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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., who, 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 testimony would set forth in the annexed transcript consisting of 7 pages.

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

Sworn to and subscribed before me
this 7th day of September 2004.

Mary J. Withington
Notary Public

My commission expires Feb. 22, 2008

MARY J WITHINGTON
Notary Public - State of Missouri
St. Louis County
My Commission Expires February 22, 2008

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. What is your present position?

A. I am Professor of Mathematics in the College of Arts and Sciences at Washington University. I also hold a joint appointment in the Division of Biostatistics of the Washington University School of Medicine.

3. Q. Please review your educational background and work experience.

A. I hold a Bachelor of Science, summa cum laude, in mathematics, awarded in 1962 by Xavier University, Cincinnati, Ohio. I hold a Master of Science (1963) and Ph.D. (1965) in mathematics awarded by the University of Chicago. I have served on the Faculty of Arts and Sciences of Washington University since 1969. I have held a joint appointment in the Division of Biostatistics since 1978. From 1965 to 1969 I was on the faculty of Northwestern University.

Attached to my testimony is Appendix A, which provides a more detailed listing of my education and qualifications in the area of mathematics and statistics.

4. Q. What is the purpose of your testimony in this case?

A. I have been employed by Tennessee American Water Company to make weather-normalized predictions of water utilization for the period January 2005 to December 2005.

5. Q. What is weather normalization?

A. From one year to the next, variations in temperature and precipitation lead to changes in water consumption. More water will generally be used during hotter, drier periods. The regulatory question is how to reflect those weather-related differences when setting rates.

For ratemaking purposes, revenues need to be set at as "normal" a level as possible, factoring out the potential or actual results of unusual weather conditions. This can be accomplished by building statistical models that predict water utilization from meteorological data and other possible predictors. An estimate of future utilization can then be made by using a long-term average of meteorological data (since there is no better way to forecast next year's weather than as an average) and known values of the other predictors.

6. Q. What are examples of these other, non-meteorological predictors?

A. One is the year itself. Due to gradual introduction of water-conserving plumbing fixtures and appliances, use of water appears to be gradually declining over time.

Another is the month of the year. While water utilization increases during the warmer, drier summer months, analysis of variance shows that month as a categorical variable is a powerful predictor even after temperature and moisture have been included in the model.

7. Q. What model for water utilization did you employ?

In a previous case before the Public Service Commission of the Commonwealth of Kentucky (1997), I screened a large number of candidate predictors by examining data from sixteen different operating companies in five states, Kentucky, Missouri, Ohio, Tennessee, and Virginia. Tennessee American Water Company was one of these sixteen companies.

I used as candidate predictors only those variables that correlated consistently with utilization for most or all of these operating companies.

I then fitted the surviving candidates in a multivariate model to predict utilization. I found that calendar month was a strong predictor even in the presence of heat and moisture variables. Therefore I included month as a categorical variable. With month included, I tested drought severity index, temperature, and calendar year as potential numeric predictors. I found that temperature was not a useful predictor in the presence of the other variables, so from that point onward, I did not use it.

For the months of January through April, there was no evidence that moisture predicted utilization. For the months of May through December, there was evidence of moisture predicting utilization, being a weak predictor in the months of May, June, November, and December and a strong predictor for the months of July through October.

Since only a deficit of moisture should lead to increased water utilization, I tested truncated versions of the Palmer Drought Severity Index as predictors, finding that truncation at 0 yielded a larger R-square than the non-truncated index and the index truncated at all other levels.

Month was a very strong predictor, both as a main effect and interacting with the truncated drought severity index. Because of this, I estimated twelve separate predictive models, one for each month of the year.

For the present case I used those same predictors to estimate Tennessee American Water Company utilization by fitting them to monthly TAWC consumption data from January 1994 through December 2003. The models were estimated separately for residential and commercial consumption. The coefficient estimates can be found in Appendix B.

8. Q. Not all of the coefficient estimates are statistically significant. Is this a problem?

A. No. The candidate variables were obtained as described above, by examining data from 16 different water companies, selecting those that correlated with utilization over most or all of those companies. Once those variables were selected, the resulting estimates based on them will be unbiased. If they are subject to further selection based on statistical signifiance, there is a chance that a small amount of bias could result.

9. Q. Once you had estimated the coefficients in these monthly models, how did you project utilization for January 2005 through December 2005?

I put the coefficients from the monthly regressions into Excel spreadsheets, one for residential customers, and the other for commercial customers. I calculated the mean truncated Palmer Drought Severity Index for each of the twelve calendar months over the 30 year period from January 1974 to December 2003 and inserted those values into the spreadsheets.

I then projected an average daily utilization for each month. Once these twelve monthly projections were computed, I calculated average daily utilization for the year by taking an average weighted by the number of days in each calendar month, counting February as having 28 days since 2003 is not a leap year.

These spreadsheets are given in Appendix C.

10. Q. What are your projections of daily utilization under average weather for the two customer classes?

A. For residential customers: 155.14 gallons / customer / day
For commercial customers: 1023.67 gallons / customer / day

11. Q. Does this conclude your testimony?

A. Yes, it does.

Edward L. Spitznagel, Jr.

Born: Cincinnati, Ohio, September 4, 1941.

Education:

Xavier University, 1959-1962
Awarded Bachelor of Science Degree (Summa Cum Laude), 1962

University of Chicago, 1962-1965
Awarded Master of Science Degree, 1963
Awarded Ph.D. in Mathematics, 1965

Scholarships and Fellowships:

Xavier University, 1959-1962
Honorary Woodrow Wilson Fellow, 1962-1963
National Science Foundation Fellow, 1962-1965

Positions:

Assistant Professor of Mathematics
Northwestern University, 1965-1969

Associate Professor of Mathematics
Washington University, 1969-1980

Professor of Mathematics
Washington University, 1980-present

Joint appointment, Division of Biostatistics,
Washington University School of Medicine, 1978-present

Consulting Experience:

Litton Industries (USACDCEC, Fort Ord, CA)
Price Waterhouse (Advanced Auditing Methods, NY)
Mallinckrodt, Inc.
St. Louis County Juvenile Court
Monsanto Company
American Red Cross
Carboline Corporation
Regional Justice Information Service
Harris-Stowe State College
Equal Employment Opportunity Commission
American Optometric Association
Petrolite Corporation
U.S Army Atmospheric Sciences Laboratory (White Sands, NM)
St Louis County Water Company
Gateway Medical Research, Inc
MasterCard
Missouri-American Water Company
Capital City Water Company
Kentucky-American Water Company
Anheuser-Busch, Inc.
Santa Clara County Mental Health Administration (San Jose, CA)
and many law firms

APPENDIX A

Publications

1 New impedance method for determining viscoelastic constants. *Rev. Sci. Inst.* **35**, 582-586 (1964) (With Potzick and Catanese)

2. Hall subgroups of certain families of finite groups *Math. Z.* **97**, 259-290 (1967)

3. A new look at the fifteen puzzle. *Math. Mag.* **40**, 171-174 (1967).

4 Terminality of the maximal unipotent subgroups of Chevalley groups *Math. Z.* **103**, 112-116 (1968).

5. Note on the alternating group. *Amer. Math. Monthly* **75**, 68-69 (1968)

6 A computer study of the orders of finite simple groups *Math Comp* **22**, 669-671 (1968). (With Szygenda)

7. Density of finite simple group orders. *Math. Z.* **106**, 175-177 (1968). (With Dornhoff)

8 An experimental approach in the teaching of probability. *The Mathematics Teacher* **61**, 565-568 (1968).

9. Structure and terminality of the maximal unipotent subgroups of Steinberg groups. *Illinois J. Math.* **13**, 400-405 (1969)

10. Poisson integrals· rigor or mortis? *Amer. J. Phys.* **38**, 266-267 (1970) (With Hart)

11 An elementary proof that primes are scarce. *Amer Math. Monthly* **77**, 396-397 (1970)

12 *Selected topics in mathematics.* Holt, Rinehart and Winston (1971).

13. Lognormal model for ascorbic acid requirements in man. *Bioscience* **21**, 981-984 (1971).

14 The uses of computing in a modernized probability and statistics course. *Proceedings of the Second Annual Conference on Computers in the Undergraduate Curricula,* 217-222 (1971).

15. Properties of a game based on Euclid's algorithm. *Math. Mag.* **46**, 87-92 (1973)

16 Use of a questionnaire-oriented research project in teaching undergraduate statistics. *Proceedings of the Fourth Annual Conference on Computers in the Undergraduate Curricula,* 352-357 (1973).

17 ·An inexpensive computer assist in teaching large enrollment mathematics courses *Proceedings of Symposia in Applied Mathematics (American Mathematical Society)* **20**, 175-179 (1974).

18 Use of SAS in teaching a first course in statistics. *Proceedings of the First Annual Conference of SAS Users Group International,* 85-89 (1976).

19 Maintenance and analysis of anesthesia/surgery data with SAS. *Proceedings of the Third Annual Conference of SAS Users Group International,* 74-76 (1978). (With Owens)

20. K W.I C. indexes with SAS *Proceedings of the Third Annual Conference of SAS Users Group International,* 267-270 (1978)

21. The use of loglinear and multivariate logistic models to assess the associations between HLA antigen responses and disease. *Proceedings of the 1978 American Statistical Association Section on Statistical Computing,* 271-275 (1978) (With Miller and Kass)

22. ASA physical status classifications: a study of consistency of ratings *Anesthesiology* **49**, 239-243 (1978) (With Owens and Felts)

23. Interfacing SAS with Mark IV *Proceedings of the Fourth Annual Conference of SAS Users Group International,* 41-44 (1979)

24 SAS as a management tool for course registration and grading. *Proceedings of the Fourth Annual Conference of SAS Users Group International,* 158-161 (1979).

25. Tally of ASA classification responses *Anesthesiology* **51**, 181 (1979). (With Owens and Felts)

26 Outcome studies of anesthesia - Washington University. in *Health Care Delivery In Anesthesia,* edited by R A Hirsh, W. H. Forrest, Jr., F. K. Orkin, and H Wollman. George F Stickley Co. 67-72 (1980) (With Owens)

27. Morphological and biochemical studies in the development of cholinergic properties in cultured sympathetic neurons I Correlative changes in choline acetyltransferase and synaptic vesicle cytochemistry *J Cell Biology* **84**, 680-691 (1980). (With Johnson et al.)

28. Letter to the editor regarding the Mahoney, Bird and Cooke article Annual clinical examination - the best available screening test for breast cancer (*N. Engl. J. Med.* **301**, 315-316 (1979)). *New England Journal of Medicine* **302**, 60 (1980). (With Gohagan et. al)

29. Anesthetic side effects and complications An overview. in *Anesthetic Side Effects and Complications. Seeking, Finding, and Treating,* edited by W. D Owens. Little, Brown and Company. 1-9 (1980). (With Owens)

30. A SAS macro for computing the kappa statistic to assess reliability. *Proceedings of the Fifth Annual Conference of SAS Users Group International,* 159-163 (1980). (With Rice and Helzer)

31. Computer generated repeatable examinations *Proceedings of the Fifth Annual Conference of SAS Users Group International,* 438-442 (1980)

32. Shaded map reports *Proceedings of the Fifth Annual Conference of SAS Users Group International,* 475-481 (1980).

33. Individual and combined effectiveness of palpation, thermography, and mammography in breast cancer screening. *Preventive Medicine* **9**, 713-721 (1980) (With Gohagan et al)

34. Effect of pedaling rate on submaximal exercise responses of competitive cyclists. *J Appl Physiol* **51**, 447-451 (1981) (With Hagberg et al.)

35. Simulation of population genetics models with SAS. *Proceedings of the Sixth Annual Conference of SAS Users Group International,* 605-606 (1981)

36. Optimal strategies for breast cancer detection. in *Systems Science in Health Care,* edited by C. Tilquin Pergamon Press 321-330 (1981) (With Gohagan et al.)

37. Computer graphics in selection of screening strategies. *Proceedings of the Seventh Annual Conference of SAS Users Group International,* 167-170 (1982) (With Gohagan)

38. Optimal stratified sampling, with an application to auditing. *Proceedings of the Seventh Annual Conference of SAS Users Group International,* 415-417 (1982).

39. *Early Detection of Breast Cancer. Risk, Detection Procedures, and Therapeutic Implications* Praeger Publishers (1982). (With Gohagan et al)

40. Plasma epinephrine and norepinephrine levels during anesthesia - enflurane-N_2O-O_2 compared with fentanyl-N_2O-O_2 *Anesth. Anal.* **61**, 366-370 (1982) (With Brown et al.)

41. Heterogeneity in schizophrenia - a cluster-analytic approach. *Psychiat. R.* **8**, 1-12 (1983). (With Farmer and McGuffin)

42. SAS methods for balanced repeated replications *Proceedings of the Eighth Annual Conference of SAS Users Group International,* 844-847 (1983).

43. Breast self examination as a screening procedure. *Third International Conference on System Science in Health Care,* 455-458 (1984). (With Gohagan et al.)

44. ROC analysis of mammography alone and in combination with clinical palpation for breast screening. *Third International Conference on System Science in Health Care,* 463-466 (1984) (With Gohagan et al.)

45 Experimental design for the evaluation of nuclear magnetic resonance imaging in clinical medicine. *Third International Conference on System Science in Health Care,* 881-884 (1984). (With Gohagan et al.)

46. Graphic representation of logistic regression models. *Proceedings of the Ninth Annual Conference of SAS Users Group International,* 870-873 (1984). (With Gohagan et al.)

47. Utilization patterns of health maintenance organization disenrollees. *Medical Care* **22**, 827-833 (1984). (With Griffith and Baloff)

48 ROC analysis of mammography and palpation for breast screening. *Invest Radiol* **19**, 587-592 (1984). (With Gohagan et al)

49. A proposed solution to the base rate problem in the kappa statistic. *Arch Gen Psychiatry* **42**, 725-728 (1985) (With Helzer)

50. A comparison of clinical and Diagnostic Interview Schedule diagnoses: Physician reexamination of lay-interviewed cases in the general population. *Arch Gen Psychiatry* **42**, 657-666 (1985). (With Helzer et al.)

51 A mouse embryo culture system for quality control testing of human in vitro fertilization and embryo transfer media and fetal cord sera *Gamete Research* **11**, 411-419 (1985) (With Cheung et al)

52 Comparison of variance estimation methods for complex sample designs under extreme conditions *Proceedings of the Tenth Annual Conference of SAS Users Group International,* 1084-1088 (1985)

53. Sampling the household population in *Epidemiologic Field Methods in Psychiatry: The NIMH Epidemiologic Catchment Area Program,* edited by W. Eaton and L Kessler. Academic Press. 23-48 (1985). (With Holzer et al.)

54. Sampling: The institutional survey. in *Epidemiologic Field Methods in Psychiatry: The NIMH Epidemiologic Catchment Area Program,* edited by W Eaton and L. Kessler. Academic Press. 49-66 (1985) (With Leaf et al.)

55. Statistical methods for estimating and extrapolating disease prevalence and incidence rates from a multisite study. in *Epidemiologic Field Methods in Psychiatry. The NIMH Epidemiologic Catchment Area Program,* edited by W. Eaton and L. Kessler. Academic Press. 351-373 (1985). (With Manton et al)

56 Staging parameters for cancers of the head and neck: a multi-factorial analysis. *Laryngoscope* **95**, 1378-1381 (1985) (With Jacobs and Sessions)

57. Radiogenic breast cancer effects of mammographic screening *Journal of the National Cancer Institute* **77**, 71-76 (1986). (With Gohagan et al.)

58. Difficult-to-recruit respondents and their effect on prevalence estimates in an epidemiologic survey *American Journal of Epidemiology* **125**, 329-339 (1987). (With Cottler et al.)

59. Left globus pallidus abnormality in never-medicated patients with schizophrenia. *Proc Natl Acad Sci USA* **84**, 561-563 (1987). (With Early et al.)

60. Multispectral analysis of MR images of the breast. *Radiology* **163**, 703-707 (1987) (With Gohagan et al)

61. The predictive validity of lay Diagnostic Interview Schedule diagnoses in the general population *Arch Gen Psychiatry* **44**, 1069-1077 (1987). (With Helzer and McEvoy)

62. The effect of medication compliance on the control of hypertension. *Journal of General Internal Medicine* **2**, 298-305 (1987). (With Eisen et al)

63. Teaching biostatistics with an emphasis on reading the medical literature *Proceedings of the 1987 American Statistical Association Section on Statistical Education*, 111-115 (1987) (With Schechtman)

64. Evidence that the biliary migrating myoelectric complex (MMC) is preserved after feeding. *Gastroenterology* ***95***, 894 (1988) (With Zenilman et al.)

65 Scheduling mammograms for asymptomatic women *Preventive Medicine* **17**, 155-172 (1988). (With Gohagan et al.)

66 Increased fentanyl requirement in patients receiving long-term anticonvulsant therapy. *Anesthesiology Review* **15**, 54-55 (1988). (With Tempelhoff and Modica)

67. Accelerated train of four recovery from atracurium in patients receiving long-term anticonvulsant therapy *Anesthesiology Review* **15**, 55-56 (1988) (With Modica and Tempelhoff)

68. Antimicrobial misuse in patients with positive blood cultures. *The American Journal of Medicine* **87**, 253-259 (1989) (With Dunagan et al)

69. Exclusion of chromosomal mosaicism in amniotic-fluid cultures – efficacy of insitu versus flask techniques *Prenatal Diagnosis* **10**, 41-57 (1990) (With Cheung et al.)

70. Anticonvulsant therapy increases fentanyl requirements during anesthesia for craniotomy. *Can J Anaesth* **37**, 327-332 (1990). (With Tempelhoff and Modica)

71. Nitrous oxide, nausea, and vomiting after outpatient gynecologic surgery *J Clin Anesth* **2**, 168-171 (1990). (With Felts and Poler)

72 The relation of ulcerative colitis to psychiatric factors a review of findings and methods. *Am J Psychiatry* **147**, 974-981 (1990) (With North et al.)

73. Clinical classification and staging for primary malignancies of the maxillary antrum. *Laryngoscope* **100**, 1106-1111 (1990) (With Zamora et al.)

74. Time-series analysis of myoelectric cycling of sphincter of Oddi: evidence of cycling during fed state. *Am J Physiology* **259**, 511-517 (1990). (With Zenilman et al.)

75. The effect of prescribed daily dose frequency on patient medication compliance. *Arch Intern Med* **150**, 1881-1884 (1990). (With Eisen et al.)

76. Resistance to atracurium-induced neuromuscular blockade in patients with intractable seizure disorders treated with anticonvulsants. *Anesthesia and Analgesia* **71**, 665-669 (1990). (With Tempelhoff et al.)

77. *California Mental Health Needs* **1**, 1-182. California Department of Mental Health (1990). (With Meinhardt and Jerrell).

78. *California Mental Health Needs* **2**, 1-467. California Department of Mental Health (1990). (With Meinhardt and Jerrell).

79. Comments on psychiatric aspects of ulcerative colitis - reply. *Am J Psychiatry* **148**, 688 (1991) (With North et al.)

80. Do life events or depression exacerbate inflammatory bowel disease? *Annals of Internal Medicine* **114**, 381-386 (1991). (With North et al.)

81. Antibiotic misuse in two clinical situations - positive blood culture and administration of aminoglycosides. *Reviews of Infectious Diseases* **13**, 405-412 (1991). (With Dunagan et al.)

82. Agreement between DSM-III and III-R substance use disorders *Drug and Alcohol Dependence* **29**, 17-25 (1991) (With Cottler et al.)

83. New methods in cross-cultural psychiatry. Psychiatric illness in Taiwan and the United States. *Am J Psychiatry* **148**, 1697-1704 (1991). (With Compton et al)

84 Surgical pathology of cancer of the oral cavity and oropharynx *Laryngoscope* **101**, 1175-1197 (1991). (With Sessions et al)

85. Sensitivity of chromosomal mosaicism detected by different tissue-culture methods *Prenatal Diagnosis* **11**, 927-928 (1991) (With Cheung et al)

86. Are hard-to-interview street dwellers needed in assessing psychiatric disorders in homeless men? *International Journal of Methods in Psychiatric Research* 1, 69-78 (1991) (With Smith and North)

87. Gender differences in sociopathy and somatization in men and women with homosexual experience. *International Journal of Methods in Psychiatric Research* 1, 89-99 (1991). (With North et al)

88 Anticoagulant effects of nonionic versus ionic contrast-media in angiography syringes. *Investigative Radiology* **27**, 185 (1992).

89. Posttraumatic stress disorder among substance users from the general population. *Am J Psychiatry* **149**, 664-670 (1992). (With Cottler et al.)

90. A systematic study of mental illness, substance abuse, and treatment in 600 homeless men. *Annals of Clinical Psychiatry* **4**, 111-120 (1992). (With Smith and North)

91 Clinical staging for primary malignancies of the supraglottic larynx. *Laryngoscope* **103**, 69-77 (1993). (With Zamora et al.)

92. Symptomatic cytomegalovirus infection in renal transplant recipients given either Minnesota antilymphoblast globulin (MALG) or OKT3 for rejection prophylaxis. *American Journal of Kidney Diseases* **21**, 196-201 (1993). (With Bailey et al.)

93 Alcohol, drugs, and psychiatric comorbidity among homeless women. *J Clin Psychiatry* **54**, 82-87 (1993). (With Smith and North)

94. Is antisocial personality a valid diagnosis among the homeless? *Am J Psychiatry* **150**, 578-583 (1993). (With North and Smith)

95. Post-traumatic stress in survivors of three disasters. *Journal of Social Behavior and Personality* **8**, 353-368 (1993). (With Smith and North)

96. Cytomegalovirus infection and pneumonitis. *Am Rev Respir Dis* **147**, 1017-1023 (1993). (With Ettinger et al.)

97 Epidermoid carcinoma of the oral cavity and oropharynx· validity of the current AJCC staging system and new statistical tools for the prediction of subclinical neck disease. *Otolaryngology and Head and Neck Surgery* **108**, 225-232 (1993). (With Ghouri et al.)

98. Results of a rubella screening program for hospital employees: a five-year review (1968-1990) *American Journal of Epidemiology* **138**, 756-764 (1993). (With Fraser et al.)

99. Subjective reports of withdrawal among cocaine users: recommendations for DSM-IV. *Drug and Alcohol Dependence* **33**, 97-104 (1993). (With Cottler et al.)

100. Posttraumatic stress disorder in survivors of a mass shooting. *Am J Psychiatry* **151**, 82-88 (1994) (With North and Smith)

101. Violence and the homeless: an epidemiologic study of victimization and aggression. *Journal of Traumatic Stress* **7**, 95-110 (1994). (With North and Smith)

102. On-site PT, aPTT and platelet count: A comparison between whole blood and laboratory assays with coagulation factor analysis in patients presenting for cardiac surgery *Anesthesiology* **80**, 338-351 (1994) (With Despotis et al.)

103. Prospective evaluation and clinical utility of on-site coagulation monitoring in patients undergoing cardiac operation *J Thorac Cardiovasc Surg* **107**, 271-279 (1994). (With Despotis et al)

104. Two-compartment pharmacokinetics. *Proceedings of the Fifth Annual International Conference on Technology in Collegiate Mathematics,* edited by L. Lum. Addison-Wesley Publishing Company. 417-420 (1994).

105. Inhalant use: characteristics and predictors. *American Journal on Addictions* **3**, 263-272 (1994) (With Compton et al)

106. Prediction of occult neck disease in laryngeal cancer by means of a logistic regression statistical model. *Laryngoscope* **104**, 1280-1284 (1994). (With Ghouri et al.)

107. Comparison of activated coagulation time and whole blood heparin measurements to laboratory plasma anti-Xa heparin concentration in cardiac surgical patients. *J Thorac Cardiovasc Surg* **108**, 1076-1082 (1994) (With Despotis et al.)

108. GAP groups, algorithms, and programming (review). *Notices Amer Math Soc* **41**, 780-782 (1994).

109 Prediction of subclinical neck disease in laryngeal cancer patients using a logistic regression statistical model. in *Laryngeal Cancer. Proceedings of the 2nd World Congress on Laryngeal Cancer, Sydney, 20–24 February 1994,* edited by R. Smee and G.P. Bridger Elsevier Science B.V. 570-573 (1994). (With Ghouri et al.)

110. Predictors of mortality in alcoholic women: a 20-year follow-up study. *Alcoholism, Clinical and Experimental Research* **18**, 1177-1186 (1994) (With Smith et al)

111. Improvement in user performance following development and routine use of an expert system. *Medinfo* **8**, 1064-1067 (1994) (With Kahn et al.)

112. Exclusion of chromosomal mosaicism in amniotic fluid cultures – determination of number of colonies needed for accurate analysis. *Prenatal Diagnosis* **14**, 1009-1017 (1994). (With Featherstone et al.)

113. Adult offspring of alcoholic women as family history informants *Alcoholism, Clinical and Experimental Research* **18**, 1354-1360 (1994). (With Smith et al)

114. The impact of heparin concentration and activated clotting time monitoring on blood conservation: A prospective, randomized evaluation in patients undergoing cardiac operation *J Thorac Cardiovasc Surg* **110**, 46-54 (1995). (With Despotis et al.)

115 Risk factors for a positive tuberculin skin test among employees of an urban, midwestern teaching hospital *Annals of Internal Medicine* **122**, 580-585 (1995) (With Bailey et al)

116 Predictors of mortality in alcoholic men a 20-year follow-up study *Alcoholism, Clinical and Experimental Research* **19**, 984-991 (1995) (With Lewis et al)

117. Complaints of constipation in obsessive-compulsive disorder. *Annals of Clinical Psychiatry* **7**, 65-70 (1995) (With North et al)

118 Is there a relationship between "heavy drinking" and HIV high risk sexual behaviors among general population subjects? *The International Journal of the Addictions* **30**, 1453-1478 (1995). (With Shillington et al.)

119 Assessing gender interactions in the prediction of mortality in alcoholic men and women: a 20-year follow-up study. *Alcoholism, Clinical and Experimental Research* **19**, 1162-1172 (1995). (With Lewis et al.)

120. Factors associated with excessive postoperative blood loss and hemostatic transfusion requirements - a multivariate analysis in cardiac surgical patients *Anesthesia and Analgesia* **82**, 13-21 (1996). (With Despotis et al.)

121. Comparing assessments of DSM-IV substance dependence disorders using CIDI-SAM and SCAN. *Drug and Alcohol Dependence* **41**, 179-187 (1996). (With Compton et al.)

122 Effects of gender and comorbidity on problem drinking in a community sample. *Alcoholism, Clinical and Experimental Research* **20**, 466-476 (1996) (With Lewis et al.)

123. Response of kaolin ACT to heparin: evaluation with an automated assay and higher heparin doses. *Ann Thorac Surg* **61**, 795-799 (1996) (With Despotis et al.)

124. Gastrointestinal symptoms and psychiatric disorders in the general population - findings from the NIMH epidemiologic catchment area project. *Digestive Diseases and Sciences* **41**, 633-640 (1996). (With North et al.)

125. Aprotinin prolongs activated and nonactivated whole blood clotting time and potentiates the effect of heparin in vitro *Anesthesia and Analgesia* **82**, 1126-1131 (1996). (With Despotis et al)

126. Are the mentally ill homeless a distinct homeless subgroup? *Annals of Clinical Psychiatry* **8**, 117-128 (1996). (With North et al.)

127. Increasing brain tumor rates: Is there a link to aspartame? *Journal of Neuropathology and Experimental Neurology* **55**, 1115-1123 (1996) (With Olney et al.)

128. Structured and semi-structured assessment of ICD-10 substance dependence disorders: CIDI-SAM vs. SCAN. *International Journal of Methods in Psychiatric Research* **6**, 285-293 (1996). (With Compton et al.)

129. Evaluation of a new point-of-care test that measures PAF-mediated acceleration of coagulation in cardiac surgical patients *Anesthesiology* **85**, 1311-1323 (1996). (With Despotis et al.)

130 More effective suppression of hemostatic system activation in patients undergoing cardiac surgery by heparin dosing based on heparin blood concentrations rather than ACT. *Thrombosis and Haemostasis* **76**, 902-908 (1996) (With Despotis et al.)

131. The effects of cytomegalovirus serology on graft and recipient survival in cadaveric renal transplantation: implications for organ allocation *American Journal of Kidney Diseases* **29**, 428-434 (1997) (With Schnitzler et al.)

132. Predictors of achieving stable housing in a mentally ill homeless population *Psychiatric Services* **48**, 528-530 (1997) (With Pollio et al)

133. Antithrombin III during cardiac surgery: effect on response of activated clotting time to heparin and relationship to markers of hemostatic activation *Anesthesia and Analgesia* **85**, 498-506 (1997). (With Despotis et al.)

134. Nonpsychotic thought disorder. objective clinical identification of somatization and antisocial personality in language patterns *Compr Psychiatry* **38**, 171-178 (1997) (With North et al.)

135. Changes in HIV/AIDS risk behaviors in drug users in St. Louis applications of random regression models *J Drug Issues* **27**, 399-416 (1997). (With Gallagher et al.)

136. Whole blood heparin concentration measurements by automated protamine titration agree with plasma anti-Xa measurements *J Thorac Cardiovasc Surg* **113**, 611-613 (1997) (With Despotis et al.)

137 Impact of cytomegalovirus serology on graft survival in living related kidney transplantation. implications for donor selection *Surgery* **121**, 563-568 (1997). (With Schnitzler et al.)

138. Homeless street people report conservative sexual attitudes yet anticipate risky behavior. *Psychiatric Rehabilitation Journal* **20**, 75-79 (1997) (With Song et al.)

139. One-year follow-up of survivors of a mass shooting. *Am J Psychiatry* **154**, 1696-1702 (1997). (With North and Smith)

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EXHIBIT1 LST

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, JANUARY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	133 66182	133 66182	28 13	0 0007
Error	8	38 01762	4 75220		
Corrected Total	9	171 67944			

Root MSE	2 17995	R-Square	0 7786
Dependent Mean	148 97400	Adj R-Sq	0 7509
Coeff Var	1 46331		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	159 79321	2 15337	74 21	< 0001
since_90	1	-1 27285	0 24001	-5 30	0 0007

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, FEBRUARY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	160 77732	160 77732	1 29	0 2898
Error	8	1000 84964	125 10621		
Corrected Total	9	1161 62696			

Root MSE	11 18509	R-Square	0 1384
Dependent Mean	152 18200	Adj R-Sq	0 0307
Coeff Var	7 34981		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	164 04800	11 04868	14 85	< 0001
since_90	1	-1 39600	1 23144	-1 13	0 2898

APPENDIX B

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, MARCH

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	65 62444	65 62444	0 80	0 3966
Error	8	654 50276	81 81284		
Corrected Total	9	720 12720			

Root MSE	9 04505	R-Square	0 0911
Dependent Mean	147 30000	Adj R-Sq	-0 0225
Coeff Var	6 14056		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	154 88097	8 93474	17 33	< 0001
since_90	1	-0 89188	0 99583	-0 90	0 3966

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, APRIL

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	209 90599	209 90599	16 94	0 0034
Error	8	99 14370	12 39296		
Corrected Total	9	309 04969			

Root MSE	3 52036	R-Square	0 6792
Dependent Mean	146 91100	Adj R-Sq	0 6391
Coeff Var	2 39626		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	160 46927	3 47743	46 15	< 0001
since_90	1	-1 59509	0 38758	-4 12	0 0034

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, MAY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	31 65368	15 82684	1 11	0 3807
Error	7	99 63116	14 23302		
Corrected Total	9	131 28484			

Root MSE	3 77267	R-Square	0 2411
Dependent Mean	155 50600	Adj R-Sq	0 0243
Coeff Var	2 42606		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	160 73995	3 72757	43 12	< 0001
pds0	1	0 56837	2 84034	0 20	0 8471
since_90	1	-0 59911	0 42181	-1 42	0 1985

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, JUNE

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	156 87683	78 43842	2 30	0 1704
Error	7	238 39286	34 05612		
Corrected Total	9	395 26969			

Root MSE	5 83576	R-Square	0 3969
Dependent Mean	166 95900	Adj R-Sq	0 2246
Coeff Var	3 49533		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	178 88060	5 97683	29 93	< 0001
pds0	1	-4 94530	4 84321	-1 02	0 3412
since_90	1	-1 52821	0 71285	-2 14	0 0692

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, JULY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	250 57398	125 28699	2 11	0 1914
Error	7	414 94931	59 27847		
Corrected Total	9	665 52329			

Root MSE	7 69925	R-Square	0 3765
Dependent Mean	176 99900	Adj R-Sq	0 1984
Coeff Var	4 34988		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	177 05755	7 63011	23 21	< 0001
pds0	1	-9 87693	4 82307	-2 05	0 0798
since_90	1	-0 43799	0 85886	-0 51	0 6258

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, AUGUST

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	246 83832	123 41916	2 58	0 1446
Error	7	334 68669	47 81238		
Corrected Total	9	581 52501			

Root MSE	6 91465	R-Square	0 4245
Dependent Mean	177 57700	Adj R-Sq	0 2600
Coeff Var	3 89389		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	177 08322	6 88767	25 71	< 0001
pds0	1	-7 40493	3 27635	-2 26	0 0583
since_90	1	-0 48203	0 77309	-0 62	0 5527

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, SEPTEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	422 40716	211 20358	2 06	0 1979
Error	7	717 73480	102 53354		
Corrected Total	9	1140 14196			

Root MSE	10 12588	R-Square	0 3705
Dependent Mean	173 57800	Adj R-Sq	0 1906
Coeff Var	5 83362		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	172 39616	10 08268	17 10	< 0001
pds0	1	-9 93592	4 90807	-2 02	0 0826
since_90	1	-0 35308	1 11875	-0 32	0 7615

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, OCTOBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	265 43024	132 71512	2 62	0 1417
Error	7	355 05016	50 72145		
Corrected Total	9	620 48040			

Root MSE	7 12190	R-Square	0 4278
Dependent Mean	165 48000	Adj R-Sq	0 2643
Coeff Var	4 30378		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	167 21713	7 06205	23 68	< 0001
pds0	1	-5 60522	2 50319	-2 24	0 0601
since_90	1	-0 61388	0 79181	-0 78	0 4636

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, NOVEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	271 98056	135 99028	26 43	0 0005
Error	7	36 02000	5 14571		
Corrected Total	9	308 00056			

Root MSE	2 26842	R-Square	0 8831
Dependent Mean	155 95200	Adj R-Sq	0 8496
Coeff Var	1 45456		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	160 12746	2 25712	70 94	< 0001
pds0	1	-4 87705	0 72796	-6 70	0 0003
since_90	1	-0 92500	0 25189	-3 67	0 0079

Run regressions by month Chattanooga, JAN1994-DEC2003
Residential Model, DECEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	8 55153	4 27576	0 21	0 8151
Error	7	142 15983	20 30855		
Corrected Total	9	150 71136			

Root MSE	4 50650	R-Square	0 0567
Dependent Mean	149 65200	Adj R-Sq	-0 2128
Coeff Var	3 01132		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	151 98697	4 48691	33 87	< 0001
pds0	1	-0 43900	1 62181	-0 27	0 7944
since_90	1	-0 30724	0 49909	-0 62	0 5576

EXHIBIT2.LST

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, JANUARY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	8581 05615	8581 05615	29 67	0 0006
Error	8	2313 52429	289 19054		
Corrected Total	9	10895			

Root MSE	17 00560	R-Square	0 7876
Dependent Mean	973 20600	Adj R-Sq	0 7611
Coeff Var	1 74738		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1059 89467	16 79821	63 10	< 0001
since_90	1	-10 19867	1 87226	-5 45	0 0006

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, FEBRUARY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	17903	17903	57 81	< 0001
Error	8	2477 59334	309 69917		
Corrected Total	9	20381			

Root MSE	17 59827	R-Square	0 8784
Dependent Mean	1005 24000	Adj R-Sq	0 8632
Coeff Var	1 75065		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1130 45479	17 38365	65 03	< 0001
since_90	1	-14 73115	1 93751	-7 60	< 0001

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, MARCH

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	18523	18523	33 91	0 0004
Error	8	4370 18556	546 27319		
Corrected Total	9	22893			

Root MSE	23 37249	R-Square	0 8091
Dependent Mean	1009 92000	Adj R-Sq	0 7852
Coeff Var	2 31429		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1137 28297	23 08745	49 26	< 0001
since_90	1	-14 98388	2 57323	-5 82	0 0004

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, APRIL

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	443 39864	443 39864	0 16	0 6963
Error	8	21664	2708 03164		
Corrected Total	9	22108			

Root MSE	52 03875	R-Square	0 0201
Dependent Mean	1029 91200	Adj R-Sq	-0 1024
Coeff Var	5 05274		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1049 61758	51 40411	20 42	< 0001
since_90	1	-2 31830	5 72928	-0 40	0 6963

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, MAY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	15324	7661 82731	15 33	0 0028
Error	7	3497 56863	499 65266		
Corrected Total	9	18821			

Root MSE	22 35291	R-Square	0 8142
Dependent Mean	1063 98400	Adj R-Sq	0 7611
Coeff Var	2 10087		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1174 52202	22 08571	53 18	< 0001
pds0	1	-25 87607	16 82889	-1 54	0 1680
since_90	1	-13 76249	2 49921	-5 51	0 0009

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, JUNE

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	20013	10006	6 99	0 0214
Error	7	10017	1431 04257		
Corrected Total	9	30030			

Root MSE	37 82912	R-Square	0 6664
Dependent Mean	1133 17700	Adj R-Sq	0 5711
Coeff Var	3 33832		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1270 58779	38 74355	32 79	< 0001
pds0	1	-41 04528	31 39508	-1 31	0 2324
since_90	1	-17 20901	4 62090	-3 72	0 0074

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, JULY

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	18246	9123 04844	4 43	0 0572
Error	7	14422	2060 22779		
Corrected Total	9	32668			

Root MSE	45 38973	R-Square	0 5585
Dependent Mean	1234 52300	Adj R-Sq	0 4324
Coeff Var	3 67670		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1301 06042	44 98212	28 92	< 0001
pds0	1	-68 01669	28 43367	-2 39	0 0480
since_90	1	-10 79666	5 06328	-2 13	0 0704

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, AUGUST

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	46011	23006	5 93	0 0311
Error	7	27144	3877 71475		
Corrected Total	9	73155			

Root MSE	62 27130	R-Square	0 6290
Dependent Mean	1261 73700	Adj R-Sq	0 5229
Coeff Var	4 93536		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1438 86385	62 02837	23 20	< 0001
pds0	1	-36 82483	29 50583	-1 25	0 2521
since_90	1	-23 52450	6 96222	-3 38	0 0118

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, SEPTEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	51567	25784	7 33	0 0192
Error	7	24611	3515 85789		
Corrected Total	9	76179			

Root MSE	59 29467	R-Square	0 6769
Dependent Mean	1243 64300	Adj R-Sq	0 5846
Coeff Var	4 76782		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1374 82313	59 04166	23 29	< 0001
pds0	1	-77 34866	28 74043	-2 69	0 0310
since_90	1	-19 26399	6 55115	-2 94	0 0217

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, OCTOBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	37465	18732	11 80	0 0057
Error	7	11116	1588 00178		
Corrected Total	9	48581			

Root MSE	39 84974	R-Square	0 7712
Dependent Mean	1196 89300	Adj R-Sq	0 7058
Coeff Var	3 32943		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1303 44835	39 51485	32 99	< 0001
pds0	1	-51 23043	14 00633	-3 66	0 0081
since_90	1	-16 27876	4 43050	-3 67	0 0079

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, NOVEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	24074	12037	19 77	0 0013
Error	7	4262 96675	608 99525		
Corrected Total	9	28337			

Root MSE	24 67783	R-Square	0 8496
Dependent Mean	1112 34500	Adj R-Sq	0 8066
Coeff Var	2 21854		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1202 78612	24 55493	48 98	< 0001
pds0	1	-34 93546	7 91937	-4 41	0 0031
since_90	1	-13 74733	2 74031	-5 02	0 0015

Run regressions by month Chattanooga, JAN1994-DEC2003
Commercial Model, DECEMBER

The REG Procedure
Model MODEL1
Dependent Variable gallons

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	13407	6703 60048	11 31	0 0064
Error	7	4148 88821	592 69832		
Corrected Total	9	17556			

Root MSE	24 34540	R-Square	0 7637
Dependent Mean	1024 34200	Adj R-Sq	0 6962
Coeff Var	2 37669		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1121 75981	24 23954	46 28	< 0001
pds0	1	-13 83307	8 76146	-1 58	0 1584
since_90	1	-12 48619	2 69620	-4 63	0 0024

Projections of Residential Water Utilization, Gallons per Day, Tennessee-American

Month	Slope of PDS0	Slope of SINCE_90	Intercept	30-yr Avg PDS0	Days	2003 Gal/Day	2004 Gal/Day	2005 Gal/Day	2006 Gal/Day	2007 Gal/Day
Jan	0	-1 27285	159.7932	-0.71567	31	143.25	141.97	140.70	139.43	138.15
Feb	0	-1.39600	164.0480	-0.85033	28	145.90	144.50	143.11	141.71	140.32
Mar	0	-0.89188	154.8810	-0.86533	31	143.29	142.39	141.50	140.61	139.72
Apr	0	-1 59509	160.4693	-0.78567	30	139.73	138.14	136.54	134.95	133 35
May	0.56837	-0.59911	160 7400	-0.55900	31	152.63	152.03	151.44	150.84	150.24
Jun	-4.94530	-1.52821	178.8806	-0.60067	30	161.98	160.46	158.93	157.40	155.87
Jul	-9 87693	-0.43799	177.0576	-0.81367	31	179.40	178.96	178.52	178.09	177.65
Aug	-7 40493	-0.48203	177 0832	-0.86433	31	177.22	176.74	176.25	175.77	175.29
Sep	-9.93592	-0.35308	172.3962	-0.66800	30	174.44	174.09	173.74	173.38	173.03
Oct	-5.60522	-0 61388	167.2171	-0.74800	31	163.43	162.82	162.20	161.59	160.97
Nov	-4.87705	-0.92500	160.1275	-0.73233	30	151.67	150.75	149.82	148.90	147.97
Dec	-0 43900	-0.30724	151.9870	-0.67500	31	148.29	147.98	147.67	147.37	147.06
			Annual projections:			156 86	155.97	**155.14**	154 28	153 42

TNAM2004 XLS

APPENDIX C

Projections of Commercial Water Utilization, Gallons per Day, Tennessee-American

Month	Slope of PDS0	Slope of SINCE_90	Intercept	30-yr Avg PDS0	Days	2003 Gal/Day	2004 Gal/Day	2005 Gal/Day	2006 Gal/Day	2007 Gal/Day
Jan	0	-10.1987	1059.895	-0.71567	31	927.31	917.11	906.91	896.72	886.52
Feb	0	-14.7312	1130.455	-0.85033	28	938.95	924.22	909.49	894.76	880.03
Mar	0	-14.9839	1137 283	-0.86533	31	942.49	927.51	912.52	897.54	882.56
Apr	0	-2.3183	1049.618	-0.78567	30	1,019.48	1,017.16	1,014.84	1,012.52	1,010.21
May	-25.8761	-13.7625	1174.522	-0.55900	31	1,010.07	996.31	982.55	968.79	955.02
Jun	-41.0453	-17.2090	1270 588	-0.60067	30	1,071.53	1,054.32	1,037.11	1,019.90	1,002.69
Jul	-68.0167	-10.7967	1301 060	-0.81367	31	1,216.05	1,205.25	1,194.45	1,183.66	1,172.86
Aug	-36.8248	-23.5245	1438.864	-0.86433	31	1,164.87	1,141.35	1,117.83	1,094.30	1,070.78
Sep	-77.3487	-19.2640	1374.823	-0.66800	30	1,176.06	1,156.80	1,137.53	1,118.27	1,099.00
Oct	-51.2304	-16.2788	1303.448	-0.74800	31	1,130.14	1,113.87	1,097.59	1,081.31	1,065.03
Nov	-34.9355	-13.7473	1202.786	-0.73233	30	1,049.66	1,035.91	1,022 16	1,008.41	994.67
Dec	-13.8331	-12.4862	1121 760	-0.67500	31	968.78	956.29	943.80	931.32	918.83
			Annual projections:			1,051.90	1,037.48	**1,023.67**	1,009.56	995.44

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