Exhibit No.:
Issue: Production Cost Model
Witness: Tom Y. Lin
Sponsoring Party: MoPSC Staff
Case Nos.: EM-96-149

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

UNION ELECTRIC COMPANY

CASE NO. EM-96-149

REBUTTAL TESTIMONY

OF

TOM Y. LIN

Jefferson City, Missouri
May, 1996

Denotes Highly Confidential Information

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Exhibit No. 6
Date 9-5-96 Case No. EM-96-149
Reporter KF

REBUTTAL TESTIMONY

OF

TOM Y. LIN

UNION ELECTRIC COMPANY

CASE NO. EM-96-149

Q. Please state your name and business address.

A. My name is Tom Y. Lin and my business address is 301 West High Street, Jefferson City, Missouri, 65101.

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

A. I am employed by the Missouri Public Service Commission (MPSC or Commission), as a Staff engineer in the Engineering Section of the Utility Operation Division's Energy Department.

Q. Please describe your educational and professional background.

A. I received a Bachelor of Engineering degree in Mechanical Engineering from Nanjing Institute of Technology (now Southeast University), China, in July, 1983. After graduation in 1983, I worked for Fujian Testing and Research Institute for Electric Power, a division of Fujian Provincial Electric Power Industry Bureau as a mechanical engineer for seven years. During that time, I was responsible for developing, designing, modifying, testing and performing computer simulation programs, boiler efficiency and heat rate tests, and various projects in

Fujian Power Plants. I then pursued an advanced degree in America and graduated from the University of Oklahoma with a Master of Science degree in Mechanical Engineering in August of 1993. I began my employment with the Commission in August 1994.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to the testimony of Union Electric Company (UE) witness Maureen A. Borkowski regarding electric production cost savings associated with the merger based on the Joint Dispatch Agreement (JDA).

Q. What are the electric production cost savings associated with the merger?

A. The electric production cost savings are those savings attributable to the joint dispatch of UE and Central Illinois Public Service Company (CIPS) generation and transmission resources on a single system basis after the merger compared to the electric production costs of UE and CIPS on a stand alone dispatch basis as if there were no merger.

Q. How much in electric production cost savings was estimated by UE on the basis of joint dispatch?

A. UE estimated that approximately $84 million in cost savings would result over the ten-year period from

1997 to 2006. Approximately $74 million of the savings result from energy costs, which are calculated through production cost model simulations, and an additional $10 million in savings is due to operational savings from coordinating maintenance schedules of both UE and CIPS over the same period. On April 19, 1996, UE updated the additional savings value from $10 million to approximately **_____** which included the savings of coordinating maintenance schedules, sharing of non-spinning reserves, improved heat rates, some operation and maintenance (O&M), system analysis software consolidation, and other savings in UE and CIPS electric production costs after the merger.

Q. What percentage is the $74 million savings estimate of the total fuel costs for the combined UE and CIPS system over the ten-year period from 1997 to 2006?

A. In response to the Commission Staff's (Staff's) Data Request (DR) #1, UE stated that the fuel costs in its production cost model run from 1997 to 2006, were approximately **_____**. Thus, the $74 million savings from joint dispatch represents approximately **_____** of the total fuel costs over the ten-year period.

Q. What is the JDA?

A. It is a written agreement that specifies how UE and CIPS intend to operate their combined system generating units and transmission facilities to meet load

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requirements. UE and CIPS would unite their generating resources and transmission facilities on a single control area basis, through the centralized, economic commitment and dispatch of the combined system's generating resources (including off-system purchases) to serve the combined system load requirements and sale obligations.

Q. What is your responsibility in this case with regard to the determination of the joint dispatch savings?

A. I am responsible for 1) evaluating the joint dispatch savings, which were calculated by UE by a computerized production cost model simulation, and 2) reviewing and assessing the reasonableness of input data used in Staff's model. The input data includes each generating unit's fuel prices, heat rates, variable O&M, maintenance outage schedules, and forced outage rates, as well as UE and CIPS native system loads over a ten-year period from 1997 to 2006. The purchased power data was obtained from Staff witness, David Elliott.

Q. How did you calculate the joint dispatch savings?

A. I ran the production cost model for three different simulations. The first two simulations assumed that the UE and CIPS generating systems would be operated as stand alone systems. The third simulation assumed that the combined generation resources of the two systems would be

operated as a single system. Annual energy (or fuel) costs for the three simulations were collected. The UE and CIPS stand alone system simulation results were added together and compared to the results for the combined UE and CIPS system operation simulation. The difference in the two results was identified as joint dispatch savings excluding other savings mentioned above.

Q. What savings from joint dispatch did you find in this case?

A. I found that the joint dispatch savings would be approximately $91 million excluding **_____** mentioned above over the period, from 1997 to 2006.

Q. What is the percentage of the joint dispatch savings calculated by the Staff compared to the total fuel costs in the UE and CIPS combined system over the ten-year period from 1997 to 2006?

A. It is approximately **____**.

Q. What is the difference of joint dispatch savings, excluding the **_____** additional savings for coordinating maintenance schedules, sharing non-spinning reserves, improved heat rates and other items over the period from 1997 to 2006, between the Staff and UE?

A. It is approximately $16,810,000.

Q. Which calculation of the joint dispatch savings between Staff and UE do you believe is more

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accurate?

A. Since both Staff and UE used projected input data and different production cost models, it is very difficult to determine if one result is more accurate than another. The actual joint dispatch savings will be different from the results of the production cost model run in the projected years, from 1997 to 2006.

Although the joint dispatch savings calculated by Staff and UE are different, the conclusions are identical. Based on the production cost model run, the JDA would result in a fuel savings in both Staff and UE analyses.

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 net power purchase, determining energy costs, fuel consumption, and emissions outputs to meet a utility's "native load."

Q. What is meant by the phrase "native load?"

A. For purposes of this case, "native load" means the firm load that a utility is obligated to serve. It includes retail, but not wholesale loads.

Q. Did you review UE's and CIPS' "native load" data?

A. Yes.

Q. Did you modify UE's and CIPS' "native load"

data?

A. No, the "native load" data over a ten-year period from 1997 to 2006 used in this analysis is the same as that furnished by UE and CIPS in response to Staff DR's #2901 and 2904.

Q. Did you review the projected fuel prices, heat rates, variable O&M, maintenance outage schedules, and forced outage rates of each generating unit?

A. Yes.

Q. Did you change any projected fuel prices, heat rates, variable O&M, maintenance outage schedules, or forced outage rates data of any generating unit, which UE and CIPS provided in response to Staff DR's?

A. No, the projected fuel prices, heat rates, variable O&M, maintenance outage schedules, and forced outage rates of each generating unit over a ten-year period from 1997 to 2006 used in this analysis were the same as that furnished by UE and CIPS in response to Staff DR's #2901 and 2907.

Q. Did you consider similar scenarios to simulate the actual dispatch and system coordinated operations in the production cost model?

A. Yes, I did. Under Commission Rule 4 CSR 240-20.080, UE submitted monthly generating unit information. For the UE system, I considered the Callaway nuclear

generating unit and Labadie 1, 2, 3, and 4, Sioux 1 and 2, Rush Island 1 and 2 coal-fired generating units as the "must run" generating units, based on 20.080 data. For the CIPS system, I considered the Coffeen 1 and 2, Newton 1 and 2, and Meredosia 3 coal-fired generating units as the "must run" units, based on CIPS in response to Staff DR's #2901 and 2907. "Must run" means that a "must run" unit must be run or dispatched even though other more economic power is available in the production cost model simulations.

Q. Did UE's analysis also consider some UE and CIPS owned generating units to be "must run" units in its production cost model run?

A. Yes. For the UE system, Meramec 1, 2 and 4 coal-fired generating units and other generating units which were the same as Staff used in the production cost model were regarded as the "must run" generating units. For the CIPS system, Coffeen 1 and 2, and Newton 2 coal-fired generating units as well as a Meredosia generating unit (three coal-fired generating units and one combustion turbine were combined as a single Meredosia generating unit in Meredosia plant) were considered as the "must run" units by UE, based on CIPS public information.

Q. Why did the Staff not consider Meramec generating units as "must run" generating units?

A. For the Meramec generating units, since there

were many reserve shutdowns shown in 20.080 data, these generating units were not considered as the "must run" units in the production cost model.

Q. What production cost model did you use?

A. I used REAL TIME.

Q. What computer program did UE use?

A. UE used the EPRI MIDAS computer model.

Q. What in your opinion, should the Commission require of UE/Ameren so that the Energy Engineering Section can perform appropriate fuel and energy cost simulation after the merger?

A. The following conditions would be necessary:

1. UE/Ameren must provide the historical hourly generation, purchase power data, and sales power data required under Commission Rule 4 CSR 240-20.080 in electronic format accessible by a spreadsheet program.

2. Acknowledgment and agreement that the Commission may access and require without subpoena the production of all accounts, books, contracts, records, documents, memoranda, papers, and employees of Ameren Corporation and any affiliate or subsidiary of Ameren Corporation.

The above language includes access to all data, records and calculations required for the analysis of fuel and energy costs.

It would be detrimental to Missouri ratepayers if the Commission did not have the above information because the Commission's ability to set just and reasonable rates would be impaired.

Q. Would you summarize your rebuttal testimony?

A. The projected fuel prices, heat rates, O&M costs, maintenance outage schedules, and forced outage rates of each generating unit, as well as native system loads and purchase power data were included in the production cost model run. The joint dispatch savings which were calculated in the simulation amounted to approximately $91 million.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the matter of the Application of Union Electric Company for an Order Authorizing (1) Certain Merger Transactions Involving Union Electric Company; (2) the Transfer of Certain Assets, Real Estate, Leased Property, Easements and Contractual Agreements to Central Illinois Public Service Company; and (3) in Connection Therewith, Certain Other Related Transactions.	)	Case No. EM-96-149

AFFIDAVIT OF TOM Y. LIN

STATE OF MISSOURI)
) ss.
COUNTY OF COLE)

Tom Y. Lin, of lawful age, on his oath states: that he has participated in the preparation of the foregoing Rebuttal Testimony in question and answer form consisting of 10 pages to be presented in the above case; that the answers in the foregoing Rebuttal 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.

Tom Yidong Lin

TOM Y. LIN

Subscribed and sworn to before me this 3rd day of May, 1996.

Beverly S Lehmen

Notary Public

My Commission Expires: _____

BEVERLY S LEHMEN
NOTARY PUBLIC STATE OF MISSOURI
CALLAWAY COUNTY
MY COMMISSION EXP. MAR. 9,1998