Exhibit No.: ________________
Issue: Plant Capacity
Witness: Brian A. Hamrick
Type of Exhibit: Rebuttal
Sponsoring Party: Algonquin Water Resources of Missouri, LLC
Case No.:WR-2006-0425
Date Testimony Prepared: Dec.28, 2006

MISSOURI PUBLIC SERVICE COMMISSION

ALGONQUIN WATER RESOURCES OF MISSOURI, LLC

CASE NO. WR-2006-0425

REBUTTAL TESTIMONY OF

BRIAN A. HAMRICK

Jefferson City, Missouri

AFFIDAVIT

STATE OF ARIZONA)
) ss
COUNTY OF MARICOPA)

I, Brian Hamrick, state that I am employed by Algonquin Water Services, LLC, the utility operator for Algonquin Water Resources of Missouri; that the Rebuttal Testimony attached hereto has been prepared by me or under my direction and supervision; and, that the answers to the questions posed therein are true to the best of my knowledge, information and belief.

[signature]

Subscribed and sworn to before me this 27 day of December, 2006.

Barbara Risden
Notary Public

My Commission Expires:

Feb. 3, 2007
(SEAL)

OFFICIAL SEAL
BARBARA RISDEN
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires Feb. 3, 2007

WITNESS INTRODUCTION

Q. WOULD YOU PLEASE STATE YOUR NAME AND BUSINESS ADDRESS?

A. My name is Brian A. Hamrick and my business address is 12725 W. Indian School Road, Suite D101, Avondale, Arizona 85323.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Algonquin Water Services as Senior Project Manager.

Q. PLEASE DESCRIBE YOUR EDUCATION, PROFESSIONAL EXPERIENCE AND TRAINING.

A. Marked as **Schedule BAH-1** and attached hereto is a description of my education, professional experience and training.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to respond to the Direct Testimony of Commission Staff witness James A. Merciel, Jr. concerning plant capacities. This includes an assessment of the calculations used to determine the water usage demand, well capacities, storage capacities, and the fire flow requirements provided by Mr. Merciel.

Q. HAVE YOU REVIEWED THE DIRECT TESTIMONY OF STAFF WITNESS MERCIEL?

A. Yes.

Q. WHAT DOES MR. MERCIEL CONCLUDE?

A. Mr. Merciel concludes that over-capacity exists at all three of the water systems. The following facilities were said to be over sized:

1. The well at Ozark Mountain Resort (OMR) has a used capacity of 32% (Merciel Dir., Schedule 3).
2. Used capacities for Well #1 and Well #2 at Timber Creek Resort (TCR) are 26% and 19%, respectively (Merciel Dir., Schedule 4).
3. The used storage capacity at TCR is 18% (Merciel Dir., Schedule 4).
4. Used storage capacity at Holiday Hills Resort is 27% (Merciel Dir., Schedule 2).

Q. DO YOU AGREE WITH MR. MERCIEL'S GENERAL METHODOLOGY FOR HIS CALCULATIONS?

A. Mr. Merciel's general methodology and logic used in the calculations is consistent with industry standards, except for the peak day demand and fire flow calculation.

Q. HOW SHOULD THE PEAK DAY DEMAND BE CALCULATED?

A. If historical meter readings are used to determine the peak day demand for a water system, then one month of data is not sufficient to make an accurate assessment. Water system demands fluctuate throughout the year and are typically higher during the summer months. Also, water demands fluctuate from year to year primarily due to rainfall totals, the number of visitors, and the addition of amenities or facilities. Mr. Merciel only looked at a snapshot of the water usage for each resort by only analyzing the water production for one month. Typically, water demands are highest in the summer when the resorts have the most visitors. To determine the peak day demand, the highest daily demand for the summer must be determined. At a resort, the highest daily demand will most likely occur during either a weekend or a holiday such as Memorial Day, Independence Day, or Labor Day. Mr. Merciel only analyzed daily production data for August 2005 (OMR and HHR) and July 2006 (TCR) as shown in Attachments 1-3 (Merciel Reb., Sch 1). If Mr. Merciel followed standard engineering practice, he would have analyzed the historical daily production data from May to September for a minimum of two consecutive years. A thorough engineering analysis would have used historical data for a period of three consecutive years or more. For rate making purposes, one month of historical production data is not sufficient to determine a peak day demand for each resort.

When reliable historical data is not available or when the accuracy of the historical data is in question, then typical water usage demands that are representative of a hotel may be used. However, typical water demands are difficult to apply to a hotel due to large fluctuations in landscaping demands and water demands associated with on-site amenities (swimming pools, restaurants, and golf courses). An analysis of historical flow meter data will provide a more accurate picture of the current water demands at each resort.

Q. ARE THERE ANY OTHER CONSIDERATIONS WHEN USING HISTORICAL FLOW METER READINGS TO CALCULATE PEAK DAY DEMANDS?

A. Yes, another issue associated with using historical meter readings, is the accuracy of the flow meters. Flow meter accuracy should be validated before meter readings are used for rate making purposes. A portable flow meter may be used to confirm the readings from the existing flow meter. Also, flow meters are periodically sent back to the factory for calibration. The last time that each flow meter was calibrated should be validated. The industry standard utilized to determine flow meter accuracy is defined in the American Water Works Association (AWWA) Methods of Practice Manual M-6.

Q. WHAT FIRE FLOW CAPACITY HAS BEEN USED BY THE STAFF WITNESS?

A. Mr. Merciel assumed a fire flow demand of 250 gallons per minute (gpm) for a period of two hours to calculate the required storage volume.

Q. IN THIS CASE, IS 250 GPM A REASONABLE VALUE TO CALCULATE FIRE FLOW STORAGE CAPACITY?

A. No. This is inconsistent with standard industry practices. 250 gpm is usually only applied to single family homes less than 2,500 square feet. At the Silverleaf Resorts, the majority of the units are 12 unit or 24 unit buildings, and each unit has two bedrooms, two baths, and a kitchen. In my experience, a fire flow of 1500 gpm or more would be more appropriate. A widely used national standard is the International Building Code and, according to Section B105.2 of the 2000 International Fire Code, the minimum fire flow required for buildings other than one and two family dwellings that have an approved fire sprinkler system is 1500 gpm for a two hour period. I believe in this case that 1500 gpm for two hours should be used to determine appropriate storage capacity at each resort. This equates to a fire reserve volume of 180,000 gallons for each resort.

Q. IF 1,500 GPM IS USED TO CALCULATE THE REQUIRED FIRE FLOW RESERVE VOLUME, HOW DOES THIS AFFECT THE REQUIRED MINIMUM STORAGE CAPACITY FOR EACH WATER SYSTEM?

A. Using Mr. Merciel's methodology to determine the excess storage capacity and replacing the 250 gpm fire flow with a 1500 gpm fire flow for a two hour period yields the following:

1. Used storage capacity at Holiday Hills Resort increases from 27% to 91%.
2. Used storage capacity at Timber Creek Resort increases from 18% to 89%.
3. Used storage capacity at Ozark Mountain Resort increases from 145% to 295%. There is no excess storage at Ozark Mountain Resort.

Q. DO ANY OF THE WATER SYSTEMS HAVE EXCESS STORAGE CAPACITY?

A. No. HHR and TCR have used storage capacities within 11% of the actual storage volume and should not be considered to have excess capacity. The calculated used storage capacity is the minimum volume required and engineers, who are often conservative in these calculations, often apply an additional 10% to the minimum storage volume for an emergency condition. When a fire flow of 1500 gpm for a period of two hours is used to calculate the required storage capacity, none of the resorts have any excess capacity associated with the ground storage tanks.

Q. ARE THERE ANY OTHER CONSIDERATIONS THAT YOU THINK SHOULD BE ADDRESSED IN REGARD TO AVAILABLE CAPACITY?

A. Yes. Determining the value or cost of any excess capacity is not simply a matter of multiplying the percentage of excess capacity by the total cost of the installation and assuming that is a proper valuation of that percentage of excess capacity that might be determined to exist. In other words, there is not a linear correlation between cost and capacity.

As a simplified example, let us consider water storage. The cost of installing such will include design, permit approvals, tendering, mobilization, site preparation, foundations and supports, installation or erection of the storage tank (lets assume it is a bolted steel tank), controls automation and instrumentation, installation of electrical and plumbing, commissioning and startup, ect. The capacity of such a storage tank could be increased by 30% (say from 300,000 to 400,000 gallons) by including one additional ring of bolt on steel wall segments, but that would not require any material change to any of the other components or labor. Adding this additional 30% additional incremental capacity might add 5% to the cost of the entire installation.

The same is true for almost every type of installation in a water system to a greater or lesser degree. The relationship between cost and capacity is closest to linear for the installation of straight pipe in the ground (although, design, permits and approvals, mobilization/demobilization, commissioning are all closer to fixed cost than variable cost) and the cost of installing 8-inch diameter pipe is not 4 times the cost of installing 2-inch diameter pipe or 16 times the price as would reflect its water transmission capacity.

Q. HOW DO WELL CAPACITY AND STORAGE RELATE TO THIS CONCEPT?

A. Well capacity and storage are fairly far away from the linear cost capacity relationship, and while I have only run approximate numbers, I would suggest that the actual cost of the approximately 25% incremental capacity that Staff witness Merciel claims is excessive, only has a value of 5% of the total installation cost and is not really material.

Q. ARE THERE ANY OTHER CONSIDERATIONS THAT YOU THINK THE ANALYSIS SHOULD HAVE ADDRESSED?

A. Yes. A valuable factor to consider is the concept of "investments prudently made". It is inconceivable that capacity can be added to water systems in infinite increments to make capacity always match the theoretical requirement of the systems. It is hard to imagine the horrendous cost and inefficiency and waste of money of installing incremental storage every time a single additional dwelling unit customer was added to a system. Given the non-linear relationship between capacity and cost this would be very expensive and wasteful. The customer should be protected from this sort of wasteful situation. As a consequence, it is much cheaper to add capacity in blocks that optimize the relationship between up front cost and the time value of money to the period where the capacity actually becomes useful to the system. Balancing this relationship effectively results in situations where there may be excess capacity for periods of time, but the investments can still be considered the most wise and prudent action. The utility should not be penalized for taking such actions which in the future will be proven to be in the best interest of the utility in that they will have secured capacity at an appropriate cost.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Mr. Merciel's methodology and calculations are consistent with industry standards except for the calculation of the peak day demand and the assumed fire flow value. Using historical metering data is the preferred method for calculating the peak day demand, but the last three years of data should be used instead of one month of data. Excess source capacity for the wells should not be based on one month of flow meter data and a more thorough analysis must be completed. Also, the accuracy of the flow meters should be checked before a final decision is made regarding any excess source capacity. In terms of storage capacity, it was found that excess storage capacity does not exist at any of the three resorts when the required fire flow reserve is calculated based on a 1,500 gpm flow requirement for a two hour period.

Even if some excess capacity would be found to exist, the capacity is still desirable from other perspectives and from the demands of the customers and hence is prudently made and worthy of rate base inclusion. To properly value the capacity, an evaluation of the actual incremental cost of that excess capacity must be determined. This is really the difference between the cost of an installation that would have met the capacity goal, versus the cost of the installation that was installed.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

Name: Brian A. Hamrick
Title: Senior Project Manager

I. Primary Job Responsibilities:

He is responsible for the planning, design, and construction of utility capital improvements for the utilities owned by Algonquin Water Services, L.L.C.

II. Education, Certifications, Awards, Recognitions:

1 BS Civil Engineering, Arizona State University – 1999.
2 Professional Engineer, State of Arizona and California.

III. Publications/Presentations:

- "Analysis of Treatment Performance and Operational Issues Associated with 12 On-Line Arsenic Treatment Systems", 2006 Arizona Water and Pollution Control Association (AWPCA) Annual Conference.
- "Impacts of the Clean Watersheds Needs Survey" – 2005 AWPCA Annual Conference.
- "Benefits of Obtaining a DeMinimus AZPDES Permit for Potable Water Discharges" – 2004 AWPCA Annual Conference.

IV. Summary of Experience:

Mr. Hamrick joined AWS in May 2006 and is currently serving as the Senior Project Manager for engineering and construction projects for the utilities owned by Algonquin Water Services, L.L.C. He is currently managing the construction of a 5 million gallon per day (MGD) arsenic treatment facility, a 4 million gallon (MG) water storage reservoir and booster pump station, a 3.8 MGD arsenic treatment facility, a 2 MGD wastewater treatment plant, 3,000 linear feet of water and sewer main replacement, and electrical improvements at a 4 MGD wastewater plant.

Prior to joining AWS, Mr. Hamrick worked for a civil and environmental engineering consulting firm from 1999 to 2006. He has more than six years of civil and environmental engineering experience who specialized in the evaluation and design of water system infrastructure (wells, tanks, pump stations, disinfection systems), hydraulic assessments and modeling, civil and storm drainage design, and electronic O&M Manuals. He has been involved with several water treatment process studies and design projects. As a consultant, he worked on multiple projects where he was responsible for the design of water production and water storage facilities. Also, he prepared water system master plans for several utilities that included an analysis of the existing average day, peak day, peak hour, and fire flow demands of a water system along with the required water storage volume. These demands were used to project future water production and storage capacity needs necessary to meet 5 year, 10 year, and 20 year growth projections.

A summary of some of the projects Mr. Hamrick has participated in follows:

1 **Taliesin West Water System Evaluation and Improvements, Scottsdale, AZ** - This project was cofunded by the Water Infrastructure Finance Authority of Arizona (WIFA). Mr. Hamrick developed the hydraulic model of the water system used to prepare a 20 year water system master plan for this small community. The master plan includes water storage, well head treatment, and distribution considerations. Economical methods of replacing water mains, installing an arsenic treatment system, providing additional water storage, and water system upgrades to meet fire flow requirements were assessed. He also designed the water system improvements that will be constructed in Fall 2006.

2 **Smith Farms Water System, Arizona** – Mr. Hamrick reviewed the assumptions, configuration, and results of the WaterCAD hydraulic model for this 600 acre housing development in Pinal County. Multiple demand scenarios were modeled to determine water main sizes, minimize water age, and verify minimum pressure requirements for the development. He also prepared the design criteria for a future well, water storage tank, and booster station that would serve the development.

3 **Cahava Ranch Water System Master Plan, Arizona** – Mr. Hamrick developed a preliminary water system master plan for a new 900 acre housing development. He also established the design criteria and preliminary alignment for a 6 mile water transmission line, associated booster pump stations, and a new storage tank site that will provide water to the development.

4 **Vernon Domestic Water improvement District Evaluation, Vernon, Arizona** - Under a project funded by the Water Infrastructure Finance Authority of Arizona, Mr. Hamrick prepared a water system master plan for this small community that included water resource and distribution considerations. Economical methods of providing water service and meeting fire flow requirements to a new school were assessed along with obtaining a certificate of Assured Water Supply from the Arizona Department of Water Resources. He performed hydraulic modeling along with preparing cost assessments of various storage, pumping, well modifications, and pipeline alternatives.