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Witness: Edward L. Spitznagel
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Case No.: WR-2007-0216 SR-2007-0217
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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. WR-2007-0216
SR-2007-0217

SURREBUTTAL TESTIMONY

OF

EDWARD L. SPITZNAGEL

ON BEHALF OF

MISSOURI-AMERICAN WATER COMPANY

MAWC Exhibit No. 22
Case No(s). WR-2007-0216
Date 8-14-07 Rptr PF

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

IN THE MATTER OF MISSOURI-AMERICAN WATER COMPANY FOR AUTHORITY TO FILE TARIFFS REFLECTING INCREASED RATES FOR WATER AND SEWER SERVICE	)))))	**CASE NO. WR-2007-0216** **CASE NO. SR-2007-0217**

AFFIDAVIT OF EDWARD L. SPITZNAGEL

Edward L. Spitznagel, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Surrebuttal Testimony of Edward L. Spitznagel"; that said testimony was prepared by him and/or under his direction and supervision; that if inquiries were made as to the facts in said testimony, he would respond as therein set forth; and that the aforesaid testimony are true and correct to the best of his knowledge.

Edward L. Spitznagel

State of Missouri
County of St. Louis
SUBSCRIBED and sworn to
Before me this 25 **day of** July **2007.**

Notary Public

DAWNESHA JOHNSON
Notary Public-Notary Seal
STATE OF MISSOURI
Commissioned for St. Louis County
My Commission Expires: Nov. 21, 2008
ID. #04607988

My commission expires:

SURREBUTTAL TESTIMONY
EDWARD L. SPITZNAGEL
MISSOURI-AMERICAN WATER COMPANY
CASE NO. WR-2007-0216

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SURREBUTTAL TESTIMONY

EDWARD L. SPITZNAGEL, JR.

WITNESS INTRODUCTION

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND EMPLOYER.

A. My name is Edward L. Spitznagel, Jr., and my business address is Campus Box 1146, One Brookings Drive, St Louis, Missouri 63130. I am employed by Washington University.

Q. ARE YOU THE SAME EDWARD L. SPITZNAGEL, JR., WHO PREVIOUSLY SUBMITTED PREPARED DIRECT AND REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. Yes, I am.

PURPOSE

Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?

A. The purpose of this testimony is to rebut certain aspects of the rebuttal testimony of Dennis L. Patterson, Witness for the Missouri Public Service Commission (PSC) Staff. Specifically, I will address his statements that:

THE COMPANY'S BILLING DATA ARE DEFICIENT

COMPANY'S WEATHER NORMALIZED GCD ARE BIASED

INAPPROPRIATE WEATHER VARIABLE

THE PDSI IS INAPPROPRIATE FOR ANALYZING UTILITY WATER USAGE

THE NORTHEAST PRAIRIE PDSI AND CMI DO NOT APPLY TO THE ST LOUIS BILLING

THIRTY-YEAR AVERAGES OF PDSI ARE NOT CONSISTENT WITH CURRENT MEASUREMENTS

Q. PLEASE RESPOND TO THE ASSERTION THAT "THE COMPANY'S BILLING DATA ARE DEFICIENT."

A. Mr. Patterson states that "in the years since 2001, numerous customers were not captured in the billing data ... ." This is due to the fact that customers billed close to a month or year boundary may sometimes be billed to one side or the other of that boundary. That is, the data provided to me by the company is in terms of bills rather than customers on the books. This is not a problem because they also provide usage billed to those customer, so it is still possible to calculate the usage per customer. Both Mr. Patterson and I did our calculations on an annual basis. Since usage in the late fall and winter months is not weather-sensitive, there is no problem for the weather normalization if a customer billed in late December of one year (say, 2003) was not billed in December of the following year (2004) but slipped across the year boundary into January (2005).

Q. PLEASE RESPOND TO THE ASSERTION THAT "COMPANY'S WEATHER NORMALIZED GCD ARE BIASED."

A. In 2002, the company added approximately 23,100 residential quarterly-billed customers with the acquisition of the Florissant and Webster Groves municipal

systems. Please see the table between Lines 3 and 4 on Page 8 of the Direct Testimony of Dennis Patterson. Mr. Patterson calculated the usage of these customers to be 0.752 that of the older SLCWC customers. He was concerned with the fact that the usage from 2002 onward, if averaged over new and old customers, would drag the trend line downward, below actual usage. He illustrates his concern with the graph between Lines 1 and 2 on Page 4 of the Rebuttal Testimony of Dennis Patterson. As can be seen, for 2006, the red triangle is approximately 1/8 unit lower than that of the diamond representing his data, and for 2007, which is the year for which he and I have computed normalized consumption, it is approximately 1/4 unit lower. This is the bias that he is referring to.

Q. DO YOU ORDINARILY INCLUDE THE CONSUMPTION OF RECENTLY ACQUIRED COMPANIES IN YOUR WEATHER NORMALIZED CALCULATIONS?

A. No, I do not, because of the bias issue that Mr. Patterson has raised, plus the difficulty of estimating the effect of weather and a possible time trend if only a few years of data are available. For example, I am currently doing weather normalization for Kentucky-American Water Company in Lexington, KY, and I excluded consumption for two acquisitions they made in 2001 and 2006. I recommended to Kentucky-American that they estimate consumption for those recently acquired customers using simple averages.

Q. COULD YOU PERFORM THE SAME TYPE OF CALCULATION WITH FLORISSANT AND WEBSTER GROVES REMOVED FROM THE ST. LOUIS COUNTY DATA?

A. Yes.

Q. HOW LARGE A BIAS IS LIKELY TO RESULT FROM INCLUSION OF THESE RECENTLY ACQUIRED CUSTOMERS IN THE SLCWC DATA?

A. In Line 28 on Page 1 of Supplemental Direct Testimony of Dennis L. Patterson, Mr. Patterson estimated that in 2002 there were 320,060 billed customers. As I mentioned above, in his Direct Testimony, he estimated the total number of customers in Florissant and Webster Groves combined to be 23,100. He refers to these as "new customers." Therefore there were 320,060 – 23,100 = 296,960 "old customers" in 2002. If we let x stand for the average usage in GCD of the "old customers," and we use his ratio of usage 0.752 for the new customers relative to the old customers, the average usage of new and old customers combined is $(296{,}960\,x + 23{,}100 \times 0.752\,x) / 320{,}060 = 0.9821\,x$. For the year 2002, the value of x estimated by Mr. Patterson is 276.25, making the average usage of new and old customers combined equal to $0.9821 \times 276.25 = 271.31$. The difference $276.25 - 271.31 = 4.94$ corresponds to the one-unit drop in Mr. Patterson's figure between Lines 1 and 2 on Page 4 of Rebuttal Testimony of Dennis L. Patterson. The bias in 2007 is the distance between the red triangle and the diamond above it, which is approximately 1/4 of the one-unit drop in Mr. Patterson's figure. Thus, the estimated bias in my method is approximately $-4.94/4 = -1.235$ GCD, which is very

small compared with the difference between Mr. Patterson's weather-normalized estimate for 2007 of 272.02 (Revised Schedule 2-1 of Supplemental Direct Testimony of Dennis L. Patterson) and my estimate for 2007 of 260.681 in Line 7 on Page 7 of my direct testimony.

Q. PLEASE RESPOND TO THE ASSERTIONS "INAPPROPRIATE WEATHER VARIABLE" AND "THE PDSI IS INAPPROPRIATE FOR ANALYZING UTILITY WATER USAGE."

A. When I first was employed doing weather normalization of water usage in 1993, it was for Missouri water companies, in Joplin and St. Joseph. I used the simple available moisture model adopted by the Commission, which I believe was developed by Dennis Patterson. It can be described in words as:

Today's moisture = yesterday's moisture – 0.06
+ today's rainfall,
Rounded down to 0.36 if above 0.36

Where the units are inches.

As I described on Pages 3 and 4 of my direct testimony, I was employed in 1997 by Kentucky-American Water Company to develop an optimal weather normalization method for them. The history behind this request is that in 1996 I was an expert witness in a Kentucky-American rate hearing in which the Commonwealth of Kentucky had employed an attorney named Scott Rubin to make weather-normalized estimates. I found serious flaws in his methods, and based on my

testimony, the Commission decided to reject Mr. Rubin's estimates. They charged Kentucky-American to develop the best possible method for weather normalization, and Kentucky-American engaged my services to develop the method. (To date, I have provided normalized estimates for Kentucky-American in a total of four rate cases, including one that is on-going. They have also asked me to predict consumption for their own planning purposes.)

Using data from 14 different operating companies within American Water Works Service Company, including 5 Missouri companies, I did head-to-head tests of the Missouri available moisture index (described above) and four NOAA indices. The NOAA-supplied Palmer Drought Severity Index (PDSI) did the best in predicting utilization. I therefore used it in the 1997 Kentucky-American normalization and have continued to use it in other cases, in Kentucky, Tennessee, Missouri, New Jersey, and Iowa. (Despite its name, "Drought Severity Index", the PDSI measures both surplus of moisture, by values greater than zero, and deficit of moisture, by values less than zero.)

While Mr. Patterson has many objections to the nature of the PDSI, I found it simply to be better than all other candidates, including the available moisture index used in Missouri. Mr. Patterson's current weather normalization has at its core the same Missouri algorithm I described above, except that he now calculates "shortfall" and includes hours of daylight and temperature in his calculations. He does not provide any studies that establish his new measure is better than Missouri's original

available moisture measure, or better than the NOAA-supplied Palmer Drought Severity Index. Until such a study is done, I believe the PDSI is the best choice for weather normalization. Despite Mr. Patterson's objections that the PDSI was not designed for weather-normalization of water consumption, my 1997 study showed that it worked better than any other index.

Q. PLEASE RESPOND TO THE ASSERTION THAT "THE NORTHEAST PRAIRIE PDSI AND CMI DO NOT APPLY TO THE ST LOUIS BILLING."

A. Missouri is divided by NOAA into six climate divisions. St. Louis County is in Division 02, which NOAA calls "Northeast Prairie," and is in the southeast corner of that division, as Mr. Patterson remarks in Lines 12 and 13 on Page 7 of Rebuttal Testimony of Dennis L. Patterson. NOAA defines its climate divisions to be approximately uniform with respect to weather, as can be seen more clearly by examining maps of California, Oregon, and Washington, where the climate divisions are determined by mountain ranges and valleys. I have to conclude that NOAA found that St. Louis County is more similar to Climate Division 02 than to any other.

Any large metropolitan area will tend to have its own microclimate, as Mr. Patterson says, also on Page 7 of Rebuttal Testimony of Dennis L. Patterson. However, it is not necessary that the rainfall and temperature in St. Louis County equal that of Division 02 overall, just that they correlate well with the Division 02 values.

Mr. Patterson's objection to using the Northeast Prairie PDSI for the much smaller St. Louis County area points up a weakness in his own method. He uses a point estimate of precipitation and temperature from one weather station, at Lambert International Airport. The airport is in the north part of the county which is close to the border with St. Charles County and therefore is not close to the geographical center of the county. Precipitation can be highly variable over the county particularly in spot thundershowers, which are not well represented by measurements made at a single point.

Q. PLEASE RESPOND TO THE ASSERTION THAT "THIRTY-YEAR AVERAGES OF PDSI ARE NOT CONSISTENT WITH CURRENT MEASUREMENTS."

A. Mr. Patterson does not quantify this assertion as to the degree of inconsistency he believes exists. He bases the assertion on the fact that temperature and rainfall enter into the calculation of PDSI, and that adjustments are made to temperature and rainfall. On Page 9 of Rebuttal Testimony of Dennis L. Patterson, he refers to adjustments that were made to data from 1971 through 2000 in determining thirty-year climate normals. Since I have obtained snapshots of PDSI data at the various times I was engaged to do weather normalizations, I compared the earliest snapshot I have, taken on February 10, 1997, with the most recent, taken on July 6, 2007. I did this for Missouri Climate Division 02, whose PDSI values I used in the current weather normalization. This enabled me to determine the changes that occurred over a ten year period for the first 21 years of the data I used in the St. Louis County normalization. This comparison is made in my workpapers file

PDSI-Comparison_1997-2007.xls. With the exception of the last five months of 1996 (Aug-Dec), all changes made were extremely small, the largest in magnitude being a change of –0.05, which occurred twice in 1986. In 91.7% of cases (231 out of 252) there was in fact no change at all.

My experience has been that the final few months of any report I snapshot are subject to change, but NOAA makes the changes relatively quickly. For example, the last five PDSI values in my data from 1996 had been changed to their current 2007 values (except October's PDSI was 0.78 and eventually became 0.79) by the time I had taken my next snapshot, in April of 1999.

The most recent PDSI values I have used in the current study were from the twelve months of 2005. They were acquired on October 29, 2006, suggesting that any necessary revisions would by then have taken place. In corroboration, the most recent snapshot I have is from July 6, 2007, and all twelve PDSI values from 2005 agree with the ones obtained on October 29, 2006 and used in the weather normalization.

I therefore conclude that my weather normalization calculations were not affected by the alleged inconsistency between thirty-year averages and current measurements.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.