NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Vegetation–Related Transmission Outage Report

Third Quarter 2012

RELIABILITY | ACCOUNTABILITY




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The NERC Board of Trustees Compliance Committee has reviewed and accepted this Vegetation-Related Transmission Outage Third Quarter 2012 Report.

Vegetation-related transmission outages that occurred in the third quarter of 2012 are being reported in accordance with standard FAC-003-1.

The standard requires each outage to be categorized as one of the following:

- Category 1 — Grow-ins: Outages caused by vegetation growing into lines from vegetation inside and/or outside of the Right-of-Way (ROW).
- Category 2 — Fall-ins: Outages caused by vegetation falling into lines from inside the Right-of-Way (ROW).
- Category 3 — Fall-ins: Outages caused by vegetation falling into lines from outside the Right-of-Way (ROW).

Table 1 is a summary of the vegetation outages that occurred in the third quarter by voltage class and category.

Table 1: Third Quarter 2012 Summary of Vegetation-Related Outages by Voltage Class and Outage Category

Category	RE Designated Critical Lines <200 kV	230 kV	345 kV	500 kV	765 kV	Total
Category 1 — Grow-ins	0	1	0	0	0	**1**
Category 2 — Fall-ins	0	0	0	0	0	**0**
Category 3 — Fall-ins	0	4	0	0	0	**4**
Total	**0**	**5**	**0**	**0**	**0**	**5**

In comparison, during the third quarter of 2011, there were no vegetation-related transmission outages reported.

Category 1 — Grow-ins

One (1) outage caused by vegetation growing into lines from vegetation inside and/or outside of the ROW was reported during the third quarter 2012.

Category 2 — Fall-ins

No outages caused by vegetation falling into lines from inside the ROW were reported during the third quarter 2012.

Category 3 — Fall-ins

Four (4) outages caused by vegetation falling into lines from outside the right-of-way were reported during the third quarter 2012.

Northeast Power Coordinating Council

Reported one 230 kV vegetation-related transmission outage caused by vegetation growing into lines from vegetation inside the right-of-way:

1. The transmission owner reported one 230 kV vegetation-related transmission outage caused by vegetation growing into lines from vegetation inside the right-of-way (ROW) on August 7, 2012 with a duration of 2 hours and 48 minutes. The line loading at the time of trip was at 21% of the normal rating. On August 8, 2012, it was reported that a small hardwood tree was found near the fault location that showed signs of arcing to the transmission line.

Background

The transmission owner performs an annual sag analysis in the winter months, prior to the growing season. It is carried out to identify vegetation from a pre-existing inventory that may have since grown within the normal limits of approach or is encroaching on the normal limits of approach utilizing data from a computerized model for predicting vegetation height growth. The sag analysis is a span by span report of the clearance between the line height at maximum sag and the predicted tree height. It is performed to ensure that there are no vegetation clearance issues on transmission lines. Once the sag analysis is completed, sites are identified that require field inspection.

The site where the contact occurred was last foot-patrolled in 2009. The tree height at that time was measured at 2.5 meters and not deemed a threat. The 2011 sag analysis identified the span in question as requiring field verification based on height growth and line sag. In the spring of 2011 the span was field checked and recorded as not being a clearance threat. The inspector at the time stated that treatment was not recommended until 2013. This was based on his professional judgment as no verification measurements of tree height and line height were recorded.

The following year, in 2012, the sag analysis again identified the span in question as requiring field verification. However, since the inspector's notes in 2011 recommended no treatment until 2013, the Forester governing the sag analysis relied on that recommendation and over-ruled the requirement for field verification.

Actions Taken After the Contact Occurred

1) The transmission owner reviewed the sag inspection process with its forestry staff, and all contractors who assist with such inspections, to ensure that all applicable personnel follow the proper inspection and reporting procedures.
2) A reassessment of all sag locations identified during the 2012 sag analysis was completed, and 82 sites were re-issued for immediate field inspection. All locations were completed by August 17, 2012. As a result, ground cutting was conducted at eight locations where vegetation had grown or where the field inspector was being cautious. The eight sites would have been identified by the 2013 sag analysis requiring field verification in the spring of 2013 and managed as per procedure.
3) The Vegetation Management Procedure was revised to clarify the following:
    a. The field verification process in support of the sag analysis;
    b. The requirement to remove vegetation based on empirical measures rather than the allowance of personal judgment;
    c. The definition of tree encroachment and the management response to encroachment. Encroachment shall be defined as vegetation being within two meters of the Normal Limits of Approach (LOA) at maximum sag. Management response has been revised to ensure that all sites found to be encroaching shall be automatically included in the vegetation management program of that year. The management timeline associated with sites that are found to be within LOA shall remain as currently described;
    d. Requirement of a 15% random field audit of field verification data collected by Forestry Inspectors. Any audit finding that is not considered correct shall be field investigated by both the Forestry Inspector and the Forester to discuss the concerns which may result in areas being re-verified;
    e. Requirement of the Forestry Manager to review the final sag analysis data, that includes field verification and audit data, to ensure accuracy and approve the required corrective actions.
4) Requirement that all field verifications of the sag analysis be completed by measuring the tree heights at the lowest point of sag and that at no time is a personal judgment to be used to report on the condition of the vegetation or the conductor clearance.
5) Requirement that all sag field verification measurements be used only to substantiate the conditions in the year they were collected and not to be used to support subsequent years.

SERC Reliability Corporation

Reported four 230 kV vegetation-related transmission outages caused by vegetation falling from outside the right-of-way:

1. The transmission owner reported one 230 kV vegetation-related transmission outage from outside the ROW on July 6, 2012 with a duration of 10 hours and 32 minutes. During a summer thunderstorm, a green pine tree located 10 feet from the edge of the ROW fell onto the transmission line causing the outage. Wind was a factor in the tree's failure, and several trees were down in the area near the easement. The tree was removed from the line, and the transmission owner sent a ground patrol to inspect the tree line for any other potential dangerous trees. The crew removed several trees that were suspected as a threat.

2. The transmission owner reported one 230 kV vegetation-related transmission outage from outside the ROW on July 31, 2012 with a duration of 5 hours and 21 minutes. A live, green pine tree located approximately 7 feet off the ROW fell into the transmission line. The tree was found uprooted, and wet ground and wind were contributing factors. The tree had to be cut from the line. The area was patrolled, and one additional dead pine was removed.

3. The transmission owner reported one 230 kV vegetation-related transmission outage from outside the ROW on August 11, 2012 with a duration of 8 hours and 10 minutes. A green tree located approximately 16 feet off the ROW fell into another green tree located approximately 15 feet off the ROW, which fell into the transmission line. One tree was cut from the line, and the other fell past the line. A patrol of the area found several dead trees off the ROW; they were removed.

4. The transmission owner reported one 230 kV vegetation-related transmission outage from outside the ROW on September 11, 2012 with a duration of 2 hours and 23 minutes. A live, green pine tree approximately 15 inches in diameter near the base and 60 feet tall growing on the edge of the ROW uprooted because of ground rot and windy conditions. The tree was removed from the line, and the area was inspected. Twenty-three trees that were either dead or suspected of disease were removed.

Table 2 summarizes the number of transmission outages by voltage level, region, and category.

Figure 1 illustrates the number of outages caused by vegetation growing into transmission lines from within the right-of-way that have been reported since 2004.

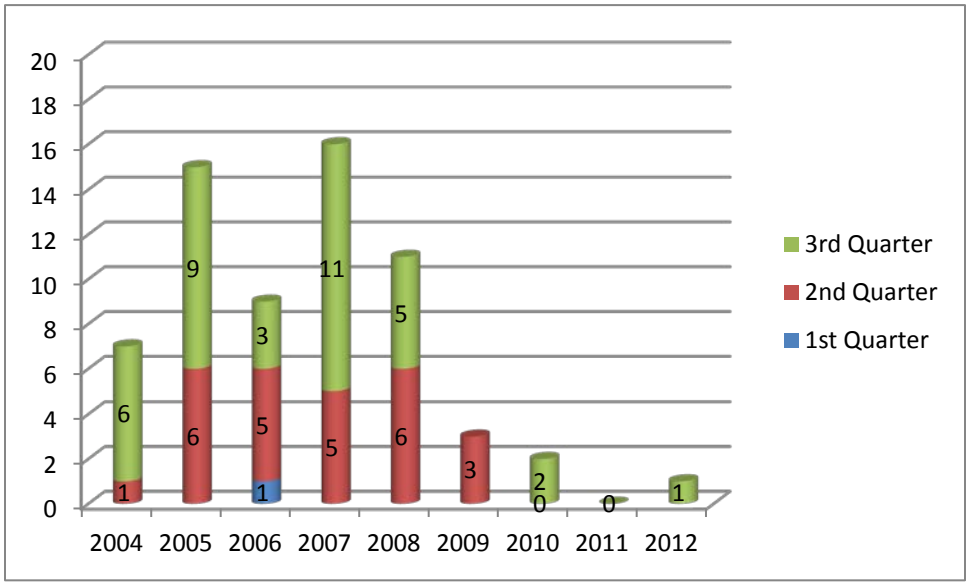
Figure 2 provides this information by voltage class for each year.

Table 2: Summary of Vegetation-Related Transmission Outages[1] by Region and by Outage Category for Each Quarter in 2012

Region	First Quarter			Second Quarter			Third Quarter			Fourth Quarter			TOTAL		
	Category 1	*Category 2*	*Category 3*	*Category 1*	*Category 2*	*Category 3*	*Category 1*	*Category 2*	*Category 3*	*Category 1*	*Category 2*	*Category 3*	***Category 1***	***Category 2***	***Category 3***
	GROW-INS (inside/ outside ROW)	FALL-INS (inside ROW)	FALL-INS (outside ROW)	GROW-INS (inside/ outside ROW)	FALL-INS (inside ROW)	FALL-INS (outside ROW)	GROW-INS (inside/ outside ROW)	FALL-INS (inside ROW)	FALL-INS (outside ROW)	GROW-INS (inside/ outside ROW)	FALL-INS (inside ROW)	FALL-INS (outside ROW)	**GROW-INS (inside/ outside ROW)**	**FALL-INS (inside ROW)**	**FALL-INS (outside ROW)**
FRCC															
MRO															
NPCC			1-345kV			1-230kV	1-230kV						1-230kV		1-230kV 1-345kV
RFC															
SERC			2-230kV			2-230kV			4-230kV						8-230kV
SPP															
TRE															
WECC			2-<200kV 4-230kV												2-<200kV 4-230kV
TOTAL			2-<200kV 6-230kV 1-345kV			3-230kV	1-230kV		4-230kV				1-230kV		2-<200kV 13-230kV 1-345kV

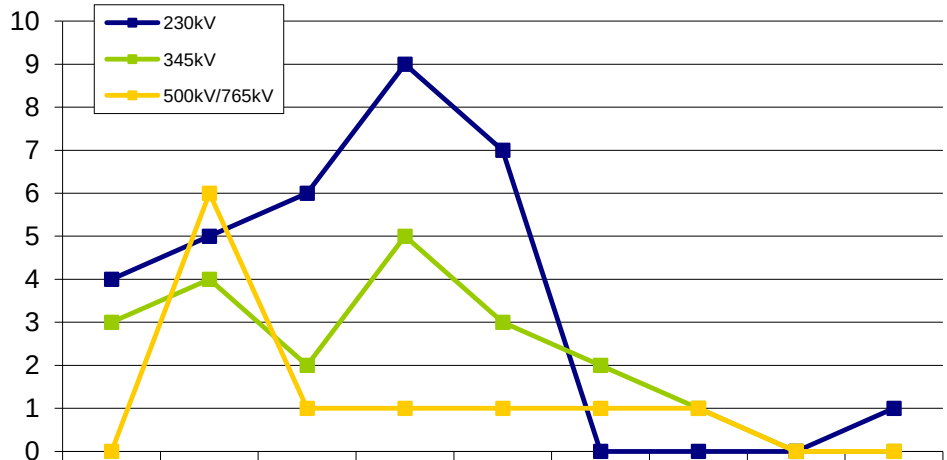
[1] Contains only sustained outages of transmission lines and does not include violations resulting from momentary outages or encroachments into the clearance zone as described in standard FAC-003.

Figure 1: Category 1 — Grow-in Outages Caused by Vegetation Growing into Lines from Inside and/or Outside the ROW.[1]



[1] Includes one 2007 Category 1 outage caused by vegetation growing into an RRO-designated critical line <200 kV.

Figure 2: Category 1 —Grow-In Vegetation Related Outages of 230 kV and Higher



	2004	2005	2006	2007	2008	2009	2010	2011	2012
230kV	4	5	6	9	7	0	0	0	1
345kV	3	4	2	5	3	2	1	0	0
500kV/765kV	0	6	1	1	1	1	1	0	0

Year

Transmission by Voltage Class