

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Vegetation-Related Transmission Outage Report

2015 Annual Report

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RELIABILITY | ACCOUNTABILITY



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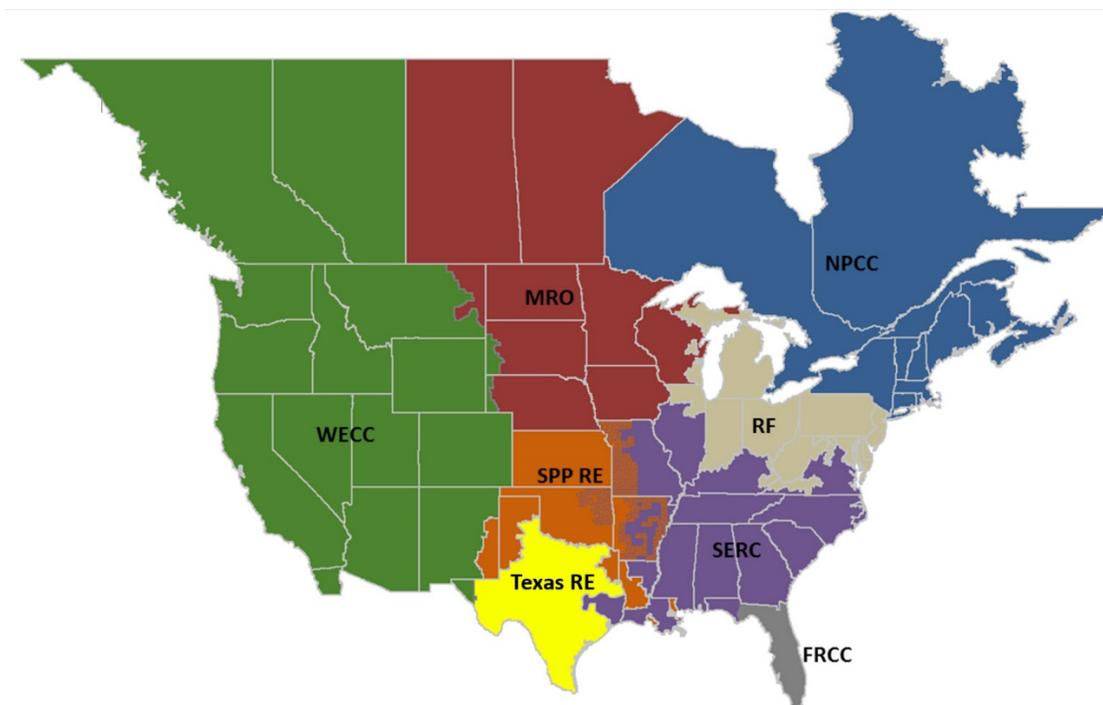
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Preface

The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system (BPS) in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the BPS through system awareness; and educates, trains, and certifies industry personnel. NERC’s area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada. NERC’s jurisdiction includes users, owners, and operators of the BPS, which serves more than 334 million people.

The North American BPS is divided into eight Regional Entity (RE) boundaries as shown in the map and corresponding table below.



The North American BPS is divided into eight Regional Entity boundaries. The highlighted areas denote overlap as some load-serving entities participate in one Region while associated transmission owners/operators participate in another.

FRCC	Florida Reliability Coordinating Council
MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
SPP RE	Southwest Power Pool Regional Entity
Texas RE	Texas Reliability Entity
WECC	Western Electricity Coordinating Council

Executive Summary

This report provides a summary of 2015 vegetation-related reportable transmission outages. Reliability Standard FAC-003-3 requires that applicable Transmission Owners (TO) and Generator Owners (GO) submit a quarterly report to their RE identifying all Sustained Outages determined by the applicable TO and GO to have been caused by vegetation. The RE then reports this outage information to NERC. These quarterly vegetation management outage reports are available on the NERC website.¹

The REs reported 23 vegetation-related outages to NERC in 2015. Twenty of the outages were caused by vegetation falling into applicable lines from outside the rights-of-way (ROW) as the result of weather activities in the applicable region. The remaining three outages were caused by vegetation growing into applicable lines from inside of the ROW although none of the lines are an element of an Interconnection Reliability Operating Limit (IROL) or Major WECC Transfer Path. The corrective and preventive actions reported were appropriate.

NERC has observed a slight increase in grow-in vegetation-related outages (shown in Figure 2) during 2015. NERC and the REs will continue to monitor these outages closely and enforce any related violations appropriately.

¹ Vegetation Reports located at <http://www.nerc.com/pa/comp/CE/Pages/vegetation-management-reports.aspx>

Introduction

Background

Ineffective vegetation management was identified as a major cause of the August 14, 2003, blackout and was also cited as a major causal factor in other large-scale North American outages.² In response, NERC developed the FAC-003 vegetation management Standard, which formalized transmission vegetation management program and reporting requirements.

Standard FAC-003-3³ helps to enhance reliability of the BPS through the following:

- Ensuring there are no reliability gaps related to vegetation management practices at applicable generation facilities;
- Expanding the applicable transmission facilities to those facilities which are an element of an Interconnection Reliability Operating Limit, or an element of a Major WECC Transfer Path; and
- Providing greater flexibility to registered entities to address local vegetation management conditions.

Applicable TOs and GOs are required to report all vegetation-related sustained outages to their REs, and then the REs report them to NERC.

The FAC-003-3 Standard requires each reportable outage to be categorized as one of the following:

- Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside or outside of the ROW.⁴
- Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside or outside of the ROW.
- Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW.
- Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW.
- Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW.
- Category 4A* — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.
- Category 4B* — Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

² US-Canada Power System Outage Task Force, August 14, 2003, Blackout: Causes and Recommendations (Apr. 2004), available at <http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf>.

³ *General Requirements at the Transmission Interface*, Order No. 785, 144 FERC ¶61,221 (2013).

⁴ Per the NERC Glossary of Terms Used in NERC Reliability Standards (NERC Glossary), as of July 1, 2014, right-of-way (ROW) is defined as “the corridor of land under a transmission line(s) needed to operate the line(s). The width of the corridor is established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built. The ROW width in no case exceeds the applicable TO’s or applicable GO’s legal rights but may be less based on the aforementioned criteria.” NERC Glossary at p. 81, available at: http://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf.

* Outage categories 4A and 4B, related to vegetation and applicable transmission lines “blowing together” from within the ROW, were not included in previous versions of the Standard.

2015 Reported Outages

Registered entities reported a total of 23 outages in 2015. As shown below, 20 reported outages were caused by vegetation falling into lines from outside the ROW (Category 3) mostly during severe weather. The remaining three were due to vegetation growing into applicable lines from within the ROW (Category 1B). The three Category 1B outages occurred in different RE footprints on 230 kV transmission lines. None of these three lines had experienced a vegetation-related transmission outage within the last eight reporting quarters.

All Category 3 outages occurred during severe weather conditions. Four of the lines had experienced a vegetation-related transmission outage within the last eight reporting quarters. All previous outages were also Category 3 and weather-related.

As noted in figure 2, there has been a slight increase in Category 3 outages in 2014 and 2015. NERC's review indicated that the Category 3 outages were isolated weather-related events that did not represent a trend or pose a significant risk to the reliability of the BPS.

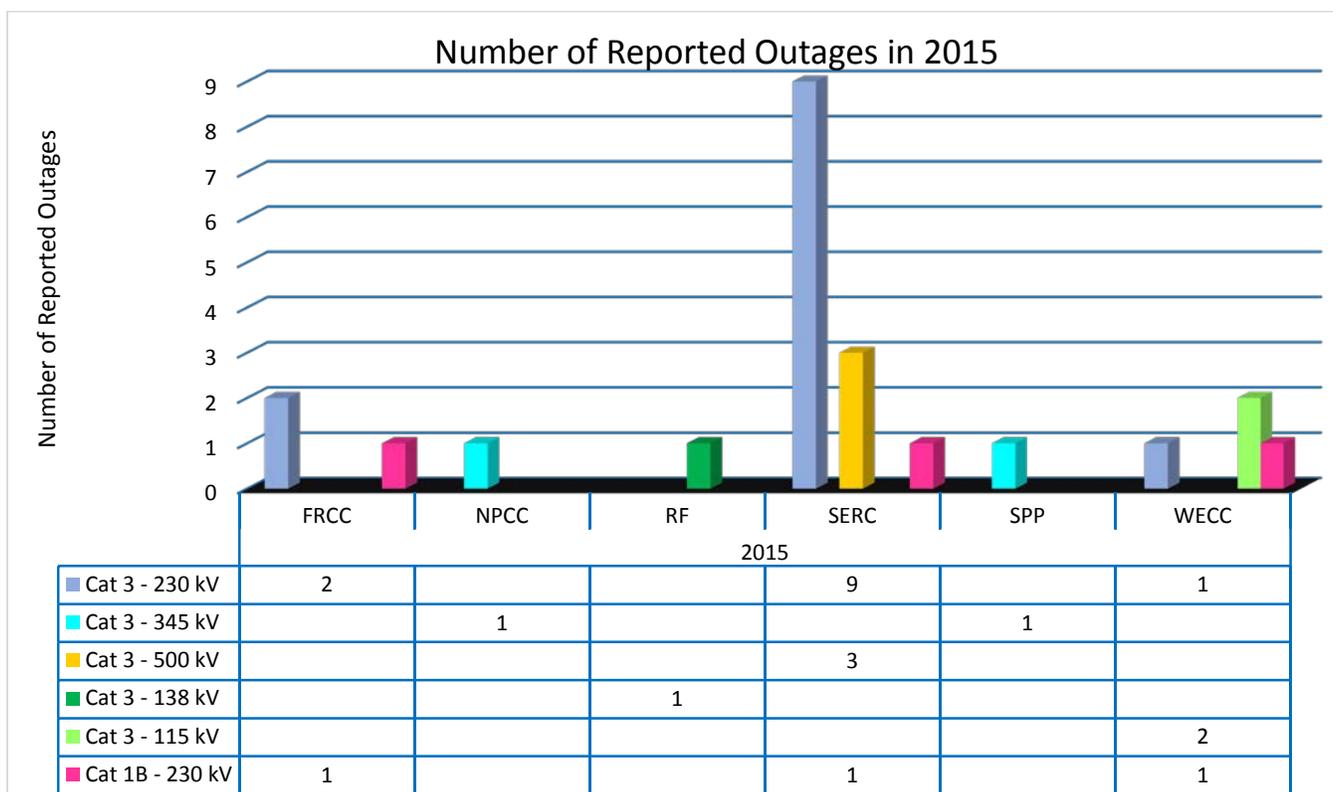


Figure 1: Vegetation-Related Outages by Regional Entity, Voltage Class, and Outage Category in 2015

The last Category 1⁵ outage in the U.S. occurred in 2010 (see Figure 2).⁶ The three registered entities experiencing Category 1B occurrences in 2015 have self-reported noncompliance with FAC-003 to the ERO Enterprise. The issues are under review by enforcement.

⁵ Prior versions of FAC-003 define Category 1 outages as those caused by vegetation growing into lines from vegetation inside and/or outside of the ROW.

⁶ A Category 1 outage occurred in 2012 in a Canadian province.

NERC and the Regional Entities continue to monitor all vegetation related transmission-outages that could pose a risk to the reliability of the bulk power system and to assess penalties as appropriate.

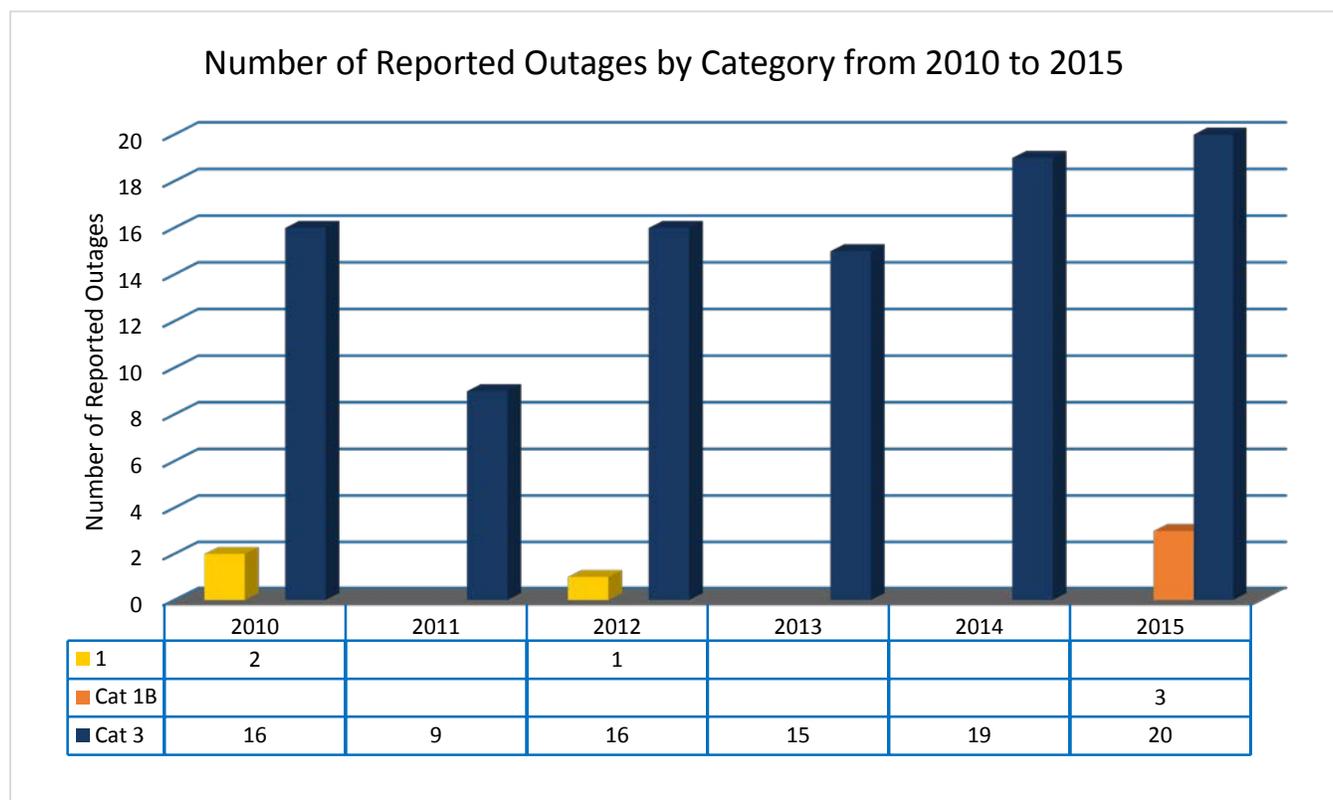


Figure 2: Vegetation-Related Outages by Outage Category from 2010 to 2015

Table 1: Summary of the Category 1B Outages			
Regional Entities	SERC	WECC	FRCC
Function TO or GO	TO	TO	TO
Nominal Voltage Rating of the Circuit (kV)	230	230	230
Has the reported circuit experienced a previous vegetation-related transmission outage within the last eight reporting quarters?	No	No	No
Element of IROL or Major WECC Transfer Path?	No	No	No
Outage Duration (in Minutes)	3495	380	1

2015 Reported Outages

<p>Detailed Description of the Cause of the Outage</p>	<p>A line crew was dispatched to investigate, and an aerial patrol was initiated, but the cause of the outage was not determined before dark. The patrols resumed the following morning and discovered that one of the conductors had sagged close to or into vegetation in a swampy area between support structures. An outage was caused by the line conductor not having sufficient ground clearance due to infrastructure changes implemented in the field in 1999, which altered the conditions from those of design. Consequently, it was inadvertently being operated outside its Rating and Rated Electrical Operating Conditions. The growing vegetation was approximately 20 feet in height.</p>	<p>A 28-foot healthy cottonwood tree growing within the ROW caused an outage on a 230kv line. A combination of line loading, ambient temperatures above normal, and the growth of the vegetation led to a sustained outage that lasted approximately 6.5 hours.</p>	<p>An "A" phase to ground fault occurred on the 230kv line about 8 miles from one substation and 26 miles from another substation due to close proximity of vegetation. The relays at substation terminals operated correctly and cleared the fault as designed. System Operations re-energized the line. The event resulted in no loss of power to customers.</p>
<p>Category Associated with the Sustained Outage per the FAC-003-3 Standard 1A&B; 2A&B; 3; 4A&B</p>	<p>Category 1B</p>	<p>Category 1B</p>	<p>Category 1B</p>
<p>Tree Type</p>	<p>River Birch and others</p>	<p>Cottonwood</p>	<p>Oak, Hackberry</p>
<p>Tree Height in Feet</p>	<p>20</p>	<p>28</p>	<p>19, 23.3</p>
<p>Tree Condition</p>	<p>Tree appeared healthy. Burn marks were identified on the vegetation at approximately 17 feet above grade.</p>	<p>Healthy</p>	<p>Healthy</p>

2015 Reported Outages

<p>Mitigation/Remediation Actions Taken by Registered Entity to Address Recurrence of the Contact/Encroachment.</p>	<p>To address the clearance issue between structures, crews installed an intermediate support structure, and transmission vegetation management crews removed vegetation in the impacted area. This work was completed on July 20, 2015, and the line was returned to service with no impact to customers (i.e., no Bulk Electric System load interrupted) as a result of the outage.</p>	<p>Tree was removed to the ground for remediation.</p>	<p>Both trees have been removed. Additional mowing scheduled.</p>
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