

Exhibit No.:  
Issues: Normalization of Sales;  
Normalization of Net  
System Input; Load  
Research Resources  
Witness: Lena M. Mantle  
Sponsoring Party: MO PSC Staff  
Type of Exhibit: Direct Testimony  
Case No.: ER-2001-672  
Date Testimony Prepared: December 6, 2001

**MISSOURI PUBLIC SERVICE COMMISSION**  
**UTILITY OPERATIONS DIVISION**

**DIRECT TESTIMONY**

**OF**

**LENA M. MANTLE**

**FILED<sup>3</sup>**  
**DEC 6 2001**

Missouri Public  
Service Commission

**UTILICORP UNITED, INC.**  
**D/B/A MISSOURI PUBLIC SERVICE**

**CASE NO. ER-2001-672**

**Jefferson City, Missouri**  
**December 2001**

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1 Q. What is the purpose of your direct testimony?

2 A. The purpose of my testimony is to recommend that the Commission adopt the  
3 weather adjustments to class usage for the weather sensitive rate classes of the Missouri  
4 Public Service Division (MPS) of UtiliCorp United, Inc. shown on Schedule 2. Staff witness  
5 Janice Pyatte calculated an adjustment to revenues based on these weather adjustments to  
6 class usage. The adjustments to class usage were also included in the calculation of the  
7 hourly generation requirements.

8 I also recommend that the Commission adopt the hourly net system energy and steam  
9 loads that I calculated for MPS and St. Joseph Light and Power Division (SJLP) of UtiliCorp  
10 United, Inc. Staff witness David Elliott used these hourly loads in estimating the normalized  
11 fuel and purchase power costs for the test year. Monthly summaries of the normalized MPS  
12 and SJLP net system loads are shown on Schedule 3-1 and 3-2.

13 My testimony also includes a discussion on the weather normalization methods used  
14 to normalize MPS class usage, the hourly net system loads and the daily normal variables  
15 that were used in both of these analyses.

16 My testimony concludes with a discussion of the importance of a good load research  
17 program and an update to the Commission regarding the amount of resources dedicated to  
18 load research at UtiliCorp United, Inc (UCU).

19  
20 **NORMALIZATION OF CLASS USAGE**

21 Q. Why is it necessary to weather normalize electricity usage?

22 A. Electricity use is very sensitive to weather conditions. The magnitude of load  
23 is directly related to daily temperatures due to the high percentage of customers that have air

1 conditioning and electric space heating. The weather fluctuated greatly in the test year. The  
2 last part of the winter of 2000 (January 2000 - April 2000) was mild and therefore, customers  
3 used less electricity than they would have had the weather been "normal." The first part of  
4 the summer (June 2000 and July 2000) was cooler than normal and so, again, the customers  
5 used less than they would have, given normal weather. August 2000 and September 2000  
6 were hotter than normal, so the usage in those months was higher than they would have been,  
7 given normal weather. November and December were extremely cold so therefore,  
8 customers used more than they would have, given normal weather.

9 Q. What method did you use to calculate the weather adjustments to class usage?

10 A. I used the Electric Power Research Institute (EPRI) Hourly Electric Load  
11 Model (HELM) to calculate the weather adjustments to class usage. In this model, the  
12 response to daily weather is first estimated for each of the rate classes from hourly class level  
13 load data. Weather normalized usage is then calculated for each month for each of the  
14 weather sensitive classes, given normal weather variables that are based on the response  
15 estimated from the load research data. In this analysis, the weather variables are carefully  
16 matched to correspond to the usage in the time period over which usage was recorded. The  
17 weather adjustment to class usage is calculated as the difference between the billing month  
18 weather normalized usage and the actual billing month usage.

19 Q. What are the inputs to this model?

20 A. There are four data inputs into the model – monthly class usage, hourly class  
21 load data, and actual and normal daily weather variables. The monthly class usage and the  
22 estimated hourly class loads were supplied by MPS. Staff witness Dennis Patterson supplied

1 the actual high and low temperatures for the test year and the history of high and low  
2 temperatures that I used to calculate daily normal weather.

3 Q. Has the staff previously used HELM in any rate cases?

4 A. Yes. We used HELM in the last MPS rate case, Case No. ER-97-394 and the  
5 last two Empire District Electric Company rate cases, Case Nos. ER-97-81 and  
6 ER-2001-299.

7 Q. Do any Missouri electric utilities use HELM?

8 A. AmerenUE is using HELM to weather normalize its monthly class usages.  
9 Kansas City Power and Light Company and UCU have used HELM in the past to analyze  
10 hourly loads in their Missouri resource planning processes. UCU also used HELM to  
11 calculate the weather normalized sales used in its filing of this case.

12 Q. Are your results different from what UCU filed?

13 A. Yes, they are different. UCU filed using a time period different from the test  
14 year in this case. However, there are a few other differences. UCU used a temperature  
15 measure that was inconsistent with the development of the weather response functions. I  
16 corrected that inconsistency. In addition, the normal weather used by UCU was not  
17 consistent with the normal weather that I developed in this case for my weather  
18 normalization of net system loads.

19 The biggest difference between my results and UCU's results are the changes that I  
20 made to the billing cycle input data. Upon examination of the billing data used by UCU in  
21 its analysis, I found some billing data that needed to be corrected. The billing data contained  
22 usage for some billing cycles that was negative and in some cases the billing usage was  
23 tremendously different (smaller or larger) than the usage for the corresponding billing

1 months surrounding it. I received corrections for many of the problems that I identified  
2 through responses to data requests to UCU.

3 Q. Was HELM used to determine any other adjustments to the class usage?

4 A. Yes, it was. HELM also includes a calculation of the adjustment necessary to  
5 convert the billing month sales, which corresponds to how customer meters are read, to  
6 calendar month sales. The model calculates the weather normalized usage on a daily basis  
7 and then aggregates these daily usages to estimate the weather adjustment to both billing and  
8 calendar month sales. I calculated the "days adjustment" from billing month sales resulting  
9 in annual sales for the twelve calendar months ending December 31, 2000. This days  
10 adjustment is the difference between the weather normalized calendar and billing month  
11 sales.

12 Q. What staff witnesses used the adjustments to class usage that you calculated?

13 A. Staff witness Janice Pyatte calculated an adjustment to Missouri retail  
14 revenues corresponding to the weather and days adjustments to class usage. Staff witness  
15 Janis Fischer used the normalized class usage in estimating the adjustment in class usage due  
16 to customer growth. The weather and days adjustments to class usage were also used in the  
17 calculation of the total test year usage shown on Schedule 2 in Ms. Pyatte's testimony. This  
18 normalized usage in turn was used in the calculation of normalized fuel and purchase power  
19 expenses.

20 **HOURLY NET SYSTEM LOAD**

21 Q. What is hourly net system load?

22 A. Net system load is the hourly electric supply requirement necessary to meet  
23 the energy demands of a utility's customers and the utility's internal needs.

1 Q. What was the starting point of your analysis of net system hourly loads?

2 A. I began my analysis with hourly net system loads for MPS and SJLP as  
3 supplied to Staff to fulfill the requirements of Commission Rule 4 CSR 240-20.080. The  
4 temperature values that I used were from the Kansas City International Airport National  
5 Oceanic and Atmospheric Association (NOAA) site. Staff witness Dennis Patterson supplied  
6 the weather data used in my analysis.

7 Q. Why was it necessary to normalize the net system loads of both MPS and  
8 SJLP?

9 A. As a result of the merger of UCU and SJLP, UCU is now jointly dispatching  
10 the MPS and SJLP generation resources. To get an accurate representation of the costs of  
11 meeting MPS's loads, it is necessary to model MPS, SJLP and the total of both divisions. I  
12 normalized the hourly loads of MPS and SJLP and added the hourly loads of the two  
13 divisions together to get the total of both divisions.

14 Q. Over what time period did you normalize hourly loads?

15 A. I normalized the hourly loads for the test year period of January 1, 2000  
16 through December 31, 2000.

17 Q. Briefly describe the process of normalizing net system loads.

18 A. The starting point is the actual hourly net system loads. Daily average hourly  
19 and peak loads calculated from these hourly loads are weather normalized and allocated back  
20 to the hours. The sum of these hourly loads for the test year is then reconciled to the  
21 normalized usage requirements of the utility's customers. These normalizations include the  
22 weather and days adjustments to class usage that I previously described, together with growth  
23 and annualization adjustments calculated by other Staff witnesses.



1 Q. What method did you use to weather normalize hourly net system loads?

2 A. The weather normalization procedure that I used was developed by the former  
3 Economic Analysis Department of the Commission in 1988. The process is described in  
4 detail in the document "Weather Normalization of Electric Loads, Part A: Hourly Net System  
5 Loads" (November 28, 1990), written by Dr. Michael Proctor of the Commission Staff.

6 Q. Briefly summarize the process you used.

7 A. Since daily peak and average hourly loads respond differently to weather,  
8 daily peak loads and average hourly loads are separately adjusted using the same  
9 methodology to reflect normal weather. Daily average hourly load is calculated as the sum of  
10 each day's twenty-four hourly loads divided by twenty-four hours. The peak load is the  
11 maximum hourly load for that day. Separate regression models for the daily average hourly  
12 and peak loads are used to estimate both a base component, which is allowed to fluctuate  
13 across time, and a weather sensitive component, which measures the response to daily  
14 fluctuations in weather. The resulting regression coefficients, along with the difference  
15 between normal and actual cooling and heating measures, are used to calculate the weather  
16 adjustments to each day's daily average hourly and peak loads. The adjustments for each day  
17 are added to the actual average hourly and peak loads for each day.

18 The starting point for allocating the weather normalized daily energy to the individual  
19 hours of each day and for applying the weather normalized daily peak to the peak hour are  
20 the actual hourly loads of the test year. The weather normalized hourly loads are calculated  
21 by applying the weather normalized daily peak load and daily average load to the unitized  
22 load curve calculated for each day as a function of the actual peak load and average hourly  
23 load for that day.

1 Q. Are checks for reasonableness a part of the process?

2 A. Yes, they are. The process starts with input data checks and ends with output  
3 data checks. Checks and balances are included in the spreadsheets that are used. In addition,  
4 I examined the intermediate results and reexamined the data at several points in the process.

5 Q. Has this methodology been used in other cases?

6 A. Yes, it has. This method has been used to weather normalize net system load  
7 in several cases previously before this Commission. Please refer to Schedule 4 for a listing  
8 of these cases.

9 Q. How were the hourly loads adjusted to correspond to the updated test year  
10 normalized usage on which revenue is based?

11 A. For MPS, I applied a ratio to the hourly net system loads to each hour's load  
12 so that the sum of the hourly net system loads across the year equals the test year normalized  
13 usage plus system losses. Staff witness Janice Pyatte supplied the annual energy that  
14 corresponds with the revenues filed in this case. I multiplied this annual usage by the loss  
15 factor supplied to me by Staff witness Alan Bax in order to obtain the amount of generation  
16 necessary to meet this usage. The ratio of this generation requirement to the sum of the  
17 weather normalized hourly loads for the test year was applied to each hourly load of the  
18 weather normalized net system loads. This resulted in the annual sum of the hourly loads  
19 being equal to the adjusted test year net usage plus losses. A monthly summary of the  
20 adjusted hourly loads for MPS is shown on Schedule 3-1.

21 I also adjusted the weather normalized net system loads of SJLP in the same manner  
22 to correspond to the SJLP normalized annual usage supplied to me by Ms. Fischer. A  
23 monthly summary of the adjusted hourly loads for SJLP is shown on Schedule 3-2.

1 Q. Did you also develop hourly steam loads for use in the production cost model?

2 A. Yes, I did. Staff received monthly steam loads for the test year from UCU for  
3 SJLP's steam heating customers. I allocated the monthly steam loads to the hours in the test  
4 year using load shapes from calendar year 1999, as supplied by UCU, for use in the  
5 production costing model used by the Staff. Because the steam loads vary between weekdays  
6 and weekend days, I was careful to match the day types so that loads for the Saturdays and  
7 Sundays in the test year corresponded with a Saturday and Sunday load shape from the time  
8 period for which we had hourly loads.

9 Q. Which staff witness used the net system input hourly normalized loads and the  
10 hourly steam loads?

11 A. Staff witness David Elliott used the test year hourly normalized net system  
12 and steam loads as an input to the production cost model Staff used to develop Staff's  
13 normalized fuel expense.

14 **NORMAL WEATHER**

15 Q. What did you use to represent normal weather in these calculations?

16 A. The normal weather used in both the normalization of monthly class usage  
17 and hourly net system loads was calculated using Staff's ranking method and daily weather  
18 values for the time period January 1, 1961 through December 31, 1990. Staff's ranking  
19 method estimates daily normal values for the year, which range from the temperature value  
20 that is "normally" the hottest to the temperature value that is "normally" the coldest. This is  
21 important in estimating generation costs because these costs are greatly impacted by daily  
22 weather extremes. Since every year normally has some days with extreme temperatures, the

1 daily normal variables should also contain some extremes. The ranking method that I used  
2 estimates normal extremes.

3 Q. How are these extremes derived?

4 A. The daily normal variables are calculated by ranking the temperatures in each  
5 year of the history. These temperatures are then averaged across the rank, not the day of the  
6 year. This results in the normal extreme being the average of the most extreme temperatures  
7 in each year of the history. The second most extreme normal variable is based on the average  
8 of the second most extreme day of each year and so forth. The normal variables calculated  
9 from this ranking are then assigned to the days in the test year based on the rankings of the  
10 actual temperatures in the year. This results in as little weather normalization occurring on  
11 each day as is possible.

12 Q. Who supplied the history of daily high and low temperatures used in your  
13 calculation of daily normals?

14 A. Staff Witness Mr. Patterson supplied the history of daily temperatures that I  
15 used in calculating the daily normal weather values.

16 **LOAD RESEARCH RESOURCES**

17 Q. What is load research?

18 A. "Load research" refers to a program designed to obtain hourly electric load data  
19 for use in calculating hourly class loads. For customer classes whose members are not  
20 routinely metered on an hourly basis, such as the residential customers, the program requires  
21 the performance of a number of distinct tasks, such as determining a statistical sampling of  
22 customers within each customer class, installing interval data recorders (meters) on the  
23 premises of these selected customers, collecting and analyzing the hourly usage data

1 recorded by the special metering, and using statistical techniques to estimate hourly electric  
2 load data for each customer class from the data collected on the sampled customers. "Load  
3 research data" is the term used to describe the hourly data collected from customers that are  
4 specifically a part of the load research program. Class load data is the term that describes the  
5 hourly electric load data for each customer class, which is estimated from the load research  
6 data.

7 Q. Why is it important that each electric utility company have an ongoing load  
8 research program?

9 A. Overall, a load research program helps the utility understand how its customers  
10 use energy. Without such data, specialized load analyses could not be performed and certain  
11 types of rates could not be billed.

12 For most customers, the current practice of measuring electricity use is on a monthly  
13 basis because monthly data is used for billing customers. However, the monthly data does  
14 not provide much useful information about the way in which the customer's usage varies  
15 over shorter periods of time. A load research program fills this "information gap" by  
16 collecting hourly data on specific customers and then using statistical methods to estimate  
17 hourly use by classes of customers.

18 Q. What is load research data used for?

19 A. There are numerous current uses for sample customer load data including load  
20 analyses such as transformer/equipment sizing, outage or usage monitoring, power quality  
21 studies, and power factor determination.

22 The other major use for individual load research data is for billing purposes. The  
23 existence of load research data allows customers to be billed for hourly electricity use (real

1 time pricing), for billing by time-of-day periods, and for the monitoring of curtailable  
2 customers during curtailment periods.

3 Q. What is class load data used for?

4 A. Class load data is used in resource planning, forecasting, line extension policies,  
5 and estimation of electric end-use impacts on both customer classes and the utility. In the  
6 regulatory arena, class load data is used for weather normalization of class sales and weather  
7 normalization of hourly class loads that are used to develop class cost-of-service study  
8 allocations. Because the most obvious cost characteristic of an electric utility company is  
9 that the cost of generating electricity varies by the hour (or even shorter intervals), hourly  
10 class data allows the allocation of generation and other costs to the customer classes and the  
11 seasons of the year.

12 Q. Did you use load research in your analysis in this case?

13 A. Both MPS and Staff used load research in the weather normalization of class  
14 sales.

15 Q. What is your issue with respect to load research resources?

16 A. I filed testimony in the EM-2000-292 merger case between UCU and SJLP  
17 detailing my concern about the difference in the quality of load research between MPS and  
18 SJLP. Briefly, the MPS load research data was of poor quality and the SJLP load research  
19 data was of high quality. My concern was that SJLP's load research data would deteriorate  
20 to the lower standards of MPS.

21 Q. How did UCU respond to your concerns?

22 A. UCU witness Steven Pella stated in his surrebuttal testimony that UCU had  
23 made significant changes to its load research program to improve the quality of the resulting

1 data. Mr. Pella also stated in his testimony that UCU proposed to bring MPS's load research  
2 program in-house to reduce the quality problems associated with using outside consultants to  
3 maintain its load research program. In addition, the UCU transition team recommended that  
4 UCU post job advertisements for three employees, in addition to the current employee whose  
5 part-time responsibility was to oversee the load research program, immediately after the  
6 merger was complete. In discussions with UCU staff at the time of the merger case, Staff  
7 was led to believe that UCU would follow the recommendations of the transition team and  
8 hire three employees to do the load research work formally done by outside consultants. In  
9 my rebuttal testimony in the merger case, I expressed my concern that three employees would  
10 still not be enough resources to ensure the production of high quality load research data and  
11 class loads for the four electric divisions of UCU (SJLP, MPS, West Plains-Kansas and West  
12 Plains-Colorado), since prior to the merger, SJLP alone had three employees working on load  
13 research.

14 Q. What has occurred since the merger?

15 A. The merger was closed on December 31, 2000. Since that time, the load  
16 research estimation has been outsourced to the same consultant under a contract due to expire  
17 on January 1, 2002 and UCU hired one of the former SJLP employees that had worked with  
18 load research. In response to Staff Data Request No. 3531 and 3532, UCU stated that in  
19 addition to this one former SJLP employee, the only other UCU employee assigned to work  
20 on load research was the Director – Energy Forecasting and Research Department, and that  
21 only forty percent (40%) of his time was dedicated to load research. This response also  
22 indicated that UCU had posted advertisements for two Load Research Technicians and  
23 planned to interview for those positions in November or December of 2001.

1           Q.     Why are you concerned about the load research resources?

2           A.     In his testimony filed in this case, Staff witness Dr. Michael S. Proctor  
3 recommends that to the Commission open a docket to investigate the functional cost  
4 components of each rate for MPS and SJLP, as well as for the purpose of investigating the  
5 class cost of service and rate design for MPS and SJLP. In his testimony, Dr. Proctor goes  
6 into detail about the problems of using the most recently estimated class loads that were  
7 developed by UCU and the importance of having available good class hourly quality loads  
8 for such a case. In addition, the employees that develop the data and estimate the class loads  
9 play an integral part in a rate design case. Poor quality data and little or no help from utility  
10 employees would make such a case a difficult, if not impossible, task. Load research is a  
11 complicated endeavor and it takes time and resource commitments to develop quality load  
12 research. UCU has not shown itself to quickly live up to its intentions in the area of load  
13 research as stated in its merger testimony.

14          Q.     Does this conclude your direct testimony?

15          A.     Yes, it does.



**BEFORE THE PUBLIC SERVICE COMMISSION  
OF THE STATE OF MISSOURI**

In The Matter Of The Tariff Filing Of )  
Missouri Public Service (MPS) A Division )  
Of UtiliCorp United Inc., To Implement A )  
General Rate Increase For Retail Electric )  
Service Provided To Customers In The )  
Missouri Service Area Of MPS. )

Case No. ER-2001-672

**AFFIDAVIT OF LENA M. MANTLE**

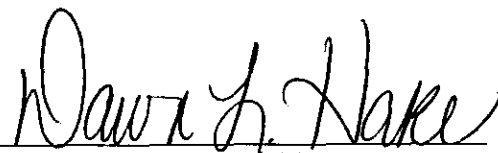
**STATE OF MISSOURI** )  
 ) ss  
**COUNTY OF COLE** )

Lena Mantle, of lawful age, on her oath states: that she has participated in the preparation of the foregoing Direct testimony in question and answer form, consisting of 14 pages of Direct testimony to be presented in the above case, that the answers in the foregoing Direct testimony were given by her; that she has knowledge of the matters set forth in such answers; and that such matters are true to the best of her knowledge and belief.

  
  
Lena M. Mantle

Subscribed and sworn to before me this 5<sup>th</sup> day of December, 2001.

**DAWN L. HAKE**  
Notary Public - State of Missouri  
County of Cole

  
Notary Public

My commission expires My Commission Expires Jan 9, 2005

**PREVIOUS TESTIMONY OF**  
**LENA M. MANTLE**

| <b>CASE NUMBER</b> | <b>TYPE OF<br/>TESTIMONY</b>            | <b>ISSUES</b>  |
|--------------------|---|--|
| ER-84-105          | Direct                                  | Demand-Side Update   |
| ER-85-20           | Direct                                  | Demand-Side Update   |
| ER-85-128, et. al  | Direct                                  | PURPA Standards  |
| EC-87-114, et. al. | Surrebuttal                             | Annualization & Normalization of Sales   |
| EO-90-101          | Direct,<br>Rebuttal, and<br>Surrebuttal | Weather Normalization of Sales<br>Normalization of Net System                              |
| ER-90-138          | Direct                                  | Normalization of Net System  |
| EO-90-251          | Rebuttal                                | Promotional Practice Variance  |
| EO-91-74, et. al.  | Direct                                  | Weather Normalization of Class Sales<br>Normalization of Net System                        |
| ER-93-37           | Direct                                  | Weather Normalization of Class Loads<br>Normalization of Net System                        |
| ER-94-163          | Direct                                  | Normalization of Net System  |
| ER-94-174          | Direct                                  | Weather Normalization of Class Sales<br>Normalization Net System                           |
| EO-94-199          | Direct                                  | Weather Normalization of Sales   |
| ET-95-209          | Rebuttal and<br>Surrebuttal             | New Construction Pilot   |
| ER-95-279          | Direct                                  | Normalization of Net System  |
| ER-97-81           | Direct                                  | Weather Normalization of Class Hourly<br>Loads, TES Tariff, Normalization of Net<br>System |

**PREVIOUS TESTIMONY**  
**OF LENA M. MANTLE (cont.)**

| <b>CASE NUMBER</b> | <b>TYPE OF<br/>TESTIMONY</b>           | <b>ISSUES</b>  |
|--------------------|--|--|
| EO-97-144          | Direct                                 | Weather Normalization of Class Loads<br>Normalization of Net System                        |
| ER-97-394, et. al. | Direct,<br>Rebuttal and<br>Surrebuttal | Weather Normalization of Class Loads<br>Normalization of Net System<br>Energy Audit Tariff |
| EM-97-575          | Direct                                 | Normalization of Net System  |
| EM-2000-292        | Direct                                 | Normalization of Net System<br>Load Research   |
| ER-2001-299        | Direct                                 | Weather Normalization of Class Loads<br>Normalization of Net System                        |
| EM-2000-369        | Direct                                 | Load Research  |
| ER-2002-1          | Direct                                 | Weather Normalization of Class Loads<br>Normalization of Net System                        |

Weather Adjustments to Class Sales  
Missouri Public Service  
January 2000 through December 2000

|        | 60/MO860     | 70/MO870     | 310/MO710   | 311/MO711   | 316/MO716 | 320/MO720   | 325/MO725 | 340/MO740   | Total        |
|--------|--------------|--------------|-------------|-------------|-----------|-------------|-----------|-------------|--------------|
| Jan-00 | 4,876,903    | 7,843,910    | 368,795     | 1,163,157   | 4,500     | 577,205     | 31,587    | 303,733     | 15,169,790   |
| Feb-00 | 6,172,885    | 10,889,093   | 494,242     | 1,541,612   | 9,135     | 933,274     | 53,212    | 323,013     | 20,416,466   |
| Mar-00 | 4,701,619    | 9,850,729    | 607,731     | 1,031,189   | 3,017     | (107,495)   | 37,799    | 320,085     | 16,444,674   |
| Apr-00 | 2,777,949    | 3,563,283    | 219,566     | 522,396     | 3,529     | 239,534     | 39,057    | 151,518     | 7,516,832    |
| May-00 | (23,929)     | 902,459      | (75,383)    | (343,417)   | (2,065)   | (487,973)   | (58,380)  | 3,126       | (85,562)     |
| Jun-00 | 1,240,032    | 1,235,562    | (74,362)    | (250,823)   | (1,972)   | (101,584)   | 31,323    | 82,315      | 2,160,491    |
| Jul-00 | 27,051,656   | 4,562,457    | 759,170     | 2,517,635   | 6,304     | 1,701,986   | 119,501   | 581,606     | 37,300,315   |
| Aug-00 | (9,380,561)  | (1,492,148)  | (326,806)   | (1,320,743) | (2,028)   | (1,306,263) | (79,009)  | (395,383)   | (14,302,941) |
| Sep-00 | (45,392,268) | (8,003,413)  | (1,565,524) | (4,710,794) | (24,706)  | (3,359,621) | (205,575) | (1,263,326) | (64,525,227) |
| Oct-00 | (11,708,572) | (1,569,392)  | (499,107)   | (1,460,035) | (8,228)   | (1,503,548) | (35,520)  | (306,356)   | (17,090,758) |
| Nov-00 | (2,376,606)  | (874,590)    | (288,756)   | (894,755)   | (4,711)   | (1,074,246) | (33,219)  | (156,328)   | (5,703,211)  |
| Dec-00 | (6,635,701)  | (10,032,861) | (633,644)   | (1,598,058) | (8,855)   | (543,728)   | (46,872)  | (428,238)   | (19,927,957) |
| Total  | (28,696,593) | 16,875,089   | (1,014,078) | (3,802,636) | (26,080)  | (5,032,459) | (146,096) | (784,235)   | (22,627,088) |
|        |              |              |             |             |           |             |           |             |              |
| Summer | (26,481,141) | (3,697,542)  | (1,207,522) | (3,764,725) | (22,402)  | (3,065,482) | (133,760) | (994,788)   | (39,367,362) |
| Other  | (2,215,452)  | 20,572,631   | 193,444     | (37,911)    | (3,678)   | (1,966,977) | (12,336)  | 210,553     | 16,740,274   |

Missouri Public Service, a Division of UtiliCorp, United  
Net System Load  
Normalized Test Year Ending 12/2000  
ER-2001-672

| Month  | Monthly Usage (MWh) |           |          |         | Monthly Peaks (MW) |        |          |         | Load Factor |             |
|--------|---------------------|-----------|----------|---------|--------------------|--------|----------|---------|-------------|-------------|
|        | Actual              | Normal    | Adj      | % Adj   | Actual             | Normal | Wthr Adj | % Adj   | Actual      | Normal      |
| Jan-00 | 429,271             | 473,533   | 44,262   | 10.31%  | 759                | 844    | 84.56    | 11.14%  | 0.760181    | 0.754508    |
| Feb-00 | 382,319             | 426,194   | 43,875   | 11.48%  | 730                | 817    | 87.83    | 12.04%  | 0.752993    | 0.749208    |
| Mar-00 | 381,561             | 405,047   | 23,487   | 6.16%   | 654                | 687    | 33.13    | 5.07%   | 0.784534    | 0.792650    |
| Apr-00 | 350,718             | 363,557   | 12,838   | 3.66%   | 684                | 658    | (25.10)  | -3.67%  | 0.712668    | 0.766923    |
| May-00 | 427,348             | 413,193   | (14,155) | -3.31%  | 1,104              | 976    | (128.06) | -11.60% | 0.520284    | 0.569058    |
| Jun-00 | 470,188             | 509,592   | 39,404   | 8.38%   | 1,093              | 1,176  | 83.17    | 7.61%   | 0.597747    | 0.602012    |
| Jul-00 | 586,107             | 632,895   | 46,788   | 7.98%   | 1,255              | 1,327  | 72.34    | 5.76%   | 0.627812    | 0.640978    |
| Aug-00 | 657,472             | 584,103   | (73,369) | -11.16% | 1,335              | 1,257  | (77.74)  | -5.82%  | 0.661897    | 0.624390    |
| Sep-00 | 481,238             | 446,076   | (35,162) | -7.31%  | 1,308              | 1,185  | (122.98) | -9.40%  | 0.510999    | 0.522818    |
| Oct-00 | 394,758             | 392,210   | (2,547)  | -0.65%  | 872                | 855    | (16.86)  | -1.93%  | 0.608682    | 0.616681    |
| Nov-00 | 409,477             | 403,822   | (5,655)  | -1.38%  | 768                | 761    | (6.45)   | -0.84%  | 0.740711    | 0.736666    |
| Dec-00 | 506,510             | 486,077   | (20,433) | -4.03%  | 937                | 885    | (51.94)  | -5.54%  | 0.726256    | 0.737843    |
| Annual | 5,476,966           | 5,536,298 | 59,332   | 1.08%   | 1,335              | 1,327  | (7.96)   | -0.60%  | 0.468298    | 0.476211    |
| Summer | 2,195,005           | 2,172,665 | (22,340) | -1.02%  | 1,335              | 1,327  | (7.96)   | -0.60%  | 0.561501144 | 0.559122    |
| Other  | 3,281,961           | 3,363,633 | 81,672   | 2.49%   | 1,104              | 976    | (128.06) | -11.60% | 0.509737797 | 0.590972708 |

St. Joseph Power and Light, a Division of UtiliCorp, United  
Net System Load  
Normalized Test Year Ending 12/2000  
ER-2001-672

| - Month | Monthly Usage (MWh) |           |          |        | Monthly Peaks (MW) |        |          |        | Load Factor |             |
|---------|---------------------|-----------|----------|--------|--------------------|--------|----------|--------|-------------|-------------|
|         | Actual              | Normal    | Adj      | % Adj  | Actual             | Normal | Wthr Adj | % Adj  | Actual      | Normal      |
| Jan-00  | 162,739             | 178,246   | 15,507   | 9.53%  | 296                | 334    | 37.64    | 12.72% | 0.738970    | 0.718075    |
| Feb-00  | 144,916             | 161,135   | 16,219   | 11.19% | 287                | 326    | 38.93    | 13.57% | 0.725480    | 0.710318    |
| Mar-00  | 142,888             | 151,933   | 9,045    | 6.33%  | 243                | 269    | 25.77    | 10.61% | 0.790345    | 0.759797    |
| Apr-00  | 129,577             | 134,726   | 5,149    | 3.97%  | 233                | 248    | 15.07    | 6.47%  | 0.772392    | 0.754285    |
| May-00  | 145,890             | 145,286   | (604)    | -0.41% | 357                | 338    | (18.84)  | -5.28% | 0.549268    | 0.577467    |
| Jun-00  | 160,998             | 173,593   | 12,595   | 7.82%  | 355                | 384    | 29.34    | 8.27%  | 0.629883    | 0.627309    |
| Jul-00  | 190,753             | 205,367   | 14,614   | 7.66%  | 378                | 414    | 35.85    | 9.48%  | 0.678276    | 0.666987    |
| Aug-00  | 207,483             | 193,106   | (14,377) | -6.93% | 403                | 398    | (4.92)   | -1.22% | 0.691998    | 0.652012    |
| Sep-00  | 162,794             | 157,449   | (5,345)  | -3.28% | 393                | 375    | (17.81)  | -4.53% | 0.575325    | 0.582855    |
| Oct-00  | 140,248             | 142,688   | 2,440    | 1.74%  | 251                | 261    | 9.88     | 3.94%  | 0.751017    | 0.735152    |
| Nov-00  | 156,902             | 153,436   | (3,466)  | -2.21% | 285                | 283    | (1.50)   | -0.53% | 0.764630    | 0.751696    |
| Dec-00  | 189,451             | 179,009   | (10,442) | -5.51% | 346                | 331    | (15.14)  | -4.38% | 0.735949    | 0.727212    |
| Annual  | 1,934,639           | 1,975,974 | 41,336   | 2.14%  | 403                | 414    | 10.85    | 2.69%  | 0.548013    | 0.545050    |
| Summer  | 722,028             | 729,515   | 7,487    | 1.04%  | 403                | 414    | 10.85    | 2.69%  | 0.611896432 | 0.602036    |
| Other   | 1,212,611           | 1,246,459 | 33,849   | 2.79%  | 357                | 338    | (18.84)  | -5.28% | 0.582419079 | 0.632029489 |

**Cases in Which Staff Weather Normalization Method Was Used  
in the Normalization of Net System Loads**

|           |             |
|-----------|-------------|
| EO-87-175 | ER-94-174   |
| EO-90-101 | ER-95-279   |
| EO-90-138 | ER-97-81    |
| ER-93-37  | EM-97-575   |
| ER-93-41  | EM-2000-292 |
| EO-93-351 | ER-2001-299 |
| ER-94-163 | EC-2001-1   |