Exhibit No.:
Issues: Weather Normalized Sales;
Peak Day Demand
Witness: James A. Gray
Sponsoring Party: MO PSC Staff
Type of Exhibit: Direct Testimony
Case No.: GR-2000-512

# MISSOURI PUBLIC SERVICE COMMISSION

# UTILITY OPERATIONS DIVISION

# DIRECT TESTIMONY

# OF

# JAMES A. GRAY

# UNION ELECTRIC COMPANY

# d/b/a AmerenUE

# CASE NO. GR-2000-512

Jefferson City, Missouri
August 2000

1      **TABLE OF CONTENTS FOR**

2      **JAMES A. GRAY**

3      **UNION ELECTRIC COMPANY**

4      **d/b/a AmerenUE**

5      **CASE NO. GR-2000-512**

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# DIRECT TESTIMONY

# OF

# JAMES A. GRAY

# UNION ELECTRIC COMPANY

# d/b/a AmerenUE

# CASE NO. GR-2000-512

Q. Please state your name and business address.

A. My name is James A. Gray. My business address is P. O. Box 360, Jefferson City, Missouri 65102.

Q. By whom are you employed and in what capacity?

A. I am employed by the Missouri Public Service Commission (Commission) as a Regulatory Economist in the Tariffs/Rate Design Section of the Commission's Gas Department.

Q. How long have been employed by the Commission?

A. I have been employed with the Commission for approximately twenty years.

Q. Please state your educational background.

A. I received a degree of Bachelor of Science in Psychology as well as one in General Studies from Louisiana State University, and I received a degree of Master of Science in Special Education from the University of Tennessee. Additionally, I completed several courses in research and statistics at the University of Missouri - Columbia.

Q. Please state your professional qualifications.

1

1    A. Prior to being employed by the Commission, I was a Research Analyst for two

2    and a half years with the Missouri Department of Mental Health where I conducted

3    statistical analyses. In 1980, I began my employment with the Commission as a

4    Statistician in the Depreciation Department where I prepared depreciation, trended

5    original cost, and trended original cost less depreciation studies.

6    Beginning in 1989 as a member of the Economic Analysis Department, I

7    submitted testimony on weather normalized sales for natural gas, water, and electric

8    utilities. In electric utilities' resource plans, I reviewed the residential electric load

9    forecasts with their associated detailed end-use studies and marketing surveys.

10    Since December of 1997, I have been in the Tariffs/Rate Design Section of the

11    Commission's Gas Department where my duties have been to review tariffs and

12    applications of natural gas utilities. In my current duties, I have submitted testimony on

13    weather normalized sales, certificates of convenience and necessity, and recommended

14    minimum statistical sample sizes to be used in natural gas residential customer billing

15    reviews.

16    Q. Please list all the cases in which you have submitted prepared written

17    testimony before this Commission.

18    A. The cases in which I have submitted prepared, written testimony are

19    enumerated in Schedule 1, attached to my testimony.

20    Q. What is the purpose of your testimony?

21    A. My testimony addresses the Commission Staff's (Staff) weather adjustment of

22    natural gas sales for the firm natural gas customers of Union Electric Company d/b/a

23    AmerenUE (AmerenUE or Company) for the test year ending June 30, 1999. I use the

1 results of my weather normalized sales studies to estimate weather normalized coincident

2 peak day demand.

3 **WEATHER NORMALIZED SALES**

4     Q. What firm customer classes did you adjust test year natural gas sales to normal

5 weather conditions?

6     A. I weather adjusted the residential (RES) and General Service (GS) customer

7 classes of AmerenUE.

8     Q. How did you segregate AmerenUE's Missouri natural gas service area for

9 your studies?

10     A. AmerenUE is supplied by three natural gas pipelines. The Panhandle Eastern

11 Pipe Line Company (PEP) supplies AmerenUE's central and eastern Missouri

12 communities, including Columbia, Jefferson City, Eldon, Mexico, Moberly, Louisiana,

13 and Wentzville. Staff witness Dennis Patterson provided me with the weather data from

14 the Columbia Regional Airport to study the PEP service area.

15     Natural Gas Pipeline Company of America (NGP) and Texas Eastern

16 Transmission Corporation (TET) supply southeastern Missouri communities, including

17 Fisk, Dexter, and Cape Girardeau. I combined AmerenUE's Texas Eastern service area

18 and Natural Gas Pipeline service area into one for my analyses. Mr. Patterson provided

19 me with the weather data from the Cape Girardeau FAA Airport to study the combined

20 NGP/TET service area.

21     Q. Please identify the Staff witnesses who utilize the results of your weather

22 adjusted volumes.

1      A.  I provided the results of my weather normalized sales volumes to Staff

2    witness Henry E. Warren, PhD for his allocation of the weather normalized sales to the

3    GS rate blocks and to Staff witness John P. Cassidy of the Commission's Accounting

4    Department for his customers' growth annualization and revenue calculations.

5      Q.  Why is it important to adjust test year natural gas sales to normal weather?

6      A.  Since rates are based on natural gas usage during the test year, it is important

7    to remove the influence of abnormal weather.  Otherwise, if natural gas usage volumes

8    reflect the influence of abnormal weather, the rates will be distorted by these deviations

9    from normal weather conditions during the test year.  My adjustments to test year sales

10    set the test year natural gas volumes at the levels that would be experienced under normal

11    weather conditions.

12      Q.  Why are natural gas sales dependent upon weather conditions?

13      A.  Weather sensitive natural gas sales increase during colder weather, primarily

14    because of space heating and, somewhat, because of water heating.  Space heating refers

15    to the amount of natural gas to heat the "space" of a residence or building structure

16    during colder weather.  In Missouri, the space heating season is usually from mid-

17    November through mid-March.

18      Q.  How does your analyses adjust test year weather sensitive sales if the test year

19    is warmer or colder than normal?

20      A.  If the test year is warmer than normal, weather adjusted natural gas sales for

21    the test year would be increased to reflect a normal year because the Company would be

22    expected to sell higher natural gas volumes during a normal, but colder year.  Conversely,

23    if the test year is colder than normal, weather adjusted natural gas sales for the test year

1   would be decreased to reflect a normal, but warmer year, because the Company would be

2   expected under normal weather conditions to sell less natural gas than the Company sold

3   during the test year. Thus, my weather normalized sales volumes adjust the test year

4   natural gas sales to normal weather conditions.

5        Q. What weather measure for the test year did you use in your analyses?

6        A. Mr. Patterson provided me with daily actual and daily normal heating degree

7   days (HDD) for the Columbia Regional Airport and the Cape Girardeau FAA Airport.

8   Mr. Patterson's testimony discusses the calculation of HDD.

9        Q. What is the source of your test year billed natural gas usage data?

10        A. AmerenUE provided monthly natural gas sales in hundred cubic feet (Ccf) and

11   monthly numbers of customers for each billing cycle, by customer class and service area

12   for the test year.

13        Q. What are billing cycles?

14        A. The Company schedules groups of natural gas meters to be read throughout a

15   month, followed by bills to be mailed throughout the month. These customers' natural

16   gas meters are read approximately every thirty days (a billing month), not a calendar

17   month, because not all natural gas meters are read on the first day of a calendar month.

18   Staggering the meter reading dates by billing cycle over the billing months reduces the

19   effort to bill AmerenUE's customers. Since there are approximately twenty-one working

20   days in a month, customers are usually grouped into one of twenty-one billing cycles.

21   The number of days between meter readings varies among the billing cycles within a

22   billing month. Moreover, individual billing cycles may exhibit month to month

23   variations in the numbers of days between scheduled meter readings, due to holidays and

1    variations in the number of days and in the placement of weekends, from one billing

2    month to another.

3        Schedule 2, attached to this testimony, shows how the twenty-one billing cycles'

4    scheduled meter reading dates are staggered for the billing month of January 1999. The

5    billing month of January starts on December 30, 1998, and ends January 28, 1999. Using

6    billing cycles allows each billing month's customer numbers and usage for a particular

7    rate class to be combined and recorded into the approximately twenty-one billing cycle

8    groups.

9        Q. Why do you rely on billing cycle usage data?

10        A. The Company's customer billing records are based on monthly billing cycles.

11    That is, the Company records maintain grouped summary natural gas statistics by billing

12    cycle for each billing month.

13        It would be ideal to have daily measures of both natural gas usage and weather, so

14    the two can be precisely matched and studied. However, natural gas companies normally

15    do not record daily usage data for RES or GS customers. Therefore, I relied on the

16    Company's monthly billing cycle data.

17        Q. Did you encounter any discrepancies in AmerenUE's customer numbers and

18    natural gas usage data?

19        A. Yes, the data furnished to Staff did not match AmerenUE witness James R.

20    Pozzo's work papers in this case. Discrepancies in natural gas volumes were especially

21    noticeable for the GS customers in July 1998. Discrepancies in July when there are no

22    space heating requirements do not necessarily distort the relationship between natural gas

23    space heating usage and HDD. I have also encountered similar problems with customer

1  numbers and Ccf in AmerenUE's Case No. GR-97-393. To properly estimate the

2  relationship between natural gas heating usage and HDD, it is important for a Company

3  to maintain and furnish accurate sales data to Staff.

4  Q. How did you analyze space heating natural gas volumes for the test year?

5  A. I performed the analyses for each of two service area classifications, PEP and

6  NGP/TET. I calculated two sets of twelve billing month averages by customer class.

7  One set of these averages was the daily average natural gas usage in Ccf and another set

8  was the daily average HDD. These billing month averages were calculated from the data

9  on numbers of customers, natural gas usage in Ccf, and summed HDD from

10  approximately twenty-one billing cycles for each billing month by customer class.

11  Q. Why did you sum Mr. Patterson's daily HDD by billing cycle?

12  A. To match the daily HDD by billing cycle with the Company's customer

13  billing records, I summed the daily HDD for the dates encompassing each billing cycle.

14  This matches Mr. Patterson' daily heating degree weather series with the Company's

15  customer billing records. These daily weather measures can be added over the dates

16  between each billing cycle's meter readings, whereas monthly values cannot be analyzed

17  or quantified by date or day. Therefore, calendar month weather measures would be

18  inappropriate for billing cycles.

19  Q. How do the twelve billing month customer weighted averages of HDD reflect

20  different customer levels among the different billing cycles throughout the test year?

21  A. Each billing month's daily average HDD in each billing cycle in the test year

22  was weighted by the percentage of customers served in that billing cycle. Thus, the

1   billing cycles with the most customers are given more weight in computing the billing

2   month daily average HDD.

3          Schedule 3, attached to this testimony shows the number of customers, Ccf used,

4   and HDD for the billing month of January 1999 for AmerenUE's GS customers in the

5   PEP service area.  Note that the customer numbers vary from 206 for billing cycle

6   number 13 to 814 customers for billing cycle number 9.  Also, the HDD vary from 885

7   for billing cycle number 5 to 1,419.5 HDD for billing cycle number 20.  This shows that

8   there are significant differences between billing cycles within a billing month.  This

9   demonstrates the need to carefully average the HDD across the approximately twenty-one

10  billing cycles for each of the billing months of the test year.

11         Q.  How did you average billing month usage in Ccf?

12         A.  I calculated twelve simple, unweighted averages representing daily usage per

13  customer for each month of the test year, ending June 30, 1999.  That is, I divided each

14  cycle's volumes by the number of customers and the number of days in each billing

15  cycle.  This stated the Company's natural gas usage by billing cycle on a daily basis.

16         So, all billing cycles in a billing month are equated, regardless of the variations in

17  the number of days between meter readings among the billing cycles within a billing

18  month.  Then I averaged all of the approximately twenty-one billing cycles' daily usages

19  per customer over each billing month of the test year to calculate one month's daily

20  average usage in Ccf.

21         Q.  How did you quantify the relationship of natural gas sales to HDD?

22         A.  My studies estimate a change in usage in Ccf to a change in HDD based on

23  the two sets of twelve monthly billing month averages of average daily usage in Ccf per

1    customer and the customer weighted average daily HDD.  These two sets of billing

2    month averages (usage and weather) were used to study the relationship between space

3    heating natural gas usage in Ccf and colder weather.

4    Regression analysis estimates the relationship for each of the RES and GS

5    customer classes in the PEP and NGP/TET service areas.  Regression analysis describes

6    the relationship between daily space heating sales per customer in Ccf to the daily HDD.

7    Q.  What are advantages to using regression?

8    A.  The main advantage is that regression is easily understood and interpreted.

9    Also, regression develops quantitative measures that describe relationships.

10    The regression equation calculates a straight line that best fits the relationship.

11    The slope (or slant) of the best fitting straight line estimates a change in the daily natural

12    gas usage per customer whenever the daily average HDD change one HDD.  For example

13    in my analyses, the slope of the best fitting regression line for AmerenUE's RES in the

14    PEP service area is 0.124054.  This means that, in AmerenUE PEP service area, a RES

15    customer's estimated usage will change approximately 0.124054 Ccf per day for every

16    change of one HDD.  The steeper the slopes of the regression lines or the larger the

17    numerical value of the slope, the greater the estimated change in space heating usage in

18    Ccf for a change of one HDD.

19    Also, regression calculates a measure of the goodness of fit.  The measure is

20    referred to as *r squared* ($r^2$).  The $r^2$ ranges from 0.00 to 1.00, with 1.00 being a perfect

21    fit.

22    Q.  How closely did your regression results match actual average daily natural gas

23    sales per customer for the billing months in the test year?

1    A.  Schedules 4-1 through 4-2, attached to this testimony, show the regression

2    best fitting lines and each billing month's actual average daily natural gas sales per

3    customer plotted against the billing month's actual average daily HDD.  The plots

4    demonstrate that the regression lines fit the data very closely.  Moreover, all of Staff $r^2$

5    values were above 0.95826, which also indicates a good fit.

6    Q.  Up to this point, is your daily estimated usage Ccf based on any normal

7    values?

8    A.  No, the estimated daily usage per Ccf per customer was based on actual HDD

9    and the actual number of days in each billing cycle for the test year.  I used the estimated

10   relationship between space heating usage in Ccf and HDD to adjust the test year actual

11   HDD to the normal HDD provided to me by Mr. Patterson.

12   Q.  How did you adjust monthly natural gas volumes to normal?

13   A.  The first step is to equalize each billing cycle's annual total normal HDD over

14   the test year.  I added or subtracted a few days to make each billing cycle's annual total

15   days match 365 days, the number of calendar days in the test year.  This adjustment for

16   days, set each billing cycle to the same total number of days and normal HDD.  Failure to

17   equalize the normal HDD in the test year will result in some billing cycles having the

18   wrong annual or total number of normal HDD for the test year.

19   Once each billing cycle has the proper normal HDD, the second step is to

20   calculate each billing cycle's difference between normal and actual (normal - actual) for

21   HDD.  The third step is to multiply these differences times the appropriate estimate from

22   the regression results.

1    The fourth step is to sum each billing cycle's adjustment volumes by billing

2    month. The fifth step is to add the monthly adjustments in Ccf to total monthly natural

3    gas sales for the test year.

4         Q. Why do you state natural gas usage on a per customer usage basis?

5         A.   After calculating its customers' growth annualization, the Commission's

6    Accounting Department can multiply its customer levels times my weather normalized

7    sales per customer.   Therefore, stating the results of my studies on a monthly per

8    customer basis facilitates calculating total test year weather normalized sales for the test

9    year.

10        Q. Are your normalized sales stated in daily usage per customer equivalent to

11   what a typical customer would use?

12        A. No, I did not select typical customers. AmerenUE provided me with all bills

13   rendered during the test year. I did not segregate those customers into heating categories,

14   such as, customers using natural gas for space heating and customers using natural gas

15   only for water heating. The data include partial bills, such as final bills or new customers

16   receiving service in the middle of the month. Also, billing adjustments to current or prior

17   months are included in the data.

18        Q. What were the results of your weather normalized sales studies?

19        A. My analyses result in an increase to test year natural gas sales because the

20   weather during the test year was warmer than normal.   My analyses result in an

21   approximate 11.1 percent increase from actual test year natural gas sales for the RES

22   customer class and an approximate 9.8 percent increase for the GS customer class. These

23   increases do not include the Staff's customer growth annualization.

1    Q.   What results did you provide to Mr. Cassidy for his customers' growth

2    annualization and revenue calculations?

3    A.   I provided monthly, normalized natural gas usage in Ccf per customer by

4    customer class for the PEP and NGP/TET service areas.  These results are contained in

5    Schedule 5, attached to my testimony.  Schedule 5 demonstrates the higher natural gas

6    usage per customer in the colder, winter months because of space heating requirements.

7    **WEATHER NORMALIZED COINCIDENT PEAK DAY DEMAND**

8    Q.   What are estimates of weather normalized coincident peak day demand by

9    customer class?

10   A.   Briefly, it is the estimated usage per customer by firm customer class on

11   Mr. Patterson's normally occurring coldest days.  The daily peak is the highest daily load

12   or draw of natural gas on a system, and the demand is the rate or amount of natural gas

13   used on that day.  My estimates of RES and GS natural gas peak usage are at the time

14   (coincident) of a utility's system peak.  These estimates of weather normalized coincident

15   peak day demand quantify the relative contributions towards that single-day system peak

16   by the RES and GS customers.  For cost-of-service studies, it is important to determine

17   the class contributions to the peak day responsibility.

18   RES and GS customers would be expected to use more natural gas on those colder

19   days since their demand for natural gas are highly dependent upon the daily weather in

20   HDD.  My studies of weather normalized sales have verified this weather sensitive usage

21   through such measures as the $r^2$ and my plots of the relationship between space heating

22   daily usage in Ccf and daily HDD.

1    Q. What weather data did Mr. Patterson provide to you for estimating weather

2    normalized coincident peak day demand?

3    A. Mr. Patterson provided me with two sets (one for the PEP service area and

4    one for the NGP/TET service area) of thirteen HDD calculated from his estimated

5    weather normalized coldest day for each month as well as a weather normalized estimate

6    of an annually occurring coldest day. Mr. Patterson's testimony discusses how he

7    calculated his estimated weather normalized coldest days.

8    Q. Why did you calculate your weather normalized coincident peak day demand

9    estimates from the Company's billing data?

10    A. Acceptable load research data are unavailable for the RES and GS customer

11    classes. Load research is the systematic gathering, recording, and analyzing of data

12    describing utility customers' patterns of energy usage. The customer billing data are the

13    best available surrogate data to estimate the relationship between the weather normalized

14    coincident peak day demand by firm customer class and HDD on the normally occurring

15    coldest days.

16    Q. How did you estimate weather normalized coincident peak day usage in Ccf

17    per customer by customer class for each month of the test year?

18    A. I used the relationships between natural gas usage per customer and HDD

19    from my weather normalized sales studies based on the Company's billing data. My

20    regression studies were based on daily usage per customer. So, the results of my weather

21    normalized sales studies were directly applied to estimate weather normalized coincident

22    peak day demand.

1       My natural gas sales regression studies estimated a change in space heating

2   natural gas usage per customer for a change of one HDD. For example, the slope of the

3   best fitting line for the RES customers in the PEP service area is 0.124054. I multiplied

4   that estimate times Mr. Patterson's thirteen coldest HDD values calculated from his

5   weather normalized coldest days.

6       Then, I added these results or mathematical products to another estimate from my

7   weather normalized sales studies. It is an estimate of non-weather sensitive usage in Ccf

8   per customer calculated from the regression equation. Non-weather sensitive usage

9   occurs in the summer months when there is no space heating requirement. That non-

10  weather sensitive usage estimate is the left, bottom point on each regression line

11  (intercept) in Schedules 4-1 and 4-2. It is non-weather sensitive because it does not

12  depend upon HDD. Accordingly, I added the preceding thirteen products to the

13  estimated non-weather sensitive usage per customer during the summer months to

14  calculate a total estimated weather normalized coincident peak day demand per customer.

15      In this manner, I used my weather normalized sales studies results to estimate the

16  natural gas usage in Ccf per customer on the weather normalized coldest day of each

17  month and for the entire year (annual). Thus, my studies allocate the weather normalized

18  coincident peak day responsibility to the RES and GS customer classes for the PEP and

19  NGP/TET service areas.

20      Schedule 6, attached to this testimony, shows the estimated weather normalized

21  coincident peak day natural gas usage in Ccf per customer by billing month and customer

22  class for the PEP and NGP/TET service areas. This information was provided to Staff

1   witness Daniel I. Beck for his calculation of total peak day demand across all customer

2   classes.

3       Q. Why did you state the weather normalized coincident peak day responsibilities

4   on a per customer basis?

5       A. This allows Mr. Beck to multiply my weather normalized coincident peak day

6   demand estimates times the appropriate customer numbers to calculate total weather

7   normalized coincident peak day demand volumes by customer class.

8       Q. What is the primary difference in methodology between your adjusting sales

9   volumes to normal weather and your weather normalized coincident peak day demand

10  studies?

11      A. My studies of weather normalized sales starts with the test year sales volumes

12  and adjusts those volumes to normal weather conditions. In contrast, I lacked acceptable

13  load research data to determine the actual coincident peak day demand for the test year

14  and adjust it. Therefore, I used the regression results from my weather normalized sales

15  studies to estimate my weather normalized coincident peak day demands by customer

16  class on Mr. Patterson's normally occurring coldest days.

17

18  **RECOMMENDATIONS**

19

20      Q. Would you please summarize your recommendations?

21      A. I recommend that the Commission utilize the results of my sales volumes

22  adjustments for normal weather including the weather adjusted normalized usage per

1  customer shown in Schedule 5 and my estimated weather normalized coincident peak day

2  demand in Ccf per customer shown in Schedule 6, attached to this testimony.

3       Q. Does this conclude your Direct Testimony?

4       A. Yes, it does.

# BEFORE THE PUBLIC SERVICE COMMISSION

## OF THE STATE OF MISSOURI

| | | |
|---|---|---|
| In the matter of Union Electric Company | ) | |
| d/b/a AmerenUE for Authority to File | ) | |
| Tariffs Increasing Rates for Gas Service | ) | Case No. GR-2000-512 |
| Provided to Customers in the Company's | ) | |
| Missouri Service Area. | ) | |

## AFFIDAVIT OF JAMES A. GRAY

| | | |
|---|---|---|
| STATE OF MISSOURI | ) | |
| | ) | ss. |
| COUNTY OF COLE | ) | |

James A. Gray, is, of lawful age, on his oath states: that he has participated in the preparation of the foregoing Direct Testimony in question and answer form, consisting of __16__ pages to be presented in the above case; that the answers in the foregoing Direct Testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such matters are true and correct to the best of his knowledge and belief.

_James A. Gray_
JAMES A. GRAY

Subscribed and sworn to before me this ___ day of August 2000.

_Sharon S. Wiles_
Notary Public

My Commission Expires: _____

Union Electric Company

d/b/a AmerenUE

Case No. GR-2000-512

**Summary of Cases in Which Prepared Testimony Was Submitted by**

**James A. Gray**

| | |
|---|---|
| Missouri Public Service Company | GR-81-312 |
| Missouri Public Service Company | ER-82-39 |
| Missouri Public Service Company | GR-82-194 |
| Laclede Gas Company | GR-82-200 |
| St. Louis County Water Company | WR-82-249 |
| Missouri Public Service Company | ER-83-40 |
| Kansas City Power & Light Company | ER-83-49 |
| Osage Natural Gas Company | GR-83-156 |
| Missouri Public Service Company | GR-83-186 |
| The Gas Service Company | GR-83-225 |
| Laclede Gas Company | GR-83-233 |
| Missouri Water Company | WR-83-352 |
| Missouri Cities Water Company | WR-84-51 |
| Le-Ru Telephone Company | TR-84-132 |
| Union Electric Company | ER-84-168 |
| Union Electric Company | EO-85-17 |
| Kansas City Power & Light Company | ER-85-128 |
| Great River Gas Company | GR-85-136 |
| Missouri Cities Water Company | WR-85-157 |
| Missouri Cities Water Company | SR-85-158 |
| United Telephone Company of Missouri | TR-85-179 |
| Osage Natural Gas Company | GR-85-183 |
| Kansas City Power & Light Company | EO-85-185 |
| ALLTEL Missouri, Inc. | TR-86-14 |
| Sho-Me Power Corporation | ER-86-27 |
| Missouri-American Water Company, Inc. | WR-89-265 ** |
| The Empire District Electric Company | ER-90-138 ** |
| Associated Natural Gas Company | GR-90-152 |
| Missouri-American Water Company, Inc. | WR-91-211 ** |
| United Cities Gas Company | GR-91-249 ** |
| Laclede Gas Company | GR-92-165 ** |
| St. Joseph Light & Power Company | GR-93-42 ** |
| United Cities Gas Company | GR-93-47 ** |
| Missouri Public Service Company | GR-93-172 ** |
| Western Resources, Inc. | GR-93-240 ** |
| Laclede Gas Company | GR-94-220 ** |
| United Cities Gas Company | GR-95-160 ** |
| The Empire District Electric Company | ER-95-279 ** |
| Laclede Gas Company | GR-96-193 ** |
| Missouri Gas Energy | GR-96-285 ** |
| Associated Natural Gas Company | GR-97-272 ** |
| Union Electric Company | GR-97-393 ** |
| Missouri Gas Energy | GR-98-140 ** |
| Laclede Gas Company | GR-98-374 ** |
| Union Electric Company | GA-99-107 |
| Laclede Gas Company | GA-99-236 |
| St. Joseph Light & Power Company | GR-99-42 ** |
| Laclede Gas Company | GR-99-315 ** |

** Concerns Weather Normalized Sales

Schedule 1

Union Electric Company
d/b/a AmerenUE
Case No. GR-2000-512

**Scheduled Meter Read Dates by Billing Cycle**
For the Test Year of July 1, 1998 - June 30, 1999

**Applicable to All Service Areas and Firm Rate Classes**

### December 1998

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | **1** Cycle 7 Read | **2** Cycle 8 Read | **3** Cycle 9 Read | **4** Cycle 10 Read | **5** |
| **6** | **7** Cycle 11 Read | **8** Cycle 12 Read | **9** Cycle 13 Read | **10** Cycle 14 Read | **11** Cycle 15 Read | **12** |
| **13** | **14** Cycle 16 Read | **15** Cycle 17 Read | **16** Cycle 18 Read | **17** Cycle 19 Read | **18** Cycle 20 Read | **19** |
| **20** | **21** Cycle 21 Read | **22** Cycle 1 Read | **23** Cycle 2 Read | **24** HOLIDAY | **25** HOLIDAY | **26** |
| **27** | **28** Cycle 3 Read | **29** Cycle 4 Read <br> December Billing Month Ends | **30** Cycle 5 Read <br> January Billing Month Starts | **31** Cycle 6 Read | | |

### January 1999

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | | | **1** HOLIDAY | **2** |
| **3** | **4** Cycle 7 Read | **5** Cycle 8 Read | **6** Cycle 9 Read | **7** Cycle 10 Read | **8** Cycle 11 Read | **9** |
| **10** | **11** Cycle 12 Read | **12** Cycle 13 Read | **13** Cycle 14 Read | **14** Cycle 15 Read <br> Cycle 16 Read | **15** Cycle 17 Read | **16** |
| **17** | **18** HOLIDAY | **19** Cycle 18 Read | **20** Cycle 19 Read | **21** Cycle 20 Read | **22** Cycle 21 Read | **23** |
| **24** | **25** Cycle 1 Read | **26** Cycle 2 Read | **27** Cycle 3 Read | **28** Cycle 4 Read <br> January Billing Month Ends | **29** Cycle 5 Read <br> February Billing Month Starts | **30** |
| **31** | | | | | | |

Union Electric Company
d/b/a AmerenUE
Case No. GR-2000-512

**Total Customers, Usage in Ccf, and Heating Degree Days by Billing Cycle**
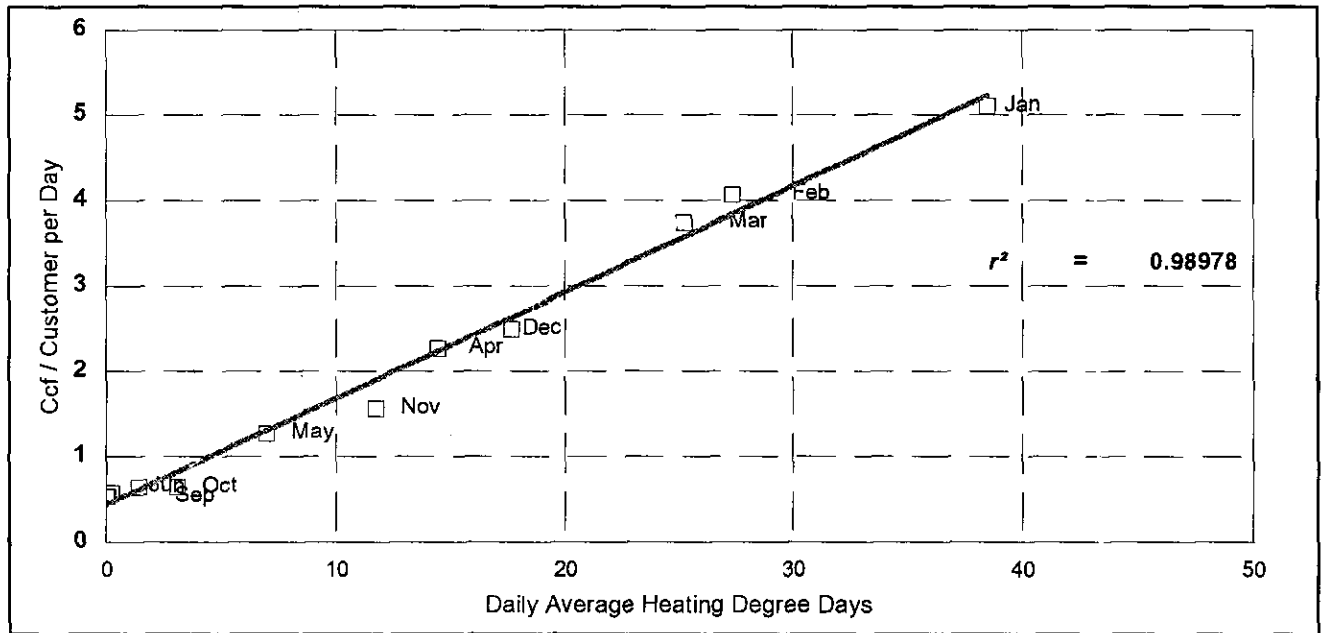For the Test Year of July 1, 1998 - June 30, 1999

**General Service Customers Supplied by Panhandle Eastern Pipe Line Company**

## December 1998

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | **1** Cycle 7<br>Cust = 590<br>Ccf = 184,981<br>HDD = 540.5 | **2** Cycle 8<br>Cust = 328<br>Ccf = 104,332<br>HDD = 542.5 | **3** Cycle 9<br>Cust = 807<br>Ccf = 211,786<br>HDD = 501 | **4** Cycle 10<br>Cust = 300<br>Ccf = 94,308<br>HDD = 484 | **5** |
| **6** | **7** Cycle 11<br>Cust = 211<br>Ccf = 51,431<br>HDD = 508 | **8** Cycle 12<br>Cust = 421<br>Ccf = 139,455<br>HDD = 511.5 | **9** Cycle 13<br>Cust = 200<br>Ccf = 68,954<br>HDD = 514.5 | **10** Cycle 14<br>Cust = 551<br>Ccf = 209,542<br>HDD = 482.5 | **11** Cycle 15<br>Cust = 338<br>Ccf = 153,214<br>HDD = 497.5 | **12** |
| **13** | **14** Cycle 16<br>Cust = 383<br>Ccf = 146,672<br>HDD = 535 | **15** Cycle 17<br>Cust = 662<br>Ccf = 254,996<br>HDD = 542 | **16** Cycle 18<br>Cust = 553<br>Ccf = 164,831<br>HDD = 517.5 | **17** Cycle 19<br>Cust = 723<br>Ccf = 201,436<br>HDD = 529 | **18** Cycle 20<br>Cust = 355<br>Ccf = 106,891<br>HDD = 534.5 | **19** |
| **20** | **21** Cycle 21<br>Cust = 330<br>Ccf = 183,092<br>HDD = 623 | **22** Cycle 1<br>Cust = 500<br>Ccf = 158,588<br>HDD = 654.5 | **23** Cycle 2<br>Cust = 324<br>Ccf = 114,211<br>HDD = 660.5 | **24** HOLIDAY | **25** HOLIDAY | **26** |
| **27** | **28** Cycle 3<br>Cust = 516<br>~~Ccf = 213,654~~<br>HDD = 828.5 | **29** Cycle 4<br>Cust = 340<br>Ccf = 235,227<br>HDD = 856<br><br>December Billing Month Ends | **30** Cycle 5<br>Cust = 247<br>Ccf = 157,531<br>HDD = 885<br>January Billing Month Starts | **31** Cycle 6<br>Cust = 252<br>Ccf = 144,375<br>HDD = 925.5 | | |

## January 1999

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | | | **1** HOLIDAY | **2** |
| **3** | **4** Cycle 7<br>Cust = 592<br>Ccf = 352,342<br>HDD = 1,132 | **5** Cycle 8<br>Cust = 324<br>Ccf = 222,039<br>HDD = 1,177.5 | **6** Cycle 9<br>Cust = 814<br>Ccf = 540,163<br>HDD = 1,214.5 | **7** Cycle 10<br>Cust = 300<br>Ccf = 1,080,753<br>HDD = 1,262.5 | **8** Cycle 11<br>Cust = 216<br>Ccf = 129,291<br>HDD = 1,266.5 | **9** |
| **10** | **11** Cycle 12<br>Cust = 424<br>Ccf = 330,182<br>HDD = 1,377 | **12** Cycle 13<br>Cust = 206<br>Ccf = 185,897<br>HDD = 1,375.5 | **13** Cycle 14<br>Cust = 552<br>Ccf = 469,033<br>HDD = 1,389.5 | **14** Cycle 15<br>Cust = 338<br>Ccf = 321,425<br>HDD = 1,401.5<br>Cycle 16<br>Cust = 399<br>Ccf = 304,840<br>HDD = 1,322.5 | **15** Cycle 17<br>Cust = 670<br>Ccf = 551,467<br>HDD = 1,331 | **16** |
| **17** | **18** HOLIDAY | **19** Cycle 18<br>Cust = 553<br>Ccf = 419,570<br>HDD = 1,410 | **20** Cycle 19<br>Cust = 725<br>Ccf = 544,226<br>HDD = 1,412 | **21** Cycle 20<br>Cust = 357<br>Ccf = 257,695<br>HDD = 1,419.5 | **22** Cycle 21<br>Cust = 334<br>Ccf = 312,717<br>HDD = 1,335 | **23** |
| **24** | **25** Cycle 1<br>Cust = 500<br>Ccf = 214,256<br>HDD = 734.5 | **26** Cycle 2<br>Cust = 330<br>Ccf = 171,062<br>HDD = 736 | **27** Cycle 3<br>Cust = 525<br>Ccf = 238,388<br>HDD = 736 | **28** Cycle 4<br>Cust = 343<br>Ccf = 283,622<br>HDD = 763.5<br>January Billing Month Ends | **29** Cycle 5<br>Cust = 250<br>Ccf = 203,617<br>HDD = 1,139<br>February Billing Month Starts | **30** |

Union Electric Company
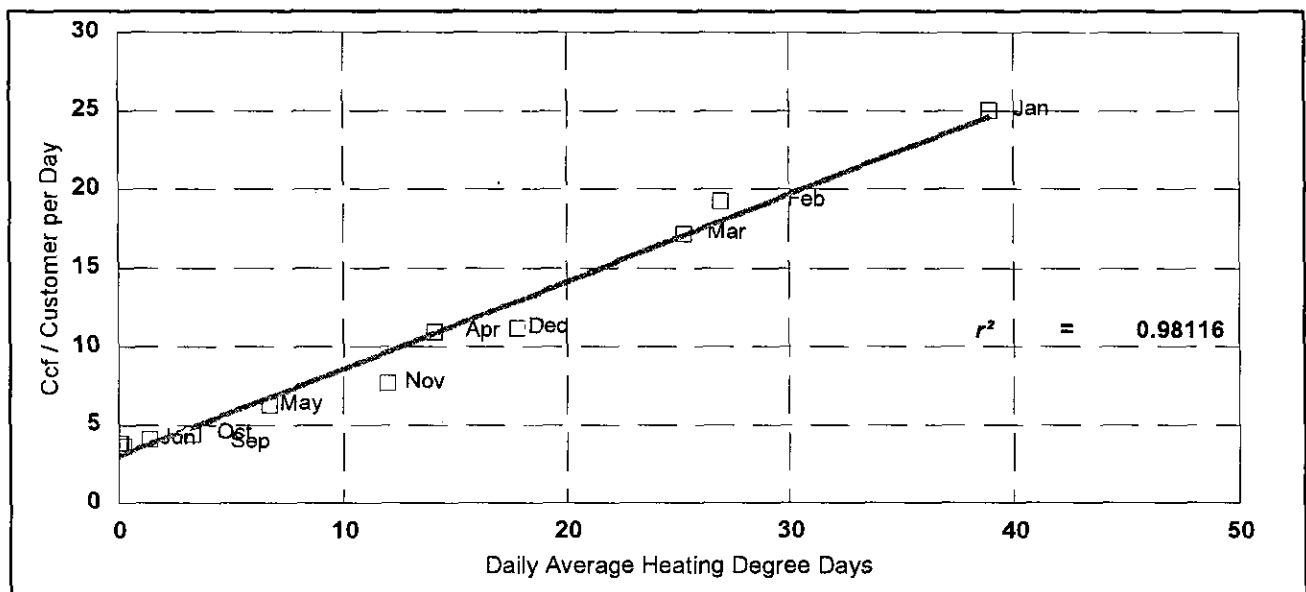d/b/a AmerenUE
Case No. GR-2000-512

**Plots of Billing Month  Actual & Estimated Usage vs. Heating Degree Days**

**Service Areas Supplied by Panhandle Eastern Pipe Line Company**
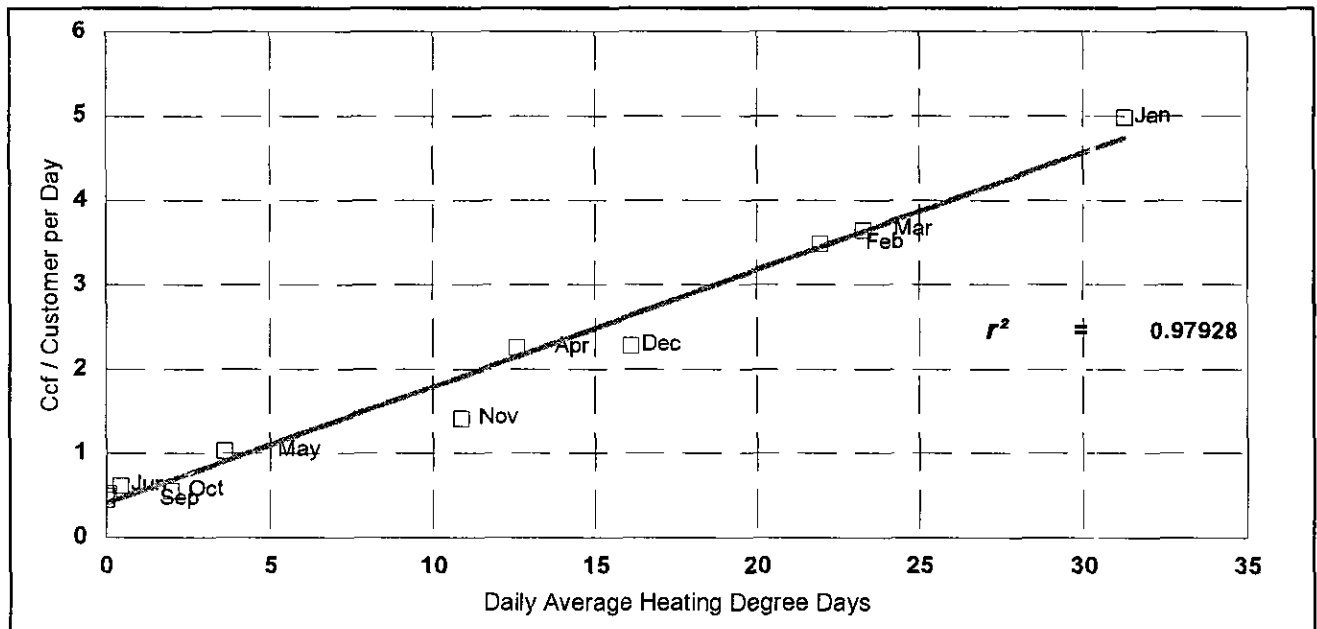
**Residential Service Customers**



**General Service Customers**

Union Electric Company
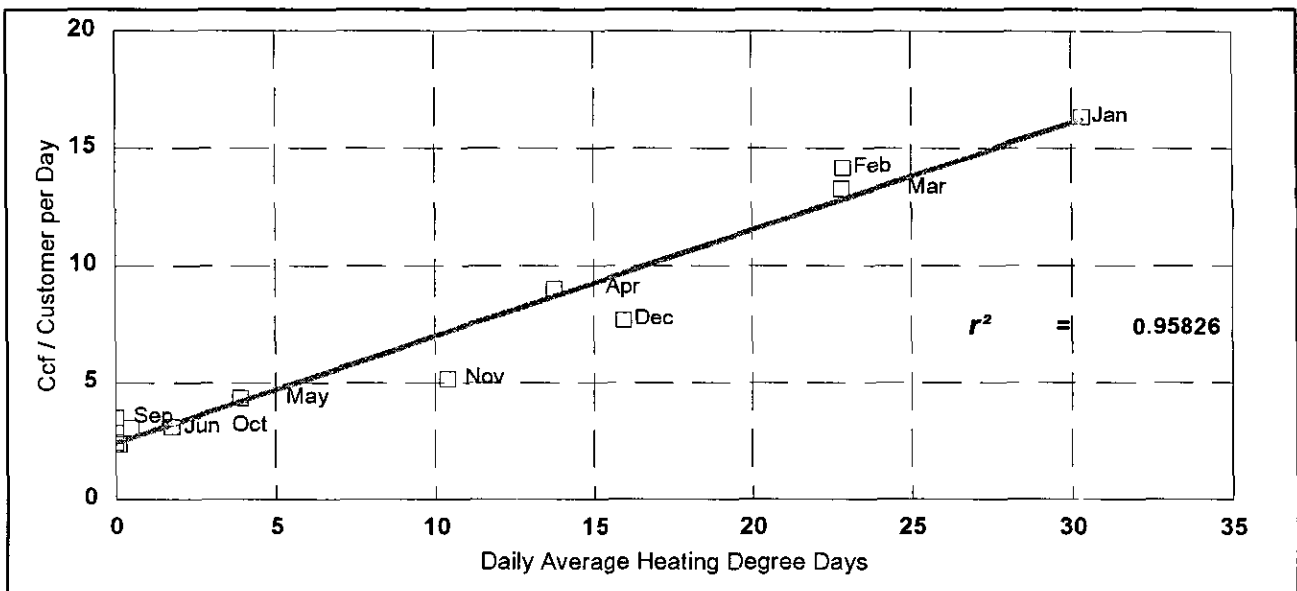d/b/a AmerenUE
Case No. GR-2000-512

**Plots of Billing Month Actual & Estimated Usage vs. Heating Degree Days**

**Service Areas Supplied by Texas Eastern Transmission Corporation and
Natural Gas Pipeline Company of America**

**Residential Service Customers**



**General Service Customers**



Schedule 4-2

d/b/a AmerenUE
Case No. GR-2000-512

**Weather Normalized Billing Month Usage in Ccf per Customer**
For the Test Year of July 1, 1998 - June 30, 1999

**Service Areas Supplied by Panhandle Eastern Pipe Line Company**

|  | Residential Service Customers | General Service Customers |
|---|---|---|
| Jul '98 | 17.2501 | 109.2530 |
| Aug | 15.8261 | 114.3668 |
| Sep | 16.6792 | 117.4498 |
| Oct | 23.2626 | 147.1696 |
| Nov | 52.5020 | 257.4728 |
| Dec '98 | 109.7413 | 493.8810 |
| Jan '99 | 157.7215 | 776.2235 |
| Feb | 154.9171 | 731.4372 |
| Mar | 122.2096 | 552.9536 |
| Apr | 76.0568 | 365.2264 |
| May | 38.6745 | 191.8081 |
| Jun '99 | 22.4785 | 135.4543 |
| Annual | 814.5588 | 4,023.5532 |

**Service Areas Supplied by**
**Texas Eastern Transmission Corporation and**
**Natural Gas Pipeline Company of America**

|  | Residential Service Customers | General Service Customers |
|---|---|---|
| Jul '98 | 15.6693 | 71.5517 |
| Aug | 14.6507 | 72.4790 |
| Sep | 13.7390 | 104.4121 |
| Oct | 20.9877 | 107.8821 |
| Nov | 44.2346 | 162.0511 |
| Dec '98 | 98.2493 | 321.8211 |
| Jan '99 | 167.3943 | 557.3637 |
| Feb | 145.8462 | 549.0668 |
| Mar | 109.3955 | 411.2438 |
| Apr | 68.4388 | 267.7106 |
| May | 34.4792 | 142.7961 |
| Jun '99 | 20.7040 | 101.4831 |
| Annual | 757.2062 | 2,878.7051 |

Schedule 5

Union Electric Company
d/b/a AmerenUE
Case No. GR-2000-512

## Weather Normalized Coincident Peak Day Demand in Ccf per Customer
### For the Test Year of July 1, 1998 - June 30, 1999

### Service Areas Supplied by Panhandle Eastern Pipe Line Company

|         | Residential Service Rate | General Service Rate |
|---------|--------------------------|----------------------|
| Jul '98 | 0.4637 | 3.1157 |
| Aug     | 0.5530 | 3.5150 |
| Sep     | 1.8717 | 9.4097 |
| Oct     | 3.4050 | 16.2639 |
| Nov     | 5.2311 | 24.4267 |
| Dec '98 | 7.5000 | 34.5692 |
| Jan '99 | 8.4478 | 38.8059 |
| Feb     | 7.7320 | 35.6062 |
| Mar     | 5.5177 | 25.7077 |
| Apr     | 3.7611 | 17.8554 |
| May     | 2.2067 | 10.9070 |
| Jun '99 | 0.8929 | 5.0344 |
| Annual  | 8.4478 | 38.8059 |

### Service Areas Supplied by
### Texas Eastern Transmission Corporation and
### Natural Gas Pipeline Company of America

|         | Residential Service Rate | General Service Rate |
|---------|--------------------------|----------------------|
| Jul '98 | 0.4010 | 2.4182 |
| Aug     | 0.4038 | 2.4273 |
| Sep     | 1.6409 | 6.4856 |
| Oct     | 3.3019 | 11.9346 |
| Nov     | 5.2054 | 18.1788 |
| Dec '98 | 7.1850 | 24.6730 |
| Jan '99 | 8.3210 | 28.3996 |
| Feb     | 7.5826 | 25.9773 |
| Mar     | 5.3647 | 18.7014 |
| Apr     | 3.5956 | 12.8980 |
| May     | 1.9332 | 7.4445 |
| Jun '99 | 0.4869 | 2.7000 |
| Annual  | 8.3210 | 28.3996 |

Schedule 6