NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Vegetation-Related Transmission Outage Report

2017 Annual Report

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RELIABILITY | ACCOUNTABILITY




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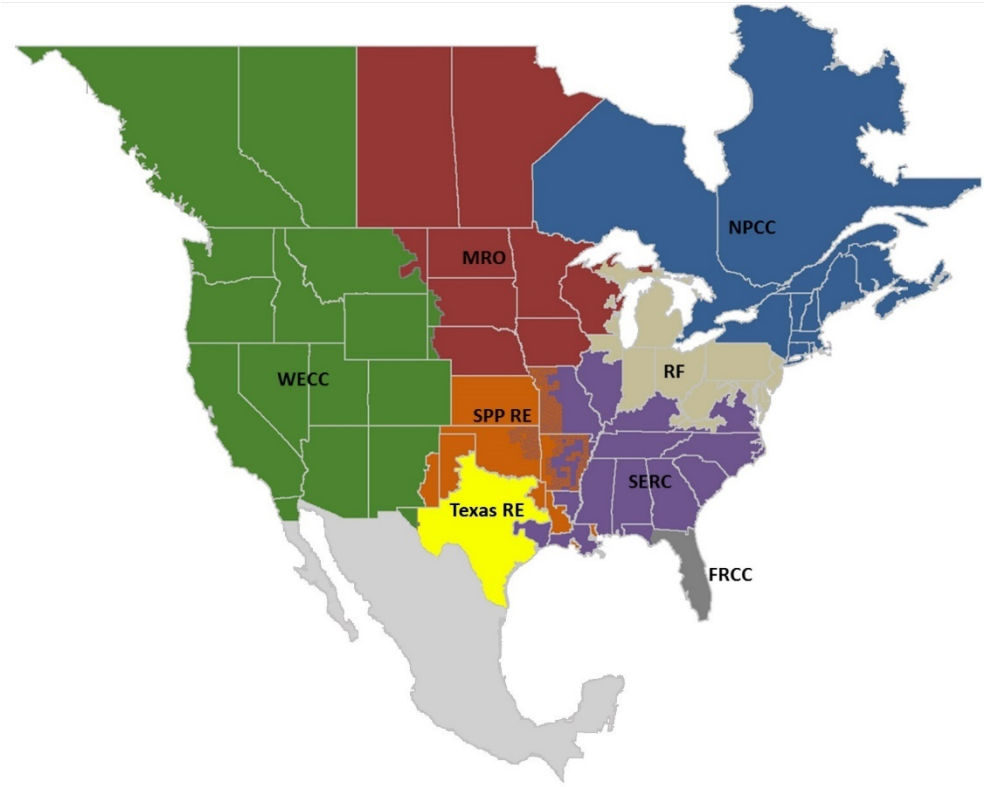
Preface

The vision for the Electric Reliability Organization (ERO) Enterprise, which is comprised of the North American Electric Reliability Corporation (NERC) and the eight Regional Entities (REs), is a highly reliable and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

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



The North American BPS is divided into eight RE 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 2017 reportable vegetation-related transmission outages. Reliability Standard FAC-003-4 requires that applicable Transmission Owners (TO) and Generator Owners (GO) submit applicable Sustained Outages[1] caused by vegetation to their REs on a quarterly basis. The RE in turn reports this outage information to NERC. The consolidated report is available on the NERC website.[2]

The REs reported 24 vegetation-related outages to NERC in 2017. Three outages were due to vegetation contact from inside of the rights-of-way (ROWs), and 21 were caused by vegetation falling into applicable lines from outside the ROWs. The majority of the outages due to vegetation falling were the result of weather activities in the applicable RE. The corrective and preventive actions that were reported appear appropriate. The ERO Enterprise is currently pursuing enforcement actions for 2017 outages involving noncompliance with FAC-003.

[1] The de-energized condition of a transmission line resulting from a fault or disturbance following an unsuccessful automatic reclosing sequence or unsuccessful manual reclosing procedure. http://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf
[2] Vegetation Reports located at http://www.nerc.com/pa/comp/CE/Pages/vegetation-management-reports.aspx

Chapter 1: Introduction

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.[3] In response, NERC developed the FAC-003 vegetation management Reliability Standard, which formalized transmission vegetation management program and reporting requirements.

FAC-003-1 became mandatory and enforceable on June 18, 2007. The current version, FAC-003-4,[4] became effective on October 1, 2016. FAC-003-4 requirements are aimed at preventing vegetation-related outages that could lead to cascading outages. FAC-003-4 accomplishes this by requiring applicable registered entities to manage vegetation located on transmission ROWs and minimize encroachments from vegetation located adjacent to the ROW.

FAC-003-4 requires that all Sustained Outages of applicable lines be identified and reported quarterly through Periodic Data Submittals. Each of the Sustained Outages is 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 Interconnection Reliability Operating Limit (IROL) or Major WECC Transfer Path by vegetation inside or outside the ROW.
- 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.

The RE submits the aggregated report to NERC.

Sustained Outages that fall within one of these categories do not necessarily indicate that a violation of FAC-003-4 has occurred. The main indicator for identifying which categories result in violations is the location of the vegetation growth. For example, any category that describes vegetation that initiates within the ROW could potentially be a violation of FAC-003-4. The identification of a possible violation is always based on the facts and circumstances present. Another important distinction is that some violations of FAC-003-4 may not fall into one of the previously outlined categories of Sustained Outages. The objective of the Standard is the management of vegetation located within the ROW and to minimize encroachments from the vegetation located adjacent to the ROW (where registered entities have less rights regarding vegetation management). Some violations may be the result of a failure to manage vegetation that results in an outage observed in Real-time, but the outage may not qualify as a Sustained Outage. Therefore, some violations of FAC-003-4 may not be classified into one of these reporting categories.

[3] U.S.-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.

[4] http://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-003-4.pdf *General Requirements at the Transmission Interface*, Order No. 785, 144 FERC ¶61,221 (2013).

Chapter 2: Sustained Outages in 2017

Registered entities reported a total of 24 Sustained Outages in 2017. These outages were largely the result of storms or other weather-related events. Twenty-one of the outages listed storms or high wind conditions as the immediate catalyst for the vegetation contact. The twenty-one were largely made up of Category 3 outages where vegetation falls in to the line from outside the ROW. There was only one Category 3 outage that was not weather related. In that instance, a tree with internal decay fell over a healthy tree, pushing the healthy tree into the transmission line. Both trees were initially located outside of the ROW. The remaining two outages that were not related to weather were the Category 1B outages.

A quarter of the outages occurred on transmission lines that had reported vegetation contacts in the past. One line had experienced four vegetation-related Sustained Outage since 2015. Further investigation revealed that the repeated outages were not indicative of a lack of oversight by the registered entity. The transmission line was located in a remote mountainous area. The line ran through difficult terrain over mountains and valleys between them. This particular transmission line sees difficult weather, particularly on the uphill sides of the mountains where "microburst storms" occur in the late summer. This section of transmission line has also been exposed to insect infestation. The extreme weather elements combined with the difficult terrain and insect situation have created conditions that are more conducive to vegetation falling despite the efforts of the registered entity. All prior outages on this line were also Category 3 outages.

The twenty-four reported outages were predominantly on 230 kV transmission lines. These lines are the most common in the ERO Enterprise and represented 75 percent of the vegetation contacts.

The 2017 Sustained Outages are broken down by RE, voltage class, and outage category in Figure 1.1 below. SERC saw the most outages within its geographical footprint with nine outages overall. SERC's large footprint combined with a longer growth season is a likely reason this RE often experiences more Sustained Outages than others.

The Category 3 outages were isolated weather-related events that did not indicate any trend toward a rise in risk to the reliability of BPS.

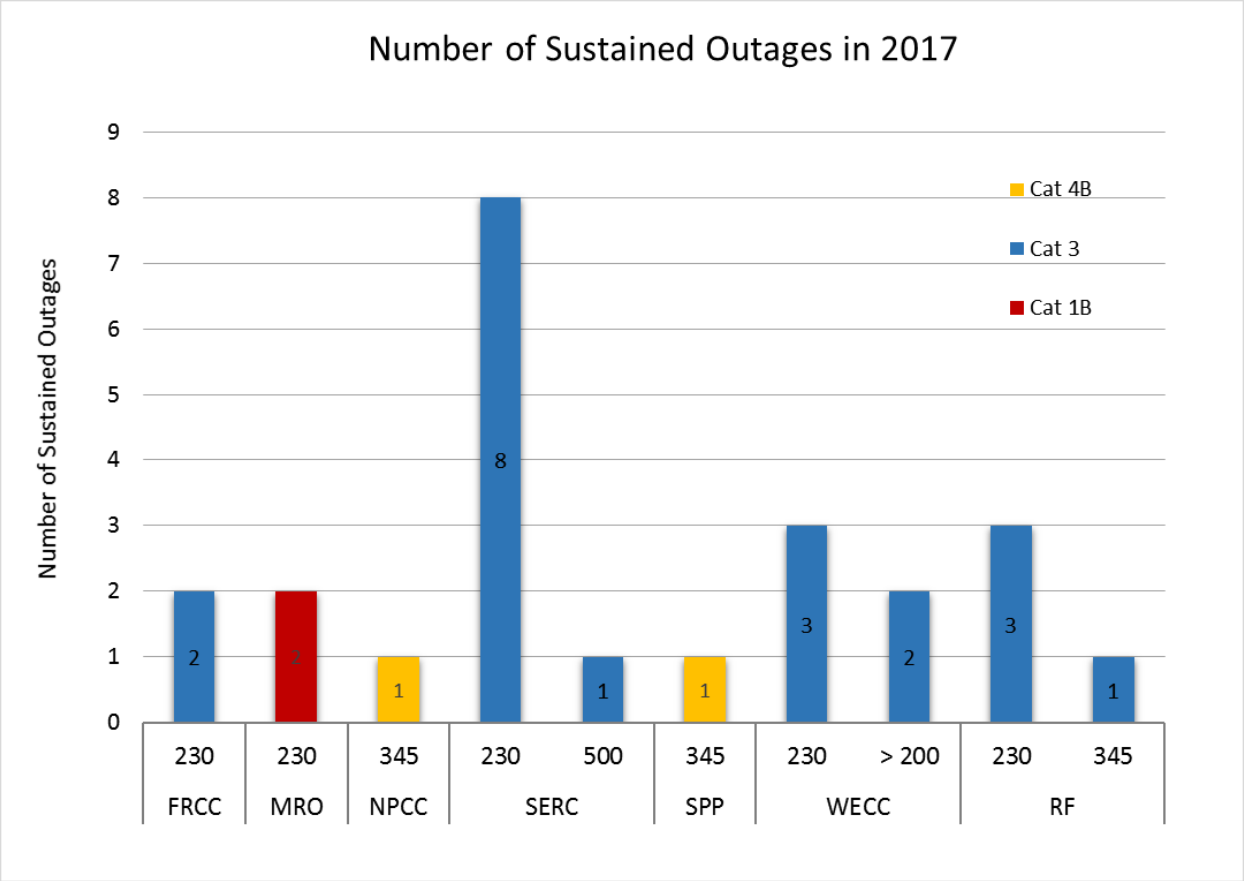


Figure 1.1: Vegetation-Related Outages by Region, Voltage Class, and Outage Category

FAC-003 Violations

There were two Category 1B outages in MRO in 2017. Both occurred at the same registered entity three weeks apart in July. The first outage occurred on an average summer day when there were no adverse weather conditions. The vegetation grew from within the ROW and made contact with the transmission line causing an outage. The second instance occurred during high temperatures and high humidity, resulting in the sagging of the conductor that came into contact with a tree causing an outage. These issues are being processed and have not yet been filed with the Federal Energy Regulatory Commission (FERC).

Since 2015, 10 FAC-003 violations with real-time observable impact from United States registered entities have been reported to NERC. Four of the violations and resulting outages have been fully mitigated and filed with FERC.[5] The remaining six violations are currently under review. It should be noted that not all FAC-003 violations meet the definition of Sustained Outages and, therefore, may not be reported as part of the periodic data reporting. All of these FAC-003 violations were self-reported.

[5] FERC dockets: NP17-6-000, NP16-19-000, NP17-19-000, and NP17-15-000.

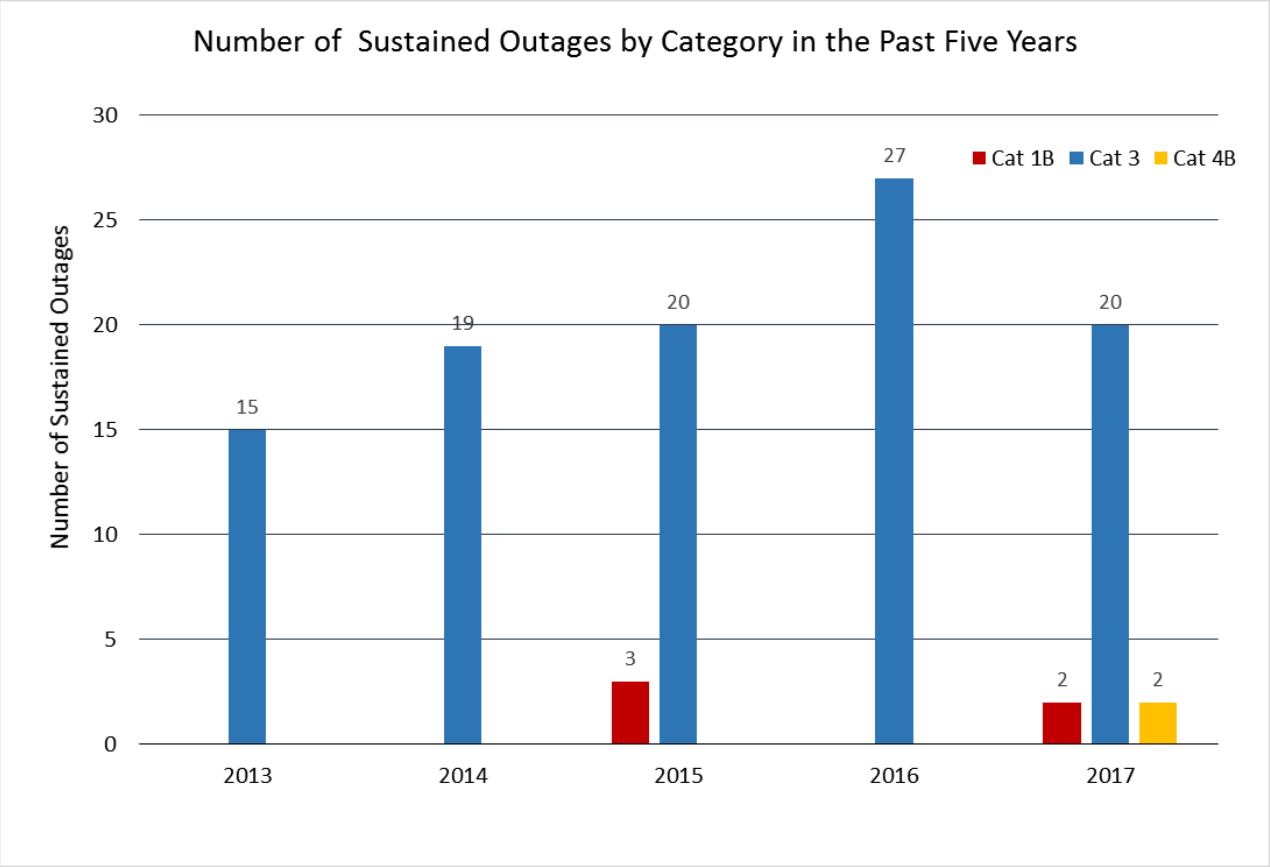


Figure 1.2: Vegetation-Related Outages by Outage Category from 2013 to 2017

The increase in the number of vegetation-related outages due to fallen trees from outside the ROW (Category 3) and the recent FAC-003 violations with real-time observations have resulted in inclusion of FAC-003 on the ERO Enterprise Compliance Monitoring and Enforcement Program (CMEP) Implementation Plan in the past including the 2018 plan.[6]

In particular, some REs have focused on compliance monitoring activities based on the increased risk within their footprint. As an example, MRO experienced an unusually warm and wet summer in 2017. This exceptionally warm weather may have prompted an increase in vegetation growth rates contributing to the vegetation issues in MRO in the summer months. For that reason, MRO issued a guided Self-Certification of FAC-003-4. The goal of the guided Self-Certifications is to provide MRO with reasonable assurance that the applicable registered entity's assessment of its vegetation programs is adequate, and that vegetation maintenance is occurring as scheduled.

[6] For 2018 ERO Enterprise CMEP Implementation Plan, visit https://www.nerc.com/pa/comp/Reliability%20Assurance%20Initiative/2018%20ERO%20CMEP%20Implementation%20Plan.pdf

Chapter 3: Conclusion

Transmission outages related to vegetation management pose an ongoing risk to the BPS reliability. As a result, the ERO Enterprise continues to include vegetation management as an area of focus for its compliance monitoring activities (included in the 2018 CMEP Implementation Plan) and is one of the six reliability metrics used to measure the reliability of the BPS.[7] The ERO Enterprise also continues to engage with industry at forums and technical committees in identifying and mitigating risks, including reducing vegetation-related outages.

[7] To review the 2018 ERO Enterprise Metrics, please visit http://www.nerc.com/AboutNERC/StrategicDocuments/2018_ERO_Enterprise_Metrics_Approved_by_the_NERC_Board_on_November_9_2017.pd