

U.S. Department of Energy

ORDER



WAPA O 450.3C

DATE: 02-06-2017

SUBJECT: TRANSMISSION VEGETATION MANAGEMENT

1. **PURPOSE.** The purpose of the Order is to define Transmission Vegetation Management for the Western Area Power Administration (WAPA) and to ensure the safe and reliable operation of the electrical transmission system in an environmentally sensitive, cost effective, and socially responsible manner.
2. **CANCELLATION.** This Order cancels WAPA O 450.3B, *Transmission Vegetation Management Program*, dated 04-18-2014 and has been revised to reflect and align with the requirement defines in the North American Electric Reliability Corporation (NERC) Standard FAC-003-4. *Transmission Vegetation Management*.
3. **APPLICABILITY.** This Order applies to all WAPA programs involved with vegetation management beneath and adjacent to transmission lines and associated facilities maintained by WAPA.
4. **POLICY.** It is WAPA's policy to identify and perform maintenance management activities in support of obtaining a desired condition for transmission line rights-of-way (ROW) and associated facilities. WAPA will apply the concept of Integrated Vegetation Management as a practice for creating and maintaining a desired condition as referenced in American National Standards Institute (ANSI) A300 Part 7. WAPA's strategies, procedures, processes, and specifications are designed to prevent vegetation from approaching the minimum vegetation clearance distances (MVCD) as defined by NERC standard FAC-003-4. WAPA's overall program strategy is to manage vegetation at such a large distance away from MVCD so as to avoid the possibility of the MVCD being approached by vegetation. At a minimum, WAPA's program targets the removal of vegetation before it encroaches within the minimum approach distance (MAD) for electrical workers.
 - a. Each region shall have a program statement which documents the maintenance strategies, procedures, processes, and/or specifications used to prevent vegetation encroachment into the MVCD of applicable lines that account for:
 - (1) The movement of applicable conductors under their rating and all rated electrical operating conditions.

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(2) The inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.

b. The program statement shall demonstrate that the Region can prevent encroachment into the MVCD considering the factors above.

5. RESPONSIBILITIES.

a. Chief Operation Officer. Ensures full compliance with NERC and regional entity reliability standards.

b. Headquarters (HQ), Office of Asset Management. Contains Asset Maintenance Office which provides oversight in the development of maintenance policies and standards.

c. HQ, Office of Engineering. Provides oversight in the development of engineering policies and standards.

d. HQ, Office of Natural Resources. Provides support to the regions relative to environment and lands policies and programs.

e. Office of General Counsel. Provides legal advice, counsel, and representation.

f. Regional Managers. Provide oversight of the maintenance and safety policies and programs in their respective regions.

g. Regional Maintenance Managers. Develop long-term strategies and programs in coordination with regional safety, environment, compliance, and lands personnel to address vegetation issues in and along all WAPA maintained transmission lines and associated facilities.

h. Regional Environmental Managers. Support the maintenance managers in ensuring that the maintenance activities are in compliance with environmental laws and regulations.

i. Regional Reliability Compliance Managers. Support the maintenance managers in ensuring that the maintenance activities are in compliance with NERC standards.

j. Regional Safety Managers. Advise the maintenance managers on the applications of the *Power System Safety Manual* and applicable safety and health regulations.

- k. Regional Vegetation Management Specialists. Support the maintenance managers in ensuring that vegetation maintenance activities comply with WAPA's overall Vegetation Management Program Policy.
 - l. Regional Realty Specialists. Support the maintenance managers in the resolution of vegetation management problems by clarifying, enforcing, modifying, and acquiring land rights.
6. DESIRED CONDITION. WAPA's intent is to secure and maintain a manageable and stable ROW that minimizes vegetative threats to transmission system safety, security and reliability, and ultimately does not require frequent re-treatments. On-the-ground conditions are variable and specific for each transmission facility. Achieving a desired condition is a process that may take several iterations over an extended period of time. The desired condition serves as the guide for the future vegetation management decisions. All subsequent vegetation treatment activities should consistently move toward achieving and maintaining the desired condition. Once achieved, it is intended that the desired condition will be proactively maintained. WAPA also encourages landowners and governmental entities to manage lands adjacent to the ROW in a manner which further reduces vegetation and wildfire hazards which are a threat to the safe, secure and reliable operation of the power facility. WAPA's desired condition, on and adjacent to its ROW and fee lands is consistent with ANSI A300 Part 7, which may be used for additional guidance and reference, and is characterized by:
- a. Stable, Compatible Plant Communities Free from Noxious or Invasive Plants. Compatible plant communities will typically be comprised of native plant species, which, at a mature height, will not interfere with the safety, secure and reliability of the transmission system. WAPA's goal is to manage vegetation for the exclusion of incompatible plant species and the retention and recruitment of compatible species.
 - b. Vegetation Managed to Reduce Wildfire Risk and Enhance Wildfire Survivability. The density of vegetation after treatment and areas of regeneration will be managed to reduce the overall fire risk. Vegetation debris from intensive or repetitive treatments may also require mitigation to reduce wildfire and enhance the survivability of the transmission facility.
 - c. Adequate access routes to provide for efficient and cost effective vegetation treatment activities.

7. PRACTICES. WAPA's vegetation management is guided by internal manuals, handbooks, guidelines, orders, and standards as listed in paragraph 12 of this Order. These documents outline WAPA's objectives, practices, approved procedures, and work specifications. These various formal documents are kept current through internal working committees from the functional organizations where the document resides.
8. REQUIREMENTS.
- a. Maintenance Schedules and Inspections. Maintenance schedules are based on requirements and procedures set forth in WAPA's maintenance program. Aerial and ground patrol schedules for each transmission facility are developed and maintained by each regional maintenance organization. At a minimum, 100-percent of lines subject to NERC Standard FAC-003-4, are inspected once per calendar year with no more than 18-months between inspections. Routine inspections of vegetation can be made during scheduled ground and aerial line patrols. Additional inspections may be performed when unusual events have been detected. For example, aerial or ground patrols may be conducted after an outage occurrence.
- b. Target Clearance Distances for Incompatible Vegetation. WAPA's objective is to manage vegetation consistent with the desired condition. When the desired condition cannot be obtained, WAPA has carefully analyzed, evaluated and set forth the following target clearance distances for incompatible vegetation after treatment.

TRANSMISSION LINE ROW TARGET CLEARANCE DISTANCES FOR INCOMPATIBLE VEGETATION AFTER TREATMENT	
Line Voltage	Clearance Between Conductor and Vegetation
69 kV	20 feet
115 kV	21 feet
138 kV	22 feet
161 kV	22 feet
230 kV	23 feet
345 kV	26 feet
500 kV	29 feet

Note: WAPA owns, operates, and maintains over 17,000 miles of transmission lines in a 15-state region. The voltages on the lines range from 69 kV to 500 kV. Developing target clearance distance requires WAPA to factor in this broad geographic scope, as well as other variables such as weather ranging from ice loading to desert heat, varying vegetation, and specific line design characteristics, such as conductor type, age, and stringing tensions. To develop

a policy to meet the NERC standard and ensure the safety, security, and reliability of the power system, WAPA's target clearance distances begin with the minimum approach distance (rounded up to the nearest foot) for nonelectrical workers (MAD-NE) set forth in Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (C.F.R.) § 1910.333. Conductor position, i.e., sag and sway, is not fixed, but rather moves due to thermal, wind, and/or ice loading. To account for this movement and ensure the safety and reliability of the system, WAPA adds an additional 5 feet to the MAD-NE. Because vegetation begins to re-grow immediately after it is cut, WAPA must also account for future re-growth before the next treatment cycle. Therefore, WAPA also adds another 5 feet to the MAD-NE to allow for an average vegetation growth of 12 inches per year and re-treatment interval of not less than 5 years. In situations where more rapid vegetation growth or more extreme sag and sway can be expected, an additional distance greater than 5 feet for each factor is required.

- c. Program Constraints and Corrective Actions. When WAPA is constrained from performing vegetation work on an applicable line operating within its rating and all rated electrical operating conditions and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan, then WAPA shall take corrective action to ensure continued vegetation management to prevent encroachments. Mitigation measures and processes to prevent encroachments are addressed in WAPA O 430.1C, *Right-of-Way Management Guidance for Vegetation, Encroachments, and Access Routes*, and the Regional program statements.
 - d. Emergency Procedures. Inspectors (line workers, contractors, etc.) are required to recognize and report vegetation conditions that are likely to cause a fault at any moment. Dispatch shall be notified without any intentional time delay of the condition in order for action to be taken to alleviate or eliminate the threat. When the facility is not under WAPA's control, dispatch, when made aware of a condition and after confirming that it is likely to cause a fault at any moment, shall without any intentional time delay, notify the control center holding switching authority for the associated applicable line.
9. ANNUAL PLANS FOR VEGETATION MANAGEMENT WORK. Each regional maintenance organization shall create and implement an annual plan for vegetation management activities to ensure no vegetation encroachment will occur within the MVCD. Each region shall complete 100 percent of its annual vegetation work plan for its applicable lines. Modifications to the work plan, in response to changing conditions or to findings from vegetation inspections, may be made (provided they do not allow encroachment of vegetation into the MVCD) and are documented.

10. **REPORTING REQUIREMENTS.** Each region will submit a quarterly report to its regional entity or the regional entity's designee, identifying all sustained outages of applicable lines operated within their rating and all rated electrical operating conditions determined to have been caused by vegetation (except as excluded in footnote 2 of the NERC Standard FAC-003-4). At a minimum, the report shall include: 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.

A sustained outage is to be categorized as one of the following:

- a. Category 1A – Grow-Ins. Sustained outages caused by vegetation (inside and/or outside of the ROW) growing into those lines addressed under requirement R1 of the Standard.
- b. Category 1B – Grow-Ins. Sustained outages caused by vegetation (inside and/or outside of the ROW) growing into those lines addressed under requirement R2 of the Standard.
- c. Category 2A – Fall-Ins. Sustained outages caused by vegetation (from within the ROW) falling into those lines addressed under requirement R1 of the Standard.
- d. Category 2B – Fall-Ins. Sustained outages caused by vegetation (from within the ROW) falling into those lines addressed under requirement R2 of the Standard.
- e. Category 3 – Fall-Ins. Sustained outages caused by vegetation falling into applicable lines (as defined in the Standard) from outside the ROW.
- f. Category 4A – Blowing Together. Sustained outages caused by vegetation (from within the ROW) and applicable lines blowing together as addressed under requirement R1 of the Standard.
- g. Category 4B – Blowing Together. Sustained outages caused by vegetation (from within the ROW) and applicable lines blowing together as addressed under requirement R2 of the Standard.

11. DOCUMENTATION. Each region shall retain data or evidence to show compliance with NERC Standard FAC-003-4, requirements R1, R2, R3, R5, R6, and R7; for 3 calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation, or for the full time period since the last audit, whichever is longer. For requirement R4 and measure M4, only the most recent 12 months of operator logs, or most recent 3 months of voice recordings or transcripts of voice recordings will be retained, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

12. REFERENCES

- a. North American Electric Reliability Corporation (NERC) Reliability Standard FAC-003-4, *Transmission Vegetation Management*.
- b. Western Area Power Administration, *Integrated Vegetation Management Guidance Manual*, January 2011.
- c. American National Standards Institute (ANSI) A300 Part 7 (2012), *Integrated Vegetation Management for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Integrated Vegetation Management, a. Electric Utility Rights-of-Way)*.
- d. American National Standards Institute (ANSI) A300 Part 1 (2008), *Integrated Vegetation Management for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning)*.
- e. American National Standards Institute (ANSI) Z133.1 (2012), *Tree Care Operations - Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements*.
- f. *Power System Maintenance Manual (PSMM)*, Chapter 13, *Maintenance Program*, latest revision.
- g. *Power System Maintenance Manual (PSMM)*, Chapter 11, *Trimming and Felling of Trees and Brush Near Power Lines*, latest revision.
- h. WAPA O 430.1, *Right-of-Way Management Guidance for Vegetation, Encroachments, and Access Routes*, latest revision.
- i. *Power System Operations Manual (PSOM)*, Chapter 1, *Power System Switching Procedures*, latest revision.

- j. *Power System Operations Manual (PSOM)*, Chapter 4, *Power System Operating Guidelines*, latest revision.
- k. *Power System Safety Manual (PSSM)*, latest revision.
- l. Regional program statements.
- m. NERC Reliability Standards, glossary.

13. DEFINITIONS. Terms as defined by the NERC Reliability Standards:

- a. Fault.
- b. Minimum Vegetation Clearance Distance (MVCD).
- c. Rated Electrical Operating Conditions.
- d. Rating.
- e. Right-of-Way (ROW).
- f. Vegetation Inspections.

14. CONTACT. Questions concerning this Order should be addressed to the HQ Office of Asset Management at (720) 962-7213.



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