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Missouri Public
Service Commission

Exhibit No.:

Issues: Fuel Expenses

Witness: David W. Elliott

Sponsoring Party: MO PSC Staff

Type of Exhibit: Direct Testimony

Case No.: ER-2004-0034 &

HR-2004-0024

(Consolidated)

Date Testimony Prepared: December 9, 2003

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

DAVID W. ELLIOTT

AQUILA, INC.

D/B/A AQUILA NETWORKS – MPS

AND AQUILA NETWORKS –L&P

CASE NOS. ER-2004-0034 & HR-2004-0024

(CONSOLIDATED)

Jefferson City, Missouri

December 2003

****Denotes Highly Confidential Information****

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Exhibit No. 116 NP
Case No(s) ER-2004-0034
Date 2/23/04 Rptr XF

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DIRECT TESTIMONY
OF
DAVID W. ELLIOTT
AQUILA, INC.
D/B/A AQUILA NETWORKS-MPS
AND AQUILA NETWORKS-L&P
CASE NOS. ER-2004-0034 and HR-2004-0024
(CONSOLIDATED)

Q. Please state your name and business address.

A. David W. Elliott, 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 Iowa State University with a Bachelor of Science degree in Mechanical Engineering in May 1975. I was employed by Iowa-Illinois Gas and Electric Company (IIGE) as an engineer from July 1975 to May 1993. While at IIGE, I worked at Riverside Generating Station, first as an assistant to the maintenance engineer, and then as an engineer responsible for monitoring station performance. In 1982, I transferred to the Mechanical Design Division of the Engineering Department where I

Direct testimony of
David W. Elliott

1 was an engineer responsible for various construction and maintenance projects at IIGE's
2 power plants. In September 1993, I began my employment with the Commission.

3 Q. Have you previously filed testimony before the Commission?

4 A. Yes. Please refer to Schedule 1 for the list of cases I have filed in.

5 Q. What is the purpose of your testimony in this Aquila, Inc. rate case,
6 Case Nos. ER-2004-0034, and HR-2004-0024 (consolidated)?

7 A. The purpose of my testimony is to present the results of the Staff's
8 production cost model simulations that were used to establish a reasonable level of
9 annualized fuel and purchased power expense for Aquila, Inc. (Aquila) for the updated
10 test year.

11 Q. To which of the Aquila operations are you directing your testimony?

12 A. This testimony addresses the electric and steam operations of Aquila in
13 Missouri.

14 Q. How many different scenarios did you run simulations on?

15 A. I ran five different scenarios. One electric scenario for Aquila Networks-
16 MPS (MPS) on a stand-alone basis, one electric scenario for Aquila Networks-L&P
17 (L&P) on a stand-alone basis, one steam scenario for L&P electric stand-alone scenario,
18 one electric scenario for the joint dispatch of a combined MPS and L&P operation, and
19 one steam scenario for the joint dispatch electric scenario.

20 Q. What is meant by joint dispatch?

21 A. Joint dispatch in this case refers to the fact that Aquila is dispatching both
22 the MPS units and the L&P units to meet the combined net system load of both MPS and
23 L&P. This allows the units in one division to be used to help meet load in the other

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1 division when otherwise that division would run a more expensive unit, or purchase
2 higher priced power to meet load.

3 Q. Why were joint dispatch and stand-alone scenarios required for steam
4 sales from L&P?

5 A. Both scenarios were necessary because the operation of the L&P electric
6 system varies based on the operation of the L&P steam system because both systems
7 share common plant. The steam costs in a joint electric dispatch would therefore be
8 different from those steam costs of a stand-alone L& P electric dispatch.

9 Q. Why did you run stand-alone scenarios?

10 A. I needed the stand-alone scenarios to allocate the annualized fuel and
11 purchased power costs of the joint scenario back to the two divisions, L&P and MPS.
12 Schedule 2 shows the allocation method for fuel and purchase power costs. Schedule 4
13 shows the allocated costs.

14 Q. What test year did Staff use?

15 A. In accordance with a Commission Order, Staff used the test year of
16 January 1, 2002 to December 31, 2002, updated through September 30, 2003.

17 Q. What is a production cost model?

18 A. The Staff's production cost model is a computer program used to perform
19 an hour-by-hour, chronological simulation of a utility's generation and power purchases.
20 The model simulates the way the company dispatches its generating units and schedules
21 purchased power to meet the net system load in a least cost manner.

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

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1 A. The production cost model used by the Staff operates in a chronological
2 fashion, meeting each hour's energy demand, or load, before moving to the next hour. It
3 schedules purchased power, or dispatches generating units to serve the load in each hour
4 in a least-cost manner based upon the fuel prices, unit availability and operating
5 conditions, and the cost of purchased power.

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

7 A. The RealTime® production cost model developed by The Emelar Group
8 was used. This is the same model used by Staff in all electric cases since 1995 that
9 required a production cost model scenario.

10 Q. What production cost model does Aquila use?

11 A. Aquila also uses the RealTime® production cost model.

12 Q. What were the sources of the input data used in the model?

13 A. The sources of the input data used in the model are listed in Schedule 3.

14 Q. What unit heat rates did Staff use in the model?

15 A. Staff used heat rates supplied by Aquila for this case.

16 Q. What is a heat rate?

17 A. A heat rate is the amount of energy from fuel required to produce one
18 kWh.

19 Q. What types of unit outages are used in the model?

20 A. There are two types of unit outages used in the model. Maintenance
21 outages are those times when the unit is scheduled to be off line in order to perform
22 maintenance on the unit. Forced outages are those times when the unit is forced off line
23 because of a failure or because it is in need of immediate repairs.

Direct testimony of
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1 Q. How did Staff develop its model inputs for maintenance outages?

2 A. Staff calculated maintenance outage hours for every unit based on the five
3 years of data on actual outages supplied by Aquila. Staff maintenance hours represent
4 hours for both major and normal outages. These hours are entered into the model at
5 specific times during the year, usually during the fall and spring, which are typical outage
6 times.

7 Q. What forced outage hours did Staff use in the model?

8 A. Staff used the five years of outage data supplied by Aquila to develop an
9 average forced outage factor (forced outage hours/8760) for each unit. These outage
10 factors are entered into the model for each unit to allow the model to determine the length
11 of the outage. Because forced outages can occur at any time, the model uses a statistical
12 sampling method to determine when the outages will occur.

13 Q. What unit capacities did Staff use in the model?

14 A. Staff reviewed Aquila's production cost model inputs and the 2002
15 historical hourly data furnished monthly by Aquila to the Staff in conformance with
16 4 CSR 240-3.190 (formerly 4 CSR 240-20.080) to determine maximum unit capacities.
17 Actual unit hourly generation was plotted to determine the maximum capacity of the
18 units.

19 Q. What plant does Aquila use to produce steam for sale to steam customers?

20 A. The boilers at the L&P Lake Road Plant are used to produce steam for
21 sales, as well as for generation of electricity.

22 Q. How did the Staff determine fuel costs for steam sales?

Direct testimony of
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1 A. The Staff ran a production cost model scenario without turbine generators
2 and using only the boilers at Lake Road Plant. Inputs to this model scenario were the
3 hourly steam load of L&P steam customers, and calculated amounts of steam used for
4 electric generation by Lake Road turbines 1,2, and 3.

5 Q. What Lake Road Plant boiler data did Staff use in the steam model?

6 A. Staff used the data furnished by Aquila.

7 Q. Briefly summarize the results of the production cost model simulations.

8 A. The results of the production cost model simulation runs are shown in
9 Schedule 4. The annual cost of fuel and purchased power for the joint electric dispatch of
10 MPS and L&P is ** HC ____ **. The annual cost of fuel for steam sales for the
11 joint electric dispatch scenario is ** HC ____ **. These amounts were supplied
12 to Staff Witnesses Graham A. Vesely, and Steve M. Traxler. For further discussion of
13 how Staff annualized the overall fuel expense in this case, please refer to Staff Witness
14 Graham A. Vesely's direct testimony, and Steve M. Traxler's direct testimony.

15 Q. Does this conclude your direct testimony?

16 A. Yes, it does.

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Previous Testimony of
David W. Elliott

- 1) ER-94-163, St. Joseph Light & Power Co.
- 2) HR-94-177, St. Joseph Light & Power Co.
- 3) ER-94-174, *The Empire District Electric Co.*
- 4) ER-95-279, *The Empire District Electric Co.*
- 5) EM-96-149, Union Electric Co.
- 6) ER-99-247, St. Joseph Light & Power Co.
- 7) EM-2000-369, UtiliCorp United, Inc. and *The Empire District Electric Co.*
- 8) ER-2001-299, *The Empire District Electric Co.*
- 9) ER-2001-672, Utilicorp United, Inc.
- 10) ER-2002-424, *The Empire District Electric Co.*

Allocation of Electric Fuel Expenses

A = Fuel and purchase power expenses for Aquila

B = Fuel and purchased power expenses for L&P stand-alone

C = Fuel and purchased power expenses for MPS stand-alone

D = Fuel and purchased power expenses of Aquila allocated to L&P

E = Fuel and purchased power expenses of Aquila allocated to MPS

Allocation formula:

$$D = A \times (B / (B + C))$$

$$E = A \times (C / (B + C))$$

**INPUT DATA SOURCES FOR
REALTIME PRODUCTION COST MODEL**

INPUT

SOURCE

Heat Rate Curves	Aquila's responses to Staff Data Requests No.24, 25 and 31 in ER-2004-0034, and Staff Data Requests No. 10, 11 and 18 in HR-2004-0024.
Forced Outage Hours	Aquila's responses to Staff Data Request No. 27 and 30 in ER-2004-0034, and Staff Data Requests No. 14 and 17 in HR-2004-0024.
Maintenance Hours	Aquila's responses to Staff Data Request Nos. 28 in ER-2004-0034, and Staff Data Requests No. 15 in HR-2004-0024.
Purchased Power Prices & Energy	Staff Witness Leon C. Bender
Hourly Net System Loads	Staff Witness Richard J. Campbell
Fuel prices	Staff Witness Graham A. Vesely
Unit Specific Data	Aquila's responses to Staff Data Request No 20 in ER-2004-0034, and Staff Data Request No. 1 in HR-2004-0024.
Steam sales	Staff Witness Janice Pyatte
Lake Road Boiler Data	Aquila's responses to Staff Data Request Nos. 26, 452, and 453 in ER-2004-0034, and Staff Data Request No. 13 in HR-2004-0024

Schedule 4
Has Been Deemed
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In Its Entirety