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February 8, 2011

VIA HAND DELIVERY

filed electronically in docket office on 02/08/11

Chairman Mary W. Freeman
c/o Sharla Dillon
Tennessee Regulatory Authority
460 James Robertson Parkway
Nashville, Tennessee 37243

Re: Docket No. 10-00189: ***Petition Of Tennessee American Water Company To Change And Increase Certain Rates And Charges So As To Permit It To Earn A Fair And Adequate Rate Of Return On Its Property Used And Useful In Furnishing Water Service To Its Customers***

Dear Chairman Freeman:

Enclosed please find an original and five (5) sets of copies of Tennessee American Water Company's Rebuttal Testimony filed on behalf of the following witnesses: Bernard L. Uffelman, James H. Vander Weide, James I. Warren, Sheila A. Miller, Patrick L. Baryenbruch, Paul R. Herbert, Dr. Edward L. Spitznagel, John S. Watson and Michael A. Miller.

Two disks are included with this submission. The first disk, labeled "Docket Manager Disk" contains PDF images of the testimony of each witness. The second disk contains all of the documents submitted in their native formats.

Please file the original and four copies of this Rebuttal Testimony and stamp the additional copy as "filed." Then please return the stamped copy to me by way of our courier.

Should you have any questions concerning this matter, please do not hesitate to contact me at the email address or telephone number listed above.

Sincerely,

David Killion

Enclosures

REBUTTAL TESTIMONY

OF

EDWARD L. SPITZNAGEL, JR.

1. 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.

2. Q. Are you the same Edward Spitznagel who has previously offered testimony in this case?

A. Yes, I am.

3. Q. What is the purpose of your rebuttal testimony?

A. I wish to offer rebuttal to the direct testimony of Michael Gorman, William Novak, Christopher Klein, and John Hughes.

4. Q. Michael Gorman proposes using a five-year average to estimate future water consumption. Is this likely to result in an inaccurate estimate?

A. Yes, Mr. Gorman's use of previous five-year averages to predict future consumption is likely to result in an overestimation of future water consumption. This is because this method fails to take into account declining water consumption trends. There is strong evidence that both residential and commercial consumption is declining. To demonstrate the extent of this decline, I have used all available years of consumption, from 1986 through 2010 for residential consumption and from 1990 through 2010 for commercial consumption. As shown on Rebuttal Exhibits ELS-1 and ELS-2, both residential and commercial consumption have been declining for more than 20 years. The long-term average decline for residential consumption is greater than one gallon per customer day ("gcd")per year, and for commercial consumption is nearly ten gcd per year. Because the statistical evidence demonstrates that water consumption is declining, then consumption in the future is necessarily going to be lower than it was in prior years. Thus, using a five-year average of **prior "old"** consumption data from the years 2005-2009 to estimate future consumption in 2011 will almost surely produce an overestimate.

5. Q. How much of an overestimate will that be?

A. We cannot know that until the end of 2011, because we do not know how much moisture there will be in 2011 to drive consumption. However, the ***expected*** value of the overestimate is 4 times 1.16396 = 4.66 gcd for residential and 4 times 9.54406 = 38.18 gcd for commercial. The multiplier 4 is the distance between the middle year 2007 of the five-year average and the year 2011.

6. Q. Can you demonstrate these overestimates for previous years?

A. Yes, I have shown details in Rebuttal Exhibit ELS-3 that demonstrate how Mr. Gorman's proposed five year average method leads to overestimation of water consumption when compared to actual consumption data. For example, since we now have consumption data for 2010, we can calculate the difference between a five-year average taken over 2004-2008, the methodology suggested by Mr. Gorman, and the actual consumption in 2010. For residential consumption, I have used all available consumption data to perform eighteen of these computations, beginning with the average consumption over 1986-1990 used to estimate consumption in 1992 and ending with average consumption over 2004-2008 used to estimate consumption in 2010. Of these eighteen computations, fourteen produced over-estimates (as high as 13.738 gcd) and four produced under-estimates (as low as -1.789 gcd). On average, there was a tendency to over-estimate by 4.640 gcd. This is nearly identical to the ***expected*** over-estimate of 4.660 gcd calculated in my answer to Question 5, thus confirming that Mr. Gorman's proposal is an inaccurate predictor of future water consumption.

7. Q. Is there a similar tendency for Mr. Gorman's five-year averages to overestimate commercial consumption?

A. Yes, I have done the same calculations for commercial consumption using all available data, to perform twelve of these computations, beginning with the average consumption over 1990-1994 used to estimate consumption in 1996 and ending with the average consumption over 2004-2008 used to estimate consumption in 2010. Of these twelve computations, ten produced over-estimates (as high as 95.325 gcd) and just two produced under-estimates (as low as -14.964 gcd). On average, there was a tendency to over-estimate by 38.071 gcd. This is nearly identical to the ***expected*** over-estimate of 38.180 gcd calculated in my answer to Question 5, again demonstrating the flaws in Mr. Gorman's proposal for estimating future commercial water consumption.

8. Q. On page 10 of his testimony, Mr. Gorman states: "The results of these calculations are presented on Exhibit MPG-3, page 3. As can be seen from the analysis, the average usage per customer has gradually declined over the years, but has not reached the levels projected by Dr. Spitznagel." Is there a flaw in his argument?

A. Yes, it is fundamentally flawed. In Exhibit MPG-3, Mr. Gorman makes his calculations using moving averages. His moving averages are naturally higher than my estimates because their center points are four years earlier than my values. I have addressed this issue more fully in response to questions 6 and 7, above. Furthermore, my weather normalization calculations adjust for whether the year was dry, average, or wet, by use of the Palmer PMDI index, so that the time trend slope is estimated much more accurately. For example, Mr. Gorman's five-year moving average for residential use in the time interval 2005-2009 is the average of the values 143, 147, 152, 141, 138. The middle value 152 comes from 2007, one of the driest years and the final value, 138, comes from 2009, one of the wettest years. Obviously, using these extremes in his limited five year average calculation will lead to skewed averages.

9. Q. On page 16 of his testimony, William Novak has criticized your "average correlation of 55.70% for residential sales and 30.28% for commercial sales" as being too low "to be used as a basis for setting customer rates." Are these correlations too low to have predictive value?

A. No, first, a clarification. The numbers referred to by Mr. Novak are ***squared*** correlations, also called R-squares, which measure the fraction of variation explained by the regression models. Thus, they are reported in percentages. For example, if a certain variable perfectly predicted future water consumption, the R-square would be at or near 100%. As explained in my testimony, I provide separate regressions for each month of the year to allow for the potential for unique slopes and trends each month, as "month" has proven to be a variable that has a very high correlation to actual water consumption. As a consequence of this month-to-month variability, simply averaging the R-squares together is misleading and will ***not*** produce the appropriate measure of variation explained by my ***overall*** revenue model. As shown in the multiple regressions in Rebuttal Exhibit ELS-4, the R-squares of the full models, where month is treated as a categorical variable and interactions are included, are much larger, 84.3% for residential and 69.3% for commercial.

The R-Squares of my full models must be used to assess the predictive value of the residential and commercial weather normalization models. The separate monthly regression models were performed for the purpose of providing greater transparency as to how the normalization process works, for the benefit of the TRA and the parties. For example, by using separate models for each month the impact of not using PMDI data for the weather-insensitive months of January through April can be better seen. However, to determine weather's ability to predict consumption in the attrition year the twelve regression models must be run in one overall model, as explained in my direct testimony. Accordingly, in no way does a simple averaging of the R-squares of my individual models reflect the actual predictive value of the variables.

10. Q. William Novak provides R-squares from natural gas usage that average around 97%. Is this a fair comparison and does it otherwise suggest that there is no correlation between weather and water consumption?

A. Since heating with natural gas is typically controlled by thermostats, it is not surprising that natural gas consumption would be tightly tied to temperature. Since outside water consumption is either a consumer's day-by-day decision, or is automatic through programmed sprinklers, it is not surprising that its correlation with weather would be somewhat weaker. However, the association of water consumption to weather is statistically significant, and should be considered when establishing rates for a future forecast period.

11. Q. On page 19 of his testimony, Christopher Klein states "There is considerable literature on estimating water demand that Dr. Spitznagel either ignores or is unfamiliar with." Is this assertion correct?

A. No, I have reviewed perhaps more than one hundred papers on water demand. Relatively few of them pertain to the precise task of weather normalization. In fact, of the four example papers referenced by Christopher Klein, none are useful for normalizing average monthly water usage. The first three are concerned with estimating peak demand, which is a serious concern for water utilities' physical plants and delivery systems, but not for billing for total consumption. The fourth paper deals with landscape irrigation in Southern California, with a complex five-tier charging system—very different from residential and commercial consumption in Chattanooga.

12. Q. On page 20 of his testimony, Dr. Klein criticizes you for using "only weather as measured by the Palmer Drought Index." Is this a fair criticism?

A. No. In my original study for Kentucky American Water Company, which is referenced in my Direct Testimony, and a complete copy of which has been provided to the CAPD, I explored every drought or moisture measure, from those available through MICIS (and now through NOAA) and ones I generated myself. I continue to check these measures and, my conclusion has not changed that the two Palmer indices, PDSI and PMDI, have always been the best indices, with virtually no difference between them. As to whether several indices would work better than a single one, it is necessary to realize that available moisture indices are highly collinear. The consequence of using more than one moisture index in the same model would cause their coefficients to be very inaccurate as estimates of the effect of weather. It could even reverse the sign of a coefficient, making it appear that high moisture is associated with an increase in water consumption, which would fly in the face of reason, and is never seen if only the single best moisture index (PMDI) is used.

Additionally, Mr. Klein incorrectly claims that my weather normalization calculations rely on very few data points, making my estimates unreliable. This is simply not true. In fact, 120 data values were used - 10 years' data times 12 months.

13. Q. On page 3 of his testimony, Mr. John Hughes recommends against using weather normalization. Do you disagree with his statement?

A. I disagree with his statement. He offers no support for it, other than referring to William Novak's testimony, which I have addressed above.

14. Q. What is your opinion of the consequences of not normalizing for weather and not accounting for downward trends in water consumption?

A. Not using proper modeling of water sales levels to account for valid, statistically-determined variations in weather and long-term declining customer usage trends would in my opinion place a level of risk that the future projection will be materially incorrect. Based on my analysis of the recommendations of Mr. Gorman, Mr. Hughes and the comments of Dr. Klein and Mr. Novak, there is a very high chance, based on statistical data, that their recommendations will significantly overstate the water sales and revenue levels for the 2011 period.

15. Q. Does this conclude your rebuttal testimony?

A. Yes, it does.

TENNESSEE REGULATORY AUTHORITY

STATE OF MISSOURI

COUNTY OF SAINT LOUIS

BEFORE ME, the undersigned authority, duly commissioned and qualified in and for the State and County aforesaid, personally came and appeared Dr. Edward L. Spitznagel, Jr., being by me first duly sworn deposed and said that:

He is appearing as a witness on behalf of Tennessee-American Water Company before the Tennessee Regulatory Authority, and if present before the Authority and duly sworn, his rebuttal testimony would set forth in the annexed transcript consisting of 9 pages.

Dr Edward L. Spitznagel, Jr.
Dr. Edward L. Spitznagel, Jr.

Sworn to and subscribed before me
this 3 day of February 2011.

Jacquelin C Metcalfe
Notary Public

My commission expires ________________.

JACQUELIN C. METCALFE
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Louis County
My Commission Expires: August 23, 2014
Commission Number: 10916396

Chattanooga Residential Consumption

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Full Year
1986	0.16445	0.15912	0.15777	0.16205	0.18251	0.18083	0.19165	0.20986	0.18102	0.17022	0.16245	0.15217	172.842
1987	0.15683	0.15471	0.15194	0.15286	0.16834	0.18086	0.17881	0.20190	0.19073	0.17390	0.16580	0.15640	169.423
1988	0.15747	0.15921	0.15337	0.15801	0.17198	0.19756	0.20818	0.18698	0.17226	0.16541	0.15824	0.15475	170.285
1989	0.15560	0.14855	0.15068	0.15392	0.16530	0.16801	0.16794	0.17192	0.17722	0.16194	0.16207	0.15423	161.448
1990	0.17452	0.15254	0.15348	0.15256	0.15768	0.16649	0.18892	0.18293	0.18534	0.16764	0.15621	0.15313	165.953
1991	0.15225	0.15011	0.15173	0.15115	0.15705	0.16309	0.16668	0.17297	0.17245	0.16867	0.16510	0.15291	160.347
1992	0.15384	0.15042	0.14820	0.14954	0.15944	0.16632	0.16522	0.16722	0.16484	0.15726	0.15477	0.14913	157.183
1993	0.15345	0.15024	0.15035	0.15252	0.15587	0.16734	0.18273	0.19124	0.18989	0.17931	0.16436	0.15520	166.042
1994	0.15430	0.17240	0.15423	0.15132	0.15733	0.16974	0.17085	0.16408	0.16435	0.16238	0.15383	0.15237	160.598
1995	0.15228	0.15261	0.15114	0.15691	0.16352	0.16947	0.18303	0.18282	0.17387	0.16168	0.15758	0.15021	162.927
1996	0.15417	0.15957	0.16003	0.15126	0.15546	0.17129	0.18633	0.18410	0.16821	0.15920	0.15508	0.15031	162.918
1997	0.15277	0.15184	0.14653	0.14928	0.15558	0.16107	0.16853	0.18066	0.17576	0.17059	0.15577	0.14786	159.687
1998	0.14838	0.14492	0.14274	0.14755	0.15252	0.17764	0.18631	0.17893	0.18431	0.18160	0.16824	0.15154	163.723
1999	0.14863	0.14605	0.13929	0.14595	0.15466	0.16800	0.16850	0.18381	0.19335	0.17791	0.15692	0.15157	161.220
2000	0.14419	0.14337	0.13991	0.14393	0.15327	0.17275	0.17922	0.18164	0.17153	0.16174	0.16064	0.14724	158.286
2001	0.14779	0.14183	0.13741	0.14072	0.15634	0.16179	0.16474	0.16696	0.16431	0.15843	0.15507	0.15026	153.804
2002	0.14152	0.14028	0.14009	0.13615	0.14885	0.16232	0.18766	0.18496	0.18419	0.16235	0.14978	0.13992	156.506
2003	0.14571	0.16895	0.16163	0.14604	0.15753	0.15552	0.17482	0.16781	0.15590	0.15892	0.14661	0.15524	157.890
2004	0.13555	0.13205	0.12748	0.14182	0.14401	0.16211	0.15602	0.15672	0.16011	0.14604	0.14868	0.14804	146.553
2005	0.13094	0.12729	0.12871	0.13276	0.13706	0.15061	0.15392	0.15571	0.15500	0.15739	0.15011	0.14614	143.803
2006	0.13319	0.13021	0.13914	0.13209	0.14396	0.16365	0.17564	0.16447	0.16988	0.14906	0.13488	0.13309	147.438
2007	0.13083	0.12756	0.13122	0.13911	0.15045	0.18551	0.17076	0.16243	0.18319	0.16209	0.14458	0.13179	151.627
2008	0.11169	0.12859	0.12242	0.12681	0.13847	0.15404	0.17097	0.16408	0.16392	0.15322	0.13209	0.12689	141.099
2009	0.12795	0.13048	0.12169	0.12046	0.13429	0.14811	0.17702	0.15991	0.14712	0.13342	0.12771	0.12422	137.698
2010	0.12858	0.12753	0.12018	0.12715	0.13854	0.14724	0.16778	0.16343	0.16603	0.15872	0.13921	0.12573	142.510

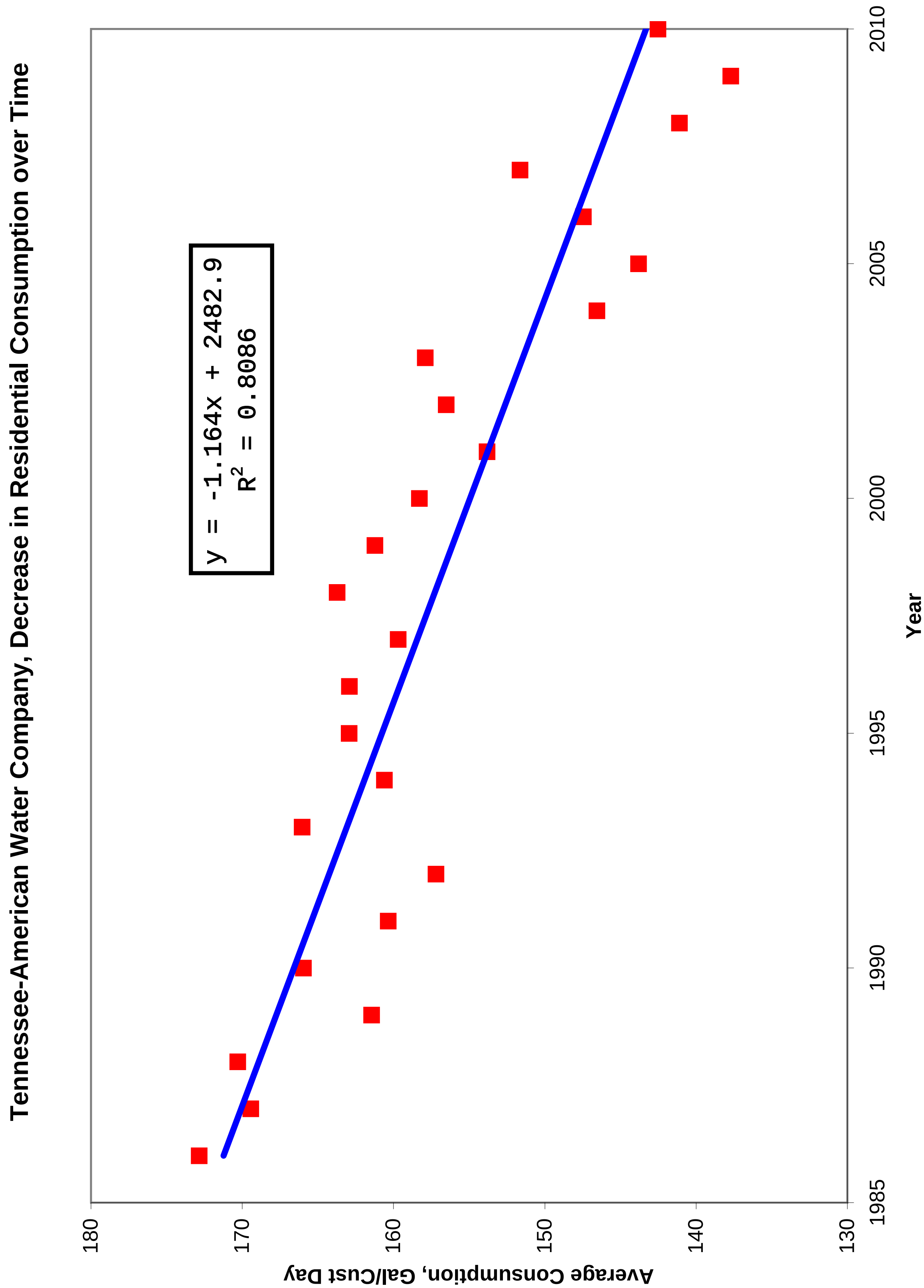
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.899238
R Square	0.80863
Adjusted R S	0.800309
Standard Err	4.257028
Observations	25

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	1761.231	1761.231	97.18591	1E-09
Residual	23	416.8126	18.12229		
Total	24	2178.044			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2482.856	235.9028	10.52491	2.89E-10	1994.855	2970.858
Year	-1.16396	0.118069	-9.85829	1E-09	-1.4082	-0.91971


Tennessee-American Water Company, Decrease in Residential Consumption over Time
y = -1.164x + 2482.9
R2 = 0.8086
Average Consumption, Gal/Cust Day
180
170
160
150
140
130
Year
1985
1990
1995
2000
2005
2010

Chattanooga Commercial Consumption

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Full Year
1990	1.14231	1.06363	1.08143	1.07085	1.09928	1.23479	1.38678	1.37607	1.40320	1.32497	1.21176	1.11775	1209.402
1991	1.01867	1.08694	1.07834	0.90132	1.16458	1.23190	1.26366	1.38123	1.38682	1.28275	1.15221	1.07707	1168.791
1992	1.00718	1.01929	1.02690	1.10641	1.11510	1.16511	1.23193	1.25654	1.26562	1.23065	1.22078	1.10892	1146.203
1993	1.02565	1.03100	1.05888	1.08161	1.09915	1.18758	1.34032	1.45722	1.46859	1.28911	1.16886	1.09735	1192.110
1994	1.00806	1.09155	1.07913	1.04140	1.09268	1.17009	1.27935	1.27176	1.25113	1.26546	1.12596	1.08841	1147.082
1995	1.00654	1.04177	1.04982	1.07950	1.12805	1.17101	1.30028	1.32037	1.31509	1.19103	1.16045	1.05360	1151.459
1996	1.01737	1.06188	1.09094	1.05068	1.10104	1.18971	1.30038	1.36934	1.25060	1.17319	1.11644	1.04294	1147.043
1997	1.01315	1.01674	1.03178	1.03016	1.08077	1.12512	1.13237	1.31365	1.25363	1.20711	1.11109	1.01402	1110.799
1998	0.95506	0.99532	0.98384	1.00585	1.04909	1.17124	1.25003	1.35139	1.28963	1.28821	1.17589	1.06222	1131.481
1999	0.97200	0.98884	0.98792	1.00123	1.08606	1.13016	1.19584	1.27938	1.39038	1.30426	1.14897	1.03428	1126.610
2000	0.95101	0.98484	0.99866	1.01263	1.07141	1.18979	1.25896	1.27712	1.26812	1.21042	1.13987	1.03423	1116.422
2001	0.92879	0.96733	0.96761	0.97653	1.04465	1.10409	1.19148	1.10348	1.18551	1.12146	1.10681	0.99613	1057.823
2002	0.93640	0.93827	0.94250	0.96786	1.01580	1.06484	1.27678	1.20523	1.18947	1.11232	1.05230	0.93510	1053.073
2003	0.94368	0.96586	0.96700	1.13328	0.97029	1.01572	1.15976	1.12565	1.04287	1.09547	0.98567	0.98249	1032.312
2004	1.08052	0.79560	0.98771	0.97659	0.87277	1.21146	0.98909	1.10834	1.18889	1.24836	1.11295	1.13281	1058.758
2005	0.97510	1.20309	1.05005	0.84284	1.09603	1.13606	0.97300	1.12250	1.14430	1.12906	1.12011	1.13580	1077.328
2006	0.91477	0.90857	1.17693	0.93481	1.18254	1.05297	1.16909	1.14124	1.19615	1.10562	0.97628	0.90435	1055.277
2007	0.93037	0.89571	0.94769	0.97446	1.02213	1.20992	1.18183	1.09871	1.34640	1.10323	1.09714	1.04228	1070.823
2008	0.79200	0.93305	0.99072	0.90562	1.06027	1.06352	1.21412	1.20283	1.20711	1.07501	1.04426	0.91288	1033.449
2009	0.84959	0.90888	0.87127	0.90118	0.91093	1.01320	1.14133	1.12587	1.07327	0.97739	0.91486	0.87513	963.575
2010	0.91464	0.90555	0.83094	0.95257	0.98460	1.00305	1.13350	1.14515	1.22259	1.10054	1.02458	0.87681	1007.877

SUMMARY OUTPUT

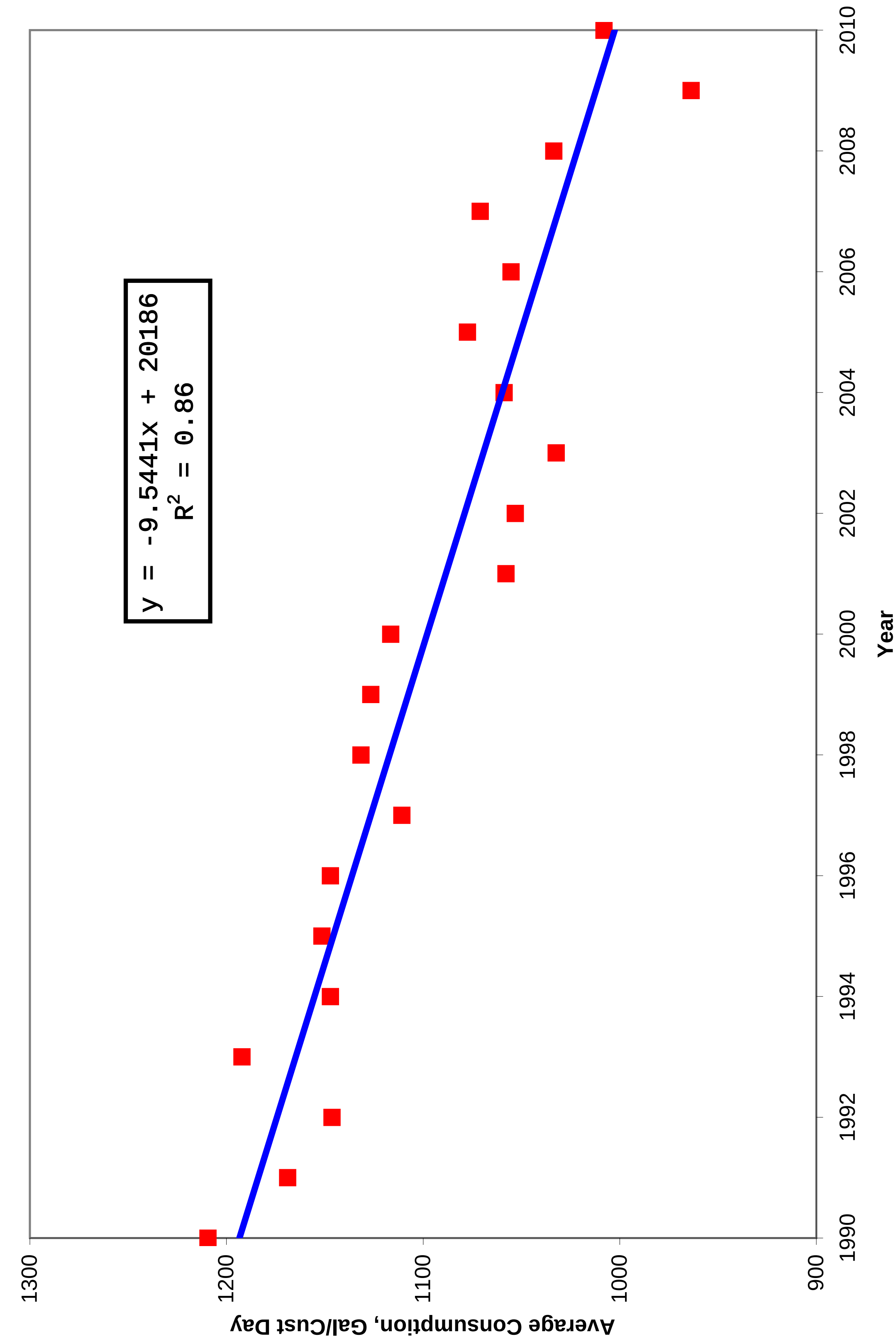
Regression Statistics	
Multiple R	0.927373
R Square	0.86002
Adjusted R S	0.852652
Standard Err	24.5121
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	70138.52	70138.52	116.7335	1.49E-09
Residual	19	11416.02	600.8432		
Total	20	81554.54			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	20186.1	1766.718	11.42576	5.9E-10	16488.31	23883.88
Year	-9.54406	0.883355	-10.8043	1.49E-09	-11.3929	-7.69517

Tennessee-American Water Company, Decrease in Commercial Consumption over Time



Demonstration of the Tendency of Five-Year Averages to Over-Estimate Future Consumption

	Residential			Commercial		
Year	**Actual Average Consumption**	**Five-Year Averages**	**Over or Under Estimates**	**Actual Average Consumption**	**Five-Year Averages**	**Over or Under Estimates**
1986	172.842					
1987	169.423					
1988	170.285					
1989	161.448					
1990	165.953			1209.402		
1991	160.347			1168.791		
1992	157.183	167.990	10.807	1146.203		
1993	166.042	165.491	-0.551	1192.110		
1994	160.598	163.043	2.445	1147.082		
1995	162.927	162.195	-0.732	1151.459		
1996	162.918	162.025	-0.893	1147.043	1172.718	25.675
1997	159.687	161.419	1.732	1110.799	1161.129	50.330
1998	163.723	161.934	-1.789	1131.481	1156.779	25.298
1999	161.220	162.434	1.214	1126.610	1149.699	23.089
2000	158.286	161.971	3.685	1116.422	1137.573	21.151
2001	153.804	162.095	8.291	1057.823	1133.478	75.655
2002	156.506	161.167	4.661	1053.073	1126.471	73.398
2003	157.890	159.344	1.454	1032.312	1108.627	76.315
2004	146.553	158.708	12.155	1058.758	1097.082	38.324
2005	143.803	157.541	13.738	1077.328	1077.248	-0.080
2006	147.438	154.608	7.170	1055.277	1063.678	8.401
2007	151.627	151.711	0.084	1070.823	1055.859	-14.964
2008	141.099	150.438	9.339	1033.449	1055.350	21.901
2009	137.698	149.462	11.764	963.575	1058.900	95.325
2010	142.510	146.104	3.594	1007.877	1059.127	51.250
Mean Residential Overestimate:			**4.640**	**Mean Commercial Overestimate:**		**38.071**

Chattanooga -- Fit Combined Monthly Regressions

The GLM Procedure

Class Level Information

Class	Levels	Values
month	12	1 2 3 4 5 6 7 8 9 10 11 12

Number of Observations Read	120
Number of Observations Used	120

Dependent Variable: residential

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	35	28698.76103	819.96460	12.89	<.0001
Error	84	5342.46082	63.60072		
Corrected Total	119	34041.22186			

R-Square	Coeff Var	Root MSE	residential Mean
0.843059	5.350776	7.975006	149.0439

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pmdi	1	0.38270	0.38270	0.01	0.9384
since_2000	1	6150.43763	6150.43763	96.70	<.0001
month	11	20552.95394	1868.45036	29.38	<.0001
pmdi*month	11	1522.25394	138.38672	2.18	0.0232
since_2000*month	11	472.73282	42.97571	0.68	0.7576

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pmdi	1	298.944778	298.944778	4.70	0.0330
since_2000	1	4515.522822	4515.522822	71.00	<.0001
month	11	4047.080217	367.916383	5.78	<.0001
pmdi*month	11	1391.161516	126.469229	1.99	0.0396
since_2000*month	11	472.732821	42.975711	0.68	0.7576

Chattanooga -- Fit Combined Monthly Regressions

The GLM Procedure

Class Level Information

Class	Levels	Values
month	12	1 2 3 4 5 6 7 8 9 10 11 12

Number of Observations Read	120
Number of Observations Used	120

Dependent Variable: commercial

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	35	1167997.989	33371.371	5.43	<.0001
Error	84	516266.892	6146.034		
Corrected Total	119	1684264.881			

R-Square	Coeff Var	Root MSE	commercial Mean
0.693476	7.469746	78.39665	1049.522

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pmdi	1	6039.2333	6039.2333	0.98	0.3244
since_2000	1	149728.7054	149728.7054	24.36	<.0001
month	11	881956.0038	80177.8185	13.05	<.0001
pmdi*month	11	116551.9366	10595.6306	1.72	0.0819
since_2000*month	11	13722.1097	1247.4645	0.20	0.9970

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pmdi	1	33604.7434	33604.7434	5.47	0.0217
since_2000	1	102154.2697	102154.2697	16.62	0.0001
month	11	258593.4190	23508.4926	3.82	0.0002
pmdi*month	11	115990.9104	10544.6282	1.72	0.0837
since_2000*month	11	13722.1097	1247.4645	0.20	0.9970