Exhibit No.:	
Issues:	System Energy Losses; Jurisdictional Allocations; Distribution Plant Allocators
Witness:	Alan J. Bax
Sponsoring Party:	MO PSC Staff
Type of Exhibit:	Direct Testimony
Case No.:	ER-2001-672
Date Testimony Prepared:	December 6, 2001

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

ALAN J. BAX

UTILICORP UNITED, INC.
D/B/A MISSOURI PUBLIC SERVICE

CASE NO. ER-2001-672

Jefferson City, Missouri
December 2001

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DIRECT TESTIMONY

OF

ALAN J. BAX

UTILICORP UNITED INC

d/b/a MISSOURI PUBLIC SERVICE

CASE NO. ER-2001-672

Q. Please state your name and business address.

A. Alan J. Bax, 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 (Commission) as a Utility Engineering Specialist III in the Energy Department of the Utility Operations Division.

Q. Please describe your educational and work background?

A. I graduated from the University of Missouri - Columbia with a Bachelor of Science degree in Electrical Engineering in December 1995. Concurrent with my studies, I was employed as an Engineering Assistant in the Energy Management Department of the University of Missouri – Columbia from the Fall of 1992 through the Fall of 1995. Prior to this, I completed a tour of duty in the United States Navy, completing a course of study at the Navy Nuclear Power School and Propulsion Plant. Following my graduation from the University of Missouri - Columbia, I was employed by The Empire District Electric Company (Empire) as a Staff Engineer until August, 1999, at which time I began my employment with the Commission.

Q. Are you a member of any professional organization?

A. Yes. I am a member of the Institute of Electrical and Electronic Engineers (IEEE) and the Missouri Chapter of the National Society of Professional Engineers (NSPE).

Q. Have you previously filed testimony before the Commission?

A. Yes. I filed Direct Testimony in Case No. EC-2002-1, the Staff's pending complaint case against Union Electric Company. I also performed the analysis and nearly all of the calculations used by Dr. Eve Lissik in her direct testimony in the Empire rate case, Case No. ER-2001-299. I eventually adopted Dr. Lissik's testimony. In addition, I filed subsequent True-Up Testimony in that Empire case.

Q. What is the purpose of your testimony in this case (Case No. ER-2001-672)?

A. The purpose of my testimony is to present my determination of system energy losses, jurisdictional allocation factors, and distribution plant factors for Missouri Public Service (MPS), a division of UtiliCorp United, Inc. (UCU).

SYSTEM ENERGY LOSSES

Q. What are system energy losses?

A. System energy losses are the energy losses that occur in the electrical equipment (transmission and distribution lines, transformers, etc.) in the Company's system between the generating sources and the customers' meters.

Q. What is the result of your calculation and how was it determined?

A. I calculated the system energy losses in this proceeding to be 7.093%. In its response to Staff Data Request No. 22, attached as Schedule 1, the Company provided

line loss percentages for each calendar year from 1990 through 2000. I disregarded the lowest and highest percentages because they fell outside the typical industry range for losses, and I averaged the remaining nine values.

Q. Does this methodology differ from what Staff has used in past cases?

A. Yes. Typically, system energy losses have been calculated in accordance with the following equation:

System Energy Losses = Net System Input (NSI) - total sales - Company use,

where:

NSI = the Company's Net Generation + (off-system purchases - off-system sales).

Then:

System Energy Loss Percentage = (System Energy Losses ÷ NSI) x 100

The required information to calculate losses in this manner is normally provided in response to Staff Data Requests. Unfortunately, in the present proceeding MPS has provided conflicting information in response to Staff's Data Requests and in documents filed with the Commission. For example, the values contained in the Federal Energy Regulatory Commission (FERC) Form 1 for MPS conflict with the corresponding values listed in the Missouri portion of the system-wide FERC Form 1 for Utilicorp United, Inc. Using information from the FERC Form 1 for MPS only, and the applicable information contained in the Company's responses to Staff Data Requests, I calculated a line loss factor of 9.174 percent. This number is unreasonable, given a typical industry range of 6.5 to 7.5 percent system-wide average annual losses. Therefore, I resorted to the averaging technique noted above, which yielded the much more reasonable loss percentage of 7.093.

Q. Which Staff witness used your calculated system loss factor?

A. I provided my calculated system loss factor to Staff witness Lena M. Mantle.

JURISDICTIONAL ALLOCATIONS

Q. Please define the phrase "jurisdictional allocation"?

A. For purposes of my testimony, a jurisdictional allocation refers to the process by which demand-related and energy-related costs are allocated to the applicable jurisdictions. In the case of MPS, these costs are divided between two jurisdictions; namely, Missouri retail operations, and Missouri wholesale operations, which are subject to the jurisdiction of the FERC. Which allocation factors are used is dependent upon the types of costs needing to be allocated.

Q. What costs were allocated on the basis of demand?

A. Costs associated with generation and transmission plant were allocated on this basis. This is appropriate because generation and transmission are planned, designed and constructed to meet the Company's anticipated demand.

Q. What methodology did you use to determine the demand allocators?

A. I used what is known as the Twelve Coincident Peak (12 CP) methodology.

Q. What is meant by "coincident peak"?

A. The term coincident peak refers to the one-hour load in megawatts (MW) of each of the two jurisdictions, at the time of the overall system peak that occurs within a designated period (day, month, year, etc.). In this case, the designated period is a month.

Q. Please describe the procedure for calculating the jurisdictional demand allocation factors using the 12 CP methodology.

A. The allocation factor for a particular jurisdiction is determined using the following process:

1. Identify the overall system hourly peak load for each month and sum them.
2. Sum the particular jurisdiction's corresponding loads for the hours identified in #1 above.
3. Divide #2 above by #1 above.

The result, when multiplied by 100, is the allocation factor for the particular jurisdiction.

Q. What are the results of your calculations?

A. As shown on Schedule 2 attached to this direct testimony, the calculated demand jurisdictional allocation factors for calendar year 2000 are as follows:

Missouri Retail	96.66%
Missouri Wholesale	3.34%

Q. What costs were allocated on the basis of energy?

A. Variable production expenses, such as fuel, are allocated to the jurisdictions based on energy consumption.

Q. How did you calculate the energy allocation factor?

A. The energy allocation factor for an individual jurisdiction is the ratio of annual kWh sales in the particular jurisdiction to the total Company kWh sales.

Q. What are the calculated energy allocation factors in this case?

A. The factors are shown in Schedule 3 and repeated here.

Missouri Retail	95.63%
Missouri Wholesale	4.57%

These factors were calculated using information contained in a Company response to Staff Data Request No. 2917.

Q. Which Staff witness used your jurisdictional demand and energy allocation factors?

A. I provided these jurisdictional allocation factors to Staff witness Phillip K. Williams.

DISTRIBUTION PLANT

Q. Is there a need to allocate distribution costs to jurisdictions?

A. No. True distribution costs are directly assignable to the local (Missouri) jurisdiction. However, in this case, there are two concerns. First, a portion of the costs collected in distribution accounts is associated with mobile substations that can be used in serving either Missouri retail or wholesale customers. Second, according to the Company, a portion of the costs associated with distribution plant is attributable to wholesale customers. Failure to address these concerns would mean that the retail ratepayers would be subsidizing wholesale customers.

Q. How did you handle these concerns?

A. In order to accommodate these circumstances, I calculated factors designed to correct the amount of distribution costs to be collected from Missouri retail ratepayers. Specifically, I divided the costs attributable to each jurisdiction by the total distribution plant costs.

Q. What are the distribution factors that you calculated?

A. I calculated the following factors, to be applied to the appropriate distribution accounts:

Missouri Retail	99.59%
Missouri Wholesale	0.41%

Q. Which Staff witness used these distribution plant factors?

A. I provided these allocation factors to Staff witness Phillip K. Williams.

Q. Have you completed your review of the Company's assignment of the costs associated with the its distribution plant?

A. No. My analysis has not been completed, as there is a need to reconcile inconsistent data provided by the Company in response to Staff Data Requests. In addition, I would like to obtain and/or verify additional information. In particular, I intend to complete my analysis as to whether the Company has appropriately classified its distribution facilities. The Company may have inappropriately classified some substations with transmission capability as distribution substations.

Q. Please explain how certain facilities could serve multiple purposes?

A. Figure 1 on Schedule 4 illustrates a schematic diagram depicting a physical representation of a portion of a utility's infrastructure. Line L1 must be able to carry the power consumed by the customers served by the substation D1 plus the power needed for D2, D3 and D4 and, under certain conditions, T1 and T2. A question arises as to what portion of the system is assigned to serve the local load (distribution) and what portion of the system should be designated as serving the transmission load (multiple jurisdictions). When taking a look inside a "distribution substation" (Figure 2 on Schedule 4), one will find not only equipment that distributes power to a certain local jurisdiction, but also equipment (b1 or b2) that aids in the reliable transmission of power.

Once a substation has been identified as containing both distribution and transmission equipment, one must determine how the cost should be apportioned between distribution and transmission. In the past, substations classified as distribution with a primary voltage of 34 KV and above have been "rolled into" transmission for rate making purposes; that is, they have been allocated to all customers.

Q. Does this represent a new methodology?

A. No. This methodology was proposed by Staff in Case Nos. ER-90-101 and ER-93-37 filed by the Company and also has been proposed in other rate cases. In both ER-90-101 and ER-93-37, the Company accepted this methodology, differing only on the number of substations and associated costs that should be allocated to both jurisdictions.

Q. Does this conclude your prepared direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In The Matter Of The Tariff Filing Of Missouri Public Service (MPS) A Division Of UtiliCorp United Inc., To Implement A General Rate Increase For Retail Electric Service Provided To Customers In The Missouri Service Area Of MPS.	))))))	Case No. ER-2001-672

AFFIDAVIT OF ALAN J. BAX

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

Alan J. Bax, 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 8 pages of Direct testimony 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 to the best of his knowledge and belief.

Alan J. Bax

Subscribed and sworn to before me this 6th day of December, 2001.

Dawn L. Hake
Notary Public

DAWN L. HAKE
Notary Public – State of Missouri
County of Cole
My Commission Expires Jan 9, 2005

My commission expires

Line Loss as a Percentage of the Total Output Load
For the 12-Month Periods Ending 12/31/90 through 12/31/00

12-Month Period Ending	Total Output Load (Megawatt Hours)	Line Loss (Megawatt Hours)	Percentage
12/31/90	3,623,509	260,515	7.19%
12/31/91	3,855,258	281,312	7.30%
12/31/92	3,676,100	264,805	7.20%
12/31/93	4,094,291	283,666	6.93%
12/31/94	4,248,168	292,700	6.89%
12/31/95	4,574,991	317,377	6.94%
12/31/96	4,991,047	327,282	6.56%
12/31/97	5,841,657	279,418	4.78%
12/31/98	6,877,830	460,693	6.70%
12/31/99	5,594,576	454,902	8.13%
12/31/00	6,083,275	566,991	9.32%

Schedule 1

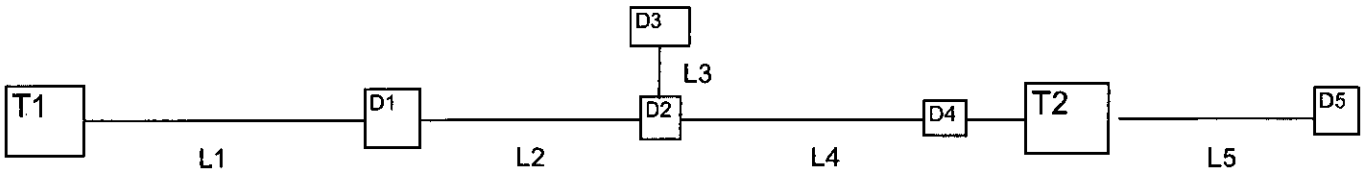
Demand Allocation Factor Calculation

MONTH	HOUR	SYSTEM PEAK	Load at System Peak RETAIL	WHOLESALE
Jan-oo	7:00 PM	752.00	708.11	43.89
Feb-oo	8:00 AM	723.00	679.84	43.16
Mar-oo	8:00 PM	649.00	610.10	38.90
Apr-oo	9:00 PM	679.00	641.27	37.73
May-oo	5:00 PM	1,096.00	1,058.29	37.71
Jun-oo	5:00 PM	1,085.00	1,053.81	31.19
Jul-oo	6:00 PM	1,247.00	1,214.86	32.14
Aug-oo	5:00 PM	1,328.00	1,302.07	25.93
Sep-oo	4:00 PM	1,300.00	1,274.80	25.20
Oct-oo	5:00 PM	863.00	839.80	23.20
Nov-oo	7:00 PM	767.00	746.53	20.47
Dec-oo	7:00 PM	929.00	907.13	21.87
SUM		11,418.00	11,036.61	381.39
Demand Allocation Factor			**0.966597**	**0.034557**

Energy Allocation Factor Determination

	Retail Sales	Wholesale Sales	Total Sales	Retail Percentage	Wholesale Percentage	
January	373,678	16,496	390,174	0.957721427	0.044144959	1.00
February	370,529	15,731	386,260	0.959273546	0.042455516	1.00
March	344,606	15,150	359,756	0.957888124	0.043963251	1.00
April	322,829	14,571	337,400	0.956813871	0.04513535	1.00
May	315,834	15,669	331,503	0.952733459	0.049611505	1.00
June	406,596	19,101	425,697	0.955130057	0.046977835	1.00
July	521,033	23,561	544,594	0.956736578	0.045219785	1.00
August	492,286	25,896	518,182	0.950025281	0.052603568	1.00
September	540,721	22,106	562,827	0.960723277	0.040882451	1.00
October	381,886	16,560	398,446	0.958438534	0.043363726	1.00
November	325,022	16,306	341,328	0.952227769	0.050168912	1.00
December	388,855	17,624	406,479	0.956642287	0.045322807	1.00
	4,783,875	218,771	5,002,646	0.956268942	0.045730919	1.00

Figure 1



T* - Transmission Sub
D* - Distribution Sub
L* - Connecting Line

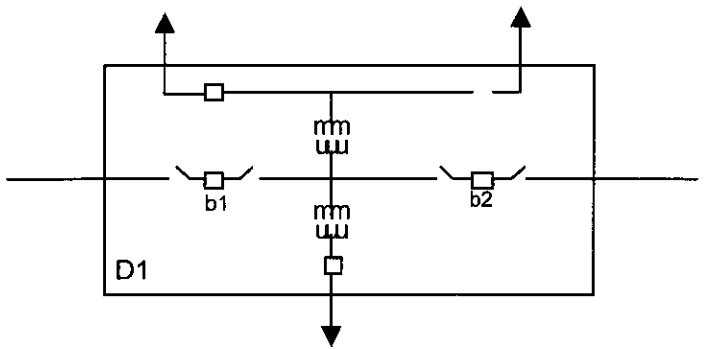


Figure 2

Schedule 4