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April 1, 2005

HAND DELIVERED

Ms. Blanca S. Bayo, Director
Division of Commission Clerk
and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Request to exclude April 11-12, 2004 outage events from annual distribution service reliability report by Tampa Electric Company; Docket No. 041375-EI

Dear Ms. Bayo:

Enclosed for filing in the above-styled matter are the original and fifteen (15) copies of a letter from Impact Weather, Inc. to Scott H. Smith of Tampa Electric Company describing the wake lows that impacted Tampa Electric's service area on the evening of April 11, 2004 and in the morning hours of April 12, 2004. This information is submitted to supplement the company's request to exclude outage events on April 11 and 12, 2004 from its Annual Distribution Service Reliability Report.

Please acknowledge receipt and filing of the above by stamping the duplicate copy of this letter and returning same to this writer.

Thank you for your assistance in connection with this matter.

Sincerely,

James D. Beasley

JDB/pp
Enclosure

cc: James Breman (w/enc.)
Angela L. Llewellyn (w/enc.)
Howard T. Bryant (w/enc.)

ImpactWeather

Mr. Scott H. Smith
Manager, System Reliability
Tampa Electric, Co.

Greetings Mr. Smith,

This document is the result of a study of the weather events of April 11-12, 2004 in the Tampa Electric service area. This document will explain what a wake low is and how it relates to Mesoscale Convective Systems (abbreviated MCS) and squall lines, and will investigate that possibility that a wake low or wake lows contributed to damage during the aforementioned period over the service area.

A wake low is a small-scale (mesolow) area of low pressure, or a collection of several small mesolows, that occurs to the rear of a squall line, or MCS, along the edge of the trailing stratiform rain area. Clouds with little vertical development, and hence little or no thunderstorm activity characterize a stratiform rain area. The exact cause of wake lows is still subject to debate. They are quite complicated in their structure but in layman's terms one could think of them as being akin to an ocean wave. The initial rush of strong winds and cooler air ahead of a squall line or MCS is caused by the cool, dense air formed as precipitation occurs within the system. This pool of cooler, denser air forms what is called a mesohigh. Since the atmosphere can be treated as a fluid, just like water, the mesohigh can be thought of as the peak of a wave in the atmosphere, and the trailing mesolow as the trough. Strong straight-line winds can occur along the edge of each system, in part due to the locally increased surface pressure gradient. Strong winds are much more common with mesohighs because the cool dense air easily reaches the surface and spreads much like a moving fluid. However, the thermal structure of the lower atmosphere behind a squall line or MCS many times contains a temperature inversion (the temperature increases with height) which prevents much of the stronger winds associated with a mesolow from reaching the surface. The inversion may only be broken in a few areas, resulting in more sporadic areas of stronger winds.

Surface and radar observations from the evening of April 11 to the morning of April 12 indicated the likelihood of two wake lows affecting the Tampa Electric service area. The first wake low event occurred behind a squall line that was moving west to east across the Florida Peninsula during the evening hours. It appears that the wake low developed between Tampa and Brooksville, Florida around 7:00pm EDT April 11 and then tracked generally to the east-northeast affecting the service area, reaching the Orlando area by 10:00pm EDT. Surface observations at all stations between Tampa and Orlando indicate a period of rapidly falling pressures as the mesolow developed along with a rapid wind shift from the northwest to the southeast. The strongest winds reported at any of the

NWS observing stations during the wake low event over the service area was 30 mph at Winter, Florida at 9:53 pm EDT. However, there are long distances between observing stations over the Florida panhandle and it is likely that stronger winds were observed over other areas, due to the strong surface pressure gradient induced by the wake low. Another small, but significant indicator of a mesolow was a small, but noticeable temperature increase over all observing stations in the region with the onset of rapidly falling pressures. This is another classic indication of mesolow development.

A second wake low affected the region during the morning hours of April 12 in the wake of a large MCS moving through the Florida Panhandle. In general this wake low event did not appear to be as significant as the earlier low, but large pressure falls and a sharp shift to easterly winds with the pressure drop all point to a wake low behind the exiting MCS. The wake low affected western areas of the service region by 6:45 to 7:00am EDT April 12, moving east to near Orlando by 9:00am EDT. The stronger peak winds observed at NWS surface observing stations were outside of the Tampa Electric service area, with Orlando peaking out at around 30 mph at 8:45am EDT. However, as with the previous system, the tight surface pressure gradient over the entire service area likely meant there were pockets of much stronger winds over the service area.

A similar wake low event occurred over South Florida on April 13, 2004. Meteorologists at the National Weather Service Forecast Office in Miami wrote a study that was presented to the American Meteorological Society. I have read this document and confirm that atmospheric conditions described in this document were very similar to what was occurring over the Tampa Electric service area on April 11-12, 2004. I will also add that I have personally observed wake low events while doing field forecasting for NASA's National Scientific Balloon Facility from 1991 to 2000, prior to joining ImpactWeather, Inc. Out of necessity I developed considerable expertise in forecasting surface and low-level winds while at NSBF. I personally experienced wake low events while in Palestine, Texas, Ottumwa, Iowa, and Fort Sumner, New Mexico. The surface observations during the Tampa area events of April 11-12, 2004 corresponded well to what I observed in those events in Iowa, New Mexico, and Texas. All of this evidence taken together leads to the conclusion that wake lows were likely responsible for wind gusts seen over the Tampa Electric service area on April 11-12, 2004.

Regards,

Robert Mullenax
Meteorologist
ImpactWeather, Inc.