Exhibit No.:
Issues: Transmission Planning/ Need for the Proposed Callaway-Franks Line
Witness: Charles E. Mitchell
Type of Exhibit: Direct Testimony
Sponsoring Party: AmerenUE
Case No.: EO-2002-351
Date Testimony Prepared: July 11, 2002

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. EO-2002-351

DIRECT TESTIMONY

OF

CHARLES E. MITCHELL

** Contains Proprietary Information **

St. Louis, Missouri
July 11, 2002

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

Application of Union Electric Company for Permission and Authority to Construct, Operate, Own and Maintain a 345 kilovolt Transmission Line in Maries, Osage and Pulaski Counties, Missouri ("Callaway-Franks Line")	))))))	Case No. EO-2002-351

AFFIDAVIT OF CHARLES E. MITCHELL

STATE OF MISSOURI)
) **ss**
CITY OF ST. LOUIS)

Charles E. Mitchell, being first duly sworn on his oath, states:

1. My name is Charles E. Mitchell. I work in St. Louis, Missouri and I am employed by Ameren Services Company as Consulting Transmission Planning Engineer of the Transmission Planning and Services Group.

2. Attached hereto and made a part hereof for all purposes is my Testimony on behalf of Union Electric Company d/b/a AmerenUE consisting of 26 pages, which has been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Charles E. Mitchell

Subscribed and sworn to before me this 10th day of July, 2002.

Debby Anzalone
Notary Public

My commission expires:

DEBBY ANZALONE
Notary Public - Notary Seal
STATE OF MISSOURI
St. Louis County
My Commission Expires: April 18, 2006

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DIRECT TESTIMONY

OF

CHARLES E. MITCHELL

AMERENUE

CASE NO. EO-2002-351

I. INTRODUCTION

Q. Please state your name and address.

A. Charles E. Mitchell, 1901 Chouteau Avenue, P.O. Box 66149, St. Louis, Missouri, 63166-6149.

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

A. I am employed by Ameren Services Company (Ameren Services) as a Consulting Transmission Planning Engineer in the Transmission Planning and Services Department of Energy Delivery Technical Services. Ameren Services performs various technical and administrative services for Union Electric Company (the Company), doing business as AmerenUE, and other subsidiaries of Ameren Corporation (Ameren).

Q. What are your responsibilities in that position?

A. My responsibilities include planning the development of the Union Electric transmission system to ensure that it is capable of transmitting the required electrical loads in an economical, safe, and reliable manner. I also work on other special projects as needed.

Q. How long have you been employed by Union Electric Company?

A. I have been employed full time at Union Electric Company since June 1971. Since January of 1998 when the UE-CIPSCO merger took effect, I became an employee of Ameren Services. My entire stay

at Union Electric and later at Ameren Services up to the present has been with Transmission Planning. I have held the positions of Assistant Engineer and Engineer in the Transmission and Interconnections Group of Planning. In 1981 I accepted the position of Supervising Engineer of the Transmission and Interconnections Group. In 1985 I became Supervising Engineer of the Bulk Substation and Subtransmission Group for all districts. In 1989 I became Supervising Engineer of the Bulk Substation and Subtransmission Group for the Missouri operating districts. In 1992, I accepted the position of Staff Engineer, and in 2001 I accepted my present position of Consulting Transmission Planning Engineer.

Q. What is your educational background?

A. I received a Liberal Arts and Science degree in Physics and Mathematics from Southern Illinois University, Carbondale, Illinois, in 1964. I also received a BS degree in Electrical Engineering from the University of Missouri-Rolla in 1971, and an MS degree in Electrical Engineering from the same school in 1978.

Q. Are you a registered professional engineer?

A. I am a registered professional engineer in the states of Missouri and Illinois.

Q. What is the purpose of your testimony?

A. I will show that the proposed Callaway-Franks 345 kilovolt (kV) transmission line is necessary to provide reliable service to the public in Missouri, including the retail electric customers of AmerenUE.

Q. Are you familiar with the subject matter of this case?

A. Yes. AmerenUE is seeking permission and authority to construct, own, operate, and maintain a 345 kV transmission line in

Osage, Maries, and Pulaski Counties, to be known as the Callaway-Franks line. As I discuss further below, AmerenUE needs to construct this line to address an electrical overloading condition we currently have on our existing electrical facilities and to otherwise improve the reliability of the transmission system in Missouri. This new 345 kV transmission line will connect UE's Callaway 345 kV Substation to Associated Electric Cooperative, Inc.'s (AECI) Franks Substation and will roughly parallel the Company's existing Bland-Franks line located to the East. The construction for this new line will be about 54 miles in length.

Q. Were you personally involved in any of the analyses or studies which the Company performed to assess the need for the proposed line?

A. Yes. I was involved in both the analyses and studies performed to assess the need for the proposed line. In particular, I performed load flow analyses on existing facilities and shared this information with my counterparts from AECI. Further, I was involved in drafting a joint study report with AECI referred to later in my testimony.

II. BACKGROUND INFORMATION ABOUT THE COMPANY'S ELECTRICAL SYSTEM AND NEIGHBORING SYSTEMS

A. Description of the Company's Electrical System

Q. Have you supplied a diagram to illustrate how electricity flows on the Company's facilities, starting from the power plants and ending up at a customer's premises?

A. Yes. Attached at the end of my testimony and marked as Schedule 1 is a diagram showing the facilities that an electric utility uses for the generation, transmission, and distribution of

electricity. The Company's request in this case pertains to the transmission portion of its system.

Q. Please describe, in more detail, how the Company's electrical system operates.

A. As illustrated on Schedule 1, electrical power is produced at the Company's generating stations at voltage levels ranging from 11,000 to about 24,000 volts, or 11 kV to 24 kV. To achieve transmission operating economies, this voltage is raised, or stepped up, by power transformers at the generating station sites to voltages generally ranging from 138 kV to 345 kV for transmission to the Company's bulk substations that are strategically located throughout its service area.

Q. What is the function of the Company's bulk substations?

A. Bulk substations receive electrical power at transmission voltage levels. They then lower, or step-down, this power to other transmission or distribution voltages generally ranging from 138 kV to 34.5 or 69 kV. Such power is then distributed over the Company's 34.5 or 69 kV distribution lines to distribution substations located throughout the Company's service area.

Q. What function do distribution substations perform?

A. Distribution substations, which are far more numerous than bulk substations, provide a further reduction in the electrical power voltage to a range of 4 to 13.8 kV within various portions of the Company's service area. Such power is then distributed over the Company's 4 to 13.8 kV distribution lines to points at or near the premises of the Company's customers.

Q. After electrical power at 4,160 to 13,800 volts is delivered to a point at or near a customer's premises, do any further reductions in voltage take place?

A. Yes, in most instances. While approximately 650 of the Company's largest industrial and commercial customers take service at the 4,160 to 13,800 volt range or higher in Missouri, the majority of the Company's customers are served at lower voltages, ranging from 120 to 480 volts. Such lower voltages are achieved through the use of numerous line transformers located at or near a customer's premises. This low voltage electrical power from the line transformer is delivered to a customer's premises over low voltage lines referred to as "secondary" and "service" lines.

Q. What voltages are utilized in providing electric service to residential customers?

A. Residential customers are served at either 120 or 240 volts depending upon the customer's service entrance panel size and connected appliances.

Q. What voltages are utilized to serve non-residential customers?

A. Non-residential customers on the Company's Small and Large General Service Rates are served at voltages from 120 to 480 volts due to the wide variety of electrical consuming devices utilized by such customers. Customers in the latter voltage range are often referred to as "secondary" voltage customers. Other larger non-residential customers receiving service at 4,160 to 13,800 volts are referred to as "primary" voltage customers. The Company also serves approximately 50 customers in Missouri at voltages above the 13,800 volt level. These are referred to as "high voltage" customers.

Q. In your description of the Company's generation, transmission and distribution system are you using the term "lines" in a general sense?

A. Yes. Such lines may be overhead conductors or underground cables. Overhead lines include all poles, towers, insulators, crossarms and all other hardware associated with such installations. Underground "lines" include direct buried cable as well as that installed in single or multi-duct conduit, and other associated hardware.

B. <u>Interconnections With Other Electrical Systems</u>

Q. Is the Company's electrical system connected with the systems of other electrical suppliers?

A. Yes. Although not illustrated on Schedule 1, the Company's electrical system is interconnected with many other electrical systems in the Midwest. These other systems include the following: AECI, Kansas City Power and Light, Aquila (formerly Utilicorp), Illinois Power, AmerenCIPS (an affiliate of AmerenUE) and MidAmerican, and many other systems as well. The Company's interconnections with these electrical systems provide great benefits to the Company's customers in terms of reliability and efficiency, and allow the Company to access power from other systems when necessary, in case of an emergency, or when it is economically desirable, when cheaper power is available from sources other than the Company's generating units.

C. <u>Requirements of Regional and National Organizations</u>

Q. Is AmerenUE a member of any regional or national organizations which impose requirements for operating and maintaining an electrical system?

A. Yes. The Company is a member of the Mid-America Interconnected Network, Inc. (MAIN). MAIN is one of several regional reliability organizations operating under the auspices of the North American Electric Reliability Council (NERC). Through MAIN, the Company is also a member of NERC.

Q. Please discuss the origins of NERC.

A. NERC was formed after the Northeastern blackout in the mid 1960s when the northeastern part of the United States experienced widespread outages and loss of power in the New York and New England areas. NERC was formed to ensure that such a widespread event would not occur again, and also to prescribe good utility practices for reliable service by electrical systems operating throughout the United States. NERC is divided into different regions, which have authority over the systems within a particular region of the country.

Q. Please discuss MAIN and AmerenUE's membership in it.

A. AmerenUE, like all prudent operators of electric transmission systems, is a member of a regional electric reliability council. In AmerenUE's case, the regional council is MAIN. MAIN serves as the regional reliability authority, which is charged with ensuring reliable service in the Midwestern areas, including all of AmerenUE's Missouri service area.

Q. Please provide an example of what MAIN will do to ensure reliable service by its members.

A. The example most relevant to this case involves Transmission Loading Relief (TLR) procedures developed by NERC and administered by each reliability authority, such as MAIN. In particular, when MAIN believes that loadings on the transmission

lines of its member companies are too high, it will invoke NERC's TLR procedures.

Q. Please describe these TLR procedures.

A. There are 7 levels (2, 3a, 3b, 4, 5a, 5b, and 6) of TLR that call for changes in transmission transactions, in generation, and in native load to maintain reliable service to as many users of the interconnected grid as possible. Level 2 holds transactions between neighboring systems at the current level. Levels 3a and 3b reallocate and/or curtail non-firm transactions. Level 4 reconfigures a transmission system. Level 5a reallocates firm transactions. Level 5b involves pro rata curtailment of firm transactions, network integrated transmission service, and native load. Level 6, Emergency Action, includes demand-side management, redispatch, voltage reductions, interruptible, and firm load shedding.

By way of analogy, TLR procedures are similar to "rules of the road" which govern traffic on an interstate highway. At the lowest and least serious level, a highway controller might issue a warning that traffic will be heavy at a particular time. At the next higher level, when traffic congestion becomes a more serious issue, the highway controller might take action to prevent any new cars from entering the highway. Next, the controller might take action to require that some cars leave the highway. (This would be analogous to a requirement to interrupt transmission service to users on a non-firm rate.) Next, the controller might require the payment of a higher toll on the road to attempt to further ease congestion. (This would be analogous to using a more expensive power plant, through redispatch, that could relieve some of the congestion.) Finally, at

the most serious level, congestion might be so intense that local traffic might be required to exit the highway. (This would be analogous to interrupting service to the utility's retail customers who are served on a firm, non-interruptible basis.)

In addition to TLRs, MAIN imposes numerous requirements on AmerenUE and the other members of MAIN in terms of how they plan and operate their systems, including how much generating reserves a system must have.

D. **Requirements of Federal and State Law**

Q. In addition to the requirements of MAIN and NERC, is the Company subject to other requirements as to how it should operate and maintain its electrical system?

A. Yes. Federal regulations require that AmerenUE and other owners of transmission systems make their systems available to eligible users on an non-discriminatory, open-access basis. This means that the Company must allow a variety of transmission customers--such as Independent Power Producers (IPPs), municipal systems, cooperatives, wholesale transmission customers and eligible retail customers--to use its transmission system, and must expand that system as necessary to accommodate their requests for transmission service. These regulations have been imposed since 1997 by the Federal Energy Regulatory Commission (FERC). More recently, the FERC has strongly encouraged owners of transmission systems such as AmerenUE to join Regional Transmission Organizations (RTOs) to allow for the coordinated operation of multiple transmission systems on a regional basis. AmerenUE is in the process of complying with FERC's requirements to join an RTO. As I understand it, this is

consistent with orders and recommendations of the Missouri Public Service Commission and its Staff.

In addition to requirements of the FERC, AmerenUE is required to comply with numerous requirements and regulations imposed by its state commissions, not only the Missouri Commission but also the Illinois Commerce Commission. Generally, the state commissions require that AmerenUE and other electrical suppliers subject to state authority operate and maintain their electrical systems in a reliable, efficient, and safe manner.

III. NEED FOR THE PROPOSED LINE

Q. Have you supplied a map showing the location of the proposed line?

A. Yes. Attached to my testimony and marked as Schedule 2 is a map showing the location of the existing Bland-Franks 345 kV line and the proposed Callaway-Franks 345 kV line. The purpose of this map is to show the approximate location of the Company's existing Bland-Franks 345 kV line and the location of the proposed Callaway-Franks 345 kV line.

Q. Please discuss why AmerenUE decided to build the proposed Callaway-Franks 345 kV transmission line.

A. AmerenUE concluded that the proposed line was essential to provide reliable and safe electric service to its Missouri customers. In particular, the proposed line is necessary 1) to avoid electric service interruptions, 2) to avoid safety related problems and hazards for employees and members of the public, and 3) to avoid damage to existing electrical facilities and to other property. If the proposed line is not built, it will compromise AmerenUE's ability to provide reliable service and will increase the likelihood that

there will be unsafe conditions and damage to persons and to property.

Q. Is the proposed line necessary to provide reliable and safe service to Missouri customers on electrical systems other than AmerenUE's?

A. Yes. The proposed line is necessary to provide reliable and safe electric service to retail customers served by AECI and its distribution cooperatives. As discussed more fully below, the need for the proposed line was determined from a joint planning effort undertaken by AmerenUE and AECI to coordinate their transmission planning efforts for their customers and to minimize the potential for conflicting and duplicative facilities.

For many years, AmerenUE's electrical system has been connected at numerous locations with AECI's electrical systems. Because of these interconnections, AmerenUE and AECI have engaged in joint efforts on previous occasions to coordinate their transmission planning efforts for the benefit of their Missouri customers.

Q. Please explain why the proposed line is needed to provide reliable service to the public in Missouri.

A. Reliable electrical service is service that is provided on a continuous basis with a minimum number of interruptions and that is within acceptable electrical parameters such as voltage and current. AmerenUE can not guarantee that there will never be any interruptions because of forces outside of AmerenUE's control, for example weather conditions (e.g. thunderstorms and tornadoes). However, AmerenUE does strive to minimize the number of interruptions by taking steps that are within its control. This includes steps to ensure that the existing electrical facilities are operating within their specified

electrical limits. If any particular transmission line becomes too heavily loaded--that is, loaded beyond its rated electrical capability--it will increase the risk of failure of that line and neighboring lines. It can even affect the entire interconnected transmission system, including as noted above AECI's system and that of its member cooperatives. This means that a line that is too heavily loaded can increase the frequency and likelihood of service interruptions to AmerenUE's and AECI's customers in Missouri.

Therefore, loading above a line's capability could jeopardize the integrity of the line and impact the reliability of the transmission system. This in turn could negatively impact both AmerenUE's customers and customers of others who depend upon the line (including the cooperatives) in a variety of ways. Furthermore, if a line were to experience an outage--that is, if it were opened, or tripped out of service--when its loading is above its capability, the impact could be felt on other area facilities.

Q. Please explain why the proposed line is needed to avoid safety related problems.

A. A loading above a line's electrical rating may cause the line to violate minimum ground clearances as specified by the National Electric Safety Code. When those clearances are violated, the risk of harm to persons, to third-party property, and to the line itself increases. Among the increased risks are of course possible direct contact with the line including electrocution or fire risks. As I discuss throughout my testimony, the overloading conditions we have seen in this area are increasing the risk of these safety concerns which we can alleviate with this new line.

Q. It seems obvious how inadequate line clearances can damage persons or property, but how does that affect the line itself?

A. Because the transmission system is interconnected, transmission facilities share in the division of power. All transmission facilities carry power (current) according to the laws of physics. As the loading on the existing Bland-Franks 345 kV line loading increases, other facilities experience an increase or decrease in power flow as well, but not in the same proportion. If the overloading results in an outage on the Bland-Franks 345 kV line--that is, if the line is not able to carry any power--then several transmission facilities in the mid-Missouri area will experience loading changes, and some of those other facilities may themselves become overloaded. For transformers, such overloads decrease the life of the transformer by weakening its insulation, thereby advancing the failure of a key facility such as a transformer. For line conductors, such overloads result in reduced strength and conductor sag. If transformers and conductors fail, service interruptions can occur, and of course the cost to operate and maintain the entire system increases. Those costs are ultimately borne by AmerenUE's customers as determined by the Commission's ratemaking process. Similar costs would be borne by customers of the cooperatives.

IV. DATA SHOWING OVERLOADINGS

Q. Please discuss the recent history concerning the use of electricity on existing lines in the area.

A. In 1997, AmerenUE's existing Bland-Franks 345 kV line loading began to experience loadings in excess of its summer normal rating. In 1998, 1999, and 2000 the loading on the Bland-Franks 345

kV line continued to get higher and higher with more frequent excursions above the normal rating. At times the loading was such that there was a potential to exceed its summer emergency rating if an outage on the parallel Rush Island 345 kV line outage were to occur. Additionally, transmission service requested by several open access transmission customers, including an IPP owning a generating plant in Missouri, was refused because of the Bland-Franks 345 kV line constraint. The addition of Callaway-Franks 345 kV line would allow the granting of transmission service associated with these requests. This type of transmission service has the ability to allow access to additional electric generation that, if needed, can be utilized by utilities such as AmerenUE or AECI.

Q. Do you have any data showing these overloading problems?

A. Yes, attached at the end of my testimony as Schedule 3 is a frequency plot of the loading on the Bland-Franks 345 kV line during the period 1998 through 2001 normalized to the summer rating of 949 MVA. The intent of the frequency plot is to help visualize the Bland-Franks 345 kV line loading for the last four years. Note that the Bland-Franks 345 kV line loading has been increasing from 1998 through 2000 and that loading in 2001 was higher than 1998 and 1999. For the year 2000, the Bland-Franks 345 kV line loading pattern was the highest when compared to the other years. The "Percent of Time" versus the "Percent of Rating" 2001 plot is less than that for 2000 because some local generation plants connecting to the 345 kV transmission system were out of service for refueling, maintenance and/or overhaul, and there was improved coordination of transmission service, and there were changes in weather and market activity. Even with these factors, the 2001 patterns are still

unacceptable from a reliability, safety and property damage perspective.

Q. Do you expect this high loading pattern to continue on the Bland-Franks 345 kV line if the Callaway-Franks 345 kV line were not built?

A. Yes, I do expect the high loading pattern on the Bland-Franks 345 kV line to continue into the future. The line loading will continue because of increases in the electrical requirements of AmerenUE's Missouri retail customers, and in the requirements of the cooperatives, and also because of long term power scheduling commitments and transmission service reservations. Based on the federal regulations of the FERC referenced above, the Company must make its transmission system available to all eligible customers such as IPPs, which want to build power plants in AmerenUE's service area, and also to Power Marketers, which want to schedule power across or into or out of AmerenUE's transmission system. These multi-purpose uses of the transmission system will result in continued exposure to high loading patterns.

Q. Have you obtained the input of the Commission's Staff regarding the need for the line?

A. Yes. The Staff has requested and obtained data, both historical and engineering, that we relied upon to demonstrate the overloadings on existing facilities. It is my understanding that the Staff concurs in our conclusions regarding the need for the proposed line as evidenced by its conditional recommendation for Commission approval as set forth in the Staff's report dated April 29th filed in this case.

V. CONSEQUENCES OF HIGH LOADINGS

Q. What happens if loadings on existing facilities become too high?

A. As referenced above (in Section II.C.), if loadings become too high, MAIN will invoke TLR procedures. It is important to understand that having to call TLR on any facility at all is never a good thing. Calling a TLR means that some facility is overloaded for normal conditions (i.e., when there are no outages) or has the potential to overload if there is an outage of some specific facilities resulting in emergency conditions.

Q. Did MAIN call TLR when the Bland-Franks 345 kV line was operating above its normal rating and/or when it was projected to operate above its emergency rating for the outage of a critical element?

A. Yes. TLR was called several times to reduce line flows that were above, or were projected to be above, a line's rating. TLRs were called by the MAIN reliability authority as a tool to reduce the heavy flows on facilities of member companies. These TLRs are also reported to the NERC.

As pointed out above, TLRs are very undesirable and should occur rarely, or not at all, if the existing transmission system is adequate. If conditions lead to a TLR being called, then transactions will be interrupted, and thus some customers may have to be interrupted. The first customers to be interrupted are those who subscribe to interruptible power, but other customers also may be affected. AmerenUE and surrounding utilities may also be forced to rely upon more expensive generation options so that the loading of the affected part of the transmission system can be reduced.

Thus, the proposed line is needed to provide adequate transmission capacity and to reduce the need for TLRs.

Q. Mr. Mitchell, how many times were TLRs called on the Bland-Franks 345 kV line in the last several years?

A. In 1997, 18 TLRs were called on Bland-Franks 345 kV line. In 1998, 15 TLRs were called on Bland-Franks 345 kV line. In 1999, 21 TLRs were called on Bland-Franks 345 kV line. In 2000, 124 TLRs were called on Bland-Franks 345 kV line. In 2001, 13 TLRs were called on Bland-Franks 345 kV line.

Q. Can you help us understand the reasons for the reduction in the TLRs called on Bland-Franks during 2001?

A. Yes. One of the major reasons for fewer TLRs called on the Bland-Franks 345 kV line in 2001 was the temporary unavailability of local generation. There were several generator unit outages the result of which was a decrease in the loading on the Bland-Franks 345 kV line. AmerenUE's Callaway Power Plant was out of service for about a month because of its refueling and associated standard maintenance schedule needs. Also, its Labadie Power Plant and Rush Island Power Plant experienced outages some of which were coincident during the spring and fall of 2001 because of forced outages. These outages were more numerous in 2001 than those in 2000. Other than the regular scheduled maintenance outages, the major units were available for operation during 2000. Another major reason was improved interregional coordination of the use of the transmission system. Also, there have been major variations in weather patterns and energy market conditions. In any case, the number of TLRs was still unacceptable, as previously discussed.

Q. What type of TLRs were called on Bland-Franks 345 kV line?

A. TLRs called on the Bland-Franks 345 kV line involved Level 3a.

Q. Did NERC identify the Bland-Franks 345 kV line as a significant constraint to power transfers to MAIN in their 2002 Summer Assessment?

A. Yes, in the NERC's 2002 Summer Assessment, the Bland-Franks 345 kV line as one of the two facilities in the MAIN region, that includes Wisconsin, Illinois, and AmerenUE's service territory in Missouri that were identified as restricting MAIN power transfers in 2001. In addition, the Bland-Franks 345 kV line has been identified by NERC as one of the primary causes of congestion in the entire interconnected transmission system (basically the electric transmission system from the Rocky Mountains to the East Cost, excluding parts of Texas).

VI. JOINT STUDY WITH AECI

Q. You previously mentioned a joint planning effort with AECI. Please discuss this joint study in more detail.

A. Attached at the end of my testimony as Schedule 4 is a report of the joint study performed by AECI and Ameren Services, together with related documents. First of all, please note that this report and the related documents contain information about other proposed lines, in addition to Callaway-Franks, that are under consideration by both AmerenUE and AECI. This information is sensitive and confidential from a commercial and business standpoint and if disclosed to the public, or to segments of the public, it could compromise the ability of AmerenUE and AECI to buy and sell electricity, and to provide transmission service, at reasonable prices. In particular, if these documents were obtained by IPPs or

other users of the transmission system it would provide to them valuable information about the development of the AmerenUE and AECI transmission systems which might allow them to game the system to the detriment of AmerenUE and AECI and their customers. For example, if such IPPs and transmission users knew the location of a proposed line that had not been disclosed to the public it might allow them to build their generating facilities in a certain location, or to choose transmission service on certain paths, ahead of other users, including the Company and AECI, to their detriment. It could also be in conflict with FERC's regulations to provide non-discriminatory open-access transmission service.

Q. Please provide some background on the joint study.

A. In the spring of 2000, AECI and AmerenUE agreed to perform a joint study to investigate the high loading being experienced on some of AECI's transmission facilities and on some of AmerenUE's transmission facilities. As the result of the joint study, the best plan to mitigate these heavy loading was to build a Rush Island-St. Francois 345 kV line, a Callaway-Franks 345 kV line, and install a larger Franks 345/161 kV transformer. Though this study is labeled as a draft, it is complete in all significant respects. In particular, both AECI and Ameren have agreed with the report contents and with the conclusions. The report has not yet been finalized because of time constraints, including the need to move forward with work needed to get the proposed line built as soon as possible. The report is complete except for certain minor tasks, consisting of the writing the Executive Summary, making a few editorial changes, and reformatting the report to improve its appearance. All of the analyses and conclusions of the report have been completed.

Q. Was power flow analysis performed as part of the joint study?

A. Yes, I performed a power flow analysis as part of the joint study.

Q. As a result of your power flow analysis, what overloads or voltage problems were identified assuming the Callaway-Franks 345 kV line was not built?

A. For the system conditions modeled in the study, several AmerenUE facilities would be overloaded in the event of the loss of, or outage of, the Bland-Franks 345 kV line. These overloaded facilities include the Overton 345/161 kV transformer, the St. Francois-Esther-Rivermines 138 kV line, the St. Francois-Rivermines 138 kV line, the Selma-Rivermines 138 kV line, and the Clark-Viburnum 161 kV line. Overloading these facilities could create the kinds of problems for Missouri customers discussed above. AECI's Maries 138/161 kV transformer could also overload negatively impacting cooperative customers. Low voltage was identified at the AECI Franks 161 kV Substation during heavy loading on the Bland-Franks 345 kV line. Low voltage situations reduce the service that the electric provider (in that case, the cooperatives) can provide to its customers.

Q. What is the significance of transmission line outages?

A. Each transmission line outage impacts other facilities. The 345 kV transmission system generally carries more power as compared to the parallel lower voltage lines, thereby relieving the lower voltage facilities of the burden of carrying large quantities of power. When 345 kV facilities suffer an outage, the impact on the lower voltage facilities is generally increased loading. This

increased loading can be such that the facilities are overloaded as was identified above. When a facility experiences an overload condition, it could become damaged or it could result in an outage of its own. In short, the present overloading of the Bland-Franks line and outages thereon expose facilities throughout the system, including other 345 kV and 161 kV lines, to potential overloads. As such, this increases the frequency and likelihood of the problems discussed earlier in my testimony.

Q. If the Callaway-Franks 345 kV line is built, would these overloads that you have been discussing be eliminated when there is an outage of the Bland-Franks 345 kV line?

A. Yes. Once the Callaway-Franks line is in service, the other facilities would not be overloaded if the Bland-Franks line experienced a forced outage (that is, forced out of service) due to weather related damage or other accident, or is out of service for maintenance, because the newly upgraded system could handle the displaced loads.

Q. Please help us understand your statement in a previous answer that low voltage was experienced in the power flow analysis at AECI's Franks Substation.

A. Voltage is another transmission system characteristic. As noted above, the Franks Substation 345 kV and 161 kV voltages are reduced as the Bland-Franks line loading increases to at or above the circuit rating. Low voltages can adversely impact reliability to area customers.

VII. ALTERNATIVES EXAMINED

Q. Were alternatives to building the Callaway-Franks 345 kV line investigated?

A. Yes, several alternatives were investigated. None of them were acceptable as compared to the construction of the Callaway-Franks line.

Q. Please tell us what alternatives were investigated.

A. In general, the joint study investigated the option of placing a series inductor in the Bland-Franks 345 kV line or building one of several other 345 kV lines. Though various series inductor impedance sizes were modeled, the end result was to push the power to other parts of the transmission system, which could then cause overloads on those parts of the transmission system. Thus, relying on series inductors to reduce loading alone simply solved one problem but created another equally unacceptable problem. We also considered building a 345 kV line from Overton to Franks, from Pleasant Hill to Morgan, and from Callaway to Jefferson City to Franks. None of these lines performed as well as the Callaway-Franks 345 kV line to relieve Bland-Franks loading.

Q. Why was the proposed Callaway to Franks 345 kV line considered as a possible solution?

A. There were two primary reasons to consider a 345 kV line from Callaway to Franks. First, it would represent a line in parallel with the Bland-Franks 345 kV line. Such a new line, operating in parallel with Bland-Franks, would share the loading that Bland-Franks now carriers thus reducing the flows (and overloading) that Bland-Franks now experiences. A good analogy to what we are doing is to take the case where a bypass highway is built to take some of the traffic off of an overloaded existing road. The power (traffic) still needs to go to and from the same places so it makes sense to build the second line (road) parallel to the existing road.

Secondly, AECI already held a significant amount of the easements needed for such a line because the proposed Callaway-Franks line is designed to serve much the same purpose for which AECI originally obtained the easements. As I discuss below, the need for a line from Callaway to Franks was able to be deferred for a number of years in part because of joint cooperation between AmerenUE and AECI, but changed circumstances have simply brought an end to that deferral period.

Q. Why did AECI hold these easements?

A. As I alluded to above, it is my understanding that AECI, as part of the addition of generating capacity at its Thomas Hill Power Plant in the 1980s planned to build 345 kV transmission from Thomas Hill to Franks via their Chamois Power Plant. Much of that line would have essentially taken the same route as our proposed Callaway-Franks line. To this end AECI began to secure right of way (ROW) for that project in the late 1970s and earlier 1980s. The 345 kV line was ultimately terminated at Kingdom City as the result of a joint study between AmerenUE and AECI. The study developed a mutually beneficial plan that allowed AECI and AmerenUE to provide reliable service to the mid-Missouri area without the need to extend the 345 kV line to Franks at that time. As a result, AECI "banked" the ROW against future needs.

Q. So the proposed line is not a new project?

A. Correct. AECI originally intended to build, at their expense, a similar line from Chamois to Franks. The earlier joint study conducted in the 1980s allowed for a deferral of the project. Current conditions have revived the need for the line, which was part of a joint effort between AmerenUE and AECI to improve the

transmission system in the Mid-Missouri area. Because this line benefits AECI and cooperative customers, AECI is contributing ROW easements as part of the project. They are also contributing a new 345/161 kV, 625 MVA transformer, a 345 kV breaker position, and associated relay equipment at their Franks Substation for this project. For its part, AmerenUE is making substation changes at Callaway, building a substation near Loose Creek, and building the line. AECI will realize improved system reliability as a result of this project plus AECI has the right to install a 345/161 kV transformer at AmerenUE's Loose Creek Substation supplied by this line that will support Central Electric Cooperative's, a member of AECI, transmission system in the Mid-Missouri area. Central Electric supplies power to the local distribution cooperatives that serve individual customers in Mid-Missouri. In short, this is a win-win for both AmerenUE and the cooperatives and their customers.

Q. What are the major benefits to be derived by AmerenUE from this proposed Callaway-Franks 345 kV line?

A. The major benefits are to relieve loading on the Bland-Franks 345 kV line, to ensure that existing facilities are safe, to keep from overloading and possibly damaging the Bland-Franks line and other transmission facilities if there are outages on the Bland-Franks 345 kV line, and to maintain a reliable transmission system for our customers.

Q. You discussed before that AECI has contributed to this project because of benefits it also realizes from it and have touched on some of the benefits AECI and the cooperatives will realize. Can you please summarize those benefits?

A. The main benefits of which I am aware will be as follows: 1) an improvement of the voltage available to AECI at its Franks substation, 2) avoiding overloading of cooperative facilities if outage conditions on the Bland-Franks line "push" loads onto these other facilities, 3) the cooperatives' ability to use the connection they will have at the new Loose Creek Substation to enhance service to their customers in the area, and 4) the access the new line gives the cooperatives to the wholesale power markets in times when they may need more power, or can buy it in the market more cheaply.

Q. One final topic that has been raised. Can the Callaway-Franks 345 kV line be placed on towers with the existing Central Electric Chamois-Maries 161 kV line?

A. No. To do so would require that the entire existing Chamois-Maries 161 kV line be taken out of service for approximately two years. The Chamois-Maries 161 kV line is one of three 161 kV outlet lines for Chamois Power Plant. The Chamois-Maries 161 kV line is an integral part of the cooperatives' transmission system. With the long-term outage of the Chamois-Maries 161 kV line, the Sullivan 161 kV Substation will be unable to support its load for a Chamois-Big Springs 161 kV line outage.

Therefore, having the existing Chamois-Maries 161 kV line out of service for an extended period of time is not an acceptable engineering solution as it would significantly impair the reliability of the cooperatives' systems. It would be like shutting down a major highway for a period of two years where there exists no acceptable detour to handle the traffic.

Q. Why couldn't the line be taken out of service in stages?

A. Power must be moved on a transmission line from point to point - substation to substation. You simply can not shut down a "piece" of a line because the power can not get from point A to point B where it needs to go. Once any part of the line is removed from service, the entire line is outaged and no power can flow from one terminal to the other terminal.

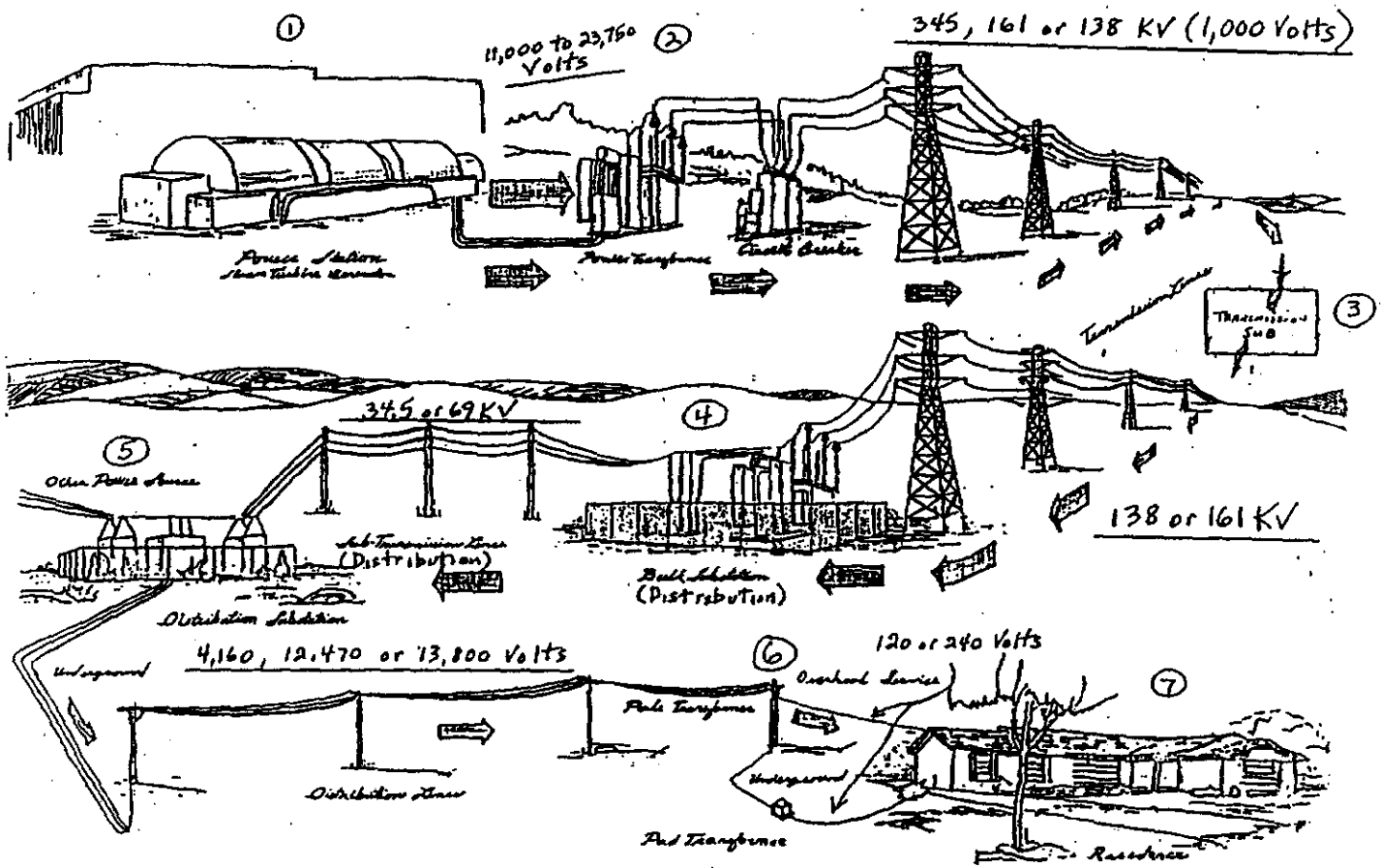
VIII. CONCLUSION

Q. Please summarize your testimony.

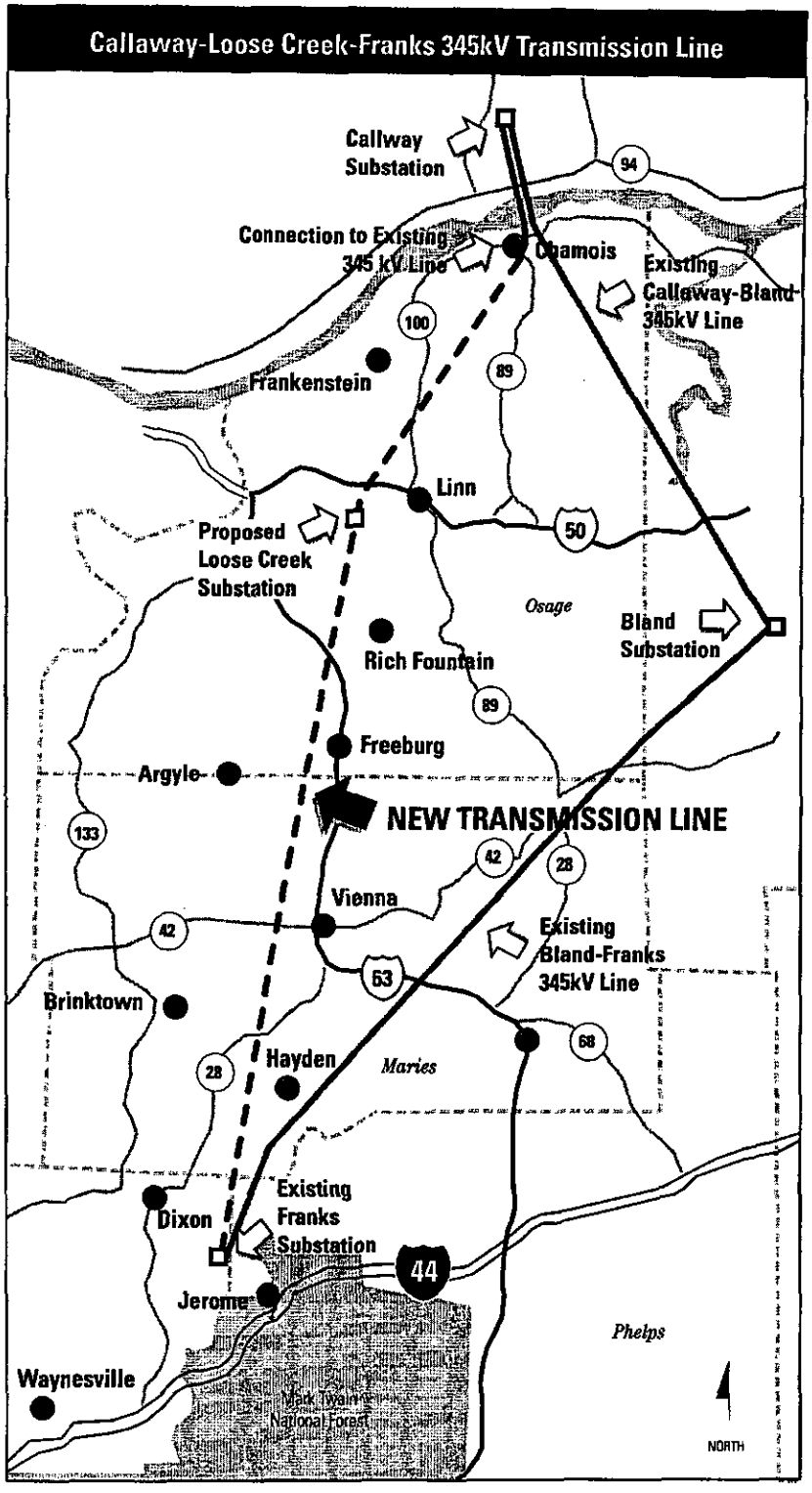
A. The Callaway-Franks 345 kV line is the result of a joint project with AECI that will enhance AmerenUE's and AECI's transmission systems, which in turn will allow AmerenUE and the cooperatives to more reliably serve their customers. Without this project, the Bland-Franks 345 kV line will continue to experience overloads and will thereby adversely impact transmission system reliability, will increase safety related problems, and will also increase the potential to damage transmission system equipment and other property. The proposed line is the best way to address these problems and is the most feasible and economical of all of the alternatives studied.

Q. Does this conclude your testimony?

A. Yes, it does.


1
11,000 to 23,760 Volts
2
345, 161 or 138 KV (1,000 Volts)
3
345 or 69 KV
4
5
138 or 161 KV
(Distribution)
(Distribution)
4,160, 12,470 or 13,800 Volts
6
120 or 240 Volts
7

Schedule 1


Callaway-Loose Creek-Franks 345kV Transmission Line
Callway Substation
Connection to Existing 345 kV Line
Chamois
Existing Callaway-Bland 345kV Line
Frankenstein
Linn
Proposed Loose Creek Substation
Osage
Bland Substation
Rich Fountain
Freeburg
Argyle
NEW TRANSMISSION LINE
Vienna
Existing Bland-Franks 345kV Line
Brinktown
Hayden
Maries
Existing Franks Substation
Dixon
Jerome
Phelps
Waynesville
Mark Twain National Forest
NORTH
94
100
89
50
133
42
28
63
68
44

Schedule 2

Schedule 3

Bland-Franks 345 kV Line
% of Time Above Summer Normal Rating
For Years 1998, 1999, 2000, and 2001