Exhibit No.:	
Issues:	Weather Normalization/In-Service
Witness:	Shawn E. Lange
Sponsoring Party:	MO PSC Staff
Type of Exhibit:	Surrebuttal Testimony
Case No.:	ER-2012-0166
Date Testimony Prepared:	September 7, 2012

MISSOURI PUBLIC SERVICE COMMISSION

REGULATORY REVIEW DIVISION

SURREBUTTAL TESTIMONY

OF

SHAWN E. LANGE

UNION ELECTRIC COMPANY
d/b/a AMEREN MISSOURI

CASE NO. ER-2012-0166

Jefferson City, Missouri
September 2012

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase Its Revenues for Electric Service	)))	Case No. ER-2012-0166

AFFIDAVIT OF SHAWN E. LANGE

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

Shawn E. Lange, of lawful age, on his oath states: that he has participated in the preparation of the following Surrebuttal Testimony in question and answer form, consisting of 12 pages of Surrebuttal Testimony to be presented in the above case, that the answers in the following Surrebuttal Testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such matters are true to the best of his knowledge and belief.

Shawn E. Lange

Shawn E. Lange

Subscribed and sworn to before me this 7th day of September, 2012.

SUSAN L. SUNDERMEYER
Notary Public - Notary Seal
State of Missouri
Commissioned for Callaway County
My Commission Expires: October 03, 2014
Commission Number: 10942086

Susan L Sundermeyer

Notary Public

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UNION ELECTRIC COMPANY

d/b/a AMEREN MISSOURI

CASE NO. ER-2012-0166

Q. Please state your name and business address.

A. My name is Shawn E. Lange and my business address is Missouri Public Service Commission, P.O. Box 360, Jefferson City, MO 65102.

Q. Are you the same Shawn E. Lange who contributed to Staff's Cost of Service Report filed in this case?

A. Yes, I am.

Q. What is the purpose of your surrebuttal testimony?

A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of Ameren Missouri ("Company") witness Steven Wills, as well as discuss the in-service of the Maryland Heights Renewable Energy Center.

Mr. Wills asserts the Large Primary Service ("LPS") customer class is significantly weather sensitive during the summer months, and therefore, should be weather normalized in this case. It is Staff's position that while the usage of the LPS class increases in the summer months, it is more sensitive to seasonal changes in weather than it is to daily fluctuations in weather, and hence not appropriate for weather normalization.

At the time direct testimony was filed in this case, the Maryland Heights Renewable Energy Center evaluation was not complete. Subsequent to the filing of direct testimony, the Maryland Heights Renewable Energy Center has satisfactorily met the established in-service criteria and should be considered "fully operational and used for service."

<u>Large Primary Service Weather Normalization</u>

Q. What types of customers are on the LPS tariff?

A. There are both industrial and commercial customers on this tariff.

Q. Why does the Staff believe that the LPS class billing data should not be weather normalized?

A. There are several reasons why the Staff did not weather normalize the LPS class. First, this class includes the large customers that the Staff individually annualizes in its case instead of applying a growth factor to. Please see Staff witness Dr. Seoung Joun Won's portion of the Staff Cost of Service Report for more information regarding the annualization of the LPS class. Second, the Staff believes that the increase in the LPS class load in the summer months is influenced more by the time of the year (season) than by the day-to-day fluctuations that occur in the other customer classes. Third, while the Staff believes that some customers in the LPS class are weather sensitive, the weather sensitive portion is a small percentage of the whole.

Q. Why doesn't Staff apply a growth factor to the LP class?

A. Typically, growth is applied to the weather-normalized usage per customer. The class usage is weather normalized, and this is divided by the number of customers in that class to get an average usage per customer. Growth in class usage is calculated by applying an increased number of customers to the average customer weather normal usage. A more detailed description of how growth is calculated can be found in Staff witness Roberta Grissum's portion of the Staff Cost of Service Report.

With that in mind, the LPS tariff class contains the largest energy users and the lowest number of customers. Because this small group of customers demands larger amounts of electricity and performs a variety of functions, e.g. hotels, office buildings, manufacturing, hospitals, etc., it is very heterogeneous in how and when it demands electricity. As a result, there is no usage that represents the average LPS customer because there is not an average customer. However, there may be, and usually are, seasonal sensitivities that correspond to the industry of which each customer is a part.

Q. Do you adjust usage in order to reflect this seasonal sensitivity?

A. No.

Q. Why not?

A. Seasonal fluctuations need to remain in the usage because they are "normal," i.e., they occur every year.

Q. Why does Staff believe that this class shows a seasonal response rather than a weather-sensitive response?

A. Seasonal sensitivity is when a company or industry experiences a change in the amount of electricity used, because of a repeating yearly cycle. Examples of seasonal effects include a July drop in automobile production as factories retool for new models and a reduction in usage because motors run more efficiently in the winter when it is cooler.

Q. Mr. Wills, in his rebuttal, illustrated that the inclusion of the non-weather sensitive customer has negligible impact on the weather coefficient. Do you agree?

A. If one was to assume all non-weather sensitive customers are as illustrated in the chart Mr. Wills proffered and there are no seasonality effects, then yes.

Q. Are all non-weather sensitive customers like what Mr. Wills illustrated?

A. No. There are customers that do not show sensitivity to day-to-day temperature fluctuations but may impact the weather normalization analysis if those customers are included. Figures 1 and 2, below, show examples of such customers:

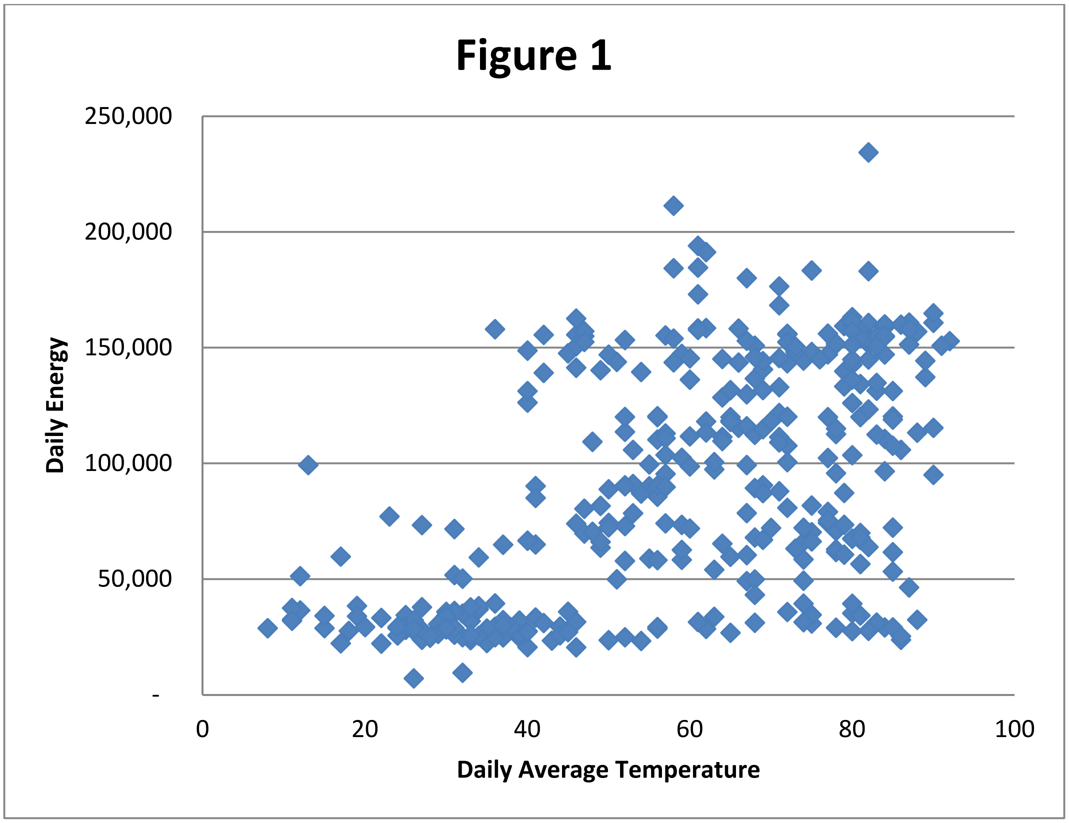

Figure 1 shows that for this customer, usage has much less dispersion prior to approximately 40 degrees than after 40 degrees. There is no discernible change in usage from 61 to 62 degrees or from 72 to 73 degrees indicating that this customer is more dependent on something other than day-to-day temperature fluctuations.

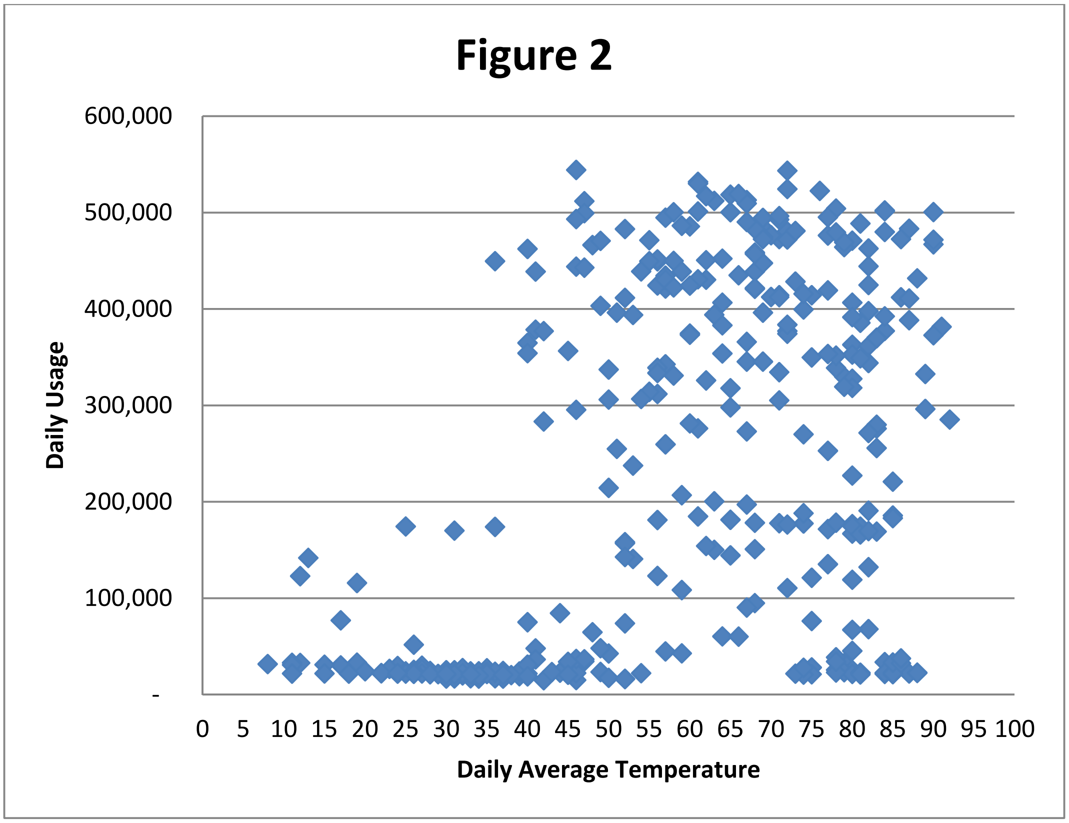

Figure 2 shows that for this customer, usage has much less dispersion prior to approximately 40 degrees than after 40 degrees. There is no discernible change in usage from 61 to 62 degrees or from 72 to 73 degrees indicating that this customer is more dependent on something other than day to day temperature fluctuations.

For comparison purposes, Figure 3 shows the residential class, which is weather sensitive.

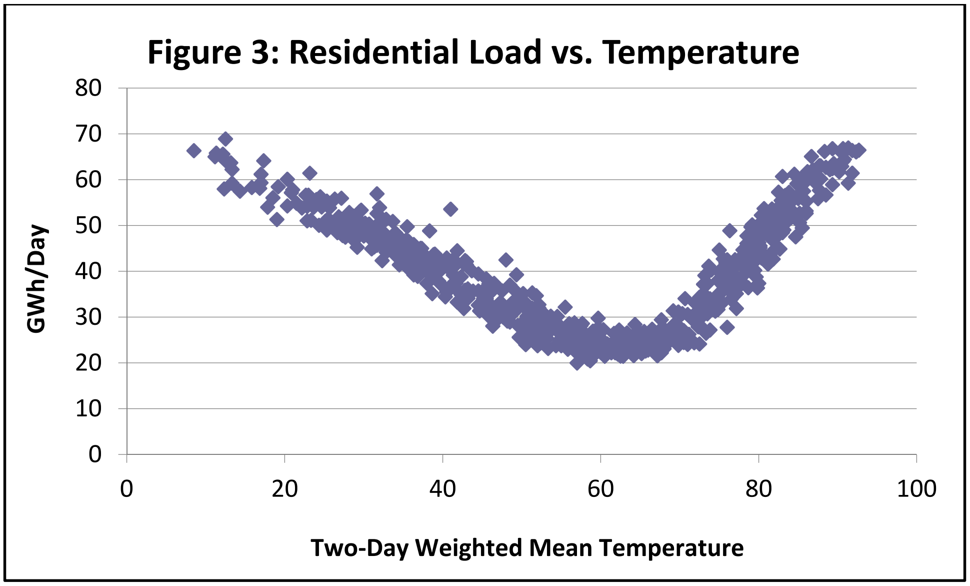

Figure 3: Residential Load vs. Temperature

Notice the discernible change in usage from 51 to 52 degrees or from 79 to 80 degrees indicating that this customer is dependent on day-to-day temperature fluctuations.

Q. What effect, if any, would including customers like those illustrated in Figures 1 and 2 have on the weather normalization of class load?

A. The experiment that Mr. Wills ran was run again. Using the same 2010 load research data, Staff ran two regressions. The first was the entire LPS class load; the second was the LPS class minus the customers shown in Figures 1 and 2. The variable coefficients for each model version are shown below:

	Total LPS	*Total LPS excluding seasonal customers*	*Difference in Coefficient*	*% change*
Intercept	8,820,088	8,387,179	(432,908)	-4.91%
Seasonal Indicator	144,786	254,466	109,680	75.75%
Weekday Indicator	1,037,378	1,067,101	29,723	2.87%
Cooling Degree Day Coefficient	69,649	67,027	(2,622)	-3.76%

Q. What conclusion can be drawn from this table?

A. The cooling degree day[1] ("CDD") coefficient changed from 69,649 kWh per degree day to 67,027 kWh per degree day, a -3.76% adjustment.

Q. When the two customers that do not show sensitivity to day-to-day temperature fluctuations are removed, does anything happen to the significance of the heating degree day[2] ("HDD") variable?

A. The HDD variable t-statistic increases from -0.92047 to 3.65. The overall explanatory power of the model also increases, r-square value increases from .812 to .827.

Q. Mr. Wills' modeling did not show winter sensitivity, is that correct?

A. Yes.

Q. Are there any customers that show a similar response in the winter and in the summer?

A. Yes, there are customers that show similar reactions to colder conditions, examples are shown in Figures 4 and 5, below.

[1] The amount of degrees colder than a base temperature (55 degrees)
[2] The amount of degrees hotter than a base temperature (55 degrees)

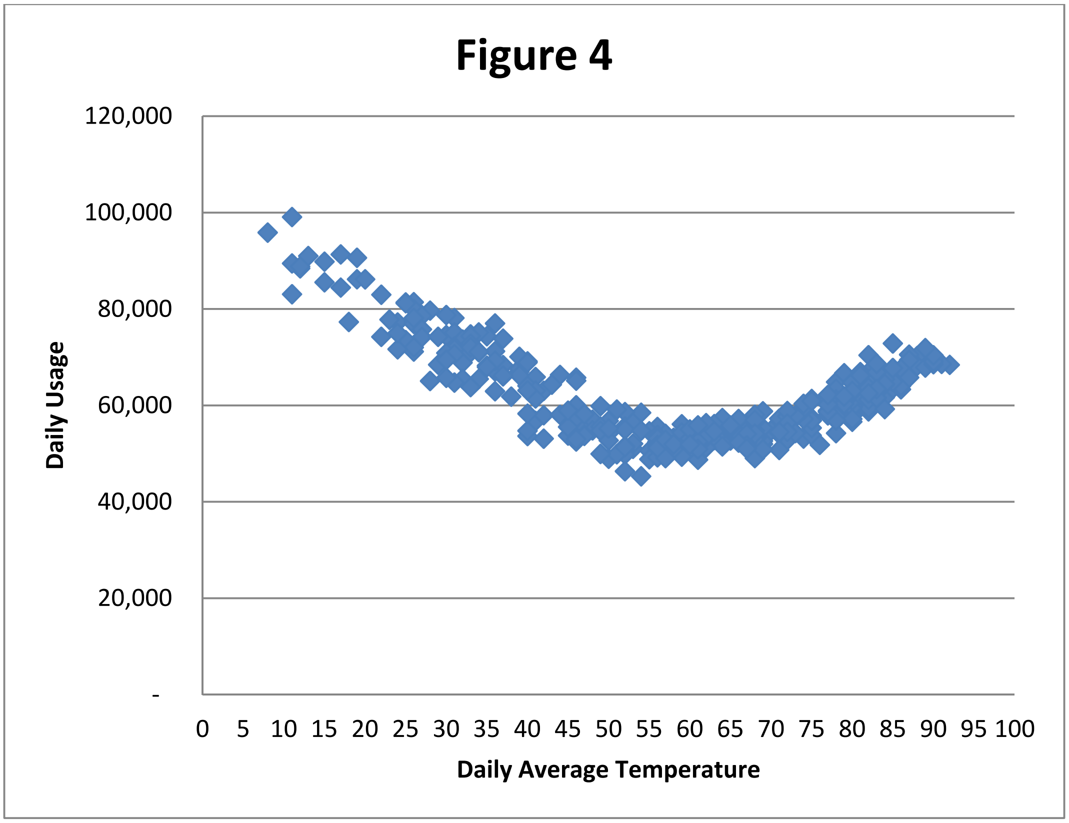
Figure 4
120,000
100,000
80,000
60,000
40,000
20,000
-
Daily Usage
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Daily Average Temperature

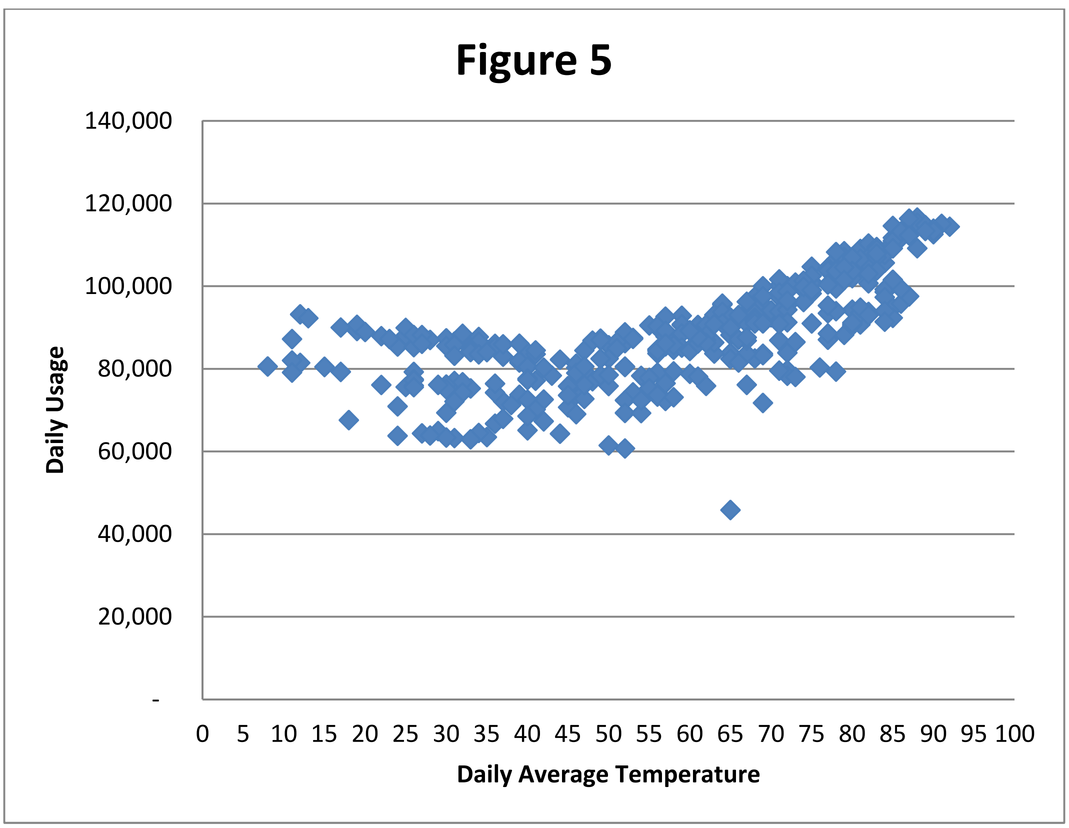
Figure 5
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Daily Usage
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Daily Average Temperature

Figures 4 and 5 are LPS customers that tend to show a similar pattern in winter and summer.

Q. Why would the class not show weather sensitivity for winter?

A. Because this small group of customers demands larger amounts of electricity and performs a variety of functions, e.g. hotels, office buildings, manufacturing, hospitals, etc., it is very heterogeneous in how and when it demands electricity. What customers are included or excluded from any analysis may have a significant impact on any class level analysis.

Q. Does the Staff weather normalize the LPS class for any of the other electric utilities?

A. No, it does not.

Q. Has the Commission ruled on this issue before?

A. Yes, in the *Report and Order* of ER-2006-0314 the Commission Stated

> The Commission finds that the competent and substantial evidence supports Staff's position, and finds this issue in favor of Staff. The LP class consists of a fairly small number of large businesses engaged in wildly different enterprises; hotels, office buildings, manufacturing, and hospitals are examples. These businesses' electricity needs vary more due to the type of commerce they are in than due to day-to-day temperature changes.[3]

Q. What is your recommendation?

A. I recommend the Commission adopt the actual LPS usage with annualization adjustments as proposed by Staff witness Dr. Seoung Joun Won.

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[3] ER-2006-0314 Report and Order pg. 73

Maryland Heights Renewable Energy Center In-Service

PROJECT DESCRIPTION

Q. Please describe the project designated as the Maryland Heights Renewable Energy Center.

A. The Maryland Heights Renewable Energy Center is located in Maryland Heights, Missouri, adjacent to a landfill operated by IESI, Inc. (formerly operated by Fred Weber, Inc.). The facility includes three (3) Solar Turbines, Mercury 50 recuperated gas turbine generator sets and equipment necessary to prepare the landfill gas for utilization as fuel for the generating units. The nominal electrical rating for each of the generating units is four and six-tenths (4.6) megawatts. An Ameren Missouri distribution substation was constructed at the site. The generating facility should qualify under Missouri statutes and regulations as a renewable energy resource and receive the one and twenty-five hundredths (1.25) credit for in-state facilities. The facility status was reviewed after the end of the test year (September 30, 2011).

Q. Have you personally visited the facility being considered in this testimony?

A. Yes. I visited the site on October 17, 2011 and June 13, 2012. During the visits, walk-through tours were conducted, equipment inspections performed, and operating equipment observations were accomplished. During the June 13, 2012 site visit, all three (3) generating units were observed during normal operation.

IN-SERVICE CRITERIA

Q. What are in-service criteria?

A. In-service criteria are a set of operational tests or operational requirements developed by the Staff to determine whether a new unit is "fully operational and used for service."

Q. Where does the phrase "fully operational and used for service" come from?

A. The phrase comes from Section 393.135, RSMo. 2000, a statute that was adopted by Initiative, Proposition No. 1, on November 2, 1976. Section 393.135, RSMo. 2000, provides as follows:

> Any charge made or demanded by an electrical corporation for service, or in connection therewith, which is based on the costs of construction in progress upon any existing or new facility of the electrical corporation, or any other cost associated with owning, operating, maintaining, or financing any property before it is <u>fully operational and used for service</u>, is unjust and unreasonable, and is prohibited. (Emphasis added)

Q. Were in-service criteria developed for the Maryland Heights Renewable Energy Center?

A. Yes. Staff and Ameren Missouri agreed to in-service criteria for the Maryland Heights Renewable Energy Center.

Q. Has the Staff evaluated the Maryland Heights Renewable Energy Center utilizing the established in-service criteria?

A. Yes.

Q. What were the results of those evaluations?

A. The results are consistent with the established in-service criteria. The results of the evaluations are summarized in Schedule 1.

Q. What is your conclusion regarding in-service criteria for the Maryland Heights Renewable Energy Center?

A. Based on my review and analysis of the data and inspection of the facilities, the Maryland Heights Renewable Energy Center has met all of the required in-service criteria effective June 16, 2012. Therefore, I recommend that the Maryland Heights Renewable Energy Center be considered fully operational and used for service.

Q. Does this conclude your surrebuttal testimony?

A. Yes, it does.

Landfill Gas Electrical Generator

In-Service Test Criteria

Maryland Heights Renewable Energy Center Unit 1

1. All major construction work is complete.

   Based on personal observations of the facility on the following dates, all major construction is complete: October 17, 2011 and June 13, 2012.

2. All preoperational tests have been successfully completed.

   Based on review of Generator Set Commissioning Procedures, Site Acceptance Test Procedures, and Emission Test Reports, preoperational tests have been successfully completed.

3. Each combustion turbine generator (CTG) successfully meets contract operational guarantees that are necessary for satisfactory completion of all other items in this list.

   Applicable operational contract guarantees have been satisfied.

4. Each CTG successfully demonstrates its ability to initiate the start sequence resulting in the unit transitioning from zero (0) rpm (or turning gear) to a load equal to or greater than 90% Available Power.

Available Power is determined from the unit-specific Gross Available Power Determination (guaranteed power output performance as supplied by the turbine manufacturer) for conditions during testing.

   Based on data obtained during the interval, 08:38:10, April 27, 2012 through 09:11:00, April 27, 2012, the generating unit successfully completed a start sequence from zero (0) rpm to greater than 90% Available Power.

5. Each CTG successfully demonstrates its ability to initiate the shutdown sequence resulting in the unit transitioning from a load equal to or greater than 90% Available Power to zero (0) rpm (or turning gear).

Based on data obtained during the interval, 13:24:50, April 27, 2012 through 13:38:00, April 27, 2012, the generating unit successfully completed a shutdown sequence from greater than 90% Available Power to zero (0) rpm.

6. Each CTG successfully demonstrates its ability to operate at or above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

Capacity Factor is determined utilizing Available Power based on average conditions during duration of testing.

Based on data obtained during the interval, 10:00:00, May 26, 2012 through 10:00:00, June 2, 2012, the generating unit successfully operated above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

7. Each CTG demonstrates its ability to operate at or above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

Based on data obtained during the interval, 10:00:00, May 26, 2012 through 10:00:00, May 29, 2012, the generating unit successfully operated above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

8. Each CTG successfully demonstrates its ability to operate at a Capacity Factor of ninety percent (90%) for four (4) hours.

Based on data obtained during the interval, 01:00:00, June 2, 2012 through 05:00:00, June 2, 2012, the generating unit successfully operated above a Capacity Factor of ninety percent (90%) for four (4) hours.

9. The failure of any CTG to achieve operations shall only impact that unit from being considered as in-service.

Not applicable

10. Landfill gas collection/supply system is capable of delivering fuel to support items (6), (7), and (8) listed above.

Based on successful completion of items (6), (7), and (8) listed above, the landfill gas collection/supply system was capable of delivering fuel to support operation of the generating unit.

11. Sufficient transmission/distribution interconnection facilities shall exist for the total CTG (plant) design net electrical capacity at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the interconnection of the generating units to the distribution system, there is sufficient interconnection capacity.

12. Sufficient transmission/distribution facilities shall exist for the total CTG (plant) design net electrical capacity into the utility service territory at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the distribution facilities connecting to the utility service territory, there is sufficient interconnection capacity.

Landfill Gas Electrical Generator

In-Service Test Criteria

Maryland Heights Renewable Energy Center Unit 2

1. All major construction work is complete.

   Based on personal observations of the facility on the following dates, all major construction is complete: October 17, 2011 and June 13, 2012.

2. All preoperational tests have been successfully completed.

   Based on review of Generator Set Commissioning Procedures, Site Acceptance Test Procedures, and Emission Test Reports, preoperational tests have been successfully completed.

3. Each combustion turbine generator (CTG) successfully meets contract operational guarantees that are necessary for satisfactory completion of all other items in this list.

   Applicable operational contract guarantees have been satisfied.

4. Each CTG successfully demonstrates its ability to initiate the start sequence resulting in the unit transitioning from zero (0) rpm (or turning gear) to a load equal to or greater than 90% Available Power.

Available Power is determined from the unit-specific Gross Available Power Determination (guaranteed power output performance as supplied by the turbine manufacturer) for conditions during testing.

   Based on data obtained during the interval, 15:02:50, June 11, 2012 through 15:44:00, June 11, 2012, the generating unit successfully completed a start sequence from zero (0) rpm to greater than 90% Available Power.

5. Each CTG successfully demonstrates its ability to initiate the shutdown sequence resulting in the unit transitioning from a load equal to or greater than 90% Available Power to zero (0) rpm (or turning gear).

Based on data obtained during the interval, 09:04:00, April 24, 2012 through 09:30:50, April 24, 2012, the generating unit successfully completed a shutdown sequence from greater than 90% Available Power to zero (0) rpm.

6. Each CTG successfully demonstrates its ability to operate at or above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

Capacity Factor is determined utilizing Available Power based on average conditions during duration of testing.

Based on data obtained during the interval, 11:00:00, June 8, 2012 through 11:00:00, June 15, 2012, the generating unit successfully operated above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

7. Each CTG demonstrates its ability to operate at or above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

Based on data obtained during the interval, 18:20:00, June 11, 2012 through 18:20:00, June 14, 2012, the generating unit successfully operated above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

8. Each CTG successfully demonstrates its ability to operate at a Capacity Factor of ninety percent (90%) for four (4) hours.

Based on data obtained during the interval, 19:00:00, June 11, 2012 through 19:00:00, June 11, 2012, the generating unit successfully operated above a Capacity Factor of ninety percent (90%) for four (4) hours.

9. The failure of any CTG to achieve operations shall only impact that unit from being considered as in-service.

Not applicable

10. Landfill gas collection/supply system is capable of delivering fuel to support items (6), (7), and (8) listed above.

Based on successful completion of items (6), (7), and (8) listed above, the landfill gas collection/supply system was capable of delivering fuel to support operation of the generating unit.

11. Sufficient transmission/distribution interconnection facilities shall exist for the total CTG (plant) design net electrical capacity at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the interconnection of the generating units to the distribution system, there is sufficient interconnection capacity.

12. Sufficient transmission/distribution facilities shall exist for the total CTG (plant) design net electrical capacity into the utility service territory at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the distribution facilities connecting to the utility service territory, there is sufficient interconnection capacity.

Landfill Gas Electrical Generator

In-Service Test Criteria

Maryland Heights Renewable Energy Center Unit 3

1. All major construction work is complete.

   Based on personal observations of the facility on the following dates, all major construction is complete: October 17, 2011 and June 13, 2012.

2. All preoperational tests have been successfully completed.

   Based on review of Generator Set Commissioning Procedures, Site Acceptance Test Procedures, and Emission Test Reports, preoperational tests have been successfully completed.

3. Each combustion turbine generator (CTG) successfully meets contract operational guarantees that are necessary for satisfactory completion of all other items in this list.

   Applicable operational contract guarantees have been satisfied.

4. Each CTG successfully demonstrates its ability to initiate the start sequence resulting in the unit transitioning from zero (0) rpm (or turning gear) to a load equal to or greater than 90% Available Power.

Available Power is determined from the unit-specific Gross Available Power Determination (guaranteed power output performance as supplied by the turbine manufacturer) for conditions during testing.

   Based on data obtained during the interval, 12:48:20, June 2, 2012 through 13:41:00, June 2, 2012, the generating unit successfully completed a start sequence from zero (0) rpm to greater than 90% Available Power.

5. Each CTG successfully demonstrates its ability to initiate the shutdown sequence resulting in the unit transitioning from a load equal to or greater than 90% Available Power to zero (0) rpm (or turning gear).

Based on data obtained during the interval, 09:19:00, April 24, 2012 through 09:31:40, April 24, 2012, the generating unit successfully completed a shutdown sequence from greater than 90% Available Power to zero (0) rpm.

6. Each CTG successfully demonstrates its ability to operate at or above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

Capacity Factor is determined utilizing Available Power based on average conditions during duration of testing.

Based on data obtained during the interval, 7:00:00, May 31, 2012 through 7:00:00, June 7, 2012, the generating unit successfully operated above a Capacity Factor of forty percent (40%) for one hundred sixty eight (168) hours.

7. Each CTG demonstrates its ability to operate at or above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

Based on data obtained during the interval, 14:20:00, June 3, 2012 through 14:20:00, June 6, 2012, the generating unit successfully operated above a Capacity Factor of sixty five percent (65%) for seventy two (72) hours.

8. Each CTG successfully demonstrates its ability to operate at a Capacity Factor of ninety percent (90%) for four (4) hours.

Based on data obtained during the interval, 04:00:00, June 3, 2012 through 08:00:00, June 3, 2012, the generating unit successfully operated above a Capacity Factor of ninety percent (90%) for four (4) hours.

9. The failure of any CTG to achieve operations shall only impact that unit from being considered as in-service.

Not applicable

10. Landfill gas collection/supply system is capable of delivering fuel to support items (6), (7), and (8) listed above.

Based on successful completion of items (6), (7), and (8) listed above, the landfill gas collection/supply system was capable of delivering fuel to support operation of the generating unit.

11. Sufficient transmission/distribution interconnection facilities shall exist for the total CTG (plant) design net electrical capacity at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the interconnection of the generating units to the distribution system, there is sufficient interconnection capacity.

12. Sufficient transmission/distribution facilities shall exist for the total CTG (plant) design net electrical capacity into the utility service territory at the time the unit is declared fully operational and used for service.

    Based on review of the System Impact Evaluation, data, drawings, and other information related to the distribution facilities connecting to the utility service territory, there is sufficient interconnection capacity.