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Witness:	Leon C. Bender
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MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

LEON C. BENDER

UNION ELECTRIC d/b/a

AMERENUE

CASE NO. EC-2002-1

Jefferson City, Missouri
July 2, 2001

Exhibit No. 16
Date 7/10/02 Case No. EC-2002-1
Reporter KRM

DIRECT TESTIMONY

OF

LEON C. BENDER

UNION ELECTRIC COMPANY

d/b/a AMERENUE

CASE NO. EC-2002-1

Q. Please state your name and business address.

A. Leon C. Bender, 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 Staff (Staff) as a Regulatory Engineer in the Electric Department of the Utility Operations Division.

Q. Please describe your educational and work background.

A. I received a Bachelor of Science degree in Mechanical Engineering in August 1978 from Texas Tech University. I became employed by Southwestern Public Service Company (SPS) as a power generation plant design engineer in September 1978. While employed by SPS, I was lead engineer on many projects involving design and construction of new power generating stations and upgrading of their older plants. In 1983, I became a registered Professional Engineer in the state of Texas. In 1986, I transferred to SPS's newly formed subsidiary company, Utility Engineering Corporation (UEC), and was responsible for various projects at various other clients' power generation plants. In June 1990, I accepted employment as a systems engineer with Entergy Operations, Inc. at the nuclear powered

generating station, Arkansas Nuclear One. In December 1995, I was employed by the Missouri Public Service Commission (Commission).

Q. What is the purpose of your testimony in this case, the Union Electric Company d/b/a AmerenUE (UE) complaint case, Case No. EC-2002-1?

A. The purpose of my testimony is to recommend that the Commission adopt the results of the Staff's electric production cost model simulation that is used to establish a normalized fuel and purchased power cost for UE for the test year.

Q. Briefly summarize the results of the production cost model simulation.

A. The results of the production cost model simulation show that the normalized cost of fuel and net purchased power for the test year is $343,785,940.

Q. What period year did Staff use to annualize fuel?

A. January 1, 2000 to December 31, 2000.

Q. What is a production cost model?

A. A production cost model is a computer program used to perform an hour-by-hour chronological simulation of a utility's generation and power purchases. The model determines energy costs and fuel consumption necessary to economically meet a utility's load.

Q. What is meant by an "hour-by-hour" chronological simulation of a utility's generation and net power purchases?

A. The production cost model operates in a chronological fashion, meeting each hour's energy demand before moving to the next hour. It will schedule generating units to dispatch in a least cost manner based upon fuel cost and the cost of purchased power. This model closely simulates the way the company should dispatch its generating units and purchase power to meet the net system load in a least cost manner.

Q. What production cost model did the Staff use in this case?

A. The RealTime production cost model was used. This is the same model used by Staff in all other electric rate cases since 1995.

Q. What were the sources for data used in the model?

A. The sources for data used in the model are listed in Schedule 1.

Q. What is purchased power?

A. Purchased power is the hourly energy which is purchased in the market place from another electric supplier and which is used to meet the load of the electric utility company.

Q. Does UE use purchased power to serve native load?

A. Yes. UE purchases power from other sources during times of plant forced or planned outages, or during times when it is more economical to use purchased power rather than generate power.

Q. What were the sources for data used to calculate purchased power prices and energy?

A. The data used to calculate purchased power prices and energy were submitted to Staff by UE as required by Commission Rule 4 CSR 240-20.080 (20.080 data).

Q. What different kinds of purchased power were used in the production cost model?

A. Three kinds of purchased power were used in the production cost model; capacity purchases, spot purchased energy, and emergency energy.

Q. Please explain what is meant by capacity purchases.

A. Capacity purchases are made through firm capacity contracts for the purchase of power, under these contracts, the purchaser pays a fixed cost for the ability to receive a maximum number of megawatts (MW) per hour and also pays a variable cost for the MW hours of energy associated with the generating capacity that is being purchased. The purchasing company can obtain a quantity of hourly energy up to the maximum amount shown in the capacity contract.

Q. What capacity purchase contracts were used in the model?

A. A list of the existing purchase contracts used in the production cost model is provided in Schedule 1.

Q. How did you calculate the hourly prices for each capacity contract?

A. I used historical prices obtained from 20.080 data. The prices were fixed for each hour of every month regardless of amount of energy purchased up to the contract maximum.

Q. What is spot purchased energy?

A. For the purposes of this case, spot energy is purchased on an hourly basis rather than through a longer-term contract. The purchasing company decides to buy spot energy from one or more suppliers based on the economics and availability of its internal resources (generating units and capacity purchases). Purchases of spot energy are made to lower fuel costs when the spot market price is below the marginal cost of providing that energy from internal resources. In rare cases, spot energy is purchased when demand exceeds the supply available from internal resources. Since the spot market depends on energy supply and demand, the prices tend to be much more volatile than capacity purchases.

Q. What methodology did you use to determine the spot purchased energy prices?

A. I used a procedure developed by the Commission's former Electric Department- Engineering Section described in the document entitled A Methodology to Calculate Representative Prices for Purchased Energy in the Spot Market. The method uses a statistical calculation based on the truncated normal distribution curve to represent the hourly purchased power prices in the spot market. UE's actual hourly non-contract transaction prices obtained from UE's 20.080 data are used as input in the calculation.

Q. How did you determine spot purchased energy available in hours that had no purchased energy?

A. I limited the amount of hourly spot purchased energy available to the amount of spot energy that was actually purchased in the same hours of days that had a similar price range. The higher the price paid, the more energy I made proportionately available, up to the maximum actually purchased as shown by the 20.080 data. This was done on an hourly basis for each month. Given the amount of spot purchased energy available, the Staff's production cost model calculates the amount of spot energy purchased based on the least cost to meet load.

Q. What is emergency purchased energy?

A. For the purposes of this case, emergency energy is purchased on a short-term hourly basis rather than through a longer-term contract. A sudden loss of generation source or transmission ability could require the purchase of energy at a higher price when other sources become unavailable.

Q. How did you determine the amount of emergency purchased energy available?

A. I estimated the hourly emergency purchased energy available to be approximately ten percent of total generation capacity (excluding summer months). For the

summer months (June through August), the amount of emergency purchased energy is approximately 15% of total generation capacity. This was done on an hourly basis for each month.

Q. How did you determine the price of emergency purchased energy available?

A. I used the highest price actually paid for purchased power in a given month plus 10%. This monthly emergency energy price was then assigned to every hour in the month. The approach assumes that a company will have to pay at least this price to meet its load in an emergency.

Q. Did you simply run UE's production costs on a stand-alone basis?

A. No. UE's production costs are determined through a Joint Dispatch Agreement (JDA) with Ameren Energy Generating Company (AEG).

Q. What is the JDA between UE and AEG?

A. On December 18, 1995, UE and Central Illinois Public Service Company (CIPS) entered into a JDA by which the generation, purchased power and power sales would be committed and dispatched as a combined system. The JDA is fundamentally a description of how the energy and costs from generation and purchased power and the profit from power sales were to be distributed between the two companies. On May 1, 2000, this JDA was amended to recognize AEG as the subsidiary to which CIPS has transferred the ownership of its generating assets.

Q. According to the JDA, how are the energy and costs from the joint dispatch of generation and purchased power assigned between UE and AEG?

A. In the joint dispatch of the generation units, whenever one of the companies generates more electricity than it needs to serve its own load, the incremental energy and cost

of the additional generation will be assigned to the other company. This concept also includes the dispatch of electricity from purchased power contracts that either company has entered into as a part of the supply resources needed to meet their individual load requirements. For purposes of this testimony the sum of generation and purchased power contracts for each company will be called "supply resources."

Q. How are energy and cost assigned by the JDA between UE and AEG when spot purchased energy is involved?

A. In the JDA, when the joint dispatch results in the combined system purchasing spot purchased energy that is economical for both companies to use, both the energy and the cost of such a purchase are assigned to each company based on its percentage share of load on that given hour. The assigned energy from spot purchased energy is then subtracted from the loads for each company, and the energy from supply resources is then compared to the remaining load to determine how much energy and cost from supply resources are being transferred from one company to the other.

Q. In this JDA, is it possible that all of the spot purchased energy is assigned to one of the two companies?

A. Yes, that is a possibility of one of the two companies. If the cost of the spot purchased energy is greater than the marginal cost of generation to meet its own load on a stand-alone basis, then all of the spot purchased energy would be assigned to the other company.

Q. How were Staff production cost model results used to determine JDA assignment of cost for energy?

A. The Staff made three production cost model runs. The first run determined the normalized costs for the joint dispatch of the UE and AEG supply resources and spot purchased energy. The additional two runs determined the stand-alone dispatch for UE and AEG. The stand-alone dispatches are compared to the joint dispatch to determine the JDA assignment of costs to UE and AEG.

Q. How was spot purchased energy modeled in the stand-alone dispatches?

A. In the stand-alone production cost model runs, the spot purchased energy available to the joint dispatch run is assigned to each company based on its percentage share of load in each hour. However, this assignment of available spot purchased energy is not a "required" purchase in the stand-alone dispatches. Instead, if either of the companies can serve its load more cheaply without this spot purchased energy, the stand-alone dispatch for that company will not include the energy or the cost of the spot purchased energy.

Q. How are the results of the three dispatches used to arrive at the assignment of joint fuel and purchased power cost between the two companies?

A. Excluding spot purchased energy, the supply resources from the stand-alone fuel runs are compared to those for the joint dispatch run for each hour. In a given hour, if for one of the companies, the energy from the supply resources for the stand-alone dispatch is less than or equal to the energy for the supply resources for that same company in the joint dispatch, then the energy and costs from the stand-alone dispatch (including spot purchased energy) are assigned to that company and subtracted from the energy and costs of the joint dispatch, and the remaining energy and costs are then assigned to the other company. For example, whenever there is a transfer from AEG to UE, AEG's assigned costs are its stand-alone costs, and the difference between the joint dispatch costs and AEG's assigned costs is

assigned to UE. But this can only happen when the difference between the joint dispatch costs and AEG's stand-alone costs are smaller than UE's stand-alone costs. Thus, the costs assigned to UE through the JDA are the lesser of: (a) UE's stand-alone costs and (b) the difference between the joint dispatch costs and AEG's stand-alone costs.

Q. How is the amount of energy from supply resources transferred from one company to another calculated?

A. For each of the companies, the energy from supply resources in the stand-alone dispatch is subtracted from its energy from supply resources in the joint dispatch. The difference measures the amount of energy from supply resources being transferred from one company to the other. The cost of the transfer is then calculated as the costs for supply resources for the company making the transfer in the joint dispatch minus that company's costs for supply resources in the stand-alone dispatch.

Q. Does the company making or receiving the transfer of energy change throughout the year?

A. The company making or receiving the transfers is determined by incremental cost relative to hourly loads. If hourly loads and unit availability do not change, the transfers will not change. But with changing hourly loads and unit availabilities, it is possible that the company making the energy transfer in one hour is UE and in the next hour is AEG.

Unit availability is affected by both scheduled and forced outages for the generation units. Thus, it is important that the calculation of hourly transfers be made from production cost model runs where the units available for dispatch are the same for the stand-alone dispatches as they are for the joint dispatch.

Q. Does the JDA take into account market prices for electricity?

A. Market prices for electricity directly impact only spot purchases and sales of energy. Otherwise, energy transfers are accounted for at incremental cost. When one company makes an energy transfer to another at incremental cost, it has given up the opportunity of selling that generation to the market. When the market price is higher than the incremental cost, the company transferring energy has a lost opportunity cost and the company receiving the transfer has gained a benefit from not having to purchase power from the market or run its own supply resources.

Q. How does the JDA assign profits from spot sales of electricity?

A. Profits from spot sales are calculated and assigned on a monthly formula. Profits from spot sales are the revenues from those sales minus the incremental costs to provide the energy for the sales. The incremental energy to make spot sales can come from either supply resources or spot purchased energy. Each month the profits are assigned to the two companies in proportion to each company's net output. Net output is the total energy delivered to meet each company's load requirements.

Q. Did the Staff include spot sales in its production cost model?

A. No, it did not.

Q. What is the test year cost of fuel and purchased power as determined by the Staff's production model for UE?

A. The test year fuel cost for fuel and net purchased power in the test year (twelve months ending December 2000) is $343,785,940. This amount was supplied to Staff witness John Cassidy to use in the annualization of fuel expense.

Q. Does this production cost number include all of the JDA calculations as previously described?

A. No. The Staff discovered that the production cost model used to simulate forced outages of the various generation units needed to be modified in order to provide access to each iteration. An iteration is a one year period having a set of generation outages that are determined using random numbers. In order to represent a "normal" outage situation for the generating units, several such iterations must be run. In order to properly calculate the transfers of energy from one company to another, these transfers should be calculated for each iteration. At the time of this filing the provider of the production cost computer program is in the process of modifying the code to allow electronic access to each iteration.

Q. What is included in the production cost number?

A. The $343,785,940 is UE's stand-alone production costs. Since UE's stand-alone production costs do not include any transfers of energy and cost from AEG, the stand-alone production cost overestimates the production cost that would be allocated to UE through the JDA.

Q. Does Staff intend to complete its analysis of the JDA calculations as described above?

A. Yes, the model provider is supplying an update to the model that will enable the Staff to obtain the output necessary to complete the calculations and the Staff will update annualized fuel expense when this calculation is complete.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

The Staff of the Missouri Public Service Commission, Complainant,	)	
vs.	)	Case No. EC-2002-1
Union Electric Company, d/b/a AmerenUE, Respondent.	)	

AFFIDAVIT OF LEON C. BENDER

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

Leon C. Bender, of lawful age, on his oath states: that he has participated in the preparation of the foregoing written Direct Testimony in question and answer form, consisting of 11 pages of testimony to be presented in the above case, that the answers in the attached written Direct 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.

Leon C. Bender

Subscribed and sworn to before me this 2nd day of July, 2001.

MICHELLE SCHWARTZE
NOTARY PUBLIC STATE OF MISSOURI
COLE COUNTY
MY COMMISSION EXP. APR. 25,2005

Michelle Schwartze
Notary Public

My commission expires

Schedule 1

Fuel Prices	Supplied by Staff Witness John Cassidy
Unit Maintenance History	Supplied by UE Data Request Response to Staff
Generation Unit Specific Data	Supplied by UE Data Request Response to Staff
Weather Normalized Hourly Load	Supplied by Staff Witness Lena Mantle
Purchase Power Contracts; Capacities and Prices	4CSR 240-20.080 data Electric Energy Inc. Mid America Energy Entergy Inc. Soyland Power Cooperative