

Exhibit No.:  
Issues: Weather Normalization  
Witness: Edward L. Spitznagel, Jr.  
Exhibit Type: Supplemental Rebuttal Testimony  
Sponsoring Party: Missouri-American Water Company  
Case No.: WR-2003-0500  
Date Filed: December 31, 2003

**MISSOURI PUBLIC SERVICE COMMISSION**

**CASE NO. WR-2003-0500**

**SUPPLEMENTAL REBUTTAL TESTIMONY**

**OF**

**EDWARD L. SPITZNAGEL, JR.**

**ON BEHALF OF**

**MISSOURI-AMERICAN WATER COMPANY**


**JEFFERSON CITY, MISSOURI**

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 )	CASE NO. WR-2003-0500
RATES FOR WATER SERVICE )	

**AFFIDAVIT OF EDWARD L. SPITZNAGEL, JR.**

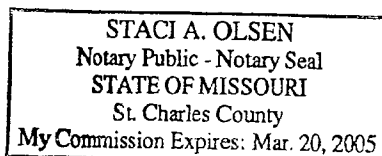
Edward L. Spitznagel, Jr., being first duly sworn, deposes and says that he is the witness who sponsors the accompanying supplemental rebuttal testimony entitled "Supplemental Rebuttal Testimony of Edward L. Spitznagel, Jr."; that said supplemental rebuttal testimony and schedules were prepared by him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

  
Edward L. Spitznagel, Jr.

State of Missouri  
County of St. Louis  
SUBSCRIBED and sworn to  
Before me this 31<sup>st</sup> day of December 2003.

  
\_\_\_\_\_  
Notary Public

My commission expires:



**WITNESS INTRODUCTION**

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31

**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. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN THIS PROCEEDING?**

A. Yes, I have submitted direct and rebuttal testimony in this proceeding.

**Q. WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL REBUTTAL TESTIMONY?**

A. The purpose is to address the issues raised by Mr. Patterson in his Supplemental Direct Testimony.

**Q. WHAT REVISED ESTIMATE OF GMD DOES MR. PATTERSON MAKE FOR ST. LOUIS QUARTERLY RESIDENTIAL CUSTOMERS?**

A. His revised estimate is 292.05 GMD. For consistency purposes it should be pointed out that in previous testimony, the term GCD is used. These are synonymous, GMD standing for Gallons per Meter per Day, and GCD standing for Gallons per Customer (per) Day.

**Q. WHAT HAS LED TO THE REVISED ESTIMATE?**

A. In examining the relationship between GMD and DNSHORT (difference between

1 current shortfall and average shortfall for weather) over the decade 1993 to 2002, he has  
2 found an unexpected drop in consumption in 2002, given that 2002 in fact had the  
3 largest value of DNSHORT of the decade.  
4

5 **Q. DOES MR. PATTERSON INDICATE A REASON FOR THE UNEXPECTED**  
6 **DROP?**  
7

8 A. Yes, he proposes several different possible reasons, which are difficult to disentangle  
9 from one another. One is the possibility of a flaw in the new billing system, while  
10 another is the shifting of the billing months for a large number of continuing customers.  
11

12 **Q. HAVE YOU DISCOVERED ANY OTHER POSSIBLE REASONS FOR THE**  
13 **DROP?**  
14

15 A. Yes, based on the individual route data for the added customers from Webster Groves  
16 and Florissant, it can be seen that both sets of customers use much less water per day  
17 than the rest of the St. Louis District quarterly residential customers. Mr. Patterson's  
18 overall weather-normalized GMD estimate is 292.05 whereas twelve-month periods for  
19 Webster Groves, one containing the dry summer of 2002 and the other containing the  
20 summer of 2003 have GMD values of 243.41 and 239.36 respectively. The difference  
21 is even more striking for Florissant, with GMD values of 190.31 and 181.46  
22 respectively. These calculations are given in Schedules ELS-1SR and ELS-2SR.  
23

24 **Q. DO THESE LOW GMD VALUES OF THE NEW CUSTOMERS ACCOUNT**  
25 **FULLY FOR THE DROP?**  
26

27 A. No, but they do account for forty percent of the drop. To demonstrate this, I removed  
28 the Webster Groves and Florissant consumption and customers from Mr. Patterson's  
29 2002 GMD of 277.41 found in Schedule 2 of his supplemental direct testimony. The  
30 GMD shot up to 286.15, as seen in Schedule ELS-3SR. I then reran Mr. Patterson's  
31 regression model and found that the coefficient of the DUMMY term changed from

1        -21.93 to -13.19. This new smaller-magnitude coefficient is still statistically  
2        significant ( $P$ -value = .003), so it cannot be ignored, but the dramatic change in its size  
3        cannot be ignored either.

4  
5        **Q.    HOW CAN THE LOWER CONSUMPTIONS OF THESE TWO NEW SETS OF**  
6        **CUSTOMERS BE ACCOUNTED FOR IN THE WEATHER NORMALIZED**  
7        **ESTIMATES?**

8  
9        A.    We only have a little less than two years of consumption data, so we have no way to  
10       weather-normalize them. However, we can weather-normalize without them, and then  
11       to be conservative, combine their 2002 dry-year GMD estimates with the weather-  
12       normalized estimate for the continuing customers.

13  
14       **Q.    HOW DOES ONE COMBINE THESE ESTIMATES, AND WHAT IS THE**  
15       **COMBINED GMD VALUE?**

16  
17       A.    The GMD estimate for the continuing customers is 292.05, which is the intercept of the  
18       regression. Because the regression contains the dummy term, that estimate is  
19       unaffected by removal of the Webster Groves and Florissant customers and their  
20       consumption values. We simply take a weighted average of the continuing customer  
21       GMD, 292.05, and the Webster Groves and Florissant conservatively high GMD's of  
22       243.41 and 190.31, where the weights are the numbers of customers in each group,  
23       287,335, 8,600, and 14,500 respectively. This is done in Schedule ELS-3RS. The  
24       weighted combination is 285.95 GMD.

25  
26       **Q.    DOES THIS CONCLUDE YOUR SUPPLEMENTAL REBUTTAL**  
27       **TESTIMONY?**

28  
29       A.    Yes, it does.

**Missouri American Water Company**  
**Rate Case WR-2003-0500**

**Schedule ELS-1SR**

**Calculation of Webster Groves Residential Water Consumption**

<b>Mgals</b>	<b>Routes</b>	<b>Revenue Periods</b>
35801.24	For Routes 450030 to 460002	For Bill Dates 3/01/2002 to 3/31/2002
20168.14	For Routes 480025 to 480034	For Bill Dates 3/01/2002 to 3/31/2002
639.62	For Routes 450030 to 460002	For Bill Dates 4/01/2002 to 4/30/2002
163.05	For Routes 480025 to 480034	For Bill Dates 4/01/2002 to 4/30/2002
171.47	For Routes 450030 to 460002	For Bill Dates 5/01/2002 to 5/31/2002
1312.18	For Routes 480025 to 480034	For Bill Dates 5/01/2002 to 5/31/2002
97328.82	For Routes 450030 to 460002	For Bill Dates 6/01/2002 to 6/30/2002
56232.41	For Routes 480025 to 480034	For Bill Dates 6/01/2002 to 6/30/2002
766.89	For Routes 450030 to 460002	For Bill Dates 7/01/2002 to 7/31/2002
458.67	For Routes 480025 to 480034	For Bill Dates 7/01/2002 to 7/31/2002
132.53	For Routes 450030 to 460002	For Bill Dates 8/01/2002 to 8/31/2002
199.63	For Routes 480025 to 480034	For Bill Dates 8/01/2002 to 8/31/2002
152513.76	For Routes 450030 to 460002	For Bill Dates 9/01/2002 to 9/30/2002
83776.49	For Routes 480025 to 480034	For Bill Dates 9/01/2002 to 9/30/2002
1477.23	For Routes 450030 to 460002	For Bill Dates 10/01/2002 to 10/31/2002
787.72	For Routes 480025 to 480030	For Bill Dates 10/01/2002 to 10/31/2002
611.27	For Routes 450030 to 460002	For Bill Dates 11/01/2002 to 11/30/2002
326.95	For Routes 480025 to 480034	For Bill Dates 11/01/2002 to 11/30/2002
120463.54	For Routes 450030 to 460002	For Bill Dates 12/01/2002 to 12/31/2002
60880.99	For Routes 480025 to 480034	For Bill Dates 12/01/2002 to 12/31/2002
329.80	For Routes 450000 to 460002	For the Revenue Period: 1/2003
1865.63	For Routes 480000 to 489999	For the Revenue Period: 1/2003
415.22	For Routes 450000 to 460002	For the Revenue Period: 2/2003
1411.64	For Routes 480000 to 489999	For the Revenue Period: 2/2003
98936.74	For Routes 450000 to 460002	For the Revenue Period: 3/2003
83392.81	For Routes 480000 to 489999	For the Revenue Period: 3/2003
1285.85	For Routes 450030 to 460002	For the Revenue Period: 4/2003
910.43	For Routes 480025 to 480034	For the Revenue Period: 4/2003
2137.14	For Routes 450030 to 460002	For the Revenue Period: 5/2003
133.95	For Routes 480025 to 480034	For the Revenue Period: 5/2003
103640.97	For Routes 450030 to 460002	For the Revenue Period: 6/2003
52929.27	For Routes 480025 to 480034	For the Revenue Period: 6/2003
3749.18	For Routes 450030 to 460002	For the Revenue Period: 7/2003
3436.37	For Routes 480025 to 480035	For the Revenue Period: 7/2003
231.70	For Routes 450030 to 460002	For the Revenue Period: 8/2003
64.44	For Routes 480025 to 480034	For the Revenue Period: 8/2003
133576.79	For Routes 450030 to 460002	For the Revenue Period: 9/2003
78199.65	For Routes 480025 to 480034	For the Revenue Period: 9/2003
808.65	For Routes 450030 to 460002	For the Revenue Period: 10/2003
2149.94	For Routes 480025 to 480034	For the Revenue Period: 10/2003
551.26	For Routes 450030 to 460002	For the Revenue Period: 11/2003
350.86	For Routes 480025 to 480034	For the Revenue Period: 11/2003
<b>Total Consumption Billed in 2002:</b>		<b>634212.6                      GMD</b>
<b>Twelve-Month Consumption including Summer of 2002:</b>		<b>764595.1                      243.41</b>
<b>Twelve-Month Consumption including Summer of 2003:</b>		<b>751852.8                      239.36</b>

**Missouri American Water Company  
Rate Case WR-2003-0500**

**Schedule ELS-2SR**

**Calculation of Florissant Residential Water Consumption**

<b>Mgals</b>	<b>Routes</b>	<b>Revenue Periods</b>	
504.05	For Routes 190020 to 190036	For Bill Dates 3/01/2002 to 3/31/2002	
81.39	For Routes 200025 to 200041	For Bill Dates 3/01/2002 to 3/31/2002	
19.43	For Routes 210044 to 210045	For Bill Dates 3/01/2002 to 3/31/2002	
92593.44	For Routes 190020 to 190036	For Bill Dates 4/01/2002 to 4/30/2002	
111099.04	For Routes 200025 to 200041	For Bill Dates 4/01/2002 to 4/30/2002	
1281.38	For Routes 210044 to 210045	For Bill Dates 4/01/2002 to 4/30/2002	
10429.59	For Routes 190020 to 190036	For Bill Dates 5/01/2002 to 5/31/2002	
19092.36	For Routes 200025 to 200041	For Bill Dates 5/01/2002 to 5/31/2002	
8813.92	For Routes 210044 to 210045	For Bill Dates 5/01/2002 to 5/31/2002	
2372.38	For Routes 190020 to 190036	For Bill Dates 6/01/2002 to 6/30/2002	
5910.83	For Routes 200025 to 200041	For Bill Dates 6/01/2002 to 6/30/2002	
1296.86	For Routes 210044 to 210045	For Bill Dates 6/01/2002 to 6/30/2002	
122107.52	For Routes 190020 to 190036	For Bill Dates 7/01/2002 to 7/31/2002	
117314.56	For Routes 200025 to 200041	For Bill Dates 7/01/2002 to 7/31/2002	
13712.73	For Routes 210044 to 210045	For Bill Dates 7/01/2002 to 7/31/2002	
5158.63	For Routes 190020 to 190036	For Bill Dates 8/01/2002 to 8/31/2002	
10579.08	For Routes 200025 to 200041	For Bill Dates 8/01/2002 to 8/31/2002	
578.37	For Routes 210044 to 210045	For Bill Dates 8/01/2002 to 8/31/2002	
175.98	For Routes 190020 to 190036	For Bill Dates 9/01/2002 to 9/30/2002	
1229.24	For Routes 200025 to 200041	For Bill Dates 9/01/2002 to 9/30/2002	
266.34	For Routes 210044 to 210045	For Bill Dates 9/01/2002 to 9/30/2002	
121811.32	For Routes 190020 to 190036	For Bill Dates 10/01/2002 to 10/31/2002	
114785.26	For Routes 200025 to 200041	For Bill Dates 10/01/2002 to 10/31/2002	
13743.04	For Routes 210044 to 210045	For Bill Dates 10/01/2002 to 10/31/2002	
6316.98	For Routes 190020 to 190036	For Bill Dates 11/01/2002 to 11/30/2002	
7468.49	For Routes 200025 to 200041	For Bill Dates 11/01/2002 to 11/30/2002	
210.32	For Routes 210044 to 210045	For Bill Dates 11/01/2002 to 11/30/2002	
89.13	For Routes 190020 to 190036	For Bill Dates 12/01/2002 to 12/31/2002	
60.78	For Routes 200025 to 200041	For Bill Dates 12/01/2002 to 12/31/2002	
74.77	For Routes 210044 to 210045	For Bill Dates 12/01/2002 to 12/31/2002	
293.86	For Routes 190000 to 190036	For the Revenue Period: 1/2003	
333.73	For Routes 200025 to 200041	For the Revenue Period: 1/2003	
0.00	For Routes 210044 to 210045	For the Revenue Period: 1/2003	
45414.39	For Routes 190000 to 190036	For the Revenue Period: 2/2003	
157765.83	For Routes 200025 to 200041	For the Revenue Period: 2/2003	
14086.50	For Routes 210044 to 210045	For the Revenue Period: 2/2003	
95.82	For Routes 190020 to 190036	For the Revenue Period: 3/2003	
1244.15	For Routes 200025 to 200041	For the Revenue Period: 3/2003	
114.42	For Routes 210044 to 210045	For the Revenue Period: 3/2003	
268.53	For Routes 190020 to 190036	For the Revenue Period: 4/2003	
160.07	For Routes 200025 to 200041	For the Revenue Period: 4/2003	
50.85	For Routes 210044 to 210045	For the Revenue Period: 4/2003	
161683.07	For Routes 190020 to 190036	For the Revenue Period: 5/2003	
60778.72	For Routes 200025 to 200041	For the Revenue Period: 5/2003	
10494.98	For Routes 210044 to 210045	For the Revenue Period: 5/2003	
1331.84	For Routes 190020 to 190036	For the Revenue Period: 6/2003	
6291.84	For Routes 200025 to 200041	For the Revenue Period: 6/2003	
840.79	For Routes 210044 to 210045	For the Revenue Period: 6/2003	
726.14	For Routes 190020 to 190036	For the Revenue Period: 7/2003	
164.45	For Routes 200025 to 200041	For the Revenue Period: 7/2003	
106.20	For Routes 210044 to 210045	For the Revenue Period: 7/2003	
122981.96	For Routes 190020 to 190036	For the Revenue Period: 8/2003	
110192.24	For Routes 200025 to 200041	For the Revenue Period: 8/2003	
12291.96	For Routes 210044 to 210045	For the Revenue Period: 8/2003	
2330.46	For Routes 190020 to 190036	For the Revenue Period: 9/2003	
2184.42	For Routes 200025 to 200041	For the Revenue Period: 9/2003	
279.80	For Routes 210044 to 210045	For the Revenue Period: 9/2003	
422.35	For Routes 190020 to 190036	For the Revenue Period: 10/2003	
64.54	For Routes 200025 to 200041	For the Revenue Period: 10/2003	
106.21	For Routes 210044 to 210045	For the Revenue Period: 10/2003	
119310.39	For Routes 190020 to 190036	For the Revenue Period: 11/2003	
115605.19	For Routes 200025 to 200041	For the Revenue Period: 11/2003	
12796.52	For Routes 210044 to 210045	For the Revenue Period: 11/2003	
<b>Total Consumption Billed in 2002:</b>		<b>789177.2</b>	<b>GMD</b>
<b>Twelve-Month Consumption including Summer of 2002:</b>		<b>1007921.0</b>	<b>190.31</b>
<b>Twelve-Month Consumption including Summer of 2003:</b>		<b>961036.9</b>	<b>181.46</b>

Missouri American Water Company  
Rate Case WR-2003-0500

Schedule ELS-3SR

Demonstration that much of the 2002 anomaly is due to addition of low-consumption customers from Webster Groves and Florissant

The data below, computed by Dennis Patterson, except for 2002, in which Webster Groves and Florissant consumption is removed:

YEAR	GMD	DNSHORT	DUMMY
1993	262.7571	-2.18583	0
1994	293.8470	0.13807	0
1995	282.0039	-0.82838	0
1996	284.5028	-0.95675	0
1997	287.2174	-0.15905	0
1998	270.9236	-1.59080	0
1999	294.5622	0.02134	0
2000	281.8458	-0.66038	0
2001	286.8267	-0.26983	0
2002	286.1528	0.56437	1

Leads to the regression model:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.974152222
R Square	0.948972551
Adjusted R Squ	0.93439328
Standard Error	2.494869145
Observations	10

ANOVA				
	df	SS	MS	F
Regression	2	810.2954068	405.1477034	65.09053447
Residual	7	43.57060434	6.224372048	3.00133E-05
Total	9	853.8660111		

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	292.0487573	1.169979527	249.6186903	4.37204E-15	289.2821973	294.8153173
DNSHORT	12.93244208	1.140949364	11.33480809	9.31445E-06	10.23452747	15.63035668
DUMMY	-13.19462119	3.011259207	-4.381762008	0.003227545	-20.31511264	-6.074129734

Conservative (over) Estimate of Weather Normalized GMD with Webster Groves and Florissant included in the Customer Base:

292.0487573	times	287335	equals	8.3916E+07	(All Customers Except Webster Groves and Florissant)
243.4124636	times	8600	equals	2.0933E+06	(Webster Groves)
190.3129250	times	14500	equals	2.7595E+06	(Florissant)
=====					
Sums:		310435		8.8769E+07	divided by
				310435	equals
				285.95	GMD