a cohesive vegetation management program for managing vegetation in such a manner as to maintain separation between conductors and vegetation. Additionally, an effective imminent threat process and interim corrective action plan strategies should be executed to be successful in meeting these requirements. The Transmission Owner's maintenance approach should result in vegetation never approaching the distances listed in the MVCD Table. However, brief encroachments by falling vegetation are not considered to be a violation.

~~In addition, the Transmission Owner should maintain detailed records of the findings of its planned inspections. This documentation constitutes evidence that the Transmission Owner had no encroachments into the MVCD Table distances.~~

~~These requirements assume that transmission lines are operating within their Rating. If a line conductor is intentionally or inadvertently operated beyond its rating (potentially in violation of other standards), the occurrence of a clearance encroachment is not be a violation of this Standard. Conductor position, and the associated vegetation distance, that result from operation of a transmission line beyond its Rating (for example emergency actions taken by a TOP or RC to protect an Interconnection) is beyond the scope of this Standard.~~

### **Requirement R3:**

~~An adequate transmission vegetation management program formally establishes the guidelines that are used by the Transmission Owner to plan and perform vegetation work that is necessary to prevent transmission outages and minimize risk to the Transmission System.~~

~~There may be many acceptable approaches to maintain clearances. However, the Transmission Owner should be able to state what its approach is and how it conducts work to maintain clearances. See Figure 1 for illustration of possible conductor locations.~~

### **Requirement R4:**

~~The term "verified knowledge" implies reliable confirmation that an imminent threat actually exists due to vegetation. This confirmation—Verification could be in that the form of initial call-in came from a qualified trained employee who personally identifies able to identify such a threat in the field. Confirmation or it could also be made verified by sending out such a qualified trained person to evaluate a situation reported by a landowner or an unqualified employee. confirm a call-in from a citizen.~~

~~Vegetation Two key elements of an acceptable imminent threat procedure are outlined below:~~

- ~~• Specify the vegetation-related conditions that warrant a response.~~

~~Examples of these vegetation-related conditions~~ include vegetation that is near or encroaching into the MVCD (~~a grow-in growth~~ issue) or vegetation that ~~could fall~~ presents an imminent danger of falling 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.

- ~~• Notify the appropriate operating authority:~~

The Transmission Owner has the responsibility to ensure the proper communication between field personnel and the ~~control center operating authority~~ to allow the ~~control center operating authority~~ to take the appropriate action until the vegetation threat is relieved. - Appropriate actions may include a temporary reduction in the line loading, ~~or~~ switching the line out of service, or positioning the system in recognition of the increasing 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).

~~The protocol for contacting the operating authority should be defined. Some Transmission Owners' processes may require a call directly to the operating authority, while other Transmission Owners may require a call to a supervisor or field forester who will in turn notify the proper operating authority.~~

~~The term "responsible control center" refers to personnel with direct responsibility for operating the transmission lines, such as the Transmission Owner's control center, an Independent System Operator, or other operating entity. In the case where the operating authority is not the Transmission Operator the communication between the Transmission Operator and the operating authority will occur by the normal policies that govern their relationship.~~

~~The imminent threat process should be implemented in terms of minutes or hours as opposed to a longer time frame for interim corrective action plans (see R5).~~

All ~~potential grow-in serious growth~~ or fall-in vegetation-related conditions will ~~are~~ not necessarily cause a Fault at any moment. ~~considered imminent threats under this Standard.~~ For example, some Transmission Owners may have a danger tree identification program that identifies trees for removal ~~trees~~ with the potential to fall near the line. These trees would ~~are~~ not require notification to ~~necessarily considered imminent threats under the control center Standard~~ 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 Transmission Owner for the mitigation of Sustained Outage risk when temporarily constrained from performing vegetation maintenance.

~~There can be situations involving vegetation that are not considered vegetation-related imminent threats under this Standard. For example, a logging operation on or near the Active Transmission Line ROW can pose an immediate threat of a sustained outage and result in the initiation of an imminent threat process in the same manner as the presence of a nearby crane or the notification of a hot spot on a conductor connector. Although the logging threat in this example tangentially involves vegetation, it is not considered a vegetation-related imminent threat under the Standard.~~

**Requirement R5:**

The intent of this requirement is to deal with situations that prevent the Transmission 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 Transmission Owner's rights, or other circumstances.

This requirement is not intended to address situations where the transmission line is not at ~~potential~~~~immediate~~ 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 chemicals on non-threatening, low growth vegetation but agree to the use of mechanical clearing. - In this case the Transmission 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 Transmission 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 Transmission Owner is constrained from performing planned vegetation maintenance work which potentially leaves the transmission line at risk.
- Developing the specific action to ~~immediately~~ mitigate any potential risk associated with not performing the vegetation maintenance work as planned.
- Documenting and tracking the specific action taken for each location.
- In developing the specific action to mitigate the potential risk to the transmission line the Transmission 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 Transmission 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 the Vegetation Inspections that fits general industry practice. In addition, the fact that Vegetation Inspections can be performed in conjunction with general line inspections further facilitates a Transmission Owner's ability to meet this requirement. However, the Transmission Owner may determine that more. More frequent inspections are may be needed to maintain reliability levels, dependent depending upon such factors as anticipated growth rates of the local vegetation, length

of the growing season for the geographical area, limited Active Transmission ROW width, and rainfall amounts. Therefore it is expected that some transmission~~some~~ lines may be designated with a higher frequency of inspections.

The VSL for Requirement R6 has VSL categories ranked by the percentage of the required ROW inspections completed. To calculate the percentage of inspection completion, the Transmission Owner ~~lines~~ may choose units such as: line miles or kilometers, circuit miles or kilometers, pole line miles, ROW miles, etc.

For example, when~~If~~ a Transmission Owner operates 2,000 miles of 230 kV transmission lines this Transmission Owner will be responsible for inspecting all 2,000 miles of 230 kV transmission lines at least once ~~line~~ 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~~inspected~~ would be  $\frac{100}{2000} = 0.05$  or 5%~~95%~~. The “Low~~Lower~~ VSL” for R6 would apply in this example.

~~The standard allows Vegetation Inspections to be performed in conjunction with general line inspections as per the definition.~~

#### **Requirement R7:**

R7 is a risk-based requirement. The Transmission Owner is required to implement an 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 Transmission Owner provide evidence of annual planning and execution of a vegetation management maintenance approach which successfully prevents encroachment of vegetation into the MVCD.

The ability to modify the work plan allows ~~Documentation or other evidence of the work performed typically consists 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, work inspection reports and walk-through reports.~~

~~Documentation is required when the annual work plan is adjusted or not completely implemented as originally planned. The reasons for the deferrals or changes and the expected completion date of postponed work should be documented.~~

~~The flexibility to adjust the annual work plan must always ensure the reliability of the electric Transmission system. Flexibility is meant to address changing conditions of the vegetation on the Active Transmission Line ROW, emergencies, and other significant changing conditions.~~

~~This standard requires that the annual work plan be flexible to allow the Transmission 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, ~~Another situational variance could be~~ a major storm could require redirecting that redirects local resources away from planned maintenance. This situation may also include complying with mutual assistance agreements by moving resources off the Transmission Owner's system to work on another system. Any Examples of these examples could result in acceptable documented adjustments may include deferrals or additions to the annual work plan. Modifications to the annual work plan must always ensure the reliability of the electric Transmission system.

In general, the

~~The work plan is not intended to be a "span-by-span" detailed description of all work to be performed. It is intended to require the Transmission Owner to annually plan and schedule vegetation work to prevent encroachment into the MVCD.~~

~~The Transmission Owner is required to implement the annual work plan for vegetation management to accomplish the purpose of this standard. This means that vegetation maintenance approach should use~~ ought to be performed to the full extent of the Transmission Owner's easement, fee simple and other legal rights. ~~It is intended to address the importance of maintaining all locations on the Active Transmission Line ROWs for reliability purposes in lieu of making special exceptions.~~

- ~~• Property owners and other interested parties occasionally request special considerations to leave undesirable vegetation conditions. Such considerations must never be allowed, to impact reliability.~~
- ~~• These undesirable vegetation conditions require more frequent work or inspections than other locations with similar vegetation threats and similar easement rights which are not subject to the special property owner requests.~~
- ~~• The Transmission Owner's vegetation maintenance work necessary to implement the annual work plan is most effective when performed to the maximum extent allowed by any easement, fee simple and other legal rights.~~
- ~~• The Transmission Owner should, therefore, endeavor to maintain its Active Transmission Line ROW to the full extent of its legal rights at all times and in all cases.~~

A comprehensive approach that exercises the full extent of legal rights on the active transmission line ROW is superior to incremental management in the long term because it reduces the overall potential for encroachments, and it ensures that future planned work and future planned inspection cycles are sufficient. ~~at all locations on the Active Transmission Line ROW.~~

When developing the annual work plan the Transmission 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. Transmission 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 Transmission 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.

~~The following conditions may result in adjustments to the annual work plan: abnormal weather such as drought, major storms, excessive rainfall, other environmental conditions such as infestation, disease, fire, etc. These conditions may be found as part of a special or scheduled Vegetation Inspection. Examples of annual work plan adjustments that are permitted may include revising the work plan priorities, rescheduling work to another time or selecting alternate vegetation control methods. Changes in land usage made by a property owner, such as timber clearing, may be another condition that warrants an adjustment.~~

FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)<sup>4</sup>  
For Alternating Current Voltages

( AC ) Nominal System Voltage (kV)	( AC ) Maximum System Voltage (kV)	MVCD feet (meters) sea level	MVCD feet (meters) 3,000ft (914.4m)	MVCD feet (meters) 4,000ft (1219.2m)	MVCD feet (meters) 5,000ft (1524m)	MVCD feet (meters) 6,000ft (1828.8m)	MVCD feet (meters) 7,000ft (2133.6m)	MVCD feet (meters) 8,000ft (2438.4m)	MVCD feet (meters) 9,000ft (2743.2m)	MVCD feet (meters) 10,000ft (3048m)	MVCD feet (meters) 11,000ft (3352.8m)
765	800	8.06ft (2.46m)	8.89ft (2.71m)	9.17ft (2.80m)	9.45ft (2.88m)	9.73ft (2.97m)	10.01ft (3.05m)	10.29ft (3.14m)	10.57ft (3.22m)	10.85ft (3.31m)	11.13ft (3.39m)
500	550	5.06ft (1.54m)	5.66ft (1.73m)	5.86ft (1.79m)	6.07ft (1.85m)	6.28ft (1.91m)	6.49ft (1.98m)	6.7ft (2.04m)	6.92ft (2.11m)	7.13ft (2.17m)	7.35ft (2.24m)
345	362	3.12ft (0.95m)	3.53ft (1.08m)	3.67ft (1.12m)	3.82ft (1.16m)	3.97ft (1.21m)	4.12ft (1.26m)	4.27ft (1.30m)	4.43ft (1.35m)	4.58ft (1.40m)	4.74ft (1.44m)
230	242	2.97ft (0.91m)	3.36ft (1.02m)	3.49ft (1.06m)	3.63ft (1.11m)	3.78ft (1.15m)	3.92ft (1.19m)	4.07ft (1.24m)	4.22ft (1.29m)	4.37ft (1.33m)	4.53ft (1.38m)
161*	169	2ft (0.61m)	2.28ft (0.69m)	2.38ft (0.73m)	2.48ft (0.76m)	2.58ft (0.79m)	2.69ft (0.82m)	2.8ft (0.85m)	2.91ft (0.89m)	3.03ft (0.92m)	3.14ft (0.96m)
138*	145	1.7ft (0.52m)	1.94ft (0.59m)	2.03ft (0.62m)	2.12ft (0.65m)	2.21ft (0.67m)	2.3ft (0.70m)	2.4ft (0.73m)	2.49ft (0.76m)	2.59ft (0.79m)	2.7ft (0.82m)
115*	121	1.41ft (0.43m)	1.61ft (0.49m)	1.68ft (0.51m)	1.75ft (0.53m)	1.83ft (0.56m)	1.91ft (0.58m)	1.99ft (0.61m)	2.07ft (0.63m)	2.16ft (0.66m)	2.25ft (0.69m)
88*	100	1.15ft (0.35m)	1.32ft (0.40m)	1.38ft (0.42m)	1.44ft (0.44m)	1.5ft (0.46m)	1.57ft (0.48m)	1.64ft (0.50m)	1.71ft (0.52m)	1.78ft (0.54m)	1.86ft (0.57m)
69*	72	0.82ft (0.25m)	0.94ft (0.29m)	0.99ft (0.30m)	1.03ft (0.31m)	1.08ft (0.33m)	1.13ft (0.34m)	1.18ft (0.36m)	1.23ft (0.37m)	1.28ft (0.39m)	1.34ft (0.41m)

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

<sup>4</sup> The distances in this Table are the minimums required to prevent ~~Flashover~~ flashover; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

Table 2 (cont.) — Minimum Vegetation Clearance Distances (MVCD)  
For **Direct Current** Voltages

( DC ) Nominal Pole to Ground Voltage (kV)	MVCD feet (meters) sea level	MVCD feet (meters) 3,000ft (914.4m) Alt.	MVCD feet (meters) 4,000ft (1219.2m) Alt.	MVCD feet (meters) 5,000ft (1524m) Alt.	MVCD feet (meters) 6,000ft (1828.8m) Alt.	MVCD feet (meters) 7,000ft (2133.6m) Alt.	MVCD feet (meters) 8,000ft (2438.4m) Alt.	MVCD feet (meters) 9,000ft (2743.2m) Alt.	MVCD feet (meters) 10,000ft (3048m) Alt.	MVCD feet (meters) 11,000ft (3352.8m) Alt.
±750	13.92ft (4.24m)	15.07ft (4.59m)	15.45ft (4.71m)	15.82ft (4.82m)	16.2ft (4.94m)	16.55ft (5.04m)	16.9ft (5.15m)	17.27ft (5.26m)	17.62ft (5.37m)	17.97ft (5.48m)
±600	10.07ft (3.07m)	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	7.89ft (2.40m)	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	4.78ft (1.46m)	5.35ft (1.63m)	5.55ft (1.69m)	5.75ft (1.75m)	5.95ft (1.81m)	6.15ft (1.87m)	6.36ft (1.94m)	6.57ft (2.00m)	6.77ft (2.06m)	6.98ft (2.13m)
±250	3.43ft (1.05m)	4.02ft (1.23m)	4.02ft (1.23m)	4.18ft (1.27m)	4.34ft (1.32m)	4.5ft (1.37m)	4.66ft (1.42m)	4.83ft (1.47m)	5ft (1.52m)	5.17ft (1.58m)

Table 3 – Minimum Distance from the Centerline of the Circuit to the edge of the active transmission line ROW

<u>69 - 138 kV</u>	<u>37.5 ft.</u>
<u>139 - 230 kV</u>	<u>50 ft.</u>
<u>231 - 345 kV</u>	<u>75 ft.</u>
<u>346 - 500 kV</u>	<u>87.5 ft.</u>
<u>501 - 765 kV</u>	<u>100 ft.</u>