Exhibit No.:
Issues: Fuel & Purchased Power
Witness: Jerry G. Boehm
Sponsoring Party: Aquila Networks-MPS & L&P
Case No.: ER-

Before the Public Service Commission
of the State of Missouri

Direct Testimony

of

Jerry G. Boehm

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**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI
DIRECT TESTIMONY OF JERRY G. BOEHM
ON BEHALF OF AQUILA, INC.
D/B/A AQUILA NETWORKS-MPS AND AQUILA NETWORKS-L&P
CASE NO. ER-________**

Q. Please state your name and business address.

A. My name is Jerry G. Boehm. My business address is 10750 East 350 Highway, Kansas City, Missouri, 64138.

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

A. I am employed by Aquila Inc. ("Aquila" or "Company") in the position of Manager, Resource Planning.

Q. What are your responsibilities as Manager – Resource Planning?

A. I am responsible for analyzing long-term Generation and Purchase Power Resources to meet the requirements of Aquila's domestic regulated electric utility operations. I am also responsible for fuel and purchase power budgeting, electric power market analysis and short-term resource analysis.

Q. Please briefly describe your education, work experience, and participation in professional associations.

A. In 1977 I received a Bachelor of Science degree in Electrical Engineering from the University of Missouri - Columbia. I am a registered Professional Engineer in the State of Missouri.

Since graduation from Missouri University the majority of my work has been in the field of electric utility power supply and delivery. In 1977 I joined the Missouri Public

Service Company as Staff Engineer. In that position I was responsible for load flow transmission analysis, power system relay and control design and maintenance, generation planning, fuel and interchange budgeting, and FERC/NERC reporting. Subsequently, I have received a number of position advancements prior to my moving to my current role in resource analysis.

Q. What is the purpose of your direct testimony?

A. The purpose of this testimony is to present and support Aquila's position in this case regarding fuel and purchased power expense for the Aquila Networks-MPS ("MPS") and Aquila Networks-L&P ("L&P") operating divisions of Aquila.

Q. How is your direct testimony organized?

A. My direct testimony is organized as follows:

I. MPS and L&P Electric Operations and Resources During 2002

II. Annualized Fuel & Purchased Power Expense

III. Regional Power Spot Market Modeling

Q. Are you sponsoring any schedules?

A. Yes. I am sponsoring one schedule which lists results of production costing modeling.

I. MPS AND L&P 2002 OPERATIONS AND RESOURCES

Q. Please describe MPS electric utility operations.

A. MPS provides electric service in Western and North Central Missouri. In 2002 it had a non-coincident summer peak load of 1333 MW compared to a coincident MPS/L&P peak load of 1729. MPS provided capacity and energy with energy generated by its thirteen generating units and purchases under its three power purchase contracts as well as purchases under short term and spot market sources.

Q. Please describe the MPS generating resources.

A. MPS generation resources consist of three coal fired steam units at the Sibley Generation Station ("Sibley"), an eight percent share in each of the three coal fired steam units at the Jeffrey Energy Center ("JEC"), four gas/#2 fuel oil fired turbines at the Greenwood Energy Center ("Greenwood"), two gas fired combustion turbines at the TWA Overhaul Base ("KCI"), one gas fired combustion turbine at the Ralph Green Station, and one oil fired combustion turbine at the Nevada substation. MPS also receives energy from an ownership share (0.12 MW) of Jeffrey Energy Center wind generation.

Q. Please describe the MPS purchase power contracts.

A. MPS has long-term purchases sourced from Sunflower Electric Cooperative and Eastern Kansas's Gray County Wind Farm. MPS also has a purchase tolling agreement with Merchant Energy Partners ("MEP") of Pleasant Hill.

Q. Please describe the L&P electric utility operations.

A. L&P provides electric service in North Central and North West Missouri. In 2002 it had a summer peak load of 399 MW. L&P provided capacity and energy with energy generated by its eight generating units and purchases from three power purchase contracts as well as purchases under short term and spot market sources.

Q. Please describe the L&P generating resources

A. L&P generation resources consist of a 18% share of the Iatan coal fired steam unit and various units at its Lake Road Generation Plant comprising one coal fired steam unit, three coal/natural gas fired steam units, one natural gas fired CT, and two oil fired jet engines.

Q. Please Describe the L&P purchase power contracts.

A. L&P has long-term purchases sourced from Nebraska Public Power District and Eastern Kansas's Gray County Wind Farm. L&P also has a purchase agreement with Sunflower Electric Cooperative.

II ANNUALIZED MPS & L&P FUEL & PURCHASED POWER EXPENSE

Q. For MPS and L&P what are the amounts and expenses for total fuel and purchases in 2002.

A. The costs of total fuel and purchases are supported by Aquila witness Lisa Starkebaum's testimony.

Q. How do those costs relate to the proper amount of fuel and purchased energy expense to be used in setting rates for MPS and L&P?

A. The costs are based upon actual expense which were dependent upon actual operating conditions during this period. During the twelve-month period ending December 31, 2002, however, operating conditions occurred which resulted in several cost items being either too high or too low to properly represent normal expenses for a rate case test period. For example, the average price paid for natural gas fuel in 2002 is much lower than current prices. Because of abnormal conditions, it is necessary to adjust high and low expenses to develop an appropriate annualized fuel and purchased energy expense for the test period.

Q. What method for annualizing the test year fuel and purchased power expense do you recommend for purposes of this case?

A. The proper method for annualizing the test year fuel and purchased power expense is to normalize and annualize unit sales, system requirements, system peak demand, generating unit maintenance and forced outages, the availability and price of purchased power and energy, and the price paid for fuel. After doing this, the fuel and purchased energy should be dispatched by a reliable and accurate production cost computer model to develop the appropriate generation and purchased energy levels and the resulting amount of fuel burned. Aquila uses the RealTime computer software for its production cost model.

Q. Are MPS and L&P systems dispatched from the same model?

A. Yes. The two systems are modeled in a joint dispatch. Two additional stand-alone production simulations are performed to demonstrate the cost of separate dispatch for each system.

Q. Why did you prepare both stand-alone and joint dispatch models?

A. The joint dispatch model reflects the expected cost of our present day operating mode. It is performed to support the dollar amounts we are submitting to be included in the cost of service. Stand alone modeling is performed to calculate the joint dispatch cost savings achieved by the merger of L&P and MPS, as more fully described in the testimony of Aquila witness, Vern Siemek.

Q. What are the calculated costs for stand-alone and joint dispatch for 2002?

A. The stand-alone costs are $139,083,118 to supply fuel and purchased power for 7,566,540 MWH to both systems. The joint dispatch costs are $131,109,320 to supply fuel and purchase power for 7,503,620 MWH.

Q. Is there a written joint dispatch agreement in place for the MPS and L&P divisions?

A. No. The need for a joint dispatch agreement has been discussed several times with the Missouri Public Service Commission Staff ("Staff") as well as the Office of the Public Counsel ("OPC"). The most recent meeting on this subject occurred on May 6, 2003 at the Commission's offices in Jefferson City. Attendees included:

<u>Staff</u> -Mike Proctor, Lena Mantle, David Elliot

<u>OPC</u> - Ryan Kind, Jim Busch

<u>Aquila</u> - Debbie Hines, Jerry Boehm, Denny Williams, John Browning

Q. Please summarize the results of that meeting.

A. After discussing different methods for allocating costs and revenues for resources, purchases, and sales, it became obvious that the method used is a function of the desired result and that one plan could not satisfy all needs. For instance, an agreement that attempts to duplicate the stand-alone and combined modeling described above is complex and fails to provide the type of accounting information needed to prepare required federal and state reports. It was agreed that information provided by a joint dispatch agreement would not eliminate the need for modeling in future cases. It was also the consensus that, since both divisions are in Missouri and regulated by the same Commission and all foreseeable future rate cases would include both MPS and L&P divisions, there is no advantage for Aquila to unfairly manipulate allocations and thus no need for a joint dispatch agreement.

Q. Did Aquila develop its recommended annualized test period fuel and purchased energy expenses for this case using the method you just described?

A. Yes.

Q. During the test period, what expense items, if any, were adjusted as a result of annualizing fuel and purchased energy expense?

A. Adjustments were made to:

System requirements. Adjustments were made to peak load and energy to reflect normalized weather. System requirements are developed from load profiles and excess energy calculations. The weather normalized load adjustments are sponsored by Aquila witness Eric Watkins and are found in his direct testimony.

Fuel Costs. Adjustments were made to reflect a normalized fuel market. Fuel cost adjustments are sponsored by Aquila witness John Browning.

Adjustments to generation and purchases are provided in Schedule JGB-1 – Itemized Costs for Annualized Fuel and Purchased Power.

MEP Pleasant Hill Unit Participation Purchase

Q. Please describe the MEP Pleasant Hill ("MEPPH") purchase.

A. The power purchase from MEPPH is a unit participation purchase from the Aries generating station located south and east of Kansas City. MEPPH is a limited liability corporation jointed owned by Calpine Corporation and Aquila Merchant Energy Partners. The Aries station is a natural gas-fired combined-cycle plant, consisting of two combustion turbines, two heat recovery steam generators and a single steam turbine. A contract with MEPPH was executed on February 26, 1999, after a procurement process to identify the optimum new resource for serving MPS' customers. In Docket EM-99-369, the Missouri Public Service Commission ("Commission") reviewed the procurement process and approved the purchase agreement by order dated April 22, 1999, effective May 4, 1999. Beginning January 1, 2002, and ending May 31, 2005, the purchase agreement provides 500 MW of capacity to MPS during the months of April – September, and 200 MW for the months of October – March. Natural gas for generation and corresponding firm transportation is provided by MPS.

Q. What is the cost of the gas associated with the MEPPH purchase?

A. The cost of fuel is supported by Aquila witness John Browning's testimony.

Q. Did MPS include the effect of the MEPPH purchase in developing the annualized costs for purchased energy in this case?

A. Yes. The purchase is modeled at 500 MW for six months, and 200 MW for six months.

<u>GCWE Unit Participation Purchase</u>

Q. Please describe the Gray County Wind Energy, LLP ("GCWE") unit participation purchase.

A. Aquila entered into an agreement with GCWE to purchase 110 MW of the output of a new wind generation farm in Gray County, Kansas. 40 MW of the purchase is delivered to MPS, and 20 MW to L&P and 40 MW to WestPlains Energy Kansas. The remainder is sold to wholesale customers. Under the terms of the contract, energy is sold to Aquila at the rate of $25/MWH. There is no demand charge. Aquila is responsible for providing transmission service from the project, located in southwest Kansas, to MPS and L&P. Because wind generation is dependent on the random nature of the wind, the purchase was modeled in the RealTime fuel model as a random source that produced annualized generated energy of 213,960 MWH.

Q. Are the 40 MW (MPS) and 20 MW (L&P) capacities allowed as accredited capacity within SPP?

A. Due to the random nature of wind generation and the inability to schedule wind generation on demand, we cannot claim full capacity for the wind generation. SPP has allowed a 33% accreditation pending a study of the performance of the plant over time. For the purposes of this case we are assuming 13MW of capacity to MPS and 7 MW of capacity to L&P. Within the RealTime simulation the full capacity of 40 MW and 20 MW respectively are modeled as available at various times throughout the year.

<u>Gentlemen Unit Participation Purchase</u>

Q. Please Describe the Nebraska Public Power District ("NPPD") Gentlemen Purchase.

A. L&P entered into an agreement for capacity and energy via a unit participation contract from the NPPD Gentleman coal fueled plant. In 2002 80 MW of capacity were received. In 2003 the capacity amount increases to 90 MW; in 2004 the capacity rises to 100 MW and remains there until the contract expires in May 2011.

<u>Sunflower Electric Unit Participation Purchase</u>

Q. Aquila entered into a purchase contract with Sunflower Electric Cooperative Incorporated (SECI). The contract is for the sale of capacity and rights to toll energy from the SECI gas fueled steam unit (S2) and CT units S4 and S5. MPS receives 40 MW of capacity; L&P receives 10 MW of capacity. Aquila also pays SECI for transmission to accredit the capacity for the peak load months of May through September and Aquila is responsible for purchasing transmission from SECI to MPS and L&P. Energy scheduled from the SECI units is based on a tolling arrangement in the contract when Aquila purchases and delivers the gas to the units and the SECI charges a tolling fee which is factored into the fuel and purchase power RealTime model. The contract expires May 31, 2005.

III MPS /L&P REGIONAL SPOT-MARKET PRICE MODELING

Q. In developing the annualized purchased energy expense in this case, did MPS adjust the price paid for spot-market energy from what was actually paid during the test year?

A. Yes, the adjustment was made to improve the accuracy of the model in response to updated fuel prices and economic conditions.

Q. Please describe the market drivers used in your development of power market price forecasts.

A. Aquila assumes that the power market price is roughly determined by the impact of several factors operating at the same time. Principal drivers of the price for power are: existing and proposed generation, current load profiles and forecasted load growth, and the current level of fuel costs with projections of future fuel price movements. Technological advancements to the production of power can have an impact over time, but have a minimal impact in the test year forecasts. Therefore those advances are left out of the price determination model.

Q. Please describe Aquila's sources for existing and future generation resources.

A. Aquila utilizes a national database of power production from M.S. Gerber and Associates that is specially formatted for use in Gerber's MIDAS analysis package. The MIDAS database has as its source the current RDI's BaseCASE database.

The MIDAS database contains unit specific operating data on every operating plant within NERC. This operating data includes unit capacity, heat rate, fuel type, variable O&M costs, fixed plant costs, etc. RDI compiles much of this data from published resources such as FERC Form 1 submissions and quarterly CEMS data compiled by the EPA.

Q. Please summarize Aquila's assumptions concerning regional and national loads.

A. Regional loads are included in the MIDAS dataset. Regional loads and 10-year forecasts are reported by NERC region in the EIA-411. RDI collects this information and breaks down load and forecasted growth by market area. The MIDAS data set uses this information to simulate the load growth of all regions and market areas in NERC. Aquila does not modify this information in the production of the forward market price curve for power. So, for the test year 2002 neighboring systems load profiles were modeled from the 2002 forecast information each neighbor submitted to NERC.

Q. Please explain which fuel costs are used in power price determination.

A. The power market price forecasting methods used by Aquila, are concerned with only a few types of primary energy source costs. Nuclear fuel, coal, hydro, natural gas and fuel oil are the fuels that have a material impact on the ultimate market price for power. The impact of wind, solar, biomass and other renewable resources appear to be minimal, and therefore are not used as a driver for market power prices.

Q. Please describe the method of predicted primary fuel source forward prices.

A. Fuel costs assumptions vary by the fuel being considered. The methods used for determining the cost of each primary energy source is considered separately.

Q. Describe the method used to forecast nuclear, coal and hydro fuel costs.

A. The majority of the energy produced in the country is generated by base loaded plants most of which use nuclear, coal or hydro fuel (stable cost) as their primary energy source. The costs of these sources have two features in common. First, the cost is heavily dependent upon the individual plant. The costs for fuel at these plants vary due to a large number of factors, including refueling schedules, coal and delivery contracts, water usage constraints, etc. The second feature these fuel costs have in common is that they are relatively stable and do not fluctuate over time. Therefore, the fuel cost estimate for actual fuel purchased costs contained in RDI's BaseCASE for each individual plant is likely to hold throughout the timeframe of the budget forecast.

For Aquila's test year forecasting purposes, RDI actual costs for the stable cost fuels are held constant for the study period.

Q. Please explain how natural gas and fuel oil prices are forecast.

A. Due to the volatile nature of the price of natural gas and the increasing percentage of time that natural gas fired generating units are the marginal price unit, the need for a natural gas forecast that considers the seasonal fuel price fluctuations is essential to an accurate power market price forecast.

Regional natural gas future prices were developed using prices sponsored in Aquila witness John Browning's testimony. The high volatility of the price curve can lead to widely varying power price forecasts. Natural gas basis for the individual plants are assumed to be relatively constant across a NERC region or sub-region. Average historical basis are calculated for each region and applied to the Henry Hub forecast to provide a delivered cost for natural gas in each of the NERC regions or sub-regions. It is assumed that the natural gas basis will not vary over time.

Fuel oil appears to drive power prices for certain months of the years in certain areas of the country, primarily Florida and the Northeast. However, the impact of fuel oil price movements to the power market prices in the Midwest is insignificant. For modeling purposes, the annual average New York Harbor delivered price of #6 Fuel oil is used as an input to the model.

Q. Please describe the method by which power prices are developed.

A. Power market prices are developed using the MIDAS analysis software from M.S. Gerber and Associates. The MIDAS software can be used in a variety of ways. When used for price forecasting, the model is being used in the "multi-area" mode.

Q. What is the MIDAS "multi-area" mode of analysis?

A. The multi-area mode of analysis is basically an application of a transportation linear programming model. All regions of the country are condensed into market areas, each with a load profile and a set of generation resources. Within each market area, loads and resources are matched 8760 hourly periods per year.

The market areas are connected in the model by a series of transmission lines, each subject to a transmission constraint. Price differences in market areas connect with an unconstrained transmission path and will cause the model to assume a power flow between the two areas, the effect of which will be to lower the cost in the high price area and increase the cost in the low cost area. This assumed power flow increases until the two market prices have equilibrated at an identical level or the transmission line has reached its limit.

Q. Are prices only developed for the SPP region?

A. No. Market prices are simultaneously determined for all regions within the model study. The Midwest model produces power market forward prices for market areas in SPP, MAPP, MAIN and SERC.

Q. Does this conclude your testimony at this time?

Yes.

Schedule 1- Itemized Costs for Annualized Fuel and Purchase Power

	Plant	Annualized Joint Dispatch		Annualized Stand-Alone Dispatch	
		MWH	$	MWH	$
1	MPS				
2	Sibley	2,911,465	$ 36,963,890	3,132,676	$ 39,851,570
3	RG	2,284	$ 149,340	2,150	$ 148,510
4	JEC	904,972	$ 12,611,390	914,288	$ 12,766,340
5	KCI	427	$ 35,430	320	$ 26,820
6	GW	11,146	$ 786,400	12,741	$ 883,670
7	Nev	162	$ 18,850	245	$ 27,310
8	JEC Wind	-	$ -	-	$ -
9	Contract Purchases	1,170,720	$ 46,473,580	1,244,054	$ 50,574,510
10	Spot Purchases	173,280	$ 6,451,632	254,671	$ 9,229,840
11	Total Generation	**3,830,456**	**$ 50,565,300**	**4,062,420**	**$ 53,704,220**
12	Total Purch	**1,344,000**	**$ 52,925,212**	**1,498,725**	**$ 59,804,350**
13	Total Supplied	**5,174,456**	**$ 103,490,512**	**5,561,145**	**$ 113,508,570**
14					
15	SJLP				
16	Lake Road Steam	688,421	$ 12,440,350	657,541	$ 11,650,197
17	Lake Road GT	713	$ 69,790	1,038	$ 117,433
18	Iatan	874,788	$ 6,502,000	565,001	$ 4,520,298
19	Contract Purchases	702,756	$ 6,280,160	714,990	$ 6,470,759
20	Spot Purchases	62,486	$ 2,326,508	66,825	$ 2,815,861
21	Total Generation	**1,563,922**	**$ 19,012,140**	**1,223,580**	**$ 16,287,928**
22	Total Purch	**765,242**	**$ 8,606,668**	**781,815**	**$ 9,286,620**
23	Total MWH Supplied	**2,329,164**	**$ 27,618,808**	**2,005,395**	**$ 25,574,548**
24					
25	Total for Aquila - Missouri				
26	Total Generation	**5,394,378**	**$ 69,577,440**	**5,286,000**	**$ 69,992,148**
27	Total Purch	**2,109,242**	**$ 61,531,880**	**2,280,540**	**$ 69,090,970**
28	Total MWH Supplied	**7,503,620**	**$ 131,109,320**	**7,566,540**	**$ 139,083,118**

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the matter of Aquila, Inc. d/b/a Aquila Networks-MPS and Aquila Networks-L&P, for authority to file tariffs increasing electric rates for the service provided to customers in the Aquila Networks-MPS and Aquila Networks-L&P area	))))))	Case No. ER-________

County of Jackson)
) ss
State of Missouri)

AFFIDAVIT OF JERRY G. BOEHM

Jerry G. Boehm, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Direct Testimony of Jerry G. Boehm;" that said testimony was prepared by him and under his direction and supervision; that if inquiries were made as to the facts in said testimony and schedules, he would respond as therein set forth; and that the aforesaid testimony and schedules are true and correct to the best of his knowledge, information, and belief.

Jerry G. Boehm

Subscribed and sworn to before me this 12th day of June, 2003.

Linda C. Howell
Notary Public
Linda C. Howell

My Commission expires:

Linda C.Howell
Notary Public-Notary Seal
State of Missouri
Jackson County
My Commission Expires: May4, 2004