



NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

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Vegetation-Related Transmission Outages Third Quarter 2005

December 21, 2005

During the third quarter of 2005, there were fifteen vegetation-related outages reported for 200 kV and higher transmission lines. There were three 230 kV, two 345 kV, three 500 kV, and one 765 kV transmission outages caused by tree contact from inside the right-of-way zone. There were five 230 kV and one 500 kV transmission outages caused by tree contact from outside the right-of-way zone. The following is a brief description of each of these outages:

Category 1 — Vegetation Located Within Transmission Right-of-Way

East Central Area Reliability Coordination

Reported one 765 kV vegetation-related outage from inside the right-of-way.

- The transmission owner reported that a momentary 765-kV vegetation-related transmission line outage occurred on July 5, 2005. The line loading percentage of normal rating at the time of the line trip was 13 percent. The presence of vegetation in the area where the line-vegetation contacts occurred had been noted on the most recent line patrol; however, the results of the aerial inspection were not communicated expeditiously to the forestry contractor. A clump of black locust trees were removed from the right-of-way. Additionally, the transmission owner has taken steps to ensure prompt reporting of serious conditions identified during aerial patrols. ECAR reports that the transmission owner's vegetation management practices were followed; they possessed generally good inspection and vegetation pruning practices prior to the incident and has implemented even more effective procedures as a result of the outage.

Florida Reliability Coordinating Council

Reported one 230-kV vegetation-related outage from inside the right-of-way.

- The transmission owner reported that a tree contacted the 230-kV transmission line causing a line outage on July 5, 2005, with a duration of sixty-eight minutes (one hour and eight minutes). The line loading percentage of normal rating at the time of the line trip was 2.2 percent. As a result, the transmission owner had the tree trimmed. No further action was taken by FRCC.

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Midwest Reliability Organization

Reported one 230 kV and one 345 kV vegetation-related outage from inside the right-of-way.

- The transmission owner reported that a tree contacted the 230-kV transmission line and caused a line outage on July 12, 2005, with duration of 453 minutes (seven hours and thirty-three minutes). The line loading percentage of normal rating at the time of the line trip was 8.5 percent. The tree was cut down and the line returned to service the same day the outage occurred. No further action was taken by MRO.
- The transmission owner reported that a tree came into contact with the 345-kV transmission line and caused a line outage on July 17, 2005, with duration of three minutes. The line loading percentage of normal rating at the time of the line trip was 24 percent. As a result, the transmission owner coordinated with a neighboring entity to reclose the line. Line patrol was subsequently conducted at which time the tree was identified and removed. No further action was taken by MRO.

Southeastern Electric Reliability Council

Reported two 500 kV vegetation-related outages from inside the right-of-way.

- The transmission owner reported that an ornamental tree grew into the 500-kV transmission line and caused a line outage on July 9, 2005, with duration of 183 minutes (three hours and three minutes). The line loading percentage of normal rating at the time of the line trip was 3 percent. The transmission owner reported that the tree that caused the outage was removed and the line was patrolled. No further action was taken by SERC.
- The transmission owner reported that a 500-kV vegetation-related transmission outage occurred on August 19, 2005, with duration of 1,054.92 minutes (seventeen hours, thirty-four minutes, and fifty-five seconds). The line loading percentage of normal rating at the time of the line trip was 45 percent. The cause of the outage was a silver maple in the right-of-way that grew into the power line. The silver maple was sixty feet from the centerline; the right-of-way width is seventy-five feet from the centerline. As a result, the silver maple that caused the outage was removed, the line was inspected, and other tree work which was identified during the inspection is being completed. No further action was taken by SERC.

Southwest Power Pool

Reported one 345 kV vegetation-related outage from inside the right-of-way.

- The transmission owner reported that a 345-kV vegetation-related transmission outage occurred on July 12, 2005, with duration of 480 minutes (eight hours). The line loading percentage of normal rating at the time of the line trip was 34 percent. The transmission owner reported that the cause of the outage was vegetation that was overlooked on patrols. As a result, the tree clump was removed and the inspection process was revised.

Western Electricity Coordinating Council

Reported one 230 kV and one 500 kV vegetation-related outage from inside the right-of-way.

- The transmission owner reported a 500-kV vegetation-related outage that occurred on July 27, 2005, with duration of two minutes. The line loading percentage of normal

rating at the time of the line trip was about 19 percent. The transmission owner reported that a Lombardi Poplar on the edge of the right-of-way bent into the power line and that the arc ignited a nearby house. The line had to be removed from service to fight the fire to the house. The transmission owner has investigated the incident, documented its findings, and is implementing a recommendation to review working patrol standard with field crews. The investigation conclusion found: The combination of all of the missed opportunities to catch this tree before it got to within flashover distance ultimately led to the tree getting too close to the line. The programs and processes that the transmission owner has implemented and refined over the years to prevent this type of event from happening failed to acknowledge that this tree was an imminent hazard. The investigation found that the transmission owner was following its maintenance plan. The tree characteristics were not recognized by the inspectors as being a potential to reach the transmission line. No additional action was taken by WECC.

- The transmission owner reported a 230-kV vegetation-related outage that occurred on September 12, 2005, with duration of six minutes. The line loading percentage of normal rating at the time of the line trip was 209 percent. The line sagged into a tree while operating well above its emergency rating, following a major disturbance on the transmission owner's system. As a result, load was shed by the transmission owner to reduce the line loading at the time of relay and the tree was properly trimmed to provide for necessary clearance for normal and emergency operation. WECC is preparing a detailed disturbance report.

Category 2 — Vegetation Located Within the Buffer Zone of the Transmission Line ROW or Outside the Transmission ROW

Northeast Power Coordinating Council

Reported two 230 kV vegetation-related transmission outage from outside the right-of-way.

- The transmission owner reported a 230 kV vegetation-related outage that occurred on August 9, 2005, with duration of 1,428 minutes (twenty-three hours and forty-eight minutes). The line loading percentage of normal rating at the time of the line trip is not available. The transmission owner reported and confirmed that several trees fell and made contact with the line. The incident occurred off the right-of-way and during a significant storm. There was also a tornado warning in the area. Major wind damage was reported in the area where the vegetation contacts occurred. NPCC stated that no regional action was required.
- The transmission owner reported a 230 kV vegetation-related outage that occurred on August 22, 2005, with duration of 435 minutes (seven hours and fifteen minutes). The line loading percentage of the line was 64 percent of the summer, 25 degree Celsius rating. The transmission owner reported that the line contacted the vegetation in a water-course buffer zone. As a result, an extra one-meter margin of cut has been incorporated into the transmission owner's standards for tree removals. Inspection data has been reviewed and all water-course and road-side buffers have been re-scoped. NPCC stated that no regional action was required.

Southeastern Electric Reliability Council

Reported three 230 kV vegetation-related transmission outage from outside the right-of-way.

- The transmission owner reported a 230 kV vegetation-related outage that occurred on July 20, 2005, with duration of 126 minutes (two hours and six minutes). The line loading percentage of normal rating at the time of the line trip is not available. A non-transmission owner -related logger that was working adjacent to the right-of-way accidentally pushed over a pine tree that came to rest on the 230-kV line. The logger was contacted by the transmission owner's personnel, who explained the possible consequences to the logger and to their customers because of his actions. The transmission owner determined that no further action was needed. No additional action was taken by SERC.
- The transmission owner reported a 230 kV vegetation-related outage that occurred on July 23, 2005, with duration of 317 minutes (five hours and seventeen minutes). The line loading percentage of normal rating at the time of the line trip is not available. A healthy eighteen-inch diameter tree that was rooted twenty-five feet from the right-of-way in an intermittent creek bank fell onto the line between structures 53 and 54 in fair weather. The transmission owner reported that this was a unique event and no action could be taken to prevent a similar occurrence. No further action was taken by SERC.
- The transmission owner reported a 230 kV vegetation-related outage that occurred on September 18, 2005, with duration of 189 minutes (three hours and nine minutes). A tree that was cut by a logger fell into the line during fair weather. The transmission owner reported that they have a logger notification program in place. No further action was taken by SERC.

WECC

Reported one 500 kV vegetation-related transmission outage from outside the right-of-way.

- The transmission owner reported a 500-kV vegetation-related outage that occurred on July 30, 2005, with duration of 411 minutes (six hours and fifty-one minutes). The line loading percentage of normal rating at the time of the line trip was about 18 percent. A landowner was using a crawler tractor to push trees over on his property and knocked one tree into another, causing the second tree to fall into the line. The landowner was unaware of the incident until the transmission owner's crew notified him. As a result, the transmission owner removed the tree and discussed the situation with the landowner. No further action was taken by WECC.

In addition to the fifteen vegetation-related outages reported for 200 kV and higher transmission lines, there were two vegetation-related Category 2 outages reported for RRC designated critical lines <200 kV.

Southwest Power Pool

Reported one <200 kV vegetation-related transmission outage from outside the right-of-way.

- The transmission owner reported a <200 kV vegetation-related outage that occurred on August 10, 2005, with a duration of 186 minutes (three hours and six minutes). The line loading percentage of normal rating at the time of the line trip was 35 percent. The

outage was caused by a tree limb contacting a 161 phase wire. The transmission owner promptly trimmed the tree back.

Western Electricity Coordinating Council

Reported one <200 kV vegetation-related transmission outages from outside the right-of-way.

- The transmission owner reported a <200 kV vegetation-related outage that occurred on July 6, 2005, with a duration of 125 minutes (two hours and five minutes). The line loading percentage of normal rating at the time of the line trip was 27 percent. A large spruce tree off the right-of-way came down in a storm and contacted the line. A hazard tree program was initiated in the area in 2004 and tree removals are taking place in 2005. The tree was not marked as a hazard tree but it was a taller veteran left along the edge of a cut block and failed from windthrow during a storm. As a result of the outage, all trees along the edge of this cut-block (about eighty trees) will be removed to avoid further windthrow events in the area. The line is also regularly patrolled to detect the presence of new cut-blocks off the right-of-way that may create tree leave strips prone to windthrow so they can be removed. The transmission owner is working with forest officials to discourage the retention of aesthetic leave strips adjacent to power lines. No further action was taken by WECC.

Table 1 summarizes the number of transmission outages by voltage level, and whether the outage was a result of vegetation within or outside of the right-of-way for the third quarter of 2005.

Table 1

Vegetation-Related Transmission Outages 2005

Region	First Quarter		Second Quarter		Third Quarter		Fourth Quarter	
	<i>Category 1</i>	<i>Category 2</i>	<i>Category 1</i>	<i>Category 2</i>	<i>Category 1</i>	<i>Category 2</i>	<i>Category 1</i>	<i>Category 2</i>
	(within ROW)	(outside ROW)	(within ROW)	(outside ROW)	(within ROW)	(outside ROW)	(within ROW)	(outside ROW)
ECAR	0	0	1-230 kV; 2-345 kV	0	1-765 kV	0	0	0
ERCOT	0	0	0	0	0	0	0	0
FRCC	0	0	0	0	1-230 kV	0	0	0
MAAC	0	0	0	0	0	0	0	0
MAIN	0	0	0	0	0	0	0	0
MRO	0	0	0	0	1-230 kV; 1-345 kV	0	0	0
NPCC	0	1-230 kV	0	0	0	2-230 kV	0	0
SERC	0	1-500 kV	1-230 kV	0	2-500 kV	3-230 kV	0	0
SPP	0	0	0	0	1-345 kV	1<200 kV	0	0
WECC	0	3-230 kV	2-500 kV	4-<200 kV 1-230 kV	1-230 kV; 1-500 kV	1<200 kV; 1-500 kV	0	0
Subtotal	0	4-230 kV; 1-500 kV	2-230 kV; 2-345 kV; 2-500 kV	4-<200 kV 1-230 kV	1-765 kV; 3-500 kV; 2-345 kV; 3-230 kV	1-500 kV; 5-230 kV; 2-<200 kV	0	0
TOTAL								