



Alberta Reliability Standards
Facilities Design, Connections and Maintenance
FAC-003-AB-1

FAC-003-AB-1 Transmission Vegetation Management Program

1. Purpose

The purpose of this reliability standard is to improve the reliability of electric transmission systems by preventing outages from vegetation located on a right-of-way, corridor or other route (collectively "ROW")...

2. Applicability

This reliability standard applies to the entities listed below as follows:

- TFOs (including generating facility owners that own transmission facilities) with transmission facilities operated at 200 kV and above and any lower voltage transmission facilities designated by the ISO as critical to the reliability of the AIES...
ISO

3. Definitions

Italicized terms used in this reliability standard have the meanings as set out in the Alberta Reliability Standards Glossary of Terms and Part 1 of the ISO Rules.

4. Requirements

R1 Each TFO must prepare a TVMP. This program is to be updated at least annually. The TVMP must include the TFO's objectives, practices, approved procedures, and work specifications.

R1.1 The TVMP must define a schedule for and the type (aerial or ground) of ROW vegetation inspections. This schedule must be flexible enough to adjust for changing conditions. The inspection schedule must 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 facilities of the TFO. The TFO must perform vegetation inspections as identified in the schedule.

R1.2 The TVMP must 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

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

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conductor sway. Specifically, the *TFO* must establish clearances to be achieved at the time of vegetation management work identified herein as Clearance 1, and must also establish and maintain a set of clearance requirements identified herein as Clearance 2 to prevent flashover between vegetation and overhead ungrounded supply conductors.

R1.2.1 Clearance 1 — Each *TFO* must determine and document appropriate clearance distances to be achieved at the time of vegetation management work based upon local conditions and the expected time frame in which the *TFO* plans to return for future 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 must be greater than those defined in Clearance 2.

R1.2.2 Clearance 2 — Each *TFO* must determine and document specific minimum radial clearance distances to be maintained between vegetation and conductors under all rated electrical operating conditions. These minimum radial clearance distances are necessary to prevent flashover between vegetation and conductors and will vary due to such factors as altitude and operating voltage. Subject to R1.2.2.1 and R1.2.2.2 these *TFO* documented specific minimum clearance distances must 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 must 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 must 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* must hold appropriate qualifications and must have taken appropriate training, as defined by the *TFO*, to perform their duties.

R1.4 Each *TFO* must develop mitigation measures to achieve sufficient clearances for the protection of its transmission facilities when it identifies locations on the ROW where it is restricted from attaining Clearance 1 distances.

R1.5 Each *TFO* must 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

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rating, switching line out of service, etc.) may be taken until the threat is relieved.

R2 The *TFO* must create and implement an annual plan for vegetation management work to ensure the *reliability* of *its transmission facilities*. The plan must describe the methods used, such as manual clearing, mechanical clearing, herbicide treatment, or other actions. The plan must 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 AIES*. Adjustments to the plan must be documented as they occur. The plan must *include* the time required to obtain permissions or permits from landowners or regulatory authorities. Each *TFO* must have systems and procedures for documenting and tracking the planned vegetation management work and ensuring that the vegetation management work was completed according to *TFO's* work specifications.

R3 Each *TFO* must report quarterly to the *ISO*, *sustained outages* to *its* transmission lines, determined by the *TFO* to have been caused by vegetation.

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

R3.2 The *TFO* is not required to report to the *ISO*, *sustained outages* to *its* transmission lines, caused by vegetation as follows:

- *Outages from vegetation falling onto a* transmission line, from outside the ROW *caused by a* natural disasters are not considered reportable (examples of disasters include, but are not limited to, earthquakes, fires, tornados, hurricanes, landslides, wind shear, ice storms, floods, major storms as defined either by the *TFO* or an applicable regulatory body).
- *Outages from vegetation falling onto a transmission line caused by,* human or animal activity are not considered reportable (examples of human or animal activity include, but are not limited to, logging, animal severing tree, vehicle contact with tree, arboricultural, horticultural or agricultural activities, or removal/digging of vegetation).

R3.3 The *outage* information provided by the *TFO* to the *ISO* must include at a minimum:

- Number or name of the transmission line(s) forced out of service,
- Date and time
- Duration of the *outage*
- Description of the cause of the *outage*
- Other pertinent comments
- *Remedial action* taken by the *TFO*

R3.4 An *outage* must be categorized *by the TFO* as one of the following:

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

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

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

R4 The ISO must report quarterly to WECC, *sustained outages* to transmission lines determined by the TFO to have been caused by vegetation.

R4.1 Multiple *sustained outages* **within a 24-hour period** on an individual transmission line, if caused by the same vegetation, must be reported as one *outage* regardless of the actual number of *outages*.

R4.2 The ISO is not required to report to WECC, *sustained outages* to transmission **lines** caused by vegetation as follows:

- *Outages* from vegetation falling onto **transmission** lines from outside the ROW **caused by** natural disasters are not reportable (examples of disasters include, but are not limited to, earthquakes, fires, tornados, hurricanes, landslides, wind shear, ice storms, floods, major storms as defined either by the TFO, or an applicable regulatory body).
- *Outages* from vegetation **caused by** human or animal activity are not considered reportable (examples of human or animal activity include, but are not limited to, logging, animal severing tree, vehicle contact with tree, arboricultural, horticultural or agricultural activities, or removal/digging of vegetation).

R4.3 The *outage* information provided by the ISO to WECC must include at a minimum:

- Number or name of the transmission line(s) forced out of service,
- Date and time
- Duration of the *outage*
- Description of the cause of the *outage*
- Other pertinent comments
- **Remedial action** taken by the TFO

R4.4 An *outage* must be categorized **by the TFO** as one of the following:

R4.4.1 Category 1 — Grow-ins: *Outages* caused by vegetation growing into **transmission** lines from vegetation inside and/or outside of the ROW;

R4.4.2 Category 2 — Fall-ins: *Outages* caused by vegetation falling into **transmission** lines from inside the ROW;

R4.4.3 Category 3 — Fall-ins: *Outages* caused by vegetation falling into **transmission** lines from outside the ROW.

5. Procedures

No procedures have been defined for this *reliability standard*.

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6. Measures

The following measures correspond to the requirements identified in Section 4 of this reliability standard. For example, MR1 is the measure for R1.

These measures will be used by the ISO in carrying out its compliance monitoring duties in accordance with ISO rule 12. The ISO may consider other data and information, including any provided by a market participant.

MR1 A revision history of the TVMP is provided annually to the ISO. A TVMP exists and is provided in the format specified in the ISO TVMP template. The TVMP is provided within 30 days of request. The TVMP is complete and includes the required component sections specified in the template.

MR1.1 A vegetation inspection schedule exists in the TVMP. The schedule is completed in accordance with the ISO TVMP template. The schedule includes all applicable transmission lines. Documentation exists to show that the vegetation inspections have been performed.

MR1.2 Clearance 1 and Clearance 2 values exist in the TVMP

MR1.2.1 Clearance 1 values exist for every transmission line. Clearance 1 values specified are greater than those of Clearance 2.

MR1.2.2 Clearance 2 values exist for every transmission line. Clearance 2 values specified are greater than the minimum clearances set in IEEE standards for the applicable scenarios.

MR1.3 Requirements, training, and qualifications for positions responsible for preparing and implementing the TVMP exist. Documentation exists to confirm that personnel meet the requirements, training, and qualifications of the position. Acceptable documentation includes training records, licenses, certificates, and resumes.

MR1.4 A list exists and specifies locations on the ROW where Clearance 1 is not attainable. Mitigation measures exist where there are restrictions. Mitigating measures are appropriate and meet the intent of this reliability standard.

MR1.5 A documented process or procedure for communication exists. The process is appropriate and of sufficient detail to meet the intent of the requirement.

MR2 A work plan exists in the form of the ISO vegetation management work plan template. The work plan is complete. The work plan is submitted annually and within 30 days of being requested.

Evidence exists to show that the work plan is implemented. Evidence may include status and inspection reports, work orders, and/or contracts. The work plan is being followed in accordance with the schedule. The work is completed in accordance with the work plan. Revision documentation exists where the plan has been revised. Evidence is provided to the ISO within 30 days of a request.

MR3 to 3.4.3 Quarterly reports are submitted to the ISO by the dates specified by the ISO. Quarterly reports contain all sustained outages caused by vegetation for that reporting period. Quarterly reports contain the specific information in the requirement.

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MR4 to 4.4.3 Quarterly reports are submitted to the WECC by dates specified by WECC. Quarterly reports contain all sustained outages caused by vegetation received by the ISO for that reporting period. Quarterly reports contain the specific information in the requirement.

7. Appendices

Appendix A - Transmission Facilities Designated as Critical to the AIES

The following facilities have been identified as critical to the AIES and require the application of this reliability standard.

- 887L (Pocaterra T48S - Alberta / BC border)
- 777L (Pocaterra T48S - Seebe T245S)
- 786L (Coleman T799S - Alberta / BC border)
- 170L (Coleman T799S - Pincher Creek T396S)

8. Guidelines

No guidelines have been defined for this reliability standard.

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with *transmission facilities* operated at 200 kV and above and any lower voltage *transmission facilities* designated by the ISO as critical to the reliability of the AIES as identified in Appendix A.

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ROWS that are assessed and identified on an annual basis not to have vegetation capable of growing higher than 2 meters are excluded.		
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Effective Dates

This *reliability standard* becomes effective 60 days after the date approved by the *Commission* with the exception of Requirements R1 and R2 which become effective one year after the date approved by the *Commission*.

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Italicized terms used in this *reliability standard* have the meanings as set out in Part 1 of the ISO Rules.

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, including, but not limited to, the following terms:

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AIES

Commission

day

generating facility owner

Independent System Operator or ISO

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ISO rules

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transmission facility owner or TFO

Transmission Vegetation Management Program or TVMP

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Requirements

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¹ Where a defined term is followed by an acronym, the acronym may be used as an alternative to the defined term.

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- MR1 The *TFO* must prepare and update a *TVMP* in accordance with the *ISO TVMP* template. The *TFO* must provide a *TVMP* revision history to the *ISO* on an annual basis. The *TVMP* must be provided to the *ISO* within 30 days if requested.
A revision history of the *TVMP* is provided annually to the *ISO*. A *TVMP* exists and is provided in the format specified in the *ISO TVMP* template. The *TVMP* is provided within 30 *days* of request. The *TVMP* is complete and includes the required component sections specified in the template.
- MR1.1 The *TFO* must have a documented vegetation inspection schedule in the *TVMP* and documentation that the *TFO* performed the inspections. This documentation must be provided to the *ISO* within 30 days if requested. A vegetation inspection schedule exists in the *TVMP*. The schedule is completed in accordance with the *ISO TVMP* template. The schedule includes all applicable transmission lines. Documentation exists to show that the vegetation inspections have been performed.
- MR1.2 The *TFO* must have documented clearances as identified in R1.2 in the *TVMP*. Clearance 1 and Clearance 2 values exist in the *TVMP*.
- MR1.2.1 The *TFO* must have documented Clearance 1 as identified in R1.2.1 in the *TVMP*.
Clearance 1 values exist for every transmission line. Clearance 1 values specified are greater than those of Clearance 2.
- MR.1.2.2 The *TFO* must have documented Clearance 2 as identified in R1.2.2 in the *TVMP*.
Clearance 2 values exist for every transmission line. Clearance 2 values specified are greater than the minimum clearances set in IEEE standards for the applicable scenarios.
- MR1.2.2.1 The *TFO* must prepare documentation in the *TVMP* that describes Clearance 2 under conditions identified in R1.2.2.1.
- MR1.2.2.2 The *TFO* must prepare documentation in the *TVMP* that describes Clearance 2 under conditions identified in R1.2.2.2.

- MR1.3 The *TFO* must have documented requirements for all personnel directly involved in the design and implementation of the *TVMP*. Further, the *TFO* must have training records, copies of licenses, or other documentation that shows personnel met the requirements.
Requirements, training, and qualifications for positions responsible for preparing and implementing the *TVMP* exist. Documentation exists to confirm that personnel meet the requirements, training, and qualifications of the position. Acceptable documentation includes training records, licenses, certificates, and resumes.
- MR1.4 The *TFO* must have documentation that it has identified any locations not meeting the clearances as identified in R1.2.1 for vegetation management and any mitigating measures the *TFO* has taken to address these deficiencies as identified in R1.4.
A list exists and specifies locations on the ROW where Clearance 1 is not attainable. Mitigation measures exist where there are restrictions. Mitigating measures are appropriate and meet the intent of this *reliability standard*.
- MR1.5 The *TFO* must have a documented process for the immediate communication of imminent threats by vegetation as identified in R1.5.
A documented process or procedure for communication exists. The process is appropriate and of sufficient detail to meet the intent of the requirement.
- MR2 The *TFO* must have documentation (in accordance with the *ISO* template) that it implemented the work plan identified in R2. This documentation must be provided annually to the *ISO* or within 30 days of an *ISO* request.
A work plan exists and is in the form of the *ISO* vegetation management work plan template. The work plan is complete. The work plan is submitted annually and within 30 days of being requested.

Evidence exists to show that the work plan is implemented. Evidence may include status and inspection reports, work orders, and/or contracts. The work plan is being followed in accordance to the schedule. The work is completed in accordance with the work plan. Revision documentation exists where the plan has been revised. Evidence is provided to the *ISO* within 30 days of a request.
- MR3 to 3.4.3. The *TFO* must supply quarterly outage reports to the *ISO*, as identified in Requirements R3 to R3.4.3, inclusive.
Quarterly reports are submitted to the *ISO* by the dates specified by the *ISO*. Quarterly reports contain all sustained *outages* caused by vegetation for that reporting period. Quarterly reports contain the specific information in the requirement.

MR4 to 4.4.3 The *ISO* must supply quarterly outage reports to the *WECC*, as identified in Requirements R4 to R4.4.3, inclusive. Quarterly reports are submitted to the *WECC* by dates specified by *WECC*. Quarterly reports contain all sustained *outages* caused by vegetation received by the *ISO* for that reporting period. Quarterly reports contain the specific information in the requirement.

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