Exhibit No.:

Issues: Weather Normal Variable

Witness: Manisha Lakhanpal

Sponsoring Party: MO PSC Staff
Type of Exhibit: Rebuttal Testimony

Case No.: ER-2010-0130

Date Testimony Prepared: April 2, 2010

# MISSOURI PUBLIC SERVICE COMMISSION UTILITY OPERATIONS DIVISION

### REBUTTAL TESTIMONY

**OF** 

#### MANISHA LAKHANPAL

## THE EMPIRE DISTRICT ELECTRIC COMPANY

**CASE NO. ER-2010-0130** 

Jefferson City, Missouri

April 2010

## BEFORE THE PUBLIC SERVICE COMMISSION

## OF THE STATE OF MISSOURI

In the Matter of the Empire District Electric Company for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Missouri Service Area of the Company	)			
AFFIDAVIT OF MANISHA LAKHANPAL				
STATE OF MISSOURI ) ) ss COUNTY OF COLE )				
Manisha Lakhanpal, of lawful age, on her oath states: that she has participated in the preparation of the following Rebuttal Testimony in question and answer form, consisting of				

Subscribed and sworn to before me this 24

day of April, 2010.

Manisha Lakhanpal

NOTARY OF MISS

SUSAN L. SUNDERMEYER
My Commission Expires
September 21, 2010
Callaway County
Commission #06942086

1		REBUTTAL TESTIMONY
2 3		OF
4 5		MANISHA LAKHANPAL
6 7		THE EMPIRE DISTRICT ELECTRIC COMPANY
8 9		CASE NO. ER-2010-0130
10 11	Q.	Please state your name and business address.
12	A.	My name is Manisha Lakhanpal and my business address is Missouri Public
13	Service Commission, P. O. Box 360, Jefferson City, Missouri, 65102.	
14	Q.	Are you the same Manisha Lakhanpal who has submitted a section on weather
15	normal variables, as part of the Cost of Service Report in the current rate case?	
16	A.	Yes, I am.
17	Q.	What is the purpose of your rebuttal testimony?
18	A.	I will address the written direct testimony of The Empire District Electric
19	Company (EDE or Company) witnesses Mark Quan regarding weather data used in th	
20	weather normalization of billing usage.	
21	Q.	Please explain the differences between the historical daily weather data used
22	by Staff and EDE?	
23	A.	Staff uses daily maximum (TMAX) and daily minimum (TMIN) temperature
24	to calculate	daily average temperature <sup>1</sup> , whereas the Company uses 24-hourly weather
25	observations	per day to derive its daily average temperature <sup>2</sup> .
26	Q.	Why should the Commission adopt Staff's weather to calculate normal
27	weather?	
	1	
		e temperature = (TMAX +TMIN)/2 e temperature = sum of the 24-hourly temperature readings/24

- A. The Commission should adopt Staff's weather for the following reasons:
- First, TMAX and TMIN are the extreme temperature values, which occur randomly but at specific moments during the day, whereas the 24-hourly temperature data recordings used by EDE are taken at a specific and predetermined moment in each hour and will only capture the TMAX and/or TMIN if they occur at the moment of one of the scheduled hourly temperature readings.
- NOAA publishes a complete series of TMAX and TMIN for the 30-year time period used to calculate normal weather. There are hours in the 24-hourly temperature series used by EDE that have missing temperature readings.
- NOAA collects and adjusts TMAX and TMIN for exposure changes over the 30-year period of weather that Staff uses to compute monthly normal temperatures.
   The 30-year period used by EDE is not adjusted for exposure changes.
- Staff adjusts daily weather temperature based off of NOAA's adjustments over the normals period. This is done to weather normalize billing usage based on temperature variation between days of the year.
- Q. What is the source of Staff's data for TMAX and TMIN?
- A. The TMAX and TMIN data were acquired from the Midwestern Regional Climate Center (MRCC) database. The MRCC is a cooperative program of the Illinois State Water Survey and the National Climatic Data Center (National Oceanic and Atmospheric Administration, U.S, Department of Commerce (NOAA)).
  - Q. Are the TMAX and TMIN drawn from the hourly temperatures?

- A. No. Modern instruments measure and record the daily instantaneous extreme temperatures electronically. Hourly temperatures are taken at a specific and predetermined moment in each hour. TMAX and TMIN could occur at any moment of the day irrespective of the time when the hourly temperature recording is taken. The recorded daily maximum temperature will be equal or greater than the highest of the 24-hourly measurements. Similarly the recorded daily minimum temperature will be equal or less than the lowest hourly measurement. The recorded mean daily temperature is defined as the average of the daily maximum and minimum temperatures, and will usually be different than the average of the 24-hourly temperatures.
  - Q. Does NOAA use TMAX and TMIN to calculate normals?
- A. Yes, TMAX and TMIN are used by NOAA to calculate its normal weather. To make its normal weather as accurate as possible, NOAA makes sure its daily weather data is serially complete (i.e. no missing values) and also adjusts for exposure changes such as changes in station locations, instrumentation, time of observation, surrounding environment, observing practice and sensor drift.
- Q. Were there exposure changes in the temperature data series for the Springfield<sup>3</sup> (SGF) weather station?
- A. Yes. Examination of the data shows that NOAA applied exposure change adjustments dating backward in time from 1978, 1984, 1990 and 1995. The adjustments were applied to monthly TMAX and TMIN from the years before 1996, and were intended to cause the earlier temperature readings to correspond with those from the current weather instrument installation at SGF, namely, the Automated Surface Observing System (ASOS).

<sup>&</sup>lt;sup>3</sup> Temperature data from Springfield Regional Airport weather station is being used by both the Company and Staff.

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Consequently, temperatures for the years from 1996 forward are the baseline, and contain no adjustments.

- Q. Does the 24-hour daily data as used by the Company account for any of the above mentioned adjustments?
  - A. No, it does not.
- Q. Does Staff make any additional adjustments to the daily weather variables that it uses to calculate normals?
- A. Staff adjusts daily weather temperature based off of NOAA's Yes. adjustments over the normals period. Staff makes adjustments to the daily weather variables such that the monthly average of the temperature variables matches the NOAA's published monthly sequentials while maintaining the same daily temperature distribution as the observed daily temperatures.
  - Q. Doesn't NOAA publish a set of normal daily values?
- A. Yes. However, NOAA collects and adjusts monthly average temperatures over a defined 30-year period to compute monthly normal temperatures. Daily normal temperatures are derived by statistically fitting smooth curves through monthly values; daily data is *not* used to compute daily normals. As a result, the published values reflect smooth transitions between seasons. The resulting normals do not contain daily temperature variation for weather-normalizing billing usage. Although the methods used by Staff and the Company to calculate daily normal weather differ, both methodologies produce daily normals that reflect typical day-to-day variations in weather that is experienced in Missouri.

#### Rebuttal Testimony of Manisha Lakhanpal

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- Q. Does EDE make adjustments to the daily weather variables such that the monthly average of the temperature variables matches the NOAA's published monthly sequentials?
  - A. No, it does not.
  - Q. What is your recommendation to the Commission?
- A. Staff recommends that the Springfield daily TMAX and TMIN data, including Staff's adjustments to the daily weather temperature based off of NOAA's adjustments over the normals period 1971-2000, be used to calculate normal weather.
  - Q. Does this conclude your testimony?
  - A. Yes, it does.