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Issues:	Analysis of Fuel and Wholeslae Electric Prices
Witness:	Michael S. Proctor
Sponsoring Party:	MoPSC Staff
Type of Exhibit:	Direct Testimony
Case No.:	ER-2007-0002
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MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

MICHAEL S. PROCTOR

UNION ELECTRIC COMPANY d/b/a AMERENUE

CASE NO. ER-2007-0002

Jefferson City, Missouri
December 2006

****Denotes Highly Confidential Information****

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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 Electric Service Provided to Customers in the Company's Missouri Service Area.	))))	Case Nos. ER-2007-0002

AFFIDAVIT OF MICHAEL S. PROCTOR

STATE OF MISSOURI)
) ss.
COUNTY OF COLE)

Michael Proctor, 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 17 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.

Michael S Proctor
Michael S. Proctor

Subscribed and sworn to before me this 11 day of Dec 2006.

JACOB METHENY
Notary Public - Notary Seal
State of Missouri
St. Louis County
My Commission Expires Jan. 25, 2009
Commission # 05656529

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UNION ELECTRIC COMPANY d/b/a AMERENUE

CASE NO. ER-2007-0002

Q. What is your name and business address?

A. My name is Michael S. Proctor. My business address is 9900 Page Avenue, Suite 103, Overland, MO 63132.

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

A. I am employed by the Missouri Public Service Commission (Commission) as Chief Regulatory Economist in the Energy Department.

Q. What is your education background and work experience?

A. I have Bachelor and Master of Arts Degrees in Economics from the University of Missouri at Columbia, and a Ph.D. degree in Economics from Texas A&M University. Prior to coming to work for the Commission, I was an Assistant Professor of Economics at Purdue University and at the University of Missouri at Columbia. Since June 1, 1977, I have been on the Staff of the Commission and have presented testimony on various issues related to weather normalized energy usage and rate design for both electric and natural gas utilities. With respect to electric issues, I have worked in the areas of load forecasting, resource planning and transmission pricing. Currently, I am serving as chairman of the Southwest Power Pool Regional State Committee's Cost Allocation Working Group, chairman of the Organization of Midwest ISO States' (OMS') Financial Transmission Rights Working Group and co-chairman of the OMS' Transmission Pricing Working Group.

Q. What are your current duties in the Energy Department as Chief Regulatory Economist?

A. I have the responsibility of being actively involved with the development and structure of Regional Transmission Organizations (RTOs) for the purpose of increasing efficiency and reliability in the competitive supply of electricity at wholesale. In addition, I am responsible to testify before the Commission on various issues where I have relevant expertise and/or experience.

EXECUTIVE SUMMARY

Q. What issues does your direct testimony address in this proceeding?

A. My direct testimony addresses both the fuel prices and the wholesale electricity prices to use in the determination of the variable production costs to be included in the Staff's determination of AmerenUE's cost of service.

Q. What areas of expertise or experience do you have for addressing fuel prices and wholesale electricity prices?

A. Because of my involvement with RTOs, I am familiar with the design and operation of the Midwest ISO's day-ahead and real-time energy market. Since going into operation in March of 2005, this energy market has been the basis for AmerenUE's participation in wholesale electricity spot markets, involving off-system sales and purchases of energy. As will be discussed in detail later in my testimony, fuel prices are one of the prime drivers of spot-market prices for electricity.

Q. What is the need for addressing fuel prices and wholesale electricity prices?

A. Both fuel prices and wholesale electricity prices significantly increased over the period starting in the spring and summer of 2005. There were two unrelated events that resulted in these increases. First, were the rail transportation problems that resulted in a decrease in the supply of western coal and the resulting increase in spot coal prices. Second, were the hurricanes in the Gulf coast area that resulted in a decrease in the supply of natural gas and the resulting increase in spot natural gas prices. Because of the increase in fuel prices, the wholesale spot market prices for electricity also increased. Over time, these fuel shortage problems have been corrected, resulting in downward movements in prices for coal, natural gas and electricity. The objective of my analyses is to remove the effects of these abnormal events on prices and recommend a set of normal prices to be used in this rate case.

Q. Can you briefly summarize the results of your analyses of AmerenUE's fuel prices and wholesale electricity prices?

A. Yes. The key to understanding fuel prices and wholesale electricity prices is the high level of correlation between the two. On-peak wholesale electricity spot market prices are highly correlated to natural gas prices; and off-peak wholesale electricity spot market prices are highly correlated to coal prices. My analysis first determines normal levels for natural gas and coal prices and then uses the high level of correlation to determine the associated levels for wholesale electricity spot market prices. The following table gives the annual average price levels determined for each of these components.

Annual Average Prices

Component	Prices
Coal Price	** _____ **
Spot Off-Peak Price	** _____ **
Natural Gas Price	** _____ **
Spot On-Peak Price	** _____ **

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ANAYLSIS OF NORMAL COAL DISPATCH PRICES

Q. What data did you use for your analysis of coal prices?

A. I used coal price data supplied by AmerenUE that it uses for the dispatch of its coal units located at Labadie, Sioux, Rush Island and Meramec. There is a different coal price for each unit based on different mixes of coal and different transportation costs. Specifically, I was interested in the various components that make up the coal dispatch prices for these four plant locations. I separated the data supplied by AmerenUE for coal dispatch prices into three distinct components: 1) mine-mouth price; 2) rail-transport price; and 3) SO2 price. I used component data from March 2004 through November 2006.

Q. Why did you separate the dispatch prices for coal into these three components?

A. I wanted to be able to determine which major components were impacted by the rail transportation problems that started in the spring of 2005.

Q. What did your analysis of the mine-mouth price of coal determine?

A. First, the mine-mouth coal prices supplied by AmerenUE represent spot prices for mine-mouth coal, which can be different from the contract price that AmerenUE pays for mine-mouth coal. As shown in Schedule 1.1 attached to my direct testimony, spot prices for mine-mouth coal were very stable from March 2004 through March 2005. Then, in April 2005 these spot prices began to increase and continued to increase through January 2006. Since reaching their peak levels in January 2006, spot prices for mine-mouth coal were falling until they began leveling off in September 2006. I obtained the Staff's level for January 2007 contract mine-mouth prices from Staff witness Mr. John Cassidy, and when I compared these recent spot prices for mine-mouth coal (September 2006 through November 2006) with the

contract mine-mouth coal prices, I found AmerenUE's contract prices are consistent with the leveling off trend that spot coal prices have taken since adjusting from the impact of the supply shortages. This is shown on Schedule 1.1, where the spot prices are graphed through November 2006 and the contract prices are the last values shown in the graph that are circled.

Q. How do AmerenUE's contract prices and recent spot prices for mine-mouth coal compare to historical mine-mouth spot prices?

A. Both AmerenUE's contract prices and recent spot price for mine-mouth coal are higher than those historically experienced in the March 2004 through March 2005 period. Therefore, I concluded that use of historical average spot prices that are significantly below contract prices for AmerenUE is inappropriate. Spot prices for mine-mouth coal in the historical period average just over ** _____ ** for Labadie, Rush Island and Meramec, and just over ** _____ ** for Sioux. Contract prices for Labadie, Rush Island and Meramec averaged ** _____ ** compared to an average price of just over ** _____ ** for November, and a contract price for Sioux of ** _____ ** compared to an average price of just over ** _____ ** for November. These contract prices for AmerenUE are much more representative of normal spot prices for mine-mouth coal than historical average levels.

Q. What is the difference between contract prices and spot prices for mine-mouth coal?

A. A contract price is what is called a "forward" price for a commodity, while a spot price is a "real-time" price. While spot prices represent the day-to-day price levels of the market, contract prices typically cover a much longer period of time and are based on buyers and sellers expectations of the future levels for spot-market prices. Thus, there is a

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relationship between the two prices based on market expectations at the time the contract is made. Over time, many unanticipated events can impact the level for spot-market prices, and only to the extent that the contract allows for these changes will they be reflected in contract prices.

Q. Why does AmerenUE use spot prices for coal for purposes of dispatch rather than contract prices?

A. The contract price of mine-mouth coal for AmerenUE represents a sunk cost, but the dispatch of its coal units are based on an opportunity cost. What this means is that the decision to burn the coal and produce electricity should be made based on other opportunities that exist with respect to the use of the coal. With respect to serving native load, AmerenUE's decision is whether to burn the coal to produce electricity to serve its native load, or in the alternative, to sell the coal at the spot price and purchase the electricity from the wholesale electricity spot market. With respect to selling electricity in the wholesale spot market, AmerenUE's decision is whether to buy additional coal at the spot price and produce more electricity from its coal-fired generation to sell into the wholesale electricity spot market, or in the alternative, not to make additional electricity sales into the wholesale spot market. In either instance, the key comparison is the opportunity cost of coal as reflected by the spot price of coal versus either purchases to or sales from the wholesale spot market for electricity.

Q. What did you determine regarding the transportation cost component of coal prices?

A. Schedule 1.2 attached to my direct testimony shows that the transportation cost component for coal prices for Labadie, Sioux and Rush Island have been relatively constant since March 2005. On the other hand, the transportation cost component for coal prices at

Meramec increased through July 2006, but have leveled off since that time. While historical averages might be relevant for Labadie, Sioux and Rush Island, that level would provide too low of an estimate at Meramec. Instead, the November 2006 transportation cost components for coal prices provides a better estimate for a normalized levels for all four plant locations than historical averages.

Q. What did you determine regarding the SO2 cost component of coal prices?

A. Schedule 1.3 attached to my direct testimony shows that SO2 costs have been fairly volatile since March 2005. While SO2 costs started to increase well before spot prices for mine-mouth coal, they otherwise follow a similar pattern of reaching a peak in January 2006 with steady decreases through 2006. Similar to spot prices for mine-mouth coal, SO2 costs have not returned to their historical lower levels experienced in the second quarter of 2004. Thus, the November 2006 SO2 cost component of coal prices provides a better estimate for a normalized level than using historical averages.

Q. Why is it important to included SO2 costs in the dispatch price for coal generation?

A. Even though AmerenUE has sufficient SO2 allowances that it would not incur any additional SO2 costs for serving its native load or making sales into the wholesale electricity spot market, it is important that it includes the opportunity cost of SO2 allowances in its decision to generate electricity from its coal fired units. In essence, since SO2 allowances are a given amount, decisions to use those allowances now or to either sell them or defer their use to the future should be based on the opportunity cost that is determined by the market price for SO2 allowances at the time the dispatch decision is made.

Q. Based on your analysis of all three components of coal prices, what do you recommend the Staff use for coal dispatch prices in its production cost model?

A. The following table shows the recommended price levels by component and by location for each of AmerenUE's plant locations.

Staff Normal Coal Dispatch Prices
¢/MMBTU

Component	Labadie	Sioux	Rush Island	Meramec
Mine-Mouth	** ____ **	** ____ **	** ____ **	** ____ **
Transportation	** ____ **	** ____ **	** ____ **	** ____ **
SO2	** ____ **	** ____ **	** ____ **	** ____ **
Total	** ____ **	** ____ **	** ____ **	** ____ **

Q. How do these normalized coal dispatch prices compare to historical levels for AmerenUE?

A. Schedule 1.4 attached to my direct testimony shows the relationship of the average of historical levels for the coal dispatch prices over the four locations compared to the average of the Staff normal coal dispatch prices. Historical coal dispatch prices show very little cyclical behavior throughout the year. So I plotted both the twelve-month moving average (12 MMA) and monthly values. The Staff normal coal dispatch price of ** _____ ** is equal to the observed levels for coal dispatch prices for the month of October and November. Because of the high levels for coal dispatch prices for November 2005 through March 2006, the 12 MMA series will not come down to the Staff's normal level until sometime in 2007 (projected for April 2007). It is possible that AmerenUE could see coal dispatch prices that are somewhat higher than the Staff normal on a twelve-month moving average basis, but with current dispatch prices having dropped to this lower level, the Staff normal levels for coal dispatch prices are consistent with historical levels. Another key

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cross check is to see what level of off-peak prices correlate with the normal coal dispatch prices, and compare the implied level for normal off-peak prices to historical levels.

ANALYSIS OF THE NORMAL OFF-PEAK ELECTRIC PRICE LEVEL

Q. Given the relationship of AmerenUEs dispatch decisions to spot prices for mine mouth coal, is there a strong correlation between dispatch coal prices and wholesale electric prices?

A. Such a correlation would be expected in hours where bids from coal units are setting the spot market prices for electricity. This would occur most often during the off-peak hours of the week. These are the hours starting at 11 p.m. at night and going up to 7 a.m. in the morning on weekdays and all hours on Saturdays and Sundays.

Q. What data did you analyze to determine the correlation between AmerenUE's coal dispatch prices and off-peak wholesale electricity spot prices?

A. I used average monthly coal dispatch prices and average monthly off-peak wholesale electricity spot prices supplied by AmerenUE from January 2003 through September 2006. In order to determine the correlation between these two data series, I calculated the 12 MMA series for each price and performed a regression analysis of the off-peak wholesale electricity price series against the coal dispatch price series.

Q. What were the results of your correlation analysis?

A. The R-Squared value that measures the percent of variation in the off-peak wholesale electricity price series explained by the coal dispatch price series, was over 97%. A graphical representation of this very high level of correlation is shown in Schedule 2.1 attached to my direct testimony.

Q. How did you apply this high level of correlation of off-peak wholesale electricity prices to coal dispatch prices?

A. First, I averaged the coal dispatch prices recommended for the four AmerenUE plant locations to arrive at an average coal dispatch price of ** _____ **. Then using the regression results between twelve-month average prices for off-peak wholesale electricity prices to coal dispatch prices, I calculated an average twelve-month off-peak wholesale electricity price of ** _____ **. This is the Staff proposed normal level for the average annual off-peak wholesale electricity price.

Q. How does this normal level compare to historical levels for twelve-month averages of off-peak wholesale electricity prices?

A. This is shown graphically in Schedule 2.2 attached to my direct testimony. In this case, because off-peak prices also have a strong cyclical component, I have not plotted actual monthly levels for off-peak wholesale prices, but have only plotted the 12 MMA series to compare to the Staff normal level for off-peak wholesale electricity prices. As with coal dispatch prices, I projected the 12 MMA to see where it would intersect with the Staff proposed normal level for twelve-month average off-peak wholesale electricity price. The projection of the 12 MMA series intersects the normal level for twelve-month average off-peak prices in December 2006. Thus, the Staff normal level for twelve-month average off-peak prices is very consistent with historical observations.

Q. What is your conclusion regarding normal levels for coal dispatch prices and off-peak electricity prices?

A. The estimates I am sponsoring for normal levels of both coal dispatch and off-peak electricity prices are conservative, and could be higher if contract rail transportation

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prices are used. Based on historical data, while AmerenUE could experience higher levels for both prices, these estimates represent what I believe are reasonable levels to use for purposes of the Staff's production cost modeling of variable production costs. It is important to keep in mind that in the production cost modeling that the correlation between coal dispatch prices and off-peak electricity prices be maintained. If the coal dispatch prices are too high relative to off-peak electricity prices, then the production cost model will generate too few off-system sales and too many off-system purchases of energy. On the other hand, if the coal dispatch prices are too low relative to off-peak electricity prices, then the production cost model will generate too many off-system sales and too few off-system purchases of energy. These proposed normal levels for coal dispatch prices and average off-peak electricity prices maintain the proper relationship between the two. Moreover, if a higher level were used for normal coal dispatch prices, then a higher normal level would also have to be used for the average off-system electricity prices. Thus, taking into account the historical levels for coal dispatch prices and off-peak wholesale electricity prices, this combination of normal prices are reasonable estimates.

ANALYSIS OF HOURLY OFF-PEAK ELECTRIC PRICE SHAPES

Q. Since the normal level for the off-peak electricity price is an average twelve-month off-peak wholesale electricity price, how did you determine the hourly off-peak wholesale electricity prices?

A. AmerenUE had performed a three-year average analysis of wholesale electric prices for the years 2003 through 2005. After making adjustments to wholesale prices for the impact of the rail transportation problems, these averages were used to represent a normal pattern of hourly wholesale electricity prices. I performed a similar analysis on monthly

Cinergy Hub prices using four years of data. That analysis involved extracting the trend from the data series to remove the impacts of whatever shortages or surpluses may have been driving the electricity markets during those years. Once the trends are extracted from the data, I averaged the data by month to estimate any monthly cyclical pattern in wholesale electricity prices. I then compared this pattern to the one derived by AmerenUE and found the two cyclical patterns to be very close for monthly average off-peak wholesale electricity prices. Thus, I used the same hourly pattern of prices that AmerenUE had used from its three-year average by applying the same percentage change to each hourly price to arrive at a twelve-month average price of ** _____ **. This price is 16.04 % higher than the twelve-month average price of ** _____ ** used by AmerenUE in its filing. In this regard, it is also important to point out that the coal dispatch prices are 16.85 % higher than those used by AmerenUE in its filing.

Q. Why did you apply the same percentage change to each hourly price rather than simply adding a constant dollars per MWh to the price in each hour?

A. While either approach would result in the same twelve-month average price, I chose the same percentage change method because it widens the gap between the highest and lowest hourly prices. For example, a 10% increase to prices of $10/MWh and $40/MWh would result in prices of $11/MWh and $44/MWh, thereby increasing the difference from $30/MWh (=$40/MWh-$10/MWh) to $33/MWh (=$44/MWh-$11/MWh). Because AmerenUE's averaging of hourly prices tends to decrease differences between high and low prices (by averaging high and low prices from the three years), using a method that would restore some of those differences between high and low prices was the most appropriate.

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ANALYSIS OF NATURAL GAS PRICES

Q. What data did you use for your analysis of natural gas prices?

A. I used natural gas price data from January 2003 through November 2006 supplied by AmerenUE that it uses for the dispatch of its gas-fired combustion turbine generators (CTGs). There is a different natural gas price based on the pipelines serving the location of AmerenUE's CTGs.

Q. What analysis did you perform on natural gas prices?

A. Unlike coal prices that vary by plant location, the natural gas prices from Panhandle Eastern Pipeline, Natural Gas Pipeline and Mississippi River Transmission pipeline are very similar, so I first calculated the average price over all three pipelines. Then I calculated a 12 MMA series and plotted this over time to see what long-run trends were being followed by natural gas prices. The 12 MMA is used to discern trends in natural gas price data because of the high degree of monthly volatility in the data series. The trend in the 12 MMA natural gas data series is shown on Schedule 3 attached to my direct testimony.

Q. What trends did you observe for natural gas prices?

A. The twelve-month average of natural gas prices began to increase in October of 2004 and continued increasing through February 2006. There was a significant drop in natural gas prices in March 2006 (below ** _____ **), and this lower level was maintained through September of 2006, resulting in a steady decrease in the twelve-month average prices through this period. In October 2006, there was another significant decrease in natural gas price (below ** _____ **), but November 2006 prices went back up (just above ** _____ **).

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Q. Based on this analysis, what do you recommend for use as a normal price level for natural gas prices?

A. The twelve-month average for the twelve months ending November 2006 appears to be an appropriate level to use for normal natural gas prices. The twelve-month average price is ** _____ ** and the November 2006 price is ** _____ **. Thus, this estimate for a normal level is consistent with both historical trends and recent, actual observations.

ANALYSIS OF THE AVERAGE LEVEL FOR ON-PEAK ELECTRICITY PRICE

Q. What data did you use for your analysis of on-peak wholesale electricity prices?

A. As with off-peak prices, I used historical data from January 2003 through September 2006 for on-peak wholesale electricity prices. Specifically, I calculated the average monthly on-peak price over the hours starting at 7:00 a.m. and ending at 11:00 p.m. for weekdays during each month. In addition, because gas-fired combustion turbines tend to set on-peak prices, I ran a correlation between on-peak wholesale electricity prices to natural gas prices. This correlation was performed by creating a 12 MMA series for both data series, and running a regression of on-peak wholesale electricity prices against natural gas prices.

Q. What were the results of your correlation analysis?

A. The R-Squared value, which measures the percent of variation in the on-peak wholesale electricity price series explained by the natural gas price series, was over 98%. A graphical representation of this very high level of correlation is shown in Schedule 4.1 attached to my direct testimony.

Q. How did you apply this high level of correlation of on-peak wholesale electricity prices to natural prices?

A. Using the regression results between twelve-month average prices for on-peak wholesale electricity prices to natural gas prices, I calculated an average twelve-month on-peak wholesale electricity price of ** _____ **. This is the Staff proposed normal level for the average annual on-peak wholesale electricity price.

Q. How does this normal level compare to historical levels for twelve-month averages of on-peak wholesale electricity prices?

A. This is shown graphically in Schedule 4.2 attached to my direct testimony. This graph shows the 12 MMA series of on-peak wholesale electricity prices along with the Staff normal level for off-peak wholesale electricity prices. While 12 MMA series is above the Staff normal level, that normal level is consistent with actual prices observed since January 2006. I have included those actual prices on the graph for purposes of comparison. I should also note the high level of volatility in on-peak prices with significant high prices in July and August of 2006 and a significant low price in September 2006. This volatility is explained in part by hotter than normal weather in July and August followed by a cooling off in September. However, the average price since January 2006 is ** _____ **, which is only slightly higher than the Staff normal of ** _____ **.

Q. What is your conclusion regarding normal levels for natural gas prices and on-peak electricity prices?

A. The estimates I am sponsoring for normal levels of both natural gas and on-peak electricity prices represent what I believe are reasonable levels to use for purposes of the Staff's production cost modeling of variable production costs. It is important to keep in mind

that in the production cost modeling, the correlation between natural gas prices and on-peak electricity prices should be maintained. If the natural gas prices are too high relative to on-peak electricity prices, then the production cost model will generate too few off-system sales of energy during the on-peak hours. On the other hand, if the natural gas prices are too low relative to on-peak electricity prices, then the production cost model will generate too many off-system sales of energy during the on-peak hours. These proposed normal levels for natural gas prices and average on-peak electricity prices maintain the proper relationship between the two, and should therefore enable the production cost model to generate reasonable results.

ANALYSIS OF HOURLY ON-PEAK ELECTRIC PRICE SHAPES

Q. Since the normal level is an average twelve-month on-peak wholesale electricity price, how did you then determine the hourly on-peak wholesale electricity prices?

A. As with off-peak electricity prices, AmerenUE had performed a three-year average analysis of wholesale electric prices for the years 2003 through 2005. After making adjustments to wholesale prices for the impact of the hurricanes, these averages were used to represent a normal pattern of hourly wholesale electricity prices. I performed a similar analysis on monthly Cinergy Hub on-peak prices using four years of data. That analysis involved extracting the trend from the data series to remove the impacts of whatever shortages or surpluses may have been driving the electricity markets during those years. Once the trends were extracted from the data, I averaged the data by month to estimate any monthly cyclical pattern in on-peak wholesale electricity prices. I then compared this pattern to the one derived by AmerenUE and found the two cyclical patterns to be very close for monthly

average on-peak wholesale electricity prices. Thus, I used the same hourly pattern of prices that AmerenUE had used from its three-year average by applying the same percentage change to each hourly price to arrive at a twelve-month average price of ** _____ **, which is 18.5% higher than the twelve-month average price of ** _____ ** used by AmerenUE in its filing. In this regard, it is also important to point out that the natural gas prices are 16.7% higher than those used by AmerenUE in its filing.

Q. Why did you apply the same percentage change to each hourly price rather than simply adding a constant dollars per MWh to the price in each hour?

A. As with off-peak wholesale electricity prices, I chose the same percentage change method because it widens the gap between the highest and lowest hourly prices. Because AmerenUE's averaging of hourly prices tends to decrease differences between high and low prices, using a method that would restore some of those differences between high and low prices was the most appropriate.

Q. Does this complete your direct testimony?

A. Yes, it does.

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Schedule 1.1

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In Its Entirety

Schedule 1.2

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In Its Entirety

Schedule 1.3

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Schedule 1.4

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