Creating Results-Based Reliability Standards

Workshop

for

Transmission Vegetation Management

NERC Standard FAC-003-2 Team

January 26-27, 2010

Compliance Automation, Inc.

Objectives

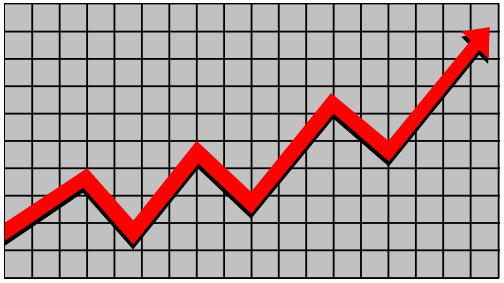
- Help you to create a results-based standard more effectively
- Clarify why changes are needed, not just in the standards
- Give you hands-on experience so you can continue much of your work without further training (or to determine if training or mentoring is needed to get to your August goal).
- Obtain impressions from you to influence the future activities, including training, templates, and guidelines needed to effectively implement results-based standards.

Topics to be Covered

- Results-based standards/requirements – why they matter
- Scope
- Suggestions for getting to result-based a standard
- Examples of rewrites of existing requirements
- Practice in restating requirements and measures to be results-oriented.

Why Results-Based?

Requirement Defects Result In

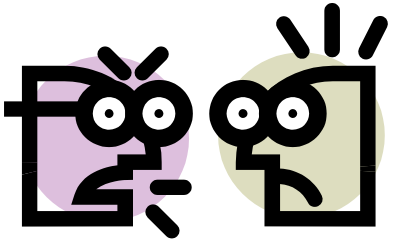


Cost overruns

Schedule slips

Frustrated employees

Unhappy customers



Wasted funds/Lost profitability

Loss of employment

Proven Techniques to Avoid Defects

- Scope first – what is your standard to cover and why
- Standard - contains necessary information for understanding by all stakeholders involved
- Standard – does not contain unnecessary information
- Requirements - necessary, verifiable and attainable
- Requirements - can only be read one-way
- Measures – achievable compliance with requirements

Scope

Stuff you need to know and agree upon in order to develop a standard and write requirements

Need – why is the standard being written

Goals – what do you have to accomplish to meet the need

Objectives – how will you know when you get there

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Finding the Need

- The reliability objective of this NERC Vegetation Management Standard ("Standard") is to prevent vegetation-related outages which could lead to Cascading by effective vegetation maintenance while recognizing that certain outages such as those due to vandalism, human errors and acts of nature are not preventable. - *Mary Had a Little Lamb*
- The real need is: to prevent vegetation-related outages that could lead to Cascading
- Is not: by effective vegetation management
- While recognizing… is neither useful nor necessary.

Goals

- Define clearances that if maintained will prevent contact
- Define what to do if clearances are observed as not being met
- Define which less than 200 V lines should meet clearances

Objectives

- Zero outages due to contact between vegetation and lines
- Identification of any vegetation that is out of spec
- Early identification of vegetation that is critically out of spec
- Rapid response and return of vegetation to non-critical state.

Scope

Stuff you need to know and agree upon in order to develop a standard and write requirements

History

Operational Concepts

Identification of Stakeholders

Understanding of Stakeholder concerns

Drivers

You Have Most of It

- It is in the document called a whitepaper in its file name, but is
- Transmission Vegetation Management NERC Standard FAC-003-2 Technical Reference
- You need – to get some of it into the standard

Standard

Needs to contain Scope as a precursor to understanding the requirements and measures

You are missing Scope information

Why

Where

What

How

Why

- Serious outages and operational problems have resulted from interference between overgrown vegetation and transmission lines located on many types of lands and ownership situations. Operating experience clearly indicates that trees that have grown out of specification could contribute to a cascading grid failure, especially under heavy electrical loading conditions.

Where

- 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. For the purposes of the Standard , the term “public lands” includes municipal lands, village lands,
  - In Scope: transmission lines that are identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major WECC Transfer Path.
  - Out of Scope: lines sections inside the electric station fence or other boundary of an electric station or underground lines.

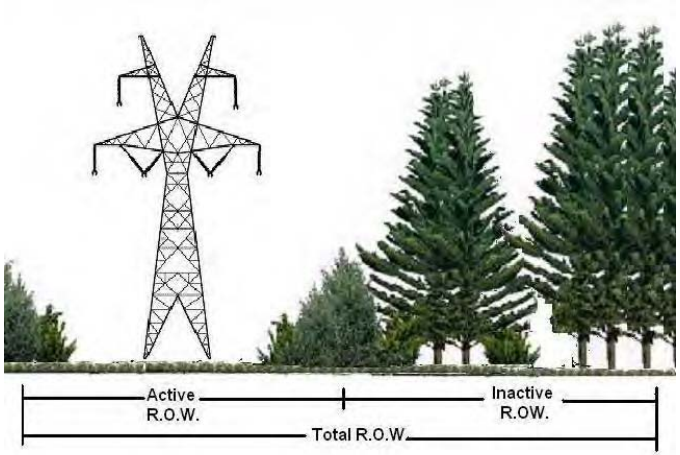
What

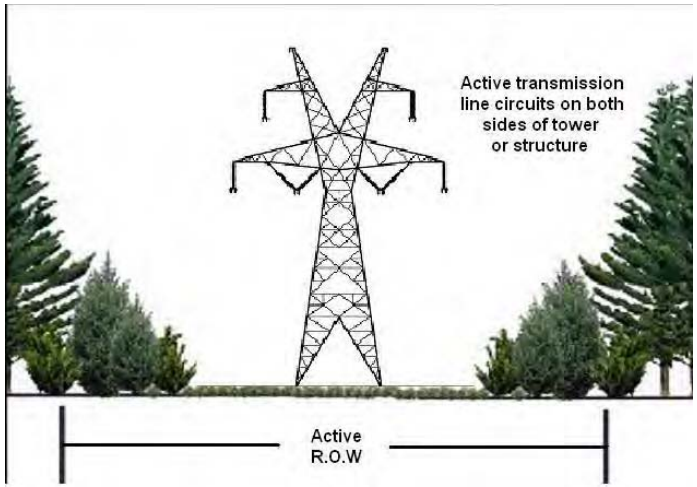
- Limits for the observed real-time separation between applicable transmission lines, operating within no-load and its Rating, and vegetation, due to:
  - vegetation **growing** within the MVCD, or
  - the blowing together of a conductor (operating within design blow-out conditions) and vegetation that has grown into and is within an Active Transmission Line Right of Way, or
  - vegetation originating within an Active Transmission Line Right of Way **falling** into a conductor

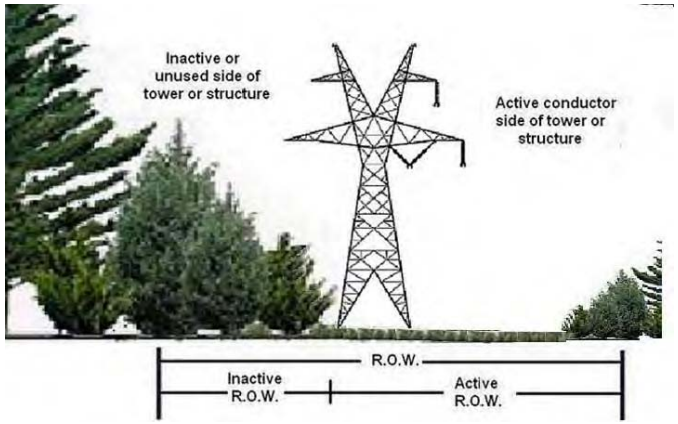
How

- Establish minimum clearances to be maintained between vegetation and lines to prevent an outage and impose on the Transmission Owners.
- The Minimum Vegetation Clearance Distances (MVCD) shown in Appendix 1 is established for this standard and will be referred to as the MVCD throughout.
- The Gallet Equation is a well-known method of computing the required strike distance for proper insulation coordination, and has the ability to take into account various air gap geometries, as well as non-standard atmospheric conditions. It was used in the creation of the MVCD and those calculations are described in detail in *Transmission Vegetation Management NERC Standard FAC-003-2 Technical Reference.*

Don’t Avoid Pictures in a Standard







Standard

Introductory Sections

Observations

Recommendations

Terms

- **Active Transmission Line Right of Way** — A strip of land that is occupied by active transmission facilities. This corridor does not include the inactive Right of Way or unused part of the Right of Way intended for other facilities.
- Is anything outside of this covered by this Standard?
- Where is “active transmission line” defined – not in your glossary, not in OSHA glossary?

Existing Section 4.2 - Facilities

1. Transmission lines ("applicable lines") operated at 200kV or higher, and transmission lines operated below 200kV designated by the Planning Coordinator as being subject to this standard including but not limited to those that cross lands owned by federal, state, provincial, public, private, or tribal entities.

Break into two items

2. Transmission lines operated below 200kV designated by the Planning Coordinator as being subject to this standard become subject to this standard 12 months after the date the Planning Coordinator initially designates the transmission line as being subject to this standard.
3. Existing transmission line(s) operated at 200kV or higher that is newly acquired by a Transmission Owner and was not previously subject to this standard, become subject to this standard 12 months after the acquisition date of the transmission line(s).

Move to Section 5 –Effective Dates

Proposed Clean-up of 4.2

4.2 Facilities:

4.2.1 Transmission lines ("applicable lines") operated at 200kV or higher.

4.2.2 Transmission lines operated below 200kV designated by the Planning Coordinator as being subject to this standard **including but not limited** to those that cross lands owned by federal, state, provincial, public, private, or tribal entities.

Exercise – Clean up Section 5

- Take existing 5 items
- Add those removed from 4.2
- Combine into well-written5

Standard

Requirements

Observations

Recommendations

Requirements Observations

- Some do not add to reliability of system
- Some are too hard to read
- Some are not written in a way to enforce

Inspect Requirements

- Requirements 1-8 are the next slides in the package. They are on four slides (26-29).
- Work as three teams
  - Team 1 R 1-3 (slide 26)
  - Team 2 R 4-6 (slides 27-28)
  - Team 3 R 7-8 (slide 29)
- Indentify defects
  - Is prescriptive or administrative
    - If we delete it do we need to replace with something else
  - Unclear – reason
  - Enforcement problems - reason
  - Other –state a defect that I left out.

Requirements 1-3

1. Each Transmission Owner shall have a documented transmission vegetation management program that describes how it conducts work on its Active Transmission Line Rights of Way to avoid Sustained Outages due to vegetation, considering all possible locations the conductor may occupy under the effects of sag and sway throughout its operating range under rated conditions. The transmission vegetation management program shall:

2. Each Transmission Owner shall implement its imminent threat procedure when the Transmission Owner has actual knowledge of such a threat, obtained through normal operating practices.

3. Each Transmission Owner shall conduct Vegetation Inspections of all applicable lines (as measured in line miles) in accordance with the frequency specified in its transmission vegetation management program, unless constrained by natural disasters[5]. When constrained by a natural disaster, the Transmission Owner shall conduct the Vegetation Inspection(s) within 6 months or a period agreed to by its Regional Entity, whichever is greater.

Requirement 4

4. Each Transmission Owner shall prevent Sustained Outages and prevent encroachments of vegetation into the Minimum Vegetation Clearance Distances (MVCD) listed in FAC-003-2 - Attachment 1 as observed in Real-time of applicable lines operating between no-load and its Rating, that are identified as an element of an Interconnection Reliability Operating Limit (IROL) (or Major WECC Transfer Path) due to:
   - vegetation **growing** within the MVCD, or
   - the blowing together of a conductor (operating within design blow-out conditions) and vegetation that has grown into and is within an Active Transmission Line Right of Way, or
   - vegetation originating within an Active Transmission Line Right of Way **falling** into a conductor

- Exceptions to this Requirement include an occurrence, non-occurrence, or other set of circumstances that are beyond the reasonable control of a Transmission Owner subject to this Reliability Standard, and are not caused by the fault or negligence of the Transmission Owner, including acts of God, strike, flood, drought, earthquake, major storms, fire, hurricane, tornado, landslides, logging activities, animals severing trees, lightning, epidemic, war, riot, civil disturbance, sabotage, vandalism, terrorism, wind shear, fresh gale that restricts or prevents performance to comply with this Reliability Standard.

Requirements 5-6

5. Each Transmission Owner shall prevent Sustained Outages and prevent encroachments of vegetation into the Minimum Vegetation Clearance Distances (MVCD) listed in FAC-003-2 - Attachment 1 as observed in Real-time of applicable lines operating between no-load and its Rating, that are not identified as an element of an Interconnection Reliability Operating Limit (IROL) (or Major WECC Transfer Path) due to:
    - vegetation **growing** within the MVCD,
    - the **blowing** together of a conductor and vegetation that has grown into or is within an Active Transmission Line Right of Way (operating within design blow-out conditions), or
    - vegetation rooted within an Active Transmission Line Right of Way **falling** into a conductor
6. Each Transmission Owner shall implement its annual work plan for vegetation management to accomplish the purpose of this standard.

Requirements 7-8

7. Each Planning Coordinator shall prepare and keep current, a list of lines that are operated below 200 kV, if any, which are subject to this standard. Each Planning Coordinator shall consult with its Transmission Owner(s) and neighboring Planning Coordinators to obtain input to develop the list.

8. Each Planning Coordinator shall develop and document its method for assessing the reliability significance of sub-200kV transmission lines whose loss would place the grid at an unacceptable risk of instability, separation, or cascading failures.

Requirement Rewrites