

Exhibit No: _____

Issues: Revenue Adjustments
Weather Normals
Weather Normalization
Customer Annualization
Revenue Reconciliation

Witness: Larry W. Loos

Exhibit Type: Surrebuttal

Sponsoring Party: Missouri Gas Energy

Case No: GR-2009-0355

Date: October 14, 2009

MISSOURI PUBLIC SERVICE COMMISSION

MISSOURI GAS ENERGY

CASE NO. GR-2009-0355

SURREBUTTAL TESTIMONY OF

LARRY W. LOOS

Jefferson City, Missouri

October 2009

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SURREBUTTAL TESTIMONY OF LARRY W. LOOS

Case No. GR-2009- 0355

INTRODUCTION

1 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. Larry W. Loos, 11401 Lamar, Overland Park, KS 66211.

3 **Q. ARE YOU THE SAME LARRY W. LOOS THAT SUBMITTED PREFILED**
4 **DIRECT AND REBUTTAL TESTIMONY IN THIS CASE?**

5 A. Yes, I am.

6 **Q. WHAT IS THE PURPOSE OF YOUR PREPARED SURREBUTTAL**
7 **TESTIMONY?**

8 A. I will respond to the rebuttal testimony of Staff Witnesses Manisha Lakhanpal and Henry
9 Warren.

10 **Q. WHAT SPECIFIC ISSUES DO YOU ADDRESS?**

11 A. Based on the rebuttal testimony of the two Staff witnesses, I will address the following:

- 12 1) Ms. Lakhanpal's characterization of Dr. Livezey's Hinge-Fit as a forecast model;
- 13 2) Ms. Lakhanpal's characterization that "Staff does not forecast weather variables
- 14 but instead adjusts the test year sales to normal";

- 1 3) Ms. Lakhanpal's suggestion that conclusions and recommendations made in 1992,
2 remain unchanged in 2009;
- 3 4) Ms. Lakhanpal's suggestion that Dr. Livezey does not present any Missouri
4 specific statistical analysis to support use of the Hinge-Fit model;
- 5 5) Ms. Lakhanpal's suggestion that Dr. Livezey uses data from various climate
6 divisions but the number of Missouri climate divisions used in the Hinge-Fit
7 model is unknown;
- 8 6) Ms. Lakhanpal's suggestion that it would be inappropriate to apply a Hinge-Fit
9 model to Missouri weather data with an assumption that the warming trend began
10 in 1975;
- 11 7) Ms. Lakhanpal's conclusion that winter period data for Missouri does not support
12 use of the hinge-fit;
- 13 8) Ms. Lakhanpal's allegation that the Company is proposing use of a Hinge-Fit
14 model that is not estimated using Missouri data;
- 15 9) Ms. Lakhanpal's suggestion that the Colorado Public Service Commission and
16 Iowa Public Utility Board stated that "use of the NOAA 30-year normal method"
17 is reasonable; and,
- 18 10) Dr. Warren's conclusion that the regression analysis that I rely on results in use
19 per customer per heating degree day (HDD) larger than it would be otherwise.

HINGE-FIT AS A FORECAST MODEL

1 Q. MS. LAKHANPAL CHARACTERIZES DR. LIVEZEY'S HINGE-FIT AS A
2 FORECAST MODEL. DO YOU AGREE WITH THIS CHARACTERIZATION?

3 A. No, I do not. The fact that applying this model produces results which can be used as a
4 forecast, makes it no more a forecast model than Staff's use of a 30-year average for a
5 period beginning more than 38 years ago.

6 As I indicated in my Direct Testimony, the purpose of weather normalizing sales is to
7 develop test period sales and revenues, which provide the Company a reasonable
8 opportunity to earn the rate of return ordered by the Commission. As I demonstrate in
9 my Direct Testimony, based on recent climatic trends in the Company's service area, the
10 probability that actual sales during the period (12-months) that rates in this case first go
11 into effect will equal or exceed the level established by use of a 30-year average for the
12 period ended 2000 are considerably less than if the test period sales are based on a normal
13 developed using the hinge-fit.

14 For example, I show in Schedule LWL-2, Sheet 6, that based on actual experience
15 reported for the weather station at the Kansas City International Airport, for the 25-year
16 period ended December 2008, the probability of actual HDD exceeding the NOAA
17 normal is less than 1 year in 4. If the hinge-fit is used to determine normal HDDs, the
18 probability increases to a little better than 1 year in three. However, if we examine only
19 the most recent 10 year period, the probability that actual HDDs will exceed the NOAA
20 normal amounts to only 1 chance in 10. The probability of actual exceeding normal
21 increases to 4 chances out of 10 if the hinge-fit is used to determine the normal HDDs.

1 Similar results are shown for the Joplin weather station.

2 **Q. WHAT IS THE SIGNIFICANCE OF THIS PROBABILITY?**

3 A. When actual HDDs are less than the normal used to develop test year sales, all other
4 factors equal, the Company will not be able to earn the return allowed by the Commission
5 in that case. By setting rates based on normal HDDs which have a bias toward colder
6 conditions, as Ms. Lakhanpal recommends, the Company would be denied a reasonable
7 opportunity to earn the rate of return the Commission finds just and reasonable.

8 **Q. YOU DO NOT AGREE WITH MS. LAKHANPAL THAT THE HINGE-FIT IS A**
9 **FORECAST MODEL. WHEN YOU RECOMMENDED NORMAL HDD'S FOR**
10 **2010, DID YOU USE IT TO FORECAST HDD'S?**

11 A. Yes, I do, but no more so than using the NOAA normal based on conditions reported over
12 38 years ago. If the Commission is concerned about using a 2010 value, I show in
13 Schedule LWL-2, values for 2008 and 2009.

14 The fact of the matter is that whatever level is used, if the Company is to be provided a
15 reasonable opportunity to earn the allowed rate of return, the implicit assumption is that
16 level is the level reasonably expected for the initial period rates will be in effect. In order
17 for the Commission to establish just and reasonable rates, the Company should be
18 afforded a reasonable opportunity that actual HDDs experienced when rates first go into
19 effect will exceed normal HDDs approximately 50 percent of the time. Of course, if the
20 Company is provided a 50% probability that actual HDDs will exceed normal, there is
21 also a 50% probability that normal HDDs will exceed actual.

1992 RECOMMENDATIONS ARE NO LONGER VALID

1 **Q. MS. LAKHANPAL CITES TESTIMONY SUBMITTED ON BEHALF OF STAFF**
2 **IN COMMISSION CASE NO. GR-92-165 TO SUPPORT NORMAL HDD'S**
3 **BASED ON THE 1971-2000 AVERAGE. DO YOU BELIEVE THAT**
4 **OBSERVATIONS MADE 17 OR SO YEARS AGO REMAIN VALID?**

5 **A.** Conclusions and recommendations made in a Laclede rate case in 1992 may or may not
6 remain reasonable in 2009. Most likely not, since conditions have certainly changed in
7 the interim period.

8 In the testimony cited by Ms. Lakhanpal, Dr. Decker recommended a thirty-year average.
9 His stated reason was to eliminate the equal weighting of the impact of events that
10 occurred in the distant past in developing normal HDDs. An issue in the instant case is
11 whether events during the most recent 8 years should be given any consideration. By use
12 of the 1971 – 2000 thirty-year average, Staff takes the position that the most recent events
13 have absolutely no relevance and should be ignored. Dr. Livezey and I say that these
14 most recent events are not only relevant, but by use of the hinge-fit, we explicitly
15 recognize the trend exhibited by the more recent data.

16 **Q. IN YOUR PRIOR RESPONSE, YOU INDICATE THAT CONDITIONS HAVE**
17 **CHANGED. HOW HAVE CONDITIONS CHANGED?**

18 **A.** In addition to the material I presented in my Direct Testimony, examination of the chart
19 of Winter Mean Temperatures in Missouri Climate Divisions 1, 3, and 4 provided in Ms.
20 Lakhanpal Rebuttal Testimony at page 8 shows that:

- 1 1) During the 50-year period prior to 1991, in only 12 years (25% of the time) did
2 the average winter temperature exceed 34 degrees;
- 3 2) Since 1990, in six years (36% of the time), the average winter temperature
4 exceeded 34 degrees;
- 5 3) During the 50-year period prior to 1991, in 22 years (44% of the time) the average
6 winter temperature was below 32 degrees. In eight of those years (16% of the
7 time), the average temperature was below 30 degrees, in six it was below 28
8 degrees; and,
- 9 4) Since 1990, in only 4 years (25% of the time) was the average temperature below
10 32 degrees. During that period, the average temperature did not fall below 30
11 degrees.

12 Clearly, things have changed. Ms. Lakhanpal's implicit assumption -- that Dr. Decker
13 would reach the same conclusion today for Western Missouri as his 1992 conclusion for
14 Eastern Missouri -- is unfounded.

MISSOURI SPECIFIC ANALYSIS

15 **Q. MS. LAKHANPAL STATES ON PAGE 5 OF HER REBUTTAL TESTIMONY**
16 **THAT DR. LIVEZEY DOES NOT PRESENT ANY SPECIFIC MISSOURI**
17 **ANALYSIS IN HIS DIRECT TESTIMONY. DO YOU AGREE WITH HER**
18 **CRITICISM?**

19 **A.** No, I do not. Ms. Lakhanpal wrongly criticizes Dr. Livezey for not presenting any
20 statistical analysis of Missouri specific data, when she has not presented any statistical
21 analysis whatsoever. Ms. Lakhanpal adopts the 1971 – 2000 average based on the World
22 Meteorological Organization (WMO) standard. Not only has she not presented any

1 statistics specific to Missouri, as far as I know, the WMO has never considered anything
2 specific to Missouri. Ms. Lakhanpal adopts the 1971 – 2000 average based on the
3 traditional NOAA method of developing normals. Again, as far as I know, NOAA has
4 never considered anything specific to Missouri in evaluating whether the average for the
5 1971 – 2000 period is statistically significant in representing current Missouri climate
6 conditions, much less for the purpose of weather normalizing sales.

7 Contrary to Ms. Lakhanpal's assertion, Dr. Livezey does statistically evaluate the
8 reasonableness of his recommendation specific to conditions in Missouri and MGE's
9 service territory. In addition, I present in my Direct Testimony a number of statistical
10 measures of the reasonableness of the normals I develop using the hinge-fit.

11 **Q. WHAT ARE SOME OF THE STATISTICS THAT YOU AND DR. LIVEZEY**
12 **PROVIDE?**

13 **A.** In my Direct Testimony I have included:

- 14 1) In Schedule LWL-2, Sheets 1A and 1B, I show graphically actual HDDs and
15 normals based on the traditional NOAA 30-year normal, the 30-year rolling
16 average, the OCN, and the hinge-fit. I show similar information in Sheets 3A,
17 3B, and 3C using 'homogenized" HDDs. The information I show is specific to
18 the weather stations I use in my weather normalization adjustment;
- 19 2) In Sheets 2A and 2B, I show a comparison of actual HDDs with NOAA normals
20 and a 30-year rolling average over various periods. These Sheets demonstrate
21 that based on actual experience, neither the NOAA normals nor the 30-year
22 rolling average can be expected to reflect what the Company actually will
23 experience;

- 1 3) In Sheets 4A through 4E, I show my development of the hinge-fit. In this
2 Schedule, I present various statistics regarding how well the hinge-fit has
3 historically compared to actual conditions over various periods;
- 4 4) In Sheet 5, I show various statistics regarding the hinge-fit for a number of
5 weather stations in the Company's service area; and,
- 6 5) In Sheet 6, I show the differences between actual and normal HDDs based on the
7 hinge-fit and for various averaging periods

8 **Q. IN YOUR PRIOR RESPONSE, YOU REFER TO THE 1971 – 2000 AVERAGE AS**
9 **THE “TRADITIONAL NOAA METHOD OF DEVELOPING NORMALS.” WHY**
10 **DO YOU REFER TO IT AS THE TRADITIONAL METHOD?**

11 A. On June 2, 2009, NOAA introduced three alternative normals to supplement the
12 traditional 30-year, once a decade normals they have historically published. These three
13 normals will be calculated and updated annually. The three new normals include a 30-
14 year rolling average, the “Optimum Climate Normal” (OCN) that Dr. Livezey and I refer
15 to in direct testimony, and the Hinge-Fit normal he and I recommend be relied on in this
16 case. Unfortunately, at the present time, NOAA does not publish normal HDDs using
17 these alternative approaches. The alternative normals NOAA publishes include average
18 daily monthly maximum, minimum, and average temperatures.

1 Q. MS. LAKHANPAL (REBUTTAL TESTIMONY, PAGE 7) STATES, "THAT DR.
2 LIVEZEY USES SEASONAL DATA FROM VARIOUS CLIMATE DIVISIONS
3 ACROSS THE COUNTRY AND WE DO NOT KNOW HOW MANY MISSOURI
4 CLIMATE DIVISIONS WERE USED IN THE HINGE-FIT MODEL." DO YOU
5 SHARE MS. LAKHANPAL'S CONCERN?

6 A. No, I do not. First of all, the number of Missouri Climate Divisions used is not relevant.
7 Staff does not determine either actual or normal HDDs using data for Missouri Climate
8 Divisions. Both Staff and I rely on data for the weather stations we use in our weather
9 adjustment.

10 Further, Ms. Lakhanpal, apparently does not fully understand the development of the
11 hinge-fit. Dr. Livezey relied on various data to develop the hinge-fit model. That model
12 simply shows that:

- 13 1) Climate conditions did not demonstrate a significant trend (either up or down)
14 from about 1940 through the mid 1970's; and,
15 2) Beginning in mid 1970's average temperatures generally demonstrate a strong
16 upward trend.

17 Dr. Livezey found that this upward trend is stronger in certain areas of the country and
18 during certain seasons.

19 In application, Dr. Livezey examines the result of applying the hinge-fit to specific data,
20 in this case data specific to the service area of MGE. I show these results in Schedule
21 LWL-2, Sheet 5. The results I show are for both reported and "homogenized" HDDs.
22 For the stations that I use (MCI and Joplin), as well as the stations Staff uses (MCI and

1 Springfield), the Hinge-Fit indicates that HDDs have been declining by between 9 and 15
2 HDDs per year based on homogenized data. This decline is specific to Missouri and the
3 weather stations that are located in the Company's service area.

MISSOURI WEATHER SUPPORTS THE HINGE-FIT MODEL

4 **Q. MS. LAKHANPAL (REBUTTAL TESTIMONY, PAGE 7) CONCLUDES THAT**
5 **IT WOULD BE INAPPROPRIATE TO APPLY A HINGE-FIT MODEL TO**
6 **MISSOURI WITH THE ASSUMPTION THAT THE WARMING TREND BEGAN**
7 **IN 1975 BECAUSE THE WINTER MEAN TEMPERATURES DROPPED IN THE**
8 **LATE 1970'S. DID WINTER TEMPERATURES DROP IN THE LATE 1970'S?**

9 **A.** In 1978 and 1979, winter period temperatures were considerably colder than anyone
10 expected. In fact, according to the graphs on Page 8 of Ms. Lakhanpal's Rebuttal
11 Testimony, they are the two coldest winters since 1900. However, temperatures in these
12 two years are anomalies. Further, these colder conditions were certainly not confined to
13 Missouri. Dr. Livezey's observations represent observations regarding climate
14 conditions over extended areas of the country, over extended periods of time. The
15 analysis that I prepared, demonstrates that at least in MGE's service area, Dr. Livezey's
16 observations are equally applicable.

17 Ms. Lakhanpal challenges Dr. Livezey's assumption that the warming trend began in
18 1975 because of the extreme cold that occurred in the late 1970's. If she is right and we
19 assume that the warming trend began in 1980, the indicated normal HDDs would decline

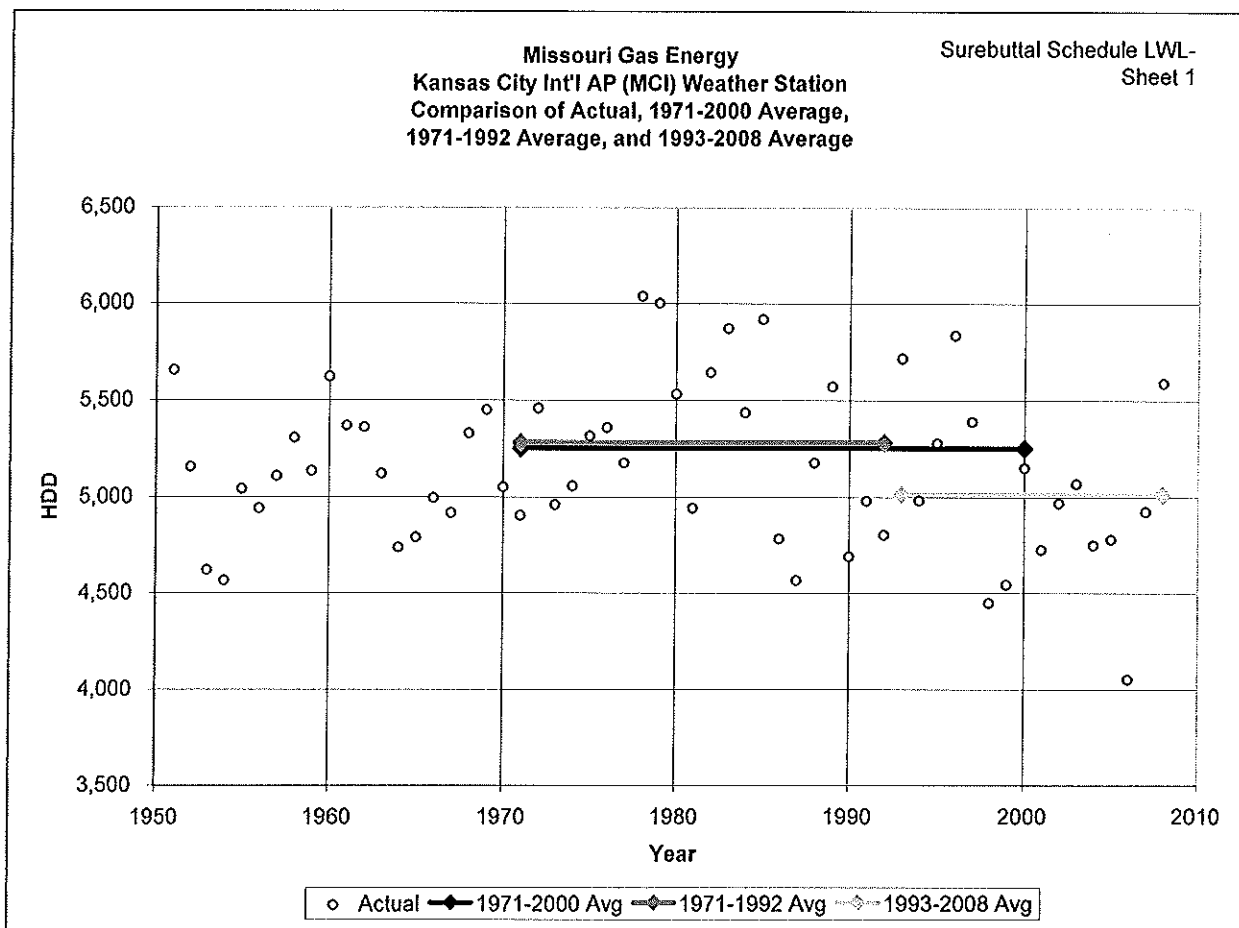
1 by 74 HDDs for MCI and 53 HDDs for the Joplin weather stations from the level I
2 recommend.

3 **Q. DOES THE GRAPH THAT MS. LANKANPAL SHOWS AT THE TOP OF PAGE**
4 **8 OF HER REBUTTAL TESTIMONY SUPPORT THE HINGE-FIT?**

5 A. Yes, it does. Ms. Lakhanpal finds a trend line to the December through February mean
6 temperatures from 1940 and found that there is no predominant trend. The trend line that
7 she develops has an r-squared value of 0.0004 and a standard error of 2.98. If I apply the
8 hinge fit to this same data, I have an r-squared value of 0.0370 and a standard error of
9 2.94. The hinge-fit fits the data better than the straight linear trend that Ms. Lakhanpal
10 shows.

11 **Q. DO YOU HAVE ANY ADDITIONAL OBSERVATIONS REGARDING THE**
12 **GRAPH MS. LAKHANPAL SHOWS AT THE TOP OF PAGE 8 OF HER**
13 **REBUTTAL TESTIMONY?**

14 A. Yes, I do. Ms. Lakhanpal uses average temperatures for 3 Missouri Climate Divisions.
15 She does not demonstrate whether these average temperatures reasonably correspond to
16 the temperatures and HDDs Dr. Warren uses to adjust sales. She recommends that the
17 Commission adopt HDDs based on the 30-year average ended in 2000. I show this
18 average in the chart below for the MCI weather station. The r-squared value of this 30-
19 year average amounts to 0.147 relative to the actual HDDs during the 1971-2000 period.
20 The standard error of this average amounts to 456, relative to actual HDDs.



If I evaluate this thirty-year average relative to actual conditions over the most recent 16 years, I find that the 30-year average exceeds the 16-year average by 238 HDDs per year. The standard error of the 30-year average relative to actual temperatures during the most recent 16-years amounts to 477. Given this average and standard error, statistically, I expect that there is only a 30 percent chance that HDDs will exceed this normal level during the first year rates will be in effect.

1 Q. DO YOU HAVE ANY OBSERVATION REGARDING THE GRAPH MS.
2 LAKHANPAL SHOWS AT THE BOTTOM OF PAGE 8 OF HER REBUTTAL
3 TESTIMONY?

4 A. Yes, I do. Ms. Lakhanpal demonstrates a slight increase in HDDs based on HDDs
5 reported for the period 1900 through 2008. She claims that this slight increase does not
6 correspond to a global climate change as proposed by Dr. Livezey.

7 Dr. Livezey does not suggest that the trend in average temperatures (HDD) has persisted
8 since 1900. Therefore, Ms. Lakhanpal's comparison is meaningless as a test of Dr.
9 Livezey's conclusion.

DECISIONS BY COLORADO AND IOWA REGULATORS

10 Q. AT PAGE 9 OF HER REBUTTAL TESTIMONY, MS. LAKHANPAL STATES
11 THAT REGULATORS IN COLORADO AND IOWA REJECTED THE HINGE-
12 FIT MODEL IN FAVOR OF USING THE NOAA 30-YEAR AVERAGE. DO YOU
13 AGREE WITH HER ASSERTION?

14 A. No, I do not. Dr. Livezey and I filed direct and rebuttal testimony in both of these cases.
15 and in both of these cases, subsequent to the filing of rebuttal testimony, a settlement was
16 reached.

17 The Colorado settlement is silent on the subject of the HDD normal underlying the
18 settlement. As for Ms. Lakhanpal's assertion that the Commission ordered use of a thirty
19 year NOAA normal, I don't recall any party even recommending use of the NOAA thirty

1 year normal. Staff recommended and the Commission ultimately accepted the settlement
2 which used what is termed a “hybrid approach.” The “hybrid approach” represents an
3 effort to align monthly averages for the most recent 30-year period with the monthly
4 normals published by NOAA. It is in fact a 30-year average for the most recent 30-year
5 period.

6 In the Iowa case, the Iowa Utilities Board included in its decision a table which shows
7 total residential and commercial weather normalized sales. The volumes shown in this
8 table range from 154,950 Dth using the hinge-fit to 165,800 Dth using the NOAA
9 traditional normal. The settlement ultimately approved by the Board included sales at
10 157,350 Dth. The sales level approved by the Board is much closer to that relying on the
11 hinge fit than the level using the NOAA normals.

WEATHER NORMALIZATION

12 **Q. DR. WARREN CONCLUDES THAT YOUR REGRESSION ANALYSIS**
13 **RESULTS IN USE PER CUSTOMER PER HDD THAT IS LARGER THAN IT**
14 **WOULD OTHERWISE BE. DO YOU AGREE?**

15 **A.** I agree that the use per customer per HDD that I determined is higher than the use per
16 customer per HDD, Dr. Warren developed. However, I expect this result because the
17 HDDs that he uses are higher than the HDDs I use.

18 Dr. Warren and I rely on the same data. Dr. Warren however calculates HDDs based on
19 reported average daily temperature. I use HDDs that are reported by NOAA. I found

1 that the difference between Dr. Warren's HDDs and mine was equal to the implications
2 of rounding. Dr. Warren rounded average daily temperature to the nearest one-half
3 degree. NOAA on the other hand rounds up in calculating HDDs. For example, if the
4 average daily temperature is 60.5 degrees, Dr. Warren includes 4.5 HDD. Using the
5 NOAA data, if the average daily temperature is 60.5 degrees, NOAA includes 4 HDD.

6 **Q. ARE DR. WARREN'S HDD'S MORE ACCURATE THAN YOURS?**

7 A. Yes they are, however, whether or not this 0.5 HDD is included does not have that much
8 affect on the result. I have few HDDs so my coefficients are generally larger. However,
9 I apply those generally larger coefficients to a lower number of HDDs. All other factors
10 equal the result will be the same.

11 Staff uses cycle HDDs in order to recognize that sales reported in a month, generally
12 represent deliveries during that month and the previous month. Implicit in Staff's
13 approach is the unreasonable assumption that all billing cycles are the same. All billing
14 cycles include the same number of customers who have the same usage characteristics.

15 I develop heat sensitive use based on monthly use per customer and heating degree-days
16 reported during the reporting month and the previous month. By regressing monthly use
17 per customer against heating degree-days for the reporting month and the previous
18 month, I also recognize that sales reported in for example December, represent deliveries
19 during November and December.

1 Staff develops heat sensitive use based solely on conditions during the test year. I
2 develop heat sensitive use based on use characteristics for the test year and up to three
3 prior years.

4 While there are differences between the coefficients Staff develops and mine, those
5 differences appear relatively minor. For Kansas City (and St Joseph), the coefficients
6 developed by Staff are less than five percent lower than those that I develop. For Joplin,
7 the coefficients developed by Staff are about 10 percent lower than mine for the SGS
8 customer class and about the same as mine for the LGS customer class. However, since
9 Staff uses HDDs from the Springfield weather station, whereas I use HDDs from Joplin a
10 larger difference is expected.

11 Since the impacts appear relatively minor and in order to minimize the number of issues,
12 I find that the Staff's coefficients are reasonable for use in this case.

13 **Q. ARE THERE OTHER ISSUES WITH STAFF'S RECOMMENDED WEATHER**
14 **NORMALIZATION ADJUSTMENT THAT ARE MORE SIGNIFICANT?**

15 **A.** Yes, there are. Staff has normalized sales to the 30-year average for the period ended
16 2000. I have relied on a normal based on data for the 58-year period ended with the test
17 period. I develop that normal based on application of the hinge-fit method described and
18 supported by Dr. Livezey in his Direct Testimony. Staff offers no justification for use of
19 the 1971 through 2000 average beyond noting that this average is used by NOAA and
20 WMO and recommended by Dr. Decker in 1992.

1 **Q. DO YOU AGREE WITH USE OF THIS 30-YEAR AVERAGE TO DETERMINE**
2 **NORMAL WEATHER?**

3 A. No, I do not. As Dr. Livezey and I explain in detail in our direct testimony, the 30-year
4 average can produce reasonable results during periods where there is no trend in climate.
5 However, as he and I demonstrate, for the past 35 years, a very pronounced warming
6 trend has persisted in MGE's service territory since the mid-1970s. The 30-year average
7 relied on by Staff completely ignores this trend. As a result, normal HDD's developed
8 relying on the hinge fit technique should be adopted for the purpose of this case. In the
9 alternative, normal HDDs developed using the OCN discussed by Dr. Livezey should be
10 used.

11 **Q. DOES THIS CONCLUDE YOUR SUREBUTTAL TESTIMONY?**

12 A. Yes, it does.